Localisation Support Fund

Feasibility Study: LFP Battery Cell Manufacturing Giga factory

Report

Prepared by **Ernst & Young Advisory Services (Pty) Ltd**

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Public Version

About LSF

The Localisation Support Fund NPC (“LSF”) was established as a non-profit company in 2021, funded by private sector contributors committed to localising manufacturing in South Africa. The LSF is a network orchestrator within the localisation ecosystem facilitating the connection between supply and demand participants, enhancing the value of the interactions by funding industry research and the deployment of technical expert resources to accelerate or unblock opportunities for localisation and growth in the manufacturing sector.

About Service Provider

EY (Ernst and Young Advisory Services Pty Ltd) is a global professional services firm with deep expertise in economic development, industrial policy, and localisation strategy. For this project, EY has been appointed to conduct a comprehensive localisation study focused on the South African LFP Battery Cell Manufacturing Feasibility and Market. The firm brings a multidisciplinary team skilled in value chain analysis, stakeholder engagement, and advanced econometric modelling.

Disclaimer

This report has been prepared as the final deliverable in the LFP Battery Cell Manufacturing Feasibility Study, and has been validated by various stakeholder groups, including but not limited to the LSF Project Steering Committee (PSC).

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Disclosure

This research was commissioned by the LSF and was conducted independently by **EY.** The lead consultant responsible for this report as well as the overall project was **EY**. The opinions or recommendations contained in this report represent the views of the authors and do not necessarily reflect the views and opinions of the LSF.

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Agenda

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2. Project Background and Approach
3. Module 1: Market & Strategic Assessment
4. Module 2: Implementation, Infrastructure & Risk Assessment
5. Module 3: Policy and Legal Risk Assessment
6. Module 4: Regulatory Roadmap
7. Appendix

Executive Summary

PROUDLY SUPPORTING LOCAL INDUSTRY

Our analysis demonstrates that the establishment of a LFP Gigafactory with 5-10 GWh capacity is feasible in South Africa

Summary of key recommendations

Establishing a **competitive LFP gigafactory in South Africa is feasible** - market demand, resource availability, and policy support align to enable successful implementation

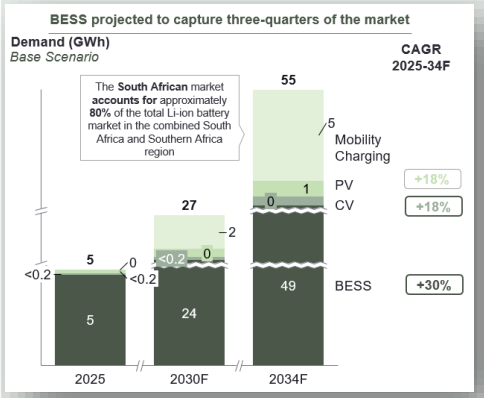
	Hypothesis	Key recommendations / takeaway	Assessment
1	**Addressable Market**	▪ South Africa and the region present **robust demand for LFP** batteries, **driven by BESS applications** and grid instability.	⊕
2	**Unique Selling Proposition**	▪ A domestic manufacturer's focus on **local manufacturing, strategic partnerships**, and tailored solutions for **C&I** and **utility sectors** is distinctive.	⊕
3	**Value Chain Viability**	▪ South Africa has a solid base for battery assembly and integration, but **upstream gaps in mineral processing and component manufacturing remain**. Strengthening local and regional supply partnerships is needed to **reduce import reliance and build long-term resilience.**	≈
4	**Ecosystem Sufficiency**	▪ **SEZs** such as Atlantis provide **robust infrastructure**, but further investment in **grid upgrades and workforce development is required** to support large-scale operations.	≈
5	**Cost Competitiveness**	▪ **Competitive energy, labour, and water costs** underpin cost-effective operations, but **exposure to global material price fluctuations** and **import dependency** must be managed.	≈
6	**Operational Feasibility**	▪ A **phased implementation approach**, aligned with **regulatory and permitting cycles**, ensures practical execution and scalability for gigafactory development.	⊕

⊕ Favorable ≈ Mixed ⊖ Unfavorable

Market & Strategic Assessment Executive Summary (1/2)

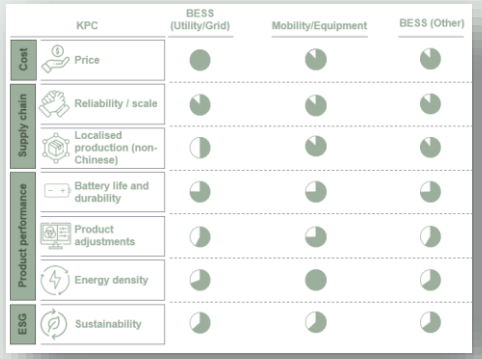
Executive Summary

Global and Regional LFP Market Overview



- **Global lithium-ion battery cell market** is set to grow from **1.6 TWh (2024) to 4.9 TWh (2034)** (12% CAGR), driven by **EV adoption** and **battery energy storage systems (BESS).**
- **South & Southern Africa** projected to reach **55 GWh by 2034** (~30% CAGR), mainly due to **BESS demand** and **loadshedding**.
- **Domestic demand** could support **2–3 local manufacturers** at scale by 2034.
- **South Africa's 2025 IRP** targets over **105 GW new generation capacity by 2030**.

Off-taker and Customer Analysis

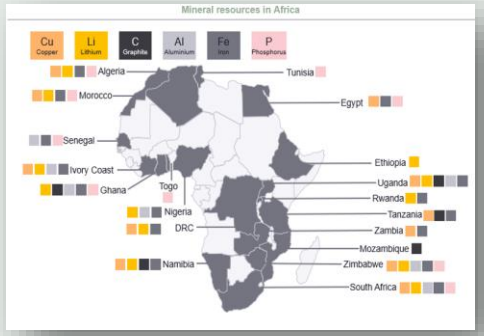


- **BESS for critical infrastructure and mining** are high-demand segments needing tailored solutions.
- **Local suppliers** are preferred if they offer **competitive pricing, quality, and supply chain support**; local sourcing boosts **resilience and autonomy** if global standards are met.

Market & Strategic Assessment Executive Summary (2/2)

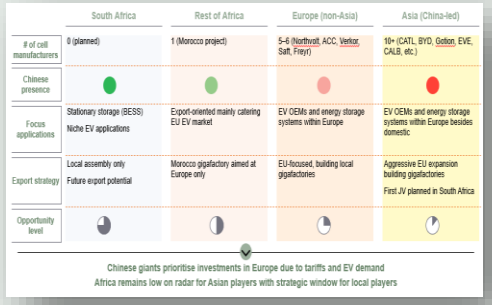
Executive Summary

Supply Chain & Local Resource Readiness



- **Strong resource base** for LFP batteries**, but gaps in lithium, graphite, and midstream processing** remain.

Benchmarking

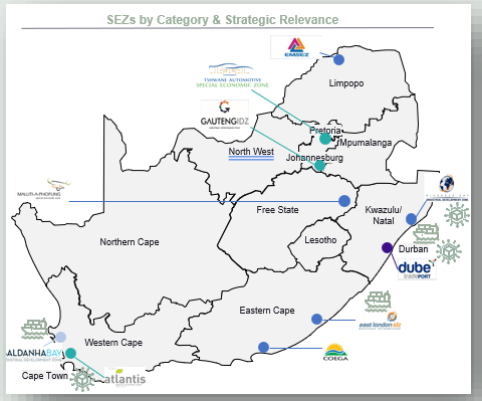


- **Global Asian manufacturers** dominate on **cost and scale; African players are few; European firms** lack scale.
- **Limited local competition; Chinese giants focus on Europe,** not Africa.

Implementation, Infrastructure & Risk Assessment Executive Summary

Executive Summary

Infrastructure Readiness



- **Gigafactory site selection** in South Africa hinges on **infrastructure and SEZ incentives; Atlantis is the top SEZ location.**
- The **Western Cape** is the main hub for **battery manufacturing, offering proximity to off-takers, global talent, grid stability, and water supply.**

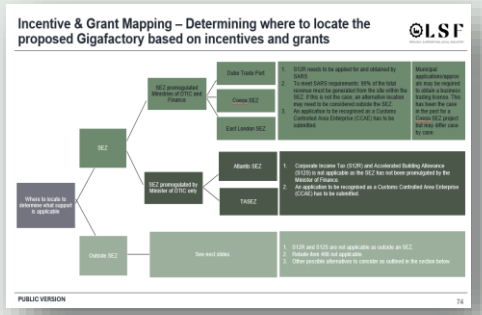
Risk Analysis and Mitigation

- **Risks:** Market, regulatory, and supply chain challenges include **policy delays, reliance on China, export restrictions, and grid instability.**
- **Mitigation: Policy advocacy, local supply chain development, strategic offtake agreements, and local talent investment** to reduce import reliance and buffer volatility.

Financial Incentives & Policy Risk Executive Summary

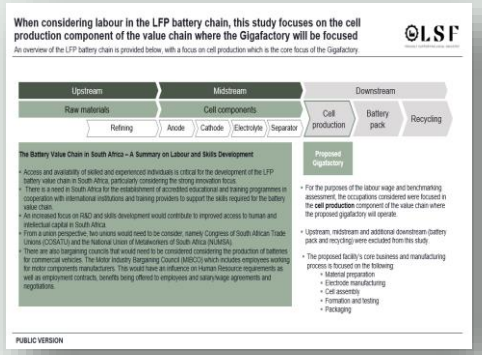
Executive Summary

Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping



- **Choosing a gigafactory site in South Africa affects available grants, tax allowances, and financial incentives.**
- **If located in Atlantis or Tshwane SEZ, Corporate Income Tax (S12R) and Accelerated Building Allowance (S12S) won't apply until the Minister of Finance formally approves the SEZ.**
- **Incentive applications are evaluated individually and may involve complexities, no fixed timelines that can be provided.**

Labour Market and Wage Benchmarking

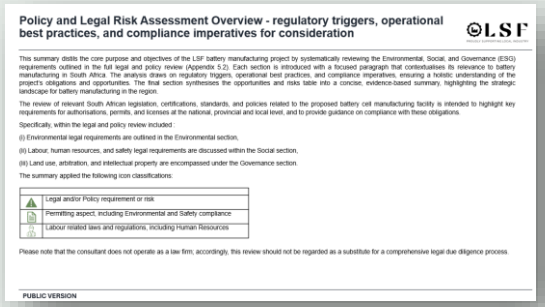


- **Skilled workers are vital** for developing South Africa's LFP battery value chain, given its focus on innovation.
- South Africa **shows uneven wage gaps between technical and support roles** and generally pays less than China and Europe.
- Factors like **living costs, labour laws, and bargaining councils** shape South Africa's wage levels. South Africa's salaries are **higher than India, Brazil, Indonesia, and Nigeria but lower than China and Europe,** highlighting the importance of **productivity and technology.**

Financial Incentives & Policy Risk Executive Summary

Executive Summary

Policy and Legal Risk Assessment



Policy and Legal Risk Assessment Overview - regulatory triggers, operational best practices, and compliance imperatives for consideration

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This summary distils the core purpose and objectives of the LSF battery manufacturing project by systematically reviewing the Environmental, Social, and Governance (ESG) requirements outlined in the full legal and policy review (Appendix 5.2). Each section is introduced with a focused paragraph that contextualises its relevance to battery manufacturing in South Africa. The analysis draws on regulatory triggers, operational best practices, and compliance imperatives, ensuring a holistic understanding of the project's obligations and opportunities. The final section synthesises the opportunities and risks table into a concise, evidence-based summary, highlighting the strategic landscape for battery manufacturing in the region.

The review of relevant South African legislation, certifications, standards, and policies related to the proposed battery cell manufacturing facility is intended to highlight key requirements for authorisations, permits, and licenses at the national, provincial and local level, and to provide guidance on compliance with these obligations.

Specifically, within the legal and policy review included :

(i) Environmental legal requirements are outlined in the Environmental section,

(ii) Labour, human resources, and safety legal requirements are discussed within the Social section,

(iii) Land use, arbitration, and intellectual property are encompassed under the Governance section.

The summary applied the following icon classifications:

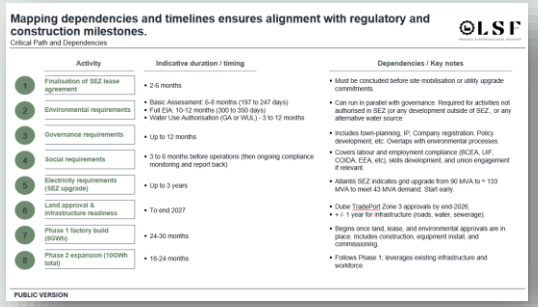
⚠	Legal and/or Policy requirement or risk
	Permitting aspect, including Environmental and Safety compliance
	Labour related laws and regulations, including Human Resources

Please note that the consultant does not operate as a law firm; accordingly, this review should not be regarded as a substitute for a comprehensive legal due diligence process.

PUBLIC VERSION

- There is support for **local production and innovation** to meet growing demand.
- While incentives and research institutions help, **limited local cell manufacturing and reliance on imports remain challenges.**
- Manufacturers must follow **extensive environmental, social, and governance regulations** to ensure market access and reduce risks.

Permitting and Approval Workflows



Mapping dependencies and timelines ensures alignment with regulatory and construction milestones.

Critical Path and Dependencies

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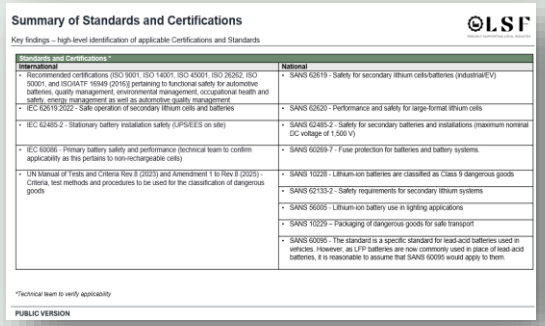
	Activity	Indicative duration / timing	Dependencies / Key notes
1	Finalisation of SEZ lease agreement	• 2-6 months	• Must be concluded before site mobilisation or utility upgrade commitments.
2	Environmental requirements	• Basic Assessment: 6-8 months (197 to 247 days) • Full EIA: 10-12 months (300 to 350 days) • Water Use Authorisation (GA or WUL) – 3 to 12 months	• Can run in parallel with governance. Required for activities not authorised in SEZ (or any development outside of SEZ., or any alternative water source.
3	Governance requirements	• Up to 12 months	• Includes town-planning, IP, Company registration, Policy development, etc. Overlaps with environmental processes.
4	Social requirements	• 3 to 6 months before operations (then ongoing compliance monitoring and report back)	• Covers labour and employment compliance (BCEA, LIF, COIDA, EEA, etc), skills development, and union engagement if relevant.
5	Electricity requirements (SEZ upgrade)	• Up to 3 years	• Atlantis SEZ indicates grid upgrade from 90 MVA to ~ 133 MVA to meet 43 MVA demand. Start early.
6	Land approval & infrastructure readiness	• To end 2027	• Dube TradePort Zone 3 approvals by end-2026. • +-1 year for infrastructure (roads, water, sewerage).
7	Phase 1 factory build (6GWh)	• 24-30 months	• Begins once land, lease, and environmental approvals are in place. Includes construction, equipment install, and commissioning.
8	Phase 2 expansion (10GWh total)	• 18-24 months	• Follows Phase 1, leverages existing infrastructure and workforce.

PUBLIC VERSION

- Setting up a manufacturing facility in South Africa **may take about 3 years**.
- Legislative **approvals can require 12 months or longer**, depending on the process.
- **Infrastructure upgrades**, like Atlantis SEZ electricity infrastructure, might take up to 3 years.
- All applications will be assessed individually

Standards and Certifications



Summary of Standards and Certifications

Key findings – high-level identification of applicable Certifications and Standards

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Standards and Certifications *	
International	**National**
• Recommended certifications (ISO 9001, ISO 14001, ISO 45001, ISO 26262, ISO 50001, and ISO/IATF 16949 (2016)) pertaining to functional safety for automotive batteries, quality management, environmental management, occupational health and safety, energy management as well as automotive quality management	• SANS 62619 - Safety for secondary lithium cells/batteries (industrial/EV)
• IEC 62619:2022 - Safe operation of secondary lithium cells and batteries	• SANS 62620 - Performance and safety for large-format lithium cells
• IEC 62485-2 - Stationary battery installation safety (UPS/EES on site)	• SANS 62485-2 - Safety for secondary batteries and installations (maximum nominal DC voltage of 1,500 V)
• IEC 60086 - Primary battery safety and performance (technical team to confirm applicability as this pertains to non-rechargeable cells)	• SANS 60269-7 - Fuse protection for batteries and battery systems.
• UN Manual of Tests and Criteria Rev 8 (2023) and Amendment 1 to Rev 8 (2025) - Criteria, test methods and procedures to be used for the classification of dangerous goods	• SANS 10228 - Lithium-ion batteries are classified as Class 9 dangerous goods • SANS 62133-2 - Safety requirements for secondary lithium systems • SANS 56005 - Lithium-ion battery use in lighting applications • SANS 10229 – Packaging of dangerous goods for safe transport • SANS 60095 - The standard is a specific standard for lead-acid batteries used in vehicles. However, as LFP batteries are now commonly used in place of lead-acid batteries, it is reasonable to assume that SANS 60095 would apply to them.

*Technical team to verify applicability

PUBLIC VERSION

- Battery off takers may require **specific certifications** to be in place in order for the Gigafactory to be a registered supplier.
- Automotive batteries in South Africa may need **homologation with the NRCS** for imported parts.
- South Africa **lacks standards and testing facilities** for storage batteries, requiring NRCS and SABS support for development.
- The Gigafactory should consider becoming an **approved OEM supplier** in South Africa.

From a labour perspective, South Africa is more cost competitive than Brazil, China, Nigeria and Germany

Rationale:

- An analysis was conducted to benchmark labour cost competitiveness across countries by linking wages to productivity. Unit Labour Cost (ULC)) – measured as the ratio of **average wage per hour to GDP per hour** – provides a clear measure of **how efficiently labour inputs translate into economic output, enabling strategic comparisons for investment and operational decisions**.

Key findings:

South Africa (UCL 100) is almost **3x more cost competitive compared to Brazil** (UCL 292) and **3.5x more cost competitive than Nigeria** (367). In Nigeria, extremely high wages relative to output undermine competitiveness, while the structural wage-productivity imbalance suggests limited viability for cost-sensitive sectors.

South Africa, Germany and Thailand are on par with each other, with Germany being slightly less cost competitive. Germany's UCL reflects a balanced cost-performance with high wages offset by high productivity which assists with maintaining competitiveness.

India, Indonesia and Hungary are more cost competitive than South Africa – with India being the most cost competitive. India's competitiveness is driven largely by low wages combined with reasonable productivity which deliver a strong cost advantage.

Unit Labour Cost Index

South Africa serves as the benchmark (ULC = 100).

- Countries with a lower ULC than South Africa are therefore more cost-competitive as they deliver output at a lower labour cost per unit of productivity.
- Conversely, higher ULC values (above 100) indicate weaker cost competitiveness.

It should be noted that labour data for China was not available. As such, data from Hong Kong was used as a proxy for China for the purpose of this report.

A domestic manufacturer's success hinges on strategic partnerships, innovative battery solutions, and world-class, de-risked operations enabling sustainable growth

Local manufacturer's path to success

RAPID MARKET ENTRY VIA STRATEGIC PARTNERSHIPS

- **Prioritise the African market** due to easier access compared to European or other global markets.
- **Sector-Specific Partnerships:** Co-develop solutions with utilities, mining, telecoms and agriculture firms for off-grid or backup applications.
- **Accelerate market entrance by leveraging Chinese expertise** to simplify go-to-market efforts & avoid pitfalls where possible, by applying their lessons learnt.

INNOVATING THE FUTURE OF BATTERY SOLUTIONS

- Offering of **differentiated, safe, efficient** and **superior** technology solutions.
- **Foster collaborative R&D partnerships** to accelerate innovation and adapt to emerging market needs.
- **Invest in modular and scalable technology platforms** that allow for **flexible** upgrades and integration with future battery chemistries.

WORLD-CLASS OPERATIONS & DE-RISKED SUPPLY CHAINS

- **Lean, efficient operations** based on its manufacturing track-record
- **Driving top-tier sustainability** with decarbonised production and de-risked supply chains.
- **Mitigate sourcing risks** by aligning with rules of origin and regional trade requirements.
- **Collaborative investment models** which engage multiple partners to share risk and enable flexible, scalable growth
- **Localise upstream activities** to strengthen operational independence and reduce reliance on imports.

The domestic manufacturer will realise its vision by combining strategic partnerships, innovative solutions, and world-class operations into a de-risked, stepwise strategy that accelerates market entry and adapts to evolving opportunities

Project Background & Approach

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PROUDLY SUPPORTING LOCAL INDUSTRY

Our LFP market and feasibility assessment serves to make an informed decision regarding the establishment of a battery cell gigafactory in South Africa

Initial situation and project objectives

Initial situation

- LSF, a South African non-profit, promotes industrial growth through strategic localisation in manufacturing and value chains.
- There is rising interest in building a battery plant in South Africa.
- A detailed market and feasibility study is needed to guide investment in a battery cell gigafactory.

Project scope & objectives

Market & Buyers	▪ Analyse cross-sector demand for battery applications and identify buyer needs and priorities
Local assessment	▪ Evaluate SA's resource base and policies, benchmark & identify USP and company positioning
Risks	▪ Identify operational and supply chain risks, and define mitigation strategies
Implemen-tation	▪ Develop a phased roll-out plan and assess infrastructure and logistics readiness
Incentives	▪ Identify financial and regulatory incentives, and assess workforce and compliance readiness
Policy	▪ Highlight legal and policy-related risks that could impact project viability
Regulatory Pathway	▪ Outline the permitting and compliance process, and clarify key standards and certifications
Stakeholder Engagement	▪ Recommend ways to streamline interactions with government and regulatory bodies

Robust, evidence-based feasibility and market viability study

Throughout the report we will validate seven key hypothesis to ensure the feasibility of establishing a 5-10 GWh LFP gigafactory in South Africa

Domestic manufacturer's path to success

Strategic Hypothesis to establish an LFP plant in South Africa

1. **Addressable Market** - There is a sufficiently large and growing addressable market for LFP battery cells globally & in South Africa, which a local manufacturer can competitively serve.
2. **Unique Selling Proposition –** A domestic manufacturer can establish a clear Unique Selling Point based on localisation, ESG compliance, regional proximity, and strategic alignment with industrial policy.
3. **Value Chain Viability -** South Africa is favourably positioned to build a viable battery value chain, with access to raw materials, processing capabilities, and enough potential partners to support end-to-end production.
4. **Ecosystem Sufficiency** - The local ecosystem provides sufficient infrastructure (electricity, water, transport), talent, and policy support to sustain gigafactory operations.
5. **Cost Competitiveness** - A South African LFP plant can achieve cost competitiveness through local sourcing, labour advantages, and SEZ incentives, despite global price pressures.
6. **Operational Feasibility -** The operational requirements—including permitting, logistics, skilled labour, and utilities - can be met within realistic timelines and budgets.

The feasibility study consists of four modules that deliver actionable insights to guide an organisation's investment decision and way forward

Approach overview

	1 Market & Strategic Assessment	2 Implementation, Infrastructure & Risks	3 Financial Incentives & Policy Risk	4 Regulatory Roadmap
Actions	Identify current & future demand for LFP batteries in mobility and stationary storage, segment by use case	Develop a phased plan for site development, construction, and commissioning	Evaluation of financial incentives and tax reliefs (identified in Module 1)	Map permitting & approval processes for land, construction, and operations
	Conduct in-depth analysis of off-takers incl. volumes & preferences	Assess essential infrastructure readiness including power, water, logistics, and evaluation of SEZ (location, incentive, benefits etc.)	Assess eligibility for customs and VAT exemptions on imported inputs	Identify technical standards & certification requirements
	Evaluate availability & readiness of local resources		Review labour regulations, & HR requirements	Outline environmental & safety compliance rules
	Benchmark locally & globally	Identify risks and propose mitigation strategies	Benchmark wage costs and availability of skilled workforce	
	Identification of policies, incentives and compliance requirements	Evaluate transport corridors and logistics capacity for inbound and outbound flows	Highlight legal and policy risks incl. land use, arbitration, and IP rights	Outline streamlined engagement with government and SEZ authorities
			Engage with SEZ operators to understand policy and regulatory challenges	
Deliverables	**Assessment of LFP market** incl. demand, off-takers, infrastructure readiness & competitive positioning / benchmarking	Consolidated **implementation plan** incl. assessment of infrastructure & risk analysis	**Report** detailing the requirements and availability of financial incentives, how to access them and how to maintain compliance	**Roadmap** of permitting and approval requirements, insights on applicable standards, and key recommendations for government liaison

Summary of Value Chain Perspectives: Battery Industry Stakeholder Interviews

Executive Summary: Battery industry stakeholder interviews

3+ Midstream (Materials, Processing, Battery Components)	• **Investment & Scale:** Local production of battery-grade materials (e.g., aluminium foil, cathodes, anodes) requires anchor customers and long-term offtake agreements to justify capital investment. Without clear demand, companies are hesitant to commit. • **Technical Capabilities:** South Africa has some processing expertise (e.g., in manganese, phosphate, and recycling), but scaling to battery-grade quality and volume remains a challenge. Partnerships and technology transfer are seen as critical enablers. • **Policy & Infrastructure:** Policy support, infrastructure upgrades, and incentives are needed to make local midstream production competitive with established global suppliers.
3+ Downstream (Cell/Battery Pack Manufacturing, Integration)	• **Cost Sensitivity:** Price competitiveness is the overriding factor for cell and pack manufacturers. Most procurement is direct from international suppliers, especially in China, due to lower costs and established supply chains. • **Local Manufacturing:** There is openness to local cell manufacturing, but only if quality, scale, and price match imports. Some players would consider paying a small premium for local supply if it reduces lead times, forex risk, or logistics costs. • **Procurement Practices:** Procurement strategies are typically based on staged payments, spot purchases, and direct supplier relationships. Long-term contracts are rare unless there is a clear cost or reliability advantage.
10+ End-User / Off-Taker (Utilities, Fleet Operators, Industrial Users)	• **Demand Drivers:** Large-scale battery energy storage systems (BESS) is across utilities as well as C&I. HCEV such as batteries for forklifts, E-buses projects are also driving demand, driven by grid stability needs, renewable energy integration, and backup power requirements. • **Procurement preferences**: Several IPP/BESS projects appoint or subcontract EPC contractors to carry out engineering, procurement, and construction of the BESS. • **Local Content:** Local content is considered if it meets quality and price criteria. Long-term warranties, after-sales support, and reliability are key decision factors.
3 SEZ Locations (Special Economic Zones)	• **Incentives & Infrastructure:** SEZs offer incentives such as tax breaks, expedited permitting, and infrastructure support (land, power, water). However, grid and water upgrades may be needed for gigafactory-scale projects. • **Green Energy & Sustainability:** Many SEZs are positioning themselves as hubs for green industry, with targets for renewable energy integration and support for sustainable construction. • **Collaboration:** SEZs encourage collaboration with local manufacturers and are open to supporting skills development and industrial clustering.

Market & Strategic Assessment

Module 1

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY

Market & Strategic Assessment

1

Global and Regional LFP Market Overview

2

Off-Taker and Customer Analysis

3

Supply Chain & Local Resource Readiness

4

Benchmarking

A domestic manufacturer is expected to encounter tailwinds in the South and Southern Africa LFP battery market mainly driven by BESS applications

Executive Summary: Global and regional LFP market overview

Overall, Li-ion market

The **global lithium-ion battery cell market** is one of the major growth markets of our time. Globally, it is a **1.6 TWh** market today (2024) growing to **a 4.9 TWh** market in **2034** (12% CAGR). Key growth drivers are the increasing adaptation of **electric vehicles** and the increasing use of **battery electric energy storage** (BESS).

As per the 2025 IRP (Integrated Resources Plan) draft, released by Department of Electricity and Energy in Africa, it has been projected that South Africa will add more than **105 GW of new generation capacity by 2039**

The regarded target market is **South Africa** and **Southern Africa**. This geography is expected to reach **55 GWh in 2034** (~1% of global battery cell demand), starting from a very low basis of **3 GWh in 2024** – the market in 2034 splits in the following ways:

- **Geographically**: 38 GWh South Africa, 17 GWh Southern Africa
- **Application**: 49 GWh BESS, 3.7 GWh CV and 2.2 GWh PV (including charging stations)

BESS is the key growth driver in this region. While grid instability has historically driven demand for battery energy storage systems (BESS), the primary driver is now the economics of renewable energy integration and the need for grid-scale solutions to support decarbonisation, particularly in response to evolving regulatory frameworks such as Carbon Border Adjustment Mechanism (CBAM).

Serviceable addressable market (SAM) and serviceable obtainable market (SOM)

The **serviceable addressable market** (SAM) for a local manufacturer includes the entire South African and Southern African market with **suitable Cell Chemistry** (L(M)FP) and the **right format** (prismatic). It amounts to **~52 GWh in 2034**:

- Again, **BESS is the main segment** and growth driver
- **Utility** applications account for the **largest capacity** to be installed with concrete government tenders announced until 2030
- **C&I** is expected to increase significantly due to higher share of **renewables esp. Pv** accompanied by **increasing battery adoption rates**

The local manufacturer's **serviceable obtainable market** (SOM) amounts to **~30 GWh in 2034** considering the market share that the manufacturer can **realistically capture vs. its peers**:

- Domestic manufacturing may be able to capture up to 60% of market demand, given the favourable market conditions and policy support.
- There is sufficient market demand to sustain two to three domestic manufacturers at scale, with local players well-positioned to benefit from strategic partnerships, policy support, and competitive cost structures.
- **Lesser market penetration** is expected within **CV (48%)** while **PV cannot be targeted by domestic players at all.**
- **Truck & bus** as well as **passenger car charging stations** are expected to be **captured by ~50%**

The 60% domestic share could be achievable as strategic policy and local value chain control create an economically resilient ecosystem that shields from foreign players

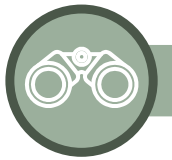
The target of 60% domestic market share could be achievable due to the combination of mandated utility demand, government policy and local content requirements creates a protected market that offshore companies cannot access

LFP/BESS Value Chain Lock-In

- The market is shifting to Lithium Iron Phosphate for BESS, a segment that is less price-sensitive than generic Pv modules because the value is derived from local expertise and system reliability
- For BESS, most of the local value-add is in the BMS, casing, integration, and specialised software—areas where foreign firms lack expertise and local certification. This local value-add segment is largely shielded from cheap cell imports.

Eskom's Increasing Power Demand

- The government is ensuring that public procurement (49% Utility BESS) creates a guaranteed market that domestic players can bank on, minimizing the risk of price dumping
- For BESS, the local demand and planned capacity are strategically aligned. Eskom's tenders are designed to ensure 2 to 3 domestic players are viable customers for new cell/pack factories



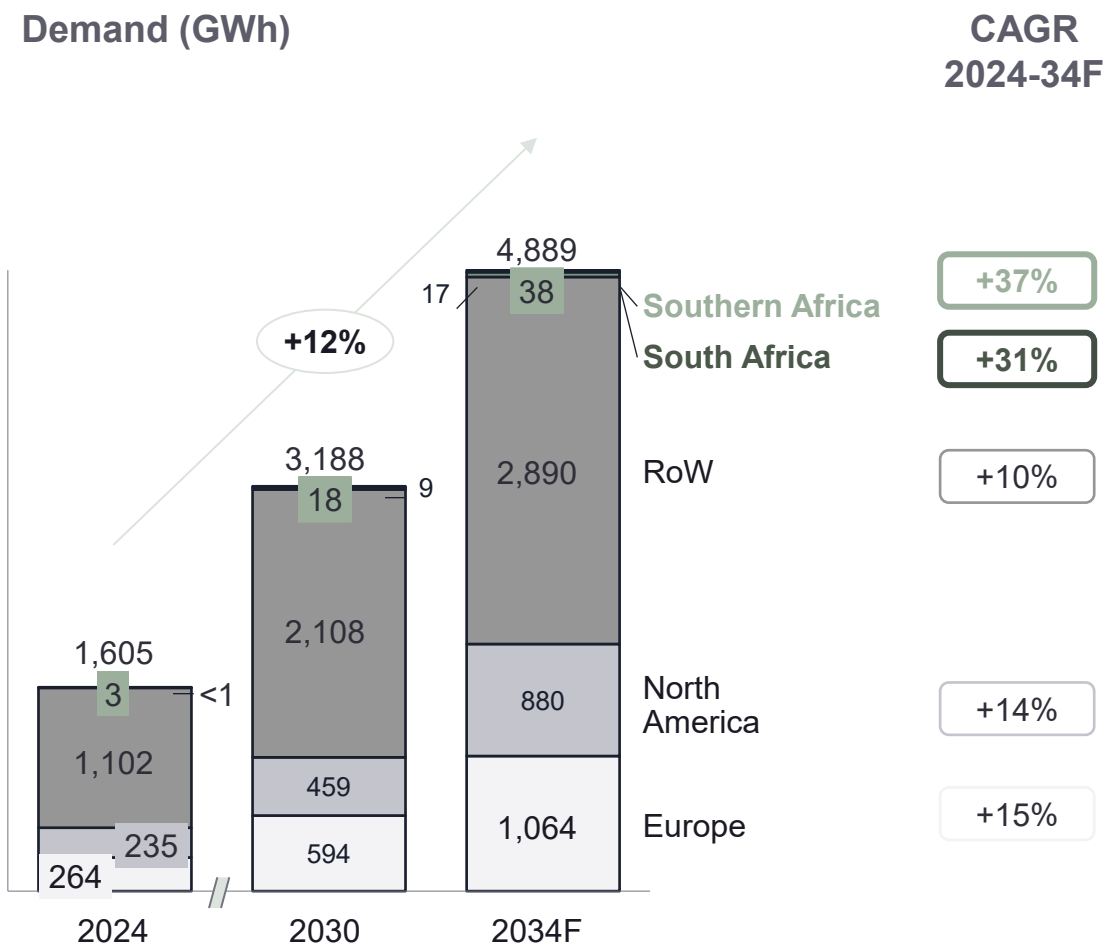
Load Shedding as Sales Barrier for Imports

- Unlike Pv which is often grid-tied, BESS is sold as a necessity for resilience. This creates a barrier for unknown foreign brands
- Utility and C&I clients will not risk their business operations on BESS systems without strong local support and local engineering to manage the highly volatile SA grid. This reliance on local expertise severely limits the market share of foreign companies that rely only on cheap imported hardware

Globally, the lithium-ion battery cell market is 1.6 TWh today (2024) growing to a 4.9 TWh market in 2034 with 12% CAGR

Global battery market demand development, 2024-34F, Base Scenario

Significant growth expected in the Southern African market



Key market drivers

South Africa

- **Battery Energy Storage Systems (BESS):** Increasing demand driven by grid instability, wholesale electricity market (energy transition & need for flexibility), and economics (tariff savings & arbitrage).
- **Electric Vehicle (EV) adoption:** Currently very low (<1%), constrained by:
  - Affordability
  - Limited infrastructure
  - Weak national incentives (still evolving)
- **Growth Outlook:** Forecasted +31% CAGR in the Li-ion battery market from 2024 to 2034.
- IRP 2025: As per the new IRP 2025 draft, it has been projected that South Africa will add more than 105 GW of new generation capacity by 2039

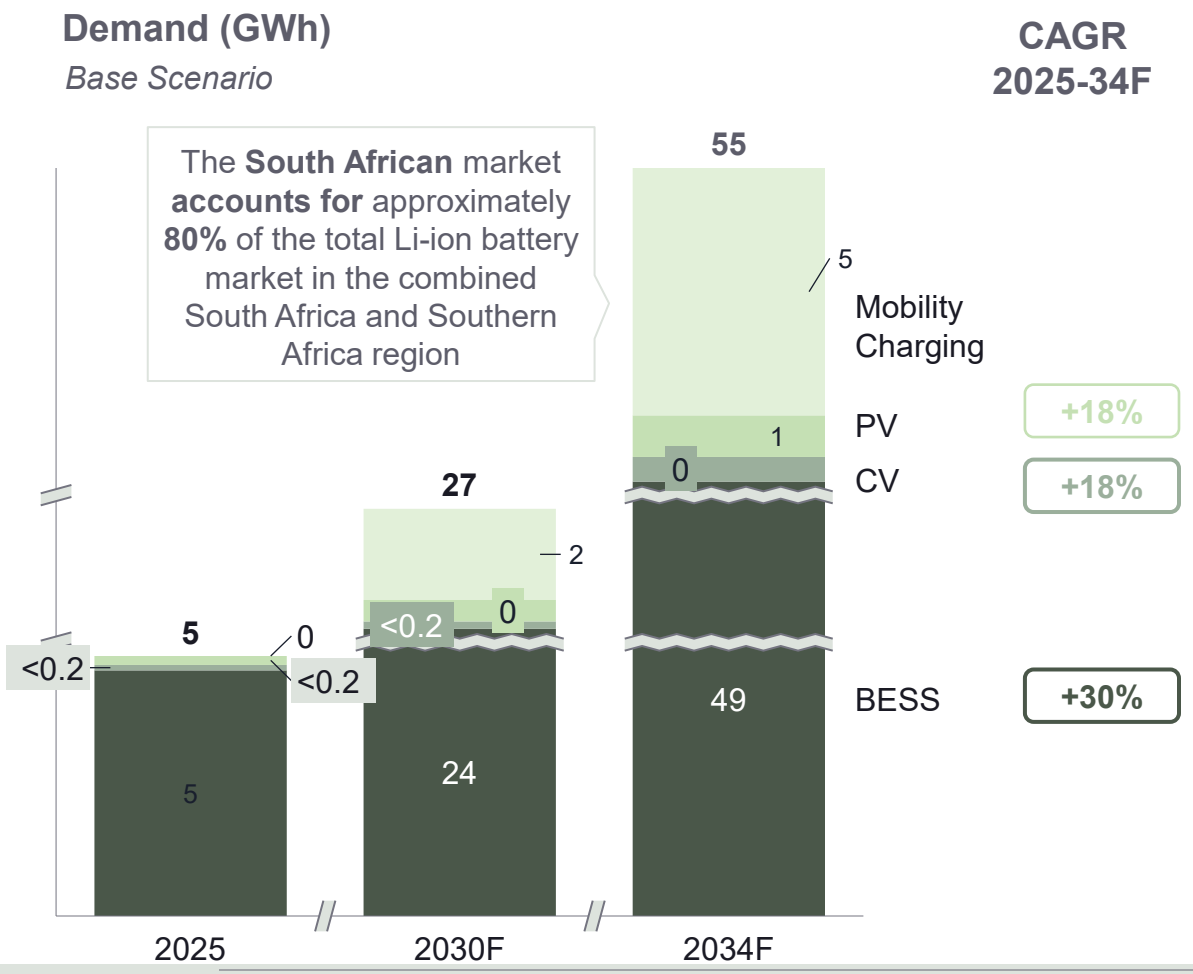
Southern Africa

- **Strong BESS Demand:** Driven by regional grid instability and resilience needs across multiple countries.
- **EV Adoption:** Also low across the region, facing similar challenges as South Africa (cost, infrastructure, incentives).
- **Regional integration potential:**
  - AfCFTA (African Continental Free Trade Area) and infrastructure corridors could unlock scale.
  - Success depends on financing and execution alignment.
- **Growth Outlook:** Forecasted +37% CAGR, making it one of the fastest-growing regions globally in the Li-ion battery market.

South Africa and Southern Africa is expected to reach 55 GWh in 2034 with BESS being the key growth driver

TAM – South Africa and Southern Africa Li-ion battery demand by segment, 2025-34F (GWh)

BESS projected to capture three-quarters of the market



Key market observations

Passenger Vehicles: Passenger vehicle market expected to more than double between 2025-34 however, this is still dependent on the growth of passenger EV adoption, as well as customer affordability in the short & long-term within the Southern African region.

Commercial Vehicles[1]: Adoption of zero emission commercial vehicles expected to boom due to Southern African CO_2 emission reduction targets for new trucks, reduced total cost of ownership (TCO) and growing charging infrastructure network. This suggests infrastructure and cost barriers may be slowing adoption despite favourable TCO and emissions targets.

BESS[2]: By 2034, Battery Energy Storage Systems (BESS) are projected to account for **~81%** of total Li-ion demand (21 GWh out of 26 GWh), confirming their central role in the region's energy strategy. This aligns with the region's need for grid stabilisation, especially as renewable energy penetration increases. The BESS demand is driven majorly by governments tenders in utility applications

1.Commercial Vehicles include trucks and buses
2.BESS includes Utility, C&I, residential (minority)

Our market methodology is structured around a TAM to SOM approach, focusing on chemistry and segment refinement through various input data parameters

SCHEMATIC

Multiple input data parameters used to develop and refine market size:

- Management workshops and input
- Market expert interviews
- Proprietary database
- Market & industry reports
- Project experience

Market definition

Total Addressable Market **(TAM)**	Serviceable Addressable Market **(SAM)**	Serviceable Obtainable Market **(SOM)**
Total South and Southern African market demand for Li-ion battery cells, incl. all potential applications	Part of the TAM, which a local manufacturer can realistically target based on its planned capabilities	Part of the SAM, which a local manufacturer can obtain in the short to mid-term (2025-35) considering its strategic plan

Key assumptions

- Assumes **no constraints** in terms of chemistry, addressable segments and sub-segments, regulations, or production capacity
- **Excludes non-relevant chemistries** (e.g., Hi-Ni NMC, NCA, sodium-ion, solid state)
- **Focuses on relevant cell formats** (prismatic) within relevant chemistries
- **Some sub-segments and applications are excluded** as those are out of a domestic manufacturer's core focus
- **Excludes all competitor market share**

In the base case, the domestic manufacturers' SAM is expected to be 52 GWh while the SOM will amount to 30 GWh until 2034

Market demand sizing - TAM to SOM bridge

ILLUSTRATIVE

Demand (GWh), base scenario

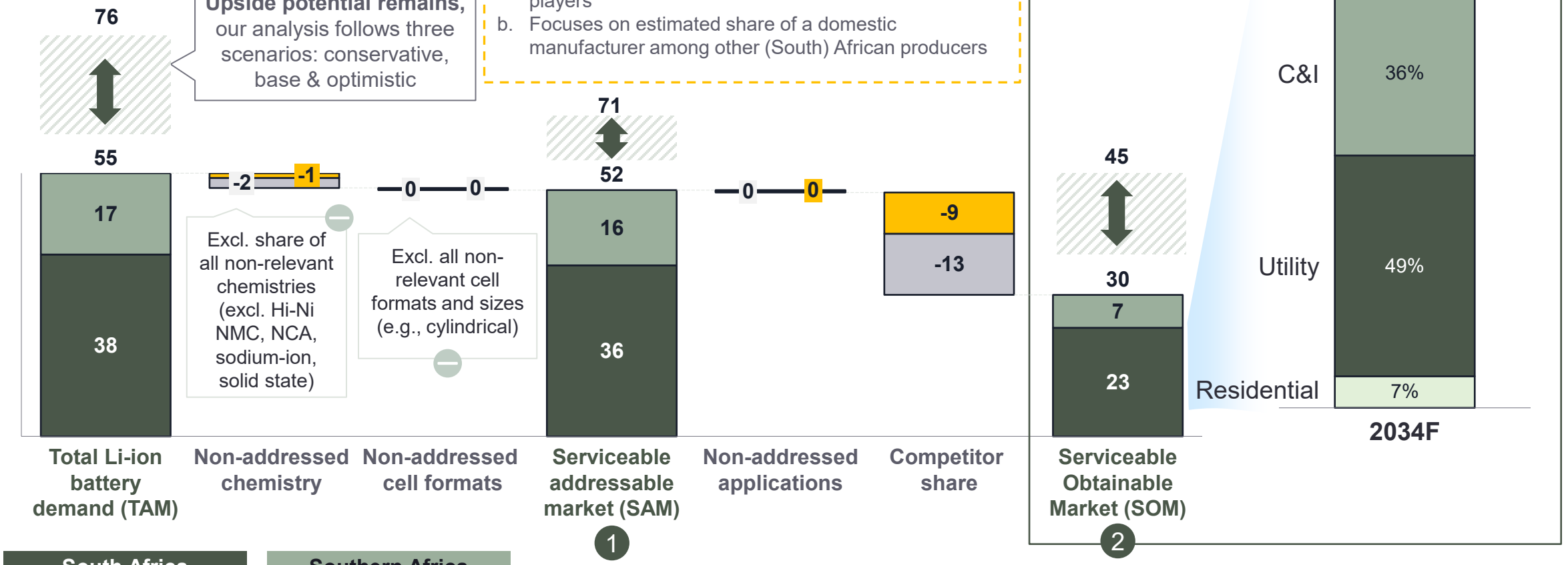
Non-addressed applications: Excludes applications from SAM that are not addressable due to lack of product and/or strategic fit (e.g. EVs)

Competitor share is eliminated in 2 steps:

a. Focuses on share of SAM that is captured by Chinese players

b. Focuses on estimated share of a domestic manufacturer among other (South) African producers

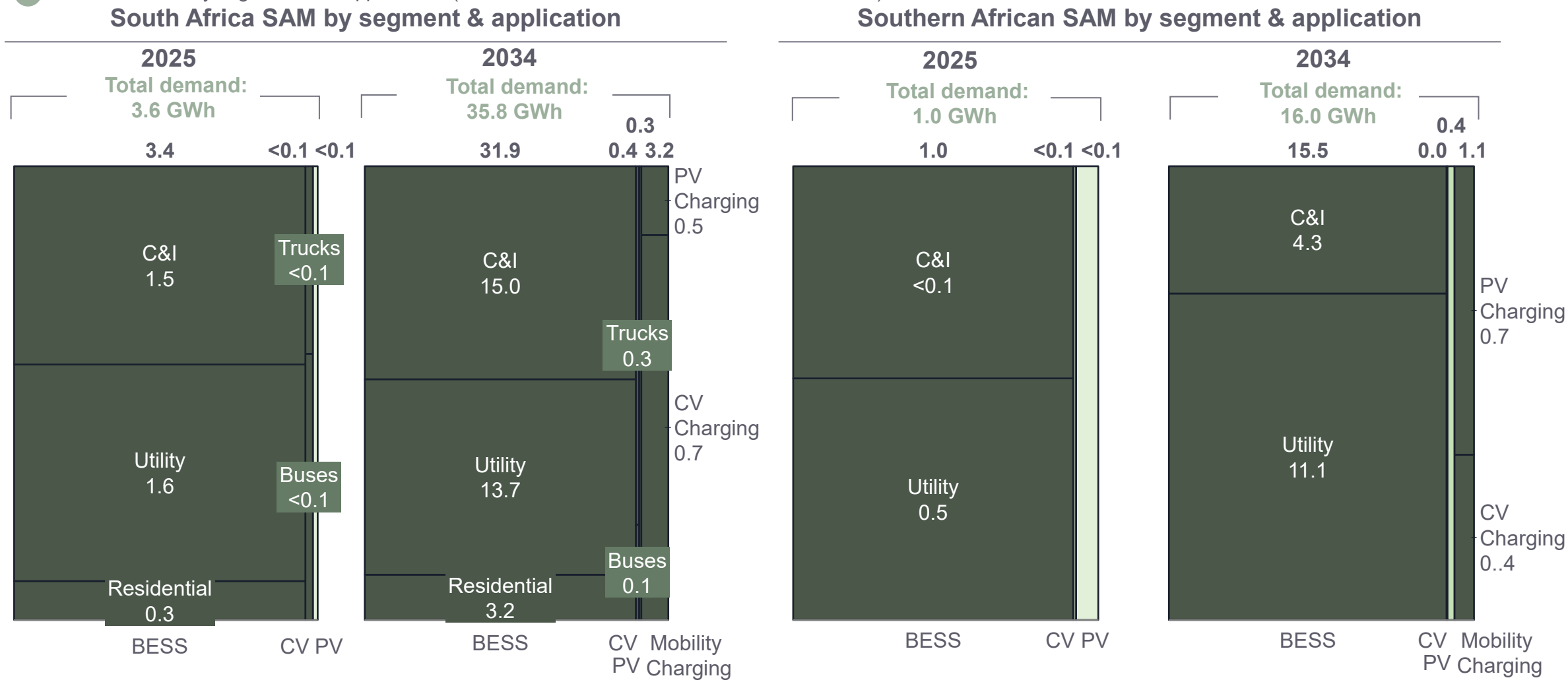
Upside potential remains, our analysis follows three scenarios: conservative, base & optimistic



South Africa | Southern Africa

Utility applications account for the largest capacity to be installed with concrete government tenders announced until 2030

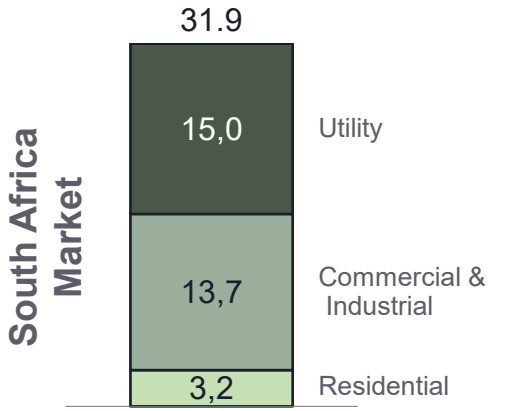
1 SAM – Demand by segments and applications (2024 vs. 2034F, Demand in GWh, base scenario)

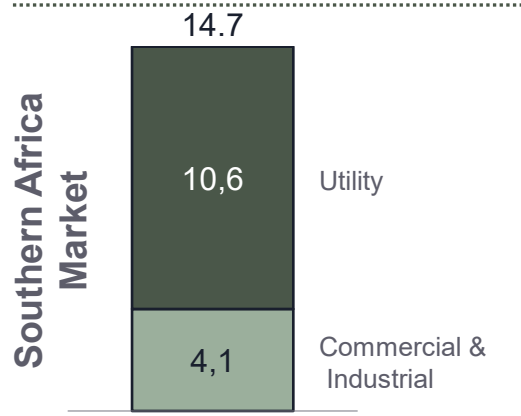


Local manufacturers are expected to capture ~ 30-60% of the market share within all Battery Energy Storage System (BESS) applications

2 SOM: BESS, by application, 2034F (GWh), base scenario

DEEP DIVE





Domestic market player SAM (2034F)	Description[1]	CAGR (2025-34F)	SAM		Product / Strategic fit		Domestic market player share		SOM (GWh)
South Africa Market	**Utility Independent Power Producers (IPP):** Dominated by government led initiatives and large-scale tenders for BESS	28%	15	⊗	1	⊗	35% - 65%	=	5.3 - 9.7
	Commercial & Industrial: Adopting battery storage to secure power supply during outages and manage peak demand costs	28%	13.7		1		35% - 65%		4.8 - 8.9
	Residential: Driven by widespread "load shedding," it is a consumer-led market, with households actively investing in solar-plus-storage	30%	3.2		1		35% - 65%		1.1 - 2.1
Southern Africa Market	**Utility (IPP):** Driven by ambitious national plans and international development finance for large-scale projects aimed at expanding access to power and supporting national grids	40%	10.6		1		25%- 45%		2.7 - 4.8
	Commercial & Industrial: This is the key growth segment, with businesses and industries investing in off-grid or hybrid solutions to secure reliable power	28%	4.1		1		25% - 45%		1.0 - 1.9

Highest growth · High growth · Moderate growth · Low growth

1. Market share of 30- 60% is based on weighted average of share in South Africa and Southern Africa. High policy action would result in 65% (high range) and low policy action would result in 30% (low range)

Lesser market penetration is expected within CV (~30-48%) while PV cannot be targeted by domestic players at all

2 SOM: CV, by application, 2034F (GWh), base scenario

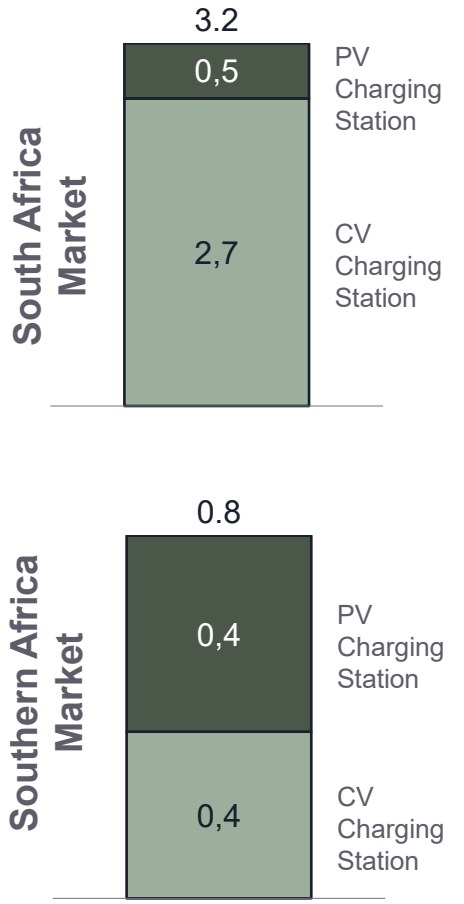
DEEP DIVE

Domestic market player SAM (2034F)	Description[1]	CAGR (2025-34F)	SAM	⊗	Product / Strategic fit	⊗	Domestic market player share	=	SOM (GWh)
South Africa Market – Trucks	**Trucks:** Driven by pilot projects from major corporations, the nascent e-truck market is focused on reducing fuel costs and emissions in freight	27%	0.3		1		30% - 50%		**0.15**
South Africa Market – Buses	**Buses:** Poised for growth, the e-bus segment is driven by municipal and public transport plans to electrify fleets and improve urban air quality	5%	0.1		1		30% - 50%		**<0.1**
Southern Africa Market – Commercial Vehicle	**Commercial Vehicles.:** The market for electric commercial vehicles is highly nascent, with initial adoption concentrated in large-scale projects and urban-based logistics, driven by international partnerships	20%	<0.1		1		25% - 35%		**<0.1**

Highest growth · High growth · Moderate growth · Low growth

Truck & bus as well as passenger car charging stations are expected to be captured by 30-55% and 25-48% respectively

2 SOM: Mobility Charging, by application, 2034F (GWh), base scenario

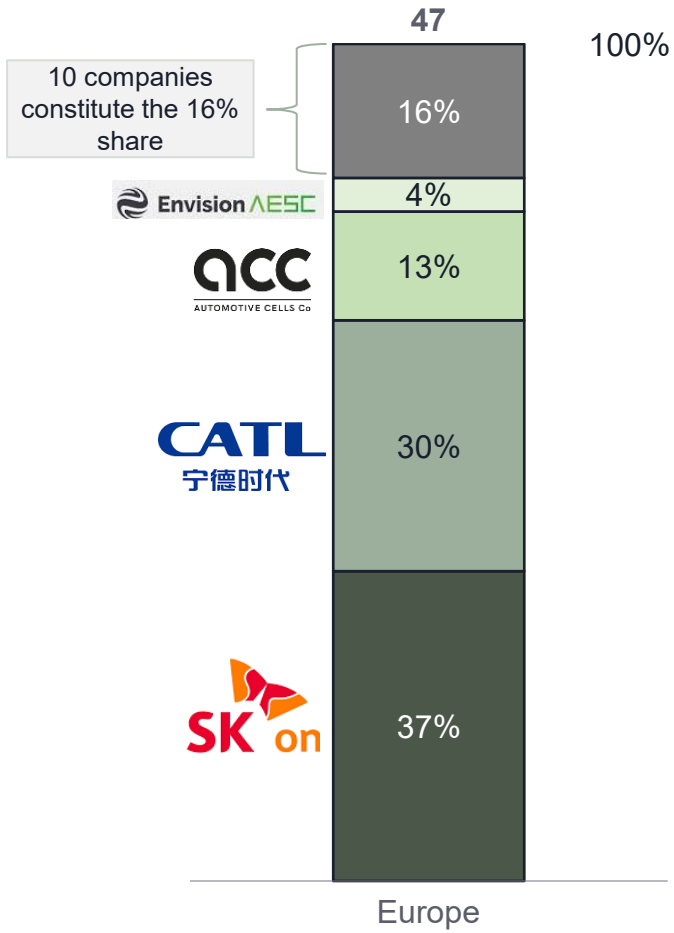


Domestic market player SAM (2034F)	Description[1]	CAGR (2030-34F)	SAM		Product / Strategic fit		Domestic market player share		DEEP DIVE SOM *(GWh)*
South Africa Market	**PV Charging:** The expansion of public charging is driven by the urgent need for reliable, resilient infrastructure	17%	0.5	⊗	1	⊗	35% - 55%	=	**0.3**
	CV Charging: Focus is on fleet and logistics depots; new high-power charging infrastructure must be deployed to manage the significant demand load of commercial vehicle charging	38%	2.7	⊗	1	⊗	35% - 55%	=	**1.5**
Southern Africa Market	**PV Charging:** Infrastructure rollout is critical for bridging inter-city distances, with investment focusing on off-grid solutions to provide charging access in remote corridors	20%	0.4	⊗	1	⊗	25% - 40%	=	**0.2**
	CV Charging: Market development centres on securing private, reliable charging capacity at industrial sites to ensure operational uptime for commercial fleets	18%	0.4	⊗	1	⊗	25% - 40%	=	**0.1**

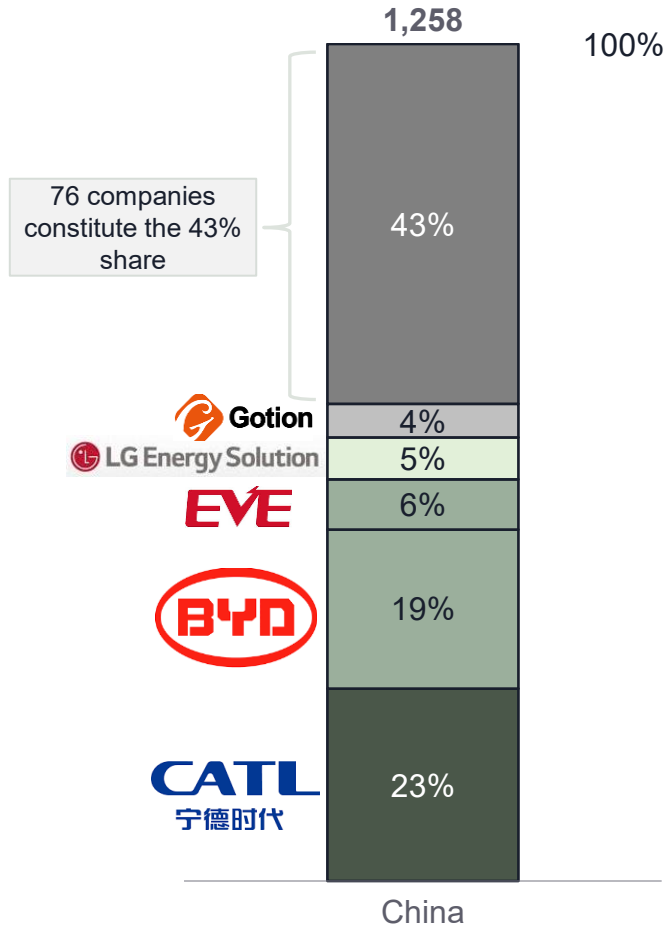
Highest growth · High growth · Moderate growth · Low growth

In more mature markets like Europe or Asia, typical shares of market leaders' range between 19 and 37 %

Battery cell market share in Europe (2024)



Battery cell market share China (2024)



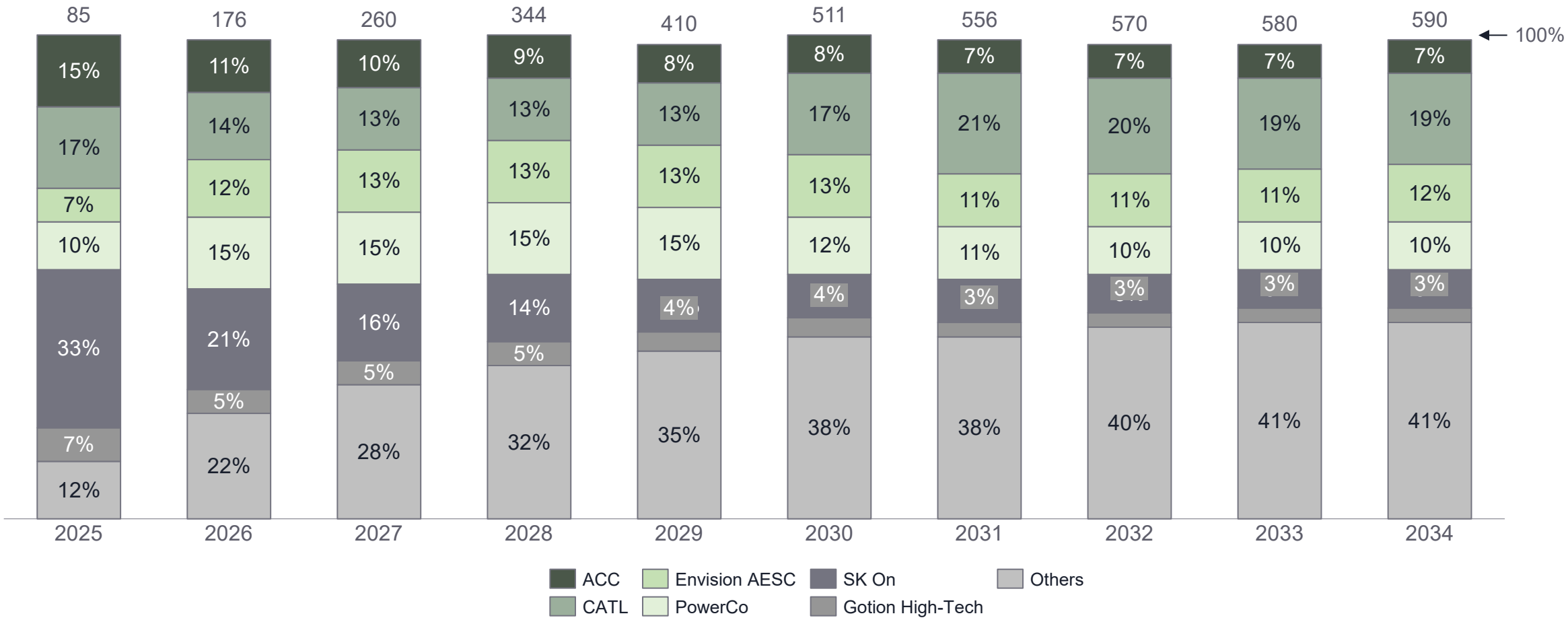
Implications for Domestic market player

- South Africa's vast Manganese and other reserves support the local viability of multiple competing battery chemistries (Lithium-ion, Vanadium Flow), naturally resisting a single-technology monopoly
- State utility Eskom uses a competitive tender process for its major BESS projects, awarding contracts to multiple international suppliers (e.g., Hyosung and Pinggao) along with domestic players like Mulilo Energy (domestic IPP), which has won the majority of the bids

> "Eskom has awarded contracts to two successful bidders – Hyosung Heavy Industries and Pinggao Group – for the provision of battery storage solutions in terms of its flagship BESS project."
>
> Eskom Press Release (July 2022)

ACC and SK On witness a decline in market share as industry matures while CATL manages to retain share

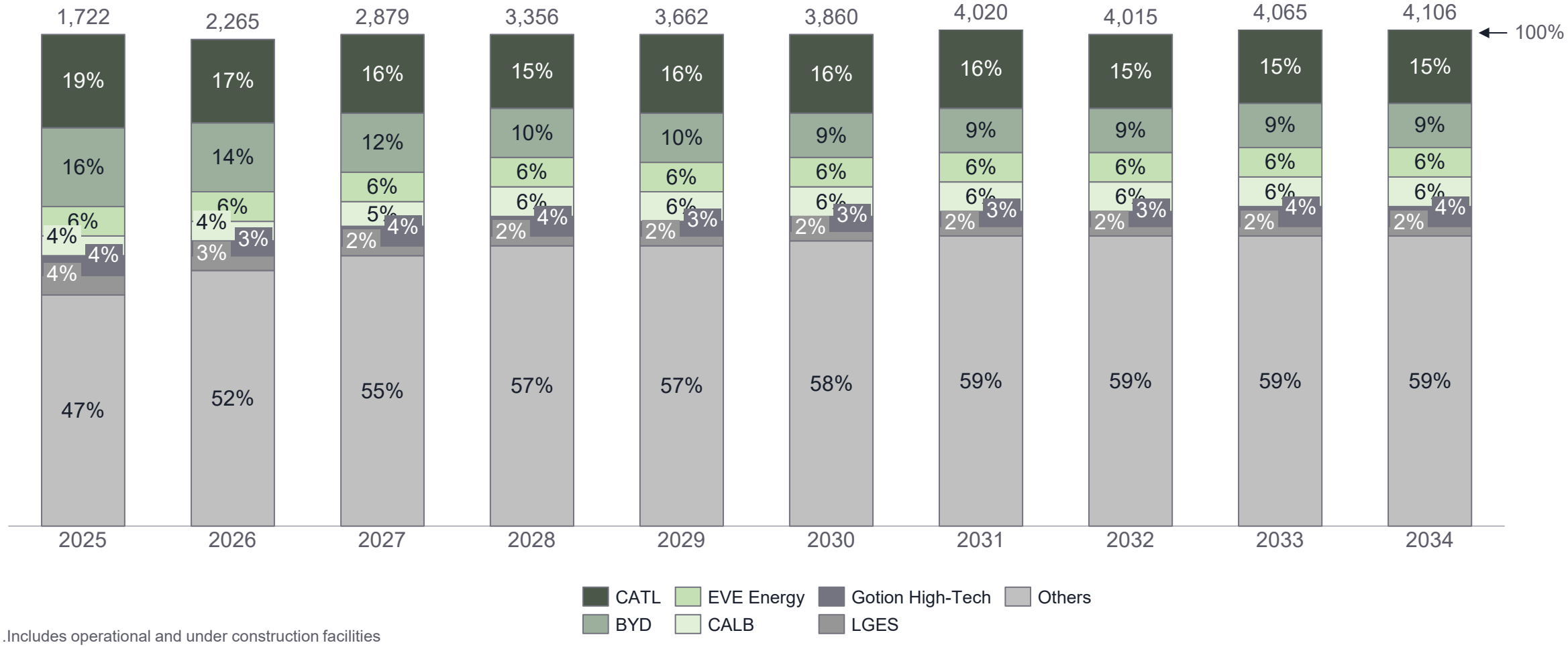
Market Share of Lithium-ion Battery Cell Manufacturing Capacity by Vendor in Europe[1] (in GWh and %)



1.Includes operational and under construction facilities

Intense competition in the Chinese market is expected to cause market share dilution for most players despite overall market growth

Market Share of Lithium-ion Battery Cell Manufacturing Capacity by Vendor in China[1] (in GWh and %)



1.Includes operational and under construction facilities

Market growth is underpinned by expanding end-market demand, with reg. shifts and geopolitical dynamics playing a pivotal role in shaping market opportunities

Overview on key market drivers and impact

INDICATIVE | NOT EXHAUSTIVE

Market drivers			Description	Growth impact
Volume	Regulatory & geo-political drivers	National Development & Energy Plans (NDP 2030 / IRP 2025)	**Long-term policy frameworks setting decarbonisation and renewable energy targets:** Multi-GW renewable additions require storage for grid stability; IRP 2025 reinforces BESS as critical enabler.R2.2tn investment roadmap provides durable demand floor for BESS. EV production incentives (150% tax deduction) retained within broader industrial strategy.	↑
		Regional Trade & Integration (AfCFTA, SADC, Lobito Corridor)	**Trade agreements and infrastructure corridors enabling regional supply chains:** Reduces logistics costs and aggregates demand across borders, making local plants viable.	↗
		Public Funding & DFIs (IDC, dtic, SEFA, AfDB)	**Development finance and grants for industrial projects:** Lowers capex barriers for local plants and pilot factories; scale depends on sustained funding.	↗
		Critical-Minerals Geopolitics (Strategic Partnerships)	**Strategic partnerships and mineral security initiatives:** Resource-rich African nations like the DRC and Zambia—aim to secure access to essential battery minerals. These alliances help guarantee feedstock availability for battery manufacturing and encourage localised downstream processing.	↑
	Growth in end-markets	EV Adoption (Light Vehicles) & NEV Policy	**National EV strategies & OEM commitments to electrification:** EV market expansion across Africa is accelerating battery demand. Government initiatives in Nigeria and South Africa support battery recycling and EV infrastructure. EV sales more than doubled to nearly 11K in 2024, driven in part by the entry of Chinese OEMs like BYD, GWM, Chery, and Dongfeng into the South African market.	↗
		Stationary Storage – C&I Behind-the-Meter	**BESS for commercial and industrial energy security:** Load-shedding and tariff volatility make storage essential for operations.	↑
Price		Local Refining & Beneficiation	**Africa-based refining and precursor production for LFP:** Local processing can deliver LFP packs at $68–72/kWh by 2030, up to 40% cheaper than global peers, cutting imports and enabling competitive regional manufacturing.	↑

↑ ↗ → ↘ ↓

High positive impact … High negative impact

Market & Strategic Assessment

1

Global and Regional LFP Market Overview

2

Off-Taker and Customer Analysis

3

Supply Chain & Local Resource Readiness

4

Benchmarking

Local sourcing is valued for resilience and autonomy, but adoption depends on cost competitiveness and segment-specific requirements

Executive Summary: Off-taker and customer analysis

Requirements by segment and application

Target segments have **different levels of demand** and **distinct requirements** for cell customisation, cost, and performance

- High-demand segments are concentrated in **BESS for critical infrastructure and mining machinery**, indicating strong **opportunities for tailored cell solutions**
- **Customised cells and large-volume applications** dominate **utility-scale BESS** and **mid-tier passenger vehicles**, reflecting **OEM-driven requirements for specialised designs**
- **Mass-market segments** (residential BESS, light CVs) **remain cost-conscious**
- A domestic manufacturer can position its South African plant as a **strategic anchor for high-value sectors** while balancing **standard** and **customised cell production** to maximise **utilisation and efficiency**

Target markets that are **comparatively smaller** and **geopolitically sensitive** segments favour **local sourcing** for autonomy

- **BESS:** High preference for local supply if cost and quality match imports, driven by resilience and grid stability needs; LFP chemistry dominates
- **Commercial Vehicles:** Moderate preference for local supply when reliability and support are ensured, even at a slight premium; safety is key
- **Passenger EVs:** Moderate preference only if cost-competitive or mandated, with local sourcing likely to grow as incentives and demand increase
- **Industrial:** Moderate preference if financially viable, but price sensitivity is high; reliability and battery life are critical

South African customer requirements and KPCs

South African cell customers prefer local suppliers typically in the case of competitiveness, supply chain reliability, and local autonomy

- Customers prioritise **cost and reliability with local sourcing** valued for **resilience** if it **matches global standards**
- Sourcing from South African cell suppliers **reduces reliance on imports**, mitigates risks from global supply chain disruptions, and strengthens regional supply resilience through proximity and policy support
- Partnering with South African suppliers **enhances operational independence**

Target markets that are comparatively smaller and geopolitically sensitive segments favour local sourcing for autonomy

Deep dive - target segments preferences

NON-EXHAUSTIVE | ILLUSTRATIVE

Segment	Preference for a local cell supplier	Indicative Stakeholder Perspectives	EU proxy: Price premiums
BESS	**High** – The preference is high, but only if **cost and quality match imports.** LFP is dominant for safety, cost, and grid stability. Local is valued for resilience and delivery, but procurement is still mostly via EPCs using global suppliers unless local can compete.	"Local is not chosen at a premium unless justified by total value"	**+10%**
Commercial Vehicles (trucks, buses, LCVs)	**Moderate:** Local supply can win if it delivers reliability and support, even at a slight premium. LFP is preferred for safety and operational reasons.	"Local supply is valued for immediate delivery and support, but price and safety are still critical. Some willingness to pay a small premium for local reliability, but not universal."	**+5-10%**
Passenger EVs	**Moderate:** Local supply is not a priority unless cost-competitive or mandated. LFP is preferred for entry-level EVs, but local sourcing is low and only likely to increase if demand and incentives rise.	"VW and others are not currently procuring EV batteries; local content is only considered if cost-competitive. Preference is moderate in theory, low in practice."	**+10%**
Industrial (Steel/Mining)	**Moderate:** Local is preferred if financially viable, but price sensitivity is high. Reliability and battery life are crucial for intensive environments.	"Highly price-sensitive, but reliability and battery life are crucial. Customisation is valued for operational fit. Local is only chosen if cost and quality are competitive."	**0%**

South African cell customers prefer local suppliers typically in the case of competitiveness, supply chain reliability, & local autonomy

Key reasons to prefer South African cell suppliers

NON-EXHAUSTIVE

Competitiveness & local support

South African suppliers are valued when they **deliver competitive price**, **high quality, strong performance, and reliable technical support.**

Local supply is desirable for its proximity and responsiveness, but it must meet rigorous standards and remain cost-effective to be preferred by customers.

> "Price, quality, performance, and access to technical support are all important criteria when selecting a cell supplier. While local supply is desirable, it must meet our standards and remain competitive."
> *Senior Manager, Customer/Off-taker*

Supply chain reliability

Sourcing from South African cell suppliers reduces reliance on imports, **mitigates risks from global supply chain disruptions**, and strengthens **regional supply resilience** through proximity and policy support.

> "Local manufacturing, supported by clear policies and incentives, could open new opportunities in the utility market and reduce reliance on imports. A strong domestic supply chain enhances resilience and flexibility."
> *Senior Manager, Customer/Off-taker*

Local autonomy

Partnering with South African suppliers **enhances operational independence.**

Ensuring critical projects can **rely on local expertise** and resources without exposure to foreign supply chain uncertainties.

> "Having knowledgeable personnel available within the country is essential. We can't afford unknown downtimes, so local after-sales support is a major advantage for operational independence.
> *Business Development Lead, Customer/Off-taker*

Customers prioritise cost and reliability with local sourcing valued for resilience if it matches global standards

KPCs		BESS (Utility/Grid)	Mobility/Equipment	BESS (Other)	Comments
Cost	Price				**Price** is the **single most important criterion** for **nearly all off-takers**. Interviewed organisations **rank price as their #1 procurement criterion.**
Supply chain	Reliability / scale				**Reliability** and **ability** to **deliver** at **scale** are **decisive**, especially for the **utility segment.** Majority of organisations cite reliability/scale as a top-3 criterion, often **as important as price**.
	Localised production (non-Chinese)				Local production is **valued for proximity, support, and supply chain resilience**, but **only if cost and quality match imports.**
Product performance	Battery life and durability				**Long battery life** and **durability** are **essential**, **especially** for **grid applications**. Organisations explicitly mention battery life/durability as a key factor in procurement.
	Product adjustments				**Customisation is valued**, **especially in the mobility segment** for operational fit.Some utility companies are **technology/chemistry agnostic.**
	Energy density				**Energy density** is **more important for mobility and industrial applications**; **less** so **for grid.**
ESG	Sustainability				**Sustainability** and **openness to recycling**/second-life initiatives are **rising** in **importance across all industries** & **off-takers interviewed**.

Level of importance:  Low ··· High

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South Africa must leverage mineral resources and phased localisation programs to build a competitive battery supply chain and enable full integration

Executive Summary: Supply chain & local resource readiness

South Africa's resources and capacities

Mineral reserves enable **LFP production**, but development of extraction, processing, and midstream capacity required.

- South Africa and the wider region offer a **strong resource base for LFP battery manufacturing**
- South Africa's **mining ecosystem** offers key minerals for LFP batteries, but **gaps** remain in lithium and graphite resources
- There is a **strong backbone for midstream capacity** but lacks battery-grade lithium and graphite processing
- South Africa must **close midstream processing gaps** and build local manufacturing to compete on cost, quality, reliability

Localisation programs

South Africa continues to actively **advocate for the development of a localised battery value chain**

- **SAREM and the Just Energy Transition Plan** aim to **industrialise renewable energy** and **battery storage** through localisation and skills development, targeting 70% component localisation by 2030
- South African government introduces **150% tax incentives for EV and hydrogen vehicle production** to attract investment, accelerate electrification and position **South Africa as a regional hub for green mobility**

Possible localisation blueprint

Localising South Africa's battery supply chain requires a **phased approach**, starting with **low-complexity steps** and progressing to **full integration** for cost competitiveness and resilience.

- **Midstream components:** Establish electrolyte production and basic pack assembly with moderate complexity
- **High-complexity materials:** Localise cathode and anode active material production through regional partnerships and technology transfer
- **Separator manufacturing:** Invest in advanced equipment and partnerships to enable local separator production
- **Full integration:** Achieve complete localisation of upstream processes, including precursor synthesis and recycling, to future-proof supply chains

Mineral reserves enable LFP battery production, but development of extraction, processing, and midstream capacity required

SA Resource assessment along the LFP value chain

LFP Battery production value chain

Value chain viability

Upstream		Midstream				Downstream		
Raw materials		Cell components				Cell production	Battery pack	Recycling
Mining	Refining	Anode	Cathode	Electrolyte	Separator			

⊕

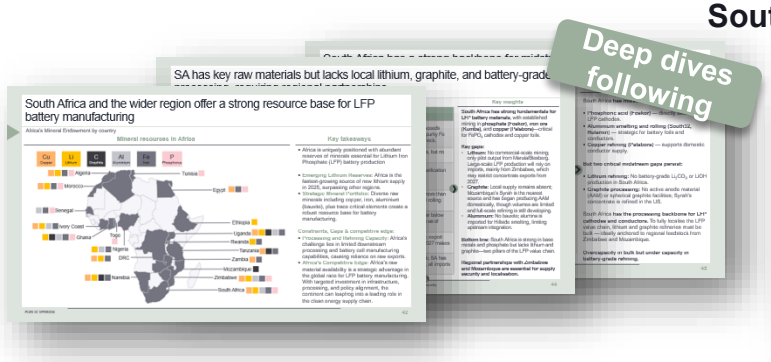
- South Africa has strong iron and phosphate reserves for LFP batteries.
- Battery-grade lithium is limited, and local refining for lithium and phosphate is underdeveloped.
- Focused investment in extraction and processing is needed to unlock upstream potential.

≈

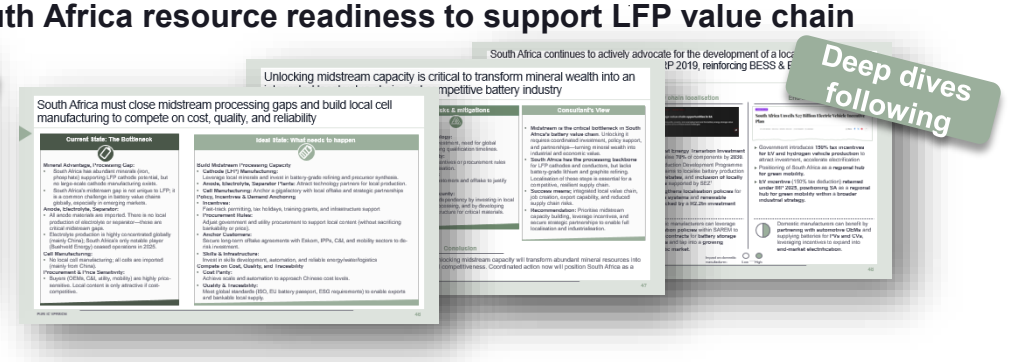
- South Africa's mineral base supports LFP cathode potential, but there is no large-scale cathode manufacturing.
- Anode materials are imported, and there is no local production of electrolyte or separator - making midstream the key bottleneck
- Industrialisation here is critical for value chain localisation.

Domestic Manufacturer

South Africa resource readiness to support LFP value chain



Mineral resource availability & processing



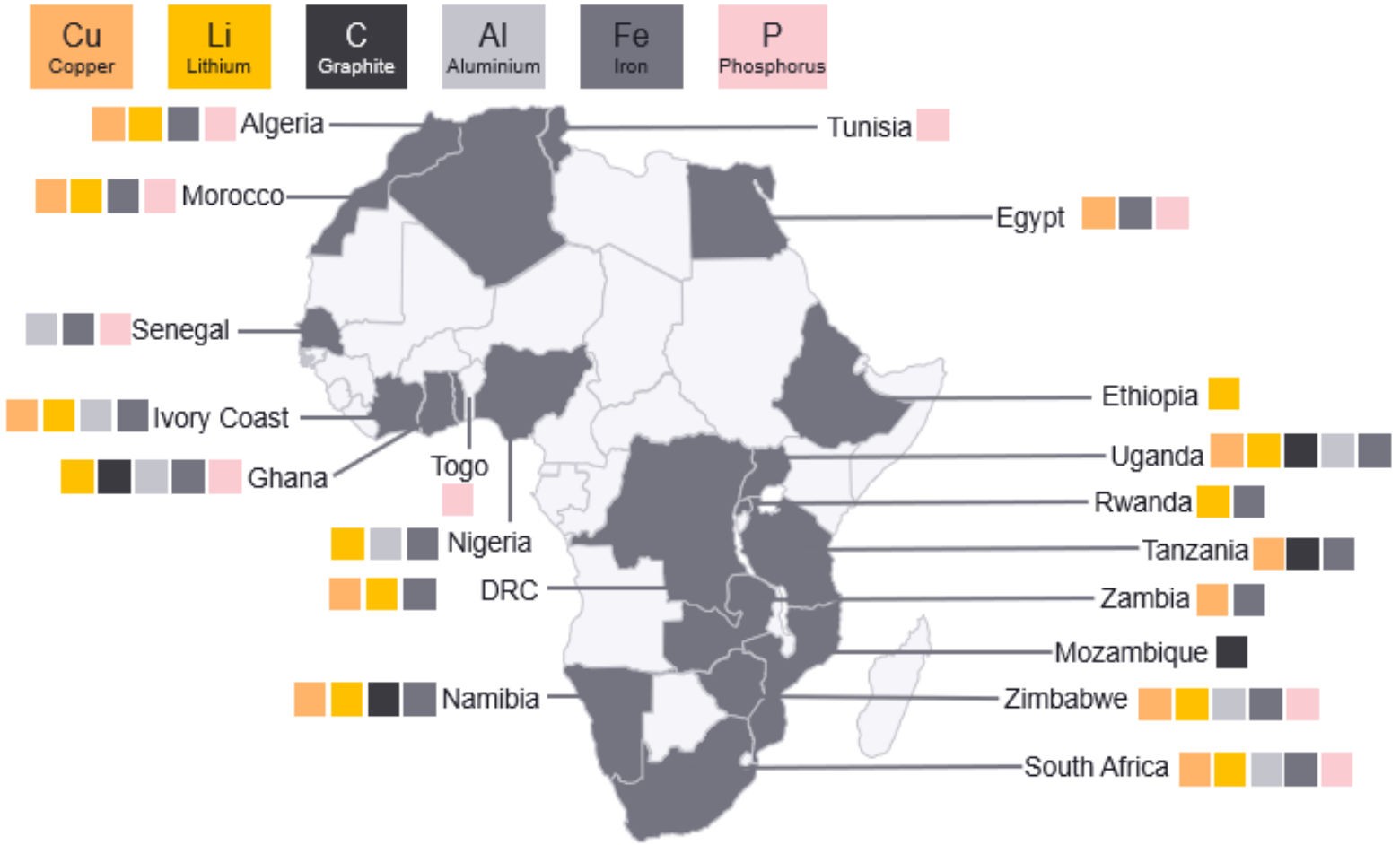
Midstream readiness

⊕ Favorable ≈ Mixed ⊖ Unfavorable

South Africa and the wider region offer a strong resource base for LFP battery manufacturing

Africa's Mineral Endowment by country

Mineral resources in Africa



Key takeaways

- Africa is uniquely positioned with abundant reserves of minerals essential for Lithium Iron Phosphate (LFP) battery production

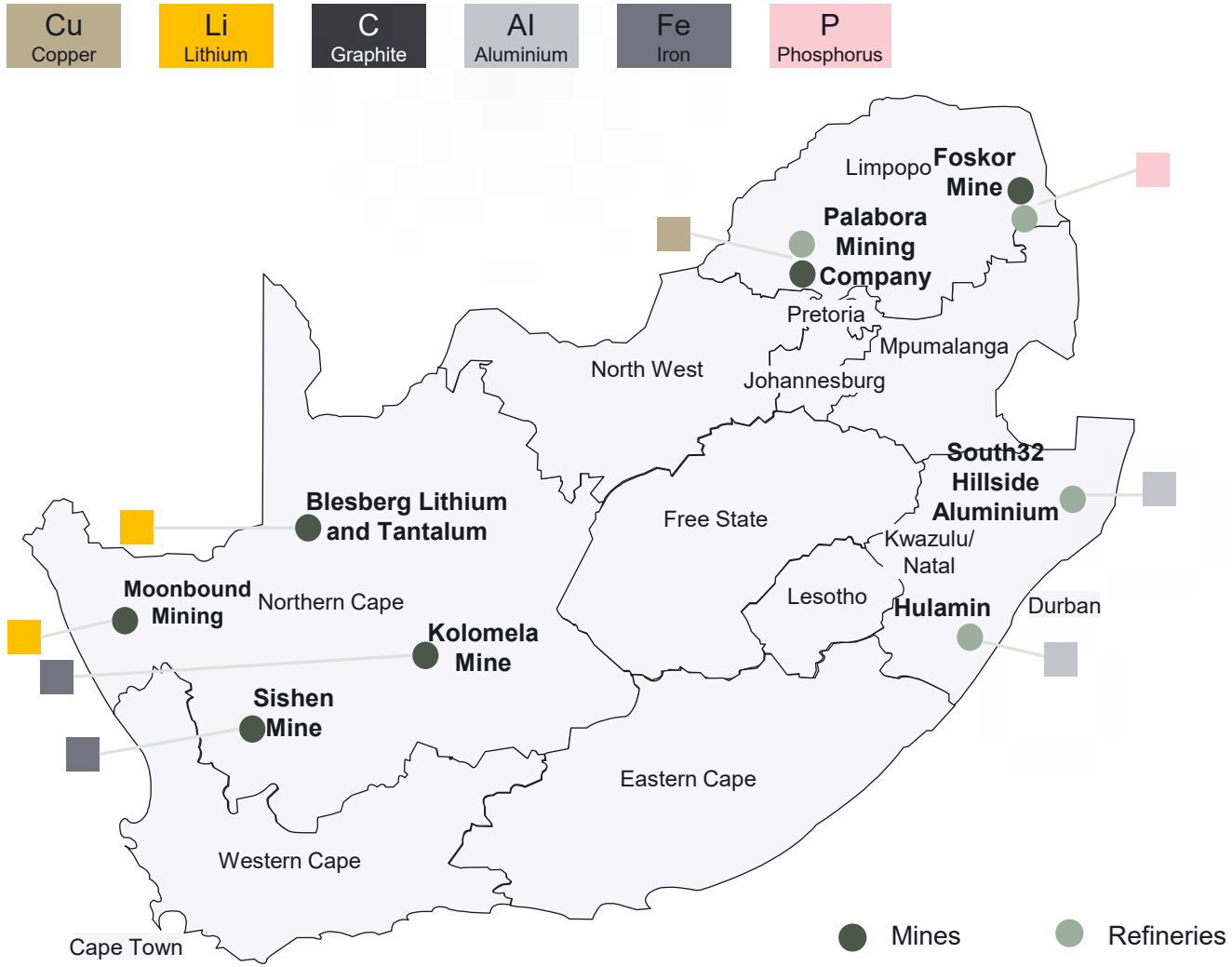
- **Emerging Lithium Reserves:** Africa is the fastest-growing source of new lithium supply in 2025, surpassing other regions.
- **Strategic Mineral Portfolio:** Diverse raw minerals including copper, iron, aluminium (bauxite), plus trace critical elements create a robust resource base for battery manufacturing.

Constraints, Gaps & competitive edge:

- **Processing and Refining Capacity:** Africa's challenge lies in limited downstream processing and battery cell manufacturing capabilities, causing reliance on raw exports.
- **Africa's Competitive Edge:** Africa's raw material availability is a strategic advantage in the global race for LFP battery manufacturing. With targeted investment in infrastructure, processing, and policy alignment, the continent can leapfrog into a leading role in the clean energy supply chain.

South Africa's mining ecosystem offers key minerals for LFP batteries, but gaps remain in lithium and graphite resources

Deep dive into some of South Africa's mineral mines



Key insights

Key mining operations:

- **Marula Mining** – Operator of the Blesberg Lithium and Tantalum Mine, a key lithium spodumene producer in the Northern Cape.
- **Palabora Mining Company** – The largest copper producer with Palabora Copper Mine in Limpopo.
- **Kumba Iron Ore** – Operates some of the largest iron ore mines in Northern Cape (Sishen, Kolomela).
- **African Rainbow Minerals** – Operates the Khumani Iron Ore Mine.
- **Foskor Mine -** Limpopo, produces around 2.6 to 3.5 million tons of high-quality phosphate rock concentrate annually, with reserves expected to last close to a century, making it a key phosphate supplier for both local and international markets.

Key take-aways:

- South Africa is **strong in iron, copper, and phosphate, with emerging lithium potential.**
- **Regional integration with Zimbabwe** (lithium) and **Mozambique** (graphite) is essential **to secure full LFP supply chain.**
- **Import dependency for bauxite/aluminium and battery-grade phosphate** may require partnerships or trade agreements with Guinea and Morocco.
- **Developing downstream refining and processing capacity** alongside mining operations **is essential** to capitalise on Africa's raw material advantage and become a global LFP battery supply chain hub.

SA has key raw materials but lacks local lithium, graphite, and battery-grade processing, requiring regional partnerships

Deep dive into the mining capacity of LFP raw material producing mines in SA (and Region)

Mine	Material	Mining capacity (kt)	5 GWh	10 GWh		Comment/Gap
Kumba Iron Ore	**Iron ore**	~36 000 kt	~2.45 kt Fe (battery-grade)	~4.9 kt Fe (battery-grade)	↑	▸SA iron supply massively exceeds need — conversion to high-purity Fe precursors is the real bottleneck.
Palabora	**Copper ore**	~60 kt	~3.75 kt Cu foil	~7.5 kt Cu foil	↗	▸Sufficient copper base exists, but no foil rolling plant in SA.
Foskor	**Phosphate rock**	~2600 – 2900 kt	~4.75 kt H_3PO_4 (battery-grade)	~9.5 kt H_3PO_4 (battery-grade)	↑	▸Capacity is abundant, but purification to battery-grade phosphoric acid/$FePO_4$ is not in place.
South32	**Alumina/ aluminium feed**[1]	(No SA Bauxite)	~2.25 kt Al foil	~4.5 kt Al foil	→	▸Primary Aluminium supply more than adequate, but no battery-foil rolling capacity in SA.
Marula / Blesberg	**Lithium**[2]	~1 kt shipments (2023)	~2.95 kt LCE	~5.9 kt LCE	↓	▸Domestic lithium mining is far below requirement; only pilot scale as of today.
Zimbabwe	**Lithium**[3]	~200–400 kt conc.	~2.95 kt LCE	~5.9 kt LCE	→	▸Regionally adequate supply; export ban on unprocessed Li by 2027 makes JV/refinery in SA urgent.
Syrah Resources	**Natural graphite**	~350 kt nameplate ~35 kt produced (2024)	~3.1 kt spherical graphite	~6.2 kt spherical graphite	→	▸Abundant regional feedstock; SA has no anode-grade processing, all imports or tolling today.

1. via imports, mining offshore ll 2. spodumene, pilot scale ll 3.country-level concentrate

Key insights

South Africa has strong fundamentals for LFP battery materials, with established mining in **phosphate (Foskor)**, **iron ore (Kumba)**, and **copper (Palabora)**—critical for $FePO_4$ cathodes and copper foils.

Key gaps:

- **Lithium:** No commercial-scale mining; only pilot output from Marula/Blesberg. Large-scale LFP production will rely on imports, mainly from Zimbabwe, which may restrict concentrate exports from 2027.
- **Graphite:** Local supply remains absent; Mozambique's Syrah is the nearest source and has began producing AAM domestically, though volumes are limited and full-scale refining is still developing.
- **Aluminium:** No bauxite; alumina is imported for Hillside smelting, limiting upstream integration.

Bottom line: South Africa is strong in base metals and phosphate but lacks lithium and graphite—two pillars of the LFP value chain.

Regional partnerships with Zimbabwe and Mozambique are essential for supply security and localisation.

↑ ↗ → ↘ ↓ High Capacity … Low Capacity

South Africa has a strong backbone for midstream capacity but lacks battery-grade lithium and graphite processing

Deep dive into local refining capacity

Capacity needed for gigafactory with

Company / Facility	Material Processed	Refining / Smelting Capacity (ktpa)	5 GWh	10 GWh		Comment/Gap
Foskor (Phalaborwa)	**Phosphoric acid**	~720 kt H_3PO_4	~4.75	~9.5	→	▸Massive overcapacity vs battery demand; purity upgrade (battery-grade) needed
South32 Hillside Aluminium (Richards Bay)	**Primary aluminium (from imported alumina)**	~720 kt	~1.5	~3	→	▸Strong supply base, no ultra-thin battery-grade aluminium foil line
Hulamin (Pietermaritzburg)	**Rolled aluminium products**	~250 kt nameplate ~173 kt sales	~1.5	~3	→	▸Rolling capacity present but no battery-grade foil rolling capability
Palabora Mining	**Refined copper**	~60 ktpa	~2	~4	→	▸Adequate copper refining; lacks copper foil rolling plants

↑ ↗ → ↘ ↓

High Capacity … Low Capacity

Key insights

South Africa **has midstream muscle in**:

- **Phosphoric acid (Foskor)** — directly usable in LFP cathodes.
- **Aluminium smelting and rolling (South32, Hulamin)** — strategic for battery foils and conductors.
- **Copper refining (Palabora)** — supports domestic conductor supply.

But two critical midstream gaps persist:

- **Lithium refining:** No battery-grade Li_2CO_3 or LiOH production in South Africa.
- **Graphite processing:** No active anode material (AAM) or spherical graphite facilities; Syrah's concentrate is refined in the US.

South Africa **has the processing backbone for LFP cathodes and conductors.** To fully localise the LFP value chain, lithium and graphite refineries must be built — ideally anchored to regional feedstock from Zimbabwe and Mozambique.

Overcapacity in bulk but under capacity in battery-grade refining.

South Africa must close midstream processing gaps and build local cell manufacturing to compete on cost, quality, and reliability

Current State: The Bottleneck

Mineral Advantage, Processing Gap:

- South Africa has abundant minerals (iron, phosphate) supporting LFP cathode potential, but no large-scale cathode manufacturing exists.
- South Africa's midstream gap is not unique to LFP; it is a common challenge in battery value chains globally, especially in emerging markets.

Anode, Electrolyte, Separator:

- All anode materials are imported. There is no local production of electrolyte or separator—these are critical midstream gaps.
- Electrolyte production is highly concentrated globally (mainly China); South Africa's only notable player (Bushveld Energy) ceased operations in 2025.

Cell Manufacturing:

- No local cell manufacturing; all cells are imported (mainly from China).

Procurement & Price Sensitivity:

- Buyers (OEMs, C&I, utility, mobility) are highly price-sensitive. Local content is only attractive if cost-competitive.

Ideal State: What needs to happen

Build Midstream Processing Capacity

- **Cathode (LFP) Manufacturing:** Leverage local minerals and invest in battery-grade refining and precursor synthesis.
- **Anode, Electrolyte, Separator Plants:** Attract technology partners for local production.
- **Cell Manufacturing:** Anchor a gigafactory with local offtake and strategic partnerships

Policy, Incentives & Demand Anchoring

- **Incentives:** Fast-track permitting, tax holidays, training grants, and infrastructure support
- **Procurement Rules:** Adjust government and utility procurement to support local content (without sacrificing bankability or price).
- **Anchor Customers:** Secure long-term offtake agreements with Eskom, IPPs, C&I, and mobility sectors to de-risk investment.
- **Skills & Infrastructure:** Invest in skills development, automation, and reliable energy/water/logistics

Compete on Cost, Quality, and Traceability

- **Cost Parity:** Achieve scale and automation to approach Chinese cost levels.
- **Quality & Traceability:** Meet global standards (ISO, EU battery passport, ESG requirements) to enable exports and bankable local supply.

Unlocking midstream capacity is critical to transform mineral wealth into an integrated local value chain and competitive battery industry

What success looks like

Integrated Local Value Chain:
- South Africa processes its own minerals into battery-grade materials, manufactures cathodes/anodes/electrolytes/separators, and assembles cells locally.

Competitive, Sustainable Industry:
- Local midstream supports gigafactory, creates jobs, and enables exports to Africa and beyond.

Resilient Supply Chain:
- Reduced forex, logistics, and supply chain risks; improved energy security and industrialisation.

Key risks & mitigations

Capital & Technology:
- High upfront investment, need for global partners, and long qualification timelines.

Policy Uncertainty:
- Inconsistent incentives or procurement rules could stall localisation.

Scale & Demand:
- Need anchor customers and offtake to justify investment.

Supply Chain Security:
- Reduce import dependency by investing in local and regional processing, and by developing recycling infrastructure for critical materials.

Consultant's View

- **Midstream is the critical bottleneck in South Africa's battery value chain**. Unlocking it requires coordinated investment, policy support, and partnerships—turning mineral wealth into industrial and economic value.
- **South Africa has the processing backbone** for LFP cathodes and conductors, but lacks battery-grade lithium and graphite refining. Localisation of these steps is essential for a competitive, resilient supply chain.
- **Success means;** integrated local value chain, job creation, export capability, and reduced supply chain risks.
- **Recommendation:** Prioritise midstream capacity building, leverage incentives, and secure strategic partnerships to enable full localisation and industrialisation.

Conclusion

South Africa's battery value chain stands at a pivotal juncture: unlocking midstream capacity will transform abundant mineral resources into sustainable industrial growth, supply chain resilience, and global competitiveness. Coordinated action now will position South Africa as a leader in clean energy manufacturing for Africa and beyond.

South Africa continues to actively advocate for the development of a localised battery value chain: IRP 2025 builds on NDP 2030 & IRP 2019, reinforcing BESS & EV incentives to accelerate decarbonisation

ILLUSTRATIVE

South African Renewable Energy Masterplan (SAREM)


HEADLINE NEWS

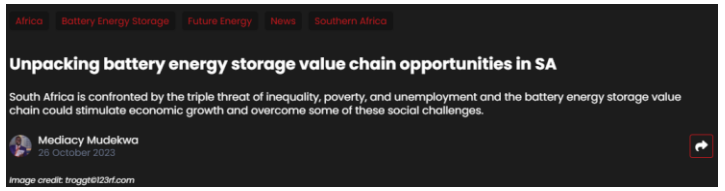
South African Renewable Energy Masterplan launched

By GREEN BUILDING AFRICA - NET CARBON ZERO BUILDINGS AND CITIES – June 25, 2025 No Comments

- **SAREM** aims to **industrialise renewable energy** and **battery storage** through localisation and skills development.
- The plan targets **25,000 jobs by 2030**, strengthens **local supply chains**, and **positions South Africa** as a leader in **clean technology manufacturing**.

Domestic manufacturers can capitalise on SAREM's incentives to secure **government support**, integrate in the national battery ecosystem, and **scale its gigafactory** as a **strategic pillar** in South Africa's energy transition.

Supply chain localisation


Africa | Battery Energy Storage | Future Energy | News | Southern Africa

Unpacking battery energy storage value chain opportunities in SA

South Africa is confronted by the triple threat of inequality, poverty, and unemployment and the battery energy storage value chain could stimulate economic growth and overcome some of these social challenges.

Mediacy Mudekwa
25 October 2023

Image credit: troggt@123rf.com

- **SAREM** and **Just Energy Transition Investment Plan** aim to localise **70%** of components by **2030**.
- Automotive Production Development Programme (**APDP**) further aims to localise battery production by offering **tax rebates**, and **inclusion of locally mined minerals** supported by SEZ[1]
- **IRP 2025 strengthens localisation policies** for **battery storage systems** and **renewable integration**, **backed by** a **R2.2tn investment roadmap.**

Domestic manufacturers can leverage **localisation policies** within SAREM to **secure contracts** for **battery storage systems** and tap into a **growing domestic market**.

End-market push


CONNECTED LIFE

South Africa Unveils $27 Billion Electric Vehicle Incentive Plan

BY LLOYD NEDOHE | 2025-01-06 | UPDATED: 2025-01-10 NO COMMENTS 4 MINS READ Share

- Government introduces **150% tax incentives for EV and hydrogen vehicle production** to attract investment, accelerate electrification
- Positioning of South Africa as a **regional hub for green mobility.**
- **EV incentive** (150% tax deduction) **retained under IRP 2025**, **positioning SA** as a **regional hub for green mobility within** a **broader industrial strategy.**

Domestic manufacturers can benefit by **partnering with automotive OEMs** and supplying batteries for **PVs and CVs**, leveraging incentives to expand into **end-market electrification**.

1. Special Economic Zones

Impact on domestic manufacturer: Low ··· High

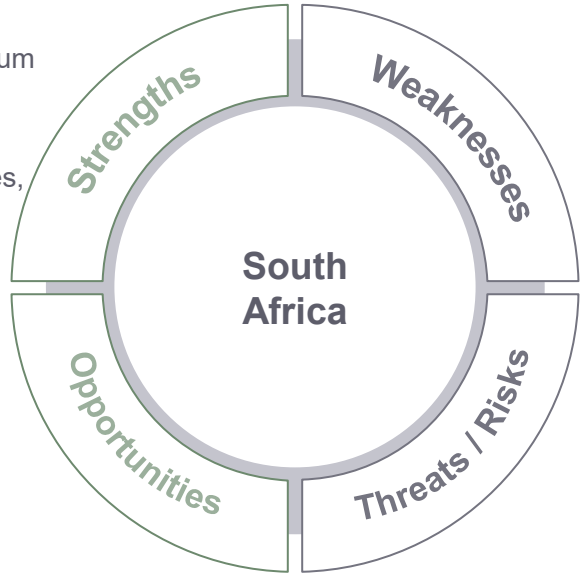
South Africa's LFP Battery Value Chain – Key Strengths, Weaknesses, Opportunities & Threats

Strengths

- **Abundant mineral reserves:** Strong in iron ore (Kumba), phosphate, and copper (Palabora), supporting cathodes and copper foils.
- **Established mining ecosystem:** Mature operations and infrastructure for base metals and phosphate.
- **Midstream backbone:** Existing phosphoric acid (Foskor), aluminium smelting/rolling (South32, Hulamin), and copper refining provide a foundation for cathode and conductor production.
- **SEZ & policy support:** SEZs offer tax, customs, training incentives, reduced bureaucracy; critical for efficient import/ export and skills development.

Weaknesses

- **Critical raw material gaps:** No commercial-scale lithium or graphite mining; lithium output is pilot-scale (Marula/Blesberg), and graphite is only available regionally (Syrah, Mozambique).
- **Processing bottlenecks:** No battery-grade lithium or graphite refining; no local production of anode material, spherical graphite, or battery-grade aluminium/copper foils.
- **Import dependency:** Alumina (for aluminium) and some phosphate products are imported, limiting upstream integration.



Opportunities

- **Regional partnerships:** Collaboration with Zimbabwe (lithium) and Mozambique (graphite) is essential for supply security and value chain localisation.
- **Phased localisation roadmap:** Start with imported materials, then localise foils (aluminium, copper), and eventually cathode/anode production as capability and demand grow.
- **Skills development:** Collaborate with universities and technical institutes for workforce training and knowledge transfer.

Threats / Risks

- **Export restrictions:** Zimbabwe's planned ban on unprocessed lithium exports (from 2027) could disrupt supply unless local refining is developed. AfCFTA could mitigate this.
- **Global competition:** Asian players dominate the battery value chain; slow development risks losing competitive advantage.
- **Policy and infrastructure gaps:** Delays in investment, policy alignment, or infrastructure upgrades could stall localisation and industrialisation efforts.

Localising SA battery supply chain requires a phased approach, starting with low-complexity, progressing to full integration for cost competitiveness and resilience

Step 1
No regret moves

Activities:

- Electrode coating and foil processing
- Cell assembly using imported CAM/AAM

Recommendations:

- Leverage existing local metal processing capabilities for aluminium and copper foils. These are the least complex components and can be localised quickly with minimal capex.
- Establish cell assembly lines using imported cathode/anode materials.
- Mitigate water supply risks by implementing on-site recycling and large storage tanks; ensure grid reliability with dedicated renewable energy.

Step 2
Midstream Components

Activities:

- Electrolyte production
- Basic pack assembly and testing

Recommendations:

- Leverage South Africa's chemical industry for local electrolyte production. This is a moderate-complexity step and can build on existing sector strengths.
- Invest in basic pack assembly and testing facilities to support downstream integration and create additional local value.
- Align ESG goals by sourcing renewable energy for these operations and embedding sustainability into process design.

Step 3
High-Complexity Materials

Activities:

- Localising CAM (Cathode Active Material) and AAM (Anode Active Material) production.

Recommendations:

- Engage in regional integration for raw materials (e.g., lithium from Zim, graphite from Moz), considering export bans and the need for joint ventures in refining.
- Monitor policy and regulatory developments to anticipate supply chain risks and opportunities.
- Benchmark against international best practices and explore economic models for localising these steps.

Step 4
Separator Manufacturing

Activities:

- Establishing separator production facilities

Recommendations:

- Assess technical and economic feasibility for local separator manufacturing, given high complexity and stringent quality requirements.
- Plan for advanced equipment and clean-room facilities; consider phased investment or continued import in the short term.
- Explore partnerships with global technology leaders to transfer know-how and accelerate local capability development.

Step 5
Full integration

Activities:

- Complete localisation of all upstream & downstream processes, including precursor synthesis & recycling loops

Recommendations:

- Develop a long-term strategy for full value chain integration, including precursor synthesis, recycling et alia.
- Pilot projects to future-proof the plant and enable technology agnosticism.
- Strengthen regional supply chains by collaborating with neighbouring countries/leveraging Africa's mineral resources, addressing processing and beneficiation bottlenecks.

Market & Strategic Assessment

1

Global and Regional LFP Market Overview

2

Off-Taker and Customer Analysis

3

Supply Chain & Local Resource Readiness

4

Benchmarking

Global Asian battery majors are dominating with cost competitiveness and scale but limited exposure to South Africa leaving opportunities for domestic players

Executive Summary: Benchmarking

Competitive landscape

Global Asian battery manufacturers lead the market with **low costs, high production volumes**, and **broad portfolios** while **African players are scarce**

European companies cater all **cell chemistries** but **lack scale and cost competitiveness**.

South Africa's LFP market faces **limited local competition** and **minimal direct threat from Chinese giants**, as their **strategic focus** is on **European EV and BESS**

- Leading Asian manufacturers maintain a **broad international presence**, supporting global supply chains and regional market access.
- **New gigafactories** are being developed in **key regions worldwide** to **localise production and mitigate trade barriers.**
- Currently, **South Africa has no operational gigafactories**, though **initial projects and feasibility studies are underway** to explore battery cell and BESS manufacturing.
- The country offers **favourable conditions for large-scale production**, including **competitive energy, water, and labour costs**, strengthening its potential as a future manufacturing hub.

Domestic cell manufacturer positioning

Differentiation comes from a **clear LFP focus**, strong **scale-up capability**, and **strategic partnerships with leading global players**, particularly major Asian manufacturers.

- Maintains a **strict LFP-only portfolio**, avoiding dilution across chemistries to ensure **cost efficiency and operational simplicity.**
- Utilises **prismatic cell manufacturing** to serve a **broad range of applications**, though this also introduces **greater competitive exposure.**
- Plans a **phased gigafactory scale-up**, starting with **initial capacity** and expanding significantly as **market demand grows**.
- Secures **upstream supply chains**, including key materials, to ensure **resilience and cost stability**.
- Through partnerships with **Tier-1 Asian manufacturers**, leverages **advanced R&D capabilities** and **proven IP**, enabling **rapid technology adoption** and **market alignment**.

South Africa's LFP market faces limited local competition and minimal direct threat from Chinese giants, as their strategic focus is on European EV and BESS

	South Africa	Rest of Africa	Europe (non-Asia)	Asia (China-led)
# of cell manufacturers	0 (planned)	1 (Morocco project)	5–6 (Northvolt, ACC, Verkor, Saft, Freyr)	10+ (CATL, BYD, Gotion, EVE, CALB, etc.)
Chinese presence				
Focus applications	Stationary storage (BESS) Niche EV applications	Export-oriented mainly catering EU EV market	EV OEMs and energy storage systems within Europe	EV OEMs and energy storage systems within Europe besides domestic
Export strategy	Local assembly only Future export potential	Morocco gigafactory aimed at Europe only	EU-focused, building local gigafactories	Aggressive EU expansion building gigafactories First JV planned in South Africa
Opportunity level				

Chinese giants prioritise investments in Europe due to tariffs and EV demand

Africa remains low on radar for Asian players with strategic window for local players

Cell manufacturers generally have a strong competitive advantage due to higher agility, innovations capacity and resilience to market shifts

Battery majors are across this ecosystem: Cell to pack

NOT EXHAUSTIVE | ILLUSTRATIVE

	Cell manufacturers	Battery manufacturers	Battery Pack Vertical Integrators
Description	▸ Start-up / scale-up providers **focusing essentially on battery cells' manufacturing** with limited capacity to date. **No existing manufacturers** in **South Africa** currently. ▸ Existing **chemistries may vary between NMC, LFP & LNMO** (+ upcoming technologies such as solid-state chemistry)	▸ **Established battery manufacturers with longer track-record** and **mechanical assembly capabilities** for battery modules & packs ▸ **More verticalised on specific applications** and larger production capacities	▸ **Established vertical integrators with application focus** (e.g. automotive for Tesla & BYD, defense for SAFT & maritime for Leclanché) ▸ **Strong integration of battery value chain** segments (usually from battery cell production to commercial application)
Typical players	SAMSUNG SDI, CALB, Gotion, SVOLT, inoBat	Li Batteries Thium South Africa, freedom won, EVE, CATL, RENTECH, solarMD, BALANCELL, BLUE NOVA energy	Gotion, BYD, SUNWODA ENERGY, PYLONTECH, TESLA
Agility	▸ **Workforce fully centered around cells** ▸ Multi sourcing benefiting to cell manufacturers with specialised production facilities	▸ **Strong capacities needed** ranging from battery cells manufacturing to packs & modules assembly ▸ Pack & module assembly lowering profitability	▸ **Workforce scattered** between different BUs and products' types along the value chain ▸ Defocus of cell specialisation
Innovation capacity[1]	▸ Cell chemistry and technology as core business enables to **dedicate full R&D spend** to **devise state-of-the-art products**	▸ **Less innovation capacities** as industrialisation already launched to meet demand and **keep up with market pace**	▸ **Innovation more focused on commercial applications** rather than battery cells
Resilience / adaptability	▸ **Most resilient positioning** as able to switch from an end-market to another to offset final demand fluctuation	▸ Battery modules & packs assembly lines tend to be **dedicated to end-markets with lower capacities to adapt to fluctuations**	▸ **Battery lines dedicated to integrators' end-markets** and subject to potential downturns without alternative applications

Focus

Highest value add

Competitive advantage: Low ··· High

1. Dedicated to battery cells
2. Strongly impacting cost of battery with integration of providers' margin when consolidating the supply chain

With prismatic cell manufacturing, a domestic manufacturer is able to serve a broader range of applications - though this also exposes the company to increased competition

Cell manufacturers positioning on technologies & applications

	Form	Assembly process	Description	Application fit	Int'l manufacturers positioning	South African manufacturers positioning
LFP	Prismatic 	Winding Stacking Z-folding	▸ **Pros:** durable & customisable for tight spaces, high capacity, easy assembly & maintenance, shock & vibration resistant perfect for commercial EVs & industrial machines ▸ **Cons:** slightly lower energy density, not impacting vehicle performance		CATL LISHEN EVE BYD REPT HTHIUM TESLA KOREPOWER Gotion BYD TESLA ElevenEs EVE LISHEN	
	Cylindric 	Winding Stacking Z-folding	▸ **Pros:** durable casing resistant to pressure & reusable, reliable & widely available ▸ **Cons:** lower capacity, welded assembly prevents individual cell replacement, parallel connections reduce battery safety at high power levels	Small PVs, two-wheelers	TESLA EVE LISHEN	No active South African players
	Pouch 	Winding Stacking Z-folding	▸ **Pros:** high energy density, lightweight & cost-effective ▸ **Cons:** weak mechanical resistance, requires protective packaging, expands during charge / discharge, not suitable for industrial vehicles	Racing vehicles	SAMSUNG SDI CATL LG Energy Solution EVE SK innovation	

BESS · Industrial & off-road · PV · Premium PV

Low — High

Implementation, Infrastructure & Risk Assessment

Module 2

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY

Infrastructure & Risk Assessment

1

Infrastructure Readiness

2

Risk Analysis and Mitigation

Selecting a gigafactory site depends on strong infrastructure and SEZ incentives, with Atlantis emerging as the most favourable location

Executive Summary: Infrastructure readiness

Infrastructure readiness

The **ecosystem analysis** has been used to **evaluate strategic and infrastructural factors** and **determine the most favourable location** for establishing a Gigafactory in South Africa.

Choosing a gigafactory site depends on **strong infrastructure**, with key factors incl. proximity to ports, access to talent and favourable tax & incentives.

There are **five different SEZ categories** i.e. Industrial Development Zone, Free Port, Free Trade Zone and Sector Development Zone

- SEZs **accelerate industrial growth** through fast setup, **government incentives**, and **strategic infrastructure**
- **Western Cape** is the primary **hub for battery manufacturing**, **assembly**, and **integration**, with strong clustering of midstream and downstream players
- Across analysed SEZ, **Atlantis ranked best** especially differentiating within **proximity to off-takers**, **global talent appeal & safety, stable grid connection** and **stable water supply**

The ecosystem analysis evaluates strategic and infrastructural factors to determine the most favourable location for establishing a Gigafactory in South Africa

Strategic option space

Choosing a gigafactory site depends on strong infrastructure, with key factors incl. proximity to ports, access to talent and favourable tax & incentives

Ecosystem Framework

	Assessment criteria	Weighting of criteria	Measure	Knock-out	Good	Great	Differentiator
Strategic factors	**Proximity to off-takers (battery manufacturers)**	**Secondary (2)**	Presence of secured or potential anchor customers		Emerging pack assemblers/integrators in the region	At least one established battery manufacturer	Cluster of multiple high-volume battery pack manufacturer
	Proximity to deep-sea ports / transport corridors	**Tertiary (1)**	Distance to nearest major port		100–200km	25–100km	<25km or direct multimodal access
	Favourable tax, incentives & policy landscape	**Primary (3)**	Breadth and depth of financial/fiscal incentives		Basic tax breaks or rebates	SEZ-level incentives	Tailored incentives/strategic designation
	Global Talent Appeal & Safety	**Secondary (2)**	Lifestyle & Security Index		Basic safety, some expat services, affordable living.	Low crime, good healthcare easy relocation.	World-class safety, top infrastructure, strong expat network.
Critical infra-structure & resource requirements	**Enough space for plant**	**Fundamental (4)**	Size of SEZ	<150 000 sqm	~200 000 sqm	~300 000 sqm	>300 000 sqm
	Stable grid connection	**Primary (3)**	Reliability and capacity of electricity supply		Some outages	Rare outages	Major supply, green energy options
	Stable water supply	**Primary (3)**	Reliability & sufficiency of water for industrial use		Some risk	Reliable supply	Sustainable source

Weighting Scale: Fundamental – 4, Primary – 3, Secondary – 2, Tertiary – 1

Ranking Scale: Knock-out – 0, Good – 2, Great – 3, Differentiator - 4

SEZs accelerate industrial growth through fast setup, government incentives, and strategic infrastructure

Strengths

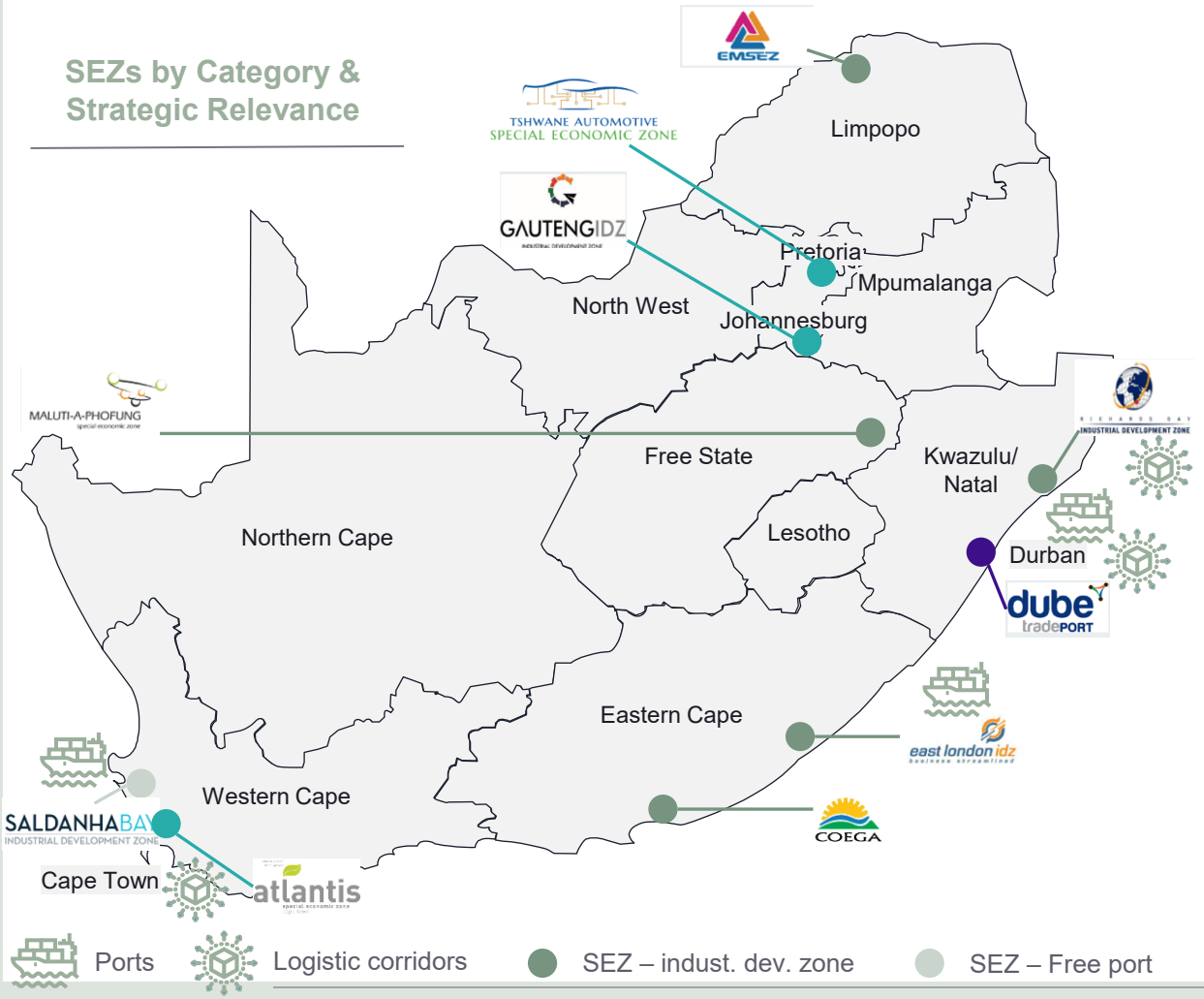
- **Access to infrastructure** (power, water, roads, telecoms)
- **Attractive tax incentives** and **customs duty exemptions**
- Streamlined permitting and regulatory processes
- **Government support** and visibility
- Often **located near ports or logistics hubs**
- Access to **industrial clusters** and **suppliers**
- **HR** and **training integration enabling workforce development** & **knowledge transfer**

Weaknesses

- **Space constraints** for **large-scale expansion**
- **Distance from raw material sources:** SEZs may be located far from upstream mineral sources, but proximity to ports and logistics hubs can offset this for imported materials.
- **Shared infrastructure** can **lead to congestion or competition**
- **Limited flexibility** in **site design**: SEZs may restrict customisation of plant layout, auxiliary facilities, or future expansion, impacting operational efficiency.

South Africa benefits from SEZs offering faster setup, reliable infrastructure, and major government incentives

Mapping Opportunities for Large-Scale Battery Manufacturing Plant Establishment



Established

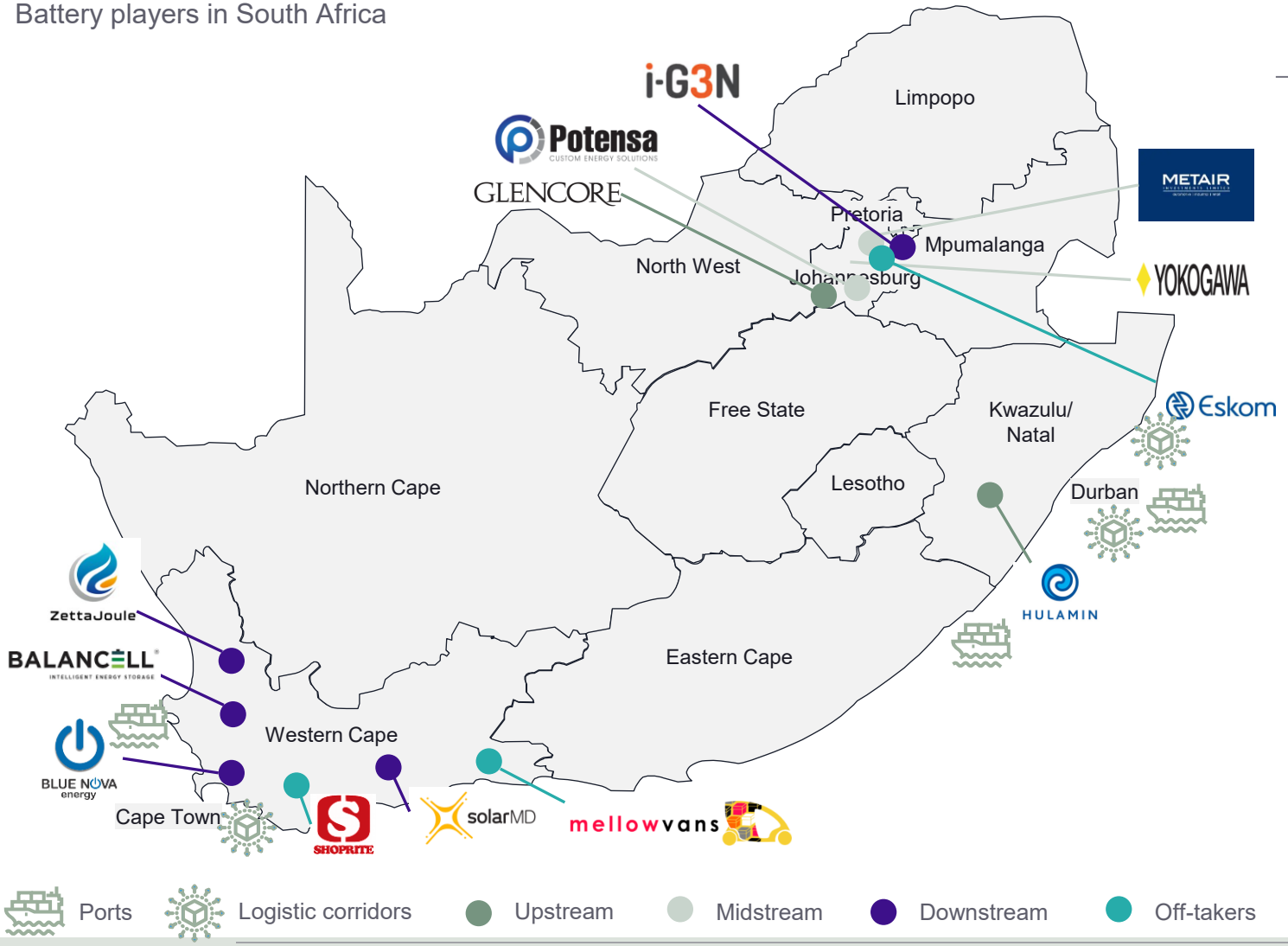
SEZ Name	Key industries
Coega IDZ (EC)	Automotive, energy, metals, logistics, export manufacturing
Richards Bay IDZ (KZN)	Metals beneficiation, energy, logistics, bulk exports.[1]
East London IDZ (EC)	Automotive, agro-processing, ICT
Saldanha Bay IDZ (WC)	Oil & gas, marine repair, logistics (Free Port)
Dube TradePort SEZ (KZN)	Logistics, electronics, agro-processing, air cargo
Atlantis SEZ (WC)	**Green tech, renewable energy**
Mussina-Makhado SEZ (LP)	Energy, mineral beneficiation
Maluti-A-Phofung SEZ (FS)	Logistics, agro-processing, manufacturing, automotive
OR Tambo International Airport SEZ (GP)	High-value manufacturing, electronics, export processing
Tshwane Automotive SEZ (GP)	Automotive manufacturing, Export-oriented production, High-tech industrial operations

1. The Richards Bay IDZ does not have a container terminal.

Western Cape is the primary hub for battery manufacturing, assembly, and integration, with strong clustering of midstream and downstream players

Battery players in South Africa

NON-EXHAUSTIVE



Key takeaways

- **Western Cape** (especially Cape Town and Atlantis SEZ) is the **primary hub for battery manufacturing, assembly, and integration**, with strong clustering of midstream and downstream players.
- **Gauteng** is a **key industrial and logistics region**, with **proximity to SEZs supporting both midstream manufacturing and downstream deployment.**
- **SEZs** and **logistics corridors are critical enablers**, attracting both established and new (greenfield) operations.
- The **value chain is well-represented**, from mining and manufacturing to system integration and end-use, with strong linkages to ports and export infrastructure.
- This geographic clustering supports **collaboration, innovation,** and **efficient market access—key advantages for investors and partners.**

The ecosystem analysis evaluates strategic and infrastructural factors to determine the most favorable location for establishing a Gigafactory in South Africa

SEZs assessment

	Assessment criteria	Coega IDZ	Tshwane Automotive SEZ	Dube TradePort SEZ	East London IDZ	Atlantis SEZ
Strategic factors	Proximity to off-takers (battery manufacturers)	Automotive & pack ecosystem potential	Adjacent to Ford and component suppliers	Regional integrators	Automotive OEMs nearby	Concentration of pack assemblers & integrators
	Proximity to deep-sea ports / transport corridors	Direct access to Ngqura port	Inland; connected via road and rail corridors	~35 km to Durban port	Smaller port (~40 km, draft limits)	~40 km to Cape Town port
	Favourable tax, incentives & policy landscape	SEZ + national strategy alignment	SEZ incentives	Free Trade Zone + bonded warehousing	SEZ incentives	SEZ incentives
	Global Talent Appeal & Safety	Coastal city, moderate expat amenities	Urban hub, diplomatic presence	Near Durban, airport connectivity, lifestyle mix	Smaller city, limited expat services	Close to Cape Town, strong lifestyle appeal
Critical infra-structure & resource requirements	Enough space for plant (>150 000 sqm)	>300k sqm	>300k sqm	~200k sqm	~300k sqm	~300k sqm
	Stable grid connection	Reliable, scalable grid	Reliable, scalable grid	Stable, airport-grade supply	Reliable grid	Reliable grid + renewable energy integration
	Stable water supply	Reliable municipal + industrial supply	Bulk services planned for industrial use	Some risk, manageable	Reliable supply	CoCT backed municipal water
	Total score:	**54**	**53**	**42**	**51**	**Deep dive 64**

Knock-out | Good | Great | Differentiator

SEZ Deep Dive: Identifying the Optimal Location for South Africa's first LFP Gigafactory

Deep dive: Atlantis SEZ

	Assessment criteria	Weighting	Rating	Total score	Comment
Strategic factors	Proximity to off-takers (battery manufacturers)	Secondary (2)	Differentiator (4)	8	Home to South Africa's densest cluster of battery pack manufacturers and integrators (BlueNova, SolarMD, Rubicon, Revov), ensuring immediate anchor demand for LFP cells.
	Proximity to deep-sea ports / transport corridors	Tertiary (1)	Great (3)	3	Located ~40 km from Cape Town port, providing solid export access.
	Favourable tax, incentives & policy landscape	Primary (3)	Great (3)	9	Beneficiary of SEZ-level incentives and backed by Western Cape's strong green economy policy, aligning with renewable and storage market growth.
	Global Talent Appeal & Safety	Secondary (2)	Differentiator (4)	8	WC offers strong lifestyle appeal, global connectivity via Cape Town, an established expat community with quality healthcare. Safety concerns exist, mitigated by secure housing and corporate relocation support.
Critical infra-structure & resource requirements	Enough space for plant	Fundamental (4)	Great (3)	12	Current land parcels (>200,000 sqm) are more limited compared to mega-SEZs, but more than sufficient for initial 5–10 GWh gigafactory capacity.
	Stable grid connection	Primary (3)	Differentiator (4)	12	Reliable electricity supply with unique access to renewable energy projects in the Western Cape, supporting a sustainable, green-powered gigafactory.
	Stable water supply	Primary (3)	Differentiator (4)	12	Great supply of municipal water available and stability also guaranteed.

Weighting x rating
Total score: 64

Knock-out | Good | Great | Differentiator

Phase 1 of the planned gigafactory will be deployed on a smaller piece of land; phase 2+3 depict the potential expansion, that will increase capacity to ~10 GWh

Manufacturing overview

	Phase 1	Phase 2	Phase 3
Production capacity	Planned **1.5 GWh**	Up to **~5 GWh**	Up to **~10 GWh**
Plant size	Initially **~25,000 sqm**	Additional **~50,000 sqm**	Additional **~75,000 sqm**

Infrastructure & Risk Assessment

1

Infrastructure Readiness

2

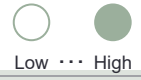
Risk Analysis and Mitigation

Battery production in SA faces risks from a complex market environment, domestic manufacturers' role amidst market headwinds

Overview of market risks

INDICATIVE | NOT EXHAUSTIVE

Market risks	Impact on domestic manufacturers: Short-term[1]	Impact on domestic manufacturers: Long-term[2]	Rationale	Market verbatim
Infrastructure & Energy Constraints / Grid Instability			▪ **Load-shedding drives urgent demand** for Commercial & Industrial batteries, boosting domestic manufacturers' pipeline. ▪ Coal-heavy energy mix and grid stabilisation reduce long-term ESG appeal.	"Load shedding remains the predominant barrier to consistent energy supply in South Africa, directly impacting sectors reliant on battery manufacturing and electric vehicle charging infrastructure." — *Energy Infrastructure Specialist, Utility Sector*
Supply Chain & Mineral Processing Challenges / Import Dependency			▪ **SA lacks advanced processing and beneficiation**, making it reliant on imports. ▪ **Domestic manufacturers must time support carefully**— too early risks failure, too late loses market share.	"South Africa relies heavily on imported lithium-ion battery cells and related components, exposing its battery market to global supply chain disruptions and price volatility." — *VP, Battery Mineral Mine*
Geopolitical & Regional Risks / Regional Integration			▪ **Regional instability** disrupts supply chains and investor confidence, long-term impact is limited due to investor familiarity the global abundance of critical minerals. ▪ **AfCFTA and Lobito Corridor** could unlock export-oriented localisation if well executed.	"Limited local manufacturing capability restricts domestic value capture and industrial growth potential in the battery sector." – *VP, Off-taker*
Policy & Regulatory Uncertainty			▪ **Delays in IRP/SAREM frameworks** stall domestic manufacturers disbursement due to lack of credible projects. ▪ **Weak standards and inconsistent execution** reduce investor confidence and fund leverage.	"Policy incentives and long-term certainty are lacking, which directly constrains the growth of local battery manufacturing and installation." — *Infrastructure Specialist, SEZ Authority*
Global Trade & Export Control Risk (China Dependency)			▪ **High dependency** on **Chinese supply chains** creates **vulnerability to geopolitical shifts** and regulatory changes. ▪ **Export restrictions** on cathode/anode **materials** and **manufacturing equipment** from China **could delay the domestic manufacturers' commissioning and increase costs.**	"China's new export licensing rules for battery materials will tighten supply and increase costs, creating a strategic choke point for global gigafactory projects." — *Industry commentary*



1. Next 1-5 years (Until 2030) II 2. Next 5-10 years (Until 2035)

Navigating the Key Risks: Infrastructure, Policy, Technology & Talent for Gigafactory Viability

Operational risk identification

Operational risks	Impact on domestic manufacturers		Rationale	Market verbatim
	Short-term[1]	*Long-term[2]*		
Utility Interface & Scaling Risk			▪ SEZ infrastructure is reliable for current capacity, but **long-term scaling depends on national grid stability**, Eskom interface, and municipal water-effluent coordination. ▪ **Expansion to 5–10 GWh will test redundancy** and **energy self-generation capacity.**	“**SEZs** like Atlantis and Coega offer robust infrastructure, but utility stability still hinges on broader grid and municipal performance.” — *Head of Infrastructure, SEZ Authority*
Regional Logistics & Concentration Exposure			▪ Tier-1 partnership secures material availability via global contracts, but **South African port congestion, inland logistics, and China-centric precursor sourcing remain constraints**. ▪ Localisation pressures may also clash with partner sourcing models.	“Tier-1 partners buffer against raw-material volatility, but **local logistics and port reliability** remain **key bottlenecks.**” — *Director, Tier-1 OEM*
Regulatory & Policy Volatility (SEZ, Incentives, Local Content)			▪ **Success depends on stable SEZ incentives**, tariff rebates, and environmental permitting. Shifts in localisation policy or fiscal incentives could alter economics and delay expansion.	“Government must send clear, positive policy signals for development of the local battery value chain.” — *Investment Manager, SEZ Authority*
Technology Dependency & IP Transfer Risk			▪ **Partner mitigates obsolescence** but **locks domestic manufacturers** into the **partner’s IP and R&D roadmap.** ▪ Flexibility to adopt **new chemistries or cross-license technology** may be limited, constraining **long-term autonomy**.	“Licensing agreements can accelerate market entry, but they rarely offer full autonomy or access to the latest advances.” — *CEO, Battery Manufacturer*
Workforce & Skills Pipeline			▪ Initial dependence on **international expertise** will shift to **local capability over time.** ▪ While partnerships with **universities** are emerging, **competition** for technical talent, wage inflation, and limited battery-specific skills remain **key constraints.**	“The industry’s biggest challenge is building a talent pipeline that can keep pace with demand.” — *VP, Battery Mineral Mine*

Low ··· High

Aligning Action with Impact: A domestic manufacturer's roadmap to risk mitigation and sustainable success

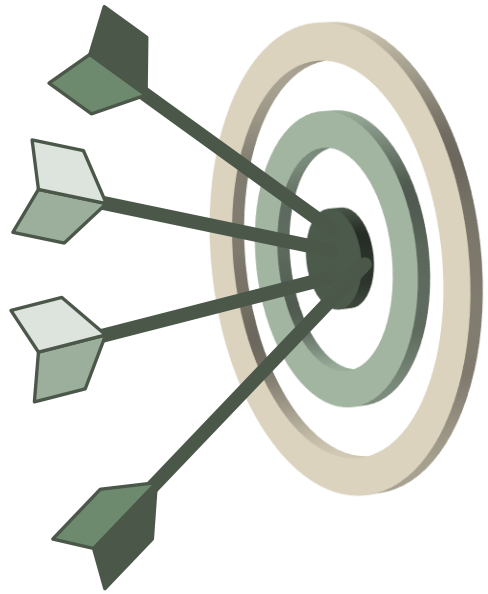
Mitigation strategies

Policy advocacy & certification capacity
Proactively engage with government and industry bodies to secure stable SEZ incentives, clear localisation policies, and streamlined permitting. Support development of local testing and certification facilities.

Develop a future-proof talent pipeline
Launch targeted training, apprenticeships, and university partnerships focused on battery engineering, manufacturing, and maintenance. Offer competitive packages and career progression to attract and retain talent.

Accelerate localisation of supply chain and certification
Develop local partnerships for mineral processing, battery component manufacturing, and certification/testing facilities. Support regional integration (AfCFTA, Lobito Corridor) for diversified sourcing.

Strategic offtake agreements & demand anchoring
Demonstrate credibility to lenders and investors, supporting financing and expansion by securing long-term offtake agreements with key commercial, industrial, and utility customers.



Key take-aways for domestic manufacturers

Policy uncertainty can stall investment and growth
Delays and ambiguity in regulatory frameworks undermine investor confidence and project timelines – proactive advocacy is required.

Talent shortages threaten quality and scale
A robust local talent pipeline is essential to reduce reliance on international expertise and support domestic manufacturers' long-term operational excellence.

Local supply chain gaps are a strategic vulnerability
Heavy reliance on imported battery materials and components expose domestic manufacturers to global shocks; localisation and regional integration are critical.

Anchored demand improves bankability and buffers volatility
Long-term customer commitments support financing, reduce market risk, and help domestic manufacturers weather policy or supply chain disruptions.

Financial Incentives & Policy Risk

Module 3

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY

Financial Incentives & Policy Risk

1

Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping

2

SEZ Infrastructure and Operational Environment

3

Labour Market and Wage Benchmarking

4

Policy and Legal Risk Assessment

Understanding the Applicable Incentive Grants, Tax Allowances, Customs and Financial Incentives for the Facility

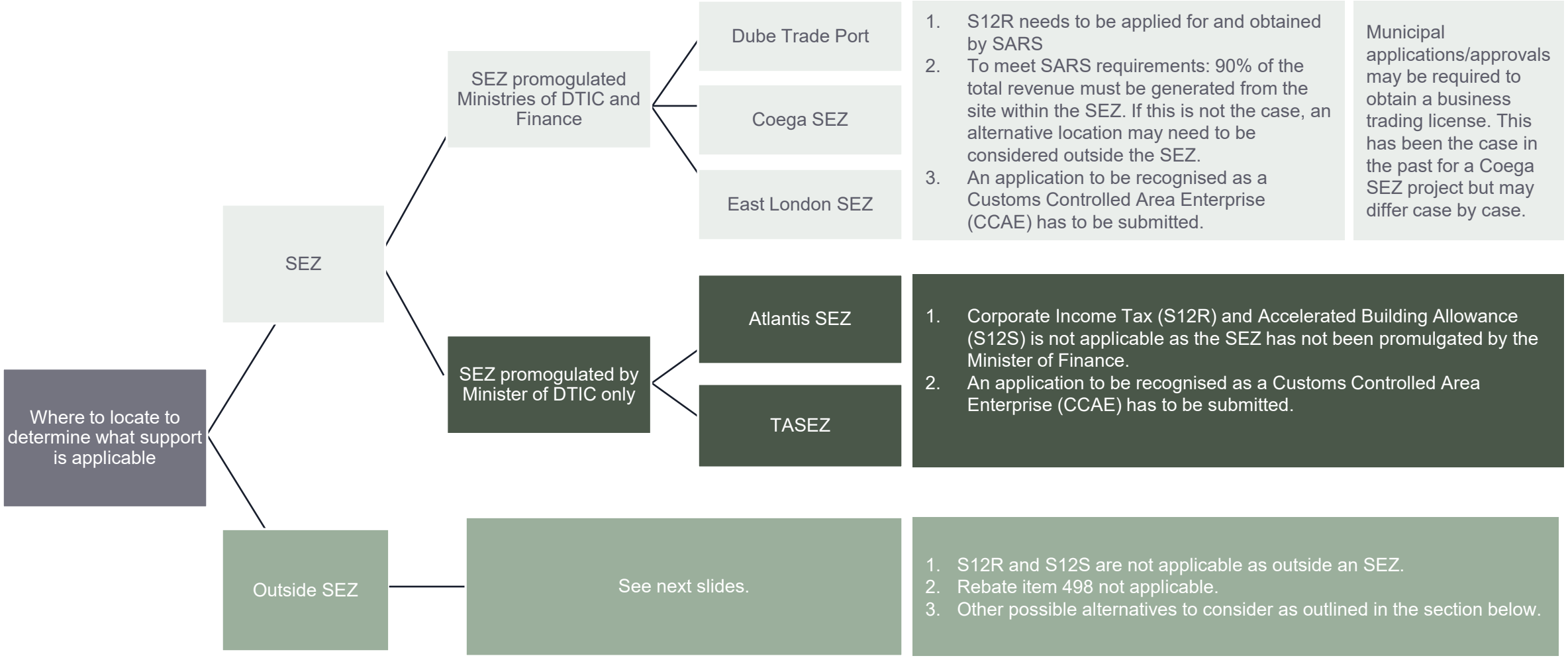
Executive Summary: Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping

Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping

The **identification and mapping of incentive grants, tax allowances, customs and financial incentives** has been used to **identify potential opportunities** to support the development of the proposed manufacturing facility. Based on the findings, the following key points should be noted:

- Should the Gigafactory be in the Atlantis SEZ or Tshwane SEZ, the Corporate Income Tax (S12R) and Accelerated Building Allowance (S12S) will not be applicable as the SEZ has not been promulgated by the Minister of Finance.
- For the S12S and S12R to be activated in the Atlantis and Tshwane SEZs, the South African Minister of Finance would need to sign off on the SEZ to enable the S12R CIT and S12S building allowance to kick in.
- The facility would need to apply to be a Custom Controlled Area Enterprise (CCAE) if choosing to operate in an SEZ.
- The facility would need to apply to ITAC for a 317.06 rebate provision should they be producing and supply products to the automotive sector in South Africa. It should be noted that as an automotive component manufacturer - 317.06 would apply to the automotive production in an OEM supply chain only.
- The Automotive Investment Scheme (AIS) is applicable to qualifying investments in automotive manufacturing, supporting large-scale capital expenditure. Only applicable if the Gigafactory will focus on supplying into an automotive OEM value chain.
- The Medium-Heavy Commercial Vehicle AIS (MHCV-AIS) - only applicable if the Gigafactory will focus on supplying into an MHCV automotive OEM value chain.
- APDP2 Production Incentive focuses on local value added in automotive production. It will be applicable if batteries are exported or supplied to aftermarket as the final manufacturer, subject to: 25% of the Gigafactory revenue originating from OEM supply chains in South Africa or a minimum of ZAR 10 million turnover.
- Manufacturing Support Programme (MSP) is appropriate for non-automotive manufacturing investments (capped at a value of R10m), although the scale of the benefit is significantly less than AIS which doesn't have a ceiling.
- Each application will be treated on merit and may have its own complexities. As a result there are no set/defined timelines in place for the application and approval process.

Incentive & Grant Mapping – Determining where to locate the proposed Gigafactory based on incentives and grants



Operating in an SEZ can offer operators benefits relate to tax, customs and allowances.

Incentive	15% Corporate Income Tax	Accelerated Building Allowance	Employment Tax Incentive (ETI)
Source	• S12R Income Tax Act	• S12S Income Tax Act	• SARS ETI Guide s6(a)(ii)
Description	• Qualifying companies pay a reduced corporate tax rate of 15% instead of the standard 27%, directly lowering annual tax liability.	• Businesses can depreciate the cost of new buildings at 10% per year over 10 years, accelerating tax deductions and improving cash flow.	• Monthly PAYE reduction for employees earning less than ZAR 7,500.
Key SEZ Availability	COEGA, east london idz, dube tradePORT	COEGA, east london idz, dube tradePORT	• All listed SEZs
Key take-away	• Significant savings in qualifying SEZs • Atlantis SEZ and Tshwane SEZ have not received the promulgation from the Minister of Finance to qualify for the reduced corporate tax benefits.	• Faster recovery of building investment in infrastructure • Atlantis SEZ and Tshwane SEZ have not received the promulgation from the Minister of Finance to qualify for the building allowance	• May not be applicable as this value has not been updated since inception of the SEZ benefits. If employees are earning more than ZAR 7,500 this will not be applicable.

Source: Desk research, consultant analysis

Duty suspension and VAT zero-rating can assist with boosting competitiveness and supporting cash flow relief

Incentive	Customs Duty Suspension	Customs Duty Exemption	VAT Suspension (Imports)	VAT Zero-Rating (Local Supply)
Source	• Rebate Item 498.01	• Rebate Item 498.01	• Section 11(1)(m) VAT Act	• VAT 267
Description	• Full suspension of customs duties on imported goods used in manufacturing. • When the manufactured product is sold in South Africa, the liability of the import duty becomes due and payable.	• Full duty exemption on exported goods.	• Full VAT suspension on imported goods until they are sold within South Africa. Once the goods are sold locally, the VAT liability becomes due and payable. • If the goods are exported, then there is no VAT liability.	• Full VAT relief on local supply transactions.
Key SEZ Availability	• All listed SEZs	• All listed SEZs	• All listed SEZs	• All listed SEZs
Key take-away	• If not exported, the only benefit is a time-value of money.	• Reduces export costs, boosting competitiveness for regional and global distribution.	• Immediate cash flow relief on imports, especially valuable for high-value equipment and raw materials	• Reduces cost of locally sourced inputs and services, encouraging domestic procurement and supplier development

Source: Desk research, consultant analysis

Depending on the products being manufactured, there are incentives available if supplying the automotive sector in South Africa

Incentive	APDP2 Production Incentive	Automotive Investment Scheme (AIS)	Medium-Heavy Commercial Vehicle AIS (MHCV-AIS)
Source	• APDP2 Regulations - Information Doc A	• AIS Guidelines 2025	• MHCV-AIS Guidelines 2023
Description	• Rebate of 62.5% of local value added in automotive production, rewarding local manufacturing and supply chain development. • It will be eligible if batteries are exported or supplied to aftermarket as the final manufacturer, subject to: 25% of the Gigafactory revenue originating from OEM supply chains in South Africa or a minimum of R10 million turnover. • Requires B-BBEE compliance: Level 4 or Level 6 with AITF contribution.	• 25% or 35% cash grant on qualifying investments in automotive manufacturing, supporting large-scale capital expenditure. • Offers 35% for EV component manufacturing. • Requires B-BBEE compliance: achieve levels 1 to 6*.	• 25% grant for investments in medium-heavy commercial vehicle manufacturing • Has not yet been updated like AIS for EV compliant components - expecting this will be revised and updated to reflect the 35% benefit. • Requires B-BBEE compliance: achieve levels 1 to 6*.
Key SEZ Availability	• Location agnostic	• Location agnostic	• Location agnostic
Key take-away	• Rebate for local manufacturing, • Demonstrate manufacturing for an OEM supply chain • Requires either 25% of revenue from an OEM supply chain in South Africa or a minimum of R10 million turnover	• Capital support for automotive-related investments; relevant if the proposed facility supplies EV components • *B-BBEE requirements currently not harmonised for APDP2 and AIS. It is expected to be aligned in the future.	• Tailored for MHCV supply chain players—valuable if the proposed facility targets commercial EV battery supply. • *B-BBEE requirements currently not harmonised for APDP2 and AIS. It is expected to be aligned in the future.

Source: Desk research, consultant analysis

Incentive & Grant Mapping – R&D and Innovation Support Incentives

Incentive	Manufacturing Support Programme (MSP)	Critical Infrastructure Programme (CIP)
Source	• MSP Guidelines 2024	• CIP Guidelines 2021
Description	• 20% grant on qualifying manufacturing investments, capped at ZAR 10m, ideal for pilot or smaller facilities. • Appropriate for non-automotive manufacturing investments • Scale of the benefit is significantly less than AIS which doesn't have a ceiling	• 10–30% grant for investment in critical infrastructure (i.e. bulk, roads etc.), reducing upfront development costs. • Excludes building structures and manufacturing equipment for the facility.
Key SEZ Availability	• Location agnostic	• Location agnostics
Key take-away	• Appropriate for non-automotive manufacturing investments	• Helps offset costs of infrastructure—key for greenfield development.

Source: Desk research, consultant analysis

Incentive & Grant Mapping – R&D and Innovation Support Incentives

KPCs	Benefit	Atlantis SEZ	Coega SEZ	East London SEZ	Dube TradePort	Tshwane Automotive SEZ
1 15% Corporate Income Tax	• 15% of taxable income	✗	✓	✓	✓	✗
2 Accelerated Building Allowance	• 10% per annum over 10 years	✗	✓	✓	✓	✗
3 Customs duty suspension	• Full duty	✓	✓	✓	✓	✓
4 Customs duty zero-rated (exports)	• Full duty	✓	✓	✓	✓	✓
5 VAT suspension (imports)	• Full VAT	✓	✓	✓	✓	✓
6 VAT Zero-Rating (local supply)	• Full VAT	✓	✓	✓	✓	✓
7 Employment Tax Incentive (ETI)	• Monthly PAYE reduction on salaries less than ZAR 7 500 per month	✓	✓	✓	✓	✓
8 APDP2 Production Incentive	• 62,5% of Local Value Add					
9 Medium-Heavy Commercial Vehicle Automotive Investment Scheme (MHCV-AIS)	• 25% of qualifying investment					
10 Manufacturing Support Programme (MSP)	• 20% of qualifying investment (subject to ZAR 10m maximum)					
11 Critical Infrastructure Programme	• 10-30% of qualifying investment					
12 Automotive Investment Scheme (AIS)	• 25% of qualifying investment					

Location agnostic – applicable inside & outside SEZs

Source: Desk research, consultant analysis

Incentive & Grant Mapping – R&D and Innovation Support Incentives

Incentive	Section 11D – R&D Tax Incentive	Support Programme for Industrial Innovation (SPII)
Source	• Income Tax Act, Section 11D	• DTIC Incentive Programme
Objective	• Encourage scientific/technological R&D to resolve uncertainty and create new/improved products	• Support development of innovative products/processes from post-research to prototype
Benefit	• **Tax-based:** Tax deduction of 150% of qualifying R&D spend (For every R1 spent on R&D, claim R1.50 as a tax deduction)	• **Grant based**: Non-repayable grants covering 50–85% of development costs (subject to a maximum R5 million benefit)
Eligibility	• Requires genuine R&D with scientific/technological uncertainty. • Replication of existing processes and formulae will not qualify • The Gigafactory would need to demonstrate novel innovation (e.g., new chemistry, advanced energy density solutions).	• Requires significant innovation beyond standard manufacturing. The facility could qualify if developing new processes, advanced battery tech, or unique IP in South Africa.
Key take-away	**Unlikely to qualify:** the proposed facility will focus on standard LFP battery production, which is not considered innovative R&D and may not meet the qualifying requirements.	**Potential to qualify:** If the facility invests in developing new technologies or processes beyond the standard LFP battery, it could qualify to access SPII funding.

Source: Desk research, consultant analysis

Financial Incentives & Policy Risk

1

Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping

2

SEZ Infrastructure and Operational Environment

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Labour Market and Wage Benchmarking

4

Policy and Legal Risk Assessment

Understanding the Applicable Incentive Grants, Tax Allowances, Customs and Financial Incentives for the Facility

Executive Summary: Infrastructure readiness

SEZ Infrastructure and Operational Environment

The **ecosystem analysis** has been used to **evaluate strategic and infrastructural factors** and **determine the most favorable location** for establishing a Gigafactory in South Africa.

Choosing a gigafactory site depends on **strong infrastructure**, with key factors incl. proximity to ports, access to talent and favorable tax & incentives.

There are **five different SEZ categories** i.e. Industrial Development Zone, Free Port, Free Trade Zone and Sector Development Zone

- SEZs **accelerate industrial growth** through fast setup, **government incentives**, and **strategic infrastructure**
- **Western Cape** is the primary **hub for battery manufacturing**, **assembly**, and **integration**, with strong clustering of midstream and downstream players
- Across analyzed SEZ, **Atlantis ranked best** especially differentiating within **proximity to offtakers**, **global talent appeal & safety, stable grid connection** and **stable water supply**

Please refer to Module 2 – Implementation, Infrastructure and Risk Assessment for further insights and overview of the proposed SEZ's being considered.

Financial Incentives & Policy Risk

1

Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping

2

SEZ Infrastructure and Operational Environment

3

Labour Market and Wage Benchmarking

4

Policy and Legal Risk Assessment

Labour Market and Wage Benchmarking Limitations and Key Definitions

Labour Market and Wage Benchmarking Methodology – key limitation and definitions to note

LIMITATIONS

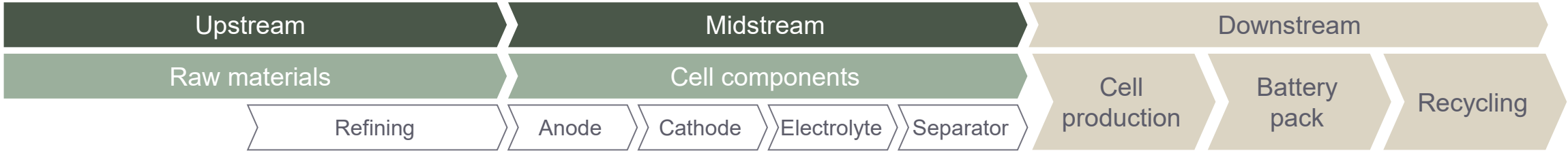
- At a country level, job titles and definitions differ, thus it is a challenge to map and benchmark jobs like for like. This has been mitigated by manually linking job titles to descriptions and evaluating job labour market conditions on as close a match as possible.
- In South Africa, the Organising Framework for Occupations (OFO) was last updated in 2021. As a result, relatively new sectors and jobs (including battery manufacturing) have not been added to the OFO. To mitigate this, similar job titles were selected that would be applicable to the battery manufacturing facility.
- **Labour data and wage data for China was not available on the various databases utilised by the consultant, including the International Labour Organisation (ILO) portal. As a result, proxy data from Hong Kong has been utilised. Given the limitations and understanding that Hong Kong is likely to have higher wages than China, the China data would need to be adjusted downward to accurately reflect the wage and labour data.**

KEY DEFINITIONS

- **OFO:** The OFO is constructed from the bottom-up by analysing jobs and identifying similarities in terms of a tasks and skills, categorising similar jobs into occupations, and classifying these occupations into occupational groups.
- **Job:** A job is a set of tasks and duties carried out or meant to be carried out, by one person for a particular employer, including self employment.
- **Skill Specialisations:** Skill specialisation is considered in terms of four conceptual concepts a) the field of knowledge required, b) the tools and machinery used, c) the materials worked on or with, d) the kinds of goods and services produced.
- **Craft and related trades workers:** Build, install, and repair components like battery casings, electrical systems, and plant infrastructure using specialised tools and techniques.
- **Plant and machine operators, and assemblers:** Operate machinery to produce battery cells, assemble modules, and monitor production lines for quality and efficiency.
- **Professionals**: Design battery technologies, manage production systems, and conduct research on materials, energy storage, and performance optimisation.
- **Clerical Support Workers**: Manage inventory records, production schedules, procurement documentation, and compliance reporting for battery manufacturing operations.
- **Technicians and Associate Professionals:** Test battery components, maintain equipment, and support engineering teams with technical diagnostics and process improvements.

When considering labour in the LFP battery chain, this study focuses on the cell production component of the value chain where the Gigafactory will be focused

An overview of the LFP battery chain is provided below, with a focus on cell production which is the core focus of the Gigafactory.



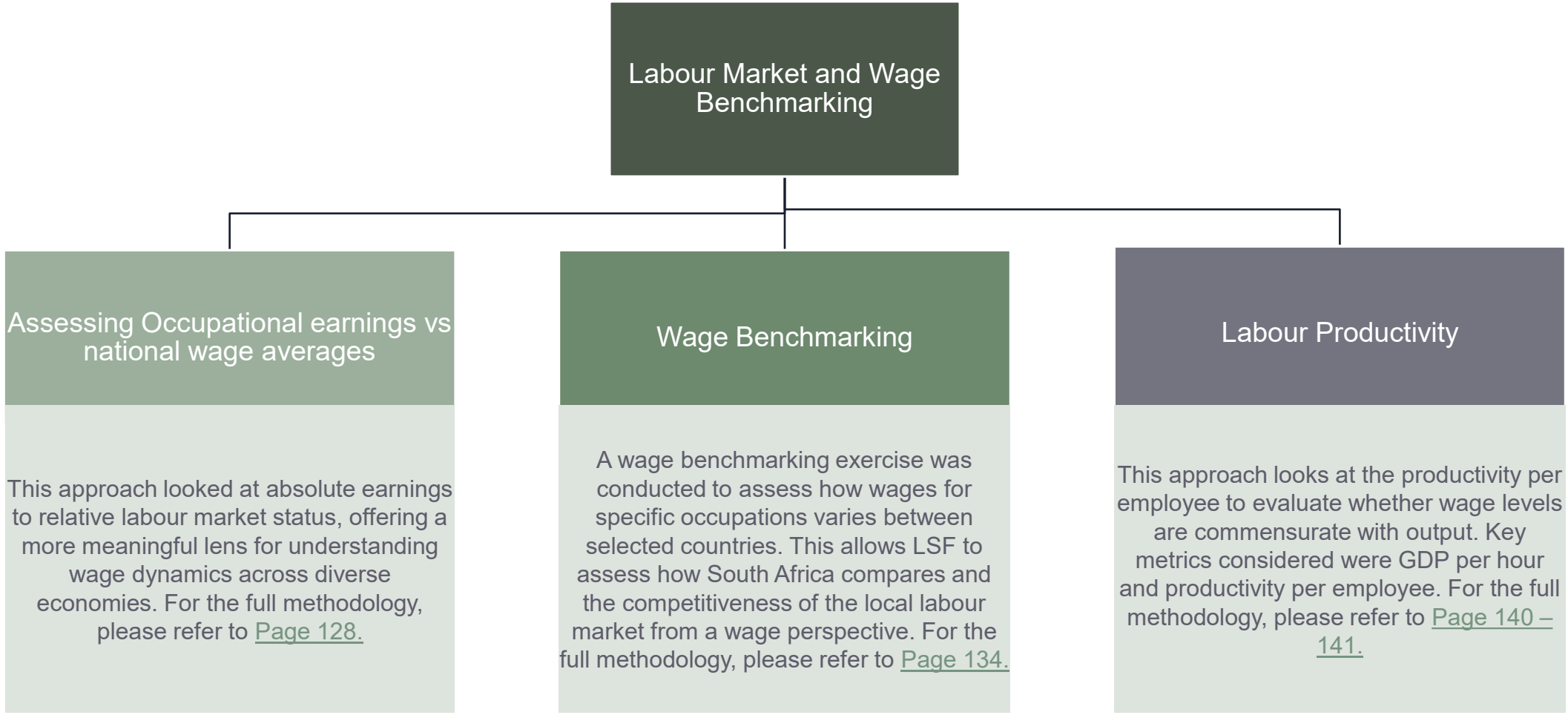
The Battery Value Chain in South Africa – A Summary on Labour and Skills Development

- Access and availability of skilled and experienced individuals is critical for the development of the LFP battery value chain in South Africa, particularly considering the strong innovation focus.
- There is a need in South Africa for the establishment of accredited educational and training programmes in cooperation with international institutions and training providers to support the skills required for the battery value chain.
- An increased focus on R&D and skills development would contribute to improved access to human and intellectual capital in South Africa.
- From a union perspective, two unions would need to be consider, namely Congress of South African Trade Unions (COSATU) and the National Union of Metalworkers of South Africa (NUMSA).
- There are also bargaining councils that would need to be considered considering the production of batteries for commercial vehicles. The Motor Industry Bargaining Council (MIBCO) which includes employees working for motor components manufacturers. This would have an influence on Human Resource requirements as well as employment contracts, benefits being offered to employees and salary/wage agreements and negotiations.

Proposed Gigafactory

- For the purposes of the labour wage and benchmarking assessment, the occupations considered were focused in the **cell production** component of the value chain where the proposed gigafactory will operate.
- Upstream, midstream and additional downstream (battery pack and recycling) were excluded from this study.
- The proposed facility's core business and manufacturing process is focused on the following:
  - Material preparation
  - Electrode manufacturing
  - Cell assembly
  - Formation and testing
  - Packaging

Labour Market and Wage Benchmarking – the approaches taken assist with quantifying and understanding the labour market and wage benchmarking from a South African perspective



The wage benchmarking compared South Africa against eight additional countries that have either well established or developing LFP battery value chains

Country	Overview	Drivers of LFP battery demand	Parallels with South Africa
	India is rapidly positioning itself as a major global player in LFP battery manufacturing. The country's EV ecosystem is increasingly favouring LFP chemistry due to its cost-effectiveness, thermal stability, and longer lifecycle, which suits Indian climatic and usage conditions.	• Strong government support via Production Linked Incentives (PLI) offering up to ₹18,100 crore (~$2.2 billion) for advanced chemistry cell manufacturing • Over 246 GWh of announced capacity, with domestic demand projected to reach 244 GWh by 2035. • Altmin's launch of India's first LFP cathode plant.	• Both countries are emerging economies with large informal sectors and a dual labour market structure. • India and South Africa face skills mismatches in technical trades and engineering, particularly in manufacturing. • Labour laws in both countries are complex and rigid, though India has recently moved toward consolidation and reform. • Wage levels in India's manufacturing sector are comparable to or lower than South Africa's, offering a useful benchmark for cost competitiveness.
	Brazil is focusing on stationary storage rather than EV batteries, driven by grid instability and renewable integration.	• Government is developing a regulatory roadmap for BESS and offering tax incentives for clean energy tech. • BYD's LFP plant in Manaus produces 18,000 modules/year. • Brazil's "Lithium Valley" in Minas Gerais is attracting global investment.	• Brazil and South Africa are BRICS peers with comparable challenges in labour informality and regional inequality. • Both countries have strong labour protections and relatively high non-wage labour costs, affecting competitiveness. • Skills gaps in Brazil's battery and energy sectors mirror South Africa's shortage of specialised technicians and engineers. • Labour productivity is constrained by infrastructure and regulatory inefficiencies, offering lessons for South Africa's reform agenda.

The wage benchmarking compared South Africa against eight additional countries that have either well established or developing LFP battery value chains

Country	Overview	Drivers of LFP battery demand	Parallels with South Africa
	Indonesia is building a vertically integrated battery ecosystem, leveraging its abundant nickel reserves. The country has banned raw nickel exports to stimulate domestic processing and attract foreign investment.	• CATL, LG, and Hyundai have committed over $7 billion to battery projects in the country. • Lopal and Indonesian Lithium Source have initiated LFP cathode and cell production. • Targeting 140 GWh/year capacity by 2030.	• Indonesia and South Africa share a resource-driven industrial base, with labour-intensive beneficiation sectors. • Both countries exhibit relatively low average wages in manufacturing, with high youth unemployment and underemployment. • Labour protections are moderate, with Indonesia recently revising its labour code to attract investment, similar to South Africa's policy debates. • Skills development systems in both countries are fragmented, with gaps in vocational training for battery-related occupations.
	Thailand is transitioning from EV assembly to integrated battery manufacturing. It is leveraging its strong automotive base and offering generous incentives to attract foreign investment.	• Amita Technology's gigafactory produces 1 GWh/year, with expansion plans. • Sunwoda's $1.5 billion investment in LFP and NMC battery plants. • Thailand's BOI offers tax holidays, import duty exemptions, and R&D support.	• Thailand and South Africa are upper-middle-income economies with strong automotive manufacturing sectors. • Both countries have structured wage-setting mechanisms (e.g., sectoral bargaining in South Africa, minimum wage councils in Thailand). • Thailand's labour productivity in manufacturing is moderately higher, offering a benchmark for efficiency gains. • Skills development is state supported but uneven, with both countries investing in technical and vocational education to close gaps.

Source: (World Bank Population Review, 2025), (East Asian Times, 2025), (Hurley, 2024), (Human Resource Management International Digest, 2024)

The wage benchmarking compared South Africa against eight additional countries that have either well established or developing LFP battery value chains

Country	Overview	Drivers of LFP battery demand	Parallels with South Africa
	Hungary is emerging as a European battery manufacturing hub, supported by strong automotive supply chains and EU incentives.	• Major investments from CATL and Samsung SDI in gigafactories. • EU Green Deal and EV transition policies driving demand for local battery production.	• Both countries have structured wage-setting mechanisms, but Hungary's productivity is significantly higher. • Skills development is supported by state programmes, offering lessons for South Africa's vocational training gaps.
	Germany has a mature industrial base and is investing heavily in EV and battery technologies to maintain global competitiveness.	• Strong automotive sector transitioning to EVs, backed by EU decarbonisation targets. • Significant R&D investment and partnerships with global battery leaders.	• Germany's high wages are commensurate with exceptional productivity, offering a benchmark for efficiency. • Structured skills development and advanced vocational systems contrast sharply with South Africa's fragmented approach.
	Nigeria is positioning itself as a key player in the upstream battery value chain, leveraging its growing lithium reserves and processing capacity	• Chinese firms (e.g., Canmax Technologies) investing over US$200 million in lithium processing plants. • Government policies promoting local beneficiation and restricting raw mineral exports.	• Both countries share resource-driven industrial bases but face challenges in productivity and infrastructure. • Labour costs are low, but skills development systems are fragmented, creating gaps in technical expertise.
	China is the global leader in battery production, with a fully integrated value chain from raw materials to gigafactories. It should be noted that labour/ wage/ productivity data for China is not publicly available. As such, labour/ productivity/ wage data for Hong Kong has been used a proxy.	• Dominance in LFP technology and cathode production. • Aggressive investment in R&D and capacity expansion, targeting global EV markets.	• China's rapid industrial scaling contrasts with South Africa's slower pace, but both share ambitions for local beneficiation. • Wage levels in China are rising, yet productivity gains justify costs, highlighting the need for efficiency improvements in South Africa.

Source: (World Bank Population Review, 2025), (East Asian Times, 2025), (Hurley, 2024), (Human Resource Management International Digest, 2024)

Labour in the Battery Value Chain – Mapping select roles that would be applicable to the LFP battery value chain with the OFO Codes

Based on the pre-feasibility study shared with the consultant, the following roles were mapped with the South African OFO codes to assess key roles, what specialisations may apply (or can be applied when advertising for jobs) and a general description of the role in line with the OFO Codes.

Key Role	OFO Code	Specialisations	Description of Role
Equipment Operator	2021-713101	Chemical Extractor / Reactor / Still Operator/Radioactive Waste Material Treatment Operator/Cleaning Materials Machine Operator/Chemical Production Sampler	Operates and monitors specialised machinery used in battery production processes such as electrode coating, cell assembly, and cell finishing, and ensures equipment runs efficiently, safely, and within quality standards. Performs basic troubleshooting and supports production continuity.
Production Coordinator	2021-432201	Logistics Clerk / Assistant / Controller / Coordinator / Planner / Officer	Records and coordinates the flow of work and materials between departments or sub-sections, examines orders for goods and prepares production schedules for production units.
Industrial Engineer	2021-214101	Quality Management Engineer/Process Engineer/Manufacturing Technology Engineer/Process Design Engineer/manufacturing Logistics Engineer/ Safety Engineer/ Automation and Control Engineer/ Plant Engineer/	Investigates and reviews the utilisation of personnel, facilities, equipment and materials, current operational processes and established practices, to recommend improvement in the efficiency of operations in a variety of commercial, industrial and production environments.
Safety Inspector	2021-325705	Factory Inspector/Safety Health Environment Quality Inspector, Works Inspector, Accident Prevention Consultant / Inspector, Lifting Machinery Inspector	Inspects machines, equipment, working conditions and public places to ensure compliance with government and industry standards and regulations, in relation to occupational health and safety.
Builder's Worker	2021-831301	Maintenance Person / Coordinator/	Performs routine tasks in erecting and repairing structures and facilities on building and construction sites and in factories producing prefabricated building components.
Mechanical Engineering Technologist	2021-214402	Maintenance Technologist	Analyses and modifies new and existing mechanical engineering technologies and applies them in the testing and implementation of mechanical engineering projects.
Store Person	2021-833402	Warehouse Assistant/Stores Assistant/Order Picker/Assembler/Manufacturing Store person	Receives, handles and dispatches goods in stores and warehouses.

Labour in the Battery Value Chain – Mapping select roles that would be applicable to the LFP battery value chain with the OFO Codes (continued)

Key Role	OFO Code	Specialisations	Description of Role
Business Training Manager	2021-121202	Human Resources Development Manager/Technical Training Manager/Quality Training Manager/Training Manager/Training & Development Manager	Plans, directs, organises, controls and coordinates training policy, provides advice, training and administrative support to trainers and learners.
Finance Manager	2021-121101	Financial Administrator Manager/ Financial Administrator/ Finance Director/CFO/Budgeting Manager/ Account Systems Manager/Chief Accountant/Internal Revenue	Plans, organises, directs, controls and coordinates the financial and accounting activities within an organisation.
Management Accountant	2021-241102	Cost Accountant/Project Accountant/Budget Accountant	Plans, reviews and administers accounting systems and procedures, analyses the financial information needs of organisations, provides advice on financial planning and risk management, and provides management with reports to assist in decision-making. May provide insight into cost performance and support the implementation of benchmarking and improvement initiatives.
Policy Analyst	2021-242202	Risk / Planning / Review / Analyst/Strategic Advisor/Strategic Business Policy Analyst/Strategy Analyst/Research Consultant/ Trade Policy Advisor	Collects and analyses information and data to produce intelligence for public or private sector organisations to support planning, operations and human resource functions.
Stock Clerk	2021-432101	Purchasing and Inventory Officer/Stores Clerk/Officer/Stores Coordinator/Inventory Clerk/Controller/Administrator	Monitors stock levels and maintains stock, order and inventory records.

Labour Market and Wage Benchmarking – Key findings based on an analysis of occupational earnings vs national wage averages

Labour Market and Wage Benchmarking – Occupational Earnings vs National Averages (Ratios)

South Africa shows uneven wage recognition	South Africa shows a fragmented wage structure. Some technical and professional roles earn above the national average, but clerical and support roles are consistently undervalued, reflecting limited wage differentiation.
Brazil reflects stable and structured compensation	Brazil maintains stable and moderately elevated earnings across most occupations, driven by institutional wage-setting and vocational alignment, especially in professional and technical roles.
India's workers are undervalued with compressed wages	India consistently ranks near or below the national average across all categories, indicating widespread wage compression and undervaluation of skilled labour, particularly in clerical and support functions.
Indonesia exhibits strong premiums for formal sector labour	Indonesia stands out with the highest relative earnings across nearly all roles, suggesting strong demand for formal sector skills and significant wage premiums for technical and clerical occupations.
Thailand offers wage offers wage floors with limited progression	Thailand's structured minimum wage councils and moderate informality (about 55%) support mid-range wages. However, limited unionisation and decentralised bargaining constrain wage growth, especially in technical and support roles.
Trends suggest that professionals and technicians are 'favoured'	Across the countries assessed, professional and technical roles tend to attract higher relative earnings, while clerical and support roles show greater variation, reflecting differences in labour market structure and institutional wage-setting.
South Africa's wages lag China and European counterparts'	South Africa's wages sit far above Nigeria's but remain well below China, Hungary, and Germany, reflecting stark productivity and industrialisation gaps that drive global wage inequality

Occupational earnings comparison – a summary of findings across the key occupational groups identified for the proposed Gigafactory.

Skill Level	Craft and Related Trades Workers	Plant and machine operators, and assemblers
Key Findings	• South African craft workers earn above the national average in three of the four roles, with ratios ranging from 0.49 to 1.51. This suggests that certain specialised trades (e.g., battery makers) are relatively well-compensated, while others (e.g., chemical production machine operators) remain undervalued. The variation reflects a partially compressed wage structure, shaped by centralised bargaining, but with room for role-specific premiums in niche industrial segments. • Brazil's ratios are around 1.03×, indicating that craft workers earn just above the national average across all roles. This uniformity points to sectoral wage-setting mechanisms and vocational standardisation, likely supported by labour institutions. • India's craft workers earn just below (0.96) the national average. This reflects moderate wage suppression, likely due to high informality, skills oversupply (specifically engineers), and fragmented wage regulation. • Indonesia shows the highest (1.6) relative wage ratios across all roles, indicating that craft workers earn significantly above the national average. This reinforces the presence of a dual labour market, where skilled trades in the formal sector command strong premiums due to scarcity and industrial demand, contrasting sharply with widespread informality. • Thailand's relative wage suggests that craft workers earn slightly above the national average. This points to the influence of minimum wage councils and structured wage floors, which provide stability. However, limited bargaining power and moderate productivity growth constrain further wage progression.	• In South Africa, earnings vary sharply between roles. Battery Bay Attendants earn well above the national average, but MC&I Aides fall far below, suggesting that wage premiums are tied to operational importance rather than occupational category. • Indonesia, on the other hand, offers the highest earnings across both roles, pointing to strong demand for technical operators in its formal sector. • Brazil and Thailand show consistent earnings just above the national average, likely reflecting stable wage-setting frameworks. • Meanwhile, India remains at the bottom, with earnings slightly below average, reinforcing the undervaluation of support roles in its labour market.
Reference Slide	*Page 129 (Appendix)*	*Page 130 (Appendix)*

Source: Desk research, consultant analysis

Occupational earnings comparison – a summary of findings across the key occupational groups identified for the proposed Gigafactory

Skill Level	Professionals	Technicians and Associate Professionals
Key Findings	• Professional earnings in Brazil are not only high but remarkably consistent, which speaks to the strength of its institutional wage-setting and vocational alignment. • Indonesia and Thailand follow a similar pattern, offering uniform earnings across roles, suggesting structured compensation systems. • India shows decent earnings for engineers and accountants, but HR roles are notably less rewarded, hinting at uneven valuation across professions. • South Africa's earnings are more variable and generally lower, with only chemical engineers approaching parity., pointing to a fragmented wage structure where high-skill roles outside core engineering are not consistently recognised.	• Safety Inspectors in South Africa earn just below the national average, reinforcing the trend of undervaluing mid-tier technical roles. • Indonesia again leads, with earnings more than triple the national average, highlighting the premium placed on compliance and safety in its formal industrial base. • Thailand and Brazil follow with strong earnings, suggesting institutional support for technical oversight roles. • India's earnings are solid but less differentiated, indicating broader wage compression across technical occupations.
Reference Slide	*Page 131 (Appendix)*	*Page 132 (Appendix)*

Source: Desk research, Consultant analysis

Occupational earnings comparison – a summary of findings across the key occupational groups identified for the proposed Gigafactory.

Skill Level	Clerical Support Workers
Key Findings	• South Africa's clerical roles fall below the national average, with Production Coordinators and Purchasing Officers earning relatively 0.9 and 0.6 respectively. This suggests limited wage recognition for administrative functions, even in industrial settings. • Indonesia stands out with the highest earnings, more than double the national average, indicating strong demand and possibly a shortage of skilled clerical staff in formal sectors. • India and Thailand offer moderately elevated earnings, pointing to structured wage floors and growing formalisation. • Brazil's consistent earnings just above average reflect stable wage-setting but limited upward mobility for clerical roles.
Reference Slide	*Page 133 (Appendix)*

Source: Desk research, consultant analysis

Labour Market and Wage Benchmarking – Based on the assessment done to look at and compare the occupational earnings, several key findings have been identified

Wage Benchmarking and Productivity findings

South Africa's Wage Premium Is Role-Dependent	South Africa offers significantly higher wages for craft, plant, and professional roles compared to India and Indonesia, but its advantage narrows or reverses in some clerical and technical professions, reflecting uneven wage-setting coverage across occupations.
Institutional Wage Setting Drives Higher Pay in South Africa	Sectoral bargaining councils and strong labour protections underpin elevated wages in South Africa, especially in mining, chemicals, and skilled trades. These institutions enforce wage floors that often exceed market rates.
India and Indonesia: Low Wages Rooted in Informality	With informality rates exceeding 80%, India and Indonesia exhibit the lowest wages across all occupational groups. Fragmented wage-setting, weak enforcement, and oversupply of low-skilled labour suppress earnings.
Brazil's Wages Reflect Formalisation and Statutory Floors	Brazil's declining informality (~38%) and widespread use of a national minimum wage contribute to relatively higher salaries, particularly in clerical and professional roles. Labour protections and recent reforms have bolstered wage stability.
Professional Salaries Reveal Mixed Competitiveness	South Africa's engineers and accountants earn salaries comparable to Brazil and above most Asian peers. However, roles like Electromechanical Technologists and HR Officers in South Africa earn less than in Brazil and Thailand, suggesting wage compression or weaker bargaining in these niches.
Clerical Roles Show Limited Wage Differentiation	In administrative roles, South Africa's wage advantage is modest or absent. Purchasing and inventory officers, for instance, earn less than their counterparts in Brazil and Thailand, reflecting weaker institutional wage support in non-core sectors.
Cost of Living and Labour Costs Shape Wage Floors	South Africa's higher cost of living and stronger enforcement of labour standards justify its wage levels. In contrast, India and Indonesia's lower living costs and lax enforcement enable firms to maintain low wage structures.
Labour Market Dualism Persists Across All Countries	All five countries exhibit dual labour markets – formal and informal – with varying degrees of segmentation. South Africa's formal sector is more regulated, while India and Indonesia's informality undermines wage progression and worker protections.
South African wages lower than European nations	While South Africa's average salaries surpass those of India, Brazil, Indonesia, and Nigeria, they remain significantly below those of China and European nations, underscoring the critical role of productivity, industrialisation, and technological advancement in driving wage competitiveness.

Occupational earnings comparison – a summary of findings across the key occupational groups identified for the proposed Gigafactory

Skill Level	Craft and Related Trades Workers	Plant and machine operators, and assemblers
Roles considered	Battery maker/reconditioner	Battery bay attendant/battery bay repairer/Measurement, Control and Instrumentation (MC&I) Aides
Key Findings	• South Africa's wages for craft and related trades workers are substantially higher than in India and Indonesia, and moderately above those in Brazil and Thailand. This reflects the country's institutionalised wage-setting via bargaining councils, which enforce sectoral minimums above market rates. • India and Indonesia's low wages stem from high informality (over 80%), fragmented wage regulations, and weak enforcement. These conditions suppress wage floors and limit worker bargaining power. • Thailand's structured minimum wage system and lower informality (~55%) support relatively higher wages, though limited unionisation constrains further gains. • Brazil's declining informality and statutory wage floors bring its wage levels closer to South Africa's, particularly in lower-tier roles. • South Africa's higher productivity in capital-intensive sectors like chemicals and mining, combined with a higher cost of living and stronger labour protections, further explains the wage premium. • Germany leads in wages for craft and related trades workers, paying around 4x more than South Africa and nearly 20x more than Nigeria, reflecting its advanced industrial economy and strong labour standards.	• South Africa's wages for plant and machine operators vary by role. For Battery Bay Attendants, monthly earnings (USD 1460) are more than double Brazil's and significantly higher than in India and Indonesia. This is reflective of South Africa's strong wage-setting institutions and the role of bargaining councils in mining and heavy industry. • In contrast, Measurement, Control and Instrumentation (MC&I) Aides earn considerably less in South Africa (USD 381), falling below Brazil's USD 664. This suggests weaker wage coordination or lower union coverage in instrumentation support roles, possibly due to their classification outside core bargaining units. • India and Indonesia again reflect low wage floors, driven by high informality and limited enforcement. Thailand's moderate wage levels (USD 492 for Battery Attendants) are supported by national wage councils but remain below South Africa's due to lower productivity and weaker collective bargaining. • Germany pays the highest wages for plant and machine operators – almost 4x South Africa and far above Nigeria. China and Hungary offer mid-range wages, positioning them as competitive alternatives for skilled roles compared to South Africa.
Reference Slide	*Page 135 (Appendix)*	*Page 136 (Appendix)*

Source: Desk research, Consultant analysis

Occupational earnings comparison – a summary of findings across the key occupational groups identified for the proposed Gigafactory

Skill Level	Professionals	Clerical Support Workers
Roles considered	Mining Engineer, HR Officer, Accountant, Chemical Engineer,	Production Coordinator, Purchasing and Inventory Officer
Key Findings	• South Africa's professional salaries are generally competitive, though they vary by role. For Chemical Engineers and Cost Accountants, wages (USD 1909 and USD 1652 respectively) are on par with Brazil and well above India, Indonesia and Thailand. This reflects South Africa's relatively high labour costs in technical and financial professions, underpinned by skills scarcity and formalised wage structures. • For Electromechanical Engineering Technologists, South Africa (USD 1294) trails Brazil and Thailand, suggesting potential wage compression in this role or weaker bargaining leverage. • Mining Engineers and HR Officers also earn less than their Brazilian counterparts, despite South Africa's mining sector being a major economic pillar - possibly indicating wage oversupply (specifically for HR Officers) or wage stagnation in these roles. • India and Indonesia consistently report the lowest wages across all professional categories, shaped by high informality, surplus of graduates, and limited wage coordination. Thailand's mid-range salaries reflect its structured wage-setting and stronger industrial base, though still below South Africa's in most roles. • Germany pays the highest wages for professionals - about 8x South Africa and far above all other countries. China and Hungary sit in the mid-range, reflecting stronger industrial and economic structures compared to South Africa and Nigeria.	• South Africa's wages for Production Coordinators (USD 911) are higher than in India and Indonesia, but trail Brazil and Thailand by a narrower margin. For Purchasing and Inventory Officers, South Africa (USD 573) lags behind all comparators except India and Indonesia, suggesting relatively lower wage premiums in administrative support roles. • The modest wage differentials reflect the limited bargaining power and weaker union coverage typically associated with clerical occupations. In South Africa, these roles often fall outside centralised bargaining structures, resulting in more market-driven wage outcomes. • Brazil and Thailand's higher wages in these roles may be attributed to stronger formalisation and the influence of statutory wage floors. • India and Indonesia remain at the bottom of the wage spectrum, consistent with broader trends of high informality and low administrative wage benchmarks. South Africa's position – above the lowest-cost peers but below upper-middle-income comparators – highlights the constrained wage progression in non-technical support functions. • Germany leads clerical wages - nearly 6x South Africa and far above Nigeria. China and Hungary pay about twice South Africa's level, reflecting stronger industrial bases. Overall, South Africa sits above Nigeria but trails Europe, signalling cost advantages yet persistent productivity gaps.
Reference Slide	*Page 137 (Appendix)*	*Page 138 (Appendix)*

Source: Desk research, Consultant analysis

Occupational earnings comparison – a summary of findings across the key occupational groups identified for the proposed Gigafactory

Skill Level	**Technicians and Associate Professionals**
Roles considered	Safety inspector
Key Findings	• South Africa's Safety Inspectors earn USD 1508/month, which is lower than Brazil (USD 1127) and Thailand (USD 942), but higher than Indonesia (USD 452) and India (USD 309). This places South Africa in the mid-range of the comparator group. • Brazil's higher wage reflects the country's strong regulatory enforcement, unionised safety roles, and the integration of safety functions within large, formalised industrial firms. • Thailand's relatively high salary suggests that safety roles are institutionally recognised, likely due to its export-oriented manufacturing sector where compliance is critical. • South Africa's moderate wage level may reflect a lack of wage progression for safety roles despite the strategic importance of the function in sectors like mining and construction. • The relatively low wage in India and Indonesia aligns with broader trends of high informality, limited regulatory enforcement, and underinvestment in occupational safety systems • Germany leads safety inspector wages at over USD 7673 – nearly 9x South Africa and far above all others – while China and Hungary offer mid-range pay (USD 3218 and USD 2528). South Africa and Nigeria remain at the bottom, signalling cost advantages but gaps in safety
Reference Slide	*Page 139 (Appendix)*

Source: Desk research, Consultant analysis

Labour Market and Wage Benchmarking – South Africa's monthly wage bill compared to compactor countries for the proposed Gigafactory

Rationale: A comparative wage bill analysis was conducted to assess the cost structure of operating a 5GWh Gigafactory across key emerging markets, including South Africa, Brazil, India, Indonesia, and Thailand. This exercise is critical for several reasons:

- It allows viewing localisation through a competitiveness lens, helping stakeholders understand how South Africa's labour cost structure compares globally.
- These estimates are valuable when sourcing financing, as they provide a realistic picture of operational expenditure and can inform investment decisions, cost-benefit analyses, and risk assessments.
- The insights can guide policy and incentive design to improve South Africa's attractiveness as a manufacturing destination, especially in high-growth sectors like battery production.

- Based on the proposed employee numbers shared with the consultant for a 5GWh Gigafactory, an estimated monthly wage bill has been calculated using the estimated gross monthly occupational wages that have been identified and benchmarked above. This shows how labour costs are distributed across different roles and processes, and to inform budgeting, workforce planning, and localisation strategies.

- The identified roles are spread across the three core production processes: **electrode manufacturing, cell assembly, and cell finishing.**

Overall, the wage distribution reflects a production-heavy cost structure, with operational and technical roles absorbing the bulk of labour expenditure. This aligns with the nature of battery manufacturing, where skilled operators and maintenance teams are indispensable.

The insights from this exercise are valuable for assessing localisation potential, as they highlight where labour investments are concentrated and where efficiencies might be pursued.

Overall Wage Bill For The Proposed Gigafactory

- Total monthly wage bill: USD 593 315 across all occupations benchmarked
- Benchmark aligns with pre-feasibility study values

Major Contributors

- Board-Level Roles: USD 1.26 million (largest contributor) – notable given their strategi oversight and governance responsibilities
- Equipment Operators: USD 356k (second largest contributor) - largest share due to mechanised, process-driven operations
- Maintenance Technicians: USD 93k (third largest) - Critical for minimising downtime

Mid-Level Roles

- Quality Inspectors and Logistics Operator: USD 58k each – highlighting focus on product assurance and material flow
- Emphasis on product assurance and material flow

Supporting Roles

- Warehouse Staff: USD 36k
- Manufacturing Engineers: USD 22k
- Essential staff required for the business with a moderate cost impact

Lean Areas

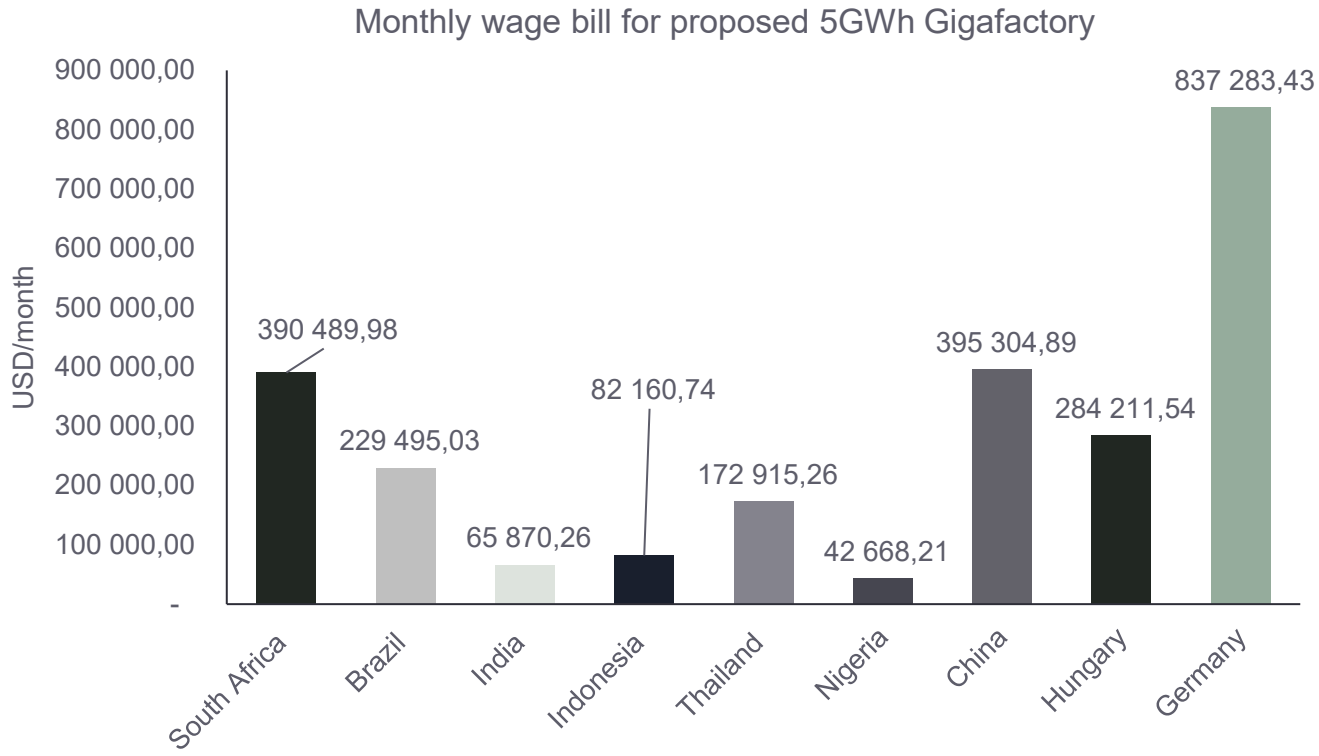
- Overhead Supervisors: USD 20k
- Quality Engineers: USD 11k
- Suggest lean staffing possibly due to shared responsibilities and a flatter organisational structure

Support Functions

- Finance: USD 7.2k
- HR: USD 6.4k
- Strategy: USD 7.7k
- Purchasing: USD 10k
- Smallest cost share, likely centralised or limited headcount

Labour Market and Wage Benchmarking – South Africa's monthly wage bill compared to other countries for the proposed Gigafactory

Labour distribution across key roles in a 5GWh battery manufacturing facility	
Occupation	**Number of employees**
Equipment operator	244
Logistic operator	68
Quality engineer	9
Quality inspector	68
Manufacturing Engineer	17
Overhead (supervisor)	24
Maintenance Technician	72
Warehouse	28
HR	5
Finance	8
Board	8
Strategy	6
Purchasing	11



- There is a strong concentration in operational roles like equipment operators (244) and maintenance technicians (72), which directly drives the wage bill up. Roles with fewer employees, such as HR (5) and finance (8), contribute minimally to the overall wage cost, reinforcing how headcount structure shapes total labour expenditure.
- The chart above depicts monthly wage bills across the countries, highlighting South Africa as the most expensive, which has implications for cost competitiveness and localisation strategy. The gap between South Africa and other countries is notable, especially when compared to India and Indonesia, where wage bills are less than a quarter of South Africa's as well as Germany's which is significantly higher.
- South Africa's wage bill is significantly higher than Nigeria, India and Indonesia's, suggesting a less cost-efficient labour environment, which may impact competitiveness unless offset by productivity or strategic advantages.

Labour Market and Wage Benchmarking – Benchmarking wage efficiency across the selected countries

Rationale: An analysis comparing wage per employee in a Gigafactory to the national average income by country was done and calculated the absolute wage per employee. This analysis was necessary to assess how wage levels in battery manufacturing compare to national income benchmarks, offering a clearer view of labour cost intensity in each country. It aids in identifying where wages are proportionally high or low, which is crucial for evaluating cost efficiency, competitiveness, and the financial viability of localisation.

South Africa

- Wage per employee: USD 5222
- Ratio to national average: 1.38×
- May challenge competitiveness unless offset by productivity or incentives

Brazil

- Wage per employee: USD 2020
- Ratio to national average: 3.42×
- High relative labour cost burden and misalignment with productivity levels

India, Indonesia and Thailand

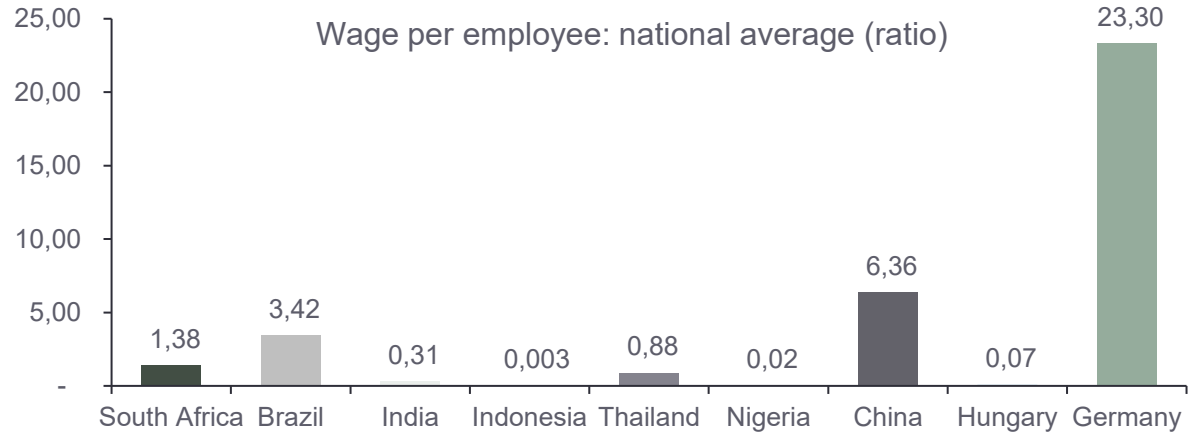
- Lowest wage levels and ratios
- Strong cost efficiency and attractive for labour-intensive operations
- Moderate wages - ratio below 1 in Thailand. Wages aligned with time-based productivity

Germany

- Highest wage per employee – USD 7370
- Ratio to national average: 23.3 x
- Germany's wages are 5x South Africa's, reflecting advanced productivity and strong labour market standards.

China

- Wage per employee: USD 3480
- Ratio to national average: 6.36
- China's wages are mid-tier and are about 2.6x South Africa's, indicative of competitive pay driven by industrial scale and technology.



Labour Market and Wage Benchmarking – Insights from Africa, South America, Europe and Asia: Wages versus Productivity

Rationale: Productivity per employee was evaluated to assess whether wage levels are commensurate with output, ensuring the analysis goes beyond costs to include efficiency and value creation. Beyond wage comparisons, productivity measures were added to assess whether wage levels are justified by output, ensuring the analysis reflects efficiency rather than cost alone. Linking wages to productivity helps identify which countries offer better value for employers.

Germany

- GDP per hour: USD 98.4 vs Productivity per employee: USD 72.54 (4.8x that of South Africa)
- High wages supported by high output
- Efficiency per time unit very high, and wages remain commensurate with output

Hungary

- GDP per hour: USD 57.1 vs Productivity per employee: USD 33.61 (2 x that of South Africa)
- Wages slightly above South Africa. Offers better employer value
- Longer working hours dilute hourly efficiency, with wages relatively high vs hourly output

South Africa

- GDP per hour: USD 21.6 vs Productivity per employee: USD 15.10 (moderate performance)
- Skilled wages high vs Brazil/India. Raises cost-competitiveness concerns
- Mid-tier per employee, moderate hourly rate.

China

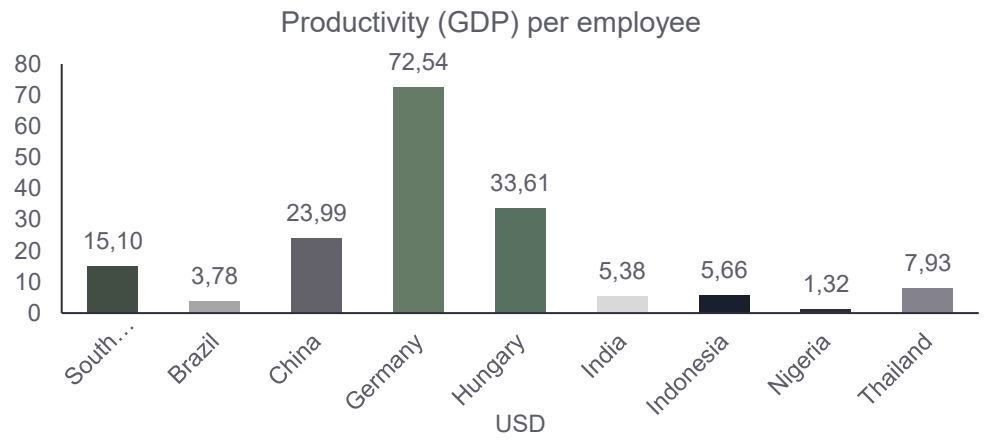
- GDP per hour: USD 63.3 vs Productivity per employee: USD 23.99 (strong performance compared to Brazil and other Asian countries)
- Strong hourly efficiency and rising wages balanced by scale
- Wages rising, balanced by efficiency and scale of operations

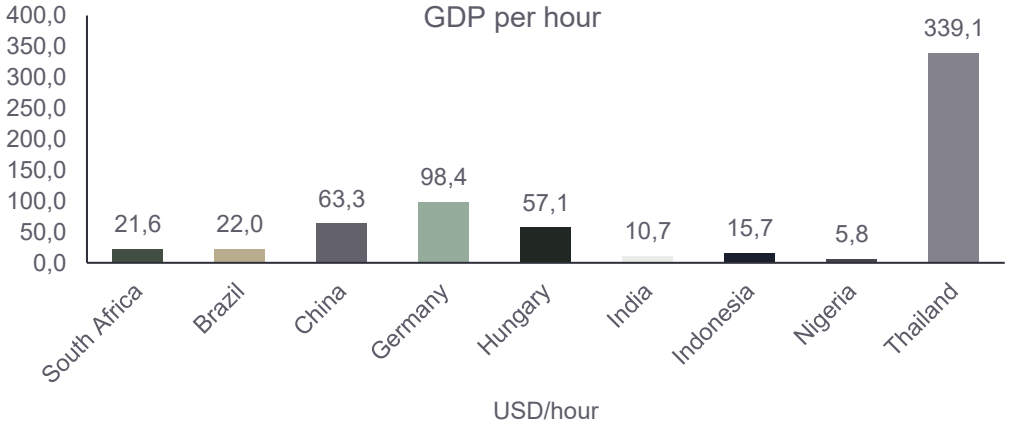
Brazil

- GDP per hour: USD 22 vs Productivity per employee: USD 3.78 (very low compared to other countries)
- Longer hours offset low per-employee output with wages misaligned with productivity
- Wages not proportionately lower for all roles indicating some misalignment and potential inefficiencies

Thailand

- GDP per hour: USD 339.1 vs Productivity per employee: USD 7.93
- Time-based productivity aligns with wages. Appears cost-effective for labour-intensive work
- Productivity low, wages also low. Cost-effective for labour-intensive work





Source: International Labour Organisation

Labour Market and Wage Benchmarking – Insights from Africa, South America, Europe and Asia: Wages versus Productivity

Rationale: An analysis was conducted to assess/benchmarked labour cost competitiveness across countries by linking wages to productivity. Unit Labour Cost (ULC)) – measured as the ratio of average wage per hour to GDP per hour – provides a clear measure of how efficiently labour inputs translate into economic output, enabling strategic comparisons for investment and operational decisions. South Africa serves as the benchmark (ULC = 100). Countries with a lower ULC than South Africa are therefore more cost-competitive as they deliver output at a lower labour cost per unit of productivity. Conversely, higher ULC values indicate weaker cost competitiveness.

South Africa

- ULC benchmark at 100, indicating moderate cost competitiveness.
- Efficiency per time unit very high, and wages remain commensurate with output

Hungary

- ULC at 78.5, among the most competitive in the group. Wages slightly above emerging peers but supported by solid productivity.
- Offers strong employer value for efficiency-driven operations

Germany

- ULC at 106, close to South Africa, reflecting balanced cost-performance. High wages offset by high productivity, maintaining competitiveness
- Best suited for advanced, high-output sectors where efficiency is critical

China

- ULC at 202, indicating weaker cost competitiveness despite strong productivity. Rising wages outpace efficiency gains, eroding historical cost advantage
- Suitable for high-value operations but less attractive for low-margin industries

Brazil

- ULC is 292, among the highest, signalling poor cost efficiency compared to South Africa. Wages misaligned with productivity, creating structural cost pressures
- Longer hours do not offset low output, raising concerns about labour market inefficiencies

Thailand

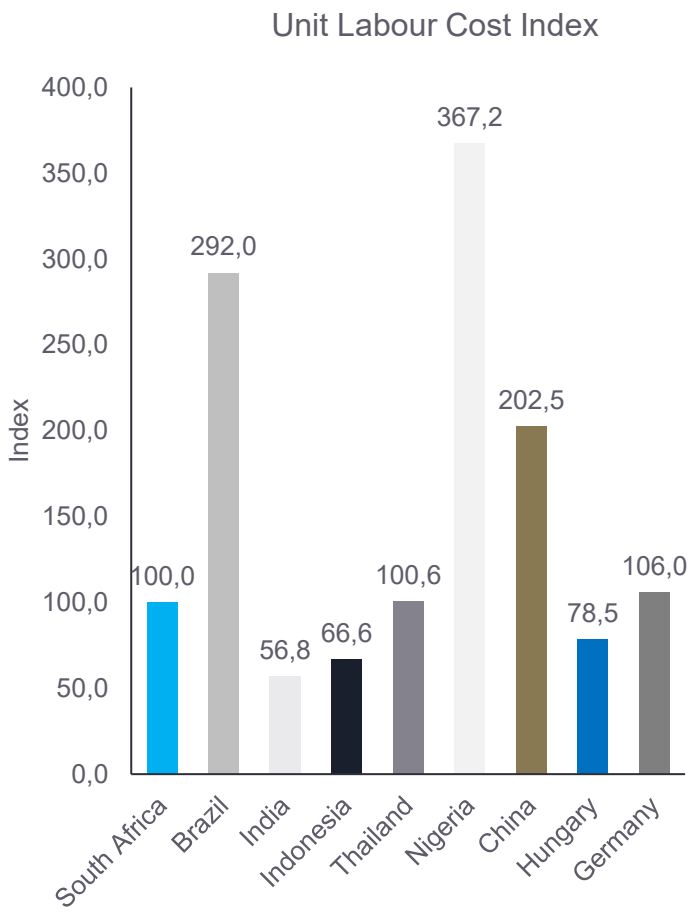
- ULC at 100.6, broadly aligned with South Africa. Balanced wage-productivity relationship, offering moderate competitiveness
- Cost structure supports labour-intensive work without significant efficiency penalties

Nigeria

- ULC at 367, the highest, reflecting severe cost inefficiency. Extremely high wages relative to output undermine competitiveness
- Structural wage-productivity imbalance suggests limited viability for cost-sensitive sectors

India and Indonesia

- India ULC at 56.8, the most competitive among peers. Low wages combined with reasonable productivity deliver strong cost advantage
- Indonesia ULC at 66.6, second-most competitive after India. Productivity and wages are both low, supporting cost-effective operations



South African Labour Market Dynamics – A Summary of Supporting Institutions, Programmes, Unions and Role-players in the LFP Battery Value Chain

Supporting Institutions

The Battery manufacturing facility could consider two SETA's in South Africa - the Manufacturing, Engineering and Related Services SETA (merSETA) and the Chemical Industries Education and Training Sector Authority (CHIETA).

- merSETA encompasses all Manufacturing, Engineering and Related Services. There are six chambers within merSETA including Metal and engineering, auto manufacturing, motor retail, tyre manufacturing, plastics manufacturing and components manufacturing.
- CHIETA aims to facilitate skills development and ensure the skills needs are identified and addressed through various training initiatives in the chemical and manufacturing industries.

Unions

In South Africa, there are several labour unions representing various sectors and industries. Of the unions, it is likely the following two are likely to be applicable to a manufacturing facility in South Africa:

- Congress of South African Trade Unions (COSATU): COSATU is the largest labour federation in South Africa. It represents over 20 affiliated unions, covering a wide range of sectors, including mining, manufacturing, public services, education, and more.
- National Union of Metalworkers of South Africa (NUMSA): NUMSA is one of the largest unions in South Africa, representing workers in the metal, engineering, and automotive sectors.

DSTI Energy Secretariat - Energy Storage Programme

- The Energy Storage programme supports R&D of energy storage technologies.
- The objective of this R&D is to develop value-added precursor materials, like lithium manganese oxide and lithium nickel manganese cobalt.
- The research involves computational modelling, precursor material development, cell manufacturing, and battery testing through a consortium of universities and science councils.
- These institutions include the University of Limpopo, the University of the Western Cape, the University of the Witwatersrand, Nelson Mandela University, the CSIR and NECSA.

Additional Stakeholders

- Department of Trade, Industry and Competition (DTIC)
- Department of Science, Technology and Innovation (DSTI)
- Department of Mineral Resources and Energy (DMRE)
- Industrial Development Corporation (IDC)
- Additional upstream and downstream players (See Modules 1 & 2 for additional stakeholders).

Financial Incentives & Policy Risk

1

Incentive Grants, Tax Allowances, Customs and Financial Incentives Mapping

2

SEZ Infrastructure and Operational Environment

3

Labour Market and Wage Benchmarking

4

Policy and Legal Risk Assessment

It is imperative to ensure the proposed Gigafactory aligns with national, provincial and local legislative requirements

Executive Summary: Policy and Legal Risk Assessment

Policy and Legal Risk Assessment

South Africa is prioritising battery manufacturing as a key sector for industrial growth, leveraging its rich mineral resources and established manufacturing base. National policies aim to foster local production, skills development, and innovation, positioning the country to meet rising demand from automotive, renewable energy, and grid storage markets.

The sector benefits from incentives, SEZ's, and strong research institutions, but faces challenges due to limited local cell manufacturing and a reliance on imported components. While there are clear opportunities for localisation and export, the industry must navigate a complex regulatory landscape and infrastructure constraints.

Manufacturers are required to comply with a wide range of environmental, social, and governance regulations at multiple government levels. Issues such as water and electricity supply, logistics, and skills shortages can impact operational reliability and cost competitiveness. High input costs and evolving policies add further uncertainty for investors.

Legal compliance is extensive, covering environmental approvals, waste management, labour laws, occupational health and safety, intellectual property, energy efficiency and technical standards. Meeting these requirements is essential for market access and risk mitigation.

Success in this sector will depend on early engagement with authorities, robust decarbonisation and efficiency strategies, investment in skills and local supply chains, and effective use of available incentives. With the right approach, South Africa can become a regional hub for battery manufacturing, but this will require coordinated action to address policy, infrastructure, and capability gaps.

Policy and Legal Risk Assessment Overview - regulatory triggers, operational best practices, and compliance imperatives for consideration

This summary distils the core purpose and objectives of the LSF battery manufacturing project by systematically reviewing the Environmental, Social, and Governance (ESG) requirements outlined in the full legal and policy review (Appendix 5.2). Each section is introduced with a focused paragraph that contextualises its relevance to battery manufacturing in South Africa. The analysis draws on regulatory triggers, operational best practices, and compliance imperatives, ensuring a holistic understanding of the project's obligations and opportunities. The final section synthesises the opportunities and risks table into a concise, evidence-based summary, highlighting the strategic landscape for battery manufacturing in the region.

The review of relevant South African legislation, certifications, standards, and policies related to the proposed battery cell manufacturing facility is intended to highlight key requirements for authorisations, permits, and licenses at the national, provincial and local level, and to provide guidance on compliance with these obligations.

Specifically, within the legal and policy review included :

(i) Environmental legal requirements are outlined in the Environmental section,

(ii) Labour, human resources, and safety legal requirements are discussed within the Social section,

(iii) Land use, arbitration, and intellectual property are encompassed under the Governance section.

The summary applied the following icon classifications:

	Legal and/or Policy requirement or risk
	Permitting aspect, including Environmental and Safety compliance
	Labour related laws and regulations, including Human Resources

Please note that the consultant does not operate as a law firm; accordingly, this review should not be regarded as a substitute for a comprehensive legal due diligence process.

Policy and Legal Risk Assessment Overview - Environmental Assessment Summary

Key findings and a high-level summary of the Environmental Risks and Legislative Findings

	Cross correlate technical / engineering design with environmental authorisation (EIA Regulations, Waste, Water Air emissions) activity triggers
	Borehole installation and water storage on site will require Department of Water and Sanitation consultation and/or approval. It is recommended that the facility installs water storage tanks on site for emergency supply.
	Waste classification (general or hazardous), temporary waste storage on site, removal services and final disposal to appropriately registered landfill site
	Extended Producer Responsibility (EPR) Regulations apply pertaining to waste management (i.e. battery recycling, etc) must be kept in mind when finalising product off takers.
	Biodiversity as well as protected area impacts is already considered as part of SEZ approval process. Consider sensitive areas within SEZ in development layout planning. Any sites within an SEZ that are close to sensitive areas (water bodies, wetlands etc.) may require additional approvals.
	Indigenous tree and plant species removal permitting the responsibility of the SEZ.

	No impact on any coastal zones within the SEZs assessed.
	The proposed facility must declare its GHG emissions contributions and establish and maintain a resource efficiency plan (or decarbonization strategy) to reduce its impact. The SEZs may require GHG reporting and/or environmental related reporting to ensure alignment with broader SEZ environmental strategies.
	Confirm geotechnical conditions with the selected SEZ which may affect engineering/technical designs.
	Hazardous substance inventory to be developed for construction and operational phases
	Consult relevant the relevant Metropolitan Municipality on wastewater / effluent treatment, air emission, groundwater abstraction approvals.
	Tie into approved SEZ stormwater management system to mitigate further approvals.
	Determine waste removal service provision and sign SLAs with waste removal contractors (if required).

Policy and Legal Risk Assessment Overview - Social Assessment Summary

Key findings and a high-level summary of the Social Risks and Legislative Findings

	SEZ confirmation of heritage impact conditions associated with the construction phase
	A legal team must provide comments on any Employment Contract/s and whether all aspects therein are compliant with the employment and labour laws in South Africa.
	A Group level Human Resource manual must be developed to guide alignment with / and implementation of the BCEA
	Pre-consultation is recommended with the Department of Employment and Labour to confirm all requirements with respect to labour laws. This includes aspects pertaining to: • Compensation for Occupational Injuries and Diseases, • Labour Relations, • Minimum Wage, • Skills Development, • Employment of Foreign workers • Unemployment Insurance
	Take note of current developments around Employment Equity sector-specific numerical targets for designated groups
	Prior to operations, a SHE policy, Baseline HSE Risk Assessment, and H&S plan would be required.
	A SHEQ representative (or a consultant to support the manufacturing operations on a retainer basis) must be appointed to ensure implementation of OHSA and all its applicable Regulations
	Consult relevant Metropolitan Municipality on health, fire safety, noise and scheduled activity approvals.

Policy and Legal Risk Assessment Overview - Governance Assessment Summary

Key findings and a high-level summary of the Governance Risks and Legislative Findings

⚠	Registration of Intellectual Property with CIPC - search prior art and file SA patent/ Patent Cooperation Treaty (PCT) national phase entry for novel chemistries/processes.
⚠	Most entities undertaking economic activity in South Africa, including organs of state, public entities, and private companies, are subject to B-BBEE measurement.
⚠	A Privacy Policy in line with Protection of Personal Information Act (POPIA) is required.
⚠	Should credit be provided as part of operations, take note of National Credit Act provisions.
⚠	A Consumer Protection Policy aligned with Consumer Protection Act will be required.
⚠	Legal team to confirm Companies Act registration requirements.
⚠	Competition Act provisions regarding anti-competitive practices like cartels, abuse of dominance, and mergers that substantially lessen competition to be noted.
⚠	Financial team to advise on Income Tax requirements.

	Carbon Tax specialist to advise on possible incentives in terms of the Carbon Tax Act for the operations (and whether it can be classified as an “approved project” as per the Carbon Offset Regulations).
⚠	Recommended to include arbitration clause aligned with the International Arbitration Act UNCITRAL Model Law for cross-border supply, JV, and licensing agreements.
⚠	Contractors used during the construction phase must be registered with the Construction Industry Development Board.
⚠	Should the manufacturing plant be larger than 2000m^2, take note of the Energy Performance Certificate requirements in terms of the National Energy Act
⚠	Operations might need a generation licence from the National Energy Regulator of South Africa (NERSA), depending on the size and power of any Pv solar system installed.
⚠	New building structures to comply with National Building Regulations and Building Standards Act.
⚠	Manufacturers must register with the National Regulator for Compulsory Specifications (NRCS) and ensure their products comply with relevant compulsory specifications and standards.
⚠	Consult relevant Metropolitan Municipality by-laws on Land Use Planning and business licensing requirements in conjunction with SEZ criteria

Summary of Policies and Strategies – Key Risks and Opportunities Identified

South Africa's battery manufacturing sector benefits from strong policy frameworks, mineral resources, and industrial capacity. However, it faces challenges such as policy misalignment, infrastructure constraints, skills shortages, and regulatory complexity. Success will depend on coherent policy execution, investment in skills, and resilient supply chains

Opportunities

- Several policies, plans/programmes, and frameworks in place which outline and discuss localization, value chain directions, targeted financing, skills development, infrastructure investment, and innovation support
- Limited local cell manufacturing (an opportunity)
- Battery manufacturing is positioned as a strategic growth area within the broader context of energy storage, green industries, and advanced manufacturing
- South Africa's abundant mineral wealth (manganese, vanadium, nickel, lithium), strengths in raw material extraction and battery pack assembly
- Incentive Schemes which support any proposed investment in battery cell manufacturing
- Established manufacturing base
- Strong tertiary institutions and R&D hubs (CSIR, Wits, UCT),
- Preferential trade agreements (AfCFTA, EU EPA).
- Growing demand from the automotive and energy (green hydrogen, and renewables)
- Initiatives such as One Stop Shop which supports and facilitate energy project applications
- SEZ and provincial initiatives, programs and strategies which support and guide the green economy available

Risks/Constraints

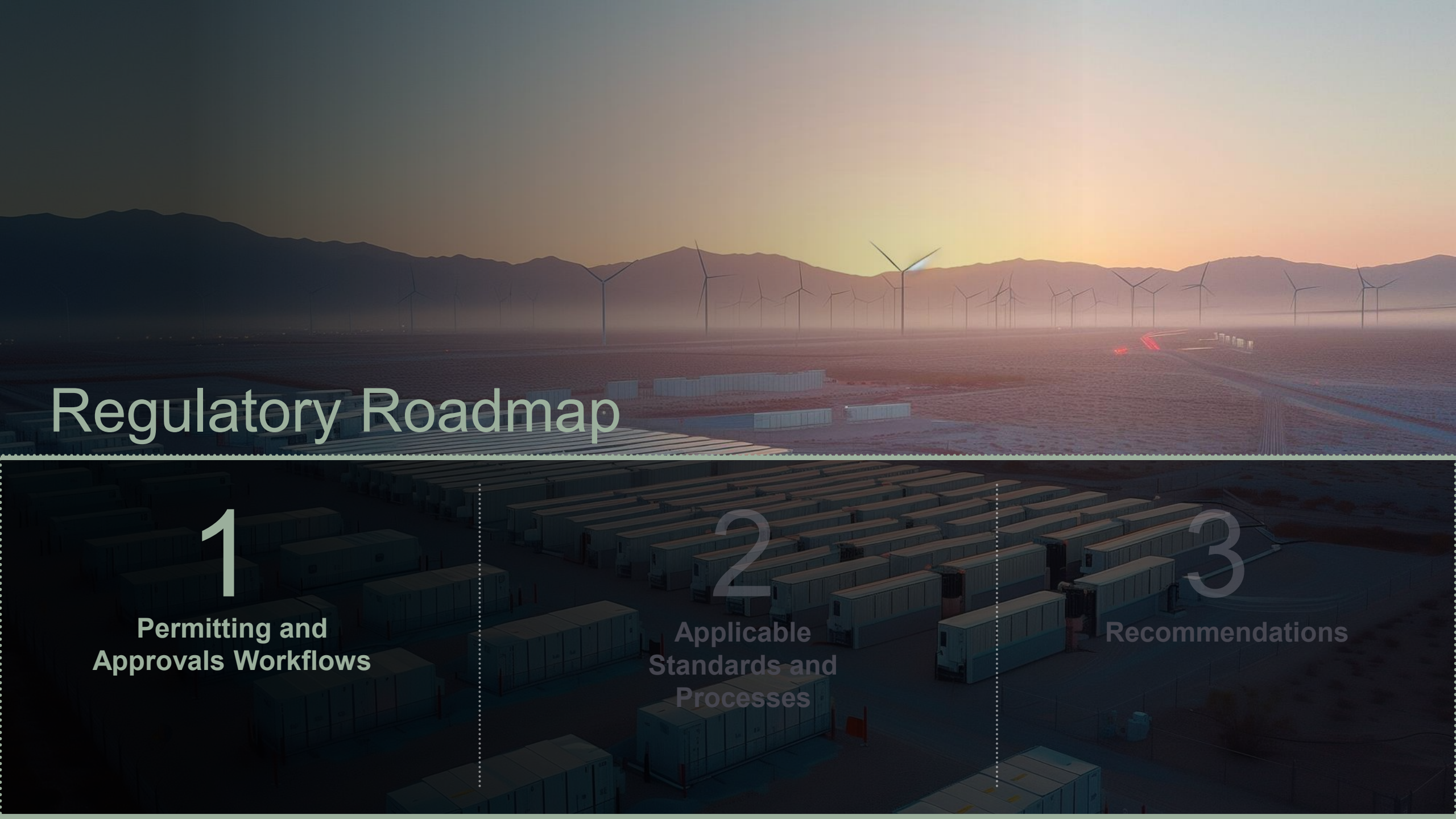
- Lack of policy coherence and programme alignment
- Long-term certainty - There's a notable absence of stable, long-term incentives for battery manufacturing
- Concentration of ownership and control
- High private sector input costs
- Water supply and availability
- Port tariffs, transport and logistic constraints
- Customs challenges
- Evolving industrial policy [i.e. recognition of BESS]
- Grid constraints and load shedding
- Skills Shortage - expertise in electrochemical engineering and battery cell production
- Access to finance for new entrants
- Extensive Environmental and Safety regulatory regime (approval processes can take up to a year)
- Geopolitical and supply chain risks
- AGOA uncertainty
- No local production of battery-grade lithium, graphite, or foils, which limits upstream integration and domestic value capture. South Africa lacks the manufacturing capabilities for producing key battery components like spherical graphite, making it a net importer of value-added products (also an opportunity)

Regulatory Roadmap

Module 4

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY



Regulatory Roadmap

1

Permitting and Approvals Workflows

2

Applicable Standards and Processes

3

Recommendations

Mapping dependencies and timelines ensures alignment with regulatory and construction milestones

Critical Path and Dependencies

	Activity	Indicative duration / timing	Dependencies / Key notes
1	**Finalisation of SEZ lease agreement**	• 2-6 months	• Must be concluded before site mobilisation or utility upgrade commitments.
2	**Environmental requirements**	• Basic Assessment:.6-8 months (197 to 247 days) • Full EIA: 10-12 months (300 to 350 days) • Water Use Authorisation (GA or WUL) - 3 to 12 months	• Can run in parallel with governance. Required for activities not authorised in SEZ (or any development outside of SEZ., or any alternative water source
3	**Governance requirements**	• Up to 12 months	• Includes town-planning, IP, Company registration, Policy development, etc. Overlaps with environmental processes.
4	**Social requirements**	• 3 to 6 months before operations (then ongoing compliance monitoring and report back)	• Covers labour and employment compliance (BCEA, UIF, COIDA, EEA, etc), skills development, and union engagement if relevant.
5	**Electricity requirements (SEZ upgrade)**	• Up to 3 years	• Atlantis SEZ indicates grid upgrade from 90 MVA to ≈ 133 MVA to meet 43 MVA demand. Start early.
6	**Land approval & infrastructure readiness**	• To end 2027	• Dube TradePort Zone 3 approvals by end-2026. • + /- 1 year for infrastructure (roads, water, sewerage).
7	**Phase 1 factory build (5GWh)**	• 24-30 months	• Begins once land, lease, and environmental approvals are in place. Includes construction, equipment install, and commissioning.
8	**Phase 2 expansion (10GWh total)**	• 18-24 months	• Follows Phase 1; leverages existing infrastructure and workforce.

Regulatory Roadmap

1

Permitting and Approvals Workflows

2

Applicable Standards and Processes

3

Recommendations

When assessing the products being sold by the Gigafactory, there are several standards and certifications that would need to be consider from a technical perspective.

Executive Summary: Standard and Certifications

Standards and Certifications

When considering standards and certifications, a review of national and international standards has been provided. In addition to these considerations, the facility should consider the final off takers and ensure if the off takers require specific certifications and/or standards to be applied to the products.

Key considerations to note include:

- If there is an export focused market, that the batteries would need comply with the relevant export standards of the country receiving the batteries.
- Off takers may have unique certification requirements to ensure alignment with procurement processes.
- There are various national certificates from SANS related to quality, safety and packaging that will need to be factored into the manufacturing process and ensuring the final product is aligned with the standards.
- Internationally, there are ISO and IEC related standards and certifications related to safety, performance and the management of risks (i.e., environmental, occupational health and safety, energy, automotive etc.).
- If supplying the automotive sector in South Africa, the battery need may need to go through homologation process in line with the National Regulator for Compulsory Specifications (NRCS) to account for the imported components.
- A World Bank Study (*South Africa & Southern Africa Battery Market & Value Chain Assessment Report, 2021*) indicated that there is a lack of standards for storage batteries in South Africa as well as a lack of testing and certification facilities in the country which may hamper the certification of locally produced products. Entities such as the NRCS and the South African Bureau of Standards (SABS) would need to support with the development of relevant standards and testing capabilities for local battery manufacturers.

Summary of Standards and Certifications

Key findings – high-level identification of applicable Certifications and Standards

Standards and Certifications *	
International	**National**
• Recommended certifications (ISO 9001, ISO 14001, ISO 45001, ISO 26262, ISO 50001, and ISO/IATF 16949 (2016)] pertaining to functional safety for automotive batteries, quality management, environmental management, occupational health and safety, energy management as well as automotive quality management	• SANS 62619 - Safety for secondary lithium cells/batteries (industrial/EV)
• IEC 62619:2022 - Safe operation of secondary lithium cells and batteries	• SANS 62620 - Performance and safety for large-format lithium cells
• IEC 62485-2 - Stationary battery installation safety (UPS/EES on site)	• SANS 62485-2 - Safety for secondary batteries and installations (maximum nominal DC voltage of 1,500 V)
• IEC 60086 - Primary battery safety and performance (technical team to confirm applicability as this pertains to non-rechargeable cells)	• SANS 60269-7 - Fuse protection for batteries and battery systems.
• UN Manual of Tests and Criteria Rev.8 (2023) and Amendment 1 to Rev.8 (2025) - Criteria, test methods and procedures to be used for the classification of dangerous goods	• SANS 10228 - Lithium-ion batteries are classified as Class 9 dangerous goods
	• SANS 62133-2 - Safety requirements for secondary lithium systems
	• SANS 56005 - Lithium-ion battery use in lighting applications
	• SANS 10229 – Packaging of dangerous goods for safe transport
	• SANS 60095 - The standard is a specific standard for lead-acid batteries used in vehicles. However, as LFP batteries are now commonly used in place of lead-acid batteries, it is reasonable to assume that SANS 60095 would apply to them.

**Technical team to verify applicability*

Regulatory Roadmap

1

Permitting and Approvals Workflows

2

Applicable Standards and Processes

3

Recommendations

Module 3 and 4 Recommendations and Key Considerations

Executive Summary: Standard and Certifications

Recommendations

Based on the findings for Module 3 and 4, the following key recommendations have been noted. These recommendations will be updated based on additional engagements with the client as well outstanding.

If the Gigafactory plans to participate in the automotive value chain, they will need to become approved OEM suppliers for the South African OEM supply chain. This will ensure that as a facility approved/accredited by the local OEM manufacturer(s) and importer(s), they will be able to supply vehicles with batteries.

Ongoing engagement with various stakeholders is required to discuss and lobby for the inclusion of after market parts in the AIS and APDP2. This will widen the mandate to include aftermarket parts, as the AIS and APDP2 currently only cover the manufacture of parts in the OEM supply chain. For the purpose of clarity, AIS covers both AIS and the MHCV-AIS.

From the incentive/tax/customs perspective, each application will be treated on merit and may have its own complexities. As a result there are no set/defined timelines in place for the application and approval processes and this should be factored into the financial and operational planning aspects.

Review the technical info/ engineering design/ operational requirements and cross correlating it to the legislative requirements and information obtained from the SEZs (to determine if any gaps/ requirements in permitting and authorisations lie).

There is a lack of standards for storage batteries in South Africa as well as a lack of testing and certification facilities in the country which may hamper the certification of locally produced products. Entities such as the NRCS and the South African Bureau of Standards (SABS) would need to support with the development of relevant standards and testing capabilities for local battery manufacturers.

Appendix

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY

Glossary – Modules 1 & 2

Abbreviation	Meaning
AAM	Anode Active Material
AfCFTA	African Continental Free Trade Area
Afrexim	African Export-Import Bank
AIS	Automotive Investment Scheme
APDP2	Automotive Production and Development Programme – Phase 2
BEV	Battery Electric Vehicle
BESS	Battery Energy Storage System
CAGR	Compound annual growth rate
CAM	Cathode Active Material
CAPEX	Capital Expenditure
C&I	Commercial & Industrial
CV	Commercial Vehicle
DFI	Development Finance Institution
dtic	Department of Trade, Industry and Competition (South Africa)
EFTA	European Free Trade Association
EMS	Energy Management System
EPC	Engineering, Procurement and Construction
EV	Electric Vehicle
$FePO_4$	Iron Phosphate (battery cathode material)
GHG	Greenhouse Gas
GWh	Gigawatt-hour
HCEV	Heavy Commercial Electric Vehicle
IP	Intellectual Property
IPP	Independent Power Producer
IRP	Integrated Resource Plan (South Africa)

Abbreviation	Meaning
JV	Joint Venture
KPC	Key Procurement Criteria
Kt	Kiloton (1,000 metric tons)
LCE	Lithium Carbonate Equivalent
LCV	Light Commercial Vehicle
LFP	Lithium Iron Phosphate (battery chemistry)
Li-ion	Lithium-ion (battery chemistry)
MWh	Megawatt-hour
NDP	National Development Plan (South Africa)
OEM	Original Equipment Manufacturer
OPEX	Operating Expenditure
PV	Passenger Vehicles
Pv	Photovoltaic
R&D	Research & Development
SAM	Serviceable Addressable Market
SAREM	South African Renewable Energy Masterplan
SEZ	Special Economic Zone
SOM	Serviceable Obtainable Market
TAM	Total Addressable Market
TCO	Total Cost of Ownership
UPS	Uninterruptible Power Supply
USP	Unique Selling Proposition
VAT	Value Added Tax

Glossary – Modules 3 & 4

Abbreviation	Meaning
AIS	Automotive Investment Scheme
APDP2	Automotive Production and Development Programme – Phase 2
BESS	Battery Energy Storage System
CCA	Customs Controlled Area
CCAE	Customs Controlled Area Enterprise
CIP	Critical Infrastructure Programme
CIT	Corporate Income Tax
dtic	Department of Trade, Industry and Competition
ETI	Employment Tax Incentive
ILO	International Labour Organisation
MC&I	Measurement, Control and Instrumentation
MHCV-AIS	Medium-Heavy Commercial Vehicle AIS
MSP	Manufacturing Support Programme

Abbreviation	Meaning
NRCS	National Regulator for Compulsory Specifications
OEM	Original Equipment Manufacturer
QES	Quarterly Employment Statistics
OFO	Organising Framework for Occupations
PLI	Production Linked Incentives
QLFS	Quarterly Labour Force Survey
R&D	Research and Development
SABS	South African Bureau of Standards
SENAI	Serviço Nacional de Aprendizagem Industria
SEZ	Special Economic Zone
SPII	Support Programme for Industrial Innovation

This report is based on multiple sources including a high number of market expert interviews

Research program - reports and other sources

Industry association reports and Databases

- Greencape Energy Report (2024, 2025)
- Global Data (2025)

Governmental institutions reports

- South African Renewable Energy Masterplan (SAREM)
- National Development Plan (NDP 2030)
- Integrated Resource Plan (IRP 2019)
- Department of Trade, Industry and Competition (dtic) policy documents

General market reports

- Wood Mackenzie, Feb. 2025, Battery cells market & producers' capacity
- World Bank Flagship report, Nov. 2023, South Africa & Southern Africa
- Battery Market & Value Chain Assessment Report
- Global EV Outlook 2025, May 2025

Other sources

- Interviews with market participants (customers and competitors) and industry experts
- Lithium Primary Batteries Global Market Opportunities And Strategies To 2031, The Business Research Company, October 2022
- Solid-State Battery Global Market Opportunities And Strategies To 2032, The Business Research Company, Nov 2023
- Africa’s Competitiveness in Global Battery Supply Chains, The Faraday Institution, October 2024

Appendix

1

Addressable Market

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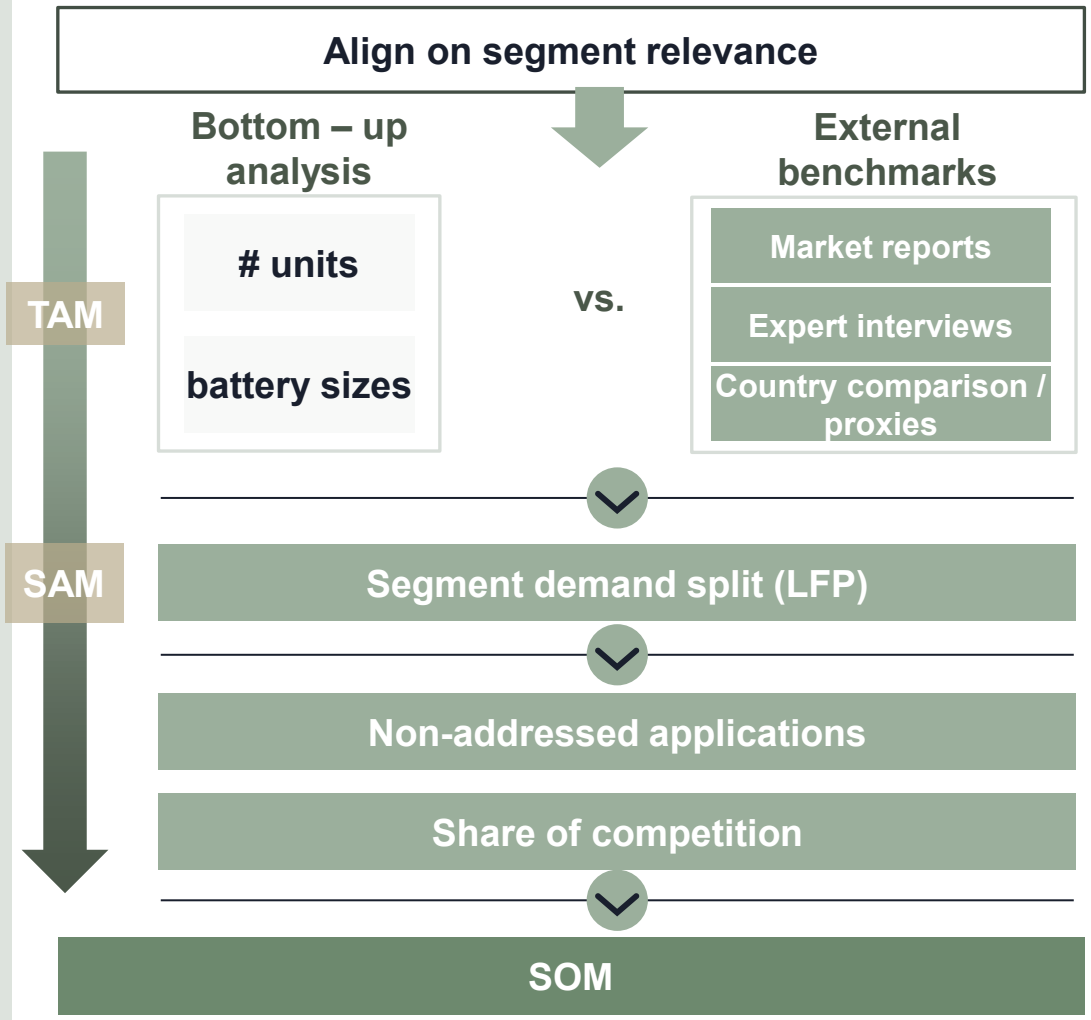
Labour and Wage Benchmarking

3

Legal and Policy Assessment

Our demand analysis filters through several steps to pinpoint a domestic manufacturers final serviceable obtainable market in South and Southern Africa



	Description	Assumptions
TAM	▪ **Total** South & Southern African **market demand** for Li-ion battery cells, incl. all potential applications	▪ **Assumes no constraints** in terms of chemistry, addressable segments and sub-segments, regulations, or production capacity
SAM	▪ Part of the TAM, which a domestic manufacturer can **realistically target** based on its planned capabilities	▪ **Excludes non-relevant chemistries** (e.g., Hi-NiNMC, NCA, sodium-ion, solid state)
SOM	▪ Part of the SAM, which a domestic manufacturer can obtain in the short to mid-term (2025-34) **considering its strategic plan**	▪ Some sub-segments and **applications** are **excluded** as those are out of a domestic manufacturer's core focus ▪ **Excludes all competitor** market share

Appendix

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Addressable Market

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Labour and Wage Benchmarking

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Legal and Policy Assessment

Occupational Earnings vs National Averages Ratios – Overview of the Methodology Adopted

- **Wage Conversion**: In the initial wage benchmarking approach, occupational wages across countries were converted into South African Rand (ZAR) and compared directly. While this method is intuitive, it fails to account for differences in income levels, cost structures, and wage dispersion within each country. A salary that appears low in Rand (ZAR) terms may, in fact, be relatively high in its domestic context.

- **Ratio Calculation:** To address this, EY calculated the ratio of each occupation's wage to the national average income. National income data were sourced from Census and Economic Information Center (CEIC) in USD and converted to local currency using the 2024 annual average exchange rate. This method allowed EY to assess how well an occupation is being compensated relative to the average worker in its own country, offering a standardised, internally consistent benchmark.

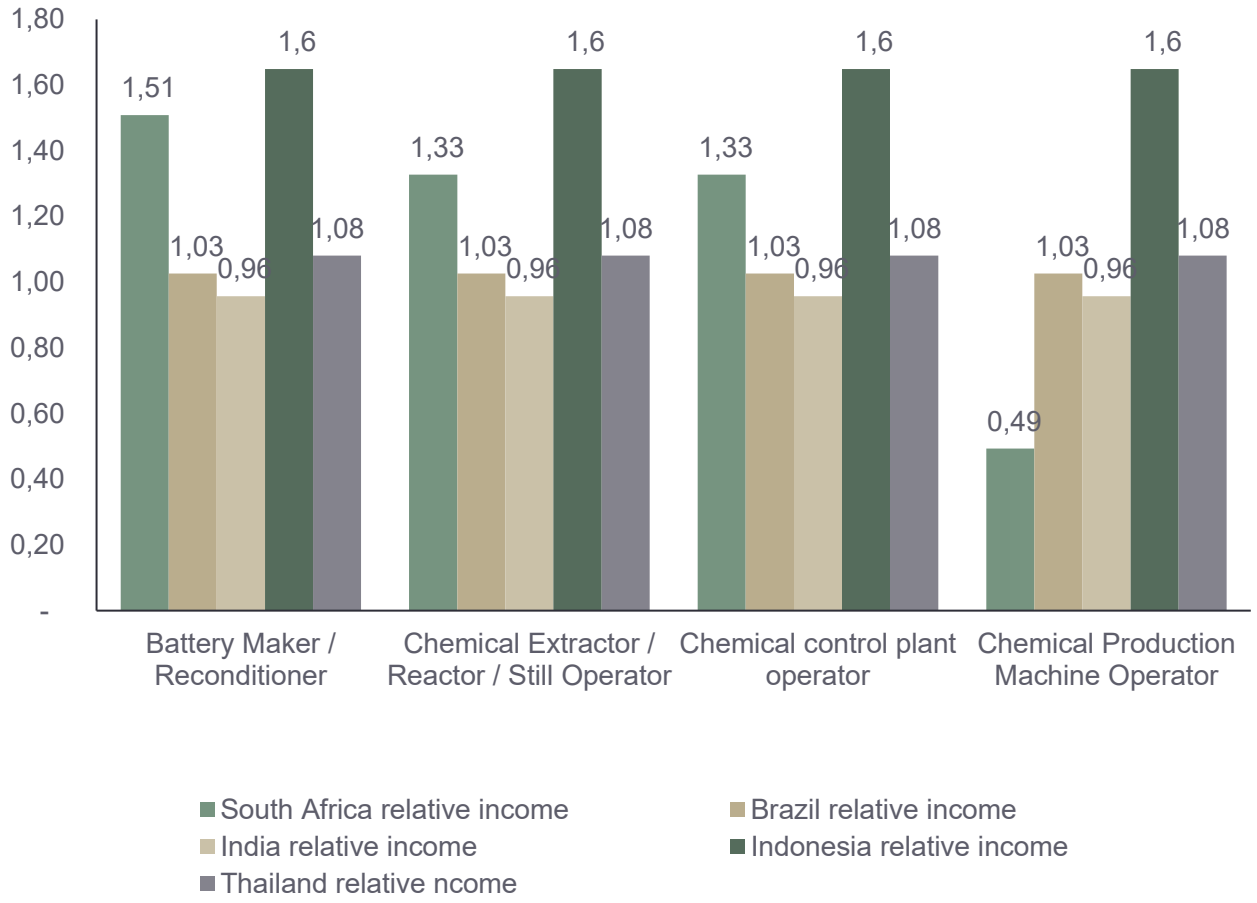
- **Value:** This approach is particularly valuable because:
  - It controls for currency volatility and purchasing power differences, which distort direct Rand-based comparisons.
  - It reveals wage compression or premiums within each labour market, highlighting structural inequalities or institutional wage-setting effects.
  - It aligns with best practices in comparative labour economics, where relative wage positioning is a key indicator of occupational value, bargaining power, and labour market segmentation.

- **Currency Conversion**: Importantly, this approach controls for currency volatility and purchasing power differences, which can distort direct comparisons. It also reveals the extent to which specific occupations are rewarded – or under-rewarded – relative to the average worker in each country. This is particularly useful in economies with high informality or wage inequality, where absolute wages may not reflect true labour market status.

In summary, this method shifts the focus from absolute earnings to relative labour market status, offering a more meaningful lens for understanding wage dynamics across diverse economies.

Occupational Earnings vs National Averages - Craft and related trades workers

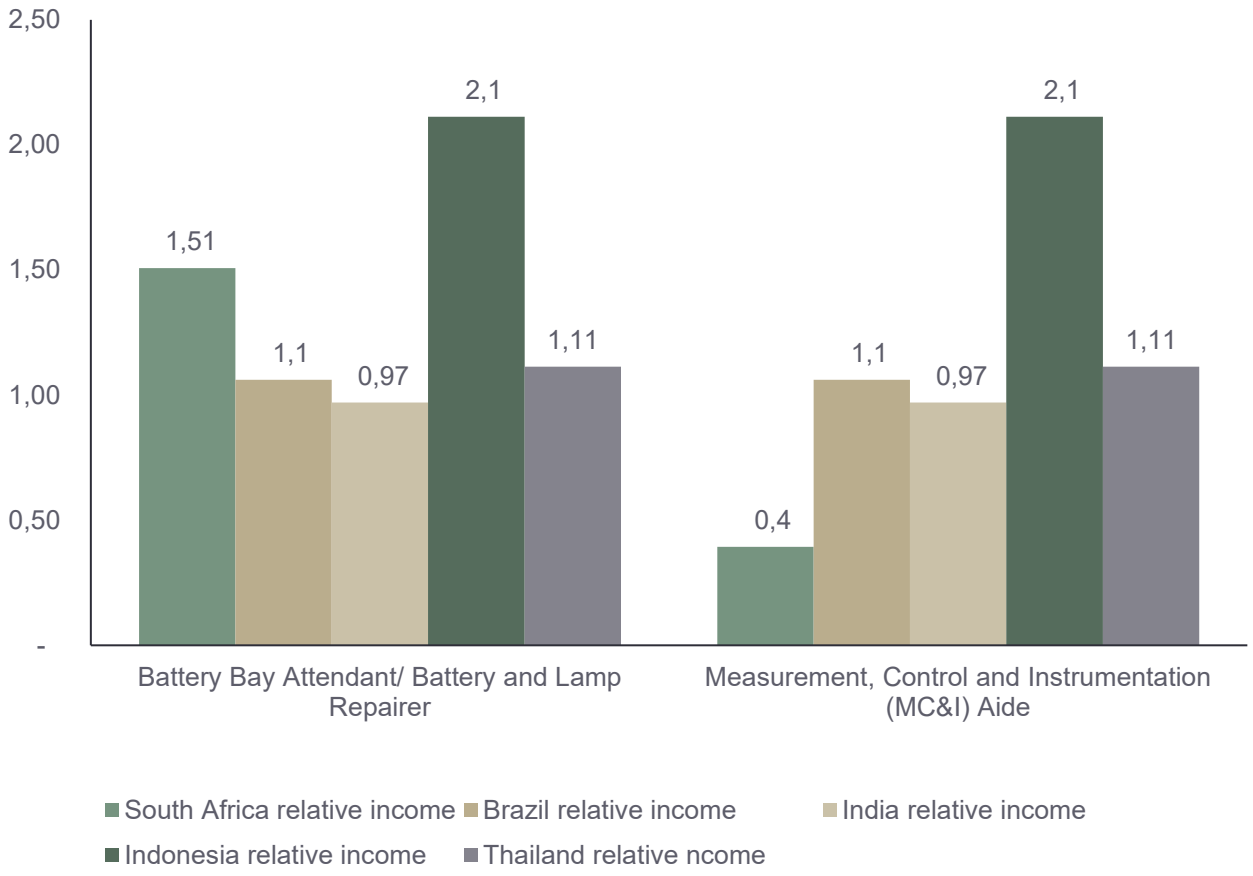
Chart 1: Occupational Earnings vs National Averages – Craft & related trades workers



- South African craft workers earn above the national average in three of the four roles, with ratios ranging from 0.49 to 1.51. This suggests that certain specialised trades (e.g., battery makers) are relatively well-compensated, while others (e.g., chemical production machine operators) remain undervalued. The variation reflects a partially compressed wage structure, shaped by centralised bargaining, but with room for role-specific premiums in niche industrial segments.
- Brazil's ratios are around 1.03×, indicating that craft workers earn just above the national average across all roles. This uniformity points to sectoral wage-setting mechanisms and vocational standardisation, likely supported by institutions such as Serviço Nacional de Aprendizagem Industria (SENAI), which help maintain wage parity across industrial occupations.
- India's craft workers earn just below (0.96) the national average. This reflects moderate wage suppression, likely due to high informality, skills oversupply (specifically engineers), and fragmented wage regulation. While not as severe as in other segments, the undervaluation of trades persists even in structured roles
- Indonesia shows the highest (1.6) relative wage ratios across all roles, indicating that craft workers earn significantly above the national average. This reinforces the presence of a dual labour market, where skilled trades in the formal sector command strong premiums due to scarcity and industrial demand, contrasting sharply with widespread informality.
- Thailand's relative wage suggests that craft workers earn slightly above the national average. This points to the influence of minimum wage councils and structured wage floors, which provide stability. However, limited bargaining power and moderate productivity growth constrain further wage progression.

Occupational Earnings vs National Averages – Plant and Machine Operators and Assemblers

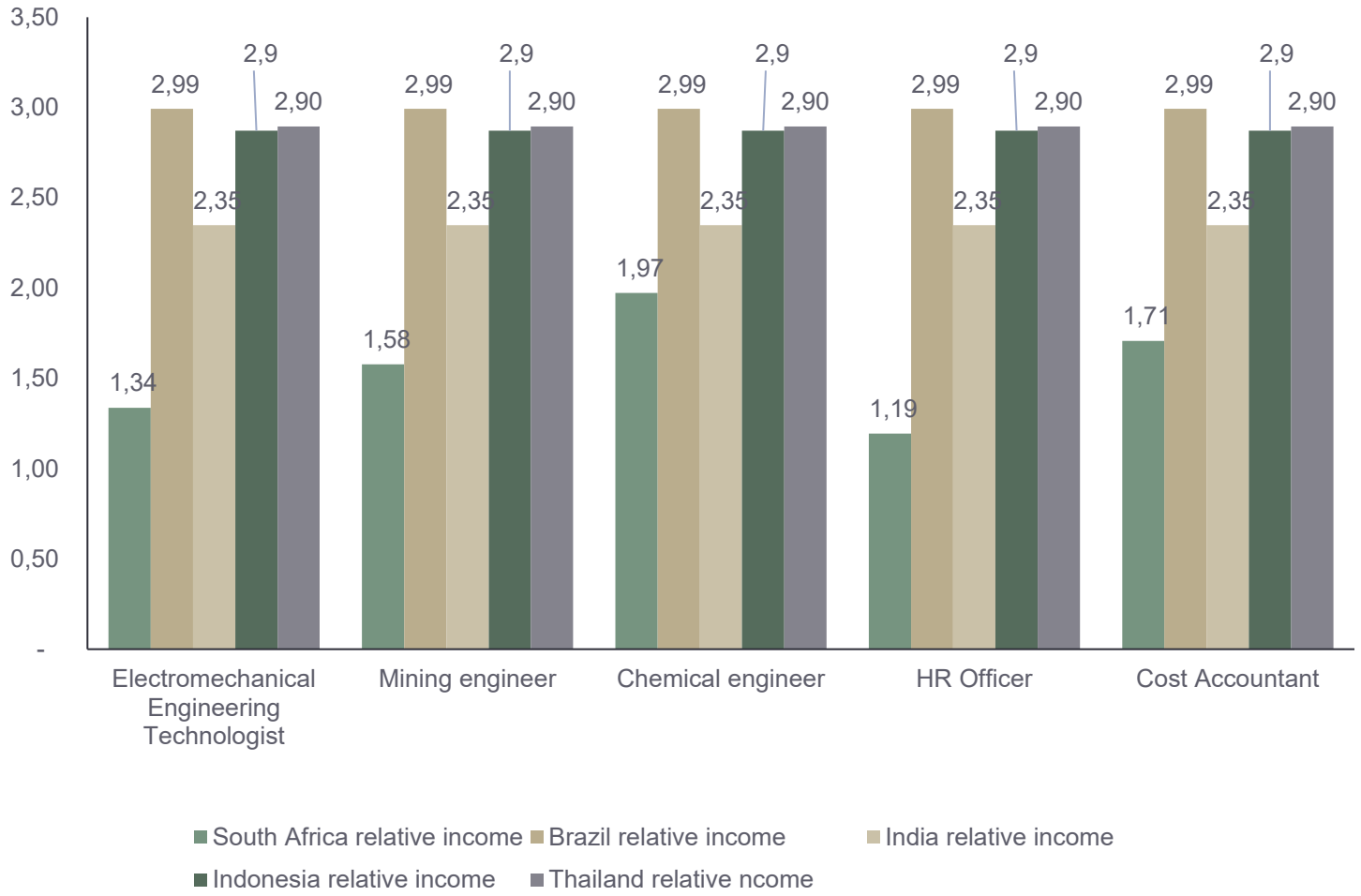
Chart 2: Occupational Earnings vs National Averages – Plant and machine operators, and assemblers



- In South Africa, earnings vary sharply between roles. Battery Bay Attendants earn well above the national average, but MC&I Aides fall far below, suggesting that wage premiums are tied to operational importance rather than occupational category.
- Indonesia, on the other hand, offers the highest earnings across both roles, pointing to strong demand for technical operators in its formal sector.
- Brazil and Thailand show consistent earnings just above the national average, likely reflecting stable wage-setting frameworks.
- Meanwhile, India remains at the bottom, with earnings slightly below average, reinforcing the undervaluation of support roles in its labour market.

Occupational Earnings vs National Averages – Professionals

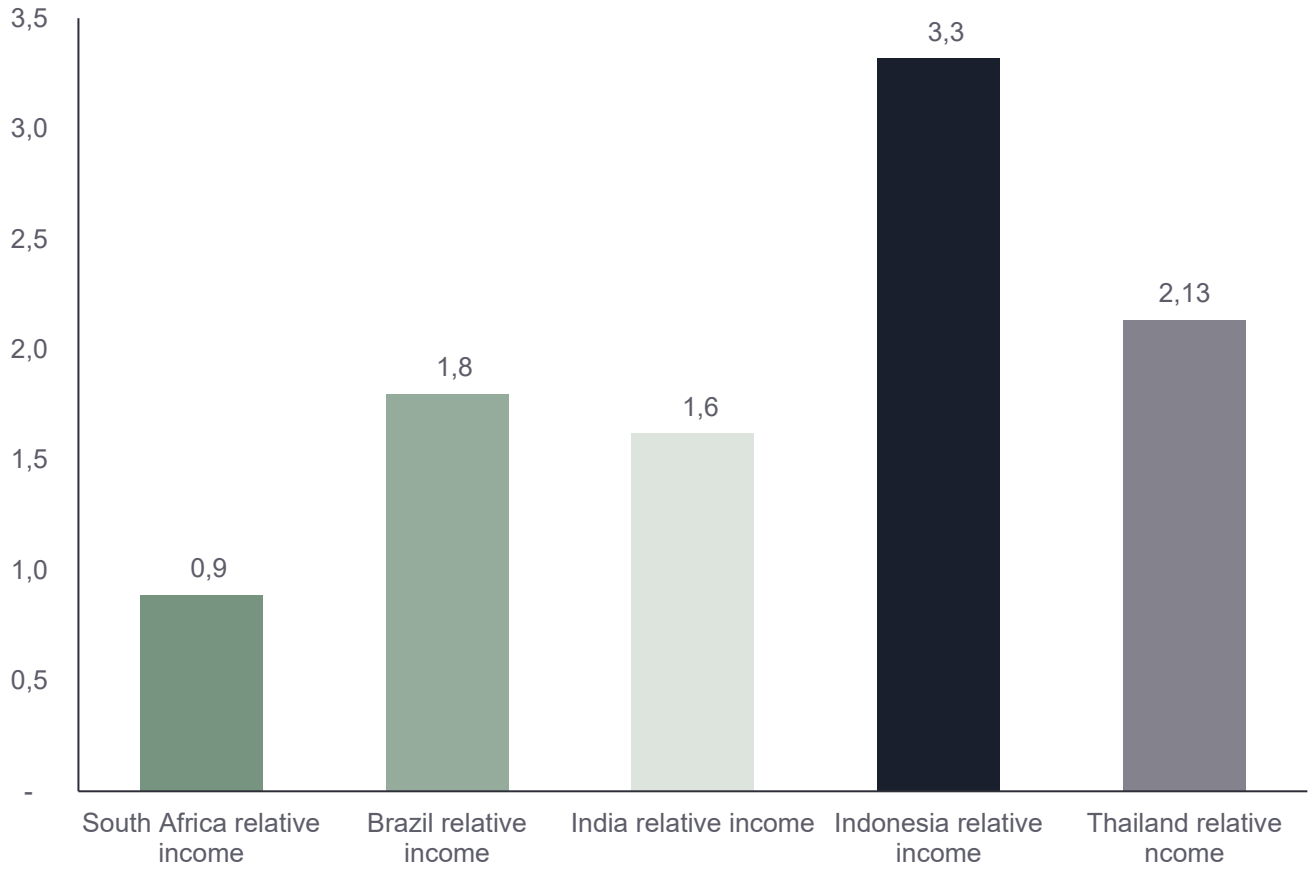
Chart 3: Occupational Earnings vs National Averages – Professionals



- Professional earnings in Brazil are not only high but remarkably consistent, which speaks to the strength of its institutional wage-setting and vocational alignment.
- Indonesia and Thailand follow a similar pattern, offering uniform earnings across roles, suggesting structured compensation systems.
- India shows decent earnings for engineers and accountants, but HR roles are notably less rewarded, hinting at uneven valuation across professions.
- South Africa's earnings are more variable and generally lower, with only chemical engineers approaching parity., pointing to a fragmented wage structure where high-skill roles outside core engineering are not consistently recognised.

Occupational Earnings vs National Averages – Technicians and associate professionals (safety inspector)

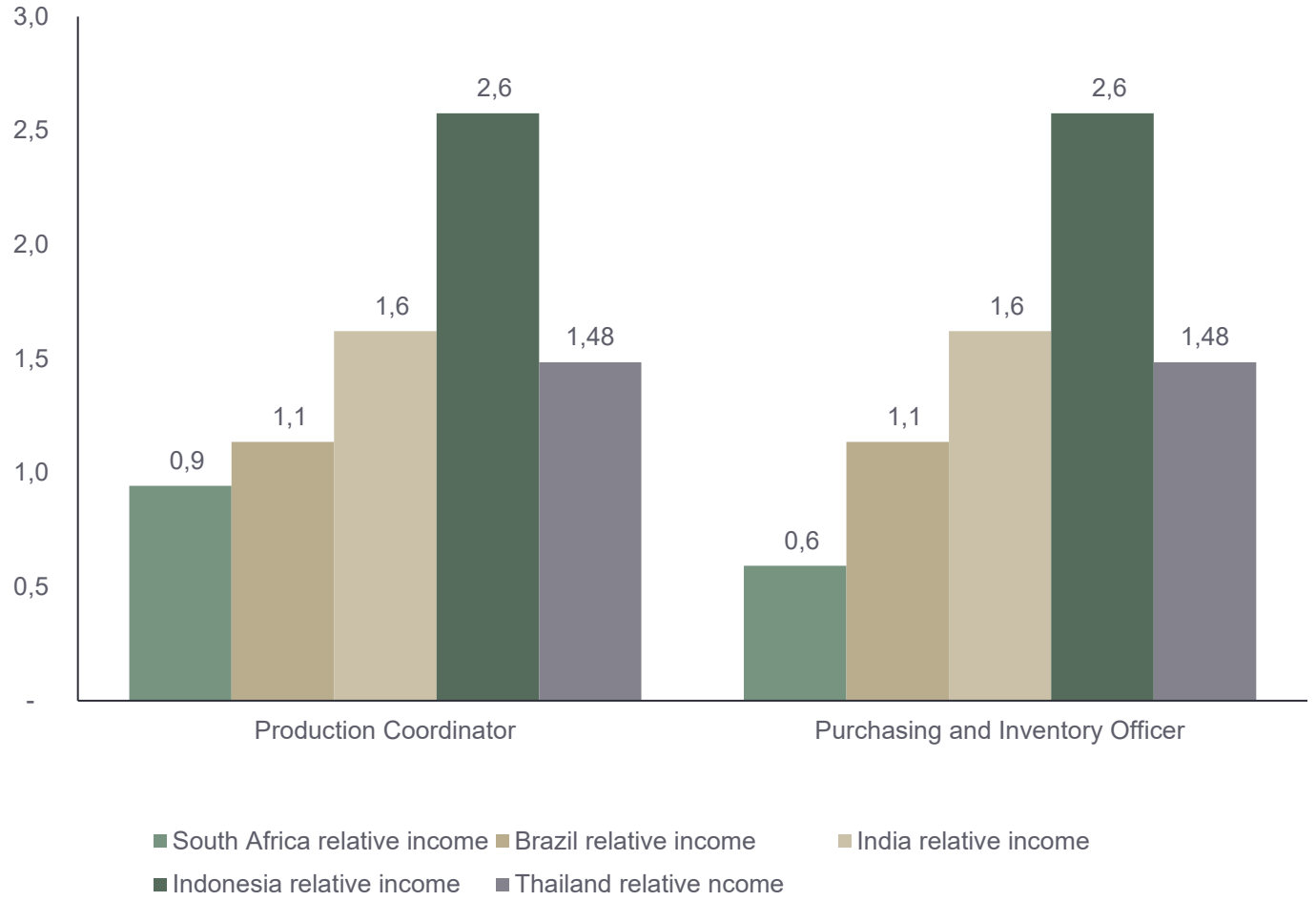
Chart 4: Occupational Earnings vs National Averages – Technicians and associate professionals (safety inspector)



- Safety Inspectors in South Africa earn just below the national average, reinforcing the trend of undervaluing mid-tier technical roles.
- Indonesia again leads, with earnings more than triple the national average, highlighting the premium placed on compliance and safety in its formal industrial base.
- Thailand and Brazil follow with strong earnings, suggesting institutional support for technical oversight roles.
- India's earnings are solid but less differentiated, indicating broader wage compression across technical occupations.

Occupational Earnings vs National Averages – Clerical Support Workers

Chart 5: Occupational Earnings vs National Averages – Clerical Support Workers



- South Africa's clerical roles fall below the national average, with Production Coordinators and Purchasing Officers earning relatively 0.9 and 0.6 respectively. This suggests limited wage recognition for administrative functions, even in industrial settings.
- Indonesia stands out with the highest earnings, more than double the national average, indicating strong demand and possibly a shortage of skilled clerical staff in formal sectors.
- India and Thailand offer moderately elevated earnings, pointing to structured wage floors and growing formalisation.
- Brazil's consistent earnings just above average reflect stable wage-setting but limited upward mobility for clerical roles.

Labour Market and Wage Benchmarking Methodology Applied to Assess Wages Across Various Markets

The methodology below outlines the key steps taken to benchmark key role associated with the LFP battery value chain in South Africa with selected countries that have a developing and/or developed LFP battery sector

- **Occupational Selection**: Key roles were selected based on relevance to the battery manufacturing value chain. International counterparts were identified using the major OFO code (first digit after the dash), aligning South African occupations with global equivalents (e.g., OFO 2021-2145 maps to international professionals via code 2).

- **International Wage Conversion**: Hourly wage data (USD) was sourced from the ILO database and converted to ZAR using Oxford Economics' 2024 average exchange rate (ZAR 18.33/USD). Monthly earnings were derived by multiplying the hourly rate by average working days (365/12) and working hours per day (8).

- **Local Wage Data**: South African wages were sourced from the 2021 Labour Market Dynamics (LMD) report and adjusted to 2024 values using compounded CPI inflation rates for 2021–2023. Where LMD data was unavailable, 2024 wage data from Quantec's Quarterly Employment Statistics (QES) was used directly. The gross wages per month were utilised for the calculations.

- **Relative Wage Benchmarking**: To assess occupational wage positioning within countries, international wages (in local currency) were compared to national average monthly earnings. Census and Economic Information Center(CEIC) data provided national averages in USD, which was converted to local currency using 2024 exchange rates.

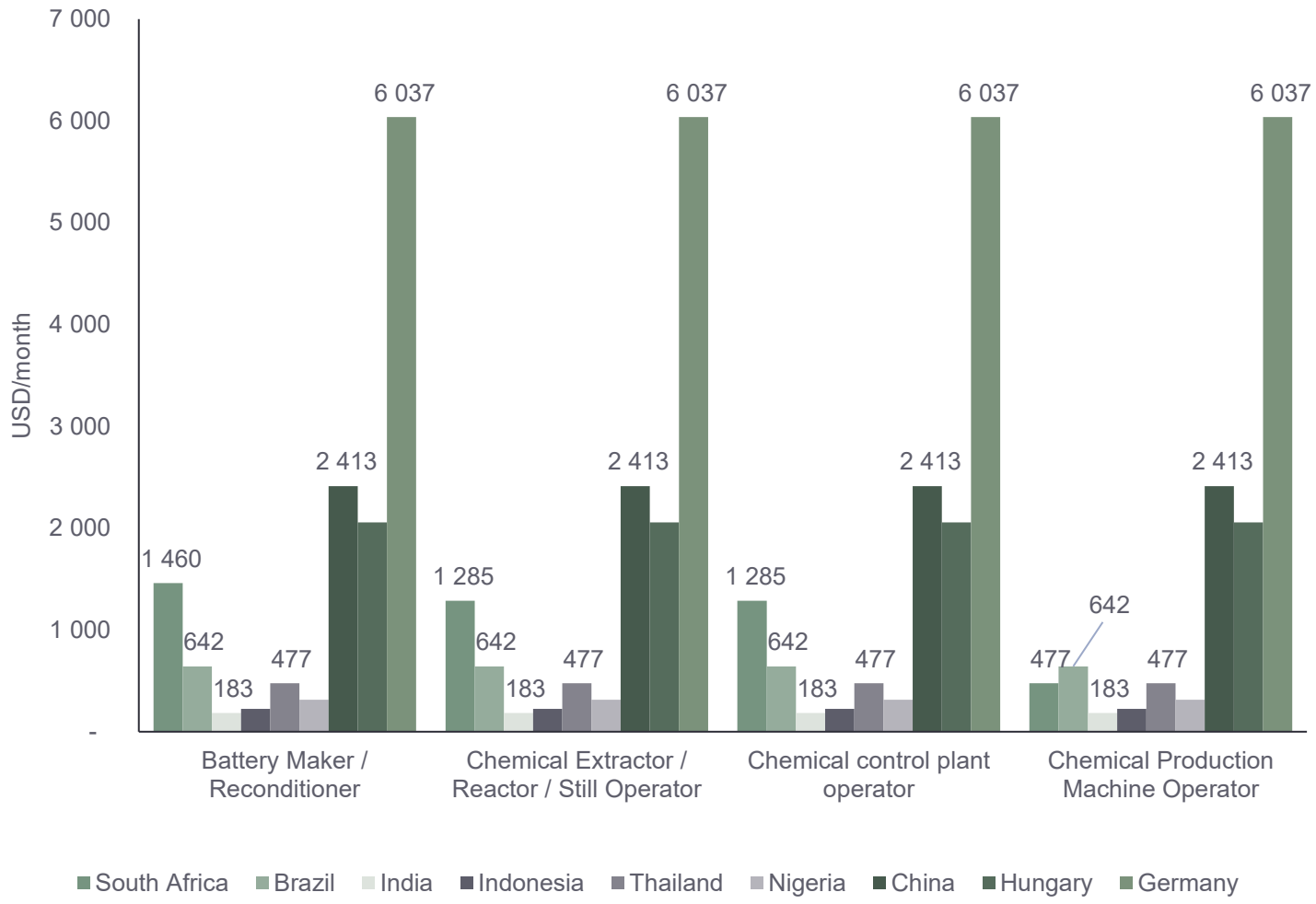
- **South African National Average Income**: A weighted average was computed using LMD data:

$$\frac{\sum(occupation's\ weight * month\ salary)}{\sum(occupation's\ weight)} = USD\ 462.54$$

Where weights represent the relative employment share of each occupation within the national labour force, used to adjust wage data for population-based averaging. The USD 462.54 was compared to QES's reported average of USD 1 473, after which a midpoint of ZAR 967.76 was adopted as a representative national average. **In computing South Africa's average occupational earnings, we excluded informal sector and agricultural employment to ensure alignment with formal wage structures and comparability with international benchmarks, which typically reflect formal sector data.**

Occupational earnings comparison – Craft and related trades workers

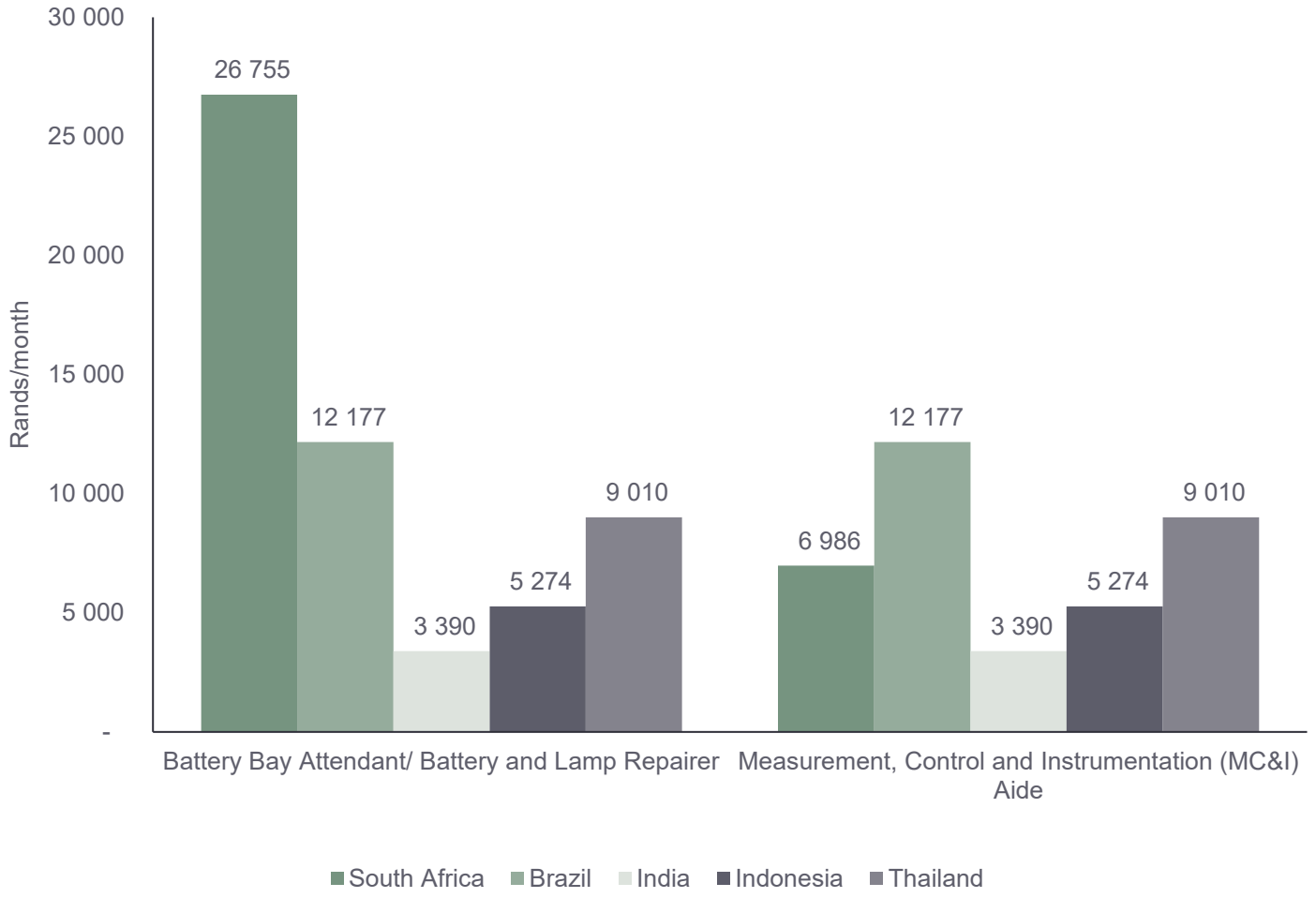
Chart 6: Occupational Earnings Comparison – Craft and Related Trades Workers



- South Africa's wages for craft and related trades workers are substantially higher than in India and Indonesia, and moderately above those in Brazil and Thailand. This reflects the country's institutionalised wage-setting via bargaining councils, which enforce sectoral minimums above market rates.
- India and Indonesia's low wages stem from high informality (over 80%), fragmented wage regulations, and weak enforcement. These conditions suppress wage floors and limit worker bargaining power.
- Thailand's structured minimum wage system and lower informality (~55%) support relatively higher wages, though limited unionisation constrains further gains.
- Brazil's declining informality and statutory wage floors bring its wage levels closer to South Africa's, particularly in lower-tier roles.
- South Africa's higher productivity in capital-intensive sectors like chemicals and mining, combined with a higher cost of living and stronger labour protections, further explains the wage premium.

Occupational earnings comparison - Plant and machine operators, and assemblers

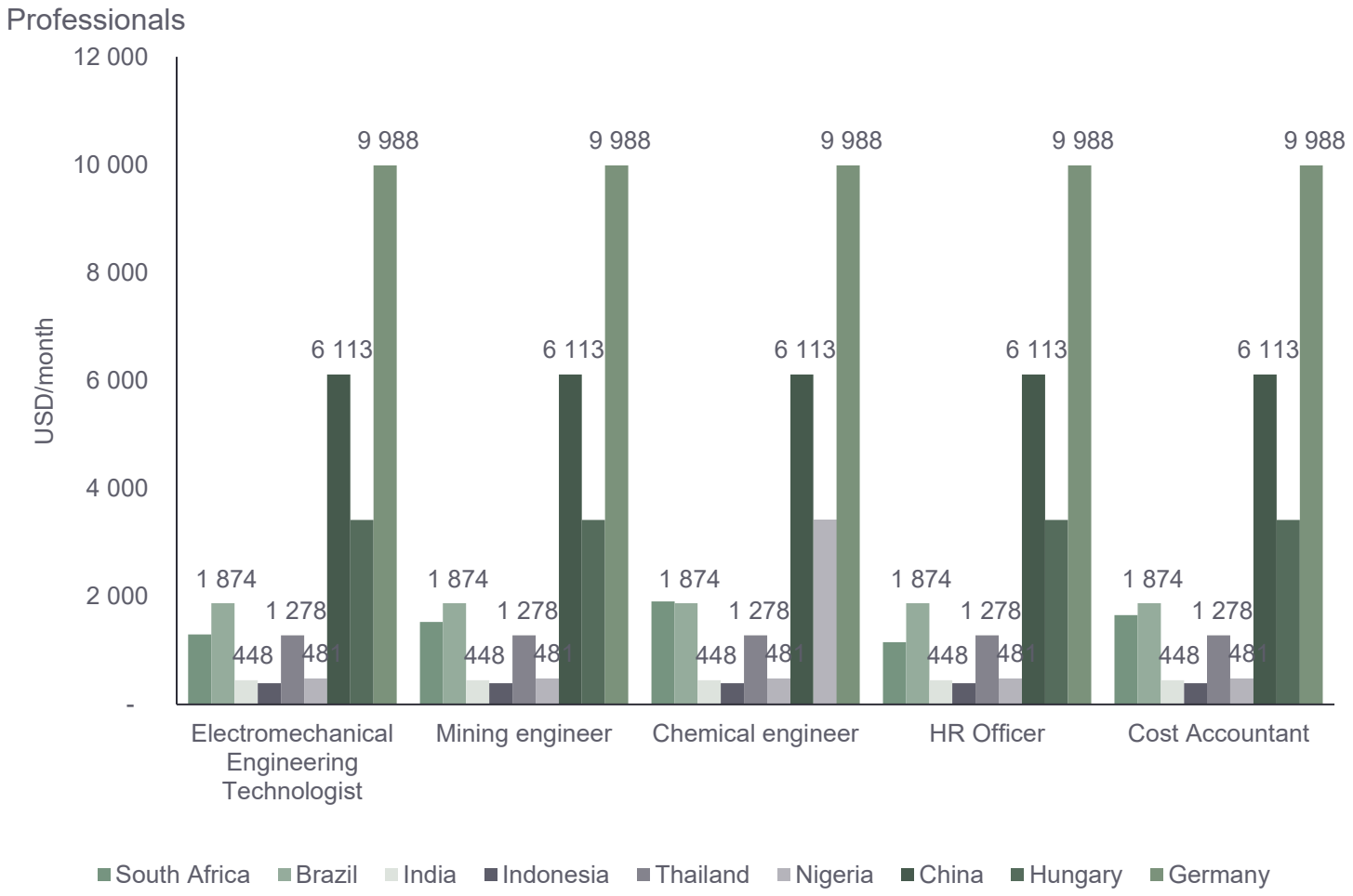
Chart 7: Occupational Earnings Comparison – Plant and machine operators/ assemblers



- South Africa's wages for plant and machine operators vary by role. For Battery Bay Attendants, monthly earnings (USD 1,460) are more than double Brazil's and significantly higher than in India and Indonesia. This is reflective of South Africa's strong wage-setting institutions and the role of bargaining councils in mining and heavy industry.
- In contrast, Measurement, Control and Instrumentation (MC&I) Aides earn considerably less in South Africa (USD 381), falling below Brazil's USD 664. This suggests weaker wage coordination or lower union coverage in instrumentation support roles, possibly due to their classification outside core bargaining units.
- India and Indonesia again reflect low wage floors, driven by high informality and limited enforcement. Thailand's moderate wage levels (USD 492) for Battery Attendants) are supported by national wage councils but remain below South Africa's due to lower productivity and weaker collective bargaining.
- The divergence within South Africa's own wage structure highlights the uneven reach of institutional wage protections across occupational categories.

Occupational earnings comparison – Professionals

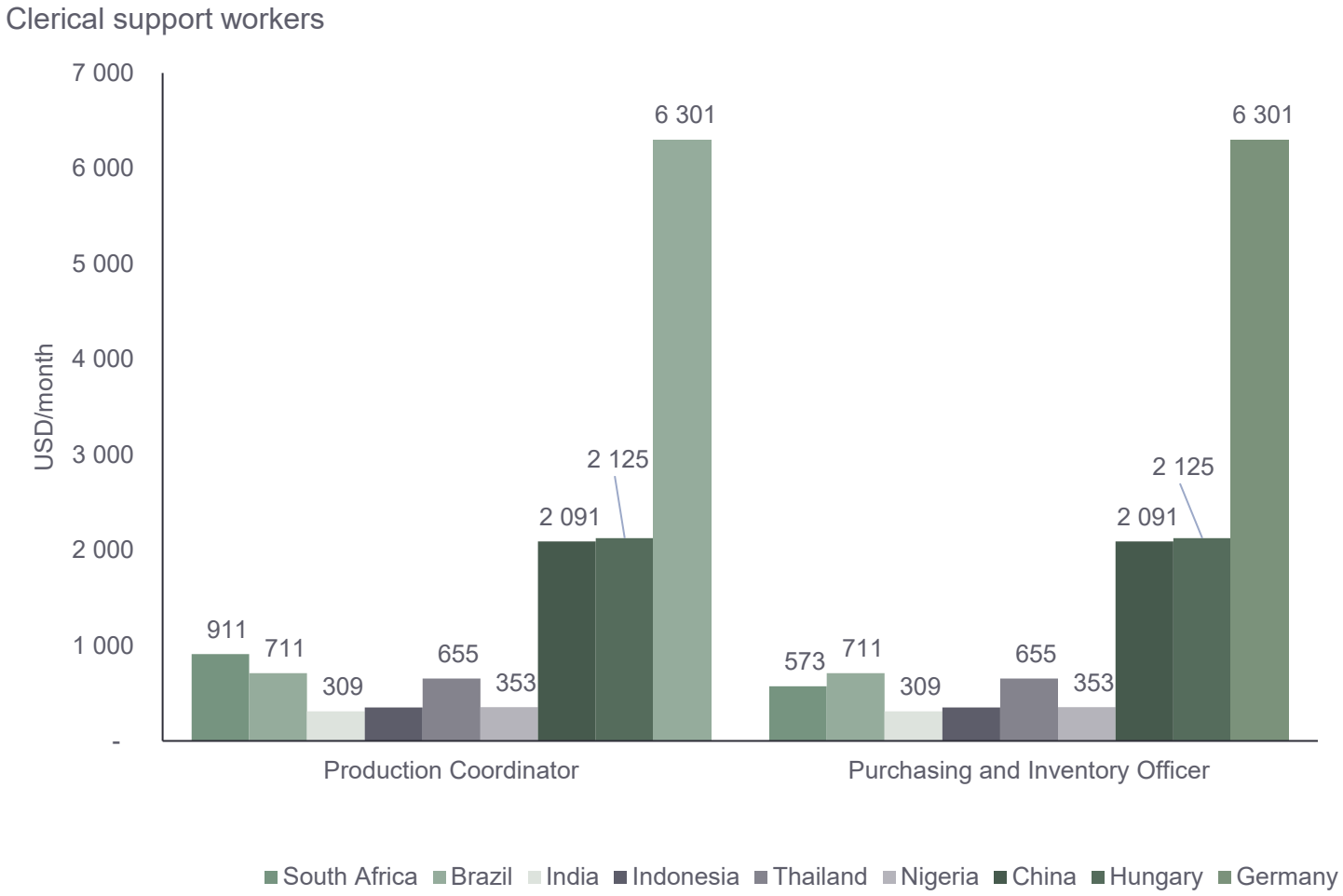
Chart 8: Occupational Earnings Comparison – Professionals



- South Africa's professional salaries are generally competitive, though they vary by role. For Chemical Engineers and Cost Accountants, wages (USD 1909 and USD 1652 respectively) are on par with Brazil (USD 1874), and well above India (USD 448), Indonesia (USD 391), and Thailand (USD 1278). This reflects South Africa's relatively high labour costs in technical and financial professions, underpinned by skills scarcity and formalised wage structures.
- However, for Electromechanical Engineering Technologists, South Africa (USD 1294) trails Brazil and Thailand, suggesting potential wage compression in this role or weaker bargaining leverage.
- Mining Engineers and HR Officers also earn less than their Brazilian counterparts, despite South Africa's mining sector being a major economic pillar - possibly indicating wage oversupply (specifically for HR Officers) or wage stagnation in these roles.
- India and Indonesia consistently report the lowest wages across all professional categories, shaped by high informality, surplus of graduates, and limited wage coordination. Thailand's mid-range salaries reflect its structured wage-setting and stronger industrial base, though still below South Africa's in most roles.

Occupational earnings comparison – Clerical support workers

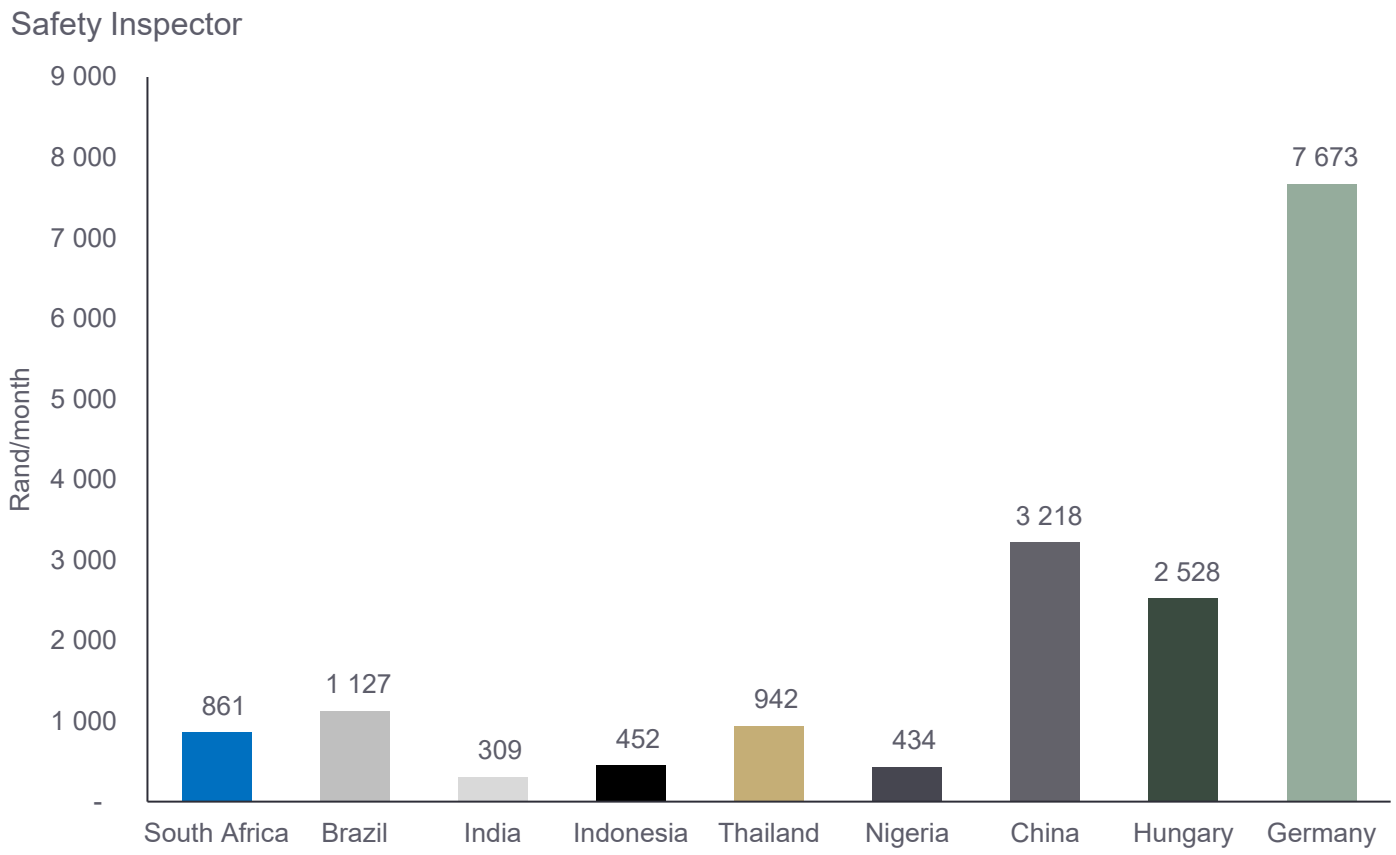
Chart 9: Occupational Earnings Comparison – Clerical support workers



- South Africa's wages for Production Coordinators (USD 911) are higher than in India and Indonesia, but trail Brazil (USD 711) and Thailand (USD 655) by a narrower margin. For Purchasing and Inventory Officers, South Africa (USD 573) lags behind all comparators except India and Indonesia, suggesting relatively lower wage premiums in administrative support roles.
- The modest wage differentials reflect the limited bargaining power and weaker union coverage typically associated with clerical occupations. In South Africa, these roles often fall outside centralised bargaining structures, resulting in more market-driven wage outcomes.
- Brazil and Thailand's higher wages in these roles may be attributed to stronger formalisation and the influence of statutory wage floors.
- India and Indonesia remain at the bottom of the wage spectrum, consistent with broader trends of high informality and low administrative wage benchmarks. South Africa's position – above the lowest-cost peers but below upper-middle-income comparators – highlights the constrained wage progression in non-technical support functions.

Occupational earnings comparison – Technicians and Associate professionals (safety inspector)

Chart 10: Occupational Earnings Comparison – Technicians and Associate professionals (safety inspector)



- South Africa's Safety Inspectors earn USD 1508/month, which is lower than Brazil (USD 1127) and Thailand (USD 942), but higher than Indonesia (USD 452) and India (USD 309). This places South Africa in the mid-range of the comparator group.
- Brazil's higher wage reflects the country's strong regulatory enforcement, unionised safety roles, and the integration of safety functions within large, formalised industrial firms.
- Thailand's relatively high salary suggests that safety roles are institutionally recognised, likely due to its export-oriented manufacturing sector where compliance is critical.
- South Africa's moderate wage level may reflect a lack of wage progression for safety roles despite the strategic importance of the function in sectors like mining and construction.
- The relatively low wage in India and Indonesia aligns with broader trends of high informality, limited regulatory enforcement, and underinvestment in occupational safety systems.

Labour Market and Wage Benchmarking – Insights from Africa, South America, Europe and Asia: Wages versus Productivity

Rationale: Productivity per employee was assessed to evaluate whether wage levels are commensurate with output, ensuring the analysis goes beyond costs to include efficiency and value creation. Beyond wage comparisons, productivity measures were added to assess whether wage levels are justified by output, ensuring the analysis reflects efficiency rather than cost alone. Linking wages to productivity helps identify which countries offer better value for employers – high productivity at moderate wages versus low productivity at similar costs. Productivity measures are at an aggregate, not sectoral, level.

Germany
- Productivity per employee: USD 72.54
- 4.8× higher than South Africa
- High wages supported by high output

Hungary
- Productivity: USD 33.61 (2x of South Africa's)
- Wages slightly above South Africa
- Offers better employer value

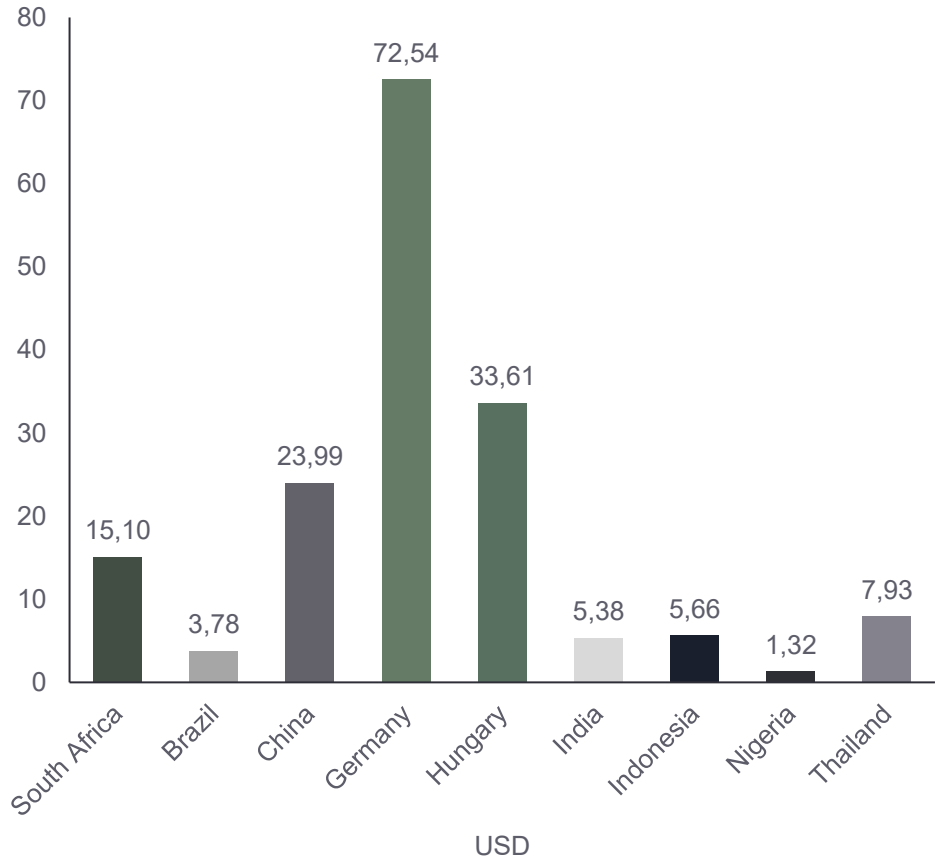
South Africa
- Productivity: USD 15.10 (moderate)
- Skilled wages high vs Brazil/India
- Raises cost-competitiveness concerns

China
- Productivity: USD 23.99 (strong relative to South Africa and other Asian countries)
- Wages rising, balanced by efficiency and scale of operations

Brazil
- Productivity: USD 3.78 (very low)
- Wages not proportionately lower for all roles indicating some misalignment and inefficiencies

Nigeria
- Productivity: USD 1.32 (extremely low)
- Wages low but high vs output which signals poor labour productivity

Thailand, Indonesia, India
- Productivity low, wages also low
- Cost-effective for labour-intensive work



Source: Oxford Economics

Labour Market and Wage Benchmarking – Insights from Africa, South America, Europe and Asia: Are Wages Commensurate with Productivity?

Rationale: This analysis was conducted to benchmark productivity using GDP per hour worked across the selected countries. GDP per hour standardises output relative to time worked, removing distortions caused by differences in employment size or hours worked, making cross-country comparisons more accurate. Unlike productivity per employee, which can mask variations in working hours and labour utilisation, GDP per hour directly reflects how efficiently labour time translates into economic value.

Germany
- GDP per hour: USD 98.4 vs Productivity per employee: USD 72.54
- Efficiency per time unit very high, and wages remain commensurate with output

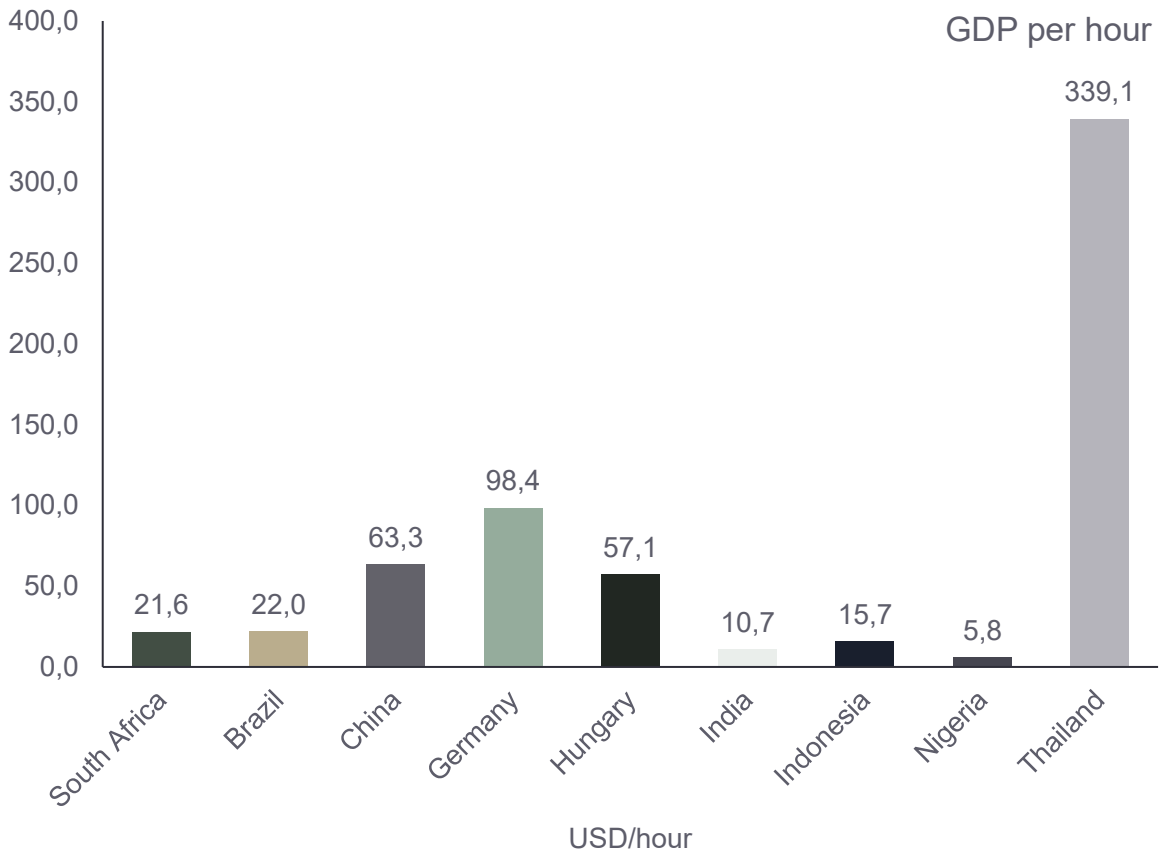
China
- GDP per hour: USD 63.3 vs Productivity per employee: USD 23.99
- Strong hourly efficiency and rising wages balanced by scale

Hungary
- GDP per hour: USD 57.1 vs Productivity per employee USD 33.61
- Longer working hours dilute hourly efficiency, with wages relatively high vs hourly output

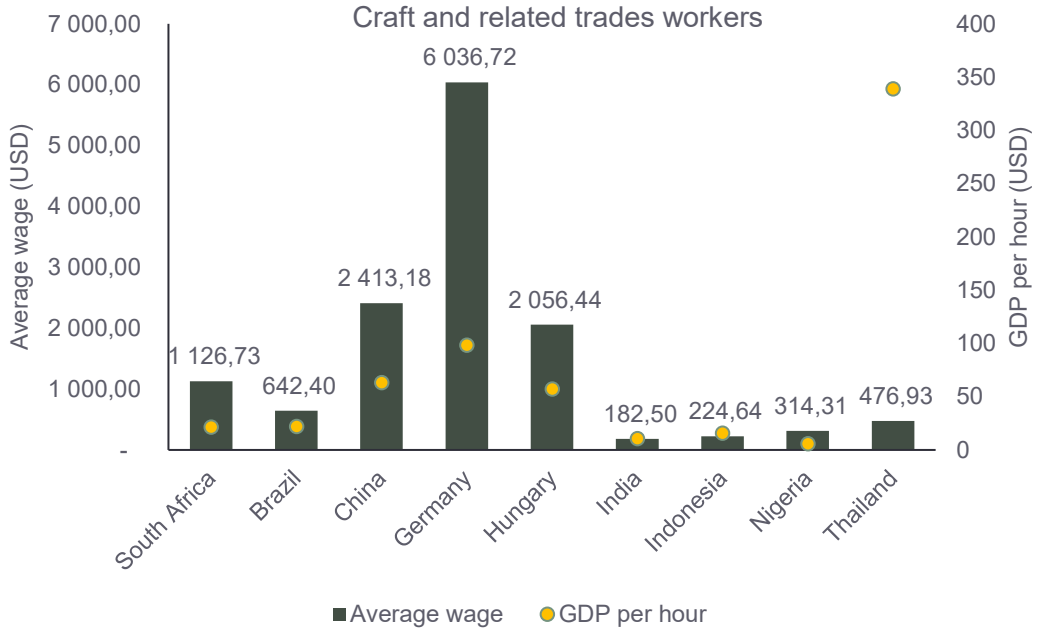
South Africa
- GDP per hour: USD 21.6 vs Productivity per employee: USD 15.10
- Mid-tier per employee, moderate hourly rate.

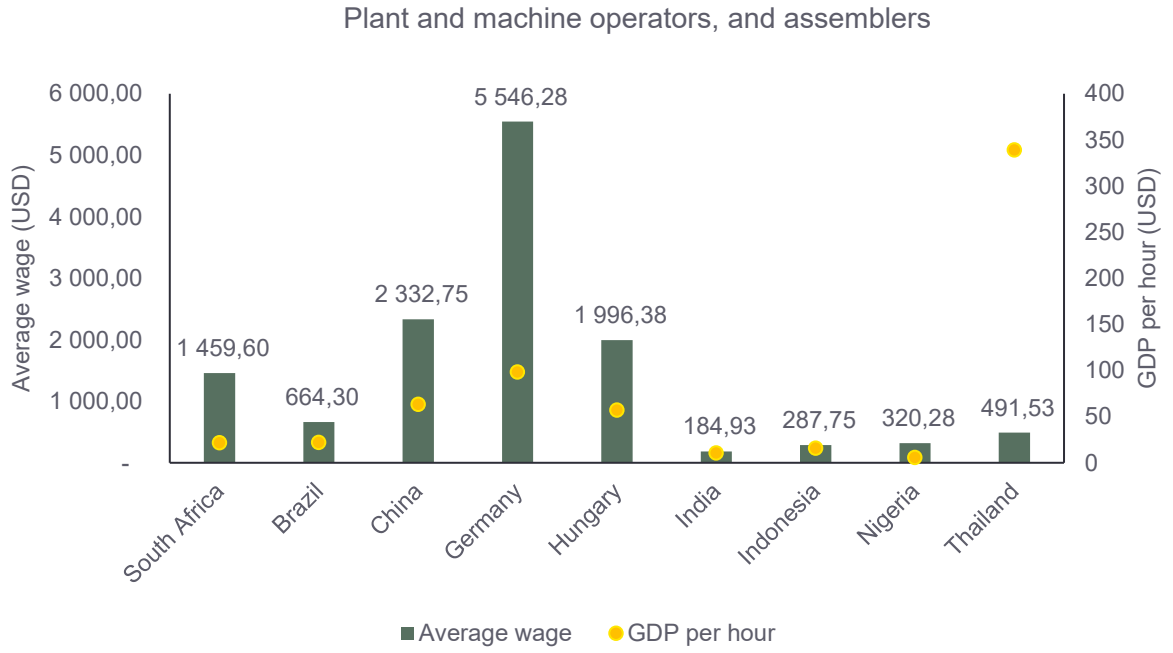
Brazil
- GDP per hour: USD 22 vs Productivity per employee: USD 3.78
- Longer hours offset low per-employee output with wages misaligned with productivity

Thailand
- GDP per hour: USD 339.1 vs Productivity per employee: USD 7.98
- Time-based productivity aligns with wages. Appears cost-effective for labour-intensive work



Labour Market and Wage Benchmarking – Productivity versus Wages

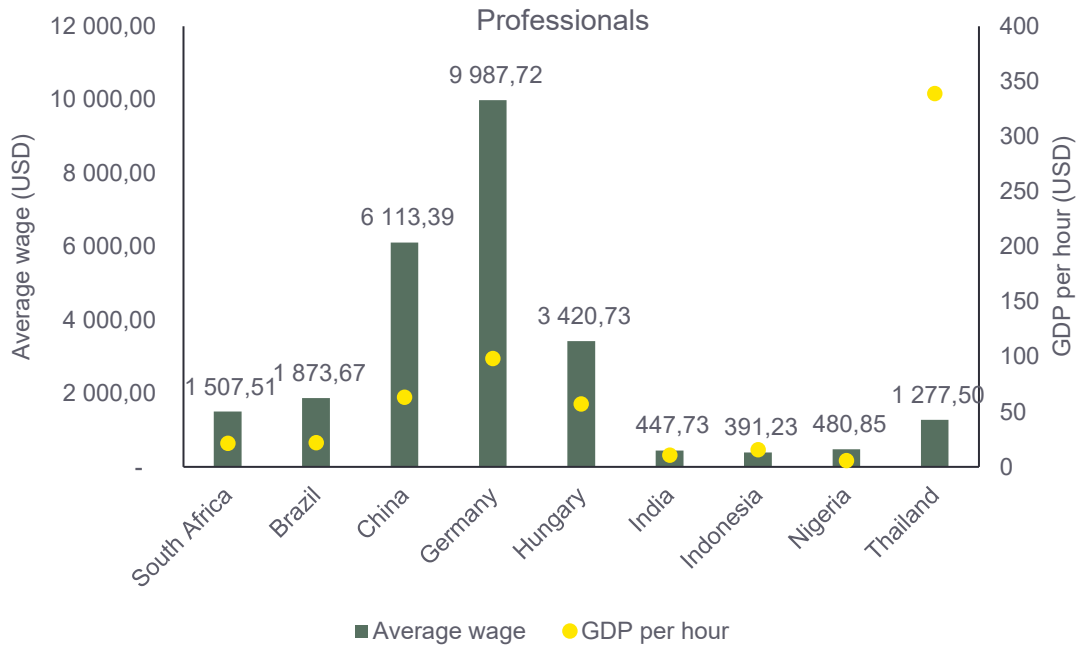


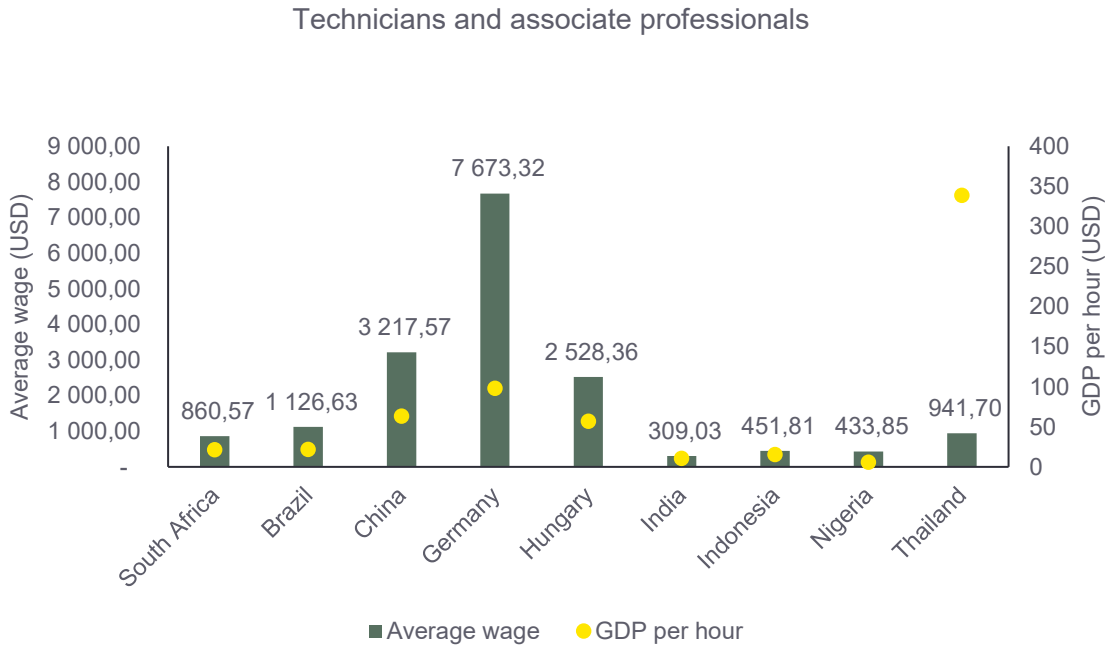


- Germany's wages and productivity far exceed all others, showing how advanced industrialisation drives premium pay – South Africa would need to boost efficiency to stay competitive.
- China and Hungary offer strong mid-tier wages tied to productivity, signalling cost-effective but skilled labour pools that challenge South Africa's positioning.
- Nigeria's extremely low wages highlight South Africa's cost advantage, but without productivity gains, this advantage risks eroding under global pressure

- Germany dominates with automation-driven productivity and wages, underscoring South Africa's need for technology adoption to close the gap.
- China and Hungary combine competitive wages with higher productivity, making them attractive for manufacturing investment compared to South Africa.
- South Africa's wages are moderate, but productivity lags behind global leaders, limiting its ability to compete on efficiency.

Labour Market and Wage Benchmarking – Productivity versus Wages

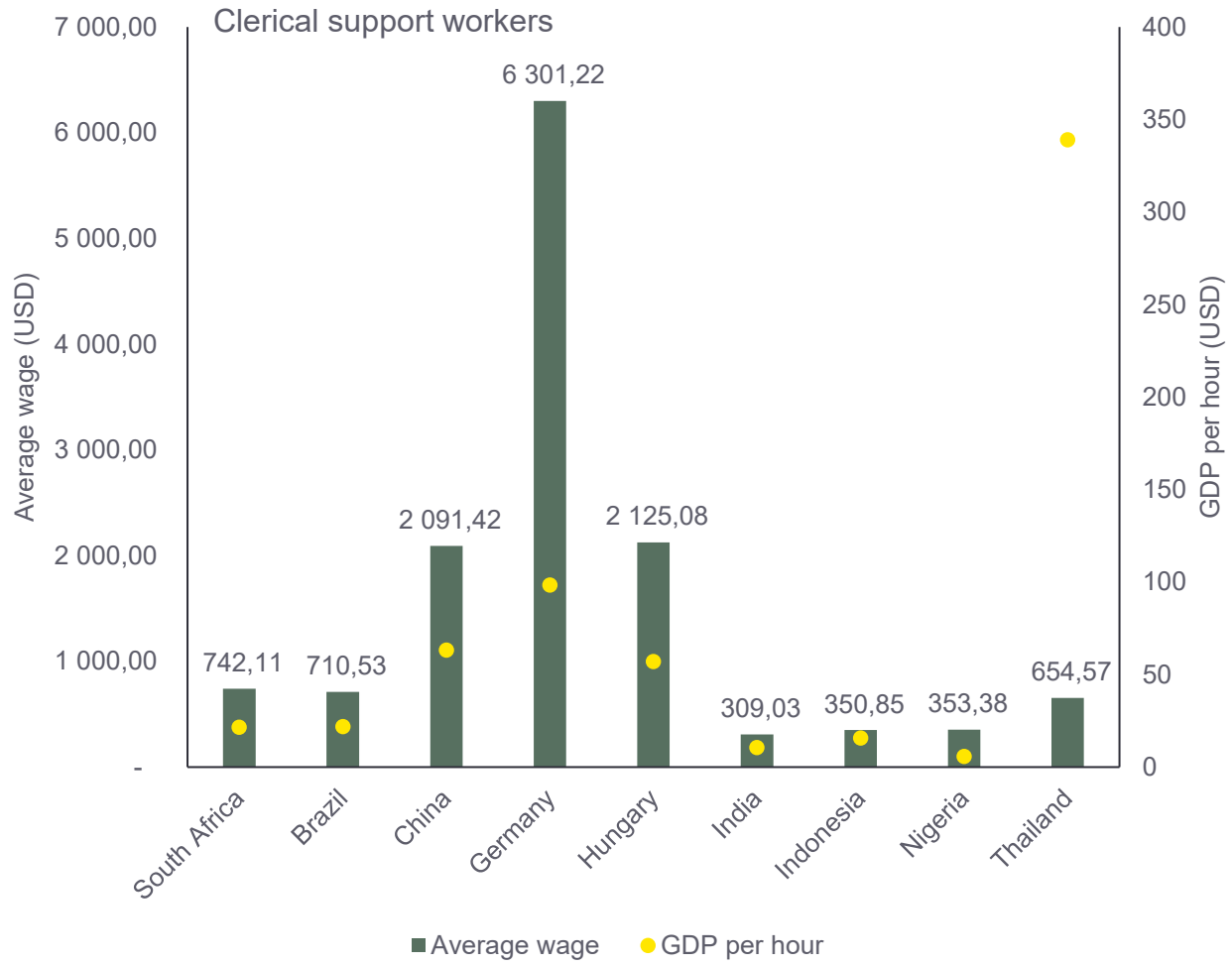




- Germany and China reward high-skill roles with premium wages, reflecting strong innovation ecosystems – South Africa must invest in skills and R&D to remain relevant.
- Hungary offers solid pay for professionals, reinforcing the link between industrial sophistication and wage competitiveness.
- South Africa trails far behind, signalling a need for structural reforms to attract and retain talent.

- Germany sets the benchmark for technical roles, highlighting the payoff of advanced training and automation – South Africa needs similar capability-building.
- China and Hungary's mid-range wages reflect strong technical ecosystems, posing competitive pressure on South Africa's industrial sectors.
- South Africa's low wages and productivity suggest underinvestment in technical skills, risking long-term competitiveness.

Labour Market and Wage Benchmarking – Productivity versus Wages



- Germany pays the highest wages (USD 6301.22) and has the second largest productivity (USD 98.39/hour), showing how advanced economies reward administrative roles – South Africa must improve efficiency to compete.
- China and Hungary offer mid-range wages (USD 2091.42 and USD 2125.08) tied to strong productivity, signalling competitive labour markets that challenge South Africa's cost advantage.
- South Africa sits above Nigeria but far behind global leaders, suggesting affordability for employers but exposing productivity gaps that limit competitiveness.

Appendix

1

Addressable Market

2

Labour and Wage Benchmarking

3

Legal and Policy Assessment

Appendix: Environmental Related Legislation Considered

Overview of key environmental legislation considered at a national, provincial and local level.

National	Provincial	Local
National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended) (NEMA)	Cape Nature and Environmental Conservation Ordinance (No 19 of 1974)	Coastal: ▪ Cape Town Coastal By-Law (2020) ▪ eThekwini Coastal Management By-Law (2017)
National Water Act (Act No. 36 of 1998) (as amended) (NWA)	Western Cape Biosphere Reserves Act (Act 6 of 2011)	Air Quality: ▪ Cape Town Air Pollution Control By-Law ▪ Cape Town Air Quality Management By-Law (2016) ▪ Nelson Mandela Bay Air Pollution Control By-Law (2010) ▪ eThekwini Air Quality Management By-Law (2018)
National Environmental Management: Waste Act 59 of 2008	Cape Nature and Environmental Conservation Ordinance (No 19 of 1974)	Water and Sanitation: ▪ Cape Town Wastewater and Industrial Effluent By-Law (2013) ▪ Cape Town Stormwater Management By-Law and Water By-Law ▪ Nelson Mandela Bay Water and Sanitation Services By-Law (2010) ▪ NMBM Stormwater Management By-law (2009) ▪ eThekwini Sewage Disposal By-Law (2016) ▪ eThekwini Water Supply By-law ▪ Stormwater Management By-law
National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA)	KZN Nature Conservation Ordinance (No 15 of 1974)	Waste: ▪ Integrated Waste Management By-Law (2009) – Cape Town ▪ NMBM Waste Management By-Law (2010) ▪ eThekwini Waste Removal By-law (2016)
National Forests Act (Act No. 84 of 1998) (NFA)		
NEM: Integrated Coastal Management Act (Act No 24 of 2008)(ICMA)		
National Environmental Management Biodiversity Act (Act No. 10 of 2004) (NEM:BA)		
National Environmental Management: Protected Areas Act (Act No. 57 of 2003		
Climate Change Act, 2024		
National Building Standards Act 103 of 1977		
Hazardous Substance Act (Act No 15 of 1973)		

Appendix: Social Related Legislation Considered

Overview of key social legislation considered at a national, provincial and local level.

National	Provincial	Local
National Heritage Resources Act (Act No. 25 of 1999) (NHRA)	Western Cape Noise Control Regulations (20 June 2013)	Health: ▪ Cape Town Environmental Health By-law (2003) ▪ NMBM Municipal Health By-Law (2010) ▪ Durban Public Health By-laws (1911)
Occupational Health and Safety Act (Act No. 85 of 1993) (OHSA)	KZN Heritage Act (Act No. 10 of 1997)	Safety and Emergency: ▪ Cape Town Community Fire Safety By-Law ▪ NMBM Fire Safety By-Law (2007) ▪ NMBM Fire Services By-Law (2019) – Draft ▪ eThekwini Fire Safety By-law, 2022 ▪ eThekwini Fire prevention and Flammable Liquids and Substances bylaw (2000)
Basic Conditions of Employment Act (Act 75 of 1997)		Noise: ▪ NMBM Noise Control By-Law (2010)
Compensation for Occupational Injuries and Diseases Act (Act 130 of 1993)		Durban Scheduled Activities By-Law (2019)
Labour Relations Act (Act No. 66 of 1995) (LRA)		
Employment Equity Act (Act No. 55 of 1998) – as amended		
National Minimum Wage Act, 2018		
Skills Development Act, 1998 (as amended)		
Unemployment Insurance Act, 2001 (as amended)		

Appendix: Governance Related Legislation Considered

Overview of key governance legislation considered at a national, provincial and local level.

National	Provincial	Local
Patents Act, 1978 (Act No 57 of 1978)	Western Cape Land Use Planning Act, 2014	Land Use Planning: ▪ CoCT Municipal Planning By-Law (2015) - as amended by Municipal Planning Amendment Bylaws of 2016, 2017, 2019, 2022 and 2025 ▪ NMBM SPLUMA By-Law (2023) ▪ NMBM Land Use Scheme (2023) ▪ eThekwini Planning and Land Use Management By-Law (2016), as amended in 2021 ▪ eThekwini Building By-Laws
Broad-Based Black Economic Empowerment Amendment Act, 2003 (Act No. 53 of 2003)	KwaZulu-Natal Planning and Development Act, 2008 (PDA)	eThekwini Business Licensing By-Law (2024)
Protection of Personal Information Act (Act 912 of 2013)- POPI Act		
National Credit Act (Act 34 of 2005)		
Consumer Protection Act (Act 68 of 2008)		
Companies Act (Act 71 of 2008)		
Close Corporations Act (Act 69 of 1984)		
Competition Act, No. 89 of 1998 (as amended)		
Income Tax Act (Act 58 of 1962)(as amended)		
Carbon Tax Act (Act No. 15 of 2019)		
Arbitration Act 42 of 1965 (as amended)		
Construction Industry Development Board Act (Act 38 of 2000)		
National Energy Act (Act 34 of 2008)		
Electricity Regulation Act (Act 4 of 2006)		
National Building Regulations and Building Standards Act 103 of 1977 (as amended in 1984, 1989, 1995, 2008)		
National Regulator for Compulsory Specifications Act, 2008 (Act No.5 of 2008) (NRCS Act).		

Appendix: Strategies and Plans Considered

Overview of key strategies and plans considered at a national, provincial and local level.

National	Provincial	Local
SA Renewable Energy Masterplan (SAREM) - 2025	Western Cape Government Green Economy Strategy Framework	City of Cape Town's Atlantis 2023 strategy
National Industrial Policy Framework (superseded by Masterplans)	Greencape – Energy Programme	Atlantis SEZ Technical Investor Brochure
Industrial Policy Action Plan (IPAP), 2020/21	Eastern Cape Economic Development, Environmental Affairs and Tourism Five Year Strategic Plan 2025-2030	COEGA Company Profile (Eastern Cape)
EV White Paper - 2023	KZN Green Economy Strategy (2010) / KZN Strategic Plan 2030	Dube TradePort (KZN)
Automotive Production and Development Programme (APDP)		
Energy Services – Market Intelligence Report (2025)		
SA Government's Department of Trade and Industry (DTI) – SA Investor's Handbook (14/15)		
Energy One Stop Shop (Energy OSS)		
World Bank Group Report – South Africa and Southern Africa Battery Market and Value Chain Assessment Report (2023)		
SA IRP 2025		

Appendix: Standards and Certifications

Overview of key standards and certifications considered at an international and national level.

International	National
ISO 9001, ISO 14001, ISO 45001, ISO 26262 and ISO 50001, ISO/IATF 16949 (2016)	SANS 62619
IEC 62619:2022	SANS 62620
IEC 62485-2	SANS 62485-2
IEC 60086	SANS 60269-7
UN Manual of Tests and Criteria Rev.8 (2023) and Amendment 1 to Rev.8 (2025)	SANS 10228
	SANS 60095

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PROUDLY SUPPORTING LOCAL INDUSTRY

Prepared by Ernst & Young Advisory Services (Pty) Ltd