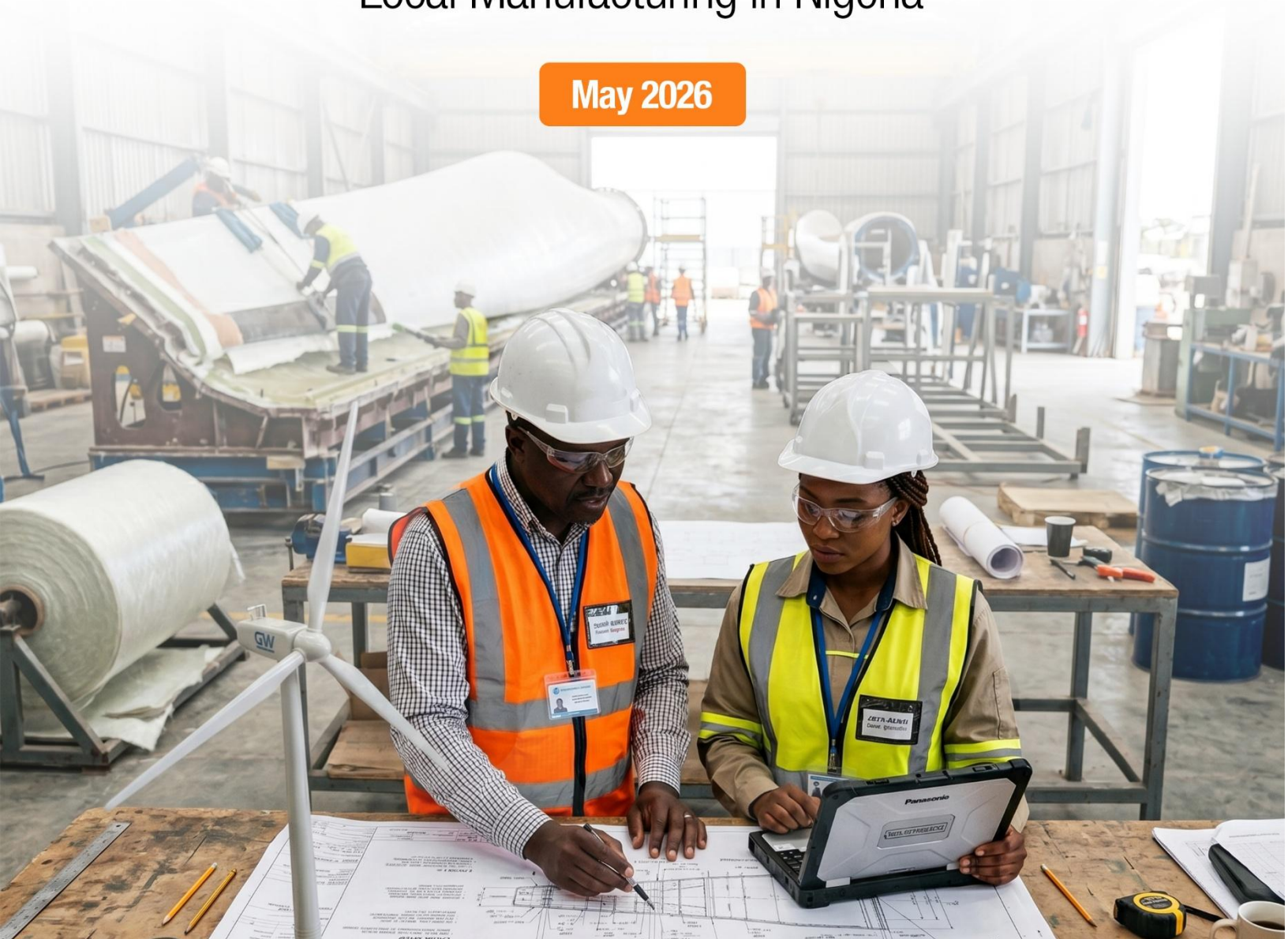


Raw Materials for Manufacturing Wind Farm Components

Availability, Opportunities, and the Path to
Local Manufacturing in Nigeria

May 2026



Executive Summary

As Nigeria explores utility-scale wind power, attention is shifting beyond project deployment to the broader industrial supply chain that underpins the sector. Wind farms are built from thousands of components, such as towers, blades, nacelles, foundations, cables, transformers, and control systems, all of which depend on a range of raw materials.

Nigeria possesses many of the mineral and industrial inputs needed to support local manufacturing of selected wind farm components, particularly steel towers, foundations, cables, and certain composite materials. The country's solid mineral deposits are widely distributed, with high concentrations of iron ore in Kogi and Enugu, limestone across Ogun, Cross River, and Sokoto, silica sand in over 25 states, and industrial minerals such as barite, quartz, and feldspar across the Middle Belt and northern states¹.

However, the country still lacks sufficient domestic capacity for advanced materials and precision-manufactured components, such as fiberglass blades, rare-earth magnets, bearings, gearboxes, and power electronics. This report examines the key raw materials required for wind farm manufacturing, assesses their availability and geographic distribution across Nigeria, and highlights where the country can localise production and where imports will remain necessary.

Key Findings at a Glance:

- Nigeria has a high availability of steel inputs (Kogi, Enugu, Kaduna), cement and limestone (Ogun, Edo, Cross River, Sokoto), silica sand (25+ states), and industrial minerals across the Middle Belt.
- Steel tower fabrication and civil works represent the clearest near-term localisation opportunities.
- Advanced materials - fiberglass blades, rare earth magnets, power electronics - remain import-dependent.
- With the right industrial policies, Nigeria can become a regional manufacturing hub for selected wind components.

1. Why Raw Materials Matter in Wind Energy Development

Modern wind turbines are highly material-intensive. A typical utility-scale wind turbine contains approximately 8,000 individual parts and relies heavily on steel, concrete, fiberglass, copper, aluminium, resins, rare-earth minerals, and speciality alloys. Towers and foundations account for the largest share of material demand, while blades and generators require more specialised inputs.

Countries that develop local supply chains for wind turbine materials can reduce project costs, create jobs, improve energy security, and build industrial capacity. India, for example, now manufactures roughly 65-70% of its wind turbine components domestically, supported by regional supply chains and industrial clusters. Brazil and Morocco have also leveraged local content policies to develop meaningful manufacturing ecosystems around wind energy.

¹Federal Government of Nigeria, 'Nigeria Solid Minerals,' Nigerian Embassy, Bucharest, Romania, <https://www.nigeriaembromania.gov.ng/nigeria-solid-minerals/>; and Association of Solid Minerals Miners and Marketers of Nigeria (ASMMMON), 'Distribution of Solid Natural Resources Across Nigeria,' 18 December 2025, <https://asmmmon.ng/2025/12/18/distribution-of-solid-natural-resources-across-nigeria/>.

For Nigeria, the strategic imperative is clear: building a wind energy sector without a domestic supply chain results in a perpetual drain on foreign exchange for imported components. Nigeria's geographic spread of mineral wealth, from iron ore in the north-central belt to limestone across the south and west, to silica sand almost everywhere, creates a genuine foundation for localised wind manufacturing that few African countries can match.

2. Main Raw Materials Used in Wind Farm Components

2.1 Steel and Iron Ore

Steel is the single most important raw material in wind energy. A single onshore turbine tower typically requires between 130 and 200 tonnes of structural steel, depending on hub height. Steel is used for turbine towers, nacelle frames, reinforced concrete foundations, fasteners, structural supports, and internal platforms.

Nigeria has significant iron ore reserves, primarily concentrated in Kogi State (Ajaokuta and Agbaja), Enugu, Kaduna, Niger, and Kwara. The Itakpe Iron Ore Mine in Kogi State holds one of Nigeria's largest iron ore reserves and was designed to supply the Ajaokuta Steel Complex and the Delta Steel Plant in Aladja. However, both facilities are currently non-operational. Ajaokuta has never produced commercial steel despite decades of investment exceeding \$8 billion, and the Nigerian government is actively pursuing rehabilitation agreements, including a 2024 MoU with the Russian firm Tyazhpromexport and ongoing talks with Chinese investors to finally bring both assets online. Despite these assets, local steel production remains well below national demand. Rolling mills exist in several states, including Lagos, Ogun, and Delta, but capacity utilisation is low. Unlocking Ajaokuta and associated downstream rolling capacity would be transformative for wind tower fabrication.

2.2 Concrete, Cement, and Aggregates

Wind turbines require large reinforced concrete foundations; a single foundation can contain between 400 and 1000+ tonnes of concrete, depending on soil conditions and turbine size. Nigeria's cement industry is one of the most developed in Africa, with different cement manufacturing companies operating integrated plants and grinding terminals across the country, with a combined installed capacity exceeding 58 million tonnes per annum. Major limestone-producing states feeding cement production include Ogun (Ewekoro, Sagamu), Edo, Cross River (Calabar), Sokoto, Kogi, Benue, and Ebonyi. Sand and gravel aggregates are available nationwide and are commercially quarried in Ogun, Lagos, Anambra, Kano, Rivers, and Plateau.

This combination makes turbine foundations and associated civil works the most immediately localisable component of any Nigerian wind farm.

2.3 Fiberglass and Composite Materials

Wind turbine blades, which can exceed 80 metres in length for utility-scale turbines, are typically made from fiberglass, carbon fibre, epoxy or polyester resins, and balsa wood or foam cores. Nigeria does not yet have wind-grade fiberglass manufacturing capacity, but it does possess several key precursor materials.

Silica sand, the primary raw material for glass production, is available in commercial quantities across more than 25 states. Key producing areas include Kogi, Anambra (Oguta), Ondo, Ogun, Plateau (Jos), Kwara, Niger, and Kebbi. Quartz and feldspar deposits, also essential for fiberglass composites, are found in Plateau, Nasarawa, Kogi, Ekiti, Oyo, Ondo, Kaduna, and Cross River. Translating these resources into wind-grade materials will require investment in beneficiation, melting, and drawing technology.

2.4 Copper and Aluminium

Copper is used extensively in wind turbine generators, transformers, cables, earthing systems, and power electronics. Copper deposits are identified in Plateau State (Bukuru area), Nasarawa (Shabu), Zamfara, Cross River, and Bauchi, but commercial extraction and refining on an industrial scale are extremely limited. Most high-grade copper products would still need to be imported for large-scale wind projects in the near term.

Aluminium-bearing bauxite deposits are found in Ekiti (Ara), Ogun, Kwara, Plateau, and Kogi. The Aluminium Smelter Company of Nigeria (ALSCON) in Ikot Abasi, Akwa Ibom, is the country's primary aluminium smelting facility, though it has operated well below capacity for years. Revitalising ALSCON would be strategically important for both the wind and broader energy sector supply chain.

2.5 Rare Earth Minerals

Permanent magnet wind turbines use rare earth minerals such as neodymium, dysprosium, and praseodymium for high-efficiency generators. Globally, rare earth supply is heavily concentrated in China, which accounts for approximately 60-70% of world production.

Trace occurrences of rare earth elements have been reported in Plateau, Cross River, Nasarawa, and Adamawa states, often associated with columbite-tantalite (coltan) and monazite deposits. However, Nigeria does not currently have a well-developed rare-earth processing and refining industry. These materials will remain import-dependent in the medium term, and their supply security is a challenge that extends well beyond Nigeria.

2.6 Barite, Industrial Minerals, and Other Inputs

Several industrial minerals are used in wind component manufacturing for coatings, composites, electrical systems, and glass production. Nigeria is one of Africa's largest producers of barite, with major deposits in Taraba (Muri area), Cross River (Abuochiche), Benue, Nasarawa, and Plateau. Dolomite is found in Ogun, Edo, Kogi, and Kwara; calcite deposits are spread across Kebbi, Sokoto, Zamfara, Niger, and Katsina. Kaolin, used in composites and refractories, is produced in Plateau (Barkin-Ladi), Cross River, Imo, Abia, Edo, and Ogun.

Petrochemical feedstocks for resin synthesis, including naphtha and ethylene derivatives, are available from facilities in Rivers State (Port Harcourt Refinery Complex and Indorama Eleme Petrochemicals Limited), Delta State, and Akwa Ibom State, though the downstream resin manufacturing industry remains underdeveloped.

3. Nigeria's Raw Material Availability: Summary Assessment

The table below provides a consolidated overview of the key raw materials required for wind farm component manufacturing, their status in Nigeria, and the specific states and locations where each material is found. Both Availability and Readiness are scored on a scale of 1 to 5 and expressed as a rating label, with the full scoring criteria set out in the Rating Key immediately below the table. The methodology is adapted from IRENA's Renewables Readiness Assessment framework, which uses structured, criteria-based scoring to evaluate a country's conditions for renewable energy deployment².

² International Renewable Energy Agency (IRENA), *Renewables Readiness Assessment: Design to Action - A Guide for Countries Aspiring to Scale Up Renewable Energy*, IRENA, Abu Dhabi, 2013, https://www.irena.org/-/media/Files/IRENA/RAA/RAA_Design_to_Action.pdf. The availability and readiness ratings in this report are NWECC's own assessments, adapted from IRENA's structured readiness evaluation methodology and applied to Nigeria's solid mineral and industrial manufacturing context.

Table Rating Key

Availability Rating: based on the size of proven reserves, the number of producing states, and documentation by the Nigerian Geological Survey Agency (NGSA) or federal government sources.

Score	Rating	Criteria - Geological Availability
5	Very High / High (5)	Commercially proven reserves >1 billion tonnes; actively quarried or mined at national scale across multiple states; well-documented by NGSA or federal government sources
4	High (4)	Commercially identified deposits in 5 or more states; some active mining or quarrying operations underway; confirmed by published government or academic sources
3	Moderate (3)	Deposits geologically mapped and identified in 2-4 states; limited commercial extraction; documented in exploration or research literature
2	Low (2)	Trace or preliminary occurrences reported in 1-2 states; not yet commercially extracted at a meaningful scale; no significant processing infrastructure
1	Very Low (1)	Geologically unconfirmed or negligible deposits within Nigeria; the country is entirely import-dependent for commercial quantities of this material

Readiness Rating: based on the existence and utilisation level of domestic processing infrastructure, manufacturing capability, and estimated investment timeline to achieve wind-supply readiness.

Score	Rating	Criteria - Industrial Readiness
5	High (5)	An active domestic industry exists; material can be converted to wind component input without significant new capital investment; market-ready supply chains are in place
4	Moderate-High (4)	Substantial processing capability exists; minor investment gaps; supply chain could be wind-ready within 1-2 years of targeted policy support
3	Moderate (3)	Partial processing or manufacturing capability exists; moderate investment of 2-4 years required to achieve wind-ready supply at commercial scale
2	Low (2)	Processing infrastructure exists but is severely underutilised or underdeveloped; 4-7 years of sustained investment and policy support required
1	Very Low (1)	No viable domestic processing or manufacturing capability; entirely import-dependent for wind manufacturing purposes in the foreseeable future

Raw Material	Main Use in Wind Turbines	Availability	Readiness	Key States / Locations in Nigeria
Steel / Iron Ore	Towers, nacelle frames, foundations, fasteners	High (4)	Moderate (3)	Kogi (Ajaokuta, Agbaja), Enugu, Kaduna, Niger, Kwara, FCT. Key assets: Ajaokuta Steel Company; Itakpe Iron Ore Mine (Kogi)
Limestone / Cement	Concrete foundations, civil works	High (5)	High (5)	Ogun (Ewekoro, Sagamu), Edo, Cross River (Calabar), Sokoto, Kogi, Benue, Ebonyi, and Niger.
Sand and Aggregates	Concrete foundations, civil works	High (5)	High (5)	Nationwide. Commercially quarried in Ogun, Lagos, Anambra, Kano, Rivers, Kaduna, Niger, Plateau
Silica Sand	Glass manufacture, composites, coatings	High (4)	Moderate (3)	Kogi, Anambra (Oguta), Ondo, Ogun, Plateau (Jos), Kwara, Niger, Kebbi. Found commercially in 25+ states
Quartz / Feldspar	Fiberglass and composite material inputs	High (4)	Moderate (3)	Plateau, Nasarawa, Kogi, Ekiti, Oyo (Igboho), Ondo, Kaduna, Cross River, Zamfara
Copper	Cables, generators, transformers, earthing	Moderate (3)	Low (2)	Plateau (Bukuru), Nasarawa (Shabu), Zamfara, Cross River, Bauchi. Deposits identified; commercial refining capacity remains very limited
Aluminium (Bauxite)	Electrical systems, structural parts, cables	Moderate (3)	Low (2)	Ekiti (Ara), Ogun, Kwara, Plateau, Kogi. Key asset: Aluminium Smelter Co. of Nigeria (ALSCON), Ikot Abasi, Akwa Ibom (currently underutilised)
Barite	Industrial applications, coatings	High (4)	Moderate (3)	Taraba (Muri), Cross River (Abuochiche), Benue, Nasarawa, Plateau. Nigeria is one of Africa's largest barite producers
Dolomite / Calcite	Industrial coatings, composites, and refractories	High (4)	Moderate (3)	Dolomite: Ogun, Edo, Kogi, Kwara; Calcite: Kebbi, Sokoto, Zamfara, Niger, Katsina
Kaolin / Clay	Composites, insulation, and refractory materials	High (4)	Moderate (3)	Plateau (Barkin-Ladi), Cross River, Imo, Abia, Edo, Ogun, Kogi, Ekiti
Fiberglass (wind-grade)	Turbine blades	Low (2)	Low (1)	No established wind-grade fiberglass plant in Nigeria. Precursor silica/quartz available (see above); significant investment required

Raw Material	Main Use in Wind Turbines	Availability	Readiness	Key States / Locations in Nigeria
Rare Earth Minerals	Permanent magnet generators	Very Low (1)	Very Low (1)	Traces reported in Plateau, Cross River, Nasarawa, and Adamawa. No commercial rare earth processing industry currently exists
Epoxy / Polyester Resins	Blade manufacturing, composites	Low-Moderate (2)	Low (1)	Petrochemical feedstocks exist in Rivers (Port Harcourt), Delta, and Akwa Ibom. Indorama Eleme Petrochemicals Limited (IEPL) in Rivers State is the primary local producer of polymer feedstocks (polyethylene/polypropylene), alongside baseline inputs from NLNG and PHRC; resin synthesis capacity is very limited

4. Nigeria's Strongest Opportunities for Localisation

Nigeria may not yet be ready to manufacture complete wind turbines domestically, but there are several areas where local content can realistically develop in the short to medium term, particularly where both availability and readiness scores are highest.

4.1 Steel Towers

Tower manufacturing is one of the most accessible wind components to localise because it relies primarily on steel plate fabrication, welding, surface coatings, and logistics. Nigeria's iron ore assets in Kogi (Ajaokuta, Agbaja), Enugu, and Kaduna, along with the Ajaokuta Steel Complex and rolling mills in Lagos, Ogun, and Delta, provide the foundation. While local steel production remains below national demand, targeted rehabilitation of existing assets, particularly the Ajaokuta-Itakpe axis, could position Nigeria to fabricate wind towers domestically within a few years of policy commitment.

4.2 Foundations and Civil Works

With major cement manufacturers in Nigeria like Dangote Cement, Lafarge Africa, and BUA Cement and with abundant limestone across Ogun, Edo, Cross River, Sokoto, and Kogi, as well as widespread sand and aggregate resources, turbine foundations, access roads, crane pads, and substation civil works can be sourced almost entirely within Nigeria. This is the clearest and most immediate localisation opportunity, and one that wind project developers can begin maximising from day one of any new project.

4.3 Electrical Cables and Balance-of-Plant Equipment

Nigeria has existing cable manufacturing capacity in Lagos, Ogun, and Ondo, and transformer production capability in Lagos and Ogun. With targeted policy support and private investment, local firms could supply an increasing share of the balance-of-plant infrastructure, including medium-voltage cables, earthing systems, and substation components, leveraging copper and aluminium inputs from Plateau, Nasarawa, Ekiti, and Akwa Ibom (ALSCON).

4.4 Composite Materials and Glass Inputs

Although Nigeria lacks wind-grade fibreglass production today, the silica sand deposits in Kogi, Anambra, Ondo, Ogun, and Plateau, combined with quartz and feldspar from Plateau, Nasarawa, and Cross River,

provide a credible raw material base for a future glass and composite manufacturing industry. Creating industrial clusters around these mineral corridors, linked to port access in Lagos, Onne (Rivers), or Calabar (Cross River), would reduce logistics costs and create viable ecosystems for component manufacturing.

5. Key Gaps Nigeria Must Address

Despite the resource potential, several challenges currently limit Nigeria's ability to serve as a manufacturing hub for wind components:

- Weak domestic steel production capacity and underperforming industrial assets (e.g., Ajaokuta Steel Company, Kogi; National Iron Ore Mining Company, Itakpe)
- Incomplete value chains for fibreglass, epoxy resins, and advanced composites despite silica availability
- Absence of commercial rare earth processing and refining capability (deposits in Plateau, Cross River, and Nasarawa remain unexploited for this purpose)
- Limited industrial-scale copper refining (deposits in Plateau, Nasarawa, Zamfara)
- Poor transport and logistics infrastructure connecting mineral-rich states (Kogi, Taraba, Plateau, Nasarawa) to industrial centres and ports
- Insufficient policy incentives and industrial strategies specifically targeting renewable energy manufacturing
- Limited research and development investment in advanced wind materials and manufacturing processes

Nigeria's mining and steel sectors remain significantly underdeveloped relative to the country's resource endowment. The gap between geological availability and industrial readiness, visible in the summary table in Section 3, is the central challenge. Closing that gap requires both public investment in infrastructure and processing, and private sector engagement driven by credible demand signals from wind procurement frameworks.

6. What Nigeria Should Do Next?

To build a domestic wind manufacturing ecosystem, Nigeria should focus on the following priorities:

- Develop a national local content strategy specifically for wind energy, with phased targets and enforcement mechanisms.
- Prioritise steel tower fabrication and concrete foundations as the first wave of localisation, activate Ajaokuta-Itakpe axis and downstream rolling capacity.
- Support local glass, fibreglass, and composite manufacturing through investment incentives, building on silica and quartz resources in Kogi, Plateau, and Anambra.
- Strengthen the mining and beneficiation of iron ore, silica, barite, and other strategic minerals through infrastructure investment in Kogi, Taraba, Nasarawa, and Cross River.
- Revitalise ALSCON (Akwa Ibom) to develop a domestic aluminium supply for electrical and structural wind components.
- Provide tax incentives and concessional financing for renewable energy manufacturers and component suppliers.
- Create industrial clusters around ports (Lagos, Onne, Calabar), steel plants (Ajaokuta), and energy corridors to reduce logistics costs.
- Require local content thresholds in wind procurement frameworks, similar to South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) model.
- Encourage joint ventures between international turbine OEMs and Nigerian industrial firms.
- Invest in technical and vocational education aligned with wind manufacturing skills requirements.

India, Brazil, and South Africa have demonstrated that wind localisation can begin with towers, foundations, and nacelle assembly before advancing into more complex manufacturing. Nigeria does not need to manufacture every component at once; a phased approach tied to demand growth, geographic resource clusters, and policy support is both practical and achievable.

Conclusion

Nigeria has many of the raw materials required to support local manufacturing of wind farm components, and unlike many countries, these materials are spread across multiple geopolitical zones, reducing the risk of supply concentration. Iron ore in Kogi and Enugu, cement and limestone across Ogun, Edo, and Cross River, silica sand in 25+ states, barite in Taraba and Cross River, and industrial minerals across the Middle Belt all represent a genuinely competitive raw material base for the early stages of a wind manufacturing ecosystem.

Advanced wind manufacturing, especially for blades, rare earth magnets, gearboxes, and power electronics, will require significant time, investment, and technology transfer. But this does not mean Nigeria should wait. Beginning with steel towers, foundations, cables, and civil works creates momentum, builds skills, and demonstrates to international investors and OEMs that Nigeria is serious about building a local wind industry.

The opportunity is clear. With the right industrial policies, investment in mineral processing, and credible procurement frameworks that mandate local content, Nigeria can position itself not only as a future utility-scale wind market but also as a manufacturing hub for selected wind energy components across West Africa.

Nigeria does not need to start by manufacturing every part of a wind turbine.

It can begin with the areas where it already has raw material advantages: steel, cement, silica, barite, and industrial minerals, and build a broader supply chain outward from there.

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