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Nigeria:

Country Private Sector Diagnostic

MAY 2025

About the Country Private Sector Diagnostic

The private sector is the engine of long-term economic growth and a vital catalyst for global social and economic development. When functioning well, the private sector promotes innovation and entrepreneurship, improves access to and the quality of economic opportunities, and supports the sustainable use of natural resources. In developing economies, the private sector creates most jobs, generates tax revenue, and accounts for significant investment.

The revised Country Private Sector Diagnostic (CPSD) reports seek to unlock private sector–led growth and investment. Prepared jointly by the institutions of the World Bank Group, each report discusses the overall business environment within a country and provides an analysis of specific sectors in which private sector investment could accelerate growth, if appropriate policy and regulatory issues are addressed.

Designed from the perspective of an investor or entrepreneur, this new generation of reports seeks to identify untapped private investment opportunities and the barriers that stand in the way (earlier reports can be found here). The sector opportunities are chosen based on their potential to spur private investment, create jobs, generate domestic revenue, and foster sustainable, inclusive growth, in response to targeted policy action. The report aims to help country policymakers prioritize the most impactful actions that can boost private sector growth, while delivering on broader development goals.

The CPSD is one of the World Bank Group's core country diagnostics produced to guide the design and implementation of public and private investment projects, budget support operations, advisory services, and other analytical work. It is intended to be of interest to domestic and foreign business investors, government officials, World Bank Group staff and management, civil society, and other development partners.

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Contents

Acknowledgments

The Nigeria Country Private Sector Diagnostic was prepared by staff from across the World Bank Group. The core team was co-led by Denny Lewis-Bynoe and Karim Ouled Belayachi, and included Chishamiso Mawoyo, Nadege Desiree Yameogo, Dotun Seyingbo, Julio Flores, Mohammed Aliyu, Alicia Maude Stephens, Jessica Wade, Florian Moelders, and Issei Takahashi. The extended team included Manievel Sene, Chidozie Anyiro, Tomi Ajayi, Volker Treichel, Ida Mboob, Maryam Lawal, Natalija Gelvanovska-Garcia, Obinna Chidozie Isiadinso, Collins Obi, Arsh Sharma, Hadija Kamayo, Ivor Ishtuk, Olawunmi Adelusi, Fatou Fadika, Ashish Shrestha, Jacqueline Irving, Abiodun Aina, Hanning Bi, Jessica Stiefler, and Olumide Okunola.

Adama Badji, Chinazaepere Ndukwe, Tooni Akinola, Olayinka Sunday, Dumebi Okwuosah, and Mary Akerele provided able administrative and logistics support to the team.

The report was conducted under the guidance and supervision of Jeffrey Chelsky, Maiko Miyake, Mehnaz S. Safavian, and Zeinab Partow and the guidance of directors Dahlia Khalifa, Ndiamé Diop, Paolo Mauro, Abebe Adugna, and Shubham Chaudhuri. The work was performed under the overall direction of Ousmane Diagana (Regional Vice President, Sub-Saharan Africa, IBRD), Susan Lund (Vice President, Economics and Private Sector Development, IFC), and Sergio Pimenta (Regional Vice President, Africa, IFC).

Peer reviewers at different stages in the preparation of the report were Miguel Angel Saldarriaga Noel, Feyi Boroffice, Ifeoma Ezeokafor, and Raha Shahidsaless.

Technical consulting services were provided by Teleola Kola-Edun, Harshit Gupta, William Burnfield, Olusola Teniola, Abubakar Maina, Usman Aliyu Mahmud, Sean Lothrop, Chris Greacen, Leigh Vial, Ifunanya Genevieve, Emeka Okpukpara, Anadach Consultants and PBR Global Health Solutions. Editorial support was provided by David Harrison.

The team is grateful for generous guidance and feedback from many other colleagues across the Bank Group, including Abdulaziz Faghi, Bertine Kamphuis, Christian Mulamula, Denis Medvedev, Kalim Shah, Roumeen Islam, Matheus Bueno, Ruchita Manghnani, Stephan Dreyhaupt, and Vengai C. Chigudu. The team also thanks other Bank Group staff who provided documents and information and participated in various meetings.

The team is also grateful to government officials, private sector representatives, development partners, and other stakeholders who provided valuable insights that helped improve the quality of the report.

Executive Summary

Nigeria has the potential to become an economic powerhouse. Its large and growing population and its regional trade ties through the Economic Community of West African States (ECOWAS) offer the potential for expanded markets for goods and services.

Nigeria's population is projected to grow 45 percent by 2045, one of the largest increases compared to its peers. This should create opportunities for private firms, contributing to jobs and economic growth. The country's rich agricultural and mineral resources create an opportunity for more private investment in food production and resource-based manufacturing to occur. Furthermore, a young, entrepreneurial workforce positions Nigeria to increase productivity and innovation through digital entrepreneurship. But Nigeria's economic growth has been slower than its peers, job creation has been modest, and almost half the population still lives below the poverty threshold.

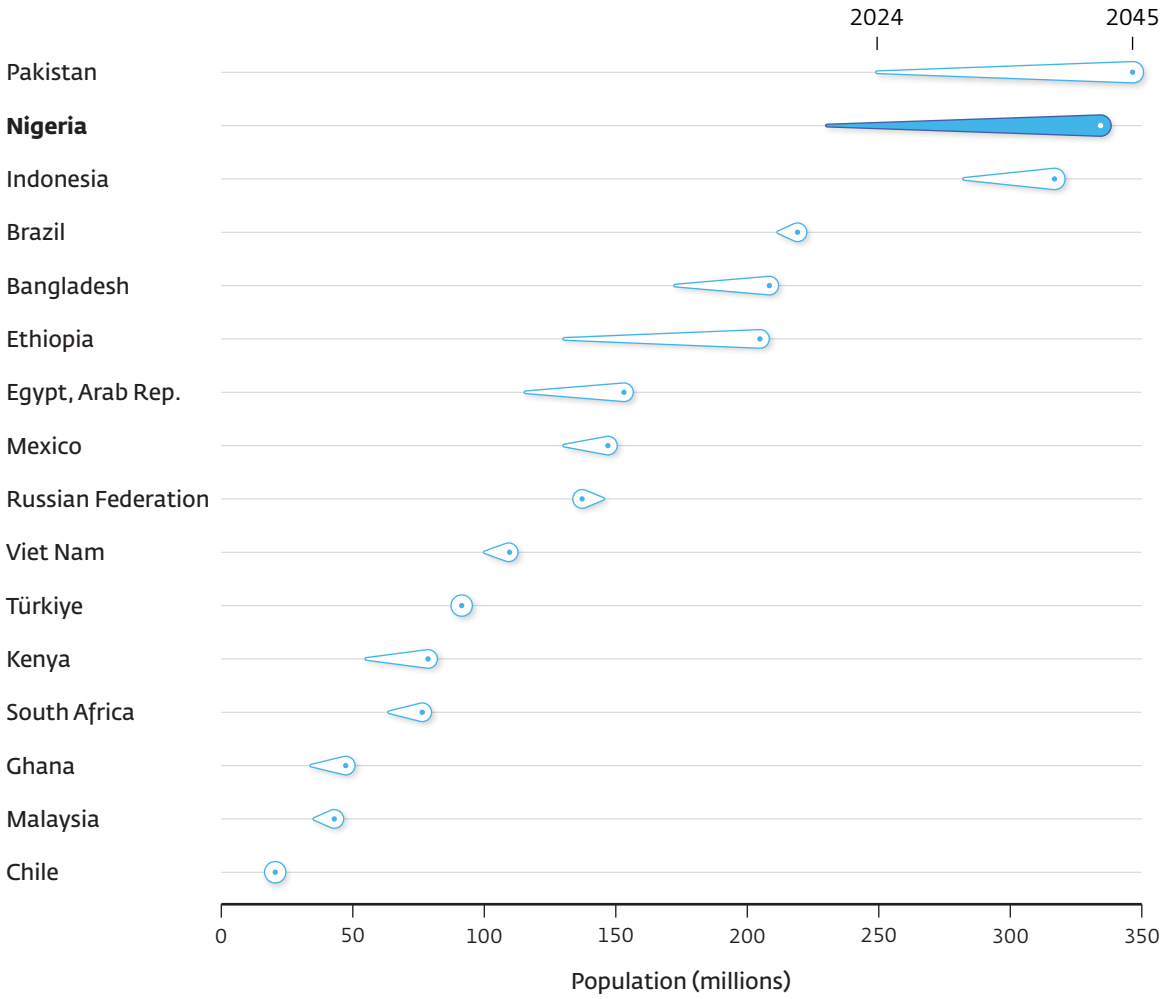
To reach that potential, Nigeria will have to overcome structural challenges. The country relies heavily on oil and gas production for exports and fiscal revenues, making Nigeria susceptible to commodity price fluctuations. Nigeria also faces significant fiscal constraints: tax-to-GDP (gross domestic product) is one of the lowest globally at 3.8 percent in 2023, while total revenue averaged 7.1 percent of GDP between 2019 and 2023, holding back spending on infrastructure and other productive investments. General government debt (percent of GDP) has increased from 13.4 percentage of GDP in 2014 to 49.1 percent in 2023. Government expenditure on education is low contributing to low literacy rates and skills development that further constrains the private sector.[1] Even with Nigeria's large population, there are not enough qualified workers for private sector jobs due to a lack of the requisite skill sets and education.[2] Nigeria's lower-than-comparator learning-adjusted years of schooling and tertiary enrollment rates have led to a shortage of qualified workers for high-skill jobs. Corruption, crime, and violence in parts of the country have discouraged private investment.

Lack of access to reliable electricity is a major constraint to the private sector in Nigeria. Nigeria's electricity supply is unreliable. Annual per capita power consumption is only 144 kilowatt-hours (kWh) compared with 351 kWh in Ghana and more than 4,000 kWh in South Africa. The private sector endures power outages that average eight hours per day. Lack of access to reliable electricity have led several leading global companies to relocate their operations to neighboring countries where electricity is more reliable.

Figure ES.1

Nigeria to experience one of the largest population increases among peers by 2045

Population, Nigeria and structural and regional peer countries



Source: United Nations World Population Prospects.

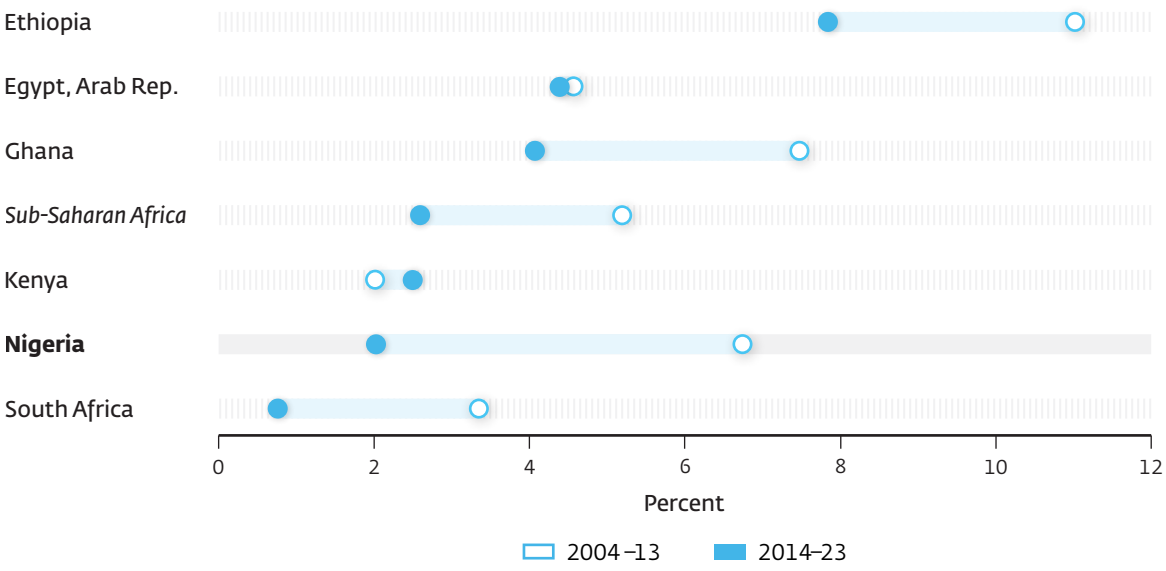
Limited access to finance is a constraint, impacting major sectors like agriculture, renewable energy, and manufacturing. Domestic credit to Nigeria's private sector was 12.9 percent of GDP in 2024, below the averages for Sub-Saharan Africa (20.1 percent) and lower-middle-income countries worldwide (34.0 percent). Banks remain constrained in their ability to intermediate longer-term finance, with bank deposit tenors predominantly short term.

The number of listed corporate bonds on the Nigerian Exchange has declined (from 50 at end-2022 to 43 at end-2024), constrained by high yields and credit risk. The corporate bond market stands at around N2 trillion (approximately 1 percent of the GDP).

Figure ES.2

Nigeria's GDP growth has lagged some of its regional peers in the last decade

GDP growth rate, Nigeria and selected regional comparators, annual averages



Source: World Bank World Development Indicators.

Given the high interest rate environment, bond market activity has been dominated by government securities. The expiration of the companies' income tax exemption on corporate bonds (effective 2022) has made corporate bonds less attractive to institutional investors (excluding the pension funds which are tax exempt), created an asymmetry between corporate bonds and federal government of Nigeria bonds which remain tax exempt and increased required returns for investments in corporate bonds, thus discouraging new corporate debt issuances.

Nigeria's equity capital market is characterized by weak liquidity, low retail investor penetration, and limited product breadth. The Nigerian Stock Exchange has yet to fully exploit its role in raising long-term financing. The total number of firms with a public equity listing fell from 181 to 169 over the five years to December 2024 and there have been only a few listings over this period (primarily re-listings by restructured financial services firms[3]). Market illiquidity has tended to distort share prices, with the resultant volatility causing firms to be wary of listing.[4] Market players point to high listing costs and a need for more streamlined listing procedures as further impediments that may deter firms from seeking a public equity listing. Net inflows of foreign direct investment averaged just 0.5 percent of GDP from 2013 to 2023.

There have been some recent promising developments, however. The Central Bank of Nigeria has enacted foreign exchange (FX) reforms that have led to the unification of FX markets and to a market-reflective exchange rate. The Central Bank of Nigeria has also tightened monetary policy and refocused on its core mandate of maintaining price stability. The government has embarked on a revenue-driven fiscal consolidation and tax simplification, including through the removal of costly gasoline and FX subsidies. As a result, access to foreign exchange has been reestablished, lowering investment risks. Going forward, Nigeria will need to deepen structural reforms and reduce policy uncertainty.

This report looks at four sectors where public policy actions could attract private investment: broadband/fiber-optic infrastructure, pharmaceutical manufacturing, solar, and cassava and soybeans. These sectors were chosen for their private investment potential if major constraints can be addressed, their impact on economic development, and the feasibility of removing constraints in the near term.

Broadband/Fiber-Optic Network

Nigeria is Africa's second-largest telecommunications market but less than half the population has a broadband internet subscription—a lower share than regional peers—suggesting there are potentially profitable investment opportunities. Expanding digital access would enable growth across sectors and improve social and economic inclusion.

Because of inadequate fiber-optic networks in the country, Nigeria uses less than 10 percent of the total communications capacity that is available through eight international submarine cables connecting it to the global network. Expanding the fiber-optic network throughout the country would pave the way for new investment to digitalize information for businesses, schools, hospitals and government agencies. Right now, most of the 35,000-kilometer fiber-optic network is operated by the country's four large mobile network operators, who each build their own connections between population centers. As a result, the network is characterized by overlapping intercity links and limited access in more rural areas. Small providers must pay high fees to use those networks, effectively restricting competition. The Federal Ministry of Communications, Innovation and Digital Economy is seeking financing for a proposed $2 billion investment in fiber networks using a special-purpose vehicle to encourage private operator investment to extend non-overlapping fiber-optics networks to a total of 120,000 kilometers.

To encourage new investment in the fiber-optic network, states should be encouraged to comply with the National Economic Council's commitment to a maximum of N145 per meter right-of-way fees. This right-of-way reform is prioritized by the government through the National Broadband Alliance for Nigeria and the State Action on Business Enabling Reforms program. This reform could reduce the cost of rolling

out a national network by 15 percent,[5] increase GDP by 3.7 percent over 10 years,[6] and lower subsidies needed to expand the network in rural areas by $800 million.[7] This report also recommends improving the capacity of the Nigerian Communications Commission to regulate the telecom market. Protecting telecom networks from vandalism or theft by designating telecom networks as critical national infrastructure would also encourage private investment, as would adopting new financial mechanisms to reduce investment risk. Implementing these reforms could generate up to $4 billion in private investment and create up to 229,000 jobs.[8]

Pharmaceutical Manufacturing

Nigeria's population is consuming more medicine. Pharmaceutical production doubled between 2018 and 2024 and the number of pharmaceutical firms operating in the country grew to 186 from 115 during that time. Yet, domestic drug manufacturers rely on imported inputs, which costs are inflated by trade barriers and hinder their expansion.

There are reasons to believe the sector has room to grow. First, the government is working on expanding universal health coverage, particularly in rural areas, which could open new markets for drug-makers to reap economies of scale. Second, as many Nigerians become more affluent, they are increasingly susceptible to noncommunicable diseases, such as those related to obesity or a more sedentary lifestyle. That has created new demand for drugs to treat hypertension and other types of cardiovascular diseases.

The Nigerian government recently set up the Presidential Unlocking Healthcare Value Chain (PVAC) initiative to promote investment in domestic drug production. A new policy requires drug importers to move toward local production within five years or partner with a domestic manufacturer to renew their import license registration. Nigeria also has an opportunity to become a regional exporter of pharmaceuticals thanks to its integration within ECOWAS.

Bringing new investment to the sector will require the National Agency for Food and Drug Administration and Control (NAFDAC) to speed up the approval process for new drugs and factories. One possible approach would be for the government to formally empower PVAC to be the central agency tasked with implementing Nigeria's pharmaceutical policy. Right now, policies are unevenly implemented, leading to uncertainty among investors. Manufacturers say the lack of skilled workers and unreliable electricity hold back investment. This report recommends increasing NAFDAC's capacity to approve new drug dossiers and new plants or lines in a shorter timeline. Adopting the reforms included in this report could generate almost $1.6 billion in new investment and create up to 44,000 jobs.

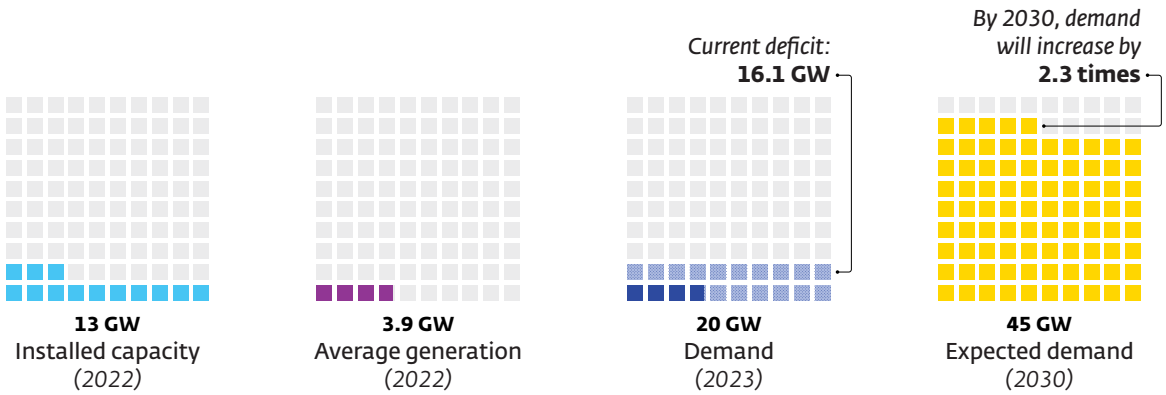
Solar Energy

Despite its extensive oil and gas reserves, Nigeria's power grid meets only 19.5 percent of domestic demand.[9] More than 85 million Nigerians do not have access to electricity and those who do suffer frequent outages. More than 65 percent of installed generation is unavailable because of poor maintenance, vandalism or aging, forcing millions of homes and businesses to keep diesel generators on hand. Economic losses from the lack of reliable electricity are estimated at 5 to 7 percent of GDP annually. Demand will likely double by 2030.

Private investment in solar energy could be profitable and help meet some of the increased demand. For instance, commercial-scale rooftop solar is cheaper than the alternatives—and is less noisy and polluting than diesel generators. Batteries, natural gas or hydropower backup systems could keep the lights on when the sun is not shining. Although there has been some initial investment in solar capacity in Nigeria, there is room for more. This could come in the form of captive generation systems for businesses, mini-grids powering homes or villages (as a backup to utilities), or through solar farms connected to the country's electrical grid. Although electricity distribution and generation has been privatized, the government remains an important player in the sector. It is important to sustain the recent efforts by the government to improve the efficiency of power distribution companies and putting the sector on a path to financial sustainability. The country and sector risks pose a challenge for private investors who perceive Nigeria's power sector as very risky, resulting in higher costs of capital or reduced willingness to invest.[10, 11]

Figure ES.3

Nigeria's electricity demand will more than double over the next five years



Source: Based on data from World Bank (2023a); NERC (2022).
Note: It should be noted that these demand estimates are very conservative. There are various estimates from the World Bank, sustainable energy for all, A2Ei reports that put the capacity of the gensets used to the address the electricity deficit at eight to 10 times that of the current grid capacity.

Nigeria's utilities distribution companies need strengthening, as some of them are weighed down by debt, weak governance, and technical issues. Improving the financial transparency of utilities would lead to improved operations, which would lead to overall financial sustainability of the sector. In practice, this may necessitate one or more options for intervention to bring them into compliance. Other regulatory fixes include raising the cap on mini-grids from 1 megawatt (MW) to 5 MWs. Right now, any project with a capacity larger than 1 MW is considered an independent power producer and must go through a long licensing process. Raising that cap would bring projects online faster. Nigeria could also consider measures to speed up the customs process for solar equipment to encourage more investment.

Access to finance is holding back investment. To mobilize local currency institutional capital at scale, Nigeria could expand the Distributed Renewable Energy Enhancement Facility (DREEF). DREEF—an InfraCredit innovation—seeks to operationalize an institutional model that will unlock, expedite, and scale access to long-term local currency capital for DRE projects while propelling project developers up the RESCO maturity curve, in a streamlined manner. Presently under operationalization, DREEF presents a first of its kind combined approach toward targeting the technical, operational, and financial hurdles encountered along the preparation, development, and construction phases of DRE projects to increase the flow of local currency institutional investment and ultimately enhance DRE access in the country, at scale. Analysis in this report estimates a potential for up to $8.5 billion in investment in solar power by 2030, creating up to 365,000 jobs.

Cassava and Soybeans

Nigeria is the world's top cassava producer and Africa's second-largest soybean producer. Still, if policy related constraints can be addressed, its climatic conditions and vast amounts of arable land would allow the country to produce even more to meet rising global and domestic demand.

Investment in agriculture is held back by inefficiencies which have kept average yields of cassava and soybeans below those of regional peers. Processors are affected by high logistics and energy costs. Nigeria's unreliable power supply remains a major constraint, stifling the competitiveness of the agriculture sector. It limits the adoption of innovative farming practices, reduces productivity, hinders preservation, decreases profitability, and increases operational costs. It is estimated that 25 percent of fruits and 40 percent of vegetables in Nigeria are lost post-harvest.[12] This loss is attributed primarily to unreliable power supply and inadequate post-harvest management. High transportation taxes, frequent security check point stops, and informal levies significantly impact logistics and operational costs, especially for perishables like cassava. The complicated land registration process has resulted in a proliferation of less-productive

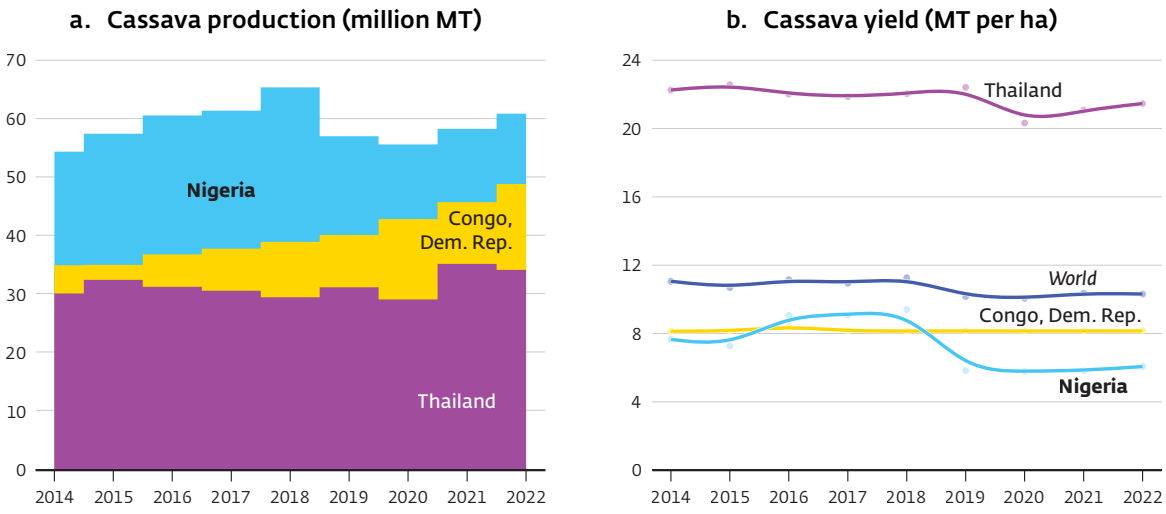
smallholder farmers operating without formal documentation. Only 12 percent of farming households have legal land titles. Consequently, increasing the commercial potential of agro-processing will require enhancing support to smallholder farmers to boost the supply of high-quality raw material inputs; the low marginal productivity of smallholder farmers stems from limited access to certified seeds, inadequate extension services, poor agronomic practices, and unaffordable credit.

Many smallholder farmers lack access to credit and certified and high yielding varieties of seeds, that, combined with poor agronomic practices and low levels of mechanization, holds down their yields. As a result, food processors cannot get enough high-quality raw cassava and soybeans to run their plants at full capacity. Compounding the challenge is the country's poor road system, which makes transporting materials to processors and consumers difficult. This is particularly problematic for perishable crops, like cassava. Processers rely on expensive diesel generated power due to the unreliability of grid supply electricity.

This report recommends making high-quality seeds more accessible, organizing all actors in agricultural supply chains to make farms more productive and improving access to finance. Enhancing the National Agricultural Seed Council's capacity for seed and field certification, or by establishing third-party certification systems can improve the quality of inputs by regulating seed quality and facilitating distribution to farmers. Government could expand and improve the access to extension services using technology

Figure ES.4

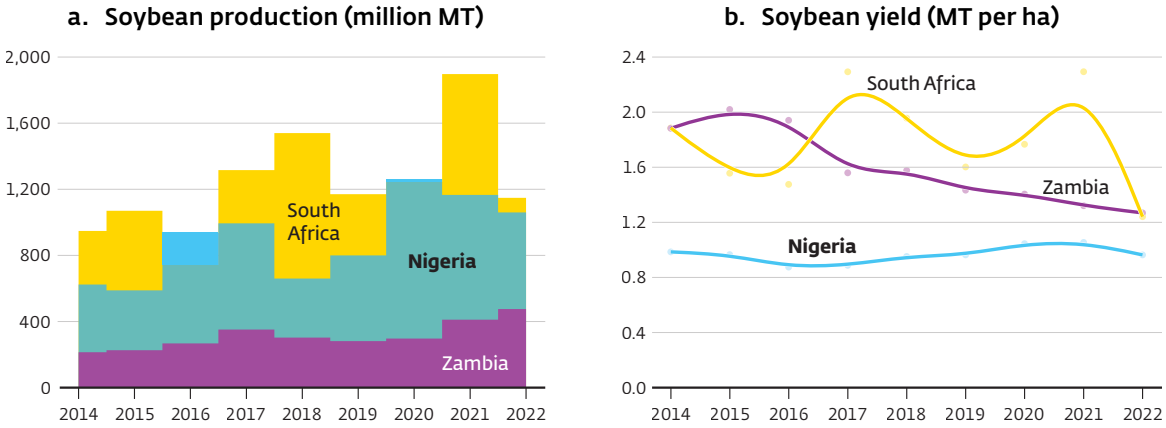
Cassava production in Nigeria is high but yields are much lower than in Asia



Source: USDA; FAOSTAT.

Figure ES.5

Nigeria's soybean production volume has grown, but yields are low relative to comparators



Source: USDA; FAOSTAT.

and develop partnerships with the private sector to encourage small farmers to adopt more efficient practices. In-grower and/or out-grower models[13] can be used by processors to achieve the scale of operation needed for profitability. These contract farming models where processors are backward integrated can limit the fragmentation of the value chains, make improved planting materials more accessible and leading to better agronomic practices and higher productivity. However, these business models will require better access to affordable and appropriately structured finance as well as effective government interventions to improve agronomic practices of farmers.

Adopting the recommendations in this report could attract new investment of up to between $3.2 to $4 billion in cassava production and $1.6 to $2 billion in soybean production, creating up to between 275,200 to 344,000 new jobs.

Table ES.1

Summary of recommendations

Sector	Key recommended actions
Broadband and fiber-optic network	
Rationale • Reduce costs of fiber-optic network deployment. • Promote access to affordable wholesale fiber-optic infrastructure. • Reduce vandalism, theft, and extortion, which will thereby reduce uncertainty, lower operational costs, and attract investment. • Extend fiber-optic networks by adopting financial mechanisms leveraging private funds support to the ICT sector. *Constraints* • High, unpredictable, and inconsistent right-of-way fees, levies, and informal charges. • Limited competitive access to wholesale fiber-optic infrastructure. • Limited supply of fiber-optic infrastructure. • Limited funding available. • Frequent vandalism, extortion, theft, and damage from road construction are expensive to repair and contribute to operator revenue losses.	• Encourage states to comply with the National Economic Council commitment to a maximum N145 per linear meter right-of-way fees. • Strengthen the Nigerian Communications Act, 2003 or its regulations, to require the Nigerian Communications Commission (NCC) to carry out market analysis on a defined timebound schedule and impose, monitor and enforce regulatory obligations on dominant operators. • NCC to complete market analysis of inter-city leased lines and dark fiber-optic in 2026 and impose and enforce regulatory obligations on dominant operators. • Ensure effective execution and monitoring of the Designation and Protection of Critical National Information Infrastructure Order, 2024, adopted in August 2024, designating telecom networks as critical national infrastructure.
Pharmaceutical manufacturing	
Rationale • Improve enabling environment for domestic pharmaceutical production. • Facilitate access to capital and best-practice production methods to improve the quality of locally manufactured products. *Constraints* • Unpredictable border procedures lead to delays and high costs. • The slow process of issuing new drug dossiers and new plant/line approvals by the National Agency for Food and Drug Administration and Control (NAFDAC) creates a disincentive to scale.	• Digitize the customs ecosystem to allow for automated duty application, assessment and clearance processes to increase efficiency and consistency in selection of the correct HS codes.[a] • The federal government of Nigeria to align HS codes in use in Nigeria to international HS codes, for all pharmaceutical products and associated raw materials, to facilitate accurate classification of products and reduce the number of products categorized as "other." • NAFDAC should digitize processes for receiving, reviewing and approving new drug dossiers and new plants/lines, thus enabling them to process more applications in a shorter timeline.

(Table continues next page)

Table ES.1

Summary of recommendation *(continued)*

Sector	Key recommended actions
• Demand side limitations due to the extremely limited number of Nigerians with adequate health insurance (only 5 percent of total population), mean that pharma-manufacturers are concerned (unwilling) to grow their production capacity in the absence of offtake assurances for their new products.	• Increase staff training to enable NAFDAC to effectively regulate the excipient and active pharmaceutical ingredient industry. • Increase the number of accredited laboratories recognized by NAFDAC for testing of new drugs and products to facilitate applications and approval process. • The NHIA, Federal Ministry of Health, and PVAC should work with NAFDAC to update Nigeria's "Essential Drugs List" to ensure that drugs on the list become core production priorities for Nigerian pharma-manufacturers. • NHIA to use structured local pooled procurement strategies to lower the cost of acquiring locally manufactured drugs on the "Essential Drugs list."
Solar energy	
Rationale • Solar is a cost-effective and clean option for 85 million Nigerians without power. • Opportunity for distribution companies and developers to improve service in sub-franchise areas. *Constraints* • Weak governance and uncreditworthy utilities constrain the ability of solar projects to sell electricity to the grid. • Cost-of-living affecting most customers ability to pay. • Cumbersome customs processes and high import tariffs. • Constraints to access to finance primarily driven by market distortions stemming from information asymmetry.	• Ensure effective implementation of the customs waiver procedures that are already in place for imported solar equipment. • Increase the mini-grid permit cap from 1 MW to 5 MW. • Design a partnership framework to mobilize at scale local currency institutional capital in the DRE sector drawing on InfraCredit's newly designed pilot Distributed Renewable Energy Enhancement Facility. • Implement necessary reforms to improve DisCos governance and performance, financial sustainability and reduce investment risks.

(Table continues next page)

Table ES.1

Summary of recommendation *(continued)*

Sector	Key recommended actions
Cassava and soybeans	
Rationale • Improve the quality and reliability of cassava and soybean supply to processors and aggregators. • Increase the capacity of cassava and soy processors to expand and mechanize their operations. *Constraints* • Inadequate technical knowledge and poor agronomic practices. • Inadequate supply of quality certified seeds. • Inequitable, fragmented, and inefficient distribution of government-subsidized programs and interventions to smallholder farmers.	• States and the Ministry of Agriculture to improve the extension service models by (a) introducing private extension service models; (b) encouraging modern climate smart agriculture practices developed by national and international agriculture research institutes in Nigeria; (c) enhancing its farmer centric nature by increasing involvement of farmer associations; and (d) delivering training using existing online platforms in the three main local languages. • Strengthen capacity of the Nigerian Agricultural Seed Council by equipping it to establish third-party certification systems, licensing, and capacity-building programs for seed producers. • Facilitate the establishment of farmer associations, improve their governance, and ensure they are linked to agro-processors. • Use farmers' National Identification Number and Bank Verification Number for verification, and geo-tag farmers to specific farms to enhance targeting of government programs aimed at supporting smallholders and minimize duplication. • Encourage the use of digital platforms to mobilize the main actors (farmers, public extension services, inputs dealers, traders, processors, mechanization services providers, transporters) along the value chain and coordinate their interventions.

a. The harmonized system (HS) code is a standardized numerical method of classifying traded products that are imported and exported around the world, in a globally-aligned way. It is used by more than 200 countries and economies around the world to identify and classify products when determining their treatment in customs tariffs and for gathering statistics.

1

Country Context and Business Environment

1 Country Context and Business Environment

Nigeria has considerable economic potential and challenges in fully realizing that potential.

Nigeria, a lower-middle-income country with a gross national income per capita of $1,880,[14] has experienced a mixed growth trajectory over the past several decades. While benefiting from oil-driven booms, the economy expanded significantly in the early 2000s but has struggled with volatility due to commodity price shocks, weak productivity growth, and structural constraints. Despite being Africa's largest economy, Nigeria's development path remains constrained by limited economic diversification, a dominance of low-value-added production, and a persistently high share of the labor force (approximately 35 percent) in agriculture. The next stage of Nigeria's economic transformation will require strengthening non-oil sectors, enhancing value chain integration, improving human capital, and fostering a more competitive business environment. However, macroeconomic instability, weak infrastructure, and governance challenges continue to hinder sustainable and inclusive growth.

As Africa's second-largest economy,[15] with a rapidly growing domestic market and abundant natural resources, Nigeria has the potential to create sizable opportunities for private investors. A massive and rising population (reaching 337 million in 2045 from 233 million in 2024), increasing urbanization (68 percent by 2050 from 57 percent in 2023),[16] and regional integration with ECOWAS, will expand the market goods and

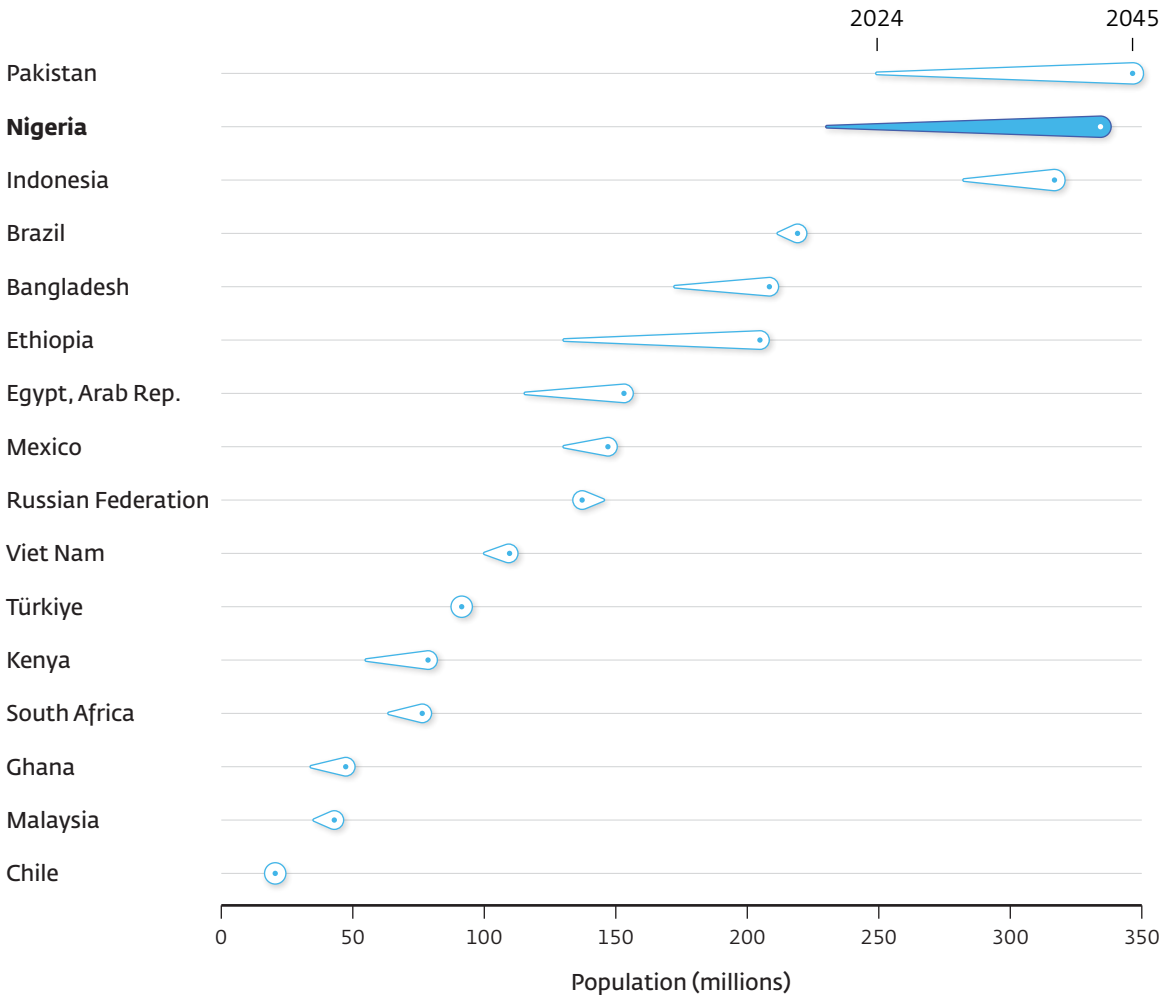
services.[17] A rich agricultural and mineral resource base provides scope for increased private investment in food production, especially in lagging regions and resource-based manufacturing. The private sector can capitalize on Nigeria's young, entrepreneurial workforce to foster productivity growth and innovation by leveraging digital and other technologies.

Nigeria's economic growth and development have fallen short of potential. However, services—especially finance, information, and communications—have been drivers of growth. Agriculture, employing more than 30 percent of the workforce, has made small

Figure 1.1

Nigeria to experience one of the largest population increases among peers by 2045

Population, Nigeria and structural and regional peer countries



Source: United Nations World Population Prospects.

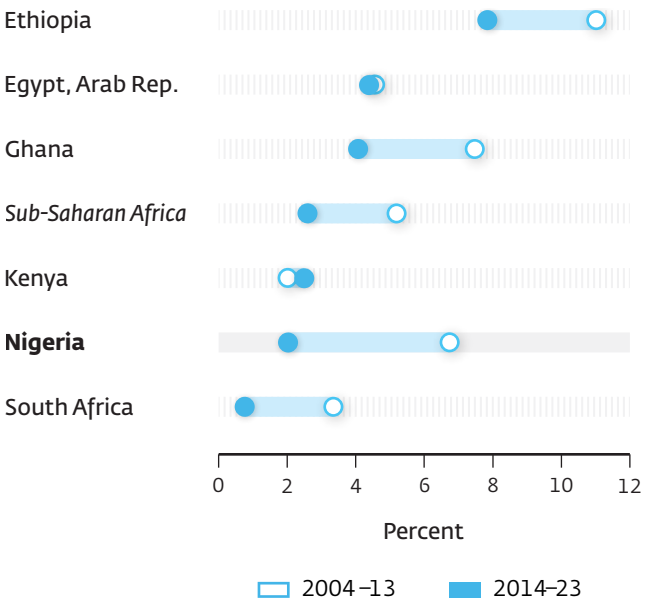
but positive contributions. Even so, gross domestic product (GDP) growth has been below that of regional peers during the past two decades (figure 1.2). Nigeria's Human Development Index is in the lowest 15 percent of countries globally[18] and 51 percent of the population, especially in rural areas, falls below the national poverty line.[19] Creation of productive jobs has not kept pace with the growth of the labor force, especially for youth. Insufficient diversification has left exports and fiscal revenues overly dependent on oil and susceptible to the vagaries of commodity prices (figure 1.3).

Macroeconomic uncertainty and institutional weaknesses weighed on investors. Prior to June 2023, the Central Bank of Nigeria tightly managed the exchange rate, which was assessed by the International Monetary Fund to be overvalued in real effective terms at end-2022.[20] It also operated multiple foreign exchange (FX) windows, with preferential FX access to selected sectors, distorting markets and creating uncertainty for investors. This increased the cost of hedging currency risks and hampered domestic and international investors' ability to access foreign exchange and repatriate profits. Such foreign exchange market distortions and multiple currency practices were progressively removed from June

Figure 1.2

Nigeria's GDP growth has lagged some of its regional peers in the last decade

GDP growth rate, Nigeria and selected regional comparators, annual averages

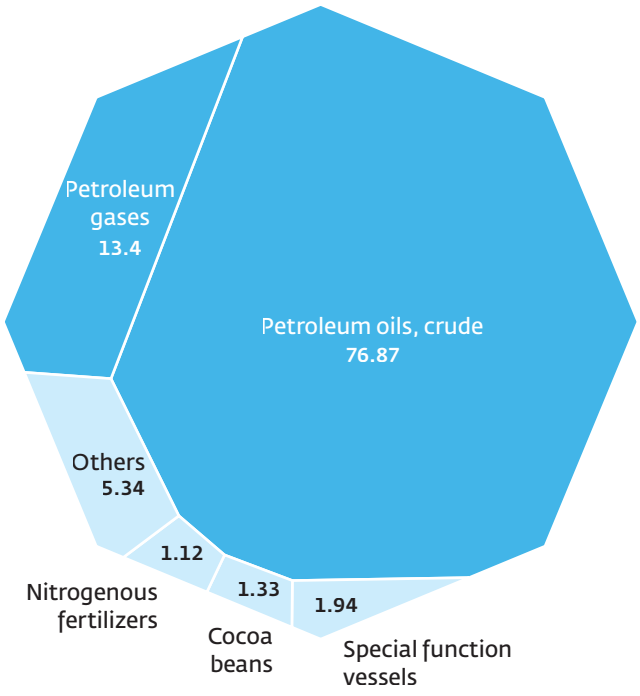


Source: World Bank World Development Indicators.

Figure 1.3

Nigeria lacks export diversification

Export structure, 2022 (%)



Source: Observatory of Economic Complexity.

2023, with the exchange rate unification having a short-term impact of fueling the already high inflation. Similarly, cumbersome and inconsistent tariffs on certain import products impose additional costs and financial uncertainties for businesses.

Fiscal constraints hamper provision of adequate infrastructure and public services, undermining private investment. This is partly due to Nigeria's low fiscal revenues, 7.1 percent of GDP on average between 2019 and 2023, owing in part to its tax-to-GDP ratio of 3.8 in 2023, one of the lowest globally.[21] Low revenue has contributed to debt accumulation—from 12.4 percent of GDP in 2013 to 49.1 percent in 2023 and constrained public investment, infrastructure maintenance and other development spending. Investment in Nigeria's transportation networks has been inadequate—less than one-third of roads are paved, compared with an average of one-half of roads in other lower-middle-income countries.[22] This constrains private sector economic activity, including farmers who need to bring their products to markets. Likewise, government expenditure on education is low contributing to low literacy rates and skills development that further constrains the private sector in a range of sectors.

Even with Nigeria's large population, there are not enough qualified workers for private sector jobs because many Nigerians lack the requisite skill sets and education.[23] According to the Nigeria Development Update (World Bank 2024a) despite the significant investment in human capital, Nigeria still has a long way to go to equip workers with the skills they need for productive jobs and to boost the skills needed to establish, maintain, and grow firms.[24] While Nigeria maintains a strong labor force engagement, the mismatch between workforce skills and job opportunities continues to constrain economic transformation. Nigeria's lower-than-comparator learning-adjusted years of schooling and tertiary enrollment rates have led to a shortage of qualified workers for high-skill jobs. Given their health and education outcomes, a child born in Nigeria in 2020 will only achieve 36 percent of the productivity he or she could have attained with full health and education, meaning Nigeria had among the lowest human capital levels in the world. This is lower than the average for the Sub-Saharan Africa region (40 percent) and lower-middle-income countries (48 percent).[25]

The private sector identifies the lack of electricity or unreliable electricity as one of its main constraints. Likewise, about 40 percent of Nigerians lack access to grid electricity.[26] Businesses suffer daily power outages averaging eight hours, and the country endured roughly 232 partial and total grid collapses between 2010 and 2023.[27] Only 13 percent of Nigerians reported having access to reliable electricity from the national grid.[28] About 86 percent of businesses in Nigeria own or share a generator. This situation has led to Nigeria having the world's largest market for private backup gasoline and diesel generators. Economic losses from unreliable electricity supply are estimated to be around 5 to 7 percent of Nigeria's GDP with a disproportionately high impact on MSMEs.[29]

Corruption, crime, and insecurity are hampering business. Corruption is perceived by many as pervasive, according to the Worldwide Governance Indicators for which Nigeria is in the bottom quartile of the global distribution.[30] Insecurity is a concern, with high rates of violent crime, kidnappings for ransom, and violent conflict in parts of the country, especially the northern and southeastern regions. These challenges have further undermined the country's ability to attract private investment.

Limited access to finance is a long-standing constraint, impacting major sectors like agriculture, renewable energy, and manufacturing. Nigeria has experienced weak credit growth in the face of high interest rates, as well as foreign exchange shortages.[31] Domestic credit to Nigeria's private sector was 12.9 percent of GDP in 2024, below the averages for Sub-Saharan Africa (20.1 percent) and lower-middle-income countries worldwide (34.0 percent) (table 1.1). Banks' lending capacity is further constrained by the Central Bank's recent increase in the cash reserve ratio for deposit money banks from 32.5 percent to 50 percent. Banks remain particularly constrained in their ability to intermediate longer-term finance, with bank deposit tenors predominantly short term. Additionally, high yielding government securities offer a risk-free alternative, discouraging private sector lending, particularly to SMEs and infrastructure projects. The absence of a deep domestic capital market further restricts banks from refinancing or offloading long-term

Table 1.1

Access to domestic financing in Nigeria is below that in peer countries

	Domestic credit to private sector (% of GDP)			Bank credit penetration (% of GDP)			Public equity market	
	2024[a]	5Y avg.	10Y avg.	2024[a]	5Y avg.	10Y avg.	No. of listed firms	Capitalization to GDP (%)
Nigeria	12.9	13.9	13.3	12.1	13.2	12.8	169[b]	27.2[b]
Sub-Saharan Africa	20.1	21.8	22.5	18.7	20.4	20.7	65	62.9
Lower-middle-income countries	34.0	35.9	35.1	32.0	33.9	33.2	307	27.9
Emerging markets and developing economies	37.8	40.1	39.9	35.1	37.3	37.1	478	56.1

Source: World Bank Group staff calculations based on data from World Bank World Development Indicators, International Monetary Fund International Financial Statistics, World Bank and Organization for Economic Co-operation and Development GDP estimates, Bank for International Settlements domestic debt securities, and World Federation of Exchanges database.
Note: Domestic credit to private sector is below all comparator averages. Additionally, bank credit penetration is below all peer group averages.
a. Latest data.
b. Data are as of December 2024 and come from the World Federation of Exchanges.

assets, exacerbating their risk aversion. Regulatory capital requirements and weak credit infrastructure add to these challenges, making long-term private sector lending both costly and unattractive.

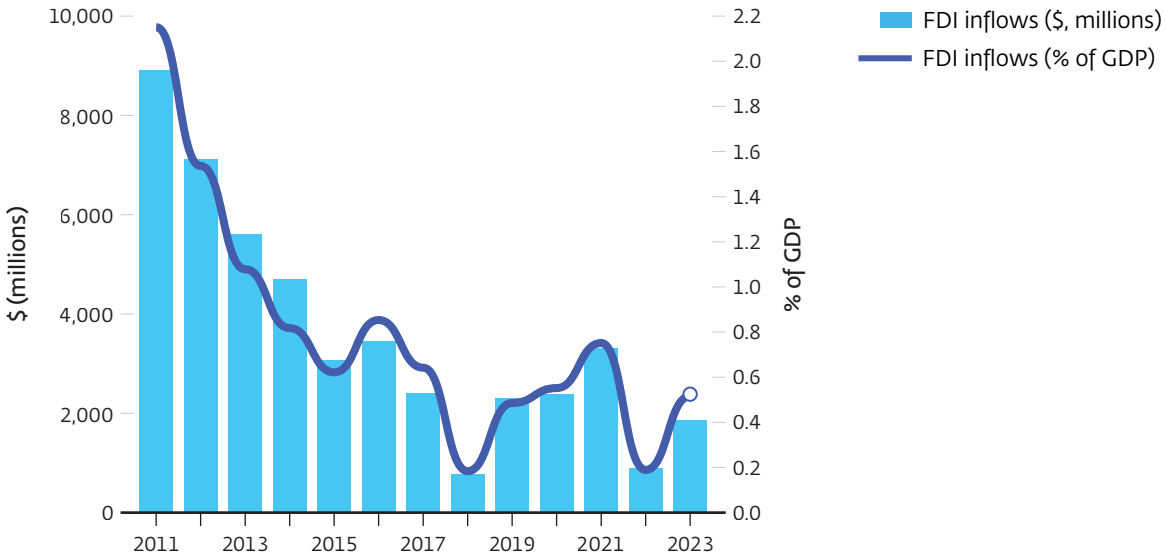
In the current high interest rate environment, the number of listed corporate bonds on the Nigerian Exchange has declined (from 50 at end-2022 to 43 at end-2024). Local banks and institutional investors purchasing government securities tend to buy and hold, impeding government securities market liquidity, and the small corporate bond market trades infrequently.[32] However, financial market authorities have stated their intentions to increase issuance of medium-term bonds and Eurobonds under the medium-term debt strategy for 2025–27. In February 2025, a palm oil manufacturer issued a N82.89 billion, seven-year bond, the largest corporate bond issue on the market since 2022 and the largest ever by an agro-industrial firm in Nigeria.

The Nigerian Stock Exchange has yet to fully exploit its potential for raising long-term financing. The market capitalization to GDP ratio of Nigeria's public equity market was only 27.2 percent at end-2024.[33] Market illiquidity has tended to distort share prices, with the resultant volatility causing firms to be wary of listing.[34] The total number of firms with a public equity listing fell from 181 to 169 over the five years to December 2024 and there have been only a few listings over this period (primarily re-listings by restructured financial services firms[35]). Banks and other financial services firms are prominent among listed firms on the Nigerian Exchange public equity market, accounting for more than one-third of listed firms. Better collaboration among regulatory authorities, the securities exchange, and local institutional investors could help unlock the potential of the capital market in Nigeria. In addition to market illiquidity, market players point to high listing costs and a need for more streamlined listing procedures as impediments that may deter firms from seeking a public equity listing. A number of firms in Nigeria's technology sector, in particular, have found private equity more attractive than a public listing.

In recent years, Nigeria has attracted less foreign direct investment as a share of GDP than other Sub-Saharan Africa countries or income group comparators. Macroeconomic uncertainty and a weak investment climate have taken a toll on foreign direct investment (FDI), which has declined significantly in US dollar terms since the early 2010s (figure 1.4). Between 2014 to 2023 net FDI inflows averaged just 0.5 percent of GDP, below comparator countries (figure 1.5). The main sectors attracting FDI have been the extractive industries, information technology services, and manufacturing (figure 1.6). FDI announcements, which had experienced a steady decline between 2020 and 2022, picked up notably in 2023 especially in services and manufacturing.[36] If these announced investments come to fruition, this will represent an expansion of FDI inflows to non-oil sectors, with benefits for economic diversification.

Figure 1.4

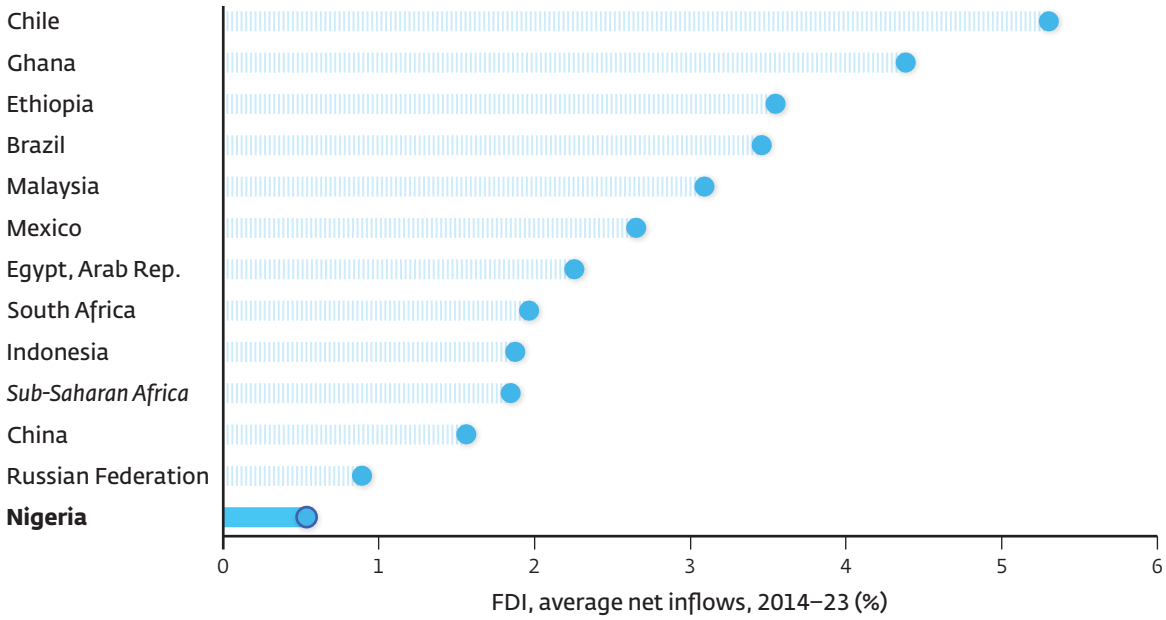
From 2019 to 2023, Nigeria's FDI inflows averaged 0.5 percent of GDP following significant decline between 2011 and 2018...



Source: UNCTAD Global Investment Report, 2024.

Figure 1.5

Nigeria's FDI inflows as a share of GDP is below those of its aspirational and regional peers



Source: World Bank World Development Indicators.

Figure 1.6

Cross-border investment announcements for Nigeria is mostly concentrated in oil and gas, communications, renewable energy sectors, and chemicals

Investment announcements by sector, average value, 2018–23 ($, millions)

Source: FDI Markets.
Note: OEM = original equipment manufacturer.

Table 1.2

Nigeria's access to international financing has been mixed, loans from foreign banks are below peer groups

	International corporate bond issuances (% of GDP)			FDI flows (% of GDP)		
	2023[a]	5Y avg.	10Y avg.	2023[a]	5Y avg.	10Y avg.
Nigeria	...	...	...	0.5	0.5	0.5
Sub-Saharan Africa	0.3	1.7	1.2	3.6	3.3	3.5
Lower-middile-income countries	0.3	0.6	0.7	2.6	2.0	2.4
Emerging markets and developing economies	0.5	1.1	1.1	3.0	3.1	3.4
IDA countries	0.6	1.5	0.7	3.1	3.4	3.6

Source: World Bank Group staff calculations based on data from Dealogic, Bank for International Settlements locational banking statistics, International Monetary Fund International Financial Statistics and balance of payments database, World Bank International Debt Statistics, World Bank and Organization for Economic Co-operation and Development GDP estimates.
Note: IDA = International Development Association. Nigeria's access to international financing has been mixed. Loans from foreign banks to residents (all sectors) (% of GDP) are below all peer group averages and have expanded. FDI flows (% of GDP) are below all comparator averages and have improved. Portfolio equity flows (% of GDP) are above all peer group averages and have increased.
a. Latest data.

Recent macroeconomic and business-climate reforms have the potential to help foster private sector-led growth. Monetary policy tightening has started to ease inflationary pressure. The policy reforms implemented since June 2023 to liberalize the FX market have improved foreign exchange availability. The naira has dropped to historic lows, correcting its previous overvaluation and enhancing Nigeria's international competitiveness. The removal of the gasoline and FX subsidies has contributed to a narrowing of the fiscal deficit.

Macroeconomic and structural reforms are critical if Nigeria is to achieve sustainable and inclusive growth. A comprehensive tax reform under analysis by the National Assembly and states could simplify the tax code and facilitate a revenue-driven consolidation.

Addressing long-standing constraints to private sector development such as limited access to reliable power, access to finance, poor connectivity, high trade barriers, poor trade facilitation and inadequate transport infrastructure are also key.

2

Sector Investment Opportunities

2 Sector Investment Opportunities

Four sectors were selected for this CPSD: fiber-optic network, pharmaceutical manufacturing, solar energy, and soybeans and cassava.

The selection of sectors was based on data analysis, internal consultations with World Bank Group experts, in-country consultations, and desk research. The selection process applied the following criteria:

1. Potential to catalyze private investment.
2. Feasibility of removing binding constraints in the near term.
3. Consistency with government priorities.
4. Potential to achieve development impact, including potential contribution to jobs, GDP, and foreign exchange.

The selection of sectors does not imply the absence of attractive private investment opportunities in other sectors, nor does the CPSD report exhaustively describe all policy actions necessary to foster private investment in the selected sectors. While the report focuses on binding constraints in sectors that meet the above criteria, other actions required to promote private investment may fall beyond the timeframe of the CPSD report. The report integrates relevant cross-cutting issues within the

sector analysis where applicable and is therefore intended to be complementary to other Bank Group analytical and diagnostic work that seeks to address constraints affecting private investment.

If targeted policy action is taken, the selected sectors have the potential to create significant private sector investment opportunities and are critical to addressing the overarching challenges facing Nigeria, which include: (i) lack of diversification of the economy, (ii) sharp economic and social regional disparities, (iii) growing climate vulnerability, and (iv) high youth unemployment.

Nigeria's ICT infrastructure—specifically fiber-optic cables—offers a compelling investment opportunity, with significant potential for returns. The country's ongoing digital transformation presents lucrative prospects in fiber-optic networks, driven by a growing demand for digital services across businesses, government, and consumers. This is well aligned with government priorities, as it is already laying the groundwork for growth by seeking financing for a proposed $2 billion investment in expansion of the national fiber-optic network backbone. Coupled with efforts to extend broadband, there is opportunity for private investors to capitalize on a growing, untapped market. There is the potential to generate up to $5 billion in tax revenue, boost GDP by 14 percent, and create millions of jobs. As the second-largest economy in Africa in purchasing power parity, Nigeria is well-positioned to become a regional leader in digital infrastructure, serving its population of over 220 million while furthering its role as a West African business and financial hub. With broadband penetration still at just 43.5 percent compared to regional peers like South Africa that boasts penetration rates of 75 percent,[37] the potential demand for improved digital connectivity remains immense, particularly in underserved rural areas.

Nigeria's pharmaceutical manufacturing sector has had strong growth (7 percent annualized) in the number of in-country pharma-manufacturers for the last seven years. The requirement that all Nigerians be covered by health insurance as a result of the 2022 amendment to the National Health Insurance Act will increase the demand for medicines. Nigeria could learn from universal health coverage reforms in Thailand which limited medicine benefits to those drugs on the National List of Essential Medicines. These reforms in Thailand led to an increase in both total pharmaceutical sales and the market share of drugs on the National Essential Medicine List status.[38] This would give domestic producers greater confidence in future demand for the designated essential drugs. The industry is split into three broad categories, ranging from those manufacturers that have low-level complexity in their processes and dosage forms, to the top tier that uses highly sophisticated production systems and have numerous offerings from tablets and capsules to syrups, injectables, and in vitro solutions. Regarding pharma sub-sectors, the greatest investment potential lies in: (i) production of non-communicable disease drugs for domestic sales, e.g., hypertension, diabetes and oncology drugs; and (ii) production of antimalarials, respiratory drugs, antibiotics and injectables for export, which Nigeria is already exporting. Finally, raw material input production of excipients and active

pharmaceutical ingredients (APIs) also present good growth prospects in Nigeria. The analysis shows that the growth and value-add to the Nigerian economy can be significant in terms of earnings, employment, and human capital development if there is improved policy coordination, strengthened capacity of the regulators, enhanced technical support and improved access to capital.

Investing in solar energy is critical to alleviate the huge energy deficit and economic loss caused by Nigeria's structurally unreliable grid. Nigeria depends heavily on fossil fuels, especially gas and high-cost diesel generators, two major sources of greenhouse gas emissions. The value proposition for solar electricity is rooted in its low-cost relative to other options, making it a promising and cost-effective solution to the Nigeria's energy transition. Solar energy solution can substitute the Nigeria's dysfunctional grid (through stand-alone systems, mini-grids, captive solar). Solar energy can complement the grid (through grid-connected solar) and make it more efficient (through utility-enabled solar). Solar power in Nigeria could potentially attract up to $8.5 billion of private investment by 2030. Such investment can address Nigeria's electricity deficit and unreliability while boosting the private sector productivity and competitiveness, economic diversification and job creation. Solar investment could scale independently of the existing grid, although a functional grid would modify the delivery methods for some solar solutions. The government has acknowledged the vital role that expanding solar energy plays in achieving the country's nationally determined contribution (NDC), and this is reflected in its Medium-Term National Development Plan.

Investment in the agriculture and agro-processing sector can be transformative. The processing of cassava into its various derivatives is already profitable, attracting investors keen to capitalize on Nigeria's large and growing domestic market. Similarly, Nigerian soybeans command a premium internationally as they are a non-GMO (genetically modified organism) crop for which there is strong export demand, and as an input to animal feed in the growing domestic livestock industry. These crops align with the government of Nigeria's goals for economic diversification and food security which means that reform feasibility is high. Policy actions to address constraints can attract additional investment in agro-processing in cassava and soybean contributing to job creation and economic diversification.

The selected sectors have the potential to attract new private investment if the identified binding constraints are addressed by the government. Table 2.2 presents an estimate of the potential of the selected sectors to attract increased private investment. These estimates, which are based on simplified assumptions, are computed against the backdrop of significant data limitations and are therefore subject to great uncertainty. They are, however, useful for illustrative purposes, emphasizing the potential of the selected sectors to contribute significantly to the overall growth and development of the country.

Table 2.1

Sector selection criteria

Potential to attract investment	Development impact potential	Feasibility of removing constraints
Broadband/fiber-optic network		
Competitive advantage due to Nigeria's large population and regional business hub status Strong market demand driven by increasing mobile, internet, and cloud services Untapped consumer demand with low broadband penetration (43.5 percent)	Create quality jobs and improve productivity that would enable the transformation of key sectors driving the economy Improve national productivity by enabling digital services for businesses, government, and consumers Enhance access to education, healthcare, and government services through digital platforms Reduce the urban-rural digital divide, increasing equity in access Enhance Nigeria's position as a competitive player in the global digital economy.	Government openness to put in place enabling policy reforms with the private sector Government-backed initiatives indicate clear prioritization.
Pharmaceutical manufacturing		
Strong demand in Nigeria for hypertension, diabetes and oncology drugs Proven competitiveness in respiratory drugs, antimalarials, anti-biotics, and in vitros/injectables, which Nigeria already exports Recent policy changes to support sector expansion	Improve the overall quality and standards of Nigerian pharma manufacturers: – Improve their cost effectiveness, their product quality, their level of staff training, and the competitiveness of their products, both domestically and regionally Increasing Nigeria's exports of pharma and forex earnings Contribute to economic diversification and job creation.	Reform appetite exists for pharma and related industries like API manufacturing, given the government stated priority as part of its diversification strategy Recent reforms to Nigeria's to National Health Insurance Act corroborate federal government's willingness to strengthen healthcare coverage and outcomes, holistically.
Solar energy		
Growing demand for electricity with an unreliable grid not being able to meet demand	Significant development multipliers by improving access to reliable electricity, such as increased productivity from SMEs due to reduced downtime from blackouts,	Supportive government policies on renewable energy (solar) Higher regulatory and financing feasibility than other power sources.

(Table continues next page)

Table 2.1

Sector selection criteria *(continued)*

Potential to attract investment	Development impact potential	Feasibility of removing constraints
	Increased agricultural productivity through water pumping and cold storage; improved education through lights that allow children to study at night; reduced air pollution and greenhouse gas emissions; and improves security through street lighting.	
Cassava and soybeans		
Abundance of arable land and water resources Large and growing market for processed cassava and soybeans Contract farming led by processors has attracted private investment and can be scaled	Increase productivity and production; increase plant utilization and private investment in high-quality cassava and soybean derivatives: animal feed, cassava flour, ethanol, and cassava-based adhesive Diversify economy into high-value-added industrial processing Increase export earnings and foreign exchange reserves Improve food security and job creation.	Important for food security. Strong government commitment to food security and economic diversification.

Table 2.2

Potential increases in private investment, by sector

Potential cumulative investment and jobs created by 2030	Approach[a]	Assumptions
Broadband/fiber-optic network		
Potential investment: $900 million to $4 billion **Potential jobs:** 200,000 to 229,000 jobs	Expected investment is based on the additional non-duplicative fiber-optic that would be required to achieve Nigeria's National Broadband Plan's objective of 70 percent broadband penetration rate for unique individuals above age 15. Estimated impact based on official the adoption of proposed policies to create a conducive investment environment. Jobs include both direct and indirect jobs, following the methodology presented in the Poulsen study on ICT infrastructure and jobs.[b] Additional jobs are estimated at about 229,000, based on estimated additional output of $5.4 billion by 2030 (using the 3 percent increase in GDP every ten years) and estimated total employment multiplier of 42 jobs for every additional $1 million increase in output.	Requires $1.5 to $2 billion investment in dark fiber-optic ($3 to $4 billion for lit fiber-optic networks) Implementing the right-of-way fee cap of N145 per linear meter across all states would increase investment and boost GDP by up to 3.7 percent over 10 years, while reducing subsidies required to support expedited fiber deployment in rural areas by $800 million, even if no other reforms are implemented.
Pharmaceutical manufacturing		
Potential investment: $1.1 billion to $1.6 billion by 2030 **Potential jobs:** 30,000 to 44,000	Estimated level of investment is based on the Nigerian government's stated objective of manufacturing 50 percent of the country's local requirement of pharmaceuticals by 2030. These figures include both the capital expenditure and working capital investments required to reach the targeted manufacturing levels per above.	The provisions of the updated National Health Insurance Act mean a significantly enlarged demand pool of pharma-product consumers in Nigeria, will address the demand side concerns previously held by pharma-manufacturers. Market projections based on UN Comtrade database, local news, consultations with domestic firms, and BMI forecasts.
Solar energy		
Potential investment: $3 billion to $8.5 billion **Potential jobs:** 129,000 to 365,000	Estimates are based on an increase in energy access and reliability from investments in distributed solar capacity by 2030. Estimated cost-competitive investment based on current Nigeria solar versus conventional electricity generation costs across four proven solar business cases: (1) captive power at existing factories,	Unmet demand: Nigeria's electricity market currently has an unmet demand of 17 to 20 gigawatts, according to data from RMI, IFC assessments, and stakeholder interviews. Capex: Projections assume a range of per watt capex from $1 to $2 per watt peak for most solar installations, depending on project economies of scale, and aligning with

(Table continues next page)

Table 2.2

Potential increases in private investment, by sector *(continued)*

Potential cumulative investment and jobs created by 2030	Approach[a]	Assumptions
	(2) utility-enabled power reaching customers poorly served by insolvent distribution companies, (3) utility-scale electricity limited to hybridization at existing and pipeline hydropower, and (4) expected energy access deployment under the World Bank Nigeria Distributed Access through Renewable Energy Scale-Up (DARES) program.	market trends and proposals for scaling solar investments over the next five years. Cost-competitiveness of solar: Levelized cost of energy comparisons show solar is more economical than gasoline/diesel generators and natural gas at all scales—utility projects, industrial systems, and remote off-grid power. DARES program leverage: The program is expected to attract over $1 billion in private capital for off-grid and grid-enabled solar deployment (World Bank analysis).
Cassava and soybeans		
Cassava **Potential investment:** $3.2 billion to $4.0 billion **Potential jobs:** 185,600 to 232,000 ***Soybean*** **Potential investment:** $1.60 billion to $2.0 billion **Potential jobs:** 89,600 to 112,000[c]	***Cassava*** Estimated investment based on adequate supply of raw cassava to processors, enabling increased plant utilization and attracting private investment in high-quality cassava flour,[d] ethanol,[e] and cassava-based adhesive.[f] ***Soybean*** Estimated investment based on a robust supply of soybeans to processors and exporters, driving investment in producing soybean meal for animal feed, oil, and exportable soybean grain.	***Cassava*** As a result of the recommended reform, cassava yields increase from 8.2 MT/ha to approximately 12.8 MT/ha, increasing total production to about 94 million MT/ha without increasing the size of the cultivation area.[g] Increased supply of raw cassava to processors doubles capacity utilization from 35 percent to 70 percent and it is assumed leads to a doubling of investment. ***Soybean*** Soybean yields double with the recommended reform actions, from 1 MT/ha to 2 MT/ha, increasing production from 1.3 million MT to approximately 2.6 million MT. Adequate supply to soybean processors increases production of animal feed, oil, and soybean grain for export, boosting investment in the sector to twice its current levels.

a. See appendix D and E.
b. Hjort and Poulsen (2019).
c. See appendix E.
d. Iwelumo et al., "Harnessing the Economic Potential of Cassava Production in Nigeria" (2020).
e. The Nation (2019).
f. Iwelumo et al., "Harnessing the Economic Potential of Cassava Production in Nigeria" (2020).
g. Iwelumo et al., Responding to the Impact of COVID-19 on Food Security and Agriculture in Nigeria" (2020).

3

Broadband/ Fiber-Optic Network

AT A GLANCE

- Nigeria's fiber-optic infrastructure presents significant private investment opportunities, with the potential to generate $5 billion in tax revenue and create up to 229,000 jobs.
- With a large population and a growing entrepreneurial ecosystem, Nigeria has the potential to become a regional leader in digital infrastructure.
- There is a large untapped demand for broadband in Nigeria, and expanding fiber-optic networks can meet this demand while accelerating the country's digital transformation.
- The government is seeking financing for a proposed $2 billion investment to deploy a national intercity fiber-optic network backbone.
- To unlock ICT private sector investment opportunities, there is a need to reduce right-of-way fees, enforce critical infrastructure protections laws and strengthen infrastructure sharing.
- Nigeria's data-center sector, already the second largest in Sub-Saharan Africa, could be poised for rapid growth, driven by increasing demand for cloud services, mobile traffic, and e-commerce. However, this potential will remain largely untapped unless the country's electricity constraints are effectively addressed.

3 Broadband/ Fiber-Optic Network

3.1 Sector Context and Opportunity

The Nigerian telecommunications market, the second largest in Africa, represents a significant investment opportunity.[39] Revenue in the Nigerian communication services market is estimated at $18.8 billion in 2024, with the mobile data market representing $12.4 billion of that market in 2024. Revenue is expected to show an annual growth rate (compound annual growth rate 2024 to 2028) of 6.17 percent, resulting in market revenue of $23.9 billion by 2028.[40] Investment in fiber-optic networks offers substantial opportunities for investors by providing foundational infrastructure to support the digitalization of the broader Nigerian economy. Investment in telecommunications infrastructure has recently been affected by the devaluation of the naira, which caused a gap between the higher costs of equipment priced in US dollars and the lower revenues operators earn in naira. This mismatch makes it harder for operators to afford necessary investments, as their income in local currency no longer covers the cost of imported goods. The Federal Ministry of Communications, Innovation and Digital Economy is seeking financing for a proposed $2 billion investment in fiber networks using a special-purpose vehicle to encourage private operator investment to extend non-overlapping fiber-optics networks to a total of 120,000 kilometers (km).

Limited broadband penetration points to an attractive investment opportunity. While the presence of mobile service providers has expanded mobile connectivity,

broadband access remains constrained. Nigeria's 35,000 km of fiber-optic backbone is mostly deployed by four mobile network operators (MNOs). Mobile connections dominate the market, with approximately 163 million active mobile internet subscriptions.[41] By contrast, the country has just 94 million broadband internet subscriptions. The combined fixed and mobile broadband penetration rate is only 43.5 percent,[42] compared to 68 percent in South Africa or 61.5 percent in Egypt.[43] This low broadband penetration indicates a clear demand for expanded access, as evidenced by the disparity between Nigeria's urban (18 percent) and rural (2.4 percent) household internet access rates.[44] Additionally, Nigeria's gender gap in mobile internet usage—where women are 38 percent less likely than men to use mobile internet—is greater than the 19 percent gap in lower-middle-income countries.[45] This gender gap highlights a potential consumer base—women—that could be tapped with greater investment. Closing these access and usage gaps would not only meet an existing demand but would enable digital growth and wider social and economic inclusion. Thus, Nigeria's broadband landscape offers a strategic entry point for infrastructure investors seeking to tap into an undersupplied, high-growth market.

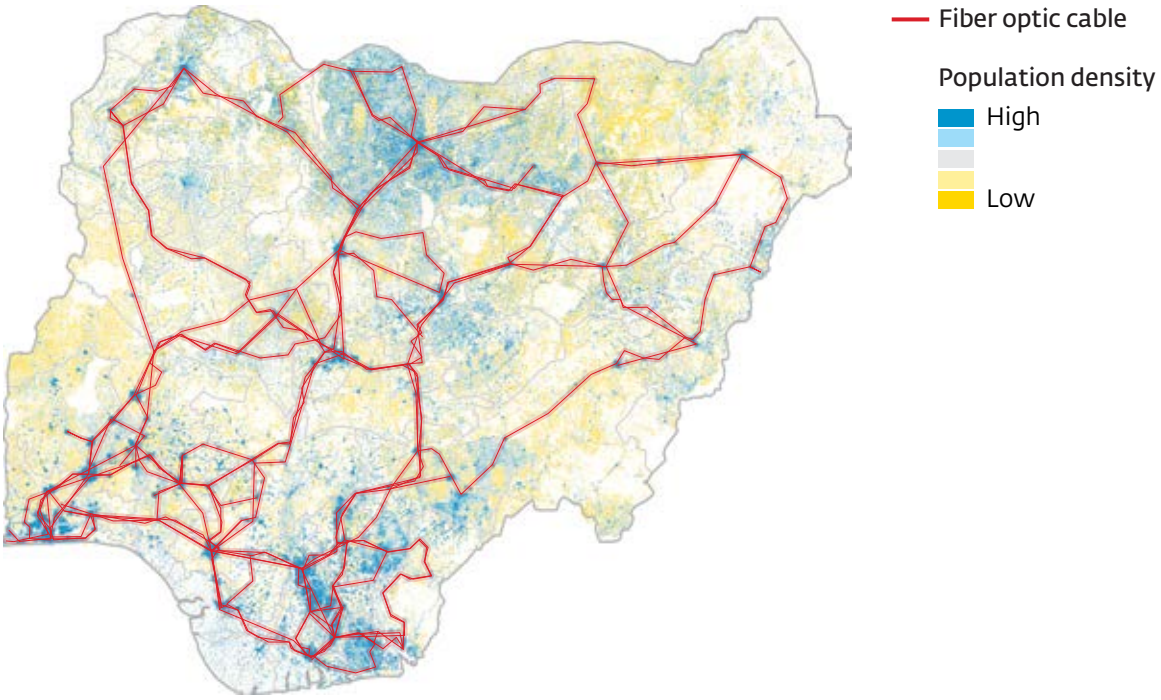
Nigeria's inter-city fiber network is limited by the absence of shared, well-regulated wholesale access, which restricts broader connectivity and drives up costs. Fiber-optic networks provide the foundational digital infrastructure needed to enable a virtuous circle of infrastructure investment, digitalization, and economic growth. Although eight international submarine cables land in Lagos, less than 10 percent of this capacity is currently used domestically.[46] The fiber network architecture needed to transport connectivity inland is largely deployed by four MNOs, who largely build their own fiber-optic network infrastructure. Consequently, smaller providers face high fees or limited options for accessing these essential fiber-optic routes, effectively restricting competition and connectivity inland. As the maps below indicate, this independent infrastructure development has resulted in multiple overlapping fiber-optic links on main intercity routes, with limited connections to inland population centers. Addressing this issue with more accessible and regulated wholesale access could help balance network distribution, improve competition, and extend connectivity to underserved regions. To address the need for financing of inland connectivity, the Federal Ministry of Communications, Innovation and Digital Economy is seeking financing for a proposed $2 billion investment in fiber-optic networks using a special-purpose vehicle to encourage private operator investment that will extend non-overlapping fiber networks to 120,000 km.[47]

Nigeria's rapidly growing demand for data-storage and processing also creates investment opportunities in nationwide data-center capacity, but this will remain largely untapped if the electricity constraints are not effectively addressed. The Nigerian data-center market is expected to experience substantial growth, with revenues

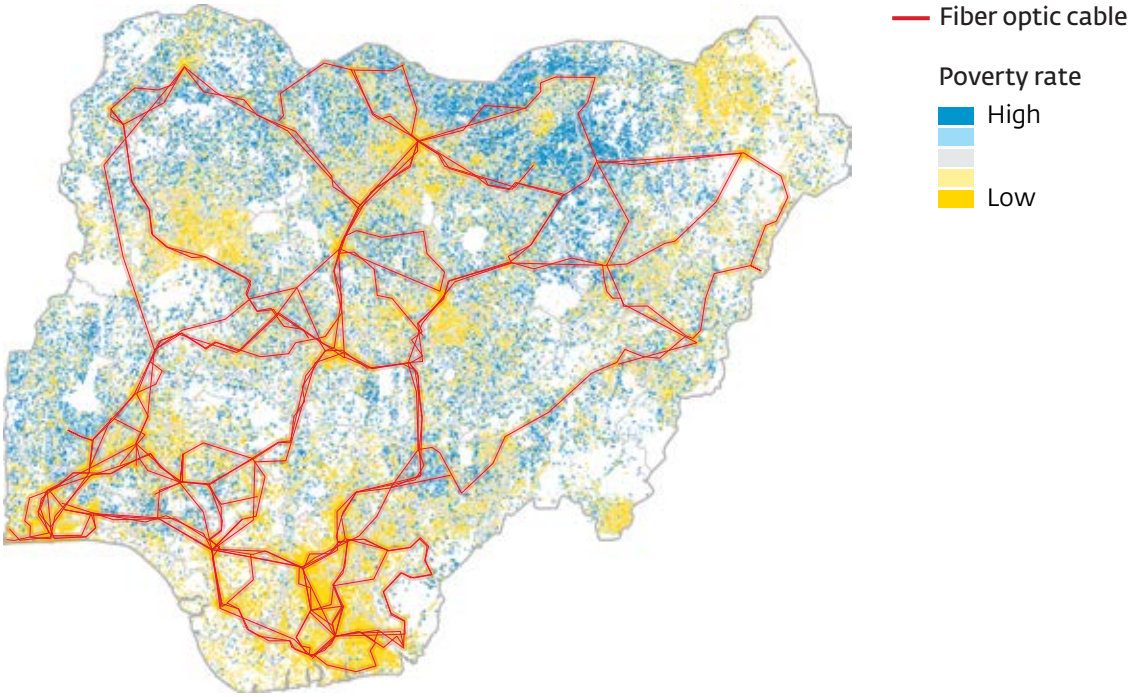
Figure 3.1

Nigeria's fiber network coverage is concentrated in coastal regions with gaps in other areas

a. Fiber infrastructure and population density



b. Fiber infrastructure and poverty rate



Source: Based on IFC (2021) and data from UN-OCHA Humanitarian Data Exchange, Meta Relative Wealth Index, and ITU Infrastructure Connectivity Map databases.

projected to reach $973 million by 2032, up from $648 million in 2023.[48] Data centers form the backbone of cloud and data infrastructure and enable the storage and processing of large data volumes, but they are highly energy intensive. They require a consistent and reliable power supply to ensure uninterrupted service. In Nigeria this poses a significant challenge. The Nigerian data-center sector could grow quickly, with projections and recent activity suggesting it may soon reach a "tipping point" similar to South Africa's position about a decade ago, when the country saw a surge in hyperscaler[49] capacity, transforming it into Africa's leading data-center location, but reliable power will be critical.

3.2 Constraints to Private Investment and Recommendations

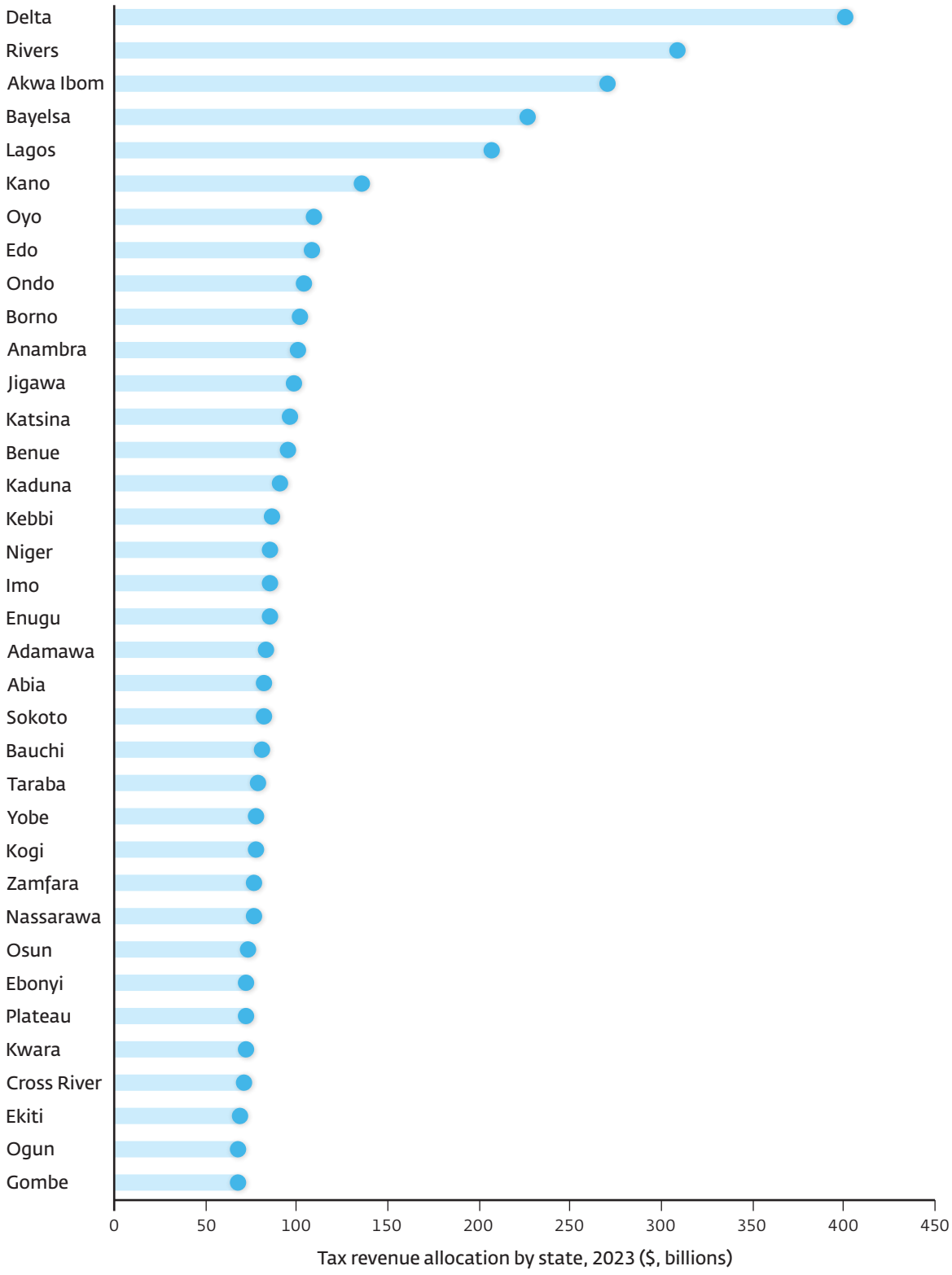
CONSTRAINT 1. Deployment of ICT infrastructure in Nigeria is characterized by high and unpredictable right-of-way fees,[50] levies, and other costs, including electricity charges. Right-of-way fees vary significantly by state (figure 3.2).[51] They often represent 30 percent of fiber-optic network deployment costs, reaching up to 70 percent in some states. This creates high barriers to entry for new operators and investors. In 2013, the National Economic Council (NEC) adopted a resolution establishing a maximum right-of-way rate of N145 per meter for fiber-optic network deployment. There are 24 states that have adopted the right-of-way cap through an executive order or regulation. Nigeria's debilitated and unstable electricity sector infrastructure adds to the uncertainty around the operating cost of fiber-optic networks.

RECOMMENDATION 1. States should be encouraged to comply with the NEC's commitment to a maximum of N145 per meter right-of-way fees. This right-of-way reforms are being prioritized by the government through the National Broadband Alliance for Nigeria and the State Action on Business Enabling Reforms (SABER) program. By participating in the SABER program, states receive financial incentives and technical assistance from the federal government to implement this cap and develop transparent procedures for obtaining rights of way. Implementing the right-of-way fee cap across all states could reduce the cost of national network rollout by an estimated 15 percent,[52] increase GDP by 3.7 percent over 10 years,[53] and reduce the subsidies required for fiber-optic network deployment in rural areas by $800 million over the same period, even if no other reforms are implemented.[54]

CONSTRAINT 2. Regulatory instruments and enforcement by the Nigerian Communications Commission (NCC) can be improved. NCC does not effectively enforce the regulations needed to support the development of a robust competitive wholesale access market. The sector's licensing framework is outdated with 26 categories of individual telecom licenses and six class-license categories. Most large telecom operators hold multiple licenses, which allow them to operate both in the wholesale and

Figure 3.2

Right-of-way charges vary greatly by state



Source: Harvey et al. (2024).
Note: The chart shows total right-of-way cost by state relative to the lowest cost state (Ekiti) which is set equal to one. Cost includes the standard annual right-of-way fee plus additional charges. such as reinstatement charges.

retail markets. This can create conflicts of interest and reduce competition, as large MNOs may impose price squeezes on new entrants and smaller players.

RECOMMENDATION 2. NCC should regularly analyze competition in wholesale telecom markets and impose relevant regulatory obligations on identified dominant operators. NCC needs to promote access to wholesale fiber-optic infrastructure at reasonable cost and encourage competition from new wholesale-only fiber-optic operator market entrants. This includes the adoption of statutory obligations[55] requiring NCC to complete market analysis on a defined and timebound schedule, which must occur at least every five years.

CONSTRAINT 3. Vandalism, theft, extortion, and damage from road construction cause fiber-optic network cuts that require expensive repairs and contribute to revenue losses by MNOs. Damaged cables are estimated to have cost two large Nigerian operators close to $23 million in 2023.[57] These incidents are frequent and widespread, with an average of eight fiber-optic network cuts per day. Vandalism and theft lead operators to invest in duplicative fiber-optic network links to provide redundancy in case of fiber-optic network cuts, adding to operational costs and contributing to market inefficiency.

RECOMMENDATION 3. To minimize incidents of vandalism, theft, and extortion, ensure the effective execution and monitoring of the Designation and Protection of Critical National Information Infrastructure (CNII) Order, 2024, designating telecom networks as critical national infrastructure. The CNII Order provides for federal prosecution of crimes, rather than prosecution by state or local governments, substantially increasing the penalties and potential for effective prosecution; the Office of the National Security Adviser is tasked with implementation of the CNII Bill. Prosecution of offenders must be swift, with strict penalties applied to deter vandalism and theft. Community partnerships should also be fostered through awareness campaigns and incentives to encourage reporting of threats and promote local support for infrastructure protection.

CONSTRAINT 4. Macroeconomic instability, high interest rates, and currency devaluation reduce access to affordable infrastructure financing. ICT infrastructure investments are capital- and import- intensive, with long project lifetimes with operator revenue denominated in naira. Although large multinational operators can obtain funding from their parent companies, currency risk is high. Moreover, loans in naira typically have floating rates, adding to interest rate and rollover risks. Smaller operators are often unable to access funding.

RECOMMENDATION 4. Adopt financial mechanisms to de-risk private investment in ICT infrastructure. Such investment initiatives, which can include public private

partnerships, should be led by the private sector in order to reduce duplication of infrastructure and encourage large and small telecom operators to invest in markets outside of Lagos. Fiber-optic network infrastructure deployment done jointly with the electricity distribution grid, railroads, and pipelines can achieve substantial economies of scale by pooling resources and investments, thereby lowering the per-unit cost of fiber-optic network deployment. Smaller operators can benefit from reduced costs when leasing capacity or accessing the network.

Table 3.1

Policy recommendations to remove impediments to private investment in broadband fiber-optic infrastructure

Constraint	Recommended actions
High, variable right-of-way fees, levies, and informal charges increase costs of fiber-optic network deployment beyond the industry standard.	Encourage states to comply with the National Economic Council's commitment to a maximum N145 per linear meter right-of-way fees.
	Responsible government entities: State governments.
Large MNOs that deploy inter-city fiber networks are not required to provide access to smaller operators, who must then deploy duplicative fiber networks to reach underserved regions. **Large MNOs with extensive fiber networks squeeze local operators out of the retail market by providing wholesale access at high prices.** **Smaller operators lack cost-based access to key inter-city routes, leaving local network investments stranded and unprofitable.**	Strengthen the Nigerian Communications Act, 2003 or its regulations, to require the Nigerian Communications Commission (NCC) to carry out market analysis on a defined timebound schedule and impose, monitor and enforce regulatory obligations on dominant operators. NCC to complete market analysis of inter-city leased lines and dark fiber-optic in 2026 and impose and enforce regulatory obligations[a] on dominant operators.
Frequent vandalism, extortion, theft, and damage from road construction are expensive to repair and contribute to operator revenue losses. **Current penalties for theft or vandalism are low and not enforced.**	Ensure effective execution and monitoring of the Designation and Protection of Critical National Information Infrastructure Order, 2024, adopted in August 2024, designating telecom networks as critical national infrastructure.
	Responsible government entities: Office of the National Security Advisor, federal government.

a. Obligations include cost-based pricing, separate accounting, transparency, and non-discrimination, including publication of Reference Access Offer (RAO) to be approved by NCC and copies of all signed RAOs.

4

Pharmaceutical Manufacturing

AT A GLANCE

- Nigeria is a strong regional hub for pharmaceutical manufacturing, despite the various economic challenges the country has undergone. The industry had growth of 9.1 percent compound annual growth rate over the past six years and receives continued investment in spite of the macroeconomic issues the country faces.
- The large population represents a readily attractive potential market for pharmaceuticals. Large-scale reforms to the universal health coverage (UHC) system are accelerating this expansion, as a significant number of Nigerian workers who currently have no health insurance, will soon be mandatorily covered under a properly functioning health insurance scheme, thereby increasing the pool of customers available for ready uptake of pharma products. Furthermore, Nigeria's regional integration within ECOWAS presents potential opportunities for increased exports, especially for products like antimalarials, respiratory drugs, antibiotics and in vitro drugs, all of which Nigeria is producing and exporting competitively already. Additionally, we note that manufacturing of drugs for non-communicable diseases (NCDs),

in particular medicines for hypertension, diabetes, and cancer, are a key focus area within the Nigerian pharma-sector for investment focus. NCDs have shown strong growth in our assessments, and there are limited local producers currently focusing on it.

- However, Nigeria's pharma-landscape is complex and fragmented, and even though it has ambitions to grow its local production capabilities, the reality is it is a heavily "import-dependent" sector, hamstrung by a number of dysfunctional systems. The inconsistent application of duties hinders the import process and results in longer clearance times, additional costs and financial uncertainty for producers.
- The National Agency for Food and Drug Administration and Control (NAFDAC) has made significant strides to advance its level of operational oversight. But it is hamstrung by limited expertise and insufficient resources to properly discharge its regulation activities, leading to long delays in new drug dossier approvals. Strengthening NAFDAC's capacity and improving its efficiency will help unlock growth of the sector.

4 Pharmaceutical Manufacturing

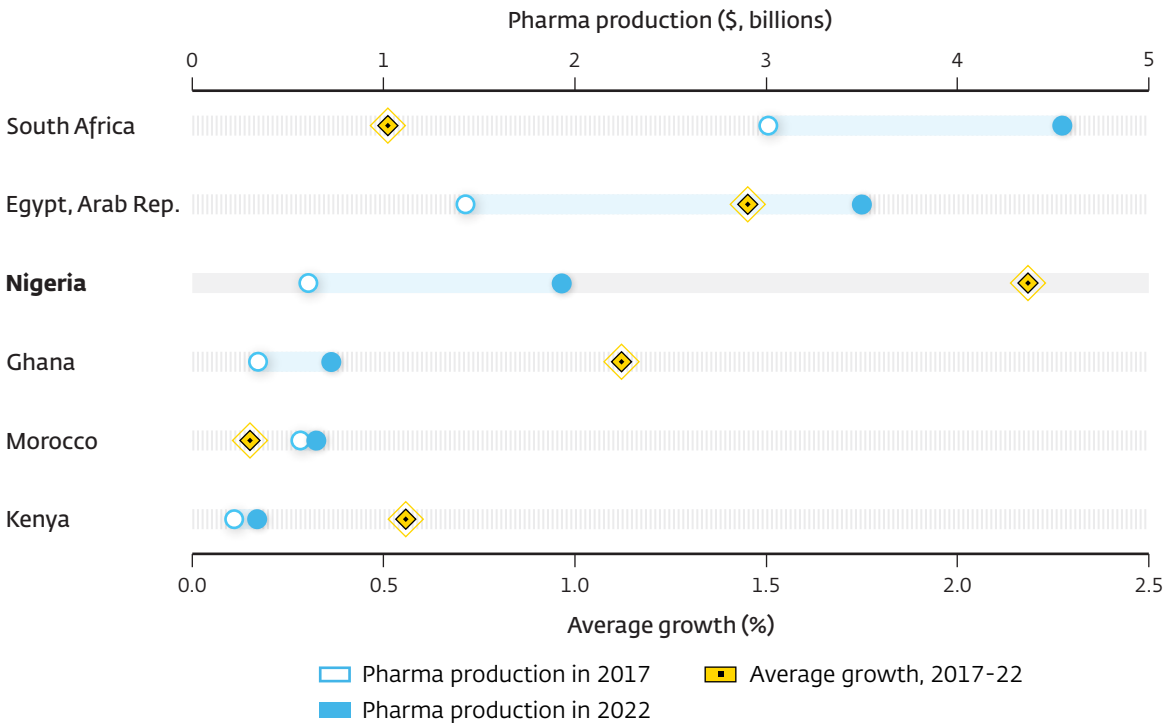
4.1 Sector Context and Opportunity

Nigeria's pharmaceutical sector has substantial potential to attract private investment and create jobs. In 2023 pharmaceutical sales were $2.03 billion,[59] representing 14.6 percent[60] of healthcare spending, and for the period 2016 to 2023, sales grew at a seven-year compound annual rate of 9.1 percent.[61] Although about 70 percent of pharmaceuticals consumed in Nigeria are imported,[62] production in the country more than doubled between 2018 and 2024, and the number of pharmaceutical firms operating in the country rose from 115 to 186 during this period (figure 4.1). Ongoing large-scale reforms to the UHC system are further accelerating this expansion, including though distribution networks into rural areas.

Sustained implementation of UHC reforms presents opportunities for growth of local manufacturing with the deployment of the Essentials Drug list. According to Danzon (2014), Nigeria's pharmaceutical market, like most pharmaceutical markets in developing economies, differs from those of industrialized countries. Domestic pharma manufacturing in countries such as Indonesia and Thailand for example, are sustained by huge offtake markets for medicines, buttressed by health insurance and high government spending on healthcare. The UHC Scheme in Thailand includes coverage for medicines on the National List of Essential Medicines.[63] Similarly, an e-catalog system in Indonesia has led to an efficient medicine production and supply system (via local pooled procurement structures)

Figure 4.1

Pharma production in Nigeria has grown rapidly relative to peers



Source: Euromonitor.

in the Indonesian Jaminan Kesehatan Nasiona program, i.e., Indonesia's UHC system. The scale of insurance and the level of government spending is a core reason that the financing arrangements for local pharma manufacturing in these countries is stronger. Another opportunity in Nigeria is provided through large public health programs. Increased public financing provides an opportunity to use innovative procurement strategies, whereby the government uses public health procurement to shape the local industrial development trajectory.

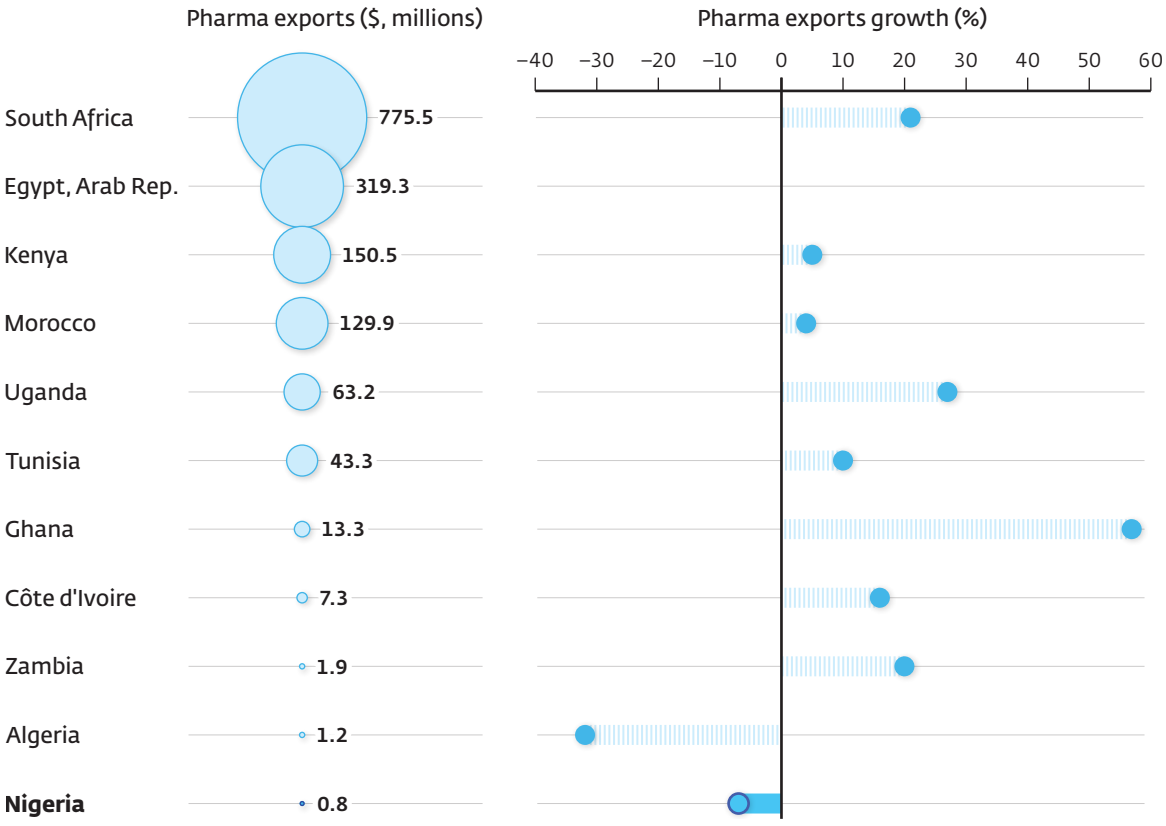
The shift in the disease burden to NCDs creates new therapeutic needs that can be met on commercial terms by pharmaceutical manufacturers in Nigeria. According to the World Health Organization (WHO), the demand for medicines for noncommunicable diseases such as diabetes and heart disease in Nigeria and Africa, is expected to grow significantly over the next ten years. NCDs medications such as antihypertensive drugs, lipid lowering drugs, and antiplatelets are among the most frequently used cardiovascular medicines globally.[64] Hypertension is the most common cardiovascular disease (CVD) in Nigeria, found in 86.4 percent of CVD patients, and is prevalent in one-third of adult Nigerians.[65, 66]

Regional integration within ECOWAS presents additional opportunities for pharmaceutical manufacturing and export, particularly if further strengthened by harmonized regulations. Nigeria's pharmaceutical sector currently focuses on the domestic market, with limited exports. This contrasts with regional peers like South Africa, Egypt, and Kenya (figure 4.2). There are, however, a range of drugs that Nigeria has been able to produce and export to neighboring countries, demonstrating the country's capacity to produce pharma products that are regionally competitive (see appendix F). Nigeria's pharmaceutical export strategy should concentrate on producing for export its more complex and diversified drug formulations that its neighbors cannot produce, especially those in the following core therapeutic sectors where Nigeria has already demonstrated competence and competitiveness: (i) antimalarials; (ii) antibiotics; (iii) expectorants; (iv) analgesics; (v) large and small volume injectables/parenteral; and (vi) antidiabetic and antihypertensive solutions for NCDs.

The Nigerian pharma-landscape is complex and fragmented. Most manufacturing firms rely on imported inputs to produce drugs on the essential medicines list and have a limited

Figure 4.2

But exports are low and declining

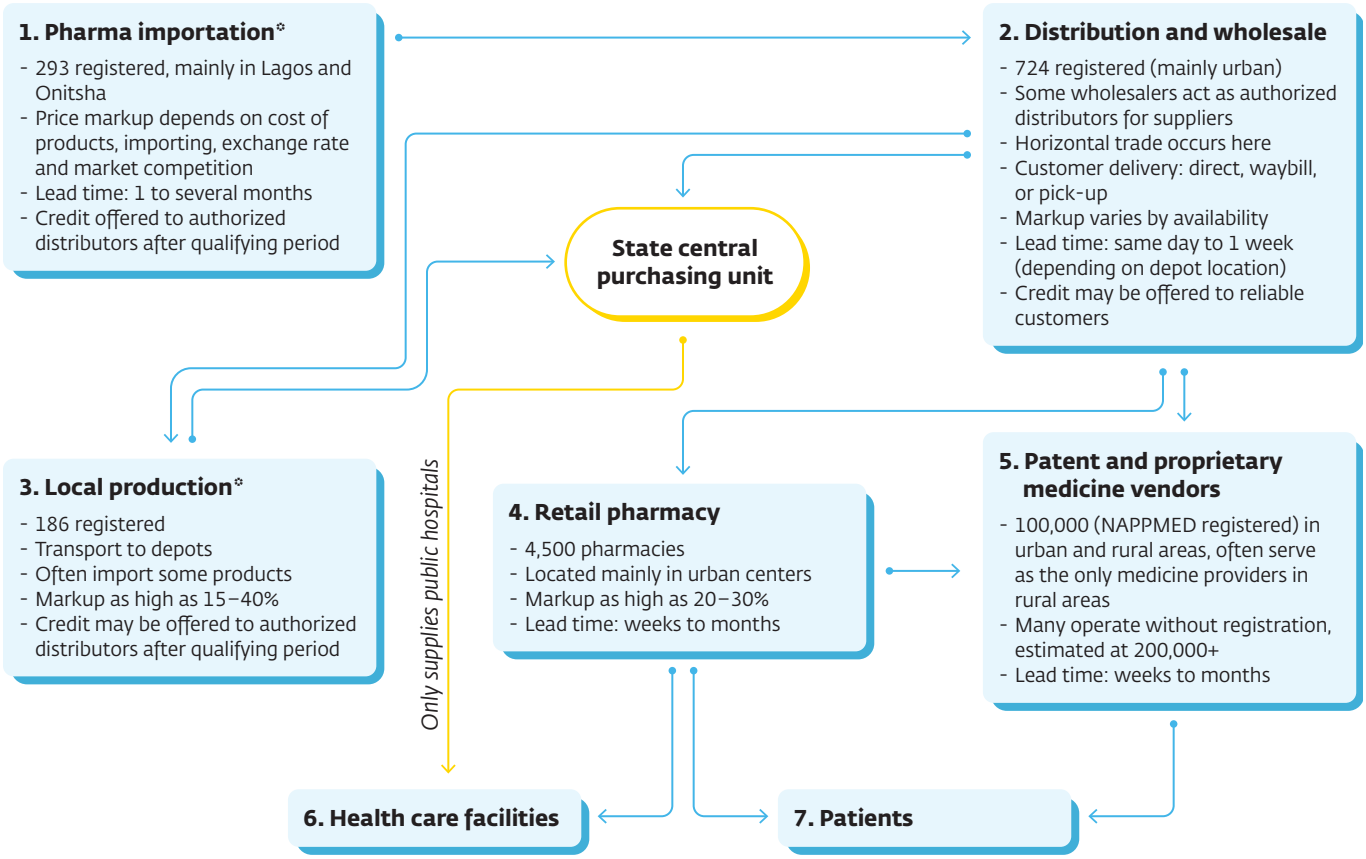


Source: ITC – UN Comtrade.

product range, meaning they collectively produce only one-third of Nigeria's essential medicines list, with the rest being imported. None produce inhalers or injection vials. All but 10 of the 186 pharmaceutical companies are Nigerian owned, and the Nigerian-based foreign-owned entities manufacture only about 10 percent of Nigeria's pharma products, according to estimates from the Nigerian Pharmaceutical Manufacturers Group. The remaining 90 percent of product comes from locally owned pharma-manufacturing entities. The sector is concentrated mainly in Lagos and Ogun states, with major distribution centers in Lagos, Onitsha, and Kano. Several distributors play crucial roles in the supply chain, including a few multinational distributors that represent several global pharmaceutical companies. Informal distribution channels which work mainly through patented and proprietary medicine vendors (PPMVs) can both assist and challenge access to rural markets for Nigerian manufacturers (figure 4.3): they provide efficient channels into hard-to-reach places, but sometimes market sub-standard products, or those outside the PPMV scope.

Figure 4.3

Product flow chart of Nigeria's formal pharmaceutical market



Source: Anadach market analysis.
*Only formally registered companies and may underestimate the size of the informal market.

Table 4.1

Snapshot of the top 10 Nigerian pharmaceutical products by market value, market volume and producer

S/no.	Name of company	Country or region of origin	Top therapy areas	Cumulative three-year market share by value (%)	Cumulative three-year market share by volume (%)
1	MNC A	Global MNC	J01 Antibacterials for systemic use	7.4	5.1
2	MNC B	Global MNC	C09 Agents acting on the renin-angiotensin system	4.4	1.4
3	MNC C	Global MNC	A11 Vitamins	4.3	1.7
4	Local co. A	Nigeria	J01 Antibacterials for systemic use	4.2	2.0
5	Local co. B	Nigeria	P01 Antiprotozoals	3.4	2.7
6	MNC D	Global MNC	J01 Antibacterials for systemic use	3.4	3.4
7	Local co. C	Nigeria	P01 Antiprotozoals	2.8	1.7
8	Local co. E	Nigeria	N02 Analgesics	2.7	14.6
9	MNC E	Global MNC	M01 Anti-inflammatory and antirheumatic products	2.7	0.9
10	Sub-regional co. A*	Sub-regional	A11 Vitamins	1.8	1.8

Note: MNC = multinational company.
*Sub-regional international pharma company mainly selling branded generics (mostly Indian entities).

Several international pharmaceuticals have begun manufacturing in the country in the past five years—albeit through toll-manufacturing[67] arrangements. Additionally, several foreign pharmaceutical companies have established scientific offices in Nigeria to focus on marketing, product information, and dissemination (table 4.1), as scientific offices

help foreign manufacturers to efficiently and effectively market and distribute drugs locally directly, i.e., without incurring the cost of engaging independent distributors who may lack commitment.

Toll manufacturing has emerged as a result of macroeconomic challenges and has expanded domestic production of pharmaceuticals. Exchange rate volatility and tightened access to foreign exchange over the past decade brought significant structural changes to Nigeria's pharmaceutical industry. This, among other reasons, led to the exit of some multinational companies, who faced persistent challenges in accessing foreign exchange for their supply chain needs, and for repatriating dividends. As these multinationals departed, the resulting supply gaps were addressed in two ways: (i) by outsourcing their imports to large Nigerian import distributors, or (ii) by signing toll-manufacturing agreements with proven local Nigerian pharma-manufacturers (which is what a few local manufacturers have done with the products of some multinational pharma-companies). These contract manufacturing developments have enabled Nigerian pharma-manufacturers to expand their product portfolios to include previously imported drugs, enhancing both depth and sophistication in the local industry. Funding these manufacturing plant expansions has come largely from incentivized low-interest rate loans provided by the Bank of Industry, which leveraged on the artificially, unsustainably low policy rates, as well as from commercial banks loans. Table 4.1 presents a cross section of the top Nigerian pharmaceutical companies by volume and by value, based on the three-year average to December 2023.

Strengthening domestic pharmaceutical manufacturing is a key objective of the federal government's Presidential Unlocking Healthcare Value Chains (PVAC) initiative. This PVAC initiative complements the government's efforts to fast track its UHC reforms and aims to shift the industry from being import dependent to having sufficient local production to meet 50 percent of local demand by 2030. PVAC's mandate is to support the economic potential of healthcare value chains by engaging private sector entities to: (i) understand bottlenecks preventing investment and sector development, (ii) facilitate the removal of key constraints inhibiting delivery of improved health outcomes, and (iii) maintain a register of existing investment opportunities in Nigeria's health sector value chains, for linkages to potential investors.

Local production is being incentivized by the "5+5 policy" adopted by the NAFDAC. This policy grants an importer an initial five-year drug registration[68] and distribution period that is renewable for an additional five years if certain requirements regarding setting up of local production facilities are met. It aims to enforce local production by transitioning imports to domestic manufacturing upon registration or renewal of drug-import licenses. For importers to continue selling their products in the country after the initial five-year registration period expires, they must show definitive progress toward initiating local production or partnering with Nigerian manufacturers via contract manufacturing. As a

result of this policy NAFDAC received plans from 57 import-distribution enterprises to transition to local manufacturing.[69] Per our analysis, NAFDAC's 5+5 policy has resulted in an estimated 15 to 30 percent increase in newly registered domestic pharmaceutical companies and has significantly increased capacity utilization of existing plants via contract manufacturing. Other recent developments in the pharma landscape include: (i) a partnership to conduct the first bioequivalence study in Nigeria, (ii) a strategic partnership on natural medicine with a local private university, (iii) a local manufacturer's attainment of WHO-prequalification for an additional product, and (vi) a presidential executive order introducing zero tariffs, excise duties, and VAT on active pharmaceutical ingredients (API), excipients, and raw materials for essential medicines and manufacturing of medical products for a period of two years.[70]

4.2 Constraints to Private Investment and Recommendations

CONSTRAINT 1. Unpredictable border procedures and frequently incorrect application of HS codes[71] lead to delays and high costs. The inconsistent application of duties by the customs and revenue agencies hinders the import process and results in longer clearance times, additional costs and financial uncertainties for producers.

RECOMMENDATION 1A. Digitize the customs clearance procedures through operationalization of the National Single Window to reduce human discretion and support the consistent and correct application of duties and fees by customs and revenue agencies. This will result in more efficient and shorter clearance times, and a reduction of additional costs and financial uncertainties for producers.

RECOMMENDATION 1B. Align Nigeria's HS codes with international HS codes, for all pharmaceutical products—raw materials, finished products, to facilitate accurate classification of products and reduce the number of products categorized as "other."

CONSTRAINT 2. The slow process of issuing new NAFDAC drug dossiers and new plant/line approvals creates a disincentive to scale. Local suppliers needing to register new drugs note that new product registrations can take up to 390 days (including market authorization), compared to India and China at just 210 and 230 days respectively (table 4.2).

RECOMMENDATION 2. To improve the efficiency of regulatory approvals, the federal government should improve NAFDAC's capacity to approve new drug dossiers and new pharma-plants more quickly—the number of registered Nigerian pharma-manufacturers increased by 53 percent from 2018 to 2023. NAFDAC's capacity and resources must therefore also be commensurately increased so it can approve new drug dossiers and new factories in shorter timelines, and so it can perform pharmacovigilance duties effectively in a growing market. It is also key for NAFDAC to

Table 4.2

Global comparison of drug approval processing timelines from selected countries versus Nigeria's

Country	Regulatory approval times for clinical trial authorization/investigational new drug application (days)	Timelines for marketing authorization application evaluation (days)
Australia	120 days	50 days
China	50	180
India	112 to 126	56 to 84
Nigeria	90 to 180	120 to 210
United Kingdom*	35	210
United States	30	180

Source: Patel, Parikh, and Shah (2012).
*By Centralized Procedure; MAA-Marketing Authorization Application, IND-Investigational New Drug, CTA-Clinical Trial Authorization.

improve its effectiveness in carrying out daily processes. This will require (i) an increase in training and resources to enable NAFDAC to effectively regulate the excipient and active pharmaceutical ingredient industry; (ii) digitization of the processes for receiving, reviewing and approving new drug dossiers; and new plants/lines; and (iii) increasing the number of accredited laboratories recognized by NAFDAC for testing of new drugs and products to facilitate applications and approval process.

CONSTRAINT 3. Uncertainty on the demand side means that Nigerian pharma-manufacturers are unwilling to expand production capacity in the absence of offtake assurances for their new products. The extremely limited number of Nigerians with adequate health insurance (only 5 percent of total population) mean that uptake of medicines by the general population remains limited as most healthcare is carried out on an out-of-pocket basis. This in turn, inhibits the pharma-manufacturers' appetite for increasing their production, as the demand side remains constrained.

RECOMMENDATION 3A. The NHIA, Federal Ministry of Health, and PVAC work with NAFDAC to update Nigeria's "Essential Drugs List" to ensure that drugs on the list become core production priorities for Nigerian pharma-manufacturers. This will build increasing demand for medicines, including the local pharma-manufacturers.

RECOMMENDATION 3B. NHIA to use structured local pooled procurement strategies to lower the cost of acquiring drugs on the "Essential Drugs List."

4.3 Additional Considerations

Lack of access to capital limits the sector's capacity to produce high-quality pharmaceutical formulations. Representatives of eight companies interviewed for this CPSD indicated that they need financing for new product lines.[72] Manufacturers require additional capital to produce new molecules. Replacement of aging plant is also critical, as only 15 percent of Nigerian manufacturers have facilities compliant with good manufacturing practices, undermining the sector's competitiveness (functional heating, ventilation and air conditioning systems, and upgraded water-purification systems are critical to achieving compliance with global quality standards). Therefore, without access to structured financing with complementary technical assistance packages to improve product quality and management systems, mid-tier and smaller players will be unable to scale-up and build the required competence to compete; and larger players cannot take informed risks. Larger pharmaceutical companies have expressed a need for financing amounting to $15 to $50 million each over the next five years to add new production lines or upgrade existing manufacturing lines. Investment capital for the mid-tier firms should be coupled with a requirement for them to upgrade their quality and manufacturing standards to meet certain internationally accepted standards (e.g., cGMP or WHO PQ, or ISO), as this enables them to grow and compete with the local and regional larger players and improve the quality of Nigerian pharma products.

Difficulties to source quality excipients[73] and active ingredients locally, limits the depth of product supply chains, and increases vulnerability of Nigeria and ECOWAS to external disruptions. Most active ingredients and excipients are imported from India, China, the United States, and Europe. As a result, during the COVID-19 lockdown when no imports came into ECOWAS for over six months, a paracetamol API shortage in Nigeria caused the price of paracetamol to skyrocket to four times the usual retail price. Despite Nigeria's capacity to grow reasonable quantities of cassava and maize, domestic production of excipients like pharmaceutical-grade starch and essential oils remains largely stalled, although some progress has been made on exploring local API production. Two local pharmaceutical manufacturers have carried out initial assessments of the feasibility of manufacturing APIs in Nigeria. One has already built an antimalarial API plant in Lagos, with a technology transfer and licensing agreement from their Indian manufacturing partner.[74] Additionally, post-completion of their excipients' feasibility study, NSIA signed a technology-transfer agreement with a leading Indian chemical-grade starch producer, to start Nigerian production soon.

Competitiveness challenges are exacerbated by the scarcity of skilled professionals with specialized pharma-sector expertise. Feedback from a survey of the top 10 manufacturers revealed a significant need to invest in training of new staff recruited from university before such staff can begin to gainfully contribute to activities in their companies. There is also need for well-trained pharma-regulatory staff at NAFDAC, to process the increasing workload on registrations and to conduct pharmacovigilance activities.

Other macro-level challenges with a direct impact on the sector including the unreliable power supply that has led manufacturers to depend on costly alternative energy sources, thereby increasing operational expenses and causing production inefficiencies. Manufacturers operate under difficult macroeconomic conditions that include high interest rates and rising production costs. Incentives such as NAFDAC's 5+5 policy and tax breaks from the federal and state governments remain in place to continue attracting new pharma-investment, but the task is a difficult one under this backdrop. Moreover, security concerns in certain regions have disrupted supply chains, elevating the risks and costs associated with transporting raw materials and finished products. Additionally, infrastructure deficiencies, such as poor road networks and congested ports, have caused significant delays in logistics, further hindering the sector's efficiency and competitiveness.

Table 4.3

Policy recommendations to reduce impediments to private investment in pharmaceuticals

Constraint	Recommended actions
Unpredictable border procedures lead to delays and high costs.	Implementation of the National Single Window; the Authorized Economic Operators Program and Risk Management Selectivity to improve clearance processes, including consistency in selection of the correct HS codes[a] and application of the corresponding duties and fees per product. This reduces discretion by customs officers to charge duties and fees that are outside the approved HS code set limits. The federal government of Nigeria to align HS codes in use in Nigeria to international HS codes, for all pharmaceutical products—raw materials, finished products, devices, equipment, instruments and other items in the healthcare value chain to facilitate accurate classification of products and reduce the number of products categorized as "other."

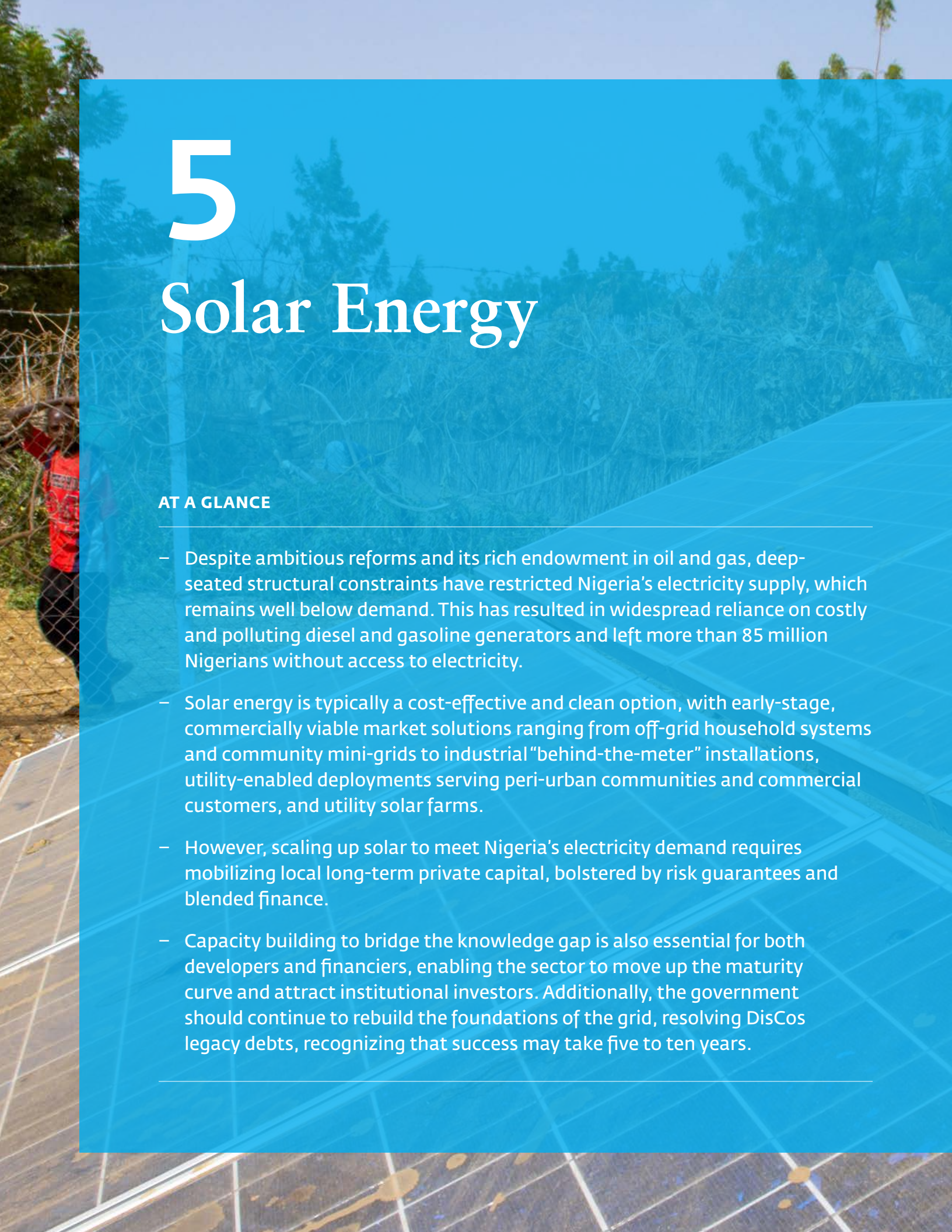
(Table continues next page)

Table 4.3

Policy recommendations to reduce impediments to private investment in pharmaceuticals *(continued)*

Constraint	Recommended actions
	Responsible government entities: NAFDAC; Ministries of (i) Health, (ii) Finance, (iii) Industry Trade and Investment; and Customs.
The slow process of issuing new NAFDAC drug dossiers and new plant/line approvals creates a disincentive to scale.	Following a full information technology system requirement assessment to identify the strengths and capacities of hardware and software necessary to properly support the digitization of all NAFDAC processes, NAFDAC should digitize processes for receiving, reviewing and approving new drug dossiers and new plants/lines, thus enabling them to process more applications in a shorter timeline. Increase staff training to enable NAFDAC to effectively regulate the excipient and active pharmaceutical ingredient industry. Increase the number of accredited laboratories recognized by NAFDAC for testing of new drugs and products to facilitate applications and approval process.
	Responsible government entities: Ministries of (i) Health, and (ii) Finance, and (iii) State Primary Healthcare Agencies; Medical Stores; State HMOs.
Demand side limitations due to the extremely limited number of Nigerians with adequate health insurance (only 5 percent of total population), mean that pharma-manufacturers are concerned (unwilling) to grow their production capacity in the absence of offtake assurances for their new products.	The NHIA, Federal Ministry of Health, and PVAC work with NAFDAC to update Nigeria's "Essential Drugs List" to ensure that drugs on the list become core production priorities for Nigerian pharma-manufacturers. This will build increasing demand for medicines, including the local pharma-manufacturers. NHIA to use structured local pooled procurement strategies to lower the cost of acquiring drugs on the "Essential Drugs list."
	Responsible government entities: FMOH, State Ministries of (i) Health, and (ii) Finance, and (iii) state primary healthcare agencies/state health insurance agencies; medical stores; HMOs.

a. The harmonized system (HS) code is a standardized numerical method of classifying traded products that are imported and exported around the world, in a globally-aligned way. It is used by more than 200 countries and economies around the world to identify and classify products when determining their treatment in customs tariffs and for gathering statistics.



5
Solar Energy

AT A GLANCE

- Despite ambitious reforms and its rich endowment in oil and gas, deep-seated structural constraints have restricted Nigeria's electricity supply, which remains well below demand. This has resulted in widespread reliance on costly and polluting diesel and gasoline generators and left more than 85 million Nigerians without access to electricity.
- Solar energy is typically a cost-effective and clean option, with early-stage, commercially viable market solutions ranging from off-grid household systems and community mini-grids to industrial "behind-the-meter" installations, utility-enabled deployments serving peri-urban communities and commercial customers, and utility solar farms.
- However, scaling up solar to meet Nigeria's electricity demand requires mobilizing local long-term private capital, bolstered by risk guarantees and blended finance.
- Capacity building to bridge the knowledge gap is also essential for both developers and financiers, enabling the sector to move up the maturity curve and attract institutional investors. Additionally, the government should continue to rebuild the foundations of the grid, resolving DisCos legacy debts, recognizing that success may take five to ten years.

5 Solar Energy

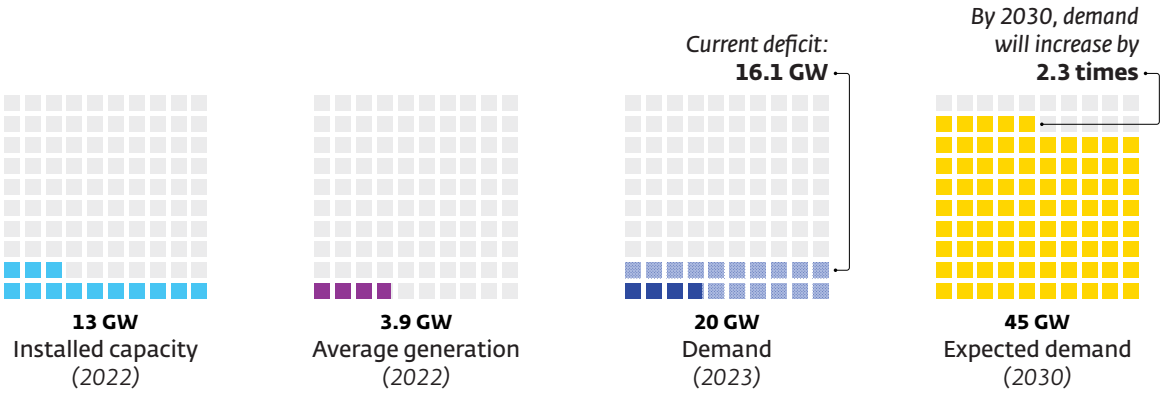
5.1 Sector Context and Opportunity

Nigeria's power grid meets just 19.5 percent of domestic demand. While some of the remaining demand is met through diesel generators, more than 85 million Nigerians are without access.[75] The country's annual per capita electricity consumption is among the lowest in Africa at 144 kilowatt-hours (kWh), compared with 351 kWh in Ghana and 4,000 kWh in South Africa.[76] Economic losses from lack of reliable electricity are estimated at N7 trillion to N10 trillion (around $25 billion) annually, or 5 to 7 percent of GDP.[77] The current demand for electricity is likely to more than double by 2030.[78]

Despite Nigeria's rich oil and gas resources, structural constraints have led to a large gap between the supply and demand for electricity. Notwithstanding many years of important reforms on tariff shortfall reductions by the federal government, more than 65 percent of installed generation capacity is unavailable to generate electricity, due to poor maintenance, age/obsolescence, and vandalism of gas pipelines, generation plants and transmission infrastructure (figure 5.1).[79, 80] Moreover, less than 20 percent of Nigeria's electricity comes from hydropower, and even this amount is subject to substantial reductions during the dry season (reductions that, as discussed later, solar electricity is particularly well-suited to complement hydropower). Grid supply has stagnated at less than 4 to 5 GW, against a demand estimated at around 20 to 24 GW mostly due to liquidity constraints in the sector resulting from contracts not honored, which led drastic

Figure 5.1

Nigeria's electricity demand will more than double over the next five years



Source: Based on data from World Bank (2023a); NERC (2022).
Note: It should be noted that these estimates are very conservative. There are various estimates from the World Bank, sustainable energy for all, A2Ei reports that put the capacity of the gensets to used address the electricity deficit at eight to 10 times that of the current grid capacity.

underinvestment. Businesses suffer daily power outages averaging eight hours, and the country endured 232 complete grid collapses between 2010 and 2023. Firms and households have been forced to put in place about 22 million private petrol and diesel generators to fill part of the gap in supply.

Private investment in Nigeria's vast solar potential of 210 GW can be profitable and, at the same time, an important piece of the solution to Nigeria's electricity woes.[81] It is cheaper than most competing options. Commercial-scale grid-tied rooftop solar costs about $0.10 per kWh, lower than the $0.127 per kWh that is charged to customers who receive "Band A" supply.[82] Solar systems paired with battery storage are very competitive with diesel generators, with costs ranging from $0.11 to $0.14 per kWh vs. $0.30 to $0.60 per kWh for diesel[83]—and without the noise and pollution associated with diesel. At utility scales, solar in Nigeria at auction is expected[84] to achieve price discovery of $0.07 or lower, which is competitive with the weighted average cost of generation (pool cost) of $0.07[85] and well below the cost of electricity from natural gas turbines ($0.10 to $0.18 per kWh).[86]

Solar power's drawbacks can be reduced. Intermittency—the fact that solar panels only generate power when the sun is shining—can be mitigated with lithium-ion batteries or backed up by existing natural gas and hydropower generation. Land requirements (about two hectares per MW), a challenge in densely populated regions or areas with competing land uses, can be mitigated through rooftop installations, using solar panels for parking lot shading, and in agro-voltaic applications in which solar is deployed above crops that benefit from partial shading.[87]

Nigeria's solar industry presents commercially viable investment opportunities amounting up to $8.5 billion cumulative by 2030. Solar power investments are already taking place but need to be scaled up significantly. The most viable value chains are isolated captive commercial and industrial (C&I) solar,[88] which can attract $6.5 billion of potential investments by 2030.[89] Utility-enabled solar, distributing solar energy with battery backup to peri-urban customers over leased distribution company lines, adds nearly $0.3 billion in private investment leveraged by the Nigeria Distributed Access through Renewable Energy Scale-up (DARES) program. Utility-scale or grid-connected solar is expected to represent a $1 billion of potential market investment by 2030,[90] replacing hydropower during dry seasons and making use of existing reliable transmission capacity nodes. The first of this type of utility-scale projects, representing about $20 million has been initiated at the Shiroro hydropower project in Niger state.[91] Stand-alone solar and isolated mini-grids under the DARES program[92] present an additional investment opportunity of $732 million by the end of 2028 in unelectrified areas.[93] These latter investments can rely on the private sector but would require targeting productive use of electricity (PUE) with government support for the poorest population. Details of these markets, and the assumptions behind the analysis, are discussed in table 5.1 below.

5.1.1 *Investment Opportunities by Business Model*

5.1.1.1 ISOLATED CAPTIVE GENERATION—C&I AND URBAN ROOFTOP

The market potential for isolated captive generation in Nigeria is driven by strong industrial and commercial demand, and by lower costs compared to traditional sources. Isolated captive generation supplies electricity directly to a single customer, typically in the commercial or industrial sector, by generating power on-site behind the customer's meter, and ensures reliability through battery storage or diesel backup. C&I users, institutions, and a growing number of urban households have adopted these solutions as a hedge against high diesel prices and tariff increases. The systems are owned outright by the customer or operated under a contractual arrangement. In 2015, C&I market demand in Nigeria was estimated at 10,713 GWh.[94] Growth in economic activity in the intervening years suggests that current market potential is even higher. Profitability derives from capturing a portion of customer savings with respect to diesel. When diesel is replaced by solar, a typical 1 megawatt-peak (MWp) solar project with battery storage in Abuja creates cost savings of $475,000 per year to be divided between consumers and the developer.[95]

The market potential for captive power is around $6.5 billion. A 2023 study by the Rocky Mountain Institute identified over 75,000 customers across Nigeria's 11 distribution companies (DisCos) categorized as maximum demand (MD) C&I customers; they already rely heavily on diesel backup generators. In addition, another 1.2 million non-MD customers were identified. Assuming that 100 percent of the MD and 5 percent (conservative assumption) of the non-MD customers were candidates for solar electricity,

Table 5.1

Investment is proceeding in five solar business models in Nigeria

Model	Description	Capacity	No. of users per project	Offtaker	Grid linked	Investable now?
Isolated captive C&I and urban rooftop	Developers offer solar PV and storage to satisfy the demand from wealthy urban households, commercial centers and industries. Financed by pay as you go or paid upfront.	10 kW to 10s of MW	1 to clusters	Consumers: urban wealthy households, C&I companies	No	***Very viable*** (finance constraints)
Utility enabled	Developers combine DisCos' energy supply with on-site solar PV and storage to provide 24 hours a day, seven days a week access. Payments to each party clearly differentiated.	100 kW to 10s of MW	100s to 10,000s	Consumers: usually urban and C&I companies	Usually	***Viable under DARES*** (subsidies and financing for developers)
Utility scale	Users are connected to the electricity network (if available).	>10 MW (usually 100s of MW)	Millions	DisCos and TransCo	Yes	***Viable in limited contexts*** (offtaker risk, network capacity constraints)
Stand-alone systems	Developers offer solar PV to satisfy minimum energy demand requirements in rural areas. Government subsidies support to increase access.	1 W to 2 kW	1	Consumers: rural, lower-income households	No	***Viable under DARES*** (subsidies and financing for developers)
Mini-grids	Developers offer solar PV and large storage for peri-urban or rural households, usually supported by government subsidies (e.g., NEP).	10s kW to MW	100s to 10,000s	Consumers: remote, lower-income households	No	***Viable under DARES*** (subsidies and financing for developers)

Source: IFC, SEforAll, RMI, and Nigeria solar sector stakeholder interviews.
Note: C&I = commercial and industrial.

the study calculated a market of nearly 170,000 C&I customers, totaling over 3.4 GW of demand and a market potential of $6.5 billion.[96] The study determines cost estimates per MW based on a cost engineering analysis of 20 C&I projects in Nigeria totaling 27 MW and with an investment cost of $43 million.[97]

Captive generation systems are already being installed in Nigeria. Examples of solar C&I projects already implemented include 10.3 MW of solar electricity across eight Nigerian Bottling Company factories and a 1.1 MW solar project in the steel sector.[98] Another company is building out a portfolio of 5 to 10 MWp solar C&I projects, adding to its portfolio of over 50 MW of gas-fired C&I generation. For C&I users, leading solar developers are offering finance to customers through power purchase agreements over periods of 10 to 20 years.

5.1.1.2 UTILITY-ENABLED SOLAR

The large potential market opportunity for utility-enabled solar in Nigeria, estimated at $0.3 billion, has generated strong interest from private investors. There is significant unmet demand from consumers who are looking for reliable energy solutions at a lower cost. In addition to providing reliable electricity, the utility-enabled solar model can turn DisCos' loss-making assets into profitable ventures through asset usage fees and supply agreements with solar developers. These projects use electricity from DisCos when available, mainly at night, and switch to solar, batteries or backup generators during outages. These models sell power directly to end users over lines leased from the DisCo, with revenues protected from DisCo payment risk. These projects are eligible for grid-connected mini-grid subsidies under the DARES program, with $296 million of private sector financing expected to be leveraged by the end of 2028, comprising $233 million under the minimum subsidy tender mechanism and $63 million under performance-based grants.[99]

Several private companies are investing in utility-enabled solar projects. A market pioneer is building a pipeline of 22 utility-enabled solar projects totaling 27 MW and representing $43 million in capital investment.[100] Another company has built a 350-kW utility-enabled mini-grid in the town of Toto, 100 km from Abuja. Demand has far exceeded expectations, and this company plans to increase capacity more than five-fold by the end of 2024. There are other players in this market segment. Innovations include sub-franchising models, where private companies improve and manage a portion of the distribution system on behalf of the DisCo in exchange for a distribution use-of-system fee.

5.1.1.3 UTILITY-SCALE SOLAR

Utility-scale solar refers to large grid-connected solar generation projects, ranging from tens or hundreds of MW to GWs. In Nigeria, the discussion usually identifies offtakers as the Nigerian Bulk Energy Trader (NBET) or DisCos. The modular nature of solar electricity allows for projects to start with relatively small capital expenditures, learn, and scale-up in the future. Since the passing of the Electricity Act of 2023, the policy and regulation of the power sector is now a responsibility of the states and hence all such projects will likely be at the state level and not with NBET, which is planned to either cease operations or transition to a different entity, possibly an exchange.

Estimates for the full market potential of utility-scale solar vary widely and range from $1 billion to $5 billion and more. There is potential for profitable utility-scale solar at hydropower and natural gas plants. A recent study on integration of solar photovoltaic power into the Nigerian National grid[101] identifies further optimal connection points for solar in the Nigerian transmission network, potentially expanding the market further. Co-location with hydropower facilities takes advantage of existing hydropower transmission infrastructure, and the solar power generated can complement electricity produced from hydropower, conserving water behind the dam and enabling extended hydropower availability during the dry season.[102] These solar projects enjoy low utility offtaker risk because in Nigeria, hydropower is the least-cost supply and receives priority dispatch and payment. The market potential for grid-connected solar at existing hydropower plants represents an estimated $0.5 to $1.4 billion by 2030 (cumulative).[103, 104] Hybridizing existing natural gas powerplants with solar provides similar additional opportunities. An IRENA (2023) study includes scenarios of 5 GW and 10 GW of utility-scale solar in Nigeria by 2030, implying a larger investment potential of $4 to $8 billion compared to the initial $1.4 billion estimate.[105]

5.1.1.4 STAND-ALONE SYSTEMS AND MINI-GRIDS

Small stand-alone systems (SAS) and isolated mini-grids provide electricity to households, public institutions, and small businesses, particularly in rural communities. The SAS are individual systems with solar panels and batteries installed in each household or small business; they provide basic energy services to a single household or micro-, small, and medium enterprises (MSMEs). The sizes of these systems vary, ranging from single dim lamps (0.3 W, equivalent to a single kerosene lantern) to solar home systems in the 10 to 200 W capacity range powering multiple lights, cell phone charging, and (for larger solar home systems) small appliances such as TVs and fans. Still larger systems of up to several kW are available for wealthier homes and enterprises powering larger appliances including refrigeration and air conditioning. Beyond lighting and entertainment, SAS systems can power PUE equipment such as small water pumps, refrigeration, and agricultural processing equipment among others.[106]

Isolated mini-grids serve multiple customers, typically a whole village of 100 or more households and small businesses and are often grid connection ready. RMI and Nayo Tech[107] conclude that a village with a mini-grid would save about $0.06 per kWh compared with a diesel generator. Isolated mini-grids have served as an incubator for developers who later expand into more profitable and larger interconnected and captive generation systems serving urban or peri-urban C&I and residential customers.

Private investment in SAS and isolated mini-grids is essential to the scale-up of these systems, although neither is usually affordable or financially viable without targeted subsidies. Most rural and peri-urban customers cannot afford the cost reflective tariffs

that SAS operators would charge without subsidies, and in the absence of subsidies, SAS companies are unlikely to set up distribution channels in rural and remote areas. Existing government and donor supported programs have allowed private developers to enter this space, and between 2018 and mid-2022, over two million Nigerian homes and SMEs have acquired SAS[108] and over 200 mini-grids have been deployed.[109]

A capable pool of private local and international SAS and mini-grid providers has emerged, spurred by these donor and government support programs. Developers are lowering costs and increasing commercial viability by building portfolios of projects, catalyzing PUE through appliance leasing and customer training, and taking advantage of the Demand Aggregation for Renewable Technology Program that aggregates equipment procurement. Developers will also be expected to keep lowering generation and distribution costs to reach grid parity as the subsidies in the sector will not remain perpetually.[110]

Under the Nigeria DARES program, the market for SAS and isolated mini-grids could grow cumulatively to $732 million by 2028. This private sector-led initiative aims to connect over 17.5 million Nigerians and almost 240,000 micro, small and medium enterprises by 2028, creating 465 MW of clean electricity capacity.[111] he program expects to catalyze $732 million in additional private investment through innovative financial and de-risking programs, allowing solar developers to deploy commercially viable mini-grids and SAS projects catalyzing PUE (see appendix B for more details on PUE). This initiative will be complemented by a US dollar–based revolving construction finance facility to bridge the gap in long-term local currency debt.[112]

5.2 Constraints to Private Investment and Recommendations

CONSTRAINT 1. Access to finance is challenging for many solar developers due to lack of familiarity by financiers on the still nascent sector, lack of developer capacity, currency risk, and other factors. Lack of familiarity with Nigeria's incipient solar market feeds a high risk perception by financiers (e.g., banks as well as institutional investors such as pension funds).[113, 114] This is compounded by the limited capacity of developers to present their case.[115] A study by the Energy Commission of Nigeria, the Global Environment Facility, and UNDP (2020) concluded that domestic investors' lack of knowledge and experience with solar developers is a major barrier in nascent markets. Capacity building for solar developers has proven to be a critical element to attract pension funds and other long-term investors.[116] Emerging solar market segments are served by foreign private non-banking financing institutions and targeted concessional finance instruments (box 5.1), but depreciation of the naira against the US dollar (for example, 260 percent between end-May 2023 to mid-September 2024[117]) has strained developers holding dollar-denominated loans. Mini-grids and SAS in particular are perceived to

have high counterpart risk from customers who are low-income households and small businesses with limited credit history. Small project sizes deter investors given high fixed due diligence costs. Even relatively lower-risk captive and utility-enabled projects, which serve wealthier urban and commercial customers, struggle to secure sufficient local currency funding.[118] In the rare case where banks invest in solar projects, commercial banks offer prohibitive interest rates, above 25 percent[119] and demand significant collateral, such as real estate,[120] and evidence of strong cash flows.[121, 122] While most commercial bank loans in Nigeria have tenors of 0.5 to four years, solar projects typically need tenors of three to 20 years since cash flows for the first few years are negative due to front-loaded development and construction costs.[123]

Box 5.1

Lessons from solar project financing around the world

Experience in developing countries in the solar sector has shown that as solar markets develop, financing follows sequenced phases to address market failures and support sector growth. Grants, concessional, and impact financing are critical in early phases, later shifting to specialist development finance institution (DFI) or venture capital-backed private equity and ultimately transitioning to corporate balance sheets and institutional investors like pension funds.

To address market failures, early-stage equity and grant funding are required to attract semi-commercial and fully commercial investors. These are often supported by specialized private equity backed by DFIs. The OECD (2022) suggests that targeted public interventions can increase the flow of capital to clean energy projects.

As an example of this approach, India successfully installed 14 GW of captive solar power since 2016.[a] India's Partial Risk Sharing Facility for energy efficiency—a risk mitigation tool—mobilized commercial capital toward the sector.[b, c] The program started gradually, with specialist equity and debt financiers, later boosted by a DFI-backed concessional bank program that reassured the market regarding the availability of finance, and improved the outreach to small developers through credit enhancement mechanisms. On-lending and co-lending structures helped gain the confidence of financial institutions.

The lesson from global experience, relevant for Nigeria, is that financing needs vary throughout the project life cycle:

- ***Seed funding is needed during project preparation, and through procurement and construction.*** The main challenge at the greenfield stage is the absence of proven stable cash flow and a creditworthiness record.
- ***Stock/procurement funding is needed to cover the purchase of system components.*** Supply chain lead times can be very long, tying up a lot of capital for a long time.
- ***Construction finance is the funding required while individual large solar projects are constructed.*** This has a lower-risk profile than the project preparation and procurement phases.
- ***Long-term finance is used to fund the long operating life of assets, freeing up developer funds to create new projects.*** This phase has the lowest risk profile. Successful solar projects would deliver steady cash flows over time. This is the phase where local currency at long tenors and low rates is needed.

Source: IFC.
a. India 14 GW since 2016 (JMK Research and Analytics 2024).
b. Steffen, Egli, and Schmidt (2020).
c. Wuester, Jungmin Lee, and Lumijarvi (2016).

RECOMMENDATION 1. To mobilize local long-term private capital at scale for solar, expand the Distributed Renewable Energy Enhancement Facility (DREEF). Designed by InfraCredit with technical support from the World Bank, DREEF aims to bridge the gap between perceived and actual risks as well as to address information asymmetry issues along the DRE value chain by providing technical and financing resources covering: (i) project development support; (ii) project capital support; and (iii) sponsor support and development. It systematically employs a comprehensive approach through these three lines of support mechanisms in collaboration with the government (through the REA under the DARES operation) and development partners to unlock, expedite, and scale access to long-term local currency finance for private sector-led greenfield DRE infrastructure projects. Post proof of concept and demonstration phase, the DREEF platform should be expanded to scale-up local currency financing and address market failures by:

a. *Providing catalytic blended finance:* Enhance risk guarantee and blended finance instruments to mitigate market failures that make DRE investments appear high risk. This support should adopt an ecosystem lens throughout the project cycle, from development, through to construction and operational phases.
b. *Building expertise of DRE developers and financiers:* Enhance the knowledge and skills of developers to improve the credit quality of DRE transactions coming to market. A focus on the financiers is also recommended to demystify the risks within the sector.

CONSTRAINT 2. Electricity tariffs do not cover DisCos' costs, heightening risks for solar projects that sell electricity to utilities.[124] Electricity tariffs set by regulators do not allow cost recovery and have led to the accumulation of $3 billion in legacy debts.[125] This has in turn led to high offtaker risks for utility-scale solar projects. The implementation of reforms enacted to address these challenges has been slow. The recent adoption of a full cost recovery tariff of N225 per kWh in April 2024 for "Band A" customers aim to alleviate these issues, though the Band A tariff was lowered somewhat to N209.5 per kWh as of July 2024. Moreover, while most DisCos have not embraced utility-enabled distributed energy solutions, a few pioneers (e.g., AEDC) have partnered with solar developers, benefiting consumers with reliable and cost-effective electricity while transforming their operational viability. Failed corporate governance, mismanagement, lack of compliance with regulations, and poor operational performance by the DisCos has also contributed to their insolvency.[126]

RECOMMENDATION 2. Support implementation of reform programs identified by Nigerian Electricity Regulatory Commission (NERC) in their 2023 annual report to rebuild the foundations of the grid, targeting

uncreditworthy DisCos, their weak governance, legacy debts, technical and financial issues. Specifically, electricity regulatory authorities should:

- Implement necessary reforms to improve DisCos governance and performance, financial sustainability and reduce investment risks.
- Rehabilitate distribution lines to cut technical losses. Enhance the transmission system with full implementation of the Supervisory Control and Data Acquisition program.
- Improve transparency in utility management information systems. Close metering gap (7.5 million missing meters) to reduce commercial losses. Increase collection and implement a consumption-based tariff framework in line with the current service-based tariff system.
- Finalize solar access points study; develop and adopt Integrated Resource Plan and a National Electrification Strategy—both at the federal and state levels.
- Complete the Power Sector Recovery Program, Nigeria Electricity Transmission Project, Presidential Power Initiative, and conduct a utility-scale solar auction drawing on lessons learned from the failed 2016 auction, such as not changing tariffs mid-auction.

CONSTRAINT 3. Cumbersome customs processes and high import tariffs on critical components such as batteries impose additional costs and significant project delivery delays on solar developers.[127] This is despite the Nigeria Customs Service's efforts to reform import procedures.[128] Customs waivers for local renewable energy developers have been poorly implemented and are ineffective; importers continue to report inconsistent application of regulations and lengthy clearance procedures—often due to outdated manual processing systems[129, 130] that add to the cost of operation that is ultimately passed on to customers.[131]

RECOMMENDATION 3. Ensure effective implementation of customs waiver procedures that are already in place for imported solar equipment to reduce lengthy delays. Measures should start with automating processing and developing procedures to ensure systematic application of customs product categories. This could be facilitated by establishing a single point of contact for all solar customs and related import processes.

CONSTRAINT 4. Developers face a time-consuming licensing process for projects larger than 1 MW. Under the 2023 mini-grid law, any solar project with a capacity larger than 1 MW is considered an independent power producer and must go through a licensing process that some developers describe as onerous. But this threshold is too low to accommodate larger mini-grid projects which could serve larger communities and productive energy users.[132] In the Nigeria context, such a cap makes it challenging to adequately serve market demand, especially in large and interconnected communities.

Based on the federal government estimates, 12,000 mini-grids will be developed by 2030, equivalent to 2,000 mini-grid permit applications that will need to be reviewed by the regulator each year.[133] Approving this volume of projects will be challenging. Currently, regulatory approvals are being managed now through batch processing. Although this is not a critical bottleneck, increasing the permit cap will help lower costs in larger projects along with the volume and speed up the process.

RECOMMENDATION 4. Increase mini-grid permit cap from 1 to 5 MW. With the August 2024 NERC orders, this decision is now in the hands of state-level regulatory authorities to whom oversight has been transferred from NERC.

5.2.1 *Other Considerations*

Utility-scale solar is especially vulnerable to political economy constraints, while other solar value chains that bypass the grid are largely unaffected. The privatization of the distribution and generation segments was completed in 2013,[134] but the Transmission Company of Nigeria remains a fully government-owned monopoly, which is not unusual in most electricity networks around the world. Additionally, the federal government, through the Ministry of Finance Incorporated, retains a 40 percent shareholding in DisCos. The Transmission Company of Nigeria manages the grid while the NBET, another state-owned enterprise, serves as a bulk trader. NBET purchases electricity from independent power producers and generation companies under long-term power purchase agreements and resells it to 11 DisCos who are responsible for delivering power to consumers and handling billing and revenue collection. DisCos owe large amounts to NBET and suffer from deficiencies in governance. There are efforts to reach consensus and decisions on how to resolve important constraints the grid faces, including resolving DisCos insolvency and losses and charging cost reflective tariffs as these are binding constraints to growth in the sector.

Nigeria's power sector faces significant risks stemming from vast inefficiencies, particularly in the distribution segment. This inefficiency, partly attributed to long-term planning, operational inefficiencies and corporate governance has plagued the sector since its privatization in 2013. The initial set of investors secured financing from Nigerian banks, which have ended up assuming much of the systemic risk in the sector. This situation has led to poor maintenance, technical and collection losses from unpaid bills, commercial losses from illegal tapping of distribution lines, and pervasive use of diesel and petrol generators in the absence of reliable supply from the grid.[135] The poor performance and cost recovery of DisCos have impacted the ability of their shareholders to repay loans, predominantly from commercial banks in Nigeria, obtained during privatization. In August 2021, the Central Bank of Nigeria valued the acquisition loans of DisCos at N820 billion (approximately $2 billion) and warned they were at risk of being classified as bad loans. This pronouncement provided grounds for creditors to recover the resources lent to

investors who acquired the DisCos in 2013, leading to five DisCos going into receivership. The regulator has taken tough actions against non-performing DisCos, including activating business continuity arrangements, management interventions, and considering license withdrawal notifications. Despite these measures, significant improvements in the performance of the DisCos have yet to be observed. All these combined risks have significantly impacted investment decisions in the Nigerian power sector due to the risk perception from potential investors, resulting in high costs of capital and reduced willingness to invest. Therefore, improving corporate governance, operational efficiency and financial sustainability of the sector is crucial for creating a more favorable investment climate in Nigeria's power sector, enabling the mobilization of private capital and the successful implementation of power projects.

Table 5.2

Policy recommendations to reduce impediments to private investment in solar energy

Constraints	Recommendations
Legacy debts, weak performance, and uncreditworthy utilities restrict solar projects' ability to sell electricity to the grid.	Implement necessary reforms to improve DisCos governance and performance. Improve governance and transparency, system planning, tariff and subsidies, to improve financial sustainability and reduce investment risks.
	Responsible government entities: BPE, DisCos, Ministries of Finance and Power, Ministry of Finance Incorporated, Nigeria Electricity Regulatory Commission, state governments.
Cumbersome customs processes, high import duties, and ambiguity increase project costs and delay timelines.	Ensure effective implementation of customs waiver procedures that are already in place for solar related imports.
	Responsible government entities: Nigeria Customs Service, Ministry of Finance, port agencies.

(Table continues next page)

Table 5.2

Policy recommendations to reduce impediments to private investment in solar energy *(continued)*

Constraints	Recommendations
Infrastructure limits grid capacity for solar.	Rehabilitate distribution lines to cut technical losses. Enhance distribution system with full Supervisory Control and Data Acquisition implementation and improve transparency in utility management information systems. Complete the Power Sector Recovery Program, Nigeria Electricity Transmission Project, Presidential Power Initiative, and utility-scale solar auction.
	Responsible government entities: DisCos, Ministry of Power, Nigeria Energy Regulatory Commission.
Inadequate metering impacts revenue collection.	Close metering gap (7.5 million missing meters) to reduce commercial losses. Continue investing to close the metering gap by 2027 deploying 7 million meters to diminish losses; increase collection and implement a consumption-based tariff framework in line with the current service-based tariff system.
	Responsible government entities: Ministry of Power, DisCos.
Last-mile access limited by lack of analysis and planning, currency devaluation and high investment risks.	Finalize solar access points study, develop Integrated Resource Development Plan and a National Electrification Strategy, and fully implement DARES with payments made in US dollars.
	Responsible government entities: Ministry of Power, Transmission Company of Nigeria, DisCos, Rural Electrification Agency.
Offtaker and developer risks are high, combined with limited understanding by financiers of solar technology and business models.	Design a partnership framework to mobilize at scale local currency institutional capital in the DRE sector. Post proof of concept by expanding DREEF to increase local currency financing to mobilize financial institutions, investors, and renewable energy fund managers. This will create blended finance instruments (corporate equity, first-loss guarantees, currency hedging); co-fund construction phase to crowd in institutional investors, improve DRE maturity for long-term local capital access.
	Responsible government entities: Ministry of Finance and Power, Rural Electrification Agency, NSIA.

6
Cassava and Soybeans

AT A GLANCE

- Nigeria's excellent agroclimatic conditions coupled with growing global demand for plant-based foods are attracting private investment into the cassava and soybean segments.
- A main constraint to attracting even larger volumes of private investment is the difficulty that processors face in securing a reliable, high-quality supply of raw cassava and soybeans from smallholder farmers.
- Potential investors in commercial-scale agro-processing face significant hurdles in identifying land for investment, with uncertainty around ownership, and conflicts ensuing even before investments begin.
- Increased production could result from scaling programs that support in-grower and out-grower schemes that make it easier for processors and aggregators to work with smallholder farmers.
- Enhancing smallholder farmers' access to certified seeds, finance and more modern agricultural know-how can improve the quality and reliability of the cassava and soybean supply.

6 Cassava and Soybeans

6.1 Sector Context and Opportunity

Agribusiness can be transformative for Nigeria given its potential contribution to employment, economic diversification, and food security. Nigeria has excellent agroclimatic conditions and rich natural resources that, under the right conditions, could support the commercial cultivation of a wide range of agricultural products. Rainfall and surface water are plentiful. Agriculture is already a significant contributor to the Nigerian economy, accounting for 24 percent of GDP in 2023 and employing over 30 percent of the labor force.[136] However, despite Nigeria's endowments and the sector's significance, less than half of the country's 82 million hectares of arable land are under cultivation.[137]

Domestic demand for agricultural products is growing, driven by high population growth rates, urbanization, and shifting consumer preferences. This is particularly true for cassava-based foods and industrial derivatives such as cassava flour, starch, and ethanol, as well as soybean-based foods, beverages, feeds, oil, and lecithin. Nigeria's population of over 220 million is growing 2.4 percent per year, with 54.3 percent of the population living in urban areas as of 2022, boosting the demand for food.[138] High food-price inflation (averaging 40 percent in 2023) and concerns about food security are driving the government's commitment to improve the enabling environment for private investment in the sector through policy and regulatory reforms focused on seeds, fertilizers, and access to finance.

In Nigeria, commercial-scale farming, which could boost the supply of agricultural products—and, by extension, agro-processing—is constrained by problems with land titling. Limited land titling and bureaucratic delays in processing land titles restrict land access and limit the growth of commercial farming.[139] Only 11.8 percent of farming households in Nigeria currently have legal land titles. The high costs and bureaucratic processes involved in land clearing, preparation, and registration have led to fragmented land ownership, which has made commercial farming challenging. This has resulted in the proliferation of smallholder farmers, who can farm smaller parcels of land without formal documentation.

Nevertheless, there are already commercially successful operators in agro-processing. These agro-processors employ either in-grower or out-grower models to achieve the scale of operation needed for profitability. In an in-grower model, the processor owns or directly manages the farmland, hiring farmers as employees to work on the land. This model allows the processor to maintain control over production practices, quality, and yields. The in-grower model is often capital-intensive but provides consistency in supply and quality, as the processor can implement standardized practices and directly monitor the crops. The out-grower model involves partnerships with independent smallholder farmers who grow crops on their own land but are supported by the processor. The processor often provides these farmers with inputs, such as seeds and fertilizers, as well as technical assistance. In return, the smallholder farmers commit to selling a portion, or all, of their harvest to the processor. This model allows processors to scale operations with less direct investment in land, while benefiting local farmers and expanding their production base.

In interviews during CPSD consultations, agro-processors confirmed the potential to expand their operations and improve profit margins, if key constraints are removed. Processors are affected by high logistics and energy costs. Nigeria's unreliable power supply remains a major constraint, stifling the competitiveness of the agriculture sector. It limits the adoption of innovative farming practices, reduces productivity, hinders preservation, decreases profitability, and increases operational costs. It is estimated that 25 percent of fruits and 40 percent of vegetables in Nigeria are lost post-harvest.[140] This loss is attributed primarily to unreliable power supply and inadequate post-harvest management. High transportation taxes, frequent security check point stops, and informal levies significantly impact logistics and operational costs, especially for perishables like cassava. Increasing the commercial potential of agro-processing would require enhancing support to smallholder farmers to boost the supply of high-quality raw material inputs; the low marginal productivity of smallholder farmers stems from limited access to certified seeds, inadequate extension services, poor agronomic practices, and unaffordable credit.

Lack of physical security and climate change discourage private investment. Security issues, including personal threats or theft of harvests and machinery, are prevalent.

Equally, climate variability, marked by frequent droughts and floods, disrupts agriculture, particularly affecting smallholder farmers and creating substantial barriers to efficiency and profitability.

Targeted policy action to address constraints can attract additional investment in agro-processing, especially in cassava and soybean. Nigeria has excellent agroclimatic conditions that could support the cultivation of a wide range of agricultural products.[141] Cassava and soybean were selected as a focus for this report owing to their potential for private investment in value addition and processing intensity. The processing of cassava into its various derivatives is already lucrative, attracting investors keen to capitalize on Nigeria's large and growing domestic market. Similarly, Nigerian soybeans command a premium internationally as they are a non-GMO crop and enjoy strong export demand, as well as demand as an input to animal feed, a growing industry domestically. These crops also align with the government of Nigeria's goals for economic diversification and food security.

6.1.1 *Cassava Processing*

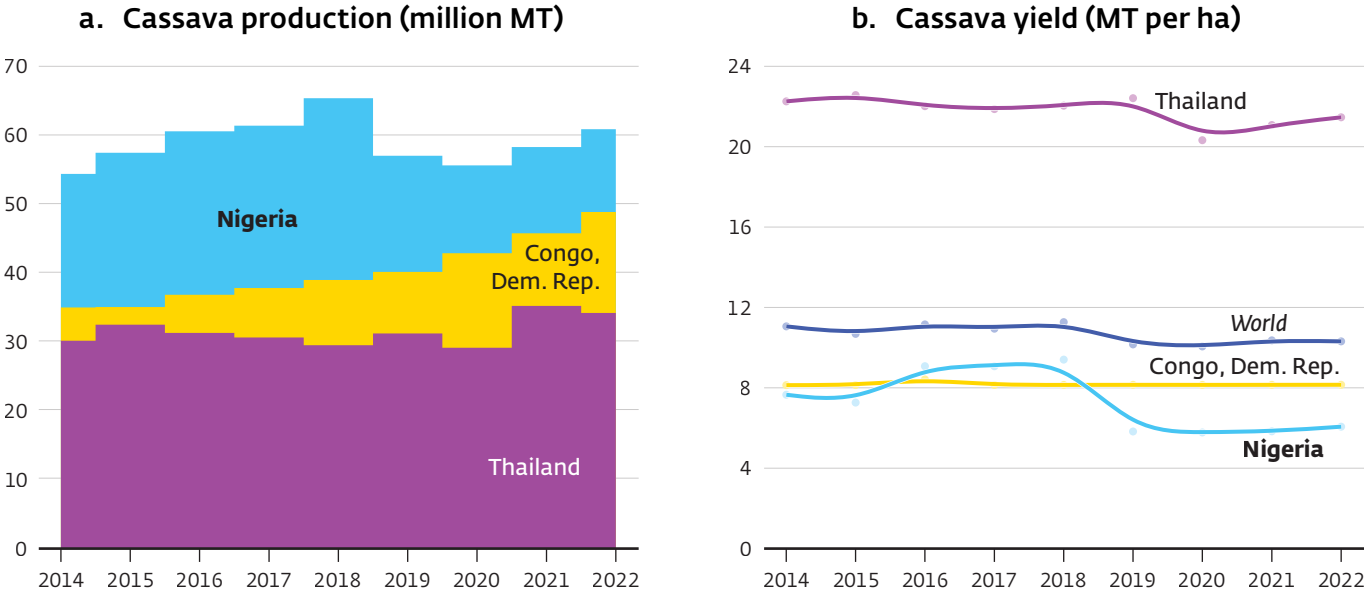
There is scope to increase private investment to increase commercially produced cassava, for industrial processing. In addition to being a staple food of Nigerians and important to food security, cassava is a versatile crop with various industrial uses, including the production of alcohol, animal feed, flour, fuel (ethanol), starch, and sweeteners. These products are, in turn, used as inputs by bakeries, pharmaceutical manufacturers, textile factories, food and beverage companies, and fast-moving consumer goods[142] companies. There is currently investor interest in cassava derivatives, and cassava processors enjoy high levels of profitability relative to other food crops.[143] With targeted policy actions, the derivatives from cassava can be significantly enhanced.

Nigeria is the world's largest cassava producer, but there is scope to significantly increase yield. Nigeria produced 55.6 million metric tons (MT) of cassava in 2020, about 21 percent of global production.[144] It achieved this despite a low marginal yield of 8.2 MT per ha, well below the global average of 12.8 MT per ha and the Southeast Asia average of 24 MT per ha.[145] Reaching the average global yield would almost double domestic production volumes without increasing land under cultivation. Over 70 percent of cassava produced is processed into food staples such as garri, 15 percent used for other processed products and 5 percent for on-farm processing, leaving 10 percent for industrial processing. Cassava production is concentrated in the southwest and north-central regions of the country, with higher processing capacity in the more densely populated southwest.

The cassava market in Nigeria is fragmented due partly to the crop's perishability and bulkiness, but also due to inefficiencies in the value chain.[146] The need to process cassava immediately after harvesting because of its perishability has led to a proliferation

Figure 6.1

Cassava production in Nigeria is high but yields are much lower than in Asia



Source: USDA; FAOSTAT.

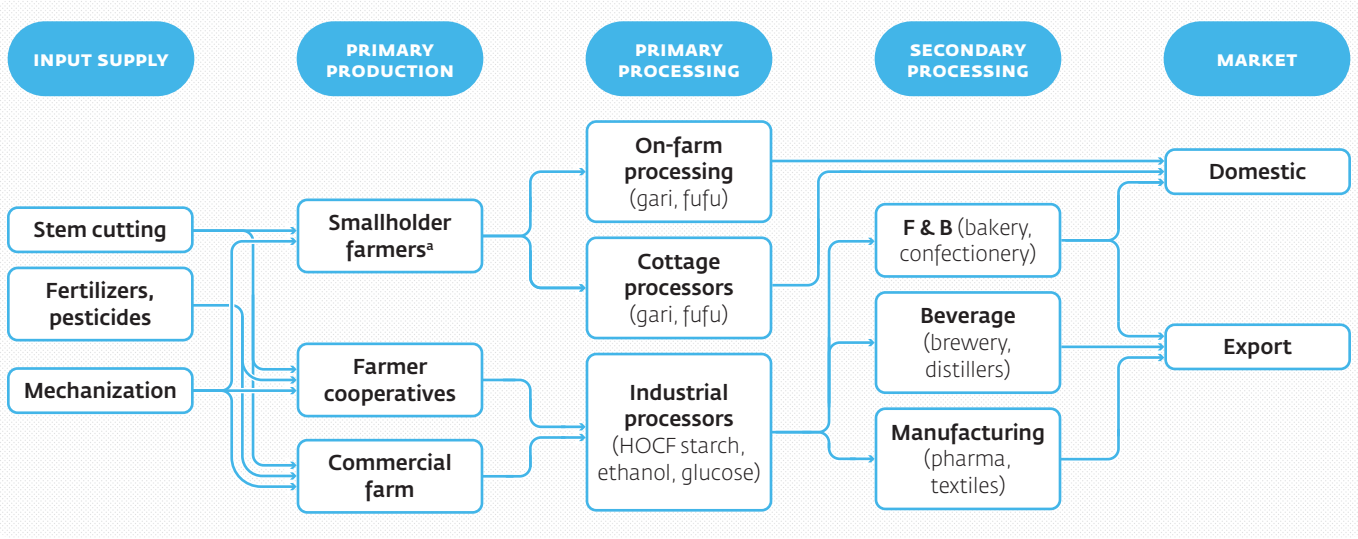
of small-scale processing facilities in villages across producing regions. Large-scale processing has proven challenging due to the poor road network. Some companies have expanded to medium scale by focusing on industrial customers and often using a vertically integrated model. These processors raise equity capital, set up their own farming operations, and employ out-grower or in-grower farming schemes.

Processors operating their own farms have higher average yields than smallholders—on par with averages in peer countries—but lack access to sufficient arable land and must also rely on smallholder farmers to meet their demand for raw cassava. The structure of the cassava value chain includes smallholder farmers, farmer cooperatives and commercial farmers (see figure 6.2). Smallholder farmers are responsible for 90 percent of the country's cassava production, while the remaining 10 percent is produced on larger commercial farms or by vertically integrated processors.[147] Smallholder farmers cultivate less than two hectares of land each, with limited economies of scale and mechanization.[148] Processors' reliance on smallholder farmers to supplement their supply of raw cassava creates supply constraints, impacting industrial processors' incentives to expand their operations. A significant portion of the cassava produced is processed into food products, which compete with industrial demand for the same raw material. To increase investment in cassava processing, interventions are needed to boost smallholder productivity and ensure a reliable supply of raw material for both food and industrial uses.[149]

Figure 6.2

Smallholder farmers play a critical role in agricultural production and local food systems

Cassava industry structure



Source: Diebiru-Ojo (2024).
a. Smallholder farmers typically manage farms smaller than five hectares.

The demand-supply gap for cassava derivatives in Nigeria highlights the sector's potential for expansion. There is a growing demand for high-quality cassava flour, with annual local estimated demand of about 500,000 MT[150] far outstripping local supply, which is less than 15,000 MT. Cassava flour can be a substitute for wheat flour and is less expensive than corn flour, which is the more widely used substitute. Nigeria's high-quality cassava flour is price competitive at $373 per ton, compared to imported corn flour at $920 per ton.[151] Both are widely regarded as popular gluten-free alternatives. There is also a ready market for domestically produced sorbitol,[152] another cassava derivative, as Nigerian companies currently import $86 million of sorbitol each year, but they grapple with increasing costs and uncertainty resulting from a depreciating naira, limited access to FX, high transport costs, and port delays. Despite having the capacity to supply 28 percent of global demand, Nigeria's sole sorbitol producer is currently operating at less than 30 percent of capacity.[153] The burgeoning livestock sector is also driving interest in cassava as an ingredient in animal feed.[154]

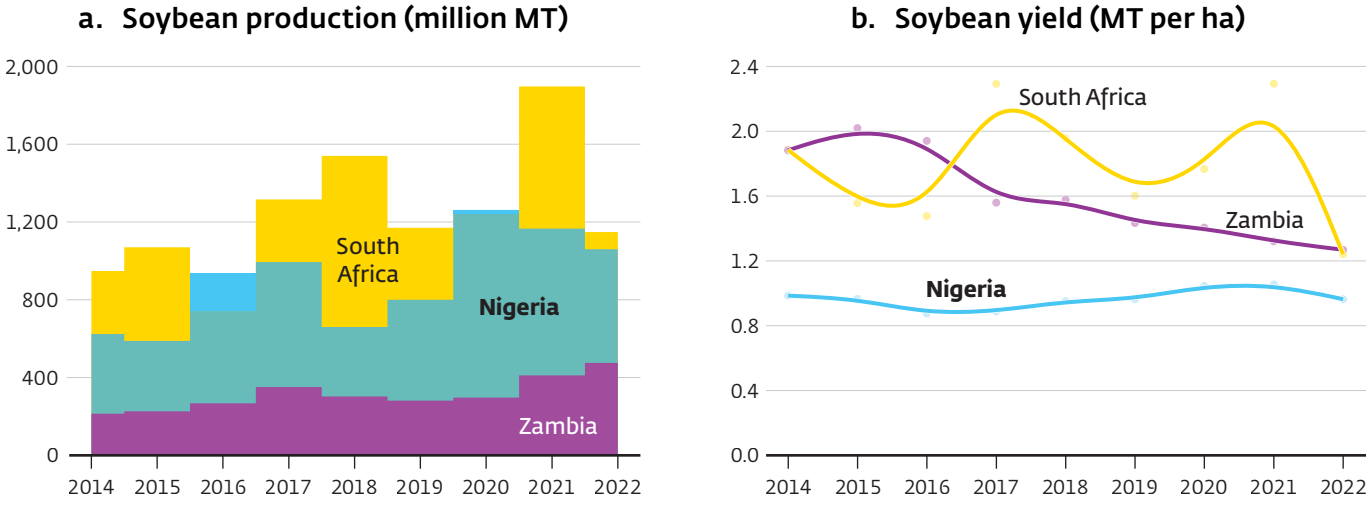
Cassava processing for ethanol production is another attractive private sector opportunity. There is a substantial demand for ethanol in Nigeria's industrial and pharmaceutical sectors, which collectively consume around 400 million liters annually.[155] Nigeria currently produces just 3 to 4 percent[156] of its annual ethanol consumption, importing N160 billion (about $104 million) in ethanol. To meet this significant demand gap, the country would need to produce 2.4 million MT of cassava, given that one ton of cassava yields 166 liters of ethanol. Nigeria's fledgling ethanol industry struggles to source adequate quantities of raw cassava and often relies on inferior starch substitutes like sugarcane.[157] Expanding cassava production could foster the development of a cost-effective domestic ethanol industry.

6.1.2 *Soybean Processing*

Nigeria is the second-largest producer of soybeans in Africa, with production rising 148 percent over the last decade.[158] Soybeans are a versatile crop that are used to produce various products, including food, animal feed, edible oil, cosmetics, textiles, paints, biofuels, and coatings (such as oil-based paints and alkyd resins). Soybean output growth has thus far been primarily linked to the expansion of cultivation area, as the average yield per hectare has remained relatively stable at around 1 MT per ha since 2017. This falls well short of the global average (3 MT per ha) and the yields of regional peers like South Africa (2.2 MT per ha) and Zambia (1.9 MT per ha). Given its climatic and soil conditions, Nigeria's northern region has a comparative advantage relative to other regions of Nigeria in the production of soybean, with 10 out of 19 states producing significant quantities.

Figure 6.3

Nigeria's soybean production volume has grown, but yields are low relative to comparators



Source: USDA; FAOSTAT.

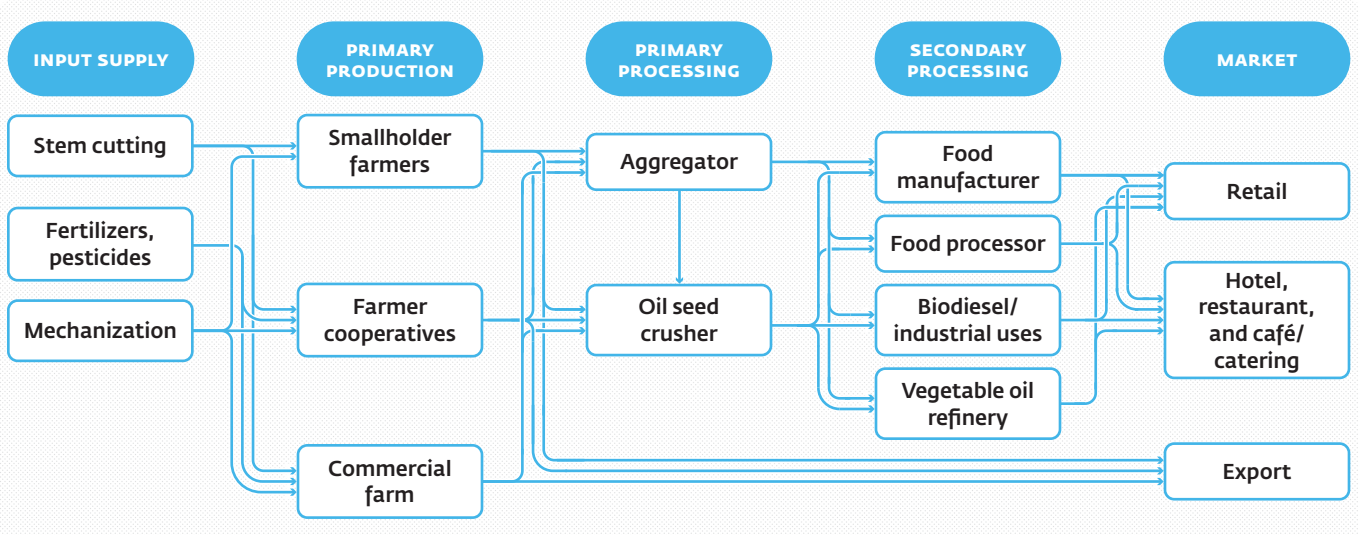
Soybeans are becoming one of Nigeria's top nonoil exports, with soybean seeds and flour/meal accounting for 13.8 percent of agricultural exports in 2023.[159] Nigerian soybeans' non-GMO, organic status is a significant driver of its export growth: soybean exports are expected to reach 212,000 MT by the end of 2024, up from just 7,000 MT in 2023.[160] This extraordinary 2,928 percent increase reflects higher production and growing export demand for Nigeria's non-genetically modified beans, supported by the naira's sizable depreciation against the US dollar in 2023-24. Nigeria exports soybeans to Canada (64 percent), Türkiye (17 percent), India (14 percent), Sri Lanka, Nepal, and Pakistan. However, phytosanitary requirements prevent Nigeria from accessing the United States and European Union markets. Improving phytosanitary standards and compliance could open these lucrative markets. Soybean exports are poised to continue to grow significantly in the coming years, following Saudi Arabia's expression of interest in an agreement with Nigeria to import 1.0 million MT annually, well in excess of current local production levels.[161] The government is in discussions with local soybean producers, entrepreneurs, and industry players to develop a plan for meeting Saudi Arabia's demand. There is also significant untapped export potential to many countries in Africa.[162]

There is considerable investment potential in processing soybeans into soymeal to meet domestic and export demand for food products and livestock feed. Nigeria's domestic soybean production is about 1.15 million MT, but annual consumption reaches 1.45 million MT. A significant part of domestic production is exported (0.21 million MT in 2024) due to its non-GMO status. At the same time, Nigeria imports soybeans, mainly for human and animal consumption. The market for animal feed in Nigeria attracts substantial local and foreign investment in large-scale feed-mill operations but relies heavily on imported inputs.[163] An increased supply of locally produced soybeans could help boost animal feed production in Nigeria.

Soybeans are a commercially valuable crop, attracting significant interest from commercial farmers. However, 80-90 percent of production is carried out by smallholder farmers. Commercial soybean farms operate through in-growers/out-grower programs.[164] As illustrated in the industry structure (figure 6.4), soybean production by smallholder farmers is consolidated by aggregators and processors. Much of which is exported as soy cake, which tends to command higher prices in international markets. Due to the dispersed nature of production, aggregators are critical in consolidating supply. Despite this, aggregation faces considerable challenges, including significant distances between production sites and processing facilities as well as inadequate rural transportation infrastructure. Soybean production is primarily concentrated in Benue state, north-central region, although it is also spread throughout the northern region of Nigeria (figure 6.5) where insecurity is high, and road infrastructure is poor. These factors result in elevated costs, delays, and post-harvest losses.

Figure 6.4

Soybean industry structure: soybean production by smallholder farmers is consolidated by aggregators and processors



Standard authorities: NASC

Financial services: BoA, BoI, CBN, NIRSAL, commercial banks

R&D institutions: IITA, NCRI, IAR, NAERL

Development programs and NGOs: USAID, IITA, AGRA, Syngenta, Propcom Mai-Karfi, GIZ, etc.

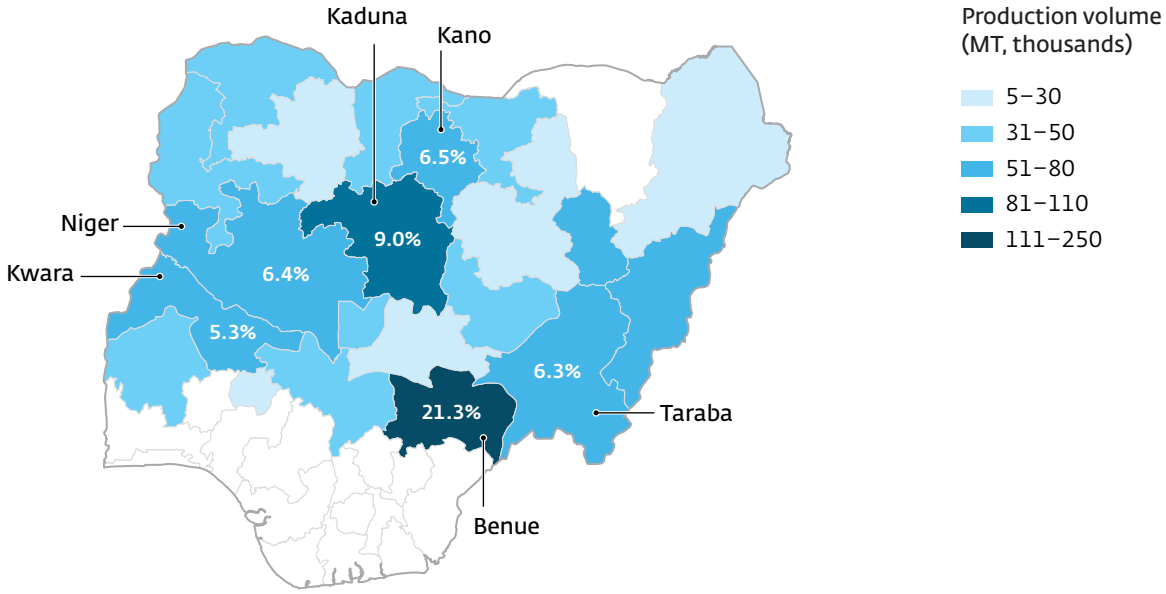
Source: Diebiru-Ojo (2024).
Note: NASC = National Agricultural Seed Council; BoA = Bank of Agriculture; BoI = Bank of Industry; CBN = Central Bank of Nigeria; NIRSAL = Nigeria Incentive-Based Risk Sharing System for Agricultural Lending; IITA = International Institute of Tropical Agriculture; NCRI = National Cereals Research Institute; IAR = Institute for Agricultural Research; NAERL = National Agricultural Extension and Research Liaison Services; USAID = United States Agency for International Development; AGRA = Alliance for a Green Revolution in Africa; GIZ = Deutsche Gesellschaft für Internationale Zusammenarbeit.

6.2 Constraints to Private Investment and Recommendations

Agro-processors have difficulty securing an adequate supply of high-quality raw cassava and soybeans, which limits their ability to scale operations. The chronic supply constraints that affect processors reflect low marginal productivity among smallholder farmers. This stems from limited access to certified seeds, inadequate extension services, poor agronomic practices, and unaffordable credit.[165, 166] As a result, processors frequently receive low-quantity and quality soybeans and cassava. Commercial-scale farming, which could boost the supply of higher quality raw cassava and soybeans to processors, is constrained by problems with land titling. The high costs and bureaucratic delays involved in land clearing, preparation, and tilting limit the attractiveness of commercial farming.[167, 168]

Figure 6.5

Soybean production is mostly concentrated in the north and north-central region of Nigeria



Source: JICA (Japan International Cooperation Agency).
Note: The percentages within the map represent the share of that state in Nigeria's total soybean production in 2021.

In-grower and/or out-grower models can be used by processors to achieve the scale of operation needed for profitability. These contract farming models where processors are backward integrated can limit the fragmentation of the value chains, make improved planting materials more accessible and leading to better agronomic practices and higher productivity. However, these business models will require better access to affordable and appropriately structured finance as well as effective government interventions to improve agronomic practices of farmers.

6.2.1 *Supporting Better Agronomic Practices*

CONSTRAINT 1. Smallholder farmers have limited knowledge and capacity, resulting in low yields. Smallholder cassava and soybean farmers use diseased stems and poor-quality seeds from previous harvests, reducing yields. The National Agricultural Seed Council's capacity to certify seeds or to carry out field verification is limited, resulting in the proliferation of poor-quality seeds. Government-subsidized interventions to improve smallholder productivity exist, but are fragmented, and programs often fail to reach intended beneficiaries due to the involvement of heavily politicized intermediaries and are often not fiscally and institutionally sustainable. Inadequate extension services limit cassava and soybean farmers' access to essential training and information, preventing

them from adopting best practices and improving productivity and pest management. The low ratio of extension workers to farmers (1:7,500[169] as against the 1:1,000 recommended by FAO) leads to inefficiencies in the value chain, which in turn result in poor yields. These challenges in the value chain discourage private investment and reduce overall performance and investment attractiveness.

RECOMMENDATION 1. To improve extension services, states and the Ministry of Agriculture should:

a. Introduce private extension service models;
b. Encourage modern climate smart agriculture practices developed by national and international agriculture research institutes in Nigeria;
c. Enhance its farmer centric nature by increasing involvement of farmer associations; and
d. Deliver training using existing online platforms in the three main local languages. The aim should be to increase the involvement of the private sector while concurrently strengthening the existing public sector extension services.

CONSTRAINT 2. Inadequate supply of quality, certified seeds. The low marginal productivity of smallholder farmers stems from limited access to certified seeds.

RECOMMENDATION 2. Strengthen the capacity of the Nigerian Agricultural Seed Council by equipping it to establish third-party certification systems, licensing, and capacity-building programs for seed producers. This will require investment in training, infrastructure, and collaborative programs with local seed companies to ensure a reliable supply of certified seeds.

CONSTRAINT 3. Inequitable, fragmented, and inefficient distribution of government-subsidized programs and interventions to smallholder farmers.

RECOMMENDATION 3A. Facilitate the establishment of farmer associations, improve their governance, and ensure they are linked to agro-processors.

RECOMMENDATION 3B. Use farmers' National Identification Number and Bank Verification Number for verification, and geo-tag farmers to specific farms to enhance targeting of government programs aimed at supporting smallholders and minimize duplication.

RECOMMENDATION 3C. Encourage the use of digital platforms to mobilize the main actors (farmers, public extension services, inputs dealers, traders, processors, mechanization services providers, transporters) along the value chain and coordinate their interventions.

6.2.2 *Other Consideration*

Limited access to affordable and appropriately structured finance. The inability of processors to secure adequate supplies of quality cassava and soybean results from the structure of the value chains and the dependence on smallholder farmers to supplement their supply. Farmers require credit to purchase productivity-enhancing seeds, fertilizers, pesticides, and farm machinery. However, Nigeria's high commercial lending rates, a function also of the macroeconomic conditions, and the high risk of agriculture (pre and post-harvest) makes borrowing infeasible for smallholder farmers and agri-businesses. The nine-month growing cycle for cassava also pose a problem for farmers seeking loans from financial institutions, which tend to prefer shorter maturities and to invest in risk-free assets such as government securities. Processors also face significant constraints in accessing working capital to purchase raw inputs during harvest seasons and to invest in modern processing techniques, impacting overall operational efficiency. Price fluctuations in the soybean market complicate financial planning and increase the risks associated with lending to farmers and agri-businesses.

Acquiring land for investment poses a significant challenge for private sector ventures in Nigeria. There is limited access to data on land use, coverage, and ownership. Without effective land information systems, both investors and the state struggle to identify the most suitable locations for investment.[170] Additionally, an estimated 70 percent of land transactions occur in the informal market, meaning many parcels of land lack formal title documents. Even when such documents exist, the process of obtaining them can be cumbersome and time-consuming.[171] States aiming to attract investments in agriculture should adopt the Framework for Responsible and Inclusive Land-Intensive Investment in Agriculture. The SABER program encourages all states to adopt it. This framework guarantees that both investors and the local community benefit from investment, and it aligns with international standards and best practices for responsible and inclusive land-based investments.

Table 6.1

Policy recommendations to reduce impediments to private investment in cassava and soy value chains

Constraints	Recommended actions
Inadequate technical knowledge: Smallholder farmers have limited knowledge and capacity, resulting in low yields.	To improve extension services, states and the Ministry of Agriculture should (a) introduce private extension service models; (b) encourage modern climate smart agriculture practices developed by national and international agriculture research institutes in Nigeria; (c) enhance its farmer centric nature by increasing involvement of farmer associations; and (d) deliver training using existing online platforms in the three main local languages.
	Responsible government entities: states, Federal Ministry of Agriculture and Food Security.
Inadequate supply of quality certified seeds	Strengthen the capacity of the Nigerian Agricultural Seed Council (NASC) by equipping it to establish third-party certification systems, licensing, and capacity-building programs for seed producers. This will require investment in training, infrastructure, and collaborative programs with local seed companies to ensure a reliable supply of certified seeds.
	Responsible government entities: NASC, Federal Ministry of Agriculture and Food Security, Ministry of Finance, National Assembly.
Inequitable, fragmented, and inefficient distribution of government-subsidized programs and interventions to smallholder farmers	Facilitate the establishment of farmer associations, improve their governance, and ensure they are linked to agro-processors. Use farmers' National Identification Number and Bank Verification Number for verification, and geo-tag farmers to specific farms to enhance targeting of government programs aimed at supporting smallholders and minimize duplication. Encourage the use of digital platforms to mobilize the main actors (farmers, public extension services, inputs dealers, traders, processors, mechanization services providers, transporters) along the value chain and coordinate their interventions.
	Responsible government entities: states, Federal Ministry of Agriculture and Food Security.

Appendixes

Appendix A

Country Growth and Jobs Report Dashboard

Table A.1

Country growth and jobs report dashboard

Indicator	Nigeria	Sub-Saharan Africa	Lower-middle-income	Comparator average[a]
Labor force supply				
Population ages 15–64 (% of total population)[b]	55.5	55.8	64.3	66.3
Labor force participation rate (% of population ages 15–64)[c]	83.4	71.3	61.2	67.4
Learning-adjusted years of school[d]	5	5	6.4	7.8
School enrollment tertiary (% gross)[e]	12	9	27	46
Labor market conditions				
Unemployment, total (% of total labor force)[c]	3.1	5.9	4.4	7.4
Firms identifying inadequately educated workforce as constraint (%)[f]	5.7	15.1	16	16.1
Employment by sector (% of total employment)[c]				
Industry	17.9	12.5	22.6	22.6
Agriculture	34.3	49	39.2	20.6
Services	47.8	38.5	38.3	56.8

Sources: Approach follows that used in the World Bank Group Growth and Jobs Reports.
a. For the comparator countries used, see IFC (2020).
b. World Development Indicators.
c. International Labour Organization, modelled figures for 2024.
d. Human Capital Index, learning-adjusted years of school adjusts the years of school for how much students learn for each year they are in school. This is done using results from standardized tests.
e. UNESCO. All countries are the latest available, Nigeria from 2018.
f. Enterprise Surveys latest available results, Nigeria from 2014.

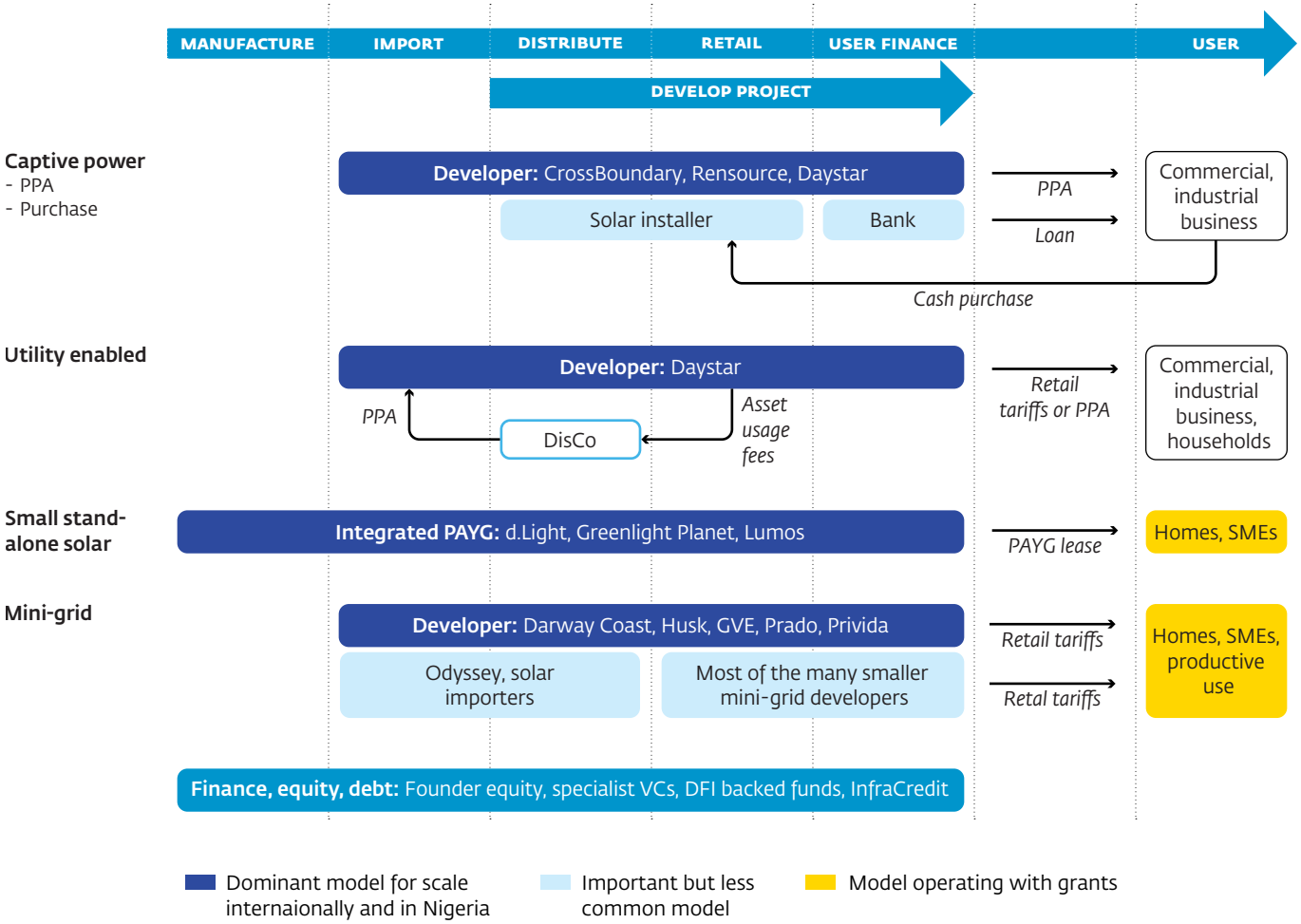
Appendix B

Solar Market Value Chain Mapping

Value chains for solar generally flow from manufacturing of solar equipment to supplying electricity to customers. Solar project developers in Nigeria (as in most countries in Africa) are direct participants in all stages of the value chain except equipment manufacture.[172] Solar equipment is mostly manufactured by large factories in China or, to a lesser extent, Europe.[173] Developers import equipment from overseas and conduct the engineering and construction of these components into functional systems (figure B.1 below). Once systems are installed, developers typically operate solar equipment, selling electricity to end users (or other offtakers such as TransCos in the case of utility-scale solar). In some cases, developers sell or lease the systems themselves, rather than selling the electricity service they provide, and thus differ in the final three steps of the value chain.

Figure B.1

Most key businesses in solar value chains import, develop projects, and sell either electricity or the systems*



Source: Authors using data from a broad range of international literature, and Nigeria solar sector interviews.
*Highly simplified summary for conciseness. The value chains have multiple sub-variants and details not shown here. "Develop project" here includes finding offtakers, building project pipelines, engaging contracting and implementation partners, mobilizing finance for different stages of project and portfolio life cycle.

Appendix C

Productive Use of Electricity

Table C.1

Targeting the PUE can make mini-grids and SHS commercially viable

PUE tiers[a]	Energy technology	PUE category	PUE application	PUE appliance/ equipment	Impact potential
Tier 2 *Small scale* 50 W to 199 W	SHS	Agriculture	Poultry incubator, fan dryer	Egg incubator, fruit/ vegetable drying	High volumes and fast moving to achieve high impact, but limited in scope
	SAS	Commercial	Barbing salons, phone charging	Hair clipper, mobile phone charging stations	
Tier 3 *Medium scale* 200 W to 799 W	Mini-grid (and/or SAS)	Agriculture	Irrigation, storage, food processing, drying, milling, cooling	Surface or submersible water pumps, freezers, mills, hullers, threshers, oil presses, egg, incubators, ice-making machines, refrigerators, and drying chambers	Broader impact scope, but supply push needed to achieve outreach
	Mini-grid	Commercial and industrial	Bars, restaurants, printer shops, hairdressing, retail cooling, phone charging, handicrafts, tailoring	Printers, music systems, fridges, freezers, refrigerators, charging stations, battery swapping stations	

(Table continues next page)

Table C.1

Targeting the PUE can make mini-grids and SHS commercially viable *(continued)*

PUE tiers[a]	Energy technology	PUE category	PUE application	PUE appliance/ equipment	Impact potential
Tier 4 *Large scale* 800 W to 1,999 W	Mini-grid (or hybrid petrol/ diesel/gas + mini-grid)	Agriculture	Milling, threshing, drying, husking, cooling	Mills, threshers, de-husking machines, thermal dryers, fridges, freezers, refrigerators	Financial and operational models to be determined to achieve large-scale impact
	Mini-grid or SAS	Commercial and industrial	E-mobility-people and goods transportation, electronic repair	Charging stations, battery swapping stations	
Tier 5 *Extra-large scale* 2,000 W and above	SAS multifunctional platforms	Agricultural, industrial	Carpentry, wood processing, mechanic, ironing, workshops, welding, bakery, parboiling, cooling	Power tools, sawmills, electric cookers, industrial parboilers, bakery ovens, cold rooms, clothes iron	

Source: Market Study to Support the Nigeria Electrification Project.
Note: PUE = productive use of electricity; SAS = stand-alone systems; SHS = solar home systems.
a. Tier one is the lowest level (up to 49 W) and usually serves to provide energy to a few lightbulbs, charge a phone or power a radio or small TV.

Appendix D

Summary of Impact of Reforms Methodology

D.1 Broadband/Fiber-Optic Network

The methodology assumes right-of-way fees are reduced to 145 naira per meter for all fiber deployment, new NCC wholesale infrastructure license, and government subsidies to improve commercial viability of fiber deployment where required. Estimates are based on financial and economic modeling completed in 2021/22 by World Bank digital economy consultants who estimated that 167,000 km of additional fiber-optic networks were required to achieve the Nigeria National Broadband Plan objective of 70 percent of individuals in Nigeria over 15 years having individual high speed broadband access by the end of the Plan term (2025) through a combination of private investment and government subsidies.

GDP impact is calculated as net present value of forecast additional GDP assuming 3 percent increase in GDP for every 10 percent increase in broadband penetration rate achieved,[174] compounded annually over 10 years. Government tax revenue impact assumes additional corporate taxes of 30 percent of estimated additional operator revenues, additional VAT of 7.5 percent of estimated additional operator revenues resulting from deployment, and additional state individual income taxes (no federal individual income taxes) of 25 percent of the newly employed who have sufficient income to pay taxes, calculated using assumed individual average state tax rate of 18 percent[175] paid on 50 percent of average 2021 Nigerian median salary.[176]

Employment impact assumes 13.2 percent additional employment for all new subscribers in unserved and underserved areas[177] and 5 percent additional employment for existing subscribers, who benefit from improved data access—i.e., higher quality access, faster speeds, cheaper capacities, which are useful for employment purposes. Additional jobs are estimated at about 229,000, based on estimated additional output of $5.4 billion by 2030 (using the 3 percent increase in GDP every ten years) and estimated total employment multiplier of 42 jobs for every additional $1 million increase in output. The 42 additional jobs are calculated as the sum of direct, indirect (backward linkages) and induced (consumption linkages) employment in number to be produced in similar sector (computer electronics and optimal products). Assumes $11,100 per km cost to deploy ducts, $2,500 per km cost to deploy fiber within ducts, range of $3,250 to $10,500 cost to hang fiber on poles, operating costs for dark fiber networks of 10 percent of capital expenditure (before right-of-way fees) with government subsidies for initial five years where required to incentivize deployment.

D.2 Solar Power

C&I potential ($6.5 billion) is from the RMI and Daystar study.[178] The underlying assumptions regarding potential in that study are: In the scaling scenario, 100 percent adoption among MD customers (>50 kW). In addition, a potential adoption rate of 5 percent among other C&I customers represents the larger non-MD customers. They estimate the market size for the business model assuming a conservative average DER system of 20 kW that is more typical of small non-MD sites across all potential C&I DER customers.

If market potential means "the portion of the market that would save money compared to the alternative of burning diesel or natural gas" then this seems reasonable. The C&I would not have to own it themselves—companies like Daystar invest and sell the electricity at a lower cost than the diesel its substituting for. **Utility solar** ($1 billion) is World Bank Group own estimate conservatively limiting to only hydropower sites with reservoirs that the solar could hybridize with, a type that is already being built out. **Interconnected mini-grids, stand-alone mini-grids, and SAS** all come from expected leveraged private sector investment as stated in the World Bank (2023a) DARES PAD.

D.3 Manufacturing Pharmaceuticals

The methodology for calculating the total expected additional investments in the Nigerian pharma-manufacturing sector, was reached through the below-noted framework. As part of the pharmaceutical manufacturing deep-dive, the World Bank Group appointed consultants, through a series of one-on-one interviews with

Nigerian pharma-manufacturing entities, carried out a detailed in-depth review of the "actual investment needs" of these Nigerian pharma-manufacturing entities. The firms interviewed represented each of the three tiers making up the Nigerian pharma-manufacturing landscape, being: (i) low-level pharma-manufacturing entities with simplified manufacturing processes and dosage forms; (ii) mid-tier companies with mid-level sophistication in their manufacturing systems; (iii) top-tier entities with highly sophisticated pharma-manufacturing systems that produce numerous offerings from tablets and capsules to syrups, injectables, and in vitro solutions. After conducting these interviews, the consultants were able to ascertain that the average financing required by the small to mid-tier firms for the five-year period from June 2025 to June 2029 occurred in three core buckets, ranging from the naira equivalent of a batch of companies needing $5 million, to those needing $7.5 million, and finally those needing $10 million. The average financing need for the top-tier companies was $25 million each for the next five years.

By extrapolation of the sampled population, the consultants were able to compute a total loan requirement of the mid-tier companies amounting to $250 million, and those for the top tier companies amounting to $125 million over the same five-year period to June 2029 (see table D.1 below).

Following the same approach, additional areas requiring investment that were extrapolated for the five years to June 2029, are: (i) investment in new technologies (e.g., for production of NCD drugs) by existing pharma-companies: $350 million; (ii) investment in backward integration into APIs and excipients: $253 million; (iii) investment in retail-pharma and distribution systems: $160 million, and (iv) investment in research and development infrastructure and activities: $25 million.

The methodology assumes that all top-tier companies will be able to access the funding they need from the market, and that only 19 percent of the combined total of both small and mid-tier firms will qualify to access funding. Finally, the framework used assumes that the investment amounts calculated represent both capital expenditure and working capital needs to be financed.

D.4 Cassava and Soybean

D.4.1 *Cassava*

The cassava value chain investment potential is proxied using projected potential exports and domestic productions earnings as per a 2020 PWC study.[179] As a result of the recommended reform, the assumption is that cassava yields increase from 8.2 metric tons per hectare (MT/ha) to approximately 12.8 MT/ha, increasing total production to about 94 million MT/ha without increasing the size of the cultivation area. Increased supply of raw cassava to processors doubles capacity utilization from 35 percent to 70 percent leading to investments of about $3.4 billion. This was approximated to between $3.2 to $4 billion

D.4.2 *Soybean*

The assumption is that soybean yields double with the recommended reform actions, from 1 MT/ha to 2 MT/ha, increasing production from 1.3 million MT to approximately 2.6 million MT. An adequate supply to soybean processors increases production of animal feed, oil, and soybean grain for export, boosting investment in the sector to twice its current levels. In the absence of actual investment data, export earnings were used as a proxy. According to a Central Bank of Nigeria report, soybeans exports in 2023 was $180 million. With the reforms, investment is expected to reach $360 million per year, a cumulative 1.8 billion between 2025 and 2029. This was approximated to between $1.6 to $2.0 billion.

Table D.1

Nigerian pharmaceutical manufacturing sector deep-dive—rationale for potential investments

Total registered pharma-manufacturing plants in Nigeria	186
Total low-level pharma-manufacturing plants in Nigeria	109
Total mid-tier pharma-manufacturing plants in Nigeria	72
Total top-tier pharma-manufacturing plants in Nigeria	5
	$ (millions)
A. Raw material inputs sub-sector	
API and excipient industry expected investments:	
– One plant each at $100 million per plant	200
– Investment in upgrades of existing plant	50
– Investments in regulatory systems for new industry-sub-sector	2.5
Subtotal	252.5

(Table continues next page)

Table D.1

Nigerian pharmaceutical manufacturing sector deep-dive—rationale for potential investments *(continued)*

	$ (millions)
B. Core pharma-manufacturing sub-sector	
Investment in upgrades of existing plant (medium firms)	250
Investment in upgrades of existing plant (top-tier firms)	125
Investment in new manufacturing technologies (by existing pharma-companies)	350
Investment in new manufacturing plants from new pharma-manufacturing entities (FDI)	200
Subtotal	925
C. Pharma-retail and distribution sub-sector	
Investment in transport and warehousing infrastructure	60
Investment in new pharma-retail infrastructure	100
Subtotal	160
D. Pharma-Research and Development sub-sector	
Investment in pharma-analytics infrastructure (including bioequivalence labs and clinical trial systems)	10
Investment in new product development and innovation systems for the Nigerian pharma-sector	15
Subtotal	25
Total estimated pharma-manufacturing industry investments	1,362.5
Low-level estimate (less 20%)	1,090.0 = $1.1 billion
High-level estimate (plus 20%)	1,635.0 = $1.6 billion

Appendix E

Note on Computation of Potential Jobs

Potential jobs are computed using the total employment multipliers, which are computed using the value-added multipliers and employment elasticities from Burgi et al. (2023). The total employment multipliers measure the effect on employment, of an increase in $1 million of sectoral output and it includes direct, backward supply chain and consumption spillover (induced) effects. We use the value of increased investment (potential) in the sub-sector where we do not have the value of increased sectoral output as a result of interventions in the sector. The total employment multipliers used for the sub-sectors include solar (43), basic pharmaceutical (27), ICT (42), soybean (56) and cassava (58). Where there is no exact total employment multiplier for the sub-sector, we use the estimated multiplier for a sub-sector in the same family. For example, for ICT, we use total employment multipliers for computer, electronics and optical products, pharmaceutical (basic pharmaceutical), solar (electrical equipment), soybean and cassava (crops).

Step 1 (a): Where the potential increase in total output resulting from the sectoral intervention is known, such as for the ICT sector, 3.2 percent increase in GDP in the next 10 years, we compute the increase in millions of US dollar for the next five years and then multiply by the total employment multiplier.

Step 1 (b): Where the potential increase in total output resulting from implementing the proposed reforms in the sector is not known, we use the provided information on the number of potential investments in millions of US dollar. For example, potential investment

to be generated in the solar sector if the proposed reforms are implemented is projected to range between $3 billion to $8.5 billion. We restated this in millions of US dollar, $3,000 million to $8,500 million and then applied the multiplier, 43. This gives the range of potential jobs between 129,000 to 365,000 to be created in five years.

Table E.1

Jobs computation

Sector	Potential additional investment ($, millions)	Total employment multipliers	Total no. of jobs (potential)
Cassava	3,200 to 4,000	58	185,600 to 232,000
Soybean	1,600 to 2,000	56	89,600 to 112,000
ICT*	5,442.22	42	230,000
Manufacturing	1,100 to 1,600	27	30,000 to 44,000
Solar	3,000 to 8,500	43	129,000 to 365,500

*Estimated value added in millions of US dollar. Others are potential additional investments.

Appendix F

Drugs Produced and Exported from Nigeria

Table F.1

Drugs produced and exported from Nigeria

Product	Active ingredient	Therapeutic category	Destination country
Capsules	Ampicillin and cloxacillin	Broad spectrum antibiotic, 1st generation	Liberia, Sierra Leone
Capsules	Amoxicillin	Broad spectrum antibiotic, 1st generation	Liberia, Sierra Leone
Suspension and tablets	Amoxicillin and clavulanic acid	Broad spectrum antibiotic	Liberia, Sierra Leone
Suspension and tablets	Metronidazole	Broad spectrum antibiotic	Liberia, Sierra Leone
Suspension and tablets	Co-trimoxazole	Broad spectrum antibiotic	Liberia, Sierra Leone
Tablets	Albendazole	Broad spectrum antibiotic	Liberia, Sierra Leone
Tablets	Omeprazole	Broad spectrum antibiotic	Liberia, Sierra Leone
Inhaler	Salbutamol	Respiratory health, for asthma	Mali, Côte d'Ivoire, Liberia, Sierra Leone
Accuhaler	Fluticasone propionate and salmeterol	Respiratory steroid	Mali, Côte d' Ivoire, Liberia, Sierra Leone

(Table continues next page)

Table F.1

Drugs produced and exported from Nigeria *(continued)*

Product	Active ingredient	Therapeutic category	Destination country
Tablets	Amoxicillin and clavulanic acid	Broad spectrum antibiotic	Mali, Côte d'Ivoire, Liberia, Sierra Leone
Tablets	Theophylline and ephedrine hydrochloride	Respiratory health, for asthma	Mali, Côte d' Ivoire, Liberia, Sierra Leone
Syrup	Diphenhydramine hydrochloride, ammonium chloride, sodium citrate, menthol	Expectorant (cough mixture)	Liberia, Sierra Leone
Syrups and tablets	Various vitamins	Various categories based on specific product formulations	Liberia, Sierra Leone
Syrups and tablets	Paracetamol and aspirin	Analgesics (painkillers)	Liberia, Sierra Leone
Tablets	Artemether and lumefantrine	Anti-malarial	Liberia, Sierra Leone
Tablets	Sulfadoxine and pyrimethamine	Anti-malarial	Liberia, Sierra Leone
Tablets	Artemether and lumefantrine, paracetamol	Anti-malarial	Liberia, Sierra Leone
Injectables	Large and small volume parenterals	Various categories based on specific product formulations	Mali, Burkina Faso
Gel	Chlorhexidine	Pre and post-natal antiseptic disinfectant	Eswatini, Liberia

Sources: Direct company survey: Emzor, Fidson and Drugfield.

Acronyms

API	active pharmaceutical ingredients
BOI	Bank of Industry
CBN	Central Bank of Nigeria
CIT	corporate income tax
CPSD	Country Private Sector Diagnostic
DARES	Distributed Access through Renewable Energy Scale-Up
DREEF	Distributed Renewable Energy Enhancement Facility
ECOWAS	Economic Community of West African States
EFCC	Economic Financial Crime Commission
FX	foreign exchange
FDI	foreign direct investment
GDP	gross domestic product
GW	gigawatt
GWh	gigawatt-hour
ICPC	Independent Corrupt Practices Commission
ICT	information and communications technology
kWh	kilowatt-hour
MNO	mobile network operators
MOOC	massive open online course
MSME	micro, small and medium enterprises
MT	metric ton
MW	megawatt
NAFDAC	National Agency for Food and Drug Administration and Control
NASC	National Agricultural Seed Council
NCC	Nigerian Communications Commission
NCDs	non-communicable diseases
NDC	nationally determined contribution
NERC	Nigerian Electricity Regulatory Commission
NIRSAL	Nigeria Incentive-Based Risk Sharing System for Agricultural Lending
PPA	power purchase agreements
PVAC	Presidential Initiative for Unlocking Healthcare Value Chains
SABER	State Action on Business Enabling Reforms
SAS	stand-alone solar
UHC	universal health coverage

Notes

1. IFC (2020).
2. IFC (2020).
3. In 2023, there were no new listings on the main board and two re-listings of financial services firms following restructurings.
4. At the same time, the NGX reported that the total value of all quoted shares listed on the exchange increased by 53.4 percent over 2024 reflecting strong performance of NGX-listed firm share prices over the period. (NGX web pages).
5. Average of the reduction in right of way as a percent of total fiber cost across all states, weighted by population.
6. World Bank Digital Development team analysis.
7. The government of Nigeria launched the State Action on Business Enabling Reforms (SABER) program in 2022, which incentivizes states to adopt aggregate fees charged for fiber optic cable deployment on a per linear meter basis at a maximum of N145 per meter, and to publish the process for obtaining right of way, including all relevant MDAs, timeframes, and costs (World Bank 2022).
8. Team calculations considering both direct and indirect jobs using the methodology from Hjort and Poulsen (2019).
9. World Bank (2023a).
10. Resimić (2023).
11. Roy et al. (2023).
12. Olayemi et al. (2012).
13. In an in-grower model, the processor owns or directly manages the farmland, hiring farmers as employees to work on the land. The out-grower model involves partnerships with independent smallholder farmers who grow crops on their own land but are supported by the processor. The processor often provides these farmers with inputs, such as seeds and fertilizers, as well as technical assistance. In return, the smallholder farmers commit to selling a portion, or all, of their harvest to the processor. This model allows processors to scale operations with less direct investment in land, while benefiting local farmers and expanding their production base.
14. Based on 2023 data from "GNI per capita, Atlas method (current US$) - Nigeria," Data, World Bank, https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=NG.
15. In purchasing parity terms.
16. UN (2019). The 2023 estimate is from the World Bank World Development Indicator which uses the urban ratios from the United Nations World Urbanization Prospects.
17. "Consumption Expenditure Pattern In Nigeria 2019," National Bureau of Statistics, https://nigerianstat.gov.ng/elibrary/read/1094.
18. UNDP (2022).
19. World Bank (2024a). Estimate is as of 2023 and based on projection using the 2018/19 Nigerian Living Standards Survey and the poverty line. According to the report, an additional nearly 35 million people have fallen into poverty since 2018/19.
20. IMF (2024).

21. World Bank (2024a).
22. See World Bank and UKAID (2016).
23. IFC (2020).
24. World Bank (2024a).
25. "Nigeria," Human Capital Country Brief, World Bank, https://thedocs.worldbank.org/en/doc/64e578cbeaa522631f08f0cafba8960e-0140062023/related/HCI-AM23-NGA.pdf.
26. "Results Worldwide," Tracking SDG 7, The Energy Progress Report, Energy Sector Management Assistance Program, https://trackingsdg7.esmap.org/.
27. Addeh (2024).
28. Twum and Beecham (2024).
29. World Bank (2023a).
30. The Worldwide Governance Indicators (WGI) are a research dataset summarizing views on the quality of governance provided by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. The WGI do not reflect the official views of the World Bank, its Executive Directors, or the countries they represent. The WGI are not used by the World Bank Group to allocate resources.
31. IFC (2024); EIU (2025).
32. The value traded on Nigeria's corporate bond market in 2024 totaled $1.32 million–equivalent versus $36.1 billion–equivalent in South Africa (World Federation of Exchanges database).
33. Market capitalization sourced from the World Federation of Exchanges database.
34. At the same time, the NGX reported that the total value of all quoted shares listed on the exchange increased by 53.4 percent over 2024 reflecting strong performance of NGX-listed firm share prices over the period. (NGX web pages).
35. In 2023, there were no new listings on the main board and two re-listings of financial services firms following restructurings.
36. FDI announcements ($) in 2023 grew three times more than the average value between 2020 and 2022.
37. Data for 2022 from the International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database.
38. Garabedian et al. (2012).
39. "Nigeria Gross Domestic Product Q4 2023," National Bureau of Statistics, https://www.nigerianstat.gov.ng/elibrary/read/1241460.
40. "Communications Services – Nigeria," Statista, https://www.statista.com/outlook/tmo/communication-services/nigeria#internet-access.
41. "Subscriber/Teledensity," Data: April 2023 - March 2024, Nigeria Communication Commission, https://www.ncc.gov.ng/statistics-reports/industry-overview.
42. "Broadband Penetration," Data: April 2023 - March 2024, Nigeria Communication Commission, https://www.ncc.gov.ng/statistics-reports/industry-overview.
43. Independent Communications Authority of South Africa and National Telecommunications Regulatory Authority, Egypt.
44. "Nigeria – Households with Internet Access at Home," DataHub, International Telecommunication Union, https://datahub.itu.int/data/?i=12047&e=NGA.
45. Shanahan (2022).
46. Africa Practice and Genesis Analytics (2022).
47. WEF (2024).
48. "Nigeria Data Center Market," Credence Research, published September 16, 2024. https://www.

credenceresearch.com/report/nigeria-data-center-market.

49. Hyperscalers are technology companies that provide large-scale cloud infrastructure and services. They handle large amounts of data, computing power, and network resources, and are designed to scale up or down to meet demand.
50. Right-of-way fees are charges levied by state government authorities for granting permission to telecom companies to lay fiber optic cables on public land, roads, and other infrastructure.
51. Harvey et al. (2024). For example, as of 2023, Ebonyi state's right-of-way rate was 69 times higher than the right-of-way rate in Ekiti state.
52. Average of the reduction in right-of-way fees as a share of total fiber cost across all states, weighted by population.
53. World Bank Digital Development team analysis.
54. The government of Nigeria launched the State Action on Business Enabling Reforms (SABER) program in 2022, which incentivizes states to adopt aggregate fees charged for fiber optic cable deployment on a per linear meter basis at a maximum of N145 per meter, and to publish the process for obtaining right of way, including all relevant MDAs, timeframes, and costs (World Bank 2022).
55. Specific statutory obligations should be adopted either by strengthening the *Nigerian Communications Act, 2003* or to its regulations.
56. A licensing review process is ongoing by the NCC to ensure harmonization of some of the licenses.
57. Oladunmade (2024).
58. Several initiatives are already underway but require scaling and faster implementation. Notably, the Bandwidth Aggregation Project by Nigeria's Universal Service Provision Fund aggregates demand across schools with deployed knowledge centers. Similar efforts are led by the Tertiary Education Trust Fund and the Universal Basic Education Commission. The recently established National Broadband Alliance serves as a collaborative platform to address low or non-consumption areas by identifying and consolidating demand.
59. A substantial part of Nigeria pharmaceutical market is informal, which complicates efforts to estimate the true export and import sales value. The informal sector accounts for a large portion of pharmaceutical transactions. Numerous issues motivate pharma-companies to maintain informal export channels, such as (i) refusal by recipient countries/importers to recognize ECOWAS-approved tariff guides for pharma-products imported from fellow ECOWAS countries; and (ii) the dual Nigerian exchange rate system which prevailed for a long time until June 2023, which meant there was a large disparity between the official rate and the parallel rate. This incentivized Nigerian pharma and other exporters to export products unofficially.
60. Business Monitor International Nigeria pharma data for 2024.
61. Goldstein Market Intelligence (2024).
62. A substantial part of Nigeria pharmaceutical market is informal, which complicates efforts to estimate the true export and import sales value. The informal sector accounts for a large portion of pharmaceutical transactions. Numerous issues motivate pharma-companies to maintain informal export channels, such as (i) refusal by recipient countries/importers to recognize ECOWAS-approved tariff guides for pharma-products imported from fellow ECOWAS countries; and (ii) the dual Nigerian exchange rate system which prevailed for a long time until June 2023, which meant there was a large disparity between the official rate and the parallel rate. This incentivized Nigerian pharma and other exporters to export products unofficially, in order to maximize on the exchange rate.
63. Garabedian et al. (2012).
64. Harrison et al. (2023).
65. Adeloye et al. (2021).
66. Nelson (2021).

67. Toll manufacturing, also known as toll processing or tolling, is a type of contract manufacturing where the customer provides the raw materials, formulas, and specifications to the manufacturer, who then processes the agreed-upon goods into finished or semi-finished products, to the required specification(s).
68. Registration occurs with NAFDAC; it is the process whereby foreign pharma-manufacturers with ambitions to produce drugs in Nigeria are allowed to *gain* the right to import and distribute such registered drugs into Nigeria, with a view to setting up manufacturing facilities in Nigeria to manufacture those drugs within five years. Failure to set-up a Nigerian factory and to start producing the registered drugs in Nigeria within five years can result in the importer being awarded a final five-year import registration permit (hence this scheme is called the "5+5"). This gives each importer-distributor a total of 10 years maximum of allowable imports per registered drug. Thereafter, if no Nigerian factory has been set up, no further imports of that drug will be allowed into Nigeria.
69. NAFDAC (2023).
70. "Executive Order: Increase Local Production of Healthcare Products," PVAC, https://pvac.gov.ng/executive-order/.
71. The harmonized system (HS) code is a standardized numerical method of classifying traded products that are imported and exported around the world, in a globally-aligned way. It is used by the World Customs Union and by more than 200 countries and economies around the world to identify and classify products when determining their treatment in customs tariffs and for gathering statistics.
72. Anadach pharmaceutical industry stakeholders interview 2024.
73. Excipients are inert pharmaceutical ingredients that are used in product formulations.
74. Ayetoto-Oladehinde (2021).
75. "Results Worldwide," Tracking SDG 7, The Energy Progress Report, Energy Sector Management Assistance Program, https://trackingsdg7.esmap.org/.
76. Federal Ministry of Finance, Budget and National Planning, "National Development Plan 2021-2025 (Vol. 1)" (PDF), https://nationalplanning.gov.ng/wp-content/uploads/2021/12/NDP-2021-2025_AA_FINAL_PRINTING.pdf.
77. World Bank (2023b).
78. NERC (2022).
79. World Bank (2023a).
80. Emovon et al. (2018).
81. The technical potential of 210 GW is based on the single constraint of using only 1 percent of suitable land for project development. IRENA (2023, 27).
82. NERC (2024). Band A customers are those with at least 20 hours of electricity supplied daily. Approximately 15 percent of Nigerian electricity customers are classified as Band A. While Band A tariffs are cost-reflective and adjusted monthly based on the exchange rate and inflation, tariffs for Bands B (at least 16 hours daily) to E (at least four hours daily) have remained unchanged.
83. Adebayo et al. (2024). The price of diesel per liter in May 2024 when this study was published was N1,403.96 per liter ("Premium Motor Spirit [Petrol] Price Watch [December 2023]," National Bureau of Statistics, https://www.nigerianstat.gov.ng/elibrary/read/1241517).
84. Based on discussion at the CPSD solar stakeholder consultation workshop, Abuja, April 2024. Other countries in Africa and beyond with similar economic size and development have carried out recent solar auctions resulting to competitive and lower energy tariffs compared to gas fired plants. Examples include Senegal at 3.8 US cents/kWh (2018); Egypt at 3 US cents/kWh (2018); Zambia at 4.8 US cents/kWh (2019); Uzbekistan at 1.8 US cents/kWh (2021); and South Africa at 2.6 US cents/kWh (2022).

85. NERC (2024, 3). In a country's power plant mix, generation costs vary by power plant technology and fuel. The weighted average cost of generation is the total cost of all the electricity generated on Nigeria's grid in a year measured in US dollars divided by the total cumulative electrical energy generated (kWh) in the year.
86. Aimikhe and Nnamdi (2022, table 5).
87. Bingwa (2023).
88. Captive solar power provides onsite solar generation to commercial and industrial customers.
89. Extrapolating from an in-depth study of 20 projects in Nigeria with an investment opportunity of $43 million, the Rocky Mountain Institute estimates the market for C&I solar projects at 3.3 GW with an investment opportunity of $6.5 billion (Meng et al. 2023).
90. Assuming utility-scale photovoltaic (PV) costs $1 million per MWp and based on a conservative PV to hydropower power ratio of 1:4 (the North South Power Company hybrid PV-hydropower project in Shiroro is 1:2), applied to Nigeria's existing installed hydropower capacity of 2.7 GW plus the 3 GW Mambilla hydropower project scheduled to enter commercial operation in 2027 (see "Top Five Hydro Power Plants in Development in Nigeria," Power Technology, https://www.power-technology.com/data-insights/top-5-hydro-power-plants-in-development-in-nigeria/?cf-view).
91. NSIA (2021).
92. Mini-grids and stand-alone solar systems target small end-users such as households and MSMEs.
93. World Bank (2023a).
94. IEA; BloombergNEF. A market is considered economically viable for C&I solar if both commercial and industrial electricity tariffs exceed BNEF's cost estimate for C&I solar.
95. Based on annual solar resource in Abuja of 1,461 kWh per kWp ("Photovoltaic Power Potenial Map," Solar Resource Maps of Nigeria, Solargis, https://solargis.com/resources/free-maps-and-gis-data?locality=nigeria) and using midpoint diesel and solar and battery generation costs referenced in footnote 126.
96. Meng et al. (2023).
97. Meng at al. (2023).
98. "Projects," Daystar Power Energy Solutions, https://www.daystar-power.com/projects.
99. World Bank (2023a, table 2, 18).
100. Meng et al. (2023).
101. World Bank (2024c).
102. Nigeria is highly vulnerable to climate change. The risks of extreme weather events are high in Nigeria including fiercer, longer dry seasons and shorter, more intense rainy seasons (see, https://gain.nd.edu/our-work/country-index/rankings/).
103. Assuming utility-scale photovoltaic (PV) costs $1 million per MWp and based on a conservative PV to hydropower power ratio of 1:4 (the North South Power Company hybrid PV-hydropower project in Shiroro is 1:2) applied to both Nigeria's existing installed hydropower capacity of 2.7 GW and the 3 GW Mambilla hydropower project scheduled to enter commercial operation by 2027. Hydro capacity from: Power Technology (see "Top Five Hydro Power Plants in Development in Nigeria," Power Technology, https://www.power-technology.com/data-insights/top-5-hydro-power-plants-in-development-in-nigeria/?cf-view).
104. NSIA (2021). The total project budget for the full 300 MW has not been disclosed, but based on global solar farm costs will be around $300 million. Extrapolating the same solar/hydro ratio to Nigeria's total hydropower capacity yields an estimate of profitable utility scale solar potential of $1 billion.
105. Estimates obtained under a planned energy scenario, which represents what would occur under current and planned policies, and a transforming energy scenario representing "an ambitious, yet realistic, energy transformation pathway based largely on renewable energy sources and steadily

improved energy efficiency." In both scenarios, utility-photovoltaic costs $800 per kW in 2030. Please refer to IRENA (2023) for assumptions used under both scenarios.

106. For the purposes of this report, small stand-alone systems do not include power solutions for larger, affluent urban residences, which are categorized under captive generation.
107. Tenenbaum, Greacen, and Shrestha (2024).
108. World Bank (2023a, 17).
109. SAS are supported by initiatives such as the UK Foreign, Commonwealth and Development Office's Solar Nigeria Programme and the Federal Government of Nigeria's Nigeria Electrification Project (NEP). Mini-grids projects have been deployed with support from the performance-based grant and minimum subsidy tender programs from the NEP and are continuing under the new DARES project.
110. The DART program is designed to accelerate the growth of the renewable energy sector by combining demand pooling and aggregated purchasing of solar equipment. The program is supported by a $10 million financing facility and focuses on providing affordable finance, coordinating customers' clearance and logistics, and leveraging economies of scale to make solar energy more accessible and cost-effective.
111. World Bank (2024b).
112. The DARES initiative of $750 million is complemented by an IFC US dollar–revolver facility of $100 million which will target the performance-based grant beneficiaries (World Bank 2023a).
113. CPI (2022).
114. Ochs and Agelebe (2020).
115. Ochs and Agelebe (2020).
116. Interview with Infracredit, August 2, 2024.
117. "Nigerian Naira to US Dollar Exchange Rate Chart," Two-Year Overview, XE, accessed on September 16, 2024, https://www.xe.com/currencycharts/?from=NGN&to=USD&view=2Y.
118. Dadzie et al. (2024).
119. BloombergNEF (2019).
120. BloombertNEF (2020).
121. ECN, GEF, and UNDP (2020).
122. Drawn mainly from the UK Foreign, Commonwealth and Development Office funded £58 million Solar Nigeria Programme "Lessons" as presented to the international investor community in 2020. Solar Nigeria pioneered the entry of C&I developers into Nigeria and delivery on commercial terms of more than 1 million SAS and solar lanterns. It invested £16 million of grants into the developers as the first stage funding as they progressed through the investment phases.
123. Meng et al. (2024); BloombertNEF (2020); BloombergNEF (2019).
124. Dadzie et al. (2024).
125. Ibid.
126. Shosanya (2022).
127. ECN, GEF, and UNDP (2020).
128. AEC (2019).
129. USTR (2024).
130. BloombergNEF (2019); Nigeria Customs Service.
131. IRENA (2023).
132. REPP, REN, and AMDA (2022).
133. Ibid.
134. Kaduna DisCo was an exception as the privatization was concluded in 2014.
135. Roy et al. (2023).
136. See, https://www.nigerianstat.gov.ng/.

137. National Bureau of Statistics (2022); Iwelumo et al., "Harnessing the Economic Potential of Cassava Production in Nigeria" (2020).
138. "Population Growth (Annual %) - Nigeria," World Bank, https://data.worldbank.org/indicator/SP.POP.GROW?locations=NG.
139. World Bank (2022).
140. Olayemi et al. (2012).
141. Mghenyi et al. (2022).
142. Fast-moving consumer goods are products that are sold quickly and at a relatively low cost.
143. Euromonitor International (2018).
144. Iwelumo et al., "Responding to the Impact of COVID-19 on Food Security and Agriculture in Nigeria" (2020).
145. Diebiru-Ojo (2024); FAOSTAT.
146. Mghenyi et al. (2022).
147. Adebayo (2023).
148. Ibid.
149. Based on Diebiru-Ojo's (2024) presentation, "Cassava Seed System."
150. Iwelumo et al., "Harnessing the Economic Potential of Cassava Production in Nigeria" (2020).
151. "Maize (Corn) Flour," Tridge, https://www.tridge.com/intelligences/maize-corn-flour/price.
152. Sorbitol is a sugar alcohol, or polyol, that is used as a sweetener, texturizer, and humectant in many foods and beverages.
153. SkyQuest Technology Consulting (2024).
154. According to major feed producer interviewed during the CPSD private sector consultations.
155. Iwelumo et al., "Harnessing the Economic Potential of Cassava Production in Nigeria" (2020).
156. Foraminifera Market Research (2021).
157. According to ethanol producers interviewed during the CPSD consultations 2023.
158. USDA Foreign Agricultural Service (2024); "CDI: Soya Bean," Central Bank of Nigeria, https://www.cbn.gov.ng/DFD/agriculture/CDI/soya-bean.html.
159. Odifa (2023).
160. USDA Foreign Agricultural Service (2024).
161. Ogundele (2024).
162. Alltech (2020).
163. USDA Foreign Agricultural Service (2019).
164. An out-grower scheme is a contractual partnership between a processor/aggregator and farmers. Under this arrangement, farmers retain ownership of their lands, while the processors/aggregators may provide inputs and cover other associated production costs. In exchange, the processors/aggregators commit to purchasing the crop in accordance with the terms agreed upon with the farmers.
165. Mghenyi et al. (2022).
166. World Bank (2021).
167. In partnership with the World Bank Group, the Ministry of Housing and Urban Development is committed to registering, documenting, and titling all land parcels within the next five years, as more than 90 percent of land, including farmlands in Nigeria, remains unregistered and untitled (Adaji 2024).
168. World Bank (2022).
169. Ifeanyi-Obi and Corbon (2023).
170. IFC (2020); World Bank (2013; 2019); PEBEC (2021); Butler (2012); GEMS3 Land Strategy (October 2015–June 2017).
171. Ibid. Under the 1978 Land Use Act, there is no private ownership of land in Nigeria. The maximum

interest a person may hold in land is the right of use and occupancy. The statutory right of occupancy of urban land is given to any person by the governor's consent and a written certificate of occupancy. Local governments may grant customary rights of occupancy for non-urban land.

172. Exceptions to this rule are solar racking, poles or other basic hardware. Some small stand-alone solar developers cost-competitively manufacture (or at least assemble in-country) their own "pay as you go" controller that interfaces with mobile money or scratch cards to enable the customer to pay for the service they receive.
173. Nigeria is unlikely to have competitive advantage in manufacture of solar equipment.
174. Interpolation of a range of estimates of recent broadband impact studies, including 1.9 percent GDP impact for every 10 percent increase in broadband penetration rate in the Americas (ITU 2019) and 2.5 percent for China (Budde et al. 2011). A 2019 Ofcom-OECD study determined that "combining the effect of the adoption and speed changes contributed 5.66 percent to OECD GDP over a 10-year period, so 0.39 percent annually on average" (Koutroumpis 2018). A 1 percent increase in broadband penetration in Asia results in GDP growing by 0.458 percent, so that puts the value at 4.5 percent increase in GDP for a 10-year increase in broadband penetration (Alam, Sultana, and Rayhan 2019). See ITU (2012) for a summary of earlier studies of GDP impact.
175. Based on Nigerian accounting firm estimate.
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Interior design: Patrick Ibay, https://www.designed-for-humans.com/.

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