# Capitalising infrastructure and manufacturing in Nigeria

## Catalysts, constraints, and PIDG's role

Market Transformation Study

Private Infrastructure Development Group



steward redqueen

**Commissioned by the Private Infrastructure Development Group,** an innovative infrastructure developer and investor. PIDG mobilises private investment in sustainable and inclusive infrastructure in Africa and South and Southeast Asia. Our investments promote socio-economic development within a just transition to net zero emissions, combat poverty and contribute to the SDGs.

This report is part of the Market Transformation Studies Programme.

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# Acronyms

| | |
|---|---|
| **AfDB** | African Development Bank |
| **AFC** | Africa Finance Corporation |
| **AKK** | Ajaokuta–Kaduna–Kano pipeline |
| **BII** | British International Investment |
| **BPE** | Bureau of Public Enterprises |
| **CBN** | Central Bank of Nigeria |
| **CEF** | Credit Enhancement Facility |
| **CEFPs** | Credit Enhancement Facility Providers |
| **CES** | Constant Elasticity of Substitution |
| **CNG** | Compressed Natural Gas |
| **DFI / DFIs** | Development Finance Institution(s) |
| **DREEF** | Distributed Renewable Energy Efficiency Fund |
| **EAAIF** | Emerging Africa Asia Infrastructure Fund |
| **EDGE** | Excellence in Design for Greater Efficiencies |
| **EPCL** | Eleme Petrochemicals Company Limited |
| **ESG** | Environmental, Social, and Governance |
| **FCDO** | Foreign, Commonwealth & Development Office |
| **FCU** | Feed Conditioning Unit |
| **FDI** | Foreign Direct Investment |
| **FGN** | Federal Government of Nigeria |
| **FIs** | Financial Institutions |
| **FMDQ** | Financial Markets Dealers Quotations |
| **FTZ / FTZs** | Free Trade Zone(s) |
| **FX** | Foreign Exchange |
| **GDP** | Gross Domestic Product |
| **ICT** | Information and Communication Technology |
| **IFC** | International Finance Corporation |
| **IFDC** | International Fertilizer Development Centre |
| **IMF** | International Monetary Fund |
| **InfraCo** | Infrastructure Company |
| **KIIs** | Key Informant Interviews |
| **LCY** | Local Currency |
| **LFZ / LFZC** | Lagos Free Zone |
| **LNG** | Liquefied Natural Gas |

| | |
|---|---|
| **LPG** | Liquefied Petroleum Gas |
| **MSMEs** | Micro, Small and Medium Enterprises |
| **NAFCON** | National Fertilizer Company of Nigeria |
| **NCGC** | National Credit Guarantee Company |
| **NERC** | Nigerian Electricity Regulatory Commission |
| **NGN** | Nigerian Naira |
| **NIPC** | Nigerian Investment Promotion Commission |
| **NNPC** | Nigerian National Petroleum Corporation |
| **NPL** | Non-Performing Loans |
| **NSIA** | Nigerian Sovereign Investment Authority |
| **NSP** | North South Power |
| **ODI** | Overseas Development Institute |
| **OLS** | Ordinary Least Squares |
| **PE** | Polyethylene |
| **PENCOM** | National Pension Commission |
| **PFA / PFAs** | Pension Fund Administrator(s) |
| **PIDG** | Private Infrastructure Development Group |
| **PPP** | Public-Private Partnership |
| **SEC** | Securities and Exchange Commission |
| **SME / SMEs** | Small and Medium-sized Enterprises |
| **SOE / SOEs** | State-Owned Enterprise(s) |
| **TA** | Technical Assistance |
| **USD** | United States Dollar |
| **WBES** | World Bank Enterprise Survey |

# Executive Summary

## Background

1. **Introduction:** This study is part of the Market Transformation Studies Programme, which consists of five market studies commissioned by the Private Infrastructure Development Group (PIDG), to assess how PIDG's interventions have contributed to transformative changes in sectors and economies.

    1.1. **PIDG's interventions in Nigeria:** The study assesses interventions in four companies across Nigeria's capital markets and manufacturing sectors. In the capital markets sector, this includes the set-up and operationalisation of InfraCredit Nigeria (GuarantCo 2016, InfraCredit 2020), a credit guarantee company which has been listed in the Nigerian stock exchange in 2025; and the guarantee of Tower Aluminium's corporate bond issuance (GuarantCo 2011). In the manufacturing sector, this focuses on the loans provided to privatise and sell the Eleme Petrochemicals plant to Indorama (EAAIF 2007) and further build-out of the Indorama Eleme Fertilizer & Chemicals plant (EAAIF 2013, 2018, 2021, 2024); as well as two loans to African Foundries (EAAIF 2009, 2015), a steel rebar manufacturer.

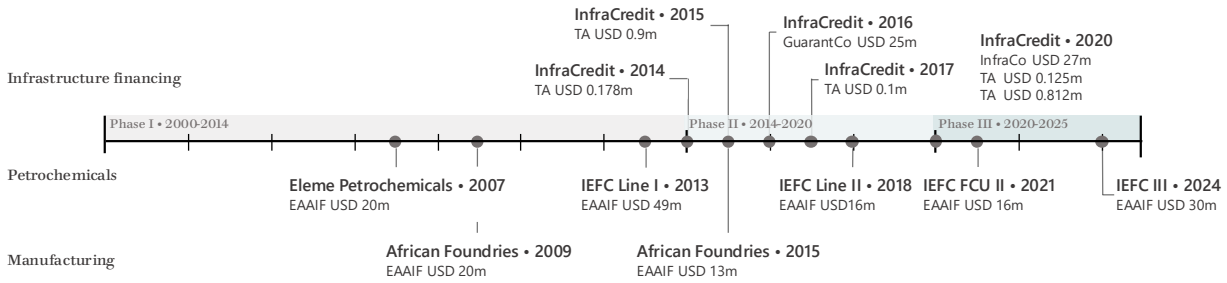
    1.2. **Approach & Methods:** The study combines desk research, stakeholder interviews, and quantitative analysis using World Bank Enterprise Survey data.

2. **Context of the Nigerian economy** provides historical and current information that sets the stage for PIDG's interventions and explains key enablers and constraints to transformation.

    2.1. **Nigeria's development trajectory** can be characterised along three phases: growth without transformation (2000–2014), external shocks (2014–2019), and structural reform with volatility (2020–2025). Across all phases, capital market constraints and weak industrial development persisted.

    2.2. **The current macroeconomic environment** is characterized by high interest rates, shallow capital markets, and FX volatility which constrain private investment in infrastructure. Growth in manufacturing remains input-driven, with persistent bottlenecks in power, logistics, and regulation.

**Figure 1: Three phase timeline and PIDG investments in capital markets and manufacturing**



# Key findings

3. **Transforming financing for infrastructure** focuses on the story of InfraCredit, with characterising detail provided from the guarantee to Tower Aluminium.

    3.1. **Context:** Infrastructure projects, as well as manufacturing companies, typically faced difficulty accessing local capital. These were due to mismatches in tenor, risk perception, and regulations requiring issuer ratings for new developers.

    3.2. **Change in the market:** By providing guarantees to infrastructure projects, InfraCredit enabled pension fund participation in corporate bonds, extended the tenors at which the market was willing to fund infrastructure bonds, successfully completing 24 transactions. InfraCredit also worked with regulators to support the establishment of a credit enhancement framework. The Nigerian financial ecosystem is now extending the use of guarantees for MSME financing, and government backed entities are setting up their own credit guarantee companies, extending impact beyond PIDG & InfraCredit's original scope.

    3.3. **Channel of market transformation:** Guarantees unlocked initial transactions and enabled price discovery, but lasting transformation required InfraCredit to work beyond its core scope, conducting capacity building for a range of ecosystem players, supporting regulatory reform, and providing project preparation support for developers, creating a new pipeline of viable businesses.

    3.4. **PIDG's role:** PIDG provided the institutional design, know-how, and patient start-up capital, while locally embedded teams drove execution, enabling a transition toward domestically anchored market development.

4. **Increasing value addition beyond extraction** focuses on Indorama's acquisition of Eleme Petrochemicals and subsequent set-up of the Indorama Eleme fertilizer plant, the first large-scale urea plant in the region.

    4.1. **Context:** Historically, Nigeria's oil & gas sector focused on extraction with limited ability to produce petrochemicals, leading to a heavy import dependence and underperforming state-owned assets.

    4.2. **Change in the market:** Nigeria has become a major fertiliser producer and exporter, reflecting a shift toward higher value-added production, though benefits remain concentrated upstream.

    4.3. **Channel of market transformation:** Although the idea to set-up a urea plant in the region was long considered, Indorama was the first to demonstrate large-scale fertiliser production viability. Continued development of the downstream petrochemical sector is constrained by structural barriers such as financing, gas supply, and macroeconomic risk.

    4.4. **PIDG's role:** Although not the lead arranger, EAAIF played a supportive role by improving financing conditions, particularly in the early stage, offering efficient and flexible financing through the commercial tranche.

5. **Driving development despite structural constraints** considers the African Foundries loan and selected transactions from InfraCredit's portfolio of guarantees to explore limits to real economy transformation.

    5.1. **Context:** Attempts to localise manufacturing face structural constraints including limited domestic inputs and reliance on imports, as well as policy changes that impact company value chains.

5.2. **Inhibitors to change in the market:** Despite some successes, broader transformation lags as firm-level successes have not translated into sector-wide transformation, with gains often fragile and easily reversed with policy changes.

5.3. **Learnings:** Key enablers & constraints cut across the Nigerian economy – transformative projects build on local strengths and collaboration with regulators but constrained by macroeconomic instability, project preparation gaps, and market concentration.

# Further study

6. **Synthesis** identifies areas of inquiry for the upcoming studies and eventual learnings section.

6.1. **Interventions must work with macroeconomic constraints:** Nigeria experiences a high velocity of money, but InfraCredit's model unlocks capital for productive use while finding opportunities for pension fund managers to make long-term investments, solving for the high velocity of money.

6.2. **PIDG's greatest successes build on its unique strengths**, such as with EAAIF's ability to provide patient and flexible capital to Indorama, or with InfraCredit relying on a range of PIDG solutions (TA, GuarantCo, InfraCo). By understanding the local context and working with key ecosystem players, PIDG succeeded in building an institution that transformed Nigeria's capital markets.



# 1 Introduction

The Market Transformation Studies Programme is a series of five market studies commissioned by the Private Infrastructure Development Group (PIDG), to assess how PIDG's interventions have contributed to transformative changes in sectors and economies, such as through the introduction of new financial instruments, shifts in risk perception, replication of business models, and improved sector performance that persists beyond PIDG's involvement.

The first study focuses on Nigeria, with upcoming studies planned for Kenya, Vietnam, and Bangladesh, as well as a fifth study that will be scoped based on priority themes or areas emerging from the preceding studies. After the five studies are complete, the programme will end with a learnings phase focused on practical recommendations for the PIDG team.

**Box 1: Definition of market transformation**

*'The extent to which a market undergoes fundamental and durable changes in its structures, incentives, behaviours, and institutional arrangements, resulting in sustained market-level shifts in how the market functions and delivers outcomes'*

The Nigeria study focuses on infrastructure financing and the manufacturing sector, two areas of focus within PIDG's portfolio and of strategic relevance to economic development in the country. The study begins by setting out the broader country context within which PIDG operates. It examines the national development trajectory from 2000 to 2025 and its implications for market transformation.

**Box 2: About PIDG**

The Private Infrastructure Development Group (PIDG) is an innovative infrastructure project developer and investor which has been mobilising private investment in sustainable and inclusive infrastructure in Sub-Saharan Africa and South and Southeast Asia for 25 years. PIDG investments promote socio-economic development within a just transition to net zero emissions, combat poverty and contribute to the Sustainable Development Goals (SDGs). PIDG delivers its ambition in line with its values of pioneering, partnership, safety, inclusivity, and urgency. PIDG offers:

- **Technical assistance** for upstream, early-stage activities and concessional capital;
- **early-stage project development** and project and corporate equity through its project development solution, InfraCo;
- **debt solutions** through EAAIF (the Emerging Africa & Asia Infrastructure Fund), one of the first and more successful blended debt funds in low-income markets; and
- **guarantee solutions** through GuarantCo, which provides credit enhancement and local currency solutions to de-risk projects.

PIDG also supports a growing portfolio of local credit enhancement facilities, which unlock domestic institutional capital for infrastructure financing.

PIDG has committed US$6.6bn since 2002, closing 286 infrastructure projects, mobilising US$32.7bn in private capital, and providing an estimated 240 million people with access to new or improved infrastructure. PIDG is funded by the governments of the United Kingdom, the Netherlands, Switzerland, Australia, Sweden, and Global Affairs Canada.

A key pillar of PIDG's approach is to transform markets by proving innovative solutions, proving their viability in fragile environments and their potential for replication by investors, developers, and institutions.

Section three explores how Nigeria's capital markets for infrastructure financing has historically struggled to channel domestic capital into long-term investments. It assesses whether PIDG interventions, through GuarantCo and InfraCredit Nigeria (henceforth InfraCredit) addressed these gaps.

Section four follows with findings regarding Nigeria's petrochemical sector, which historically had low productivity under public ownership. The section studies whether PIDG's interventions through EAAIF, providing patient capital for the privatisation of Eleme Petrochemicals and co-financing successive investments in urea production, contributed to a structural shift toward activities with higher value addition.

Section five explores structural constraints in the real economy by examining interventions in the broader manufacturing sector, including PIDG investments in the steel manufacturing sector and case studies from InfraCredit's portfolio. The report concludes with insights relevant across sectors and markets.

## 1.1 PIDG's interventions in the markets

This study assesses five PIDG projects, each composed by one or more transactions, as detailed in Table 1. These transactions cover the capital markets and manufacturing sectors in Nigeria and are analysed throughout the report across three main sections: i) section three on infrastructure financing; ii) section two on the petrochemicals value chain; iii) section three on the broader manufacturing sector.

Infrastructure financing is assessed by studying two PIDG's projects: (i) GuarantCo's and InfraCo's funding and technical support in the set-up of InfraCredit; and (ii) GuarantCo's 2011 guarantee to Tower Aluminium, which

established the first naira-denominated guarantee for a manufacturing company. In addition, the activities of InfraCredit are also assessed for the purpose of this analysis.

In the petrochemicals value chain, the study examines (iii) EAAIF's role in the privatisation of Eleme Petrochemicals (EPCL) to Indorama Corporation, and (iv) PIDG's subsequent participation in Indorama's expansion into urea fertiliser manufacturing.

The fourth section on structural constraints in the broader manufacturing sector examines (v) GuarantCo's guarantee to African Foundries Limited for its steel rebar technology upgrade. This case illustrates the limits of financial instrument-based transformation where sector-level bottlenecks, input costs, power supply, import competition, remain structurally unresolved.

**Table 1: Overview of PIDG's projects assessed in the study**

| Report section | Project name | Year of signing | PIDG funding |
|---|---|---|---|
| Infrastructure financing | InfraCredit Nigeria | 2016 (initially)<br>2020 (expansion)<br>2025 (exit) | USD 25m (GuarantCo)<br>USD 27m (InfraCo) |
| | InfraCredit Nigeria (PIDG TA) | 2014<br>2015<br>2017<br>2020<br>2020 | USD 0.178m<br>USD 0.9m<br>USD 0.1m<br>USD 0.125m<br>USD 0.812m |
| | Tower Aluminium | 2011 | USD 14m (GuarantCo) |
| Petrochemicals | Indorama Eleme Fertilizer & Chemicals | 2013 (Line I)<br>2018 (Line II)<br>2021 (FCU II)<br>2024 (Line III) | USD 49m (EAAIF)<br>USD 35m (EAAIF)<br>USD 16m (EAAIF)<br>USD 30m (EAAIF) |
| | Eleme Petrochemicals | 2007 | USD 20m (EAAIF) |
| Manufacturing | African Foundries | 2009 (initially)<br>2015 (expansion) | USD 20m (EAAIF)<br>USD 13m (EAAIF) |

## 1.2 Approach & Methods

The study draws on three sources of evidence. First, desk research comprising transaction-level document review and secondary data on Nigeria's macroeconomic and sectoral development since 2000. Second, approximately ten online stakeholder interviews conducted during the terms of reference and preparation phases, followed by approximately thirty in-person interviews conducted across Lagos and Abuja (as detailed in Appendix A). Third, a quantitative analysis drawing on three waves of the World Bank Enterprise Survey (2007, 2014, 2025) to trace productivity dynamics in Nigeria's manufacturing sector over time. A regression analysis was performed to identify the relative contribution of labour, capital, and material inputs to firm-level sales across survey waves.

Analysis was divided across two workstreams: capital markets and manufacturing. For each workstream, the project team first defined how the three dimensions of market transformation (efficiency, resilience, and integration) would be reflected within the sector. This was followed by defining hypothesis based on initial desk research, which were tested using secondary data, stakeholder interviews, and quantitative analysis. Given data limitations, a quantitative counterfactual was not constructed. Instead, PIDG's contribution to market

transformation was validated through stakeholder interviews, assessing alternative explanations to identify the most plausible attribution for observed market outcomes. Methodological detail is provided in Appendix C.

## 1.3 Theory

Across this programme of studies, the concept of market transformation is applied as a conduit to driving development. Private sector actors have a significant role to play in market transformation, magnifying development impact beyond what constrained government budgets alone can achieve.

**Box 3: Market transformation channels & outcomes**

This report applies PIDG's approach to market transformation, which is an adaptation of IFC AIMM's methodology. This approach consists of three channels through which transformation takes place, and three market outcomes that track its progress. Examples are provided below, while these concepts are applied to the sectors under study in Appendix C.

Market transformation channels

- **Demonstration & replication effects:** First-of-a-kind transactions in nascent markets, business model innovations, as well as second- and third-of-a-kind operating in slightly new modalities or contexts
- **Enabling frameworks:** Legal/regulatory framework changes, development and use of industry standards
- **Building Skills and Capacity:** Skills transfer, training, increasing capabilities and expertise in the sector

Market transformation outcomes

- **Efficiency:** Optimal allocation and utilization of capital, technology and productive assets through competitive markets
- **Resilience:** Ability to withstand shocks, through technology, market governance, or industry practices
- **Integration:** Physical, technological, and financial connectivity, within and across sectors and markets

Market transformation fits within the economic transformation-led model of development, focusing on increasing productivity. As early as 1956, economists Robert Solow & Trevor Swan identified the now empirically validated concept that productivity improvements are the core driver of long-term economic growth[1]. The Overseas Development Institute's framework for economic transformation identifies three pathways to improve productivity of developing economies:

(i) move labour and capital from lower productivity to higher productivity sectors;

(ii) improve productivity within sectors by promoting the entry or growth of more productive firms; and,

(iii) improve productivity within sectors by improving productivity within firms[2].

The first pathway refers to the structure of an economy. Constraints that inhibit movement of labour and capital towards higher productivity sectors are referred to as structural in this report, and although market transformation does not focus on moving labour towards higher productivity sector, it can enable the movement of capital towards more productive activities. Improving the *efficiency* of markets assists directly with the first two pathways, as a more competitive market provides incentives for individual firms to pursue the third pathway. *Integration* within and across sectors improves the productivity of both individual firms and

[1] Ferrera, M. (2025)
[2] Overseas Development Institute. (2017); Overseas Development Institute (2021) Acemoglu, D., Johnson, S., & Robinson, J.A. (2005)

the sector in aggregate by reducing friction in delivering products and services, whereas *resilience* ensures that productivity gains persist and can survive external shocks.

There are several preconditions to enabling market transformation. The first precondition, identified by Solow & Swan, was the requirement for accumulation of capital to enable investments that lead to change[1]. Second, direct productivity improvements most often result from adoption of new technologies, which requires capacity building. Lastly, development requires inclusive institutions that foster efficiency, resilience, and integration through enabling frameworks, with the goal of driving widespread participation in the economy and limiting rent-seeking[3]. Successful firms often fill institutional voids to provide lasting market transformation[4].

Realising Nigeria's infrastructure and industrial potential requires addressing structural barriers that have historically constrained private investment and productive capacity specifically in the manufacturing sector and in capital markets. For capital markets, transformation hinges on several conditions:

(i) the development of a stronger pipeline of bankable, well-structured projects that can attract institutional and international investors;

(ii) improved financial and technical skills within the local market to originate, structure, and manage complex transactions; and,

(iii) a more conducive regulatory environment that provides investor confidence through transparent rules, enforceable contracts, and predictable policy.

For the manufacturing sector, transformation depends on advances of the core factors of production, namely:

(i) labour, through better governance and targeted upskilling to raise workforce productivity;

(ii) assets, through expanded production capacity and a shift toward higher value-added output; and,

(iii) material, electricity or other inputs through more reliable, affordable, and higher-quality supply chains that reduce the cost and risk of doing business.

[3] Acemoglu, D., Johnson, S., & Robinson, J.A. (2005)
[4] Khanna, T. & Palepu, K. (2005)



# 2 Context of the Nigerian economy

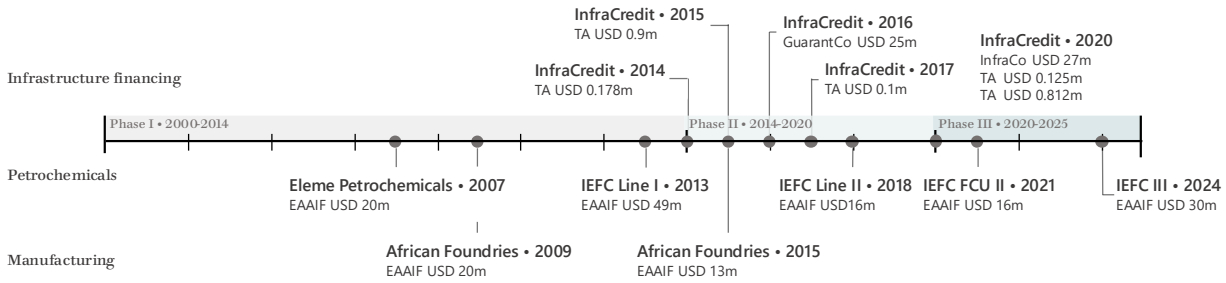
The contextual analysis serves to provide a snapshot of Nigeria's development trajectory since 2000 and current macroeconomic conditions, as many of the enabling and constraining factors for development of the sectors under study tie to the underlying economy. Nigeria's development trajectory is defined across three phases:

- The first phase (2000-2014) highlights the attempt at liquidity expansion and market opening, where democratic transition, privatisation, debt relief, and banking consolidation, created conditions for growth and infrastructure investment.
- The second phase (2014-2019) marks the period when the oil crisis hit, triggering recession, foreign reserves crashing, and private infrastructure investment plummeting.
- The third phase (2020-2025) represents the adjustment and uncertain reset after several recessions and sustained hits to the Naira, characterised by bold structural reforms (subsidy removal, FX liberalisation) and nascent recovery, yet implementation gaps and currency volatility persist.

Each phase reveals different dynamics shaping the environment for private infrastructure participation in Nigeria. In capital markets, private capital has struggled to fill infrastructure financing gaps across all three phases, with domestic credit severely limited, capital markets shallow, and banks structurally misaligned with long-term infrastructure investment needs. Meanwhile, manufacturing remains input-driven rather than productivity-led, with persistent bottlenecks in power and regulation limiting industrial development. There

are however signs of gradual progress, with internationally exposed firms gradually becoming more capital-intensive, and a shift toward greater domestic sourcing as well as increased electricity grid reliance. Figure 1 maps PIDG's interventions across a timeline, indicating the phase in which each was carried out, as further detailed in the following chapters[5].

**Figure 1: Three phase timeline and PIDG investments in capital markets and manufacturing**




# 2.1 Development trajectory

## Phase 1: Market Expansion

Although Nigeria's first phase (2000-2014) was characterised by liquidity expansion and economic growth, this failed to translate into structural transformation as growth remains concentrated in extractive sectors. Real GDP grew at an average of 7% annually[6], peaking at 14.6% in 2002[7], driven primarily by the high oil prices as well as growing sectors such as telecom and banking[8]. Yet, little investment was made in manufacturing and value-add sectors, such as metals, petrochemicals, fertilisers and other higher value industrial processes. Underinvestment left critical infrastructure underdeveloped and underlying structural vulnerabilities, including weak institutions and shallow capital markets, largely unaddressed. Even as oil revenues increased in absolute terms, it declined as a share of GDP form 23.6% in 2011 to 19.7% in 2012[9]. Yet, the economy remained dependent on oil for government revenues and foreign exchange, exposing the country to severe market volatility. The fuel subsidy cost the government further, constraining fiscal space and preventing the accumulation of reserves needed to buffer against shocks to oil prices[10].

Recognising the need to reduce oil dependency and improve performance of, what was mostly then, state owned enterprises, president Obasanjo's privatisation program (1999-2007) earmarked approximately 100 state-owned enterprises for sale across manufacturing, telecommunications, and other sectors under the National Council on privatisation framework[11]. However, weak post sale monitoring, unresolved operational constraints (unreliable power supply, high borrowing costs, and poor roads and logistics)[12], and governance challenges meant that many privatised enterprises underperformed or collapsed. Eleme Petrochemicals, PIDG's

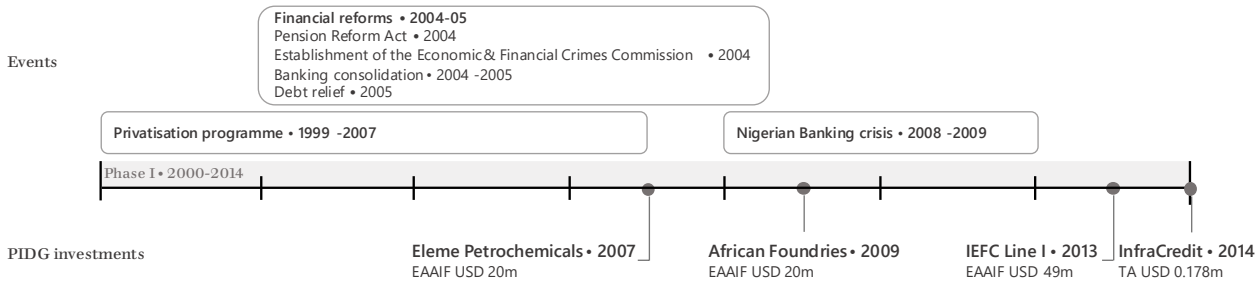
[5] Link to interactive timeline with all plotted events
[6] World Bank. (2019)
[7] Intelpoint. (2025)
[8] Intelpoint. (2025)
[9] World Bank. (2013)
[10] World Bank. (2013)
[11] Jerome, A. (2008)
[12] Anyaogu, I. (2024, December 11)

first investment in Nigeria, was one of the flagship transactions for this programme in 2006, and one of the successful privatisation cases.

Although Nigeria's financial sector reforms between 2004 and 2005 significantly increased domestic liquidity and strengthened financial institutions, they failed to create long-term financing channels for productive industrial investment. Banking consolidation reduced the number of banks from 89 to 25 between 2004 and 2005, while the 2004 Pension Reform Act established the National Pension Commission (PENCOM)[13] and introduced a contributory pension scheme, laying the institutional foundation for what would become Nigeria's largest pool of domestic savings[14].

Despite these reforms, capital markets remained shallow and failed to channel liquidity toward productive investment. Rising interest rates made Federal Government of Nigeria (FGN) securities increasingly attractive in the bond market, while corporate bond issuances were almost entirely absent. The handful of deals that did occur were short-dated and placed privately rather than listed on public markets[15]. The absence of a long-term local currency debt market meant infrastructure and industrial financing remained constrained, with government securities crowding out private long-dated instruments[16]. Manufacturing companies continued to access finance almost exclusively through short-term commercial bank loans, typically at three to five years, with no access to the long-tenor capital needed to finance capital-intensive technology upgrading or capacity expansion.

**Figure 2: Events in Phase I**




## Phase 2: External Shocks

The oil price collapse of 2014 revealed the economy's reliance on a single external flow and limited diversification, with real GDP contracting by 1.6% in 2016[17], triggering the first recession. The shock sharply weakened both fiscal capacity and foreign exchange availability, as oil accounted for approximately 70% of government income and 85% of foreign exchange earnings[18]. Falling oil prices forced the government to reduce public spending even as recessionary conditions increased demand for fiscal support. Foreign reserves declined significantly as the Central Bank intervened to defend the naira, which depreciated by 84% from approximately ₦195 per US dollar in 2015 to about ₦359 per US dollar in 2020 while being weaker yet on the parallel market with an estimated exchange rate of ₦434 per US dollar[19]. The resulting foreign exchange shortages constrained businesses across the economy, particularly firms dependent on imported inputs and foreign currency access.

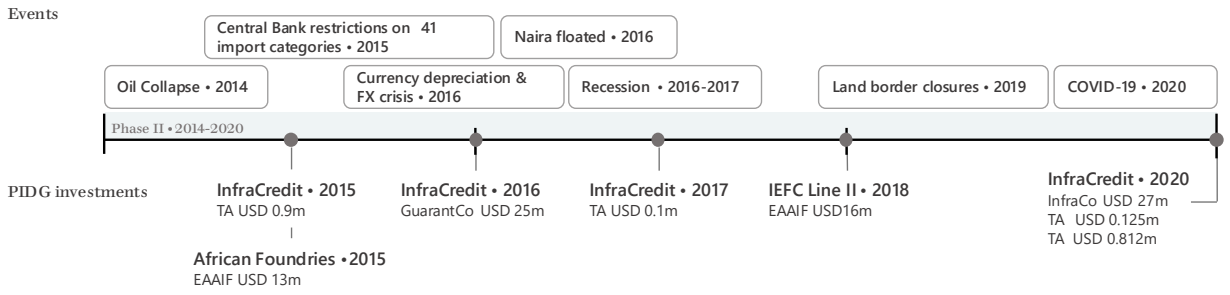
[13] African Development Bank. (2007)
[14] National Pension Commission. (2025)
[15] African Development Bank. (2007)
[16] Cambridge Economic Policy Associates. (2015).
[17] Intelpoint. (2025)
[18] Eboh, C. (2016, March 23)
[19] Central Bank of Nigeria. (n.d.)

These shocks compressed private investment and pushed up the cost of capital, making long-dated bond issuance by corporates effectively prohibitive without credit enhancement. Institutional investors, particularly pension funds, further concentrated their investments in federal government securities and were reluctant to take on credit risk for infrastructure projects. As interest rates rose, the yields on the sovereign bonds became increasingly attractive, giving pension funds even less reason to take on the credit risk that infrastructure financing would require. It was against this backdrop that InfraCredit was established in 2016.

Policy responses increasingly relied on administrative controls rather than structural reform. To conserve scarce foreign exchange and support domestic production, the Central Bank restricted 41 categories of goods including fertiliser, iron rods, and reinforcing bars from accessing foreign exchange at the official rate, while the government closed land borders to curb smuggling and promote local manufacturing [20]. Although these measures aimed to conserve scarce foreign exchange and support domestic manufacturers, they distorted market incentives and failed to address the structural constraints undermining industrial capacity and competitiveness. Manufacturers continued to face unreliable power supply, poor logistics infrastructure, and high cost of capital which constrained productive investment

Although power sector privatisation expanded private participation in Nigeria's infrastructure sector, the macroeconomic crisis exposed the sector's underlying commercial and financial fragilities. The privatisation of generation and distribution assets in 2012–2013 created a new class of infrastructure companies, including North South Power. However, the macroeconomic crisis exposed fragilities in sector business models. Distribution companies struggled with collection losses and below-cost tariffs [21], while generation companies faced payment delays from the state-owned transmission company [22], creating liquidity constraints throughout the value chain. As a result, manufacturers were forced to rely heavily on expensive self-generation. As macroeconomic conditions deteriorated, manufacturing capacity utilisation fell to a record low of 40.1% in June 2020[23]. The sector's dependence on import for raw materials exposed manufacturers to currency depreciation and foreign exchange shortages, as rising input costs coincided with weak domestic demand that limited firms' ability to pass higher costs on to consumers.

### Figure 3: Events in Phase II




## Phase 3: Structural Reform

Starting in 2020, the third phase was characterised by renewed structural reforms, including subsidy removal, foreign exchange liberalisation, and post-recession economic restructuring. However, the COVID-19 pandemic and the 2020 oil price collapse triggered Nigeria's second recession in five years, with real GDP contracting by

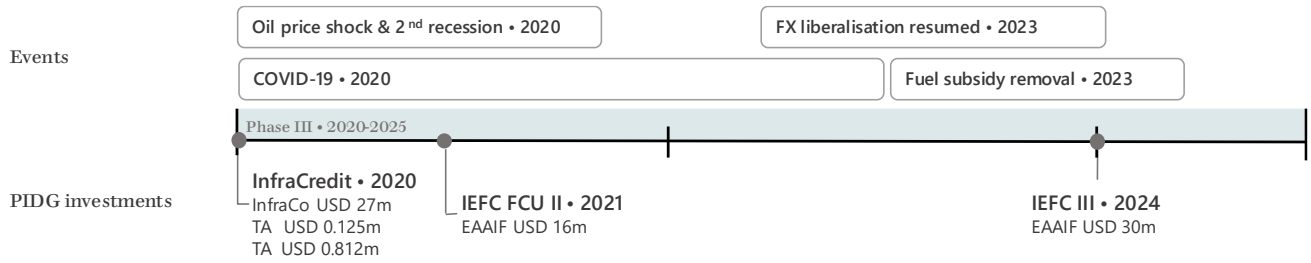
[20] Vagmon e-Grup & Logistics Ltd. (2023)
[21] Africa Energy Portal. (2024, July 22)
[22] Oguntola, S. (2019, February 5)
[23] CEIC Data. (n.d.)

1.8% in 2020 [24]. The crisis again exposed the economy's continued dependence on oil, which still accounted for more than 80% of Nigeria's exports, 30% of its banking-sector credit and 50% of the overall government revenue [25]. As a result, macroeconomic stability remained highly vulnerable to price volatility. Despite these pressures, the economy recovered relatively quickly with real GDP rebounding to 3.65% growth in 2021 and 3.25% in 2022, before moderating to approximately 3% growth in 2023-2024 [26].

The most significant policy shift came in June 2023 when President Tinubu simultaneously removed fuel subsidies and floated the naira, ending two policies that had shaped Nigerian macroeconomic management for decades [27]. On June 14, 2023, the Central Bank abandoned its currency peg, causing the naira to fall 36% in a single day. The exchange rate moved from approximately ₦477 to ₦750 per dollar [28], eventually reaching over ₦1,600 by mid-2024 before stabilising at around ₦1,370 by early 2026. These reforms were intended to prevent fiscal and foreign exchange crisis. However, the immediate impact was a sharp increase in inflation and business costs. For manufacturing, naira deprecation significantly raised input costs of imported inputs and foreign currency obligations [29]. At the same time, this improved competitiveness for firms that were able to source locally or generate export revenues, as the naira value of exports increased[30].

Despite continued macroeconomic volatility, this phase marked the beginning of a more significant structural change in how domestic capital was deployed. Credit enhancement institutions such as InfraCredit demonstrated that pension funds could finance infrastructure when supported by the appropriate risk mitigation mechanisms. Guaranteed infrastructure bonds achieved an average tenor of 11 years compared to a market average of 3.2 years for non-guaranteed issuances[31]. This helped redirect portions of domestic savings away from short-term government securities toward longer-term productive investment. At the same time, fuel subsidy removal created new commercial incentives for investment in natural gas infrastructure. As petrol prices increased, gas became more economically competitive for power generation and transportation. Together, these developments signalled the early emergence of deeper local capital markets and new industrial investment opportunities.

### Figure 4: Events in Phase III




[24] World Bank. (2021, June 15)
[25] World Bank. (2020, June 25)
[26] World Bank Development Indicators. (2000-2025)
[27] Financial Times. (2024)
[28] Ohuocha, C., & Bala-Gbogbo, E. (2023, June 14)
[29] World Bank. (2024)
[30] Olufemi, S. (2025, January 25)
[31] OECD. (2025)

## 2.2 Macroeconomic environment

Nigeria's economic performance has lagged some of its regional peers in recent years reflecting both cyclical shocks and structural constraints. Prior to 2014, growth exceeded the regional average. In contrast, over the past decade, GDP growth has averaged around 1%. This is well below the regional average of roughly 2% and significantly lagging peers such as Kenya and Ghana, as well as Ethiopia, where growth has even reached around 8% [32].

### Financing for infrastructure

Nigeria's infrastructure financing gap is estimated at USD 3 trillion[33] over the next thirty years and closing it will require substantial private sector participation[34]. Public finances alone cannot credibly fill that gap, as government revenues average only around 10% of GDP [35], among the lowest globally, leaving little fiscal space for large-scale infrastructure investment. Meeting Nigeria's infrastructure needs therefore depends on mobilising private capital at scale, yet the conditions for doing so remain underdeveloped.

Private investment in Nigerian infrastructure has been limited in scale, heavily concentrated in lower-risk sectors and mostly financed internationally. Of roughly USD 13 billion invested by the private sector in Nigerian infrastructure between 2000 and 2024, more than 90% is concentrated in seaports and energy, sectors where risk can be structured through long-term concession agreements or power purchase agreements, leaving other infrastructure sectors largely untouched. In addition, most is financed through bilateral, multilateral, and international sources rather than domestic capital markets [34]. These investments are well below the estimated USD 100 billion per year needed to bridge Nigeria's infrastructure gap, underscoring the scale of the financing shortfall and the need for private sector participation[36].

International funding in infrastructure has not translated into deep or stable capital flows and is mostly directed towards public-sector initiatives [37]. While FDI inflows briefly peaked at around 3% of GDP in the mid-2000s, they have since fallen to below 1%, lagging regional peers, pointing to weak long-term investor confidence. Portfolio equity flows, meanwhile, remain highly volatile, suggesting that foreign participation in Nigerian markets is largely short-term and driven more by shifting risk sentiment than sustained investment conviction[32].

[32] World Bank Development Indicators. (2000-2025)
[33] Federal Ministry of Finance. (2020)
[34] World Bank PPI. (2000-2024)
[35] International Monetary Fund. (2026)
[36] Falaju. (2025, September 17)
[37] Cambridge Economic Policy Associates Ltd. (2015)

Private infrastructure developers face acute financing constraints, as domestic credit to private sector stands at roughly 10% of GDP, far below the sub-Saharan African average of approximately 30% in 2025 (see Figure 6) [32] . Indeed, World Bank Enterprise Survey data shows that on average 71% of firm working capital is financed internally, with just 0.5% from bonds and 2.5% from bank borrowing. Access to finance has increasingly become a business constraint, rising from 13% of firms citing it as a major obstacle in 2007 to 26% in 2022. This is driven less by outright credit rejection than by discouragement,

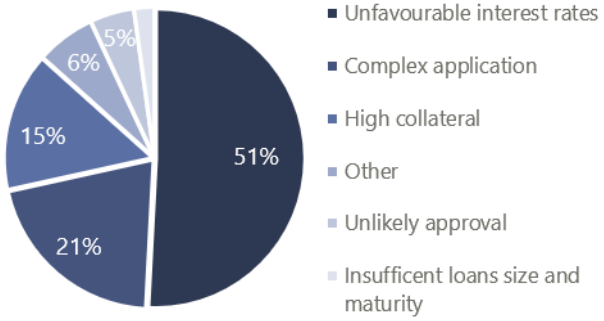



**Figure 5: Main reasons firms don't apply for loans/credit lines**

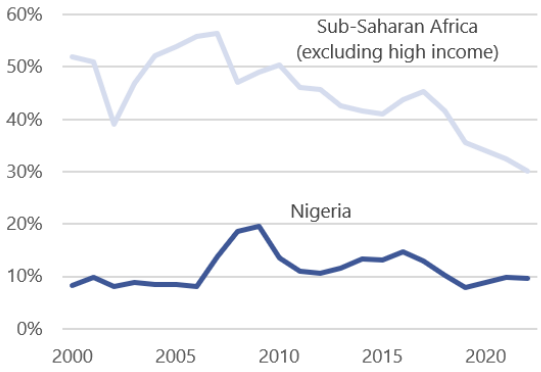



**Figure 6: Domestic credit to private sector (% of GDP)**

as 84% of constrained firms do not apply for credit, largely deterred by high interest rates (see Figure 5) [38].

Despite accounting for around 80% of total financial sector assets, Nigerian banks have historically lent little to the private economy, and their capacity to do so has weakened further in recent years [39]. This is unlikely to materially change in the near term, given the structure of monetary and prudential requirements. The Central Bank of Nigeria has steadily increased the cash reserve ratio in recent years, requiring 45% of deposits to be held as non-interest-bearing reserves, effectively removing a large share of bank funding from productive use. With the benchmark rate above 25% as of early 2026, the cost of capital is prohibitively high for most infrastructure projects, narrowing the universe of viable investments and deterring developers from locking in long-tenor debt. In addition, capital adequacy requirements typically absorb a further 10–15% of risk-weighted assets, further constraining balance sheet capacity for long-term project finance [40].

Where bank lending does occur, it is structurally misaligned with infrastructure investment needs. Banks favour short-term, lower-risk exposures, driven by a deposit base that is predominantly short-term in tenor. This was reinforced by repeated occurrences of asset quality stress, with NPL surges during the global financial crisis, the 2014 oil price shock, and the 2015–16 recession [26] . High-yielding government securities compound the problem, offering banks an attractive, low-risk alternative to private sector lending that requires little credit assessment and no long-term balance sheet commitment.

On top of this, Nigeria's capital markets have historically played a limited role in financing the real economy. Equity markets have remained relatively illiquid, with stock market capitalisation hovering around 10% of GDP through most of the 2000s and 2010s, a fraction of what is typical in more developed markets. Corporate bond issuance has been similarly thin, with activity concentrated in short-tenor instruments and dominated by a small number of large issuers [41].

[38] World Bank Enterpise Survey. (2007-2025)
[39] International Monetary Fund. African Dept. (2027, April 5)
[40] Central Bank of Nigeria. (2026, February 23)
[41] SEC. (2010-2013)

## Manufacturing

Structural and infrastructure barriers have significantly impacted the development of Nigeria's manufacturing sector, limiting its ability to expand despite periods of partial recovery. While manufacturing value added has recovered from below 7% in the early 2010s to around 9% today (see Figure 7), its share of GDP is volatile due to the dominant role of oil in overall output. Still, Nigeria's manufacturing base remains structurally underdeveloped compared with both regional peers in Sub-Saharan Africa and emerging economies such as Vietnam, where manufacturing accounted for approximately 24% of GDP in 2024. It also lags behind developed countries such as Poland, which had a comparable level of industrial development to Nigeria in the early 2000s [42]. This reflects Nigeria's persistent bottlenecks in power, transport, and financing that constrain sustained industrial development.

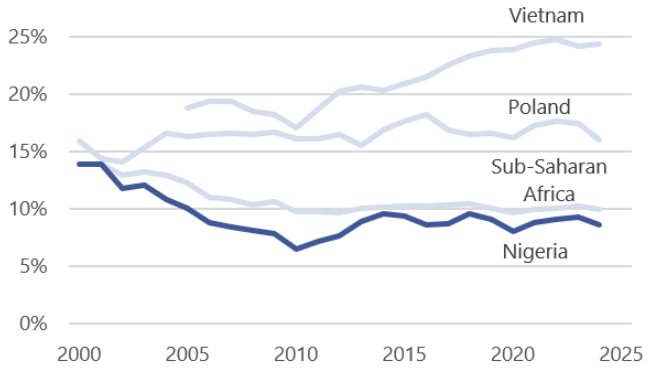



**Figure 7: Manufacturing, value added (% of GDP)**

Manufacturing growth in Nigeria is largely input-driven rather than productivity-led, making it inherently less sustainable over time. Firm-level analysis based on the World Bank Enterprise Survey shows that growth is primarily explained by the accumulation of labour, capital, and materials rather than through higher factor productivity [43]. Firms operate under roughly constant returns to scale, with sales rising in line with input use and no clear evidence of productivity improvements as firms expand [44]. This pattern reflects a broader trend in Sub-Saharan Africa, where labour productivity growth outside agriculture have come largely from workers moving into higher-productivity sectors rather than from firms in those sectors becoming more efficient over time. Labour-intensive production structures and frequent power outages then continue to constrain productivity at the firm level [45] [46].

Despite the absence of broad efficiency gains, Nigerian manufacturing firms seem to gradually shift toward more capital-intensive production. The responsiveness of sales to capital has increased from an elasticity of 0.04 in 2014 to 0.06 in 2025, meaning that a given injection of capital now generates a larger increase in sales than it did a decade ago. For a firm with NGN 10 million in sales, a 10% increase in capital raised sales by NGN 40,000 in 2014 vs NGN 60,000 in 2025 [44]. This increasing role of capital could point towards gradual improvements such as better machinery, technology adoption, and more efficient production organisation, and aligns with broader shifts toward more capital-intensive manufacturing observed across Sub-Saharan Africa.

This change is most prominent and capital most productive in firms engaged in international trade. Estimated capital elasticities are significantly higher for exporters and importers than for domestically oriented firms, with a 10% increase in capital associated with sales gains of around 3.2% and 1.4%, respectively [44]. This gap is not explained by differences in capacity utilisation but likely reflects but likely reflects access to longer-tenor, lower-cost financing instruments, including trade finance and supplier credit that are structurally unavailable to

[42] World Bank Development Indicators. (2000-2025)
[43] For methodology and detailed data based on the World Bank Enterprise Survey please refer to Appendix C.
[44] World Bank Enterpise Survey. (2007-2025)
[45] Diao, X., Ellis, M., McMillan, M., and Rodrik, D. (2025)
[46] Abdu, M., Jibir, A., Abdullahi, S. et al. (2021)

domestically oriented firms. Additionally, this might be accompanied by stronger managerial capabilities, and the competitive pressures faced by internationally exposed firms. The differences in productivity and returns to capital could point towards a growing divide between internationally connected manufacturers and firms primarily serving domestic markets. This is supported by other studies that show increased effectiveness for exporting manufacturing firms as compared to non-exporters. While exporters tend to face fewer financing constraints, some self-selection into export markets is likely. However, there is also evidence of "learning by exporting" in Nigeria, with firms improving productivity over time through exposure to international standards new technologies, and competitive pressures. By investing in the infrastructure that enables and sustains such market access, PIDG helps create the conditions for these productivity gains to scale[47] [48].

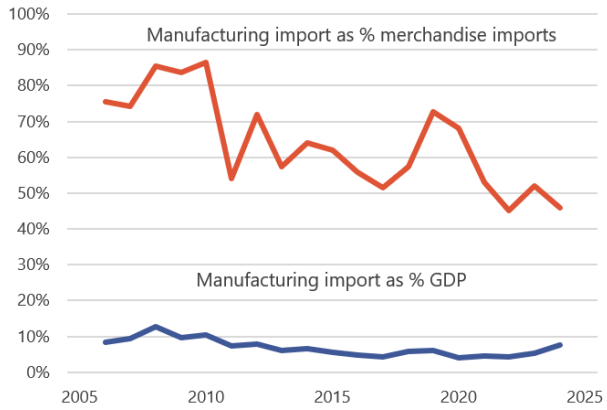



**Figure 8: Nigerian import developments**

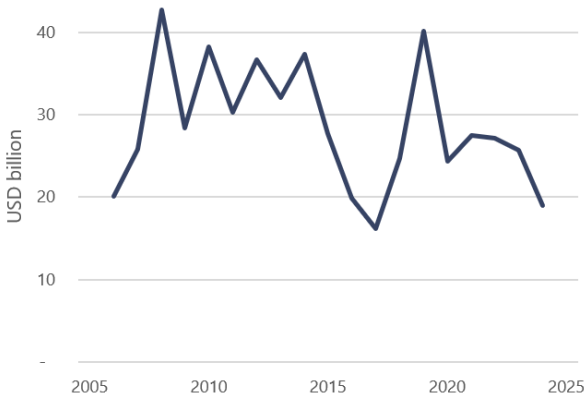



**Figure 9: Nigerian manufacturing imports (current USD)**

Nigerian manufacturers are also becoming less dependent on imported material inputs. While in 2014 around 82% of inputs used by manufacturers were domestically sourced, this increased to 85% in 2025 [49], a pattern reinforced by import restrictions and foreign exchange constraints [50]. Consistent with this, macroeconomic data show a modest decline in the share of manufacturing imports relative to GDP since the mid-2000s (see Figure 8). However, in absolute terms (see Figure 9), import values remain volatile, largely reflecting exchange rate fluctuations – particularly during episodes of naira depreciation – often linked to oil price shocks and the resulting pressures on foreign exchange availability [51]. At the firm level, World Bank Enterprise Survey data indicates that a 10% increase in material costs would raise firm sales by about 6.2% in 2014 versus 5.7% in 2025. This decreased reliance on materials could point to some degree of input substitution, possibly driven by greater use of locally produced materials. While firms may revert to imports if restrictions ease, the shift still supports industrial development by strengthening upstream sectors, improving supply chain resilience, and deepening domestic market participation.

[47] Abdu, M., Jibir, A., Abdullahi, S. et al. (2021)
[48] Alka, K.A. (2024)
[49] World Bank Enterprise Survey. (2007-2025)
[50] World Bank PPI. (2000-2024)
[51] World Bank Development Indicators. (2000-2025)

Historically electricity has been one of the most binding constraints on Nigerian manufacturing. While this is still the case, recent capacity additions and grid reforms show early signs of improvement. In 2025, around 79% of firms experience outages each year, resulting in over 1,000 hours of lost power annually, constraining productivity, investment planning, and the adoption of more capital-intensive processes. At the same time, the share of firms identifying electricity as their main obstacle has fallen significantly, from about 70% in 2007 to 31% in 2025, reflecting positive developments [49]. Electrification rates have increased (from roughly 43% in 2000 to 61% in 2023), while transmission and distribution losses have declined [51]. The World Bank Enterprise Survey confirms corresponding shift as fuel-based energy use, which was a significant driver of sales in earlier years, has given way to grid electricity as the more important input. This shift points towards a gradually improved power infrastructure environment.

Another key structural factor is a weak and burdensome regulatory environment. Nigeria's regulatory quality as remains below the global average, improving only marginally [51]. Compliance is also costly in time terms, with around one in five firms reporting that senior management spends at least 10% of their working week - about half a day - on regulatory requirements. This increases costs and uncertainty, reinforcing cautious investment behaviour and compounding existing financing constraints [49].



# 3 Transforming financing for infrastructure

InfraCredit Nigeria has delivered on its ambition to unlock local currency financing for infrastructure projects, enabling the entry of pension capital and extending bond tenors. The market for infrastructure financing has advanced from highly underdeveloped at baseline to underdeveloped or moderately underdeveloped depending on the market outcome assessed. Pension funds have entered the infrastructure bond market for the first time, average bond tenors have extended from 3.2 to 11 years in InfraCredit's portfolio, and a legal framework for credit enhancement now exists. These are changes that would not have occurred at the same pace or depth without InfraCredit. The market nonetheless remains thin and dependent on a single guarantor, constrained by the high-interest rate environment and a persistent upstream project preparation gap.

### Box 4: PIDG-supported interventions in Nigerian capital markets

The study considers the following transactions as part of the scope of the study. Refer to Appendix B for a detailed overview of the transactions considered.

**PIDG's activities in Nigeria**

The assessment focuses on GuarantCo's role in establishing InfraCredit in 2017, in partnership with the Nigerian Sovereign Investment Authority (NSIA). GuarantCo provided an initial contingent capital injection of USD 25 million in 2016 and subsequent financing in 2020 of USD 27 million from InfraCo. GuarantCo

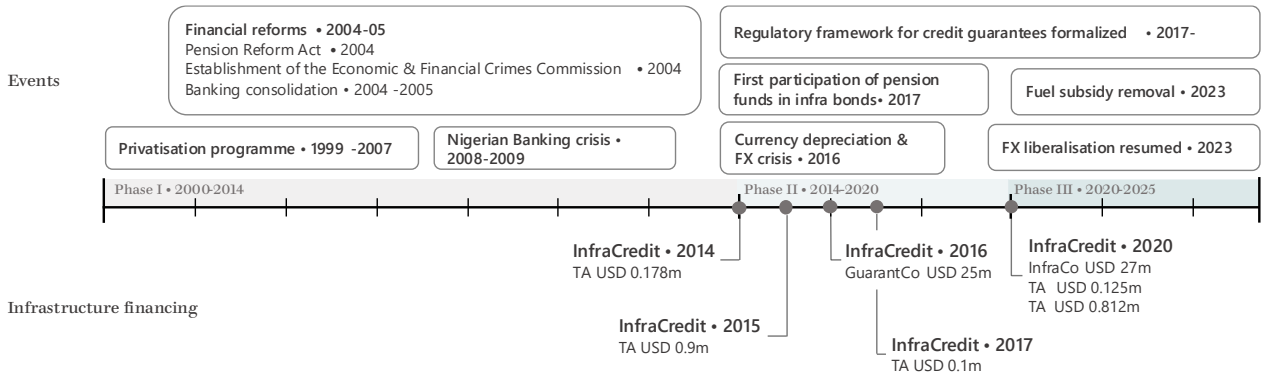
also provided approximately USD 2 million in technical assistance between 2014 and 2020, covering setup costs, investor workshops, and first-time bond issuance expenses. Beyond its foundational role, GuarantCo acted as co-guarantor on select InfraCredit transactions, including a 2023 counter-guarantee supporting Lagos Free Zone Company's bond programme, and structured to manage single-obligor concentration limits on InfraCredit's balance sheet.

The study also considers an earlier standalone transaction: GuarantCo's 2011 guarantee of 75% of a USD 14.2 million local currency refinancing for Tower Aluminium, one of Nigeria's earliest institutional-grade corporate bonds. The guarantee refinanced a USD-denominated bank loan that had become financially distressed following a 25% currency devaluation.

**InfraCredit's activities**

The study considers all of InfraCredit's activities in the market since its establishment. As of 2025, InfraCredit has guaranteed 24 transactions, listed in Appendix B, mobilising over NGN 200 billion across power, transport, logistics, telecoms, and off-grid energy sectors, with tenors ranging from 10 to 20 years against a market average of 3.2 years prior to its establishment. While the first 10 transactions were completed across the first five years of operations (2017–2022), the remaining 14 transactions were all completed between 2022 and 2025, reflecting a significant acceleration in deal flow as market confidence grew. Beyond guarantee provision, InfraCredit has i) provided issuer advisory and transaction structuring support to investees; ii) provided capacity building on pricing to investors, and iii) engaged directly with Nigeria's Securities and Exchange Commission (SEC) and the National Pension Commission (PENCOM) to shape the CEF regulatory framework and remove the dual-rating requirement.

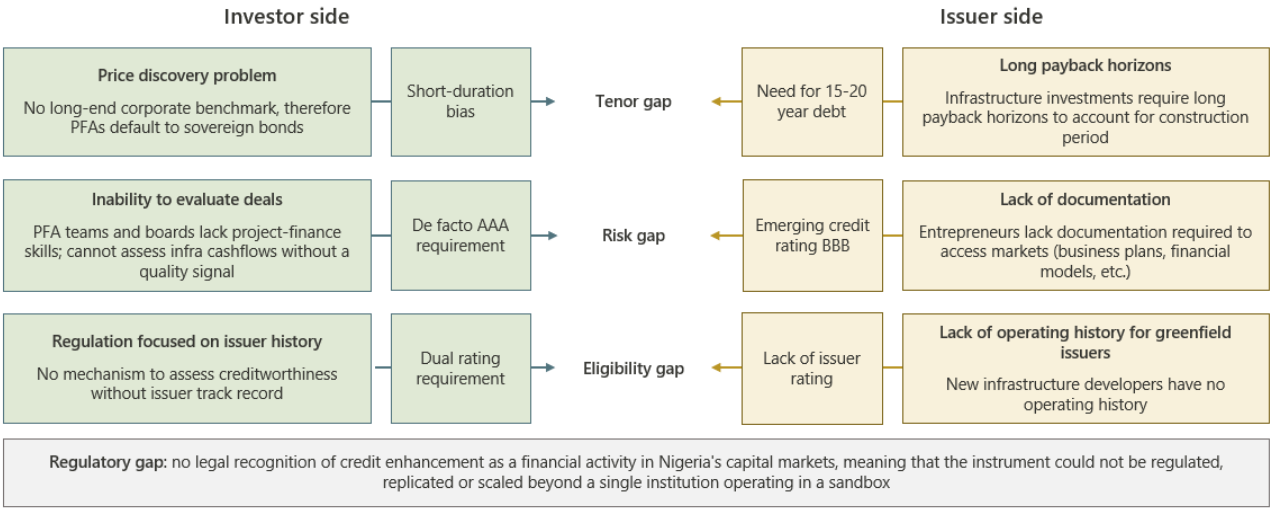
**Figure 10: Overview of infrastructure financing and relevant events**




# 3.1 Infrastructure projects had difficulty accessing local capital

Nigeria's market for corporate infrastructure bonds has historically been shaped by four structural gaps: risk, tenor, eligibility, and regulatory. Together, these prevented long-term domestic capital from reaching infrastructure projects.

**Figure 11: Visualisations of mismatches in the Nigerian capital markets for infrastructure financing**




The first was a tenor gap. Commercial bank loans of five to seven years were the only financing available [52], structurally mismatched against infrastructure investment horizons of fifteen to thirty years. The Tower Aluminium case illustrates this directly, as the company historically relied on short-tenor commercial bank debt requiring constant refinancing. This structural vulnerability was further exposed during the 2008 financial crisis, when Nigerian banks offered no refinancing solution at all, leaving Tower Aluminium with no viable path to restructure its debt. In addition to this, the Nigerian market had no long-end corporate bond benchmark, so investors had no reference point to price long-dated infrastructure risk and defaulted to sovereign bonds. According to the World Bank Enterprise Survey data, mismatches in loan size, tenor and project needs are indicated as reason why companies are discouraged to apply for a credit [53].

The second was a risk gap. Infrastructure issuers were typically rated BBB, too low to attract pension fund investment in practice. Most lacked the documentation and financial models needed to demonstrate creditworthiness. On the investor side, Pension Fund Administrators' (PFAs) teams and boards had no project finance expertise and could not assess infrastructure credit risk without an external quality signal. As confirmed during Key Informant Interviews (KIIs) with stakeholders, PFAs would not have invested in these transactions without a AAA rating, given boards' fiduciary caution and limited internal capacity. This was partially a holdover from the Regulation on Investment of Pensions Funds pre-2008, when PENCOM used to mandate a AAA rating for corporate debt, before progressively allowing allocation for risk rating as low as BBB [54]. The Tower Aluminium case corroborates this precisely: the company carried a standalone credit rating of BBB, and its advisor explicitly confirmed that pension funds required a minimum A rating to invest, a threshold no corporate could reach without credit enhancement.

The third was an eligibility gap. The SEC's dual-rating requirement, mandating both an issuer rating and a bond rating, systematically excluded new greenfield developers with no operating history from capital markets. As noted during KIIs, this blocked the developers who most needed long-term capital, while established corporates who needed it less could still access bank financing at prime lending rates.

The fourth was a regulatory gap. Credit enhancement had no legal recognition in Nigeria's capital markets. No framework existed for structuring, registering, or supervising guarantee instruments. Even where a guarantee

[52] SEC. (2010-2013)
[53] World Bank Enterprise Survey. (2025)
[54] PENCOM. (2006); PENCOM. (2008)

existed in practice, it could not be regulated, replicated, or scaled. As described in KIIs, when the institution was set up, the SEC chose to observe before deciding whether regulation was warranted, leaving the instrument without institutional grounding for nearly a decade.

### Expected transformational outcomes of PIDG-supported interventions

Against the backdrop evidenced above, the study examines the transformational effects of PIDG-supported interventions, as outlined in Box 3.

Our hypothesis, in line with PIDG's rationale for the projects, is that PIDG-supported interventions would unlock domestic institutional capital for infrastructure investment through three reinforcing pathways. First, by providing advisory support to issuers, InfraCredit would convert viable but underprepared infrastructure ideas into bankable projects capable of accessing capital markets. Second, by sharing risk through guarantees, InfraCredit and GuarantCo would reduce the perceived risk of infrastructure investments sufficiently to attract domestic institutional investors. Third, by providing capacity building to asset managers, InfraCredit would enable them to accurately price infrastructure bonds, enabling longer tenors. Third, by working with the SEC to improve regulation, InfraCredit would create a more conducive regulatory environment for new capital market instruments, including guarantees. Together, these pathways would structurally deepen Nigeria's local currency infrastructure bond market, though the speed of pipeline conversion, high interest rates, and the continued reliance of first-time issuers on guarantees are expected to temper the pace and scale of transformation. Refer to Appendix C for a more detailed overview of the developed hypotheses for PIDG's interventions, including expected market conditions and external enablers and constraints.

## 3.2 InfraCredit unlocks local pension capital for infrastructure investment

The evidence points to significant sector transformation within Nigeria's capital markets for infrastructure financing. Assessed against PIDG's market transformation framework, which evaluates sectors across efficiency, integration, and resilience outcomes, the sector has advanced from highly underdeveloped across all three dimensions in 2011 to underdeveloped in efficiency and resilience, and moderately developed in integration, in 2025. Full definitions, development stage criteria, and the reasoning underpinning these placements are set out in Appendix C.

InfraCredit's entry in Nigeria's infrastructure capital markets has driven change across three dimensions: (i) more issuers and investors have entered the infrastructure bond market, (ii) financing tenors have extended materially, and (iii) a legal framework now exists for credit enhancement as a regulated activity. However, the market remains thin and dependent on a single guarantor.

More issuers and investors have entered the market, improving the sector's integration. On the issuer side, InfraCredit's successful advocacy led the SEC to remove the dual-rating requirement, allowing project-only ratings for the first time. This opened the market to greenfield developers previously excluded by the absence of an issuer track record. Transaction and project advisory has further increased the pool of bankable issuers, reducing average time to financial close from over 200 days to under 30 days, as indicated in interviews with key stakeholders. On the investor side, pension funds have entered the infrastructure bond market as active investors for the first time, accounting for 56% of the value of InfraCredit-backed issuances, as indicated in interviews with key stakeholders. PENCOM also increased the infrastructure allocation ceiling from 5% to 20%, largely to encourage investment in productive sectors. According to interview with key stakeholders,

PENCOM's allocation ceiling adjustment partly reflects demonstrated market performance under InfraCredit's guarantees.

That said, on the issuer side, high interest rates still present a material constraint on the pace of further transformation. With Nigeria's benchmark rate above 25% as of early 2026, the cost of capital makes it difficult for issuers to justify locking in long-tenor debt, suppressing appetite for bond issuance regardless of the quality of the guarantee infrastructure now in place.

Further, on the investor side, pension fund allocation to infrastructure remains below 1% of total assets, notwithstanding the increased PENCOM ceiling, which itself applied only to equity infrastructure funds, not bonds. The most binding constraint is pipeline conversion, since the project preparation gap upstream of financial close remains large and insufficiently addressed by existing advisory programmes, as noted in interviews with key stakeholders. Compounding this, PFA boards and investment teams frequently lack the technical capacity to evaluate infrastructure cashflows independently reinforcing a default towards sovereign bonds that, in the current high-interest rate environment, offer yields difficult for infrastructure to compete with on a risk-adjusted basis.

Financing tenors have extended and pricing has improved, increasing the sectors' efficiency. Average corporate bond tenors have grown from a market average of 3.2 years pre-InfraCredit to 11 years for InfraCredit-backed transactions, as indicated in interviews with key stakeholders. The Lagos Free Zone (LFZ) 20-year bond established a new long-end corporate benchmark with no precedent in the Nigerian market. Oversubscription rates further signal improved market confidence: the North South Power (NSP) 2019 bond was oversubscribed by more than 50% and the LFZ Series II bond by 165%, as noted in interviews with key stakeholders. According to interviewees from the Nigerian Financial Markets Dealers Quotations (FMDQ), the spread over sovereign bonds on InfraCredit-guaranteed transactions has narrowed progressively across successive issuances, reflecting emerging competitive pressure on the cost of long-term capital.

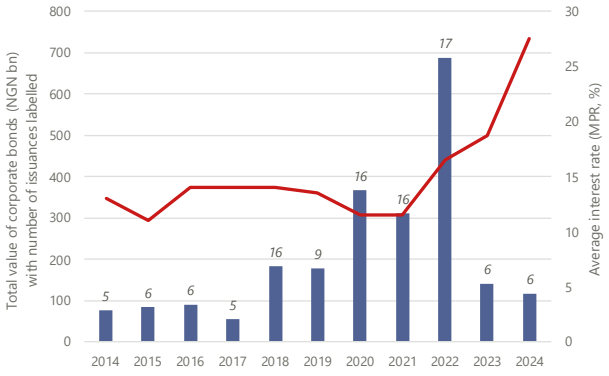



**Figure 12: Corporate bond activity charted against average interest rate**

The Nigerian market has seen an uptick in corporate bond activity (see Figure 12 [55]). Despite a relatively flat interest rate as set by the CBN's Money Policy Rate (MPR), 2020 and 2021 saw a sustained uptick in the value of corporate bond issuances, which increased in 2022 as part of a general upswing in the market. The corporate bond issuances returned to pre-2020 levels in 2023 & 2024, but largely as a function of the MPR reaching 26.5%, making the vast majority of issuances uncompetitive.

A legal framework for credit enhancement now exists, and ownership is becoming more domestic, making the sector more resilient. In 2023, the SEC codified a legal framework for credit enhancement facilities modelled explicitly on InfraCredit's operating blueprint, institutionalising credit enhancement as a regulated financial activity and providing the architecture for additional guarantee providers to enter the market, as indicated in interviews with key stakeholders. InfraCredit's subsequent listing on the Nigerian market, with domestic pension funds and insurance companies entering its shareholder base, marks a transition from DFI-anchored to domestically capitalised ownership. This goes beyond familiarity with the guaranteed instrument, as domestic investors are now willing to capitalise the guarantor itself. FCDO's Mobilist exited its position at a

[55] PwC. (2020 – 2025)

return exceeding InfraCo's, signalling strong market demand. This is an early but meaningful sign that the guarantee business model is beginning to be judged on commercial merits.

The market nonetheless remains thin and concentrated. No additional credit enhancement facility has yet entered under the new SEC framework, meaning single-guarantor concentration risk persists in the short term when the market still depends on guarantees, as noted in interviews with key stakeholders. Total infrastructure finance volumes remain limited relative to Nigeria's infrastructure gap, estimated at USD 3 trillion over the next thirty years, with InfraCredit's ~USD 125 million (NGN 200 billion) mobilised to date representing a fraction of what is required. The high-interest rate environment, with Nigerian benchmark rates above 25% as of early 2025, has further suppressed corporate appetite for long-tenor bond issuance, limiting the pace at which the market can grow, as noted in interviews with key stakeholders.

## 3.3 Guarantees enable first transactions, supported by capacity building & regulatory reform

Market transformation changes described above were driven through four distinct channels: guarantees closing the risk gap and enabling first transactions, successive issuances improving price discovery, InfraCredit's due diligence and advisory upgrading issuer and investor capacity, and direct regulatory engagement reshaping the rules of the market.

### Extending the yield curve through price discovery

The *demonstration effect* of guarantees operated through price discovery, by enabling transactions that would not otherwise have occurred, each issuance established a new benchmark and progressively extended the yield curve. InfraCredit-backed transactions extended the yield curve from a market average of 3.2 years to an average of 11 years across its portfolio, with the LFZ 20-year bond creating an unprecedented long-end reference point, as indicated in interviews with key stakeholders. The yield curve has extended, but long-end corporate benchmarks remain dependent on InfraCredit-backed transactions.

### Building issuer credibility and enabling independent market access

The *replication effect* of guarantees operated through risk gap closure, by converting BBB-rated or unrated credits into AAA issuances that met PFA investment mandates, guarantees gave larger, more established issuers the credibility needed to return to the market independently. NSP's 2019 green bond, rated AAA with InfraCredit's guarantee against an underlying issuer rating of BBB+, was oversubscribed by more than 50%, as indicated in interviews with key stakeholders. Critically, the effect persisted beyond the guaranteed transaction. NSP's second bond in 2021 (NGN 6.33 billion, 10 years) was issued at AA without InfraCredit's involvement, attracted the same investor base, and was again oversubscribed. Similarly, LFZ's fourth bond (NGN 17.5 billion, 20 years) was raised without a guarantee and attracted pension funds and insurance companies, as indicated in interviews with key stakeholders. In both cases, the tenor achieved independently, while shorter than the InfraCredit-backed predecessor, would have been unachievable without the credibility established by the first guaranteed transaction.

### Upgrading issuer and investor capacity

InfraCredit's due diligence and advisory substantially upgraded issuer capacity. Project developers consistently described the process as among the most demanding they had encountered. Yet they equally credited it with lasting improvements in financial modelling, governance, and reporting, strengthening their position in subsequent transactions with other investors. This in turn enabled them to access subsequent rounds of capital, including from IFC. As noted during interviews with financiers, the projects InfraCredit funded could not have

gone to market in a viable manner without it, as there were no other institutions that would build issuer capacity; InfraCredit created an entirely new market of viable businesses that would otherwise not have existed.

In the distributed renewable energy space, the Distributed Renewable Energy Efficiency Fund (DREEF), an InfraCredit-backed project preparation facility, formalised this capacity-building function for developers, reducing average time to financial close from over 200 days to under 30 days for participating companies. The specific challenges for distributed renewable energy are discussed further in section 5.2.

Investor capacity building shifted institutional understanding of infrastructure as an asset class. InfraCredit's education programme, including workshops for PFA boards and investment committees, played a material role in enabling pension funds to evaluate infrastructure investments for the first time. Investors confirmed that capacity building funded through PIDG technical assistance had contributed to their ability to assess infrastructure asset risk and understand what information was relevant to their evaluation, as indicated in interviews with key stakeholders.

### Box 5: Most plausible counterfactual according to interviewees

**Without InfraCredit, institutional investors might have eventually started to provide capital to infrastructure financing, but slower, costlier, and without the structural foundations**

Interviewees from PENCOM, FMDQ, and the Bank of Industry agreed that infrastructure finance would have developed without InfraCredit, but slower, costlier, and without the regulatory and capacity-building foundations that have made the transformation durable.

In the near term, infrastructure financing would have remained dependent on corporate balance sheets and short-term commercial bank loans at tenors of three to seven years. Pension funds would have stayed concentrated in sovereign bonds. Greenfield developers would have remained entirely dependent on grants, with no viable path to the capital markets. Some larger issuers, including NSP and LFZ, acknowledged they might eventually have accessed the bond market independently. However, they were clear that yields would have been significantly higher, tenors shorter, and that InfraCredit's guarantee was decisive in attracting pension fund investors for the first time.

The market would have moved toward greater institutional investor participation over time, no through credit enhancement guarantees but through different instruments. PENCOM and FMDQ interviewees noted that increasing pension fund exposure to infrastructure was already a stated policy goal before InfraCredit existed. The instruments now emerging independently from InfraCredit illustrate this: PENCOM is developing a pension investment infrastructure consortium with FSD Africa, and NSIA is understood to be developing a dedicated infrastructure fund. These initiatives reflect the direction the market was always heading.

Overall, a credit enhancement facility of InfraCredit's design was uniquely a PIDG contribution. The institutional architecture, DFI backing, and regulatory groundwork it required were beyond what the domestic market could have produced independently. The removal of the dual-rating requirement and the codification of the CEF framework were both directly shaped by InfraCredit's engagement and would not have materialised as fast without a functioning guaranteed transaction market to demonstrate their necessity.

## Development of the regulatory framework

Direct regulatory engagement reshaped regulatory frameworks around credit enhancement instruments and facilities, creating an *enabling framework*. InfraCredit's engagement with SEC and PENCOM translated market

experience into structural regulatory change. This led to the removal of the dual-rating requirement, which had previously excluded greenfield developers from capital markets; the increase in PFA infrastructure allocation from 5% to 20%; and the codification of the CEF framework in 2023, as indicated in interviews with key stakeholders. The CEF framework creates for the first time a clear set of requirements for future Credit Enhancement Facility Providers (CEFPs), giving these facilities a legal standing as a regulated financial activity and facilitating the pathway for actors looking to replicate the model to build new credit guarantee companies.

## Box 6: Changes in regulatory capital relief for credit enhanced products

Although PIDG's interventions in Nigeria's capital markets are limited to guarantees of corporate bonds through GuarantCo and InfraCredit, there have been changes in the ecosystem for commercial banks engaging with guaranteed products. Alongside the Nigerian SEC's creation of the CEF framework, the Central Bank of Nigeria also updated its guidance on credit risk capital requirements in 2023. This is relevant as it offers regulatory capital relief to banks participating in lending where guaranteed instruments are involved. It allows banks to appropriately account for the reduced risk of lending where guarantees are on offer, which frees them of the need of holding higher tier capital, increasing their ability and willingness to lend through guarantees.

The key changes with the new guidance note were to increase the list of eligible guarantors. Previously, guarantees were only recognised if offered by sovereign entities, central banks, and supervised banks, but this was expanded to include other public sector authorities, multilateral development banks, and credit guarantee companies recognised under the SEC's framework (i.e., supervised institutions). Further, the framework recognised counter-guarantees and partial guarantees, and defined an approach to calculate capital requirement for such instruments. The changes in the guidance note came with further requirements on withdrawal clause treatment and governance of organisations to ensure risk management [56].

| Aspect | 2015 Guidance Note | 2023 Guidance Note |
|---|---|---|
| Eligible guarantors | Limited to sovereign entities, central banks, and banks, with foreign bank exposures risk-weighted off the foreign sovereign's rating one grade less favourable. | Expanded to also include public sector entities, regional and local authorities, multilateral development banks, supervised institutions, corporates with minimum credit quality rating. |
| Counter-guarantees | Not addressed as a distinct category; only the direct guarantor's status mattered for recognition. | New dedicated sub-section (5.1.4) allows an exposure to be treated as covered by the counter-guarantor's risk weight, provided the counter-guarantee covers all credit risk elements and both layers meet guarantee requirements. |
| Partial/tranche guarantees | Not addressed; the document did not specify treatment where a guarantee covered only part of an exposure. | Where the protected amount is less than the exposure and both portions share equal seniority, capital relief is applied pro-rata; where seniority differs (tranche), the securitisation framework applies instead. |
| Withdrawal clause treatment | General prohibition on clauses allowing unilateral cancellation, with no further detail on partial withdrawal scenarios. | Where a contract permits the protection provider to withdraw, the agreement must preserve coverage and obligations for amounts arising before the withdrawal takes effect. |
| Organisational/ governance requirements | Minimal; banks were generally expected to undertake legal review and periodic enforceability checks. | Detailed documented policies required covering instrument eligibility, valuation, ongoing risk assessment, concentration/residual risk monitoring, and periodic legal documentation reviews. |

[56] Central Bank of Nigeria. (2015); Central Bank of Nigeria. (2023)

With the updated regulatory framework in place, the Nigeria Ministry of Finance Incorporated, Nigeria Sovereign Investment Authority, Bank of Industry, and Nigerian Consumer Credit Corporation jointly founded the National Credit Guarantee Company (NCGC). NCGC provides partial credit guarantees to reduce the risks FIs face when lending to MSMEs, consumers, and other eligible businesses. NCGC's participating financial institutions include deposit money banks, microfinance banks, development finance institutions and CBN-licensed fintech companies, which is only possible due to the updated guidance from the CBN.

Although the evidence to draw a direct link between GuarantCo and InfraCredit's activities to the updates in the regulatory framework and the NCGC is not available, PIDG and InfraCredit have demonstrated the utility of the guarantee structure to Nigerian financial markets. InfraCredit's engagement with ecosystem players has increased the capacity of the local market to engage in such structures. This is visible as the ecosystem is building further guarantee companies, evolving beyond PIDG's direct intervention.

## 3.4 PIDG provided the foundation for a local team to drive market transformation

PIDG was the foundational enabler of Nigeria's infrastructure bond market transformation. Beyond providing the initial funding to cover operational costs through technical assistance (in three tranches between 2014 – 2017) and the initial callable capital facility through GuarantCo (2016), PIDG provided the institutional architecture, and capacity building that made InfraCredit viable.

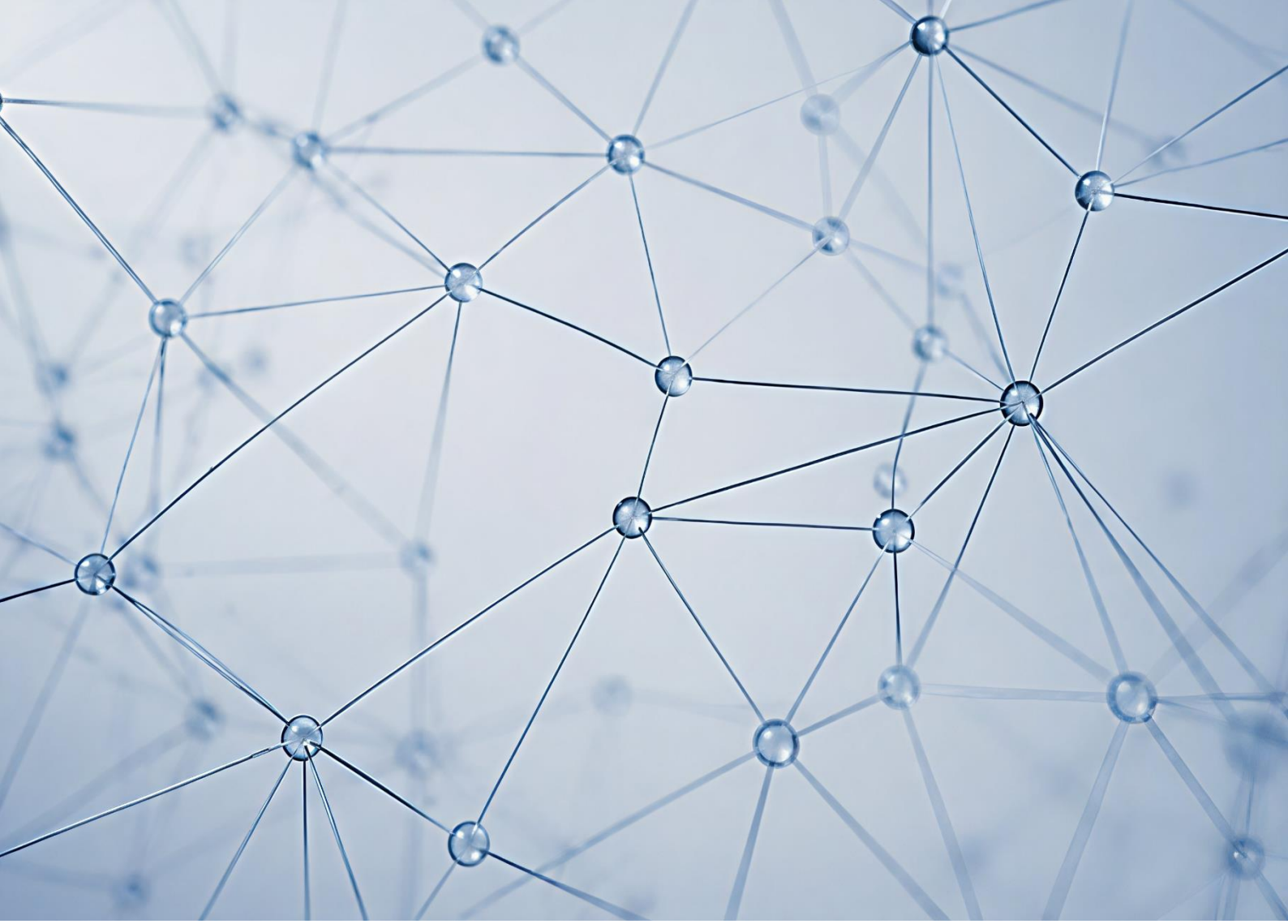
The decision to establish a locally embedded institution was a deliberate strategic choice by GuarantCo, and one that proved far more effective than a remotely operated guarantee facility would have been. GuarantCo's intention from the outset was not simply to create an institution, but to ensure it had the capacity, governance, and local legitimacy to drive systemic change independently. InfraCredit's on-the-ground presence enabled the regulatory engagement, issuer handholding, and investor relationship-building that drove market transformation, activities that GuarantCo, operating from London, could not have delivered at the same depth or pace.

This deliberate localisation of InfraCredit extended to ownership, as GuarantCo actively worked to bring in domestic co-founders and investors. NSIA's co-founding role was essential in this regard, providing the local sovereign legitimacy that underpinned InfraCredit's credibility with Nigerian regulators and investors from the start. Subsequent capital injections from AfDB, KfW, AFC, and domestic pension funds and insurance companies have progressively diluted PIDG's centrality, a transition that was by design rather than by accident. An institution that is domestically capitalised and governed is inherently more resilient, less vulnerable to shifts in donor priorities, and more likely to drive lasting market transformation than one that remains dependent on international development capital. The listing of InfraCredit on the Nigerian market and the entry of domestic institutional investors into its shareholder base are evidence that the strategy of building a self-standing local institution is working.

At the transaction level, guarantees have been most effective where the primary barrier was credit risk perception rather than commercial viability, notably in gas-to-power, hydro generation, logistics, and telecoms infrastructure. GuarantCo has also played a direct transaction role alongside InfraCredit, most notably by providing the NGN 20.23 billion counter-guarantee supporting LFZ's three bond issuances, and by stepping into co-guarantee transactions where InfraCredit had reached its maximum single-obligor exposure. This risk-sharing role has been important in the current transition phase, where market demand for credit enhancement

guarantees might exceed what a single guarantor on this type can absorb alone. As the market matures and the need for guarantee support gradually recedes, single-guarantor concentration will become less of a constraint, but in the near term it remains a structural vulnerability, and GuarantCo's ability to provide backstop capacity has been critical in preventing it from becoming a limit on market development.

Advisory provided by InfraCredit has proven to be as important as the guarantee itself for many smaller and emerging-corporate clients who would not have reached financial close without it. The need for advisory was not anticipated in InfraCredit's original design but was identified and acted upon by the local team in response to what they observed in the market. PIDG provided the technical assistance funding that made it possible to provide these services, including co-funding investor capacity building workshops in 2017 and supporting legal due diligence and credit rating costs for first-time issuers in 2020.



# 4 Increasing value addition beyond extraction

The establishment of Indorama's urea plant in Port Harcourt transformed Nigeria from a fertilizer importer to an exporter, creating significant value addition in the country's oil and gas sector, though transformation has not progressed downstream. The shift from a highly underdeveloped to an underdeveloped sector is evidenced by the privatised Eleme Petrochemicals complex becoming a sustained investment hub, urea production capacity expanding sixty-fold since 2010. However, farm-level fertiliser uptake remains low despite the production transformation, constrained by downstream barriers that lie outside the petrochemical value chain.

PIDG's role was supporting rather than catalytic. IFC led and majority-funded all major transactions, and Indorama has confirmed it could have sourced financing elsewhere. Nonetheless, EAAIF's contribution was tangible, reducing transaction friction through faster execution, structural flexibility, and local market familiarity, particularly in earlier rounds when commercial lenders had limited appetite for Nigerian country risk.

### Box 7: PIDG-supported interventions in the petrochemical sector

The study considers the following transactions as part of the scope of the study. Refer to Appendix B for a detailed overview of the transactions considered.

PIDG's engagement in Nigeria's petrochemical sector dates to 2007, when EAAIF provided USD 20 million in patient turnaround capital to support the privatisation and rehabilitation of Eleme Petrochemicals. This was followed by a sequence of large-scale investments in fertiliser production and input integration. In 2013, EAAIF committed USD 49 million to finance the construction of Line I, an ammonia and urea production facility, and invested a further USD 35 million in 2018 to expand capacity and establish Line II. Most recently, in 2024, EAAIF provided USD 30 million to finance Line III, an ammonia and urea plant dedicated exclusively to export production. Complementing these investments, EAAIF provided USD 16 million in 2021 to finance a Feed Conditioning Unit (FCU) to recover natural gas liquids.

## 4.1 The petrochemicals value chain was dominated by extraction

Before 2006, the petrochemicals value chain was underdeveloped with minimal domestic production capacity and limited to low value-added outputs, despite the country's abundance of oil and gas resources. Nigerian manufacturers relied on imports for more than 85% of their petrochemical inputs[57] reflecting the inability of local facilities to operate reliably and thereby hindering the development of the petrochemical value chain.

The value chain was weighted toward raw material extraction, with little to no capacity to turn it into higher downstream products (see Figure 14). The only three[58] companies mandated to produce ethylene and propylene as feedstocks for polyethylene (PE) and polypropylene (PP), one of which was Eleme Petrochemicals Company Limited (henceforth Eleme Petrochemicals), were owned by Nigeria's state oil firm NNPC and operated at a near zero capacity. Studies indicate that a combination of technical and economic factors led to chronic underinvestment, equipment deterioration, and a lack of spare parts, worsened by security issues and social factors which created an unreliable feedstock supply These factors were worsened by political factors, especially indecision and inconsistent funding allocation[59].

Although the government established a privatisation framework as early as 1999[60] to support the turnaround of state-owned enterprises, underinvestment and poor maintenance left many assets operationally weak with limited revenue-generating capacity [61], reducing their attractiveness to investors. Rehabilitating infrastructure of this scale required enormous capital investment, yet investors who did acquire assets had borrowed heavily to do so, leaving them focused on repaying loans rather than revitalising operations[62]. As a result, several privatisations failed to deliver expected outcomes, and investor scepticism grew toward the programme and the state-owned enterprises (SOEs).

Before 2016, the underdevelopment of Nigeria's petrochemical value chain, particularly the absence of large-scale domestic fertiliser production, limited the agricultural sector's access to critical inputs and exposed the country to import dependence and global price volatility [63]. This structural constraint contributed to persistently low fertiliser application rates among farmers, with uptake remaining among the lowest in sub-Saharan Africa due to high input costs and limited access. Between 2012 and 2015, Nigeria averaged just 9 kg of fertiliser per

[57] Eguzozie, B. (2014, October 16)
[58] Eleme, the Warri Refining and Petrochemical Company (WRPC), and the Kaduna Refining and Petrochemical Company (KRPC)
[59] Iheukwumere, O., Moore, D., & Omotayo, T. (2021)
[60] The Public Enterprises (Privatisation and Commercialisation) Act of 1999 established the Bureau of Public Enterprises (BPE) creates a formal framework for privatising state-owned companies
[61] Jerome, A. (2008)
[62] Ikeanyibe, O. M. (2021)
[63] NIPC. (2020)

hectare, compared to 38 kg per hectare across sub-Saharan Africa itself about 10 times less of the world average[64].

### Expected transformational outcomes of PIDG-supported interventions

Against this backdrop, the study examines the transformational effects of five PIDG-supported interventions: the provision of turnaround capital for Eleme Petrochemicals' privatisation and provision of debt for construction of three urea and ammonia lines and one feed continuing unit to recover natural gas liquids, as outlined in Box 6.

The Eleme Petrochemicals and Indorama interventions are hypothesised to contribute to the transformation of the petrochemicals sector, by enabling a shift toward higher value-added industrial production, and consequently in the agriculture sector, a key purchaser of fertiliser, through import substitution.

The rehabilitation of a key petrochemical asset and the introduction of best-in-class urea production facilities were expected to transform the sector by increasing value added. This is not understood as firm-level cost efficiency, but as a structural change in the allocation and utilisation of industrial assets and inputs, particularly gas and the existing petrochemical facility. The shift from crude petrochemical outputs to processed fertiliser products would move Nigeria up the value chain, generating more economic value from the same raw material base.

The increased availability of locally produced petrochemical-based fertiliser inputs, was expected to support downstream transformation in agriculture by improving access to critical inputs, reducing reliance on imports. By anchoring fertiliser supply in domestic petrochemical production, the interventions were hypothesised to reduce exposure to external supply disruptions and international price volatility. Over time, higher fertiliser uptake was expected to contribute to productivity improvements in the agricultural sector, reflecting a shift in how downstream value chains source and use industrial inputs.

Refer to Appendix C for a more detailed overview of the developed hypotheses for PIDG's interventions, including expected market conditions and external enablers and constraints.

## 4.2 Nigeria transformed from a fertilizer importer to a globally competitive exporter

The evidence points to significant sector transformation within the petrochemical sector, which has not yet achieved spillovers in downstream sectors. Assessed against PIDG's market transformation framework, which evaluates sectors across efficiency, integration, and resilience outcomes, Nigeria's petrochemical sector has advanced from highly underdeveloped across all three dimensions at baseline in 2006 to underdeveloped in 2025, reflecting some market transformation. Full definitions, development stage criteria, and the reasoning underpinning these placements are set out in Appendix C.

Across this transformation, PIDG-supported interventions have contributed to three areas of change in the sector: (i) transforming an underutilised complex into a sustained investment hub, (ii) unlocking production of higher value-added products, and (iii) improving the resilience of the fertiliser supply chain through domestic production and export capacity. On the other hand, transformation has not fully translated to the farm level, where fertiliser uptake remains constrained by structural barriers downstream of the production stage.

[64] Balana, B. B., & Fasoranti, A. S. (2022)

## Transformed underutilised complex into a sustained investment hub

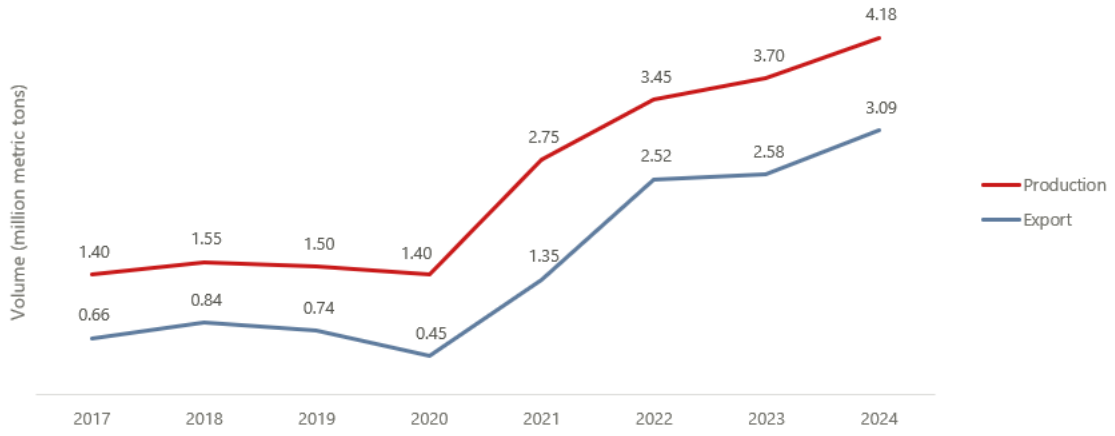
Through the privatisation, Eleme Petrochemicals has transformed from an unproductive plant to a hub for sustained investment in Nigeria's petrochemical value chain. The Eleme plant's production output surpassed pre-privatisation levels within two years of acquisition, with the company posting a net income after tax of 43.4% in the first half of 2008 [65]. By 2022, Indorama's total investment in Nigeria across petrochemicals, fertiliser, gas pipeline, port development, and allied utilities exceeded USD 3.5 billion, with plans to reach USD 6.4 billion by 2025 through an additional USD 3 billion investment programme [66]. BII and AfDB have backed Indorama across multiple transactions, indicating continued DFI commitment to the company's expansion [67].

## Unlocked production of higher value-added products

Investment in large-scale urea production has driven a structural shift in Nigeria's petrochemical sector from pure extraction of raw materials to production of higher value-added products. Domestic production capacity expanded significantly over the past decade, with urea output increasing from 69,561 metric tonnes in 2010 to approximately 4.18 million metric tonnes in 2024[68], reflecting the rapid scaling of integrated fertiliser production facilities.

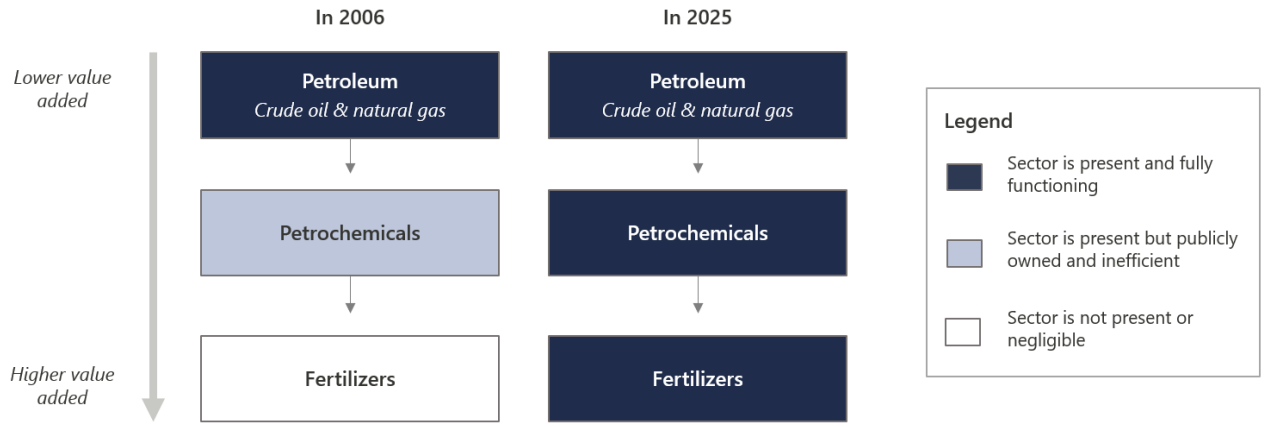
This expansion has occurred against a manufacturing sector that remains structurally subdued at around 9% of GDP, indicating that the petrochemical transformation reflects firm- and sub-sector-level dynamics rather than a broader manufacturing recovery.

**Figure 13: Production and export volumes of urea fertilizer in Nigeria**




[65] BPE. (2018)
[66] NIPC. (2022)
[67] BII. (2024)
[68] Milach, S. (2025, May 21)

**Figure 14: As Nigeria's petrochemical value chain becomes more integrated, higher value-added sectors emerge, positioning it as an international hub**




## Improved the resilience of the fertiliser supply chain through export capacity

Hard currency revenues generated through export markets improve the petrochemical sector's resilience by reducing exposure to domestic economic constraints, particularly important in the context of persistent naira volatility. Urea exports grew from negligible levels in 2016 to 2.6 million metric tonnes in 2023 [69], making it Nigeria's largest non-oil manufactured export. This represents a structural shift in Nigeria's export base as a higher value-added product is generating meaningful foreign exchange, demonstrating that Nigeria can compete in global markets with manufactured goods.

Increased domestic production has reduced the agriculture sector's reliance on fertiliser imports, improving its resilience to global supply shocks. Retail urea prices in Nigeria were less affected by the 2021–2022 global fertiliser crisis than in import-dependent peers such as Ghana, Mali, and Kenya, where prices rose markedly during the same period, an outcome directly linked to local production capacity [70].

### Box 8: External shocks

**The Strait of Hormuz and Nigeria's petrochemical supply chain**

With the Strait of Hormuz effectively closed in 2026, roughly 30% of globally traded ammonia-based nitrogen fertiliser have been cut off from world markets, forcing buyers to scramble for alternative suppliers. This has created a significant demand opportunity for Nigeria's petrochemical sector, as buyers seek non-Gulf sources for fertilisers and chemical feedstocks. Nigeria has notably emerged as a relevant alternative supplier, particularly to Europe, which has deepened its search for Atlantic-facing sources to replace disrupted Gulf cargoes.

## Constrained domestic farm-level fertiliser uptake due to structural barriers

Nonetheless, farm-level uptake has not kept pace with production growth. World Bank data shows fertiliser consumption falling to 4.2 kg/ha in 2023, down from a peak of 22.6 kg/ha in 2020, well below the 50 kg/ha target set by the Abuja Declaration and approximately 36 times below the global average of 153.7 kg/ha. The

[69] IFDC, (2024)
[70] Njoroge, S., Mugi-Ngenga, E. W., Chivenge, P., Boulal, H., Zingore, S., & Majumdar, K. (2023)

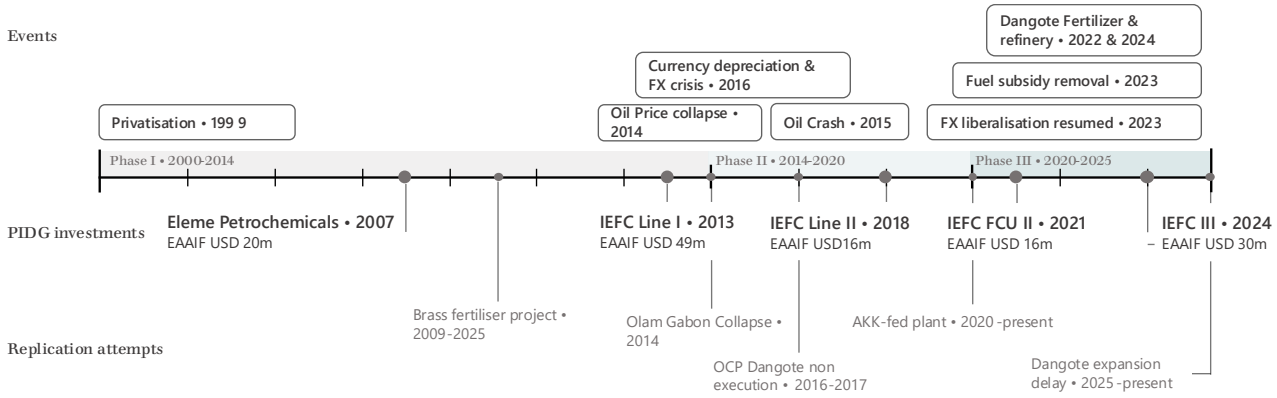
binding constraints lie downstream of the production stage: high prices following subsidy removal, limited rural distribution networks, lack of affordable credit for smallholder farmers, and weak extension services mean that demand cannot sustain commercially priced fertiliser at scale regardless of production capacity, as noted during KIIs with stakeholders.

## 4.3 Indorama demonstrates operational excellence but structural barriers limit replication

PIDG-supported interventions in Eleme Petrochemicals and Indorama may have contributed to the transformation of Nigeria's petrochemicals sector by demonstrating the commercial viability of large-scale, higher value-added production. This could, in principle, have led to a replication effect, possibly influencing Dangote's decision to invest in a domestic fertiliser plant, although a direct causal relationship remains difficult to establish with certainty. Furthermore, the pattern of failed replication, domestically and regionally, points to structural barriers as the binding constraint on new investment, not the absence of a commercial proof point.

Indorama established a new operational benchmark but did not create the proof of concept for fertilizer production in Nigeria. Domestic urea production was not absent before Indorama. Notore Chemical Industries had been producing urea at limited capacity since taking over the former NAFCON plant in 2005, albeit constrained by gas supply issues and operational difficulties. What Indorama demonstrated was not that fertilizer production was possible in Nigeria, but that it could be done at scale, efficiently, and profitably, by building an integrated complex that systematically addressed institutional gaps. This operational excellence, rather than a simple proof of concept, is what distinguished Indorama's contribution to the sector.

**Figure 15: Timeline of relevant events in the petrochemical sector**




Dangote's investment was shaped by multiple factors, of which Indorama's track record was likely not the primary one. While Dangote had already expressed interest in entering the fertiliser market as early as 2010, prior to Indorama's 2013 announcement of its own urea plant, construction of the Dangote facility only commenced in 2017, one year after Indorama's plant became operational in 2016. At the same time, several alternative explanations may account for Dangote's timeline. Gas supply constraints are a well-documented barrier to urea production in Nigeria, affecting all three producers including Indorama and Notore, whose output has periodically fallen short of capacity for this reason [71]. Financing a USD 2.5 billion industrial facility also requires extended development and structuring timelines regardless of market conditions. Further, the Presidential Fertiliser Initiative, formally instituted in December 2016 and implemented by NSIA, created a

[71] IFDC. (2024)

government-backed demand signal for locally blended NPK fertiliser that may have been a more direct driver of Dangote's final investment decision than Indorama's operational track record [72].

The evidence of failed replication, domestically and regionally, points to structural barriers as the binding constraint on new investment, not the absence of a commercial proof point. The Brass Fertilizer and Petrochemical Company has spent over fifteen years pursuing financial close on a USD 3.5 billion complex without success; the Ajaokuta–Kaduna–Kano (AKK) pipeline-fed plants and Dangote's own announced expansion remain at pre-financial-close stages; and regionally, Olam's ammonia-urea project in Gabon collapsed after its lead equity partner withdrew in 2014, while OCP–Dangote joint venture discussions of the same period did not progress to execution. Across all cases, the binding constraints were gas supply security, financing tenor, and sovereign risk, not the absence of a working model to replicate.

### Box 9: Most plausible counterfactual according to interviewees

**Without EAAIF, Indorama would likely have reached the same point, but slower, at higher cost, and with greater financing complexity across successive expansion phases**

Interviewees broadly agreed that without EAAIF, Indorama would very likely have proceeded with both the Eleme Petrochemicals turnaround and subsequent fertiliser investments, but on less favourable terms, over longer timelines, and through a more complex financing structure.

In the most likely counterfactual, Indorama would have relied more heavily on commercial banks, which are typically constrained to tenors of five to seven years, increasing refinancing risk and misalignment with long-horizon project timelines. Financing rounds would have required coordination across multiple lenders rather than through a single counterparty, adding transaction complexity and slowing execution, a material cost in capital-intensive projects where delays translate directly into financial losses.

Indorama was explicit that access to capital was not a binding constraint, and that financing rounds were often oversubscribed. EAAIF's counterfactual impact therefore lies not in whether the investments would have occurred, but in the efficiency and terms on which they were financed. Its hybrid DFI–commercial model provided longer tenors, streamlined approvals, and a single point of coordination that reduced friction across all three financing rounds.

Over fifteen years spanning Lines 1 through 3, EAAIF also provided relationship continuity and familiarity with the Nigerian operating context that enabled smoother waivers, faster structuring, and greater flexibility across successive expansion phases. Alternative lenders could have been mobilised but would have replicated this only partially and at greater cost, with the impact most pronounced in the earlier transactions, when commercial appetite for Nigerian country risk was more limited.

## 4.4 PIDG participated in the transformation of the petrochemicals sector

The privatisation of Eleme Petrochemicals enabled Indorama to enter the Nigerian market. Leveraging its sector expertise and operational know-how, it restored a strategically important industrial asset that had been effectively idle under public ownership. Within four months of the acquisition, a USD 130 million turnaround programme had returned the complex to operational status. Indorama subsequently commissioned a 1.5

[72] NSIA. (2026)

million metric tonne per annum urea fertiliser plant in 2016, which at the time was the world's largest single-train urea plant, demonstrating the sector's potential under private management.

The significance of the ownership and management transition is underscored by the contrasting performance of the other NNPC-owned petrochemical plants in Warri and Kaduna, which remained largely non-operational throughout the same period and eventually shutdown [73]. This suggests that the improvement at the Eleme complex was primarily driven by the change in management and investment approach, rather than by broader external market conditions alone.

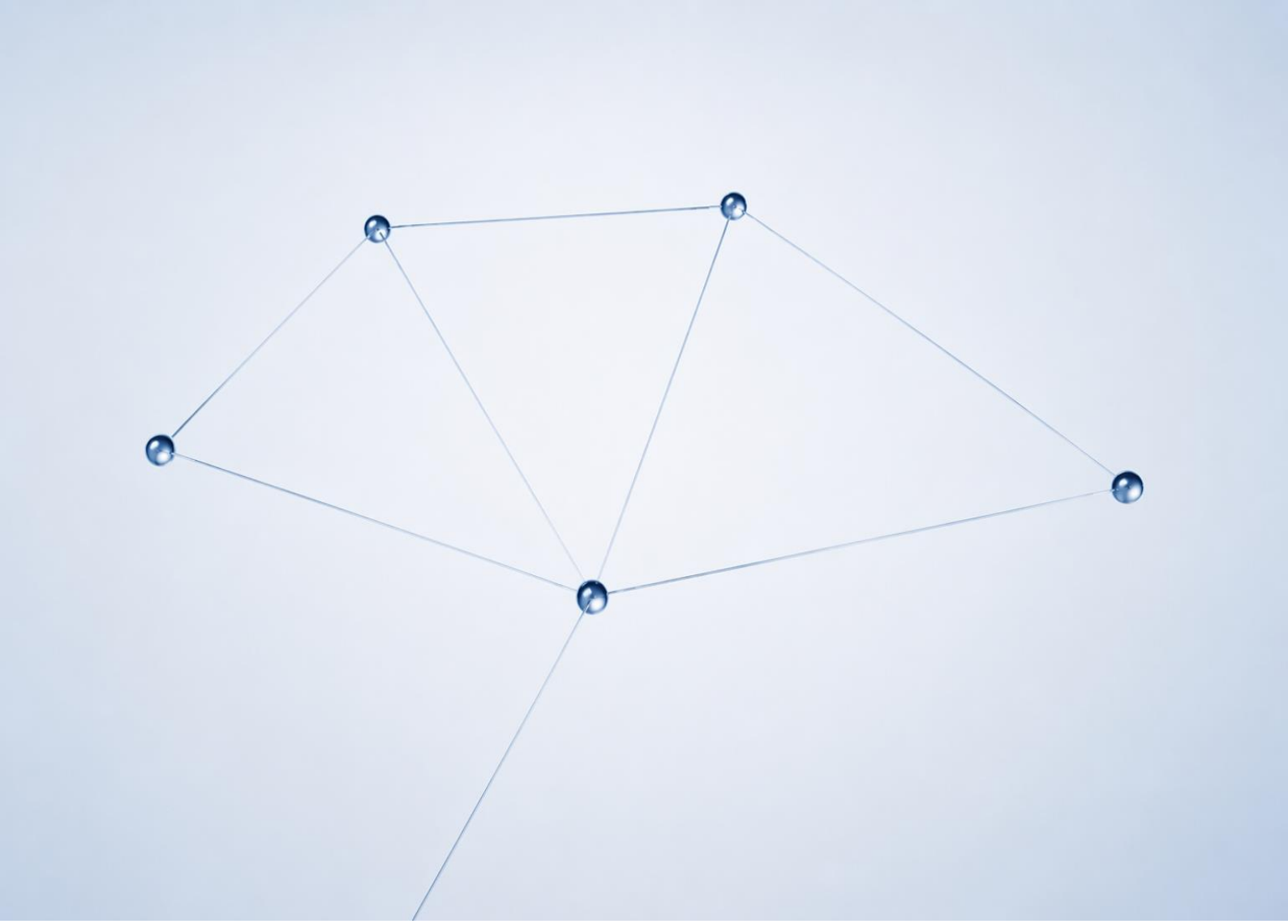
PIDG's role in the privatisation process was meaningful, though not catalytic. BPE documentation confirms that Indorama invested USD 470 million to acquire a 75% equity stake in Eleme Petrochemicals and immediately committed a further USD 130 million to the turnaround programme, supported by EAAIF's patient financing [74]. The limited level of international investor interest during the competitive bidding process, ultimately resulting in Indorama emerging as the sole bidder, reflects the perceived risk associated with Nigeria at the time and is consistent with EAAIF having played an enabling role through the provision of long-term capital. At the same time, Indorama was already actively pursuing entry into Nigeria as part of a broader petrochemical strategy and had bid on multiple opportunities prior to Eleme Petrochemicals. As a large, well-capitalised multinational with acknowledged access to alternative financing sources, PIDG's role through EAAIF was complementary rather than essential, supporting an investment that Indorama was already positioned and motivated to undertake, rather than enabling one that would not otherwise have occurred.

Out of the subsequent debt financing rounds (Line I, II, III and FCU-II), PIDG's role was most significant in the first Line I transaction. This is mostly because at the time of Line I, Indorama had no track record of executing a successful industrial turnaround in Nigeria, and prior privatisation attempts in other sectors had largely failed, leaving significant uncertainty around the viability of this one. The Port Harcourt location further constrained commercial investor appetite, reducing the realistic pool of available financiers.

EAAIF's additionality under Line I was further reinforced by its response to the 2017 Nigerian USD liquidity crisis. When Ecobank became unable to meet its dollar disbursement commitments, EAAIF and FMO agreed to take over its undisbursed participation. Standard Bank confirmed it had exhausted all options within the commercial tranche, including Stanbic IBTC, without finding any lender willing to absorb the commitment, with several having considered invoking the market disruption clause. Beyond keeping the project fully funded and on schedule, the intervention returned dollar liquidity to Ecobank, relieving immediate operating pressure, and EAAIF's agreement to underwrite FMO's participation during a credit process delay provided certainty to all parties that the transaction would proceed.

In the subsequent debt financing rounds, PIDG's role through EAAIF shifted to that of a valued co-lender providing operational efficiency, structural flexibility, and credibility to financing packages that would likely have closed regardless. Indorama confirmed it could have sourced financing elsewhere, as evidenced by the oversubscription of the Line 3 financing, which attracted over USD 2 billion in commitments against a requirement of USD 1.25 billion. IFC acted as lead mandated arranger and largest lender across all major debt transactions, making it more additional than other lenders in those rounds. That said, Indorama explicitly cited speed of execution as EAAIF's primary differentiator, critical in capital-intensive projects where delays translate directly into financial losses, and valued EAAIF's ability to provide a blended long-tenor DFI and shorter-term commercial tranche through a single counterparty, reducing transaction complexity.

[73] Reuters. (2021, January 7)
[74] BPE. (2018)



# 5 Driving development despite structural constraints

An analysis of diverse manufacturing sectors concludes that transformation in the Nigerian economy is constrained by structural barriers that no single intervention can resolve. Individual companies can and do perform well, but triggering a broader flywheel, where firms develop to address the needs of the internal market and progressively reduce import dependence, has proven difficult across sectors. At the same time, interventions that build on existing local strengths and operate within enabling frameworks show greater traction than those starting from scratch.

### Box 10: PIDG's interventions in Nigeria's steel sector

**African Foundries**

African Foundries is the leading steel reinforcement bar producer in Nigeria, developing critical inputs for the construction sector. In 2009, PIDG, through EAAIF, supported African Foundries with long-term financing to develop and operate a steel mill, including captive gas-fired power generation, which became operational in 2013. In 2015, EAAIF supported a further expansion of the plant to enable in-house steel bar production using local scrap metal.

*Note:* Part of the case for lending to African Foundries was linked to their commitment to environmental, health and safety (EHS) standards, but weak implementation led to an eventual early exit from the transaction. The business case was to improve EHS standards and align with ISO systems in line with the objective of building a rebar plant at international standards, both in terms of quality and safety. However, the developed ISO systems were weak, and despite some trainings EAAIF found limited management follow-through and lack of compliance with the standards. EAAIF made the decision to terminate the relationship early, and as of 2022, EAAIF has exited the transaction.

## 5.1 Difficulties in building a local value chain

Despite rich iron ore deposits, Nigeria's steel sector has struggled to invest in an indigenous steel value chain [75]. Efficiency issues at state-owned enterprises, lack of investment in technology, and unreliable power have pushed mills producing finished products to rely on imported steel billets rather than raw materials from within the country.

African Foundries was one of the private sector companies producing rebars for the local market, largely relying on imported billets. In 2013, African Foundries obtained financing from parties including EAAIF to expand its plants with a shredder, furnace, and decarburisation technology to allow it to produce international-grade rebar and increase the use of local scrap metal as inputs.

In June 2015, the Central Bank of Nigeria banned the use of foreign exchange in the official market for imports of a series of products, which included finished and semi-finished steel products. Importers were not disallowed but had to rely on parallel markets for foreign currency to pay for imports.

### Expected change of PIDG-supported interventions

For African Foundries, the proceeds were expected to be used to finance technology upgrades, so that higher quality steel rebar could be produced using locally available materials. Previously, all rebar was produced using imported billets – with the upgrade, the idea was to help African Foundries produce billets, with the expectation of reducing reliance on imports and reducing costs.

## 5.2 Real economy transformation lags capital markets

In the period of this ban, from 2015 – 2023, African Foundries' increased capacity for domestic production allowed them to become the dominant player in high-end constructional steel in the country[76]. There was an increase in resilience in the local economy, as the level of imported steel dropped from 71% in 2014 to 48% in 2017 [77].

Despite African Foundries' expansion, steel rebar production in Nigeria did not undergo sufficient localisation, and imports rebounded once the import restrictions were lifted in 2023. This was partially because upstream inputs such as steel billets were still not available locally, and because there was limited capacity of manufacturers that could produce high quality rebar from locally available scrap steel. Manufacturers often resorted to unofficial sources of FX to source billets, as the long-running issues with initial steel processing from Nigeria's domestic steel sectors were not resolved [78]. The ban also increased the volatility of supply in

[75] Udofia (2024, February 29)
[76] GCR Ratings (2023)
[77] Global Trade Analysis Project (2026)
[78] Isaac (2022)

Nigeria's finished steel sector, with supply and prices more exposed to fluctuations in the parallel markets. Once the import ban was lifted in 2023, costs remained high, imports resumed, and issues around quality continued to surface in the following years[79].

The structural constraints that limit transformation in the steel sector are seen across other sectors in Nigeria. While InfraCredit's impact on Nigeria's capital markets is real, transformational, and measurable, its transmission to the real economy remains limited to date. A big limitation here is that most of the guaranteed transactions have taken place over the last four years and may require more time to come to fruition. However, across interviews, stakeholders mentioned structural issues such as high interest rates and inflation as a significant deterrence from greater investment into different verticals across the infrastructure sector. This can be illustrated by taking examples of sectors that have been supported by InfraCredit's guarantees (full list of transactions in Appendix B), with insights collated across KIIs (see Box 10).

## Box 11: Attempts at transformation and hurdles across sectors in Nigeria

| | Rural electrification (distributed energy) | On-grid power | Free trade zones | Food processing |
|---|---|---|---|---|
| Problem statement | Rural electrification remains state-led, through locally and internationally funded grants, with difficulties in scaling. | After privatisation of power generation, the sector has struggled to attract investment due to payment and liquidity issues. | Red tape around import & export, high costs and low reliability of power & logistics create hurdles for export-oriented businesses. | Inconsistent input quality and constrained ability of market to pay limit the scalability and competitiveness of food processing. |
| Attempted solution | Efforts to crowd in mini- and off-grid developers, supported by viability gap funding, and a securitisation process to allow private investment. | Private companies relying on a portfolio of generation sources and, to move investors from an asset-based to company-based view. | Create a free trade zone, with streamlined import/ export processes and reliable infrastructure for power, logistics, and inputs. | Focus on high-value export-oriented crops and targeted trade policies & import bans to stimulate domestic processing capacity. |
| Indications of early success | Gradual expansion of rural access through pilot private projects and donor-supported schemes, with scale-up programs starting soon. | Access to electricity has increased over time and reliance on grid power has grown among firms, indicating improvement in availability | Multiple free trade zones exist, and improved government processes to streamline approval processes. | Some sectors see export growth (e.g., palm oil) while protected markets temporarily boost domestic crop production (e.g. rice). |
| Hurdles | Only early tracking of productive use of power, with most models still dependent on subsidies, and an unclear path to phase out grants. | Guarantees can backstop government risk but do not resolve market fragilities related to tariffs, collections, and distributor solvency | Most of the tenants in the FTZs are linked to the developer of the zone, with limited uptake outside of their ecosystem | Gains are fragile, as producers cannot compete once the ban is lifted, due to issues such as high input costs (especially fertiliser) |

Although there are individual companies that perform well and address market needs, changes in the broader value chain are difficult to achieve. Across sectors, commonalities include a lack of investment in domestic capacity, which leads to shortages in key inputs, and creates high exposure to currency risk and interest rates. This makes it difficult for individual interventions to start a flywheel, wherein companies develop to address the needs of the internal market.

[79] Okojie-Okeiyi (2024)

## 5.3 Key enablers & constraints cut across the Nigerian economy

Given the lack of transformation in the sectors discussed in this chapter, it is most relevant to discuss constraints and potential enablers of market transformation (as opposed describing channels of market transformation).

### Market-level enablers

Two factors have enabled PIDG-supported interventions to gain traction in Nigeria: (i) the existence of local strengths and inputs that the interventions could activate, and (ii) regulatory frameworks that created the conditions for private investment.

Successful interventions built on existing local strengths rather than creating the underlying conditions for transformation from scratch. In the capital markets space, Nigeria's large and growing pension fund sector provided the savings pool that InfraCredit's guarantees were designed to unlock. Without a domestic institutional investor base of this scale, the model would not have been viable. In petrochemicals, access to affordable natural gas provided the critical production input that made large-scale urea and polymer production economically feasible at Eleme, and that underpinned Dangote's subsequent investment. In both cases, PIDG-supported transactions activated latent potential that already existed in the market.

Regulatory and legal frameworks have also been enabling, and in some cases have themselves been shaped by PIDG-supported interventions. The privatisation framework that allowed Indorama to acquire Eleme Petrochemicals was a necessary precondition for the efficiency transformation that followed, as it provided an entry point for a private investor in the first place. In capital markets, the SEC's codification of the CEF framework in 2023, modelled explicitly on InfraCredit's operating blueprint, now provides the legal architecture for additional guarantee providers to enter the market, reducing the barrier to replication that constrained the model for its first decade of operation.

### Market-level constraints

Three factors have limited how far PIDG-supported interventions have been able to drive market transformation: (i) a macroeconomic environment that suppresses demand for long-term finance, (ii) a persistent advisory gap that constrains the supply of bankable projects, and (iii) the market's continued dependence on large single actors.

The macroeconomic environment has been the most immediate and broadly felt barrier across all interventions. High interest rates, with the Nigerian benchmark rate above 25% as of early 2026, make it difficult for financiers to lock in capital at lower rates. This reduces investment, as the returns required to justify the high cost of capital limits the feasible number of projects. In infrastructure, this supresses the appetite of developers long-tenor bond issuance, as companies are unwilling to lock in expensive long-term debt. This is has materially limited the pace at which transformation can deepen regardless of the quality of the guarantee infrastructure now in place.

The advisory and project preparation gap has constrained the capital markets transformation more specifically. Pipeline conversion remains low because too few projects reach the standard of bankability required to access the market. The upstream gap in documentation, financial modelling, feasibility analysis, and governance is large and insufficiently addressed by existing programmes, including DREEF, which remains limited in scale relative to the size of the pipeline.

Key markets have not evolved to a point where they can operate independently of a few critical actors. InfraCredit remains the sole active credit enhancement facility in Nigeria, and while the SEC framework now exists for others to enter, none has done so. Other domestic pools of long-term capital beyond pension funds, insurance companies, sovereign wealth, domestic private equity, remain limited in size and infrastructure exposure. In petrochemical products such as fertilisers, there are two key companies (Indorama and Dangote) that make up the majority of the available capacity. Without the value chains of their entire groups, the sector would struggle to exist. Transformation remains dependent on the continued operation of a single institution which generates concentration risk and caps the scale of change the market can achieve.



# 6 Synthesis

A consistent theme across all consulted key informants and sources of information is the impact of macroeconomic constraints. Nigeria's volatile and depreciating currency and issues with inflation require the Central Bank to apply high interest rates. These high interest rates combined with the short tenor of financing in capital markets reduces the scope of potential investment in productive sectors.

One measure that can be used to understand the extent to which Nigeria's economy is overheating is the velocity of money. Defined as the ratio of nominal GDP to the supply of money in the market, the velocity of money describes the rate at which capital changes hands. Although a low velocity indicates stagnation, an extremely high velocity of money can indicate that the economy is overheating due to a lack of confidence in the currency, especially when there is a lack of investment in productivity to go alongside the high velocity of money.

In Nigeria, the velocity of money is higher than most selected markets (see Table 2), and similar to those struggling with inflation. The Central Bank of Nigeria uses the tools at its disposal to manage this problem and prevent overheating; apart from high interest rates, a key level is to increase the cash reserve rates. As discussed in the section on macroeconomic environment, banks in Nigeria have a requirement of 45% in cash reserves, which is much higher than other comparable markets with high inflation rates (21% in Brazil; 25% in Turkey)[80].

[80] Trading Economics (2025) – Cash Reserve Ratio

Although these measures help to reduce inflation and the velocity of money and keep the Naira's depreciation in check, there is the significant side effect of lowering investment in the real economy.

### Table 2: Velocity of money in selected markets, 2025[81]

| Country | Nigeria | Kenya | Vietnam | Bangladesh | USA | UK |
|---|---|---|---|---|---|---|
| Velocity of money (M2 Money Supply)[82] | 3.6 | 3.0 | 0.9 | 2.4 | 1.4 | 0.9 |

Translating these measures into real impacts, the high velocity means that money in Nigeria circulates largely in short duration uses such as consumption, trade, and transactions in the informal economy. Intuitively, the velocity of money indicates that the average Naira is circulated three times per year, which aligns with the low tenor of financing available to firms in the country [83]. Very little of this high-velocity circulation is being captured and redirected into productive investment, even of a medium tenor.

This highlights the suitability of InfraCredit's solution for the Nigerian market. Credit enhancement simultaneously increases the availability of finance for infrastructure at a project-level, while productively reducing the money velocity at a macroeconomic level. By shifting risk away from balance sheets, it lets the largest local sources of capital move money into productive use, while locking up capital at longer tenors. This cools the economy, but in contrast to high interest rates or high cash reserve ratios, does so while enabling productive use of capital.

Increasing the supply of patient capital broadly reduces risk in the market and creates more leeway for investment across the value chain. For large productive companies like Indorama, EAAIF support along with other financiers allowed them to enter the market, build a secure complex to address gaps left by institutional voids, and start the process of turning Nigeria into a urea exporter. In critical sectors that are reliant on imports, development requires concurrent investment across the value chain; an increase in longer tenor financing allows private actors to have more time to develop different sections of the value chain.

Creating institutions and financial instruments that can simultaneously resolve macroeconomic challenges while driving development is the key to lasting transformation. Similar instruments across sectors can continue driving this positive transformation. For sectors dominated by SMEs, even increasing the supply of medium tenor loans (2-3 years) can reduce risk, as this provides stability in comparison with the speed of inventory, while reducing reliance on expensive short-term working capital solutions. The role of PIDG in founding and supporting InfraCredit with a range of instruments allowed for one such solution to exist – further transformation will require similar innovation across the economy.

[81] Trading Economics (2025) – Money Supply M2; World Bank (2025) – GDP (current LCU).
[82] Actual velocity of money in the formal sector is expected to be lower due to high percentage of GDP activity taking place informally.
[83] World Bank Enterprise Survey (2007 – 2025)

# Appendices

Market Transformation Study

Private Infrastructure Development Group



steward redqueen

# Appendix A: List of interviewees

**Table 3: List of interviewees**

| Entity | Role of stakeholder |
|---|---|
| InfraCredit | Vice President, Origination & Structuring |
| InfraCredit | Head of Impact |
| InfraCredit | Head of ESG |
| InfraCredit | CEO |
| InfraCredit | ESG Lead |
| InfraCredit | Deputy Head of Origination & Structuring |
| InfraCredit | Vice President, Infrastructure Development Finance |
| InfraCredit | Development Impact Manager |
| Lagos Free Zone | Finance |
| Indorama Ventures | Country Head |
| Indorama Fertilizer | Corporate Finance |
| Darway Coast | CEO |
| Darway Coast | Head of Finance and Strategy |
| Manufacturing Africa | Country Manager |
| Manufacturing Africa | Transaction support |
| SEC | Director General |
| Bank of Industry | Group Head, Loan Recovery |
| Bank of Industry | Group Head, Credit Monitoring & Operational Risk |
| Bank of Industry | Strategy |
| Bank of Industry | Infrastructure Sector Specialist |
| Bank of Industry | Infrastructure Sector Specialist |
| Bank of Industry | Manufacturing Sector Specialist |
| Bank of Industry | Technology Sector Specialist |
| Bank of Industry | Impact Specialist |
| Debt Management Office | Director General |
| Debt Management Office | Head |
| FMDQ Group | Senior Vice President, Government Affairs |
| Hotspot | Chief Operating Officer |
| Hotspot | Chief Investment Officer |
| North South Power | Assistant General Manager, Corporate Finance & Development |
| North South Power | Principal Manager, Corporate Finance & Development |
| Rural Electrification Agency | Senior Advisor |
| PENCOM | Principal Manager |

| | |
|---|---|
| AfDB | Chief Capital Market Officer |
| FCDO | Private Sector Development Advisor |
| PIDG | Chief Executive Officer |
| PIDG | Sustainable Impact Director |
| PIDG | Impact Officers |
| PIDG | Head of Credit Enhancement Facility |
| PIDG | Global Head of TA |
| PIDG | Chief of Staff and Global Head of Communications |
| PIDG | Global Head of Investor Relations |
| PIDG | Chief Sustainable Impact Officer |
| PIDG | Chief Investment and Project Development Officer |
| PIDG | Investment Officers |
| PIDG/ InfraCo | Head of Business Development, Asia |
| GuarantCo / PIDG | Managing Director; Head of Asia |
| GuarantCo | Investment Associate Director |
| GuarantCo | Investment Director – North, West and Francophone Africa Lead |
| GuarantCo | Senior Impact Advisor |
| GuarantCo | Senior Impact Advisor |
| GuarantCo | Impact Manager |
| GuarantCo | Impact Advisor |
| Ninety One | Co-Head of Emerging Market Alternative Credit |
| Ninety One | Investment Professional – EM Alternative Credit |
| Ninety One | Impact & Sustainability Specialist, Fund manager EAAIF |
| InfraCo | Senior Impact Advisor, Africa |
| InfraCo | Impact Advisor, Africa |
| InfraCo | Senior Impact Manager, Asia |

# Appendix B: List of transactions

### Table 4: List of PIDG transactions in scope of the study

| Project name | Year of signing | PIDG funding | Total investment committed | Sector | Project description |
|---|---|---|---|---|---|
| InfraCredit Nigeria | 2016 (initially)<br>2020 (expansion) | USD 25m (GuarantCo)<br>USD 27m (InfraCo) | USD 100m (initially)<br>USD 173m (expansion) | Domestic Credit Enhancement Facility | Facility founded in partnership with GuarantCo and operational in 2017 to mobilise long-term Naira-denominated infrastructure finance. GuarantCo's initial support included a USD 50 million callable funding and technical assistance facility. This was wound down to USD 25 million over time as InfraCredit developed alternative sources of capital. InfraCo joined InfraCredit as an additional shareholder in 2020 with an equity investment of USD 27 million. |
| InfraCredit Nigeria (PIDG TA) | 2014<br>2015<br>2017<br>2020<br>2020 | USD 0.178m<br>USD 0.9m<br>USD 0.1m<br>USD 0.125m<br>USD 0.812m | | Domestic Credit Enhancement Facility | TA was provided to:<br>• Perform pre-feasibility assessment of a guarantee facility<br>• Cover set up costs, including legal and credit rating<br>• Set-up workshops for institutional investors<br>• Cover costs for legal due diligence and credit ratings of first-time bond issuances<br>• Develop the Housing Solution Initiative |
| Indorama Eleme Fertilizer & Chemicals | 2013 (Line I)<br>2018 (Line II)<br>2021 (FCU II)<br>2024 (Line III) | USD 49m (EAAIF)<br>USD 35m (EAAIF)<br>USD 16m (EAAIF)<br>USD 30m (EAAIF) | USD 1.2b (Line I)<br>USD 1.1b (Line II)<br>USD 180m (FCU II)<br>USD 1.2b (Line III) | Fertiliser manufacturing (ammonia & urea) | EAAIF initially supported this project as a as a greenfield fertiliser development integrated with gas supply and port infrastructure. Subsequent EAAIF-supported investments funded multiple expansion phases, including Line II, Line III, and feed conditioning units to recover natural gas liquids supplied to Line II. |
| Eleme Petrochemicals | 2007 | USD 20m (EAAIF) | USD 400m | Petrochemicals manufacturing (polyolefin) | EAAIF supported critical maintenance and rehabilitation through financing to enable a post-privatisation turnaround following Indorama's acquisition of a controlling stake. |
| Tower Aluminium | 2011 | USD 14m (GuarantCo) | USD 30m | Aluminium manufacturing (incl. roofing) | The company issued a seven-year, Naira-denominated corporate bond to refinance earlier USD-denominated bank loans used to finance a new factory. GuarantCo supported this through a partial credit guarantee of USD 14.2 million. |

| | | | | | |
|---|---|---|---|---|---|
| African Foundries | 2009 (initially)<br>2015 (expansion) | USD 20m (EAAIF)<br>USD 13m (EAAIF) | USD 155m (initially)<br>USD 34m (expansion) | Steel manufacturing (reinforcement bars from scrap metal) | EAAIF supported African Foundries with long-term financing to develop and operate a steel mill, including captive gas-fired power generation, which became operational in 2013. Later, EAAIF supported a further expansion of the plant to enable in-house steel bar production using local scrap metal. |

## Table 5: List of InfraCredit transactions in scope of the study

| Project name | Year of disbursement | Guarantee | Sector | Project description |
|---|---|---|---|---|
| Vithan | 2017 | - | Off-grid power | CNG plant construction in Abeokuta and expansion of Lagos Disco networks to grow commercial customer base |
| North South Power | 2019 | NGN 3,053,858,282 | Renewable energy | Hydropower upgrade and expansion, Guarara plant rehabilitation, 30MW solar project in Shiroro, and refinancing of short-term debt |
| Gel Utility | 2019 | NGN 2,322,000,000 | Off-grid power | Collaboration for 14MW power evacuation in Port Harcourt and supply of 84MW to the Port Harcourt refinery |
| TSL | 2020 | NGN 5,092,500,000 | Transportation | Acquisition of new assets including terminals, fleet that will drive the expansion of its urban/mass transit business |
| LFZC | 2021 | NGN 5,271,502,000 | Logistics | Operational port and industrial zone with dry bulk terminal and supporting infrastructure (10–40MW power, gas, warehouses) |
| GPC | 2021 | NGN 11,100,000,000 | Transportation | Acquisition of 220 trucks and refinancing of short-term LCY and FCY debt. |
| Pan African Towers Limited | 2022 | NGN 9,088,140,000 | ICT/Telecommunications | Development of new tower sites, transition to renewable power (replacing diesel), and working capital funding |
| Asiko Energy Holding | 2022 | NGN 1,380,000,000 | Gas-to-power | Procurement of dual-fuel generators for 14 Union Bank branches and associated propane logistics equipment |
| Asiko Gas Terminalling | 2023 | NGN 12,134,605,000 | Gas-to-Clean Cooking | Development of a LPG terminal in Ijora, Lagos |

| | | | | |
|---|---|---|---|---|
| Darway Coast | 2022 | NGN 1,472,000,000 | Renewable Energy | Construction and commissioning of solar mini-grids across six sites in Rivers and Abia. |
| GLNG | 2022 | NGN 32,260,125,000 | Gas-to-power | LNG liquefaction, regasification, storage, and logistics infrastructure development |
| Falcon | 2023 | NGN 4,791,000,000 | Gas-to-Clean Cooking | Development of a 5,000MT LPG terminal in Ijora, Lagos |
| VI Power | - | - | Gas-to-power | Construction of a 30MW gas-fired plant with gas spur line and distribution network |
| HotSpot | 2023 | NGN 1,414,000,000 | Renewable energy | Deployment of solar-powered base stations across 120 communities in 24 states |
| Coleman | - | NGN 10,000,000,000 | Manufacturing | Construction of plant for high-capacity power cable production |
| Abuja Steel | - | NGN 9,500,000,000 | Manufacturing | Upgrade and expansion of steel plant |
| Me Cure | 2023 | NGN 10,000,000,000 | Healthcare | Development of two pharmaceutical plants with tablet production |
| Modern Shelter | 2023 | NGN 4,433,000,000 | Housing | Construction of an EDGE-certified affordable housing project in Nasarawa |
| ACOB | 2023 | NGN 1,758,306,820 | Renewable Energy | Construction of solar mini-grids across seven communities in Edo and Ondo |
| Prado Power | 2024 | NGN 4,506,417,000 | Renewable Energy | Construction of solar mini-grids across four sites in Benue and Akwa Ibom |
| Ladol | 2024 | Refinancing | Logistics | Development of a power plant for zone supply, supporting SSEZ growth and future bond financing |
| Ekiti State Government-Annuity PPP | 2025 | NGN 28,160,800,000 | Transportation | Development of a toll road under an annuity PPP framework |
| Pirano | 2025 | NGN 806,767,008.17 | Renewable Energy | Deployment of solar systems for commercial and residential customers and refinancing of Clean Energy Fund debt. |

# Appendix C: Approach & Methods

## Capital markets

### Sector-level transformation

In line with the proposed methodology, we assessed whether Nigeria's infrastructure capital markets have undergone transformation since baseline across three outcome dimensions: efficiency, integration, and resilience. The three dimensions are defined as follows in the context of capital markets:

- **Efficiency:** Available capital matches the financing needs of infrastructure issuers in terms of maturity, cost, and currency, so that issuers can access competitively priced, longer-term finance rather than relying on short-term or foreign-denominated instruments.
- **Integration:** Nigeria's capital market is open to previously excluded domestic issuers and investors and progressively aligned with international capital market standards and investor requirements, enabling a broader range of participants to access and provide capital.
- **Resilience:** The capital market can continue to function and channel financing despite shocks, whether macroeconomic, regulatory, or political, because instruments, investors, and issuers are sufficiently diversified and the legal and regulatory environment is sound.

These outcomes have been defined at different development stages, from highly underdeveloped to highly developed, as shown in Table 7.

Using these definitions, we assess how Nigeria's capital markets for infrastructure financing have developed between 2011, when GuarantCo provided its first guarantee in Nigeria for Tower Aluminium, and 2025.

Efficiency, resilience, and integration were all highly underdeveloped in 2006, with efficiency and resilience moving to underdeveloped while integration reached moderately developed, as mapped in Table 8.

In 2011, no long-term local-currency financing existed for infrastructure issuers. Institutional investors concentrated almost entirely in government securities, leaving infrastructure issuers reliant on short-term bank lending or multilateral concessional finance. The capital market was closed to private infrastructure issuers, domestic institutional investors were inactive in the asset class, and no framework existed to support infrastructure bond issuance, leaving all three dimensions highly underdeveloped.

By 2025, InfraCredit has supported NGN 150 billion in bond issuances at an average tenor of 11 years, against a market average of 3.2 years, a material extension of available maturities. However, financing costs remain high and the market still mostly depends on guarantee support to reach investment-grade ratings, so efficiency remains underdeveloped. On integration, pension funds, banks, insurance companies, fund managers, and trustees all participated in InfraCredit-guaranteed issuances, representing a genuine broadening of investor and issuer participation that justifies a rating of moderately developed. On resilience, the market remains dependent on a single guarantee provider and the regulatory environment is not yet robust enough to absorb shocks independently, placing resilience at underdeveloped.

**Table 6: Defining market transformation outcomes of Nigeria's capital markets for infrastructure financing (efficiency, integration and resilience) across development stages**

| | Highly underdeveloped | Underdeveloped | Moderately developed | Highly developed |
|---|---|---|---|---|
| Efficiency | No long-term local-currency financing available; capital is short-term, costly, or foreign-denominated; no competition among providers; government bonds and banks absorb all available capital. | Some longer-term instruments exist but remain expensive or scarce; limited provider competition; infrastructure issuers depend on concessional finance in the absence of market alternatives. | Longer-term local-currency instruments available at broadly competitive prices; some provider competition emerging; maturity, cost, or currency mismatches persist for certain issuer types. | Capital consistently matches issuer needs in maturity, cost, and currency; genuine competition among banks, institutional investors, and government bonds; pricing reflects creditworthiness rather than market constraints. |
| Integration | Market limited to sovereign or quasi-sovereign issuers; domestic institutional investors absent; no alignment with international standards; foreign investors cannot participate. | Limited issuer access with significant barriers for smaller or excluded issuers; institutional investor participation nascent; partial alignment with international standards; foreign investor participation minimal. | Broader issuer access including infrastructure and corporate issuers; institutional investors active; international alignment progressing; some foreign investor participation but market openness incomplete. | Market open to a wide range of issuers and investor classes; fully aligned with international standards; foreign and domestic investors participate on comparable terms; multiple issuer and investor types create genuine market depth. |
| Resilience | Market entirely dependent on a single instrument, issuer, or investor class; legal and regulatory environment weak or unpredictable; any single shock would halt market functioning. | Narrow range of instruments, issuers, and investors; legal and regulatory framework partially developed but inconsistently enforced; moderate shocks cause significant market disruption. | Some diversification across instruments, issuers, and investors provides a partial buffer; legal and regulatory environment broadly functional; market absorbs moderate shocks but concentration remains a vulnerability. | Sufficient diversification across instruments, issuers, and investors so that no single failure impairs market functioning; legal and regulatory environment sound and consistently enforced; market continues to channel financing through macroeconomic, regulatory, and political shocks. |

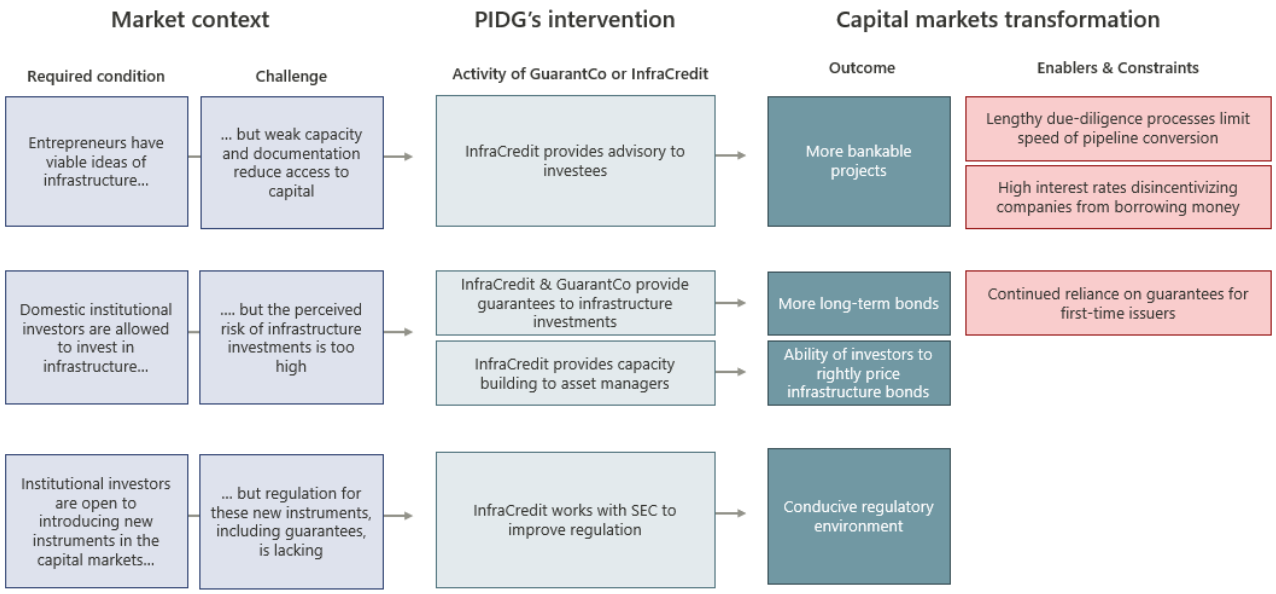
**Table 7: Development of Nigeria's infrastructure capital markets across efficiency, integration, and resilience dimensions: baseline (2011) versus current (2025)**

| | Highly underdeveloped | Underdeveloped | Moderately developed | Highly developed |
|---|---|---|---|---|
| Efficiency | Baseline | 2025 | | |
| Integration | Baseline | | 2025 | |
| Resilience | Baseline | 2025 | | |

### Hypotheses

The market transformation analysis is structured around a set of hypotheses linking PIDG's activities, specifically the founding, investment in, and support provided to InfraCredit, and the provision of guarantees by GuarantCo, and InfraCredit's activities to expected market outcomes. For each hypothesis, we specify the required market conditions under which the outcome is expected to materialise, as well as external enablers and constraints anticipated to amplify or limit PIDG's contribution. Enablers are highlighted in green and constraints in red.

**Figure 16: Hypotheses of transformational outcomes of PIDG's interventions in Nigeria's capital markets for infrastructure financing**




### Theory-based analysis of alternative explanations

The market transformation described above was driven by three outcomes: more bankable projects, longer-tenor bonds, and a more conducive regulatory environment. These outcomes may reflect PIDG's interventions but could equally have been driven by other factors.

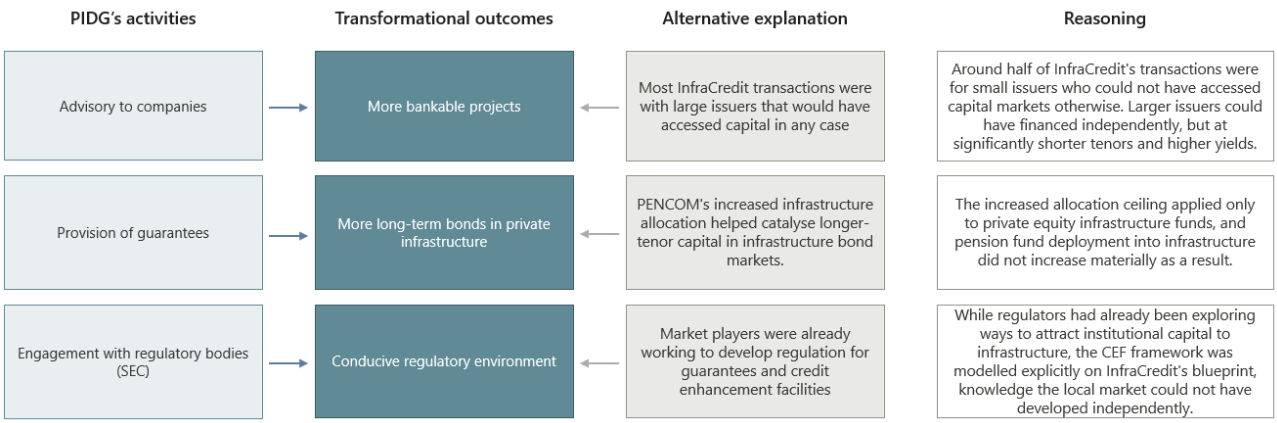
To assess PIDG's contribution, we cannot rely on a quantitative counterfactual, as this would require transaction-level data and market benchmarks that are not available at the required granularity. Instead, we

adopt a theory-based approach, which begins by taking PIDG's theory of change as the primary causal claim and systematically tests it against alternative explanations rooted in competing causal logics.

Our starting point is that InfraCredit drove the observed outcomes through four channels: guarantees closing the risk gap and enabling first transactions; successive issuances improving price discovery; due diligence and advisory upgrading issuer and investor capacity; and direct regulatory engagement reshaping the rules of the market. Drawing on stakeholder interviews and document review, we assess the relative plausibility of this claim against alternative explanations.

Figure 17 provides an overview of these alternative explanations and the reasoning around them. In all cases, the evidence points more strongly to PIDG's interventions than to any of the alternative explanations considered.

**Figure 17: Alternative explanations for capital markets' transformational outcomes**




## Petrochemicals sector

### Sector-level transformation

In line with the proposed methodology, we assessed whether Nigeria's petrochemicals sector has undergone transformation since baseline across three outcome dimensions: efficiency, integration, and resilience. The three dimensions are defined as follows in the context of capital markets:

- **Efficiency:** Existing industrial assets are used productively because they are professionally managed, maintained, upgraded, and enhanced through innovative technologies, so they generate output, value, and investor confidence instead of sitting idle or deteriorating.
- **Integration:** Linking production stages, technologies, and markets so that feedstock plants, and end-markets work together, enabling scale, full utilisation, and the production of value-added products across a diversified portfolio.
- **Resilience:** The industry can continue operating and investing despite shocks (financial distress, supply disruptions, market volatility, or regulatory change) because assets, firms, and financing structures are robust and the sector can adapt its feedstocks, processes, and products to evolving economic, environmental, and competitive conditions.

These outcomes have been defined at different development stages, from highly underdeveloped to highly developed, as shown in Table 9.

**Table 8: Defining market transformation outcomes of Nigeria's petrochemicals sector (efficiency, integration and resilience) across development stages**

| | Highly underdeveloped | Underdeveloped | Moderately developed | Highly developed |
|---|---|---|---|---|
| Efficiency | No firms operate at commercial scale and productive capacity is concentrated in state-owned or non-operational entities. | Only one or very few firms achieve operational efficiency, so productive capacity is not distributed across the sector. | A small number of firms operate efficiently, with concentration still high but market entry occurring. | A sufficient number of firms operate efficiently so that productive capacity is distributed across the sector and no single player's exit would critically impair overall performance. |
| Integration | No firms span multiple value chain stages and no cross-player linkages or market relationships exist. | Integration is limited to one or two firms, making value chain linkages fragile and dependent on individual players. | Multiple firms participate across some value chain stages, with linkages emerging but not yet systemic or competitive. | Multiple firms are integrated across the value chain, creating systemic linkages, competitive market relationships, and reduced single-point dependencies. |
| Resilience | The sector is entirely dependent on one or no commercially operating firms, so any single failure would effectively halt sector activity. | The sector depends on very few firms, so individual firm distress has an outsized impact on overall sector performance and investor confidence. | A small but growing number of firms provides some structural buffer, so the sector can partially absorb the distress of one player without full operational disruption. | A sufficient number and diversity of firms ensures that no single failure critically impairs sector operations, with competitive market structure itself acting as a resilience mechanism. |

Using these definitions, we assess how Nigeria's petrochemical sector has developed between 2006, when EAAIF provided the first private financing in the sector through the privatisation of Eleme Petrochemicals, and 2025.

Efficiency, resilience, and integration were all highly underdeveloped in 2006 and have each shifted one level to underdeveloped in 2025, as mapped in Table 10.

In 2006, Nigeria's refineries operated at near-zero capacity under state ownership, with no private firms active, no professional management, and no technology investment. Production stages were entirely isolated from one another and from downstream markets, and the sector had no financial buffers or supply diversification, leaving it with no capacity to absorb shocks across any dimension.

By 2025, the expansion of Dangote's production capacity and the long-standing operations of Indorama Eleme Petrochemicals represent a clear step forward, with assets now professionally managed, technologically advanced, and operating at commercial scale. However, with only two privately operating firms, productive capacity, value chain participation, and financial robustness remain concentrated in individual players. This concentration is the binding constraint across all three dimensions: a shift to moderately developed requires a critical mass of firms that does not yet exist.

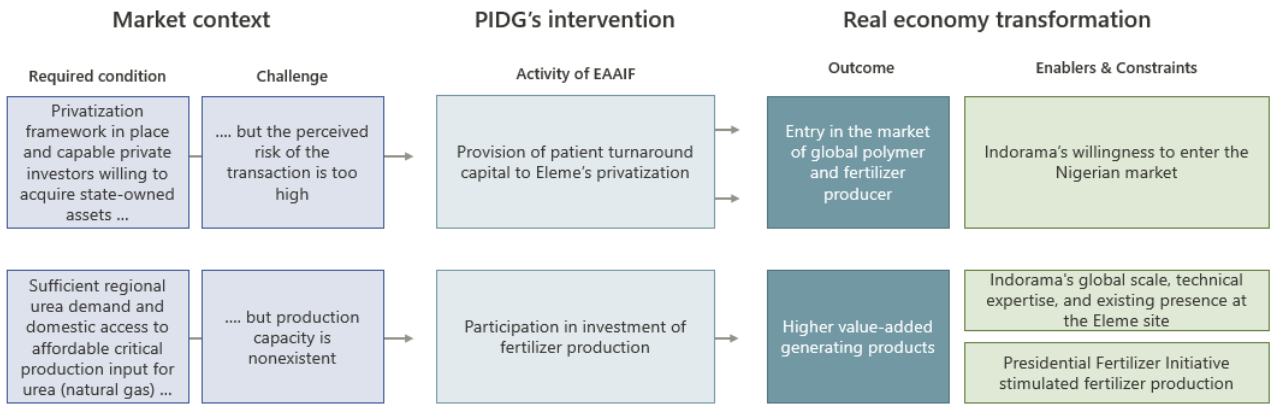
**Table 9: Development of Nigeria's petrochemicals sector across efficiency, integration, and resilience dimensions: baseline (2006) versus current (2025)**

| | Highly underdeveloped | Underdeveloped | Moderately developed | Highly developed |
|---|---|---|---|---|
| Efficiency | Baseline | 2025 | | |
| Integration | Baseline | 2025 | | |
| Resilience | Baseline | 2025 | | |

### Hypotheses

The market transformation analysis is structured around a set of hypotheses linking PIDG's activities, specifically the provision of patient turnaround capital for the privatisation of Eleme Petrochemicals and the subsequent investment in fertilizer production, to expected market outcomes. For each hypothesis, we specify the required market conditions under which the outcome is expected to materialise, as well as external enablers and constraints anticipated to amplify or limit PIDG's contribution. Enablers are highlighted in green and constraints in red.

**Figure 18: Hypotheses of transformational outcomes of PIDG's interventions in Nigeria's petrochemical sector**




### Theory-based analysis of alternative explanations

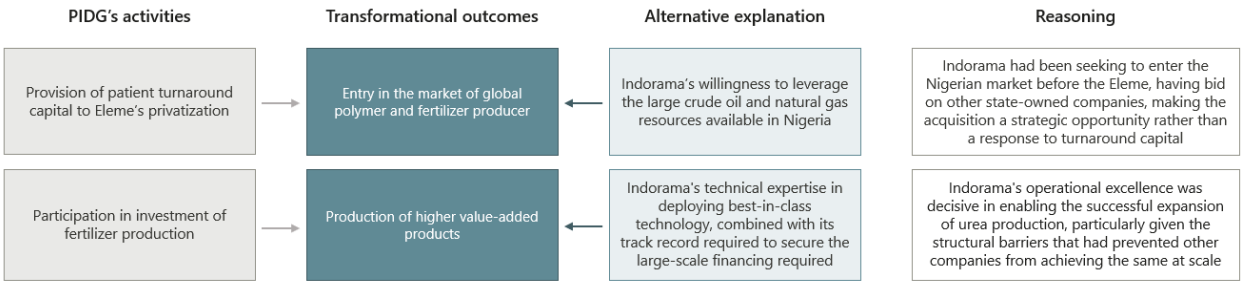
The market transformation described above was driven by two outcomes: the entry of Indorama in the market and the development of higher value-added production in fertilizers and polymers. These outcomes may reflect PIDG's interventions, but could equally have been driven by other factors, including Indorama's strategic objective of entering the Nigerian market, its expertise and track record.

To assess PIDG's contribution, we cannot rely on a quantitative counterfactual, as this would require firm-level production and investment data that are not available at the required granularity. Instead, we adopt a theory-based approach, which begins by taking PIDG's theory of change as the primary causal claim and systematically tests it against alternative explanations, drawing on stakeholder interviews and document review.

PIDG's contribution is assessed across the channels through which it plausibly drove the observed outcomes: the provision of patient turnaround capital enabling Eleme Petrochemicals' privatisation and the participation in investment in fertilizer production lines. Both channels are tested against the alternative explanations.

Figure 19 provides an overview of the alternative explanations tested and the reasoning around them, with the evidence consistently pointing more strongly to the alternative explanations than to PIDG's activities.

**Figure 19: Alternative explanations for petrochemical sector's transformational outcomes**




## World Bank Enterprise Survey Analysis

### Factor shares estimation

Our analysis uses firm-level data from the World Bank Enterprise Survey (WBES) to estimate how economic output changes in response to capital and other firm inputs. Since panel data across years is lacking, in the analysis hereafter, that means we deploy a cross-sectional rather than a longitudinal analysis. The analysis then assumes a Cobb-Douglas production function, which models firm output as a multiplicative function of production inputs. The use of the Cobb-Douglas function with cross-sectional regression is common. For example, Saliola and Seker used this approach to analyse total factor productivity across emerging markets [84]. In its expanded form, the production function is specified as (e.g., Charner et al, 1976):

$$Y = A \times K^{\alpha} \times L^{\beta} \times E^{\gamma} \times M^{\mu}$$

A is the so-called total factor productivity, which describes the increase of production that cannot be explained by increases in the factors of capital and labour. An example of this is the use of better technology. The other variables refer to annual sales (Y), capital (K), labour cost (L), electricity cost (E), and material cost (M) with their respective factor shares, or output elasticities α, β, γ, δ and μ. The specification builds the baseline Cobb–Douglas model ($Y = A \times K^{\alpha} \times L^{\beta}$) by incorporating additional inputs (materials, electricity and if necessary other inputs like fuel) to form a KLEM production function. More complex forms of production functions (e.g. the constant elasticity of substitution (CES) function) are available to overcome some of the constraints of the Cobb-Douglas production, namely perfect substitutability of inputs and absence of technological interaction between inputs [85]. But absent panel data of sufficient quality, the reduced estimation complexity and superior

[84] Saliola, F. and Seker. M. Total Factor Productivity across the developing world. Enterprise Note 23, World Bank, 2011
[85] Another example is given by J. Colmer, D. Lagakos and M. Shu, Is electricity sector a weak link in development? LSE, 2024.

interpretability of the Cobb-Douglas function make it a reliable workhorse of micro economic analysis of firm behaviour.[86] The factors in the Cobb-Douglas production function should ideally be stated in unit rather than monetary terms, in order to see the relationships more directly. In practice, this introduces issues of comparability between sectors (e.g. different types of labour, very many different types of intermediary materials, etc [87]. And while in longitudinal analysis the relationships could be affected by price changes, in the cross-sectional approach taken here, that is not so much of an issue. Finally, data is hardly ever available in terms of units, and the WBES data used here indeed only captures monetary data. To estimate factor shares, the model is transformed into a log–log specification, yielding a standard estimable regression equation:

$$\log Y = \log A + \alpha \times \log K + \beta \times \log L + \gamma \times \log E + \mu \times \log M + \varepsilon$$

This transformation converts the multiplicative production function into a linear form, which can be estimated using ordinary least squares (OLS). The coefficients α, β, γ and μ can then be directly interpreted as elasticities: for example, α captures the percentage change in sales associated with a 1% increase in capital, holding other inputs constant. Results of this analysis can be found in the able below.

### World bank Enterprise Survey data

The World Bank Enterprise Survey (WBES) for Nigeria is a firm-level dataset based on representative samples of private sector firms. The survey covers formal (registered) enterprises operating primarily in the manufacturing and services sectors. Sample sizes vary across survey rounds, with approximately 2,300 firms surveyed in 2007, 2,700 in 2014, and 1,000 in 2025. Since panel data linking firms across survey waves are not available for 2025, we perform cross-sectional regression for 2014 and 2025. The analysis draws on five key survey variables to estimate a Cobb–Douglas production function: total annual sales (Y), the replacement value of machinery, vehicles, and equipment (K), total annual labour costs (L), total annual expenditure on intermediate goods and materials (M), and total annual electricity costs (E). Where available, annual fuel costs (F) are also included. Observations with missing values for any of these variables are excluded from the estimation sample and data cleaned for outliers. Outliers are defined as firms with implausible input–output relationships, specifically those for which (Y − L − E − M)/Y < −40%, electricity expenditure exceeds 50% of total sales, or material input costs exceed sales. The importer subsample includes only firms reporting a non-zero share of material inputs, supplies, or resale goods of foreign origin. The exporter subsample includes firms reporting a non-zero share of sales from direct or indirect exports.

### WBES analysis results

Table 10 below display the results of the factor share estimation. The coefficients reported for each input represent factor elasticities, i.e. the estimated percentage change in output associated with a one percent increase in that input, holding others constant. The values we find for the factor elasticities for capital, labour, electricity and intermediary materials correspond well with those found in Saliola and Seker [84]. A positive and statistically significant coefficient (p-value <0.05) then indicates that the factor makes a meaningful contribution to output. This im[plies that our estimations are all statistically significant, as indicated by the p-value well below 0.1 or even 0.05 (except for electricity due to unreliability of grids in 2014 as well as the exporters dataset due to the small sample size). The $R^2$ values indicate the share of variation in firm output explained by the model, with values above 0.89 across all specifications suggesting a good overall fit. Results are presented across two survey years (2014 and 2025) and, for 2025, disaggregated by exporters and importers to allow comparison of factor intensities across firm types.

[86] Balk, B. M., Why is the Cobb-Douglas production function so popular? Evolutionary and Institutional Economics Review 21, 2024

[87] Using physical units renders any production function dimensionally inconsistent. In monetary terms, the Cobb-Douglas function is dimensionally meaningful, provided that economies of scale remain constant (i.e. the sum of factor shares equals 1).

**Table 10: WBES analysis results and factor shares**

| | 2014: Y=KLEFM | 2014: Y=KLEM | 2025: Y=KLEM | 2025 (exporters): Y=KLEM | 2025 (importers): Y=KLEM |
|---|---|---|---|---|---|
| K (capital) | 0.0433 | 0.043 | 0.063 | 0.319 | 0.143 |
| *p-value* | *<0.001* | *<0.001* | *0.054* | *0.001* | *0.038* |
| L (labour) | 0.267 | 0.263 | 0.254 | 0.301 | 0.258 |
| *p-value* | *<0.001* | *<0.001* | *<0.001* | *0.176* | *<0.001* |
| E (electricity) | -0.004 | 0.068 (Electricity + Fuel) | 0.150 | 0.081 | 0.085 |
| *p-value* | *0.536* | *0.000 (Electricity + Fuel)* | *<0.001* | *0.553* | *0.031* |
| Fuel | 0.058 | - | - | - | - |
| *p-value* | *<0.001* | - | - | - | - |
| Materials | 0.619 | 0.616 | 0.573 | 0.330 | 0.573 |
| *p-value* | *<0.001* | *<0.001* | *<0.001* | *0.135* | *<0.001* |
| Intercept | 0.646 | 0.618 | 0.589 | 0.540 | 0.295 |
| *p-value* | *<0.001* | *<0.001* | *<0.001* | *0.450* | *0.227* |
| R square | 0.976 | 0.988 | 0.893 | 0.891 | 0.947 |
| Observations | 1475 | 1475 | 304 | 27 | 95 |

## Limitations

The analysis of Nigeria's market transformation is subject to a number of methodological and data-related limitations. The limitations outlined below represent the most material constraints on the analysis and are presented in order of priority. For each limitation, we outline the approach adopted to mitigate its implications.

**1. Difficulty in attributing causality in Nigeria's capital markets and petrochemicals transformation**

Nigeria's market transformation over the study period was shaped by a complex combination of factors, including macroeconomic shifts such as the removal of fuel subsidies, regulatory developments driven by multiple actors, and the concurrent activity of other DFIs and development partners. The ability to delineate PIDG's specific contribution from these overlapping drivers was inherently limited.

- *To address this limitation, we were explicit throughout the evaluation about where causality could be argued. By systematically identifying and evidencing alternative explanations, as described in the alternative explanations sections for both the capital markets and petrochemicals cases, conclusions about PIDG's contribution were kept transparent, qualified, and well-grounded.*

**2. Data gaps and limited availability of capital market and sector-level indicators**

Nigeria presented specific data constraints that limited the depth of quantitative analysis. Transaction-level data on infrastructure bond issuance volumes, tenors, and pricing was not available in a consolidated or publicly accessible form, preventing the construction of a quantitative counterfactual for the capital markets

transformation. In the petrochemicals case, firm-level production, capacity utilisation, and financial performance data for Eleme Petrochemicals and Indorama were not publicly available, constraining the precision of impact assessments. World Bank Enterprise Survey data, while useful for the manufacturing sector analysis, was collected at irregular intervals and covered a limited number of reference years, reducing its sensitivity to recent structural changes.

- *Where quantitative analysis was not feasible, available evidence was complemented with qualitative and descriptive analysis drawn from project documentation, stakeholder interviews, and observed market behaviour. The decision to adopt a theory-based alternative explanation approach, rather than a quantitative counterfactual, directly reflects these data constraints.*

**3. Limited stakeholder coverage in the petrochemicals case**

The petrochemicals analysis was constrained by limited stakeholder coverage. Evidence from the Indorama side rested on a single interview, limiting the depth and triangulation of insights on PIDG's additionality, particularly in relation to the financing rounds and the turnaround programme. The absence of competitor perspectives further constrained the assessment of replication dynamics and the extent to which Indorama's track record influenced subsequent investment decisions by others. Where these gaps could not be filled, relevant conclusions were flagged as provisional and their implications for the strength of the findings noted explicitly.

- *Where these gaps could not be filled through interviews, the analysis relied primarily on available documentation, including credit papers and publicly accessible sources, with relevant conclusions flagged as potential.*

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