NBI
National Business Initiative

# Powering Pathways: Building South Africa's Green Workforce Pipeline

## A Skills Development Zones Approach



AFRICAN DEVELOPMENT BANK GROUP

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# Unlocking South Africa's Just Energy Transition Opportunity

South Africa's Just Energy Transition (JET) represents a generational opportunity – one capable of reshaping our economy, creating new industries, and opening pathways into decent work for communities across the country. Investment is already flowing into renewable energy, transmission, green hydrogen, battery storage and new energy vehicles. The task before us now is to ensure that this investment translates into jobs, skills and local economic opportunities that South Africans are ready to participate in and benefit from.

Skills Development Zones (SDZs) are one of the most promising mechanisms we have for doing exactly that.

The opportunity presented by the Transition is fundamentally a national one, but it will be won or lost at the level of place. Each JET project (whether a green hydrogen hub in the Northern Cape or a new energy vehicle initiative in the Eastern Cape) creates a distinct, localised demand for skills, infrastructure and enterprise development. SDZs give us a way to meet that demand head-on: by bringing government, business, training providers, funders and communities together around a shared, place-based agenda, focused squarely on turning local opportunity into local outcomes.

What makes this approach so compelling is its efficiency. SDZs are not a call for new institutions or a more complicated system. They are a coordination solution, a way of connecting the strengths that already exist across our skills ecosystem and channelling them toward the specific places where the Transition is creating real, immediate opportunity.

In a system as institutionally rich as ours, this is often the highest-leverage intervention available; not building more but aligning what we already have.

Business has an indispensable role to play in bringing this vision to life. As the driver of investment, technology deployment and green job creation, the private sector is uniquely positioned to define what an SDZ needs to succeed, and through platforms like the Just Energy Transition Skilling for Employment Programme (JET SEP), has already demonstrated its readiness to organise and act collectively in support of this agenda. SDZs offer business a direct, tangible avenue for that commitment: a place where partnership with government and training institutions can translate into real workforce pipelines, meaningful workplace-based learning, and lasting local impact.

This Report sets out the case for SDZs as a practical, scalable pathway to realising the JET's full potential. It is offered as the National Business Initiative's (NBI) contribution to a shared national effort – a platform for aligning the ambition of our Transition with the coordinated, demand-led action needed to deliver it.

South Africa's JET offers us a rare chance to build an economy that is more competitive, more inclusive, and more resilient. SDZs show us a credible, workable way to get there; place by place, opportunity by opportunity. I look forward to working with government, business, labour and training partners to bring this vision to life.



**Shameela Soobramoney**
Chief Executive Officer
National Business Initiative (NBI)

# Acknowledgements

## About the Just Energy Transition Skilling for Employment Programme (JET SEP)

The Just Energy Transition Skilling for Employment Programme (JET SEP) is a multi-stakeholder and collaborative initiative led by the National Business Initiative (NBI) and is endorsed by Business Unity South Africa (BUSA), the JET Project Management Unit (PMU) as mandated by the Presidency and the Presidential Climate Commission (PCC). It works in partnership with the JET Skills Desk in the Department of Higher Education and Training (DHET), the Wits Centre for Researching Education and Labour (REAL) and the Southern Africa Labour and Development Research Unit (SALDRU). It is supported by African Development Bank (AfDB), FirstRand Empowerment Foundation (FREF), Global Affairs Canada (GAC) and South Africa's CEOs.

JET SEP supports the implementation of the Skills Portfolio under the Just Energy Transition Implementation Plan, with a focus on strengthening the skills ecosystem, supporting workforce development and enabling sustainable employment opportunities.

### In Partnership With

**JET Skills Desk**

The JET Skills Desk, established within the Department of Higher Education and Training (DHET), supports the coordination and implementation of the JET Skills Portfolio. The Desk plays a central role in anticipating skills needs, strengthening alignment with industry demand and supporting the establishment of the Skills Development Zones.

**Wits Centre for Researching Education and Labour (REAL)**

Wits REAL is a research initiative at the University of the Witwatersrand focused on understanding and responding to the changing world of work. Through interdisciplinary research, education and engagement, Wits REAL contributes to strengthening the connections between education, skills, employment and economic development in support of a just transition.

**Southern Africa Labour and Development Research Unit (SALDRU)**

SALDRU is a research unit within the School of Economics at the University of Cape Town, focused on applied research and capacity building across labour markets, poverty, inequality, human capital and social policy. Through policy-relevant research and evidence, SALDRU contributes to understanding labour market dynamics and pathways to improved economic opportunity.

### Endorsed By

**Business Unity South Africa (BUSA)**

Business Unity South Africa represents South African business and advocates for policies that support sustainable and inclusive economic growth. BUSA contributes to the Just Energy Transition by supporting collaboration between business, government and other stakeholders to strengthen economic participation and ensure that the Transition creates opportunities for people and communities.

**JET Project Management Unit (JET PMU)**

The JET PMU supports the implementation of South Africa's Just Energy Transition Investment Plan and coordinates stakeholders, resources and implementation efforts across the transition. The PMU plays an important role in advancing the Skills Portfolio and supporting the development of the workforce required to enable the JET to reach its full potential.

**Presidential Climate Commission (PCC)**

The Presidential Climate Commission advises on South Africa's climate transition and supports a just, inclusive and sustainable transition to a low-carbon economy. The PCC brings together government, business, labour, civil society and other stakeholders to advance a coordinated approach to climate action and the Just Energy Transition.

# Foreword

## From Opportunity To Participation

As South Africa's JET presents an extraordinary economic opportunity, the scale of investment, the number of projects developed or even the number of jobs created will not, on their own, determine whether the Transition is Just. The more fundamental test will be who is able to access, participate in and benefit from the economy that emerges.

This is why skills development is so critical.

The NBI's previous work through Powering Futures: The Green Skilling Opportunity demonstrated the scale of the employment opportunity associated with South Africa's Transition. This Report takes the next critical step: asking how we translate that national opportunity into functioning, local pathways between people, skills, enterprises and real economic demand.

SDZs provide an important mechanism for doing this. Their value lies not in creating another institution or programme, but in connecting what already exists: employers with training institutions; project pipelines with skills pipelines; national ambition with local economic realities; and, critically provide people with opportunities.

The three provinces explored in this Report illustrate why this cannot be achieved through a single national framework. Mpumalanga must navigate the reskilling and redeployment of workers within a coal-dependent economy while simultaneously creating pathways for new entrants into renewable energy and related industries. The Eastern Cape must protect and reposition a significant automotive workforce as the industry transitions towards New Energy Vehicles.

The Northern Cape has the opportunity to build entirely new capabilities around renewable energy and green hydrogen, often in communities where access to education, training and employment opportunities has been constrained. The Transition challenge is therefore different in each place, and our response must be equally differentiated. This is precisely the rationale underpinning the place-based SDZ model.

But being place-based and demand-led is not, by itself, enough to guarantee inclusion.

South Africa's labour market enters the green Transition with deep and persistent inequalities. Women remain underrepresented in many technical and industrial occupations. Young people face significant barriers in moving from learning into earning. Persons with disabilities and other marginalised groups continue to



encounter barriers to education, skills development, entrepreneurship and employment. If we do not deliberately design for inclusion, we risk carrying these patterns of exclusion into a new, greener economy.

This means that gender equity, diversity and social inclusion must be embedded in the architecture of the skills response from the outset. We must understand what skills will be required and where and who currently has access to those skills and opportunities, who does not, and why. We need training pathways that respond to the practical realities of people's lives; recruitment and workplace practices that broaden participation; enterprise development that opens emerging value chains to a more diverse group of entrepreneurs; and data that enables us to see whether opportunity is genuinely translating into more equitable outcomes.

The SDZ model offers us an opportunity to do this differently. Since it is local, it allows us to understand barriers at community level. As it is collaborative, it allows government, business, education institutions and communities to solve those barriers together. Since it is demand-led, it provides the possibility of connecting skills development directly to real employment and enterprise opportunities rather than training people in the hope that opportunities will follow. The report rightly defines SDZs as bottom-up mechanisms connecting training providers, employers and communities around a shared place-based employment agenda.

There is also an important lesson here for how we measure success. Numbers trained are not enough. We need to understand who completes training, who transitions into work, who remains and progresses in employment, whose enterprises enter emerging supply chains, and whether these opportunities ultimately contribute to improved livelihoods and greater economic participation. The Report's call for common measures of skills, enterprise and income outcomes provides an important foundation for that accountability.

The Transition gives South Africa an opportunity to build a more inclusive economy in the process. That outcome is not inevitable. It will depend on deliberate choices about how investment, skills development and economic opportunity are connected.

Our task is therefore to ensure that more South Africans can see a place for themselves in the transition, access it and build sustainable livelihoods through it.

That is the promise of SDZs – and ultimately, the standard against which a Just Transition should be judged.

**Gugu McLaren-Ushewokunze**
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# JET SEP CEO Champions

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# Nomenclature

| TERM | DEFINITION |
|---|---|
| **Just Energy Transition (JET)** | South Africa's Transition towards a lower-carbon energy system in a manner that is just, inclusive and supports the country's development needs. |
| **Just Energy Transition Investment Plan (JET-IP)** | South Africa's investment framework for financing the Transition, including investment in electricity, New Energy Vehicles, green hydrogen, skills and other enabling areas. |
| **Just Energy Transition Implementation Plan (JET-IP)** | The plan setting out how the JET-IP is to be implemented, including the Skills Portfolio and the establishment of three Skills Development Zones. |
| **Skills Development Zone (SDZ)** | A place-based, bottom-up coordination mechanism that connects education and training institutions, employers, communities and other stakeholders around a shared, demand-led skills and employment agenda. |
| **Three-Tier JET Skills Ecosystem** | The national skills architecture comprising the JET Skills Desk, National JET Skills Advisory Forum and SDZs, with the SDZs providing the localised delivery layer. |
| **Demand-Led Skills Development** | An approach in which skills development is informed by current and anticipated employer, industry and project demand, rather than training supply alone. |
| **Place-Based Skills Development** | An approach that responds to the specific economic, industrial, labour-market and community context of a particular geography. |
| **Skills Ecosystem** | The interconnected set of institutions, employers, programmes, policies, data and stakeholders involved in anticipating, developing and utilising skills. |
| **Skills Supply** | The skills and capabilities available within the labour market through existing and prospective workers and the education and training system. |
| **Skills Demand** | Current and anticipated requirements for skills arising from employers, industries, projects and emerging value chains. |
| **Green Economy** | The emerging economy associated with low-carbon and environmentally sustainable economic activity, including renewable energy, green hydrogen, battery energy storage, new energy vehicles and energy efficiency. |
| **Green Workforce** | The workforce required to support emerging green economy value chains and the broader energy transition. |
| **Economic Empowerment** | The deliberate creation of pathways for workers, young people, enterprises and communities in transitioning regions to participate in and benefit from new economic opportunities. |
| **Local Learning Network** | The term used in the JET Implementation Plan to describe the SDZ model: a network anchored in local education institutions and working with business to support community and local economic development. |

| TERM | DEFINITION |
|---|---|
| **Localised Delivery** | Translating national JET priorities, skills intelligence and planning into interventions that respond to specific provincial, district and municipal contexts. |
| **Value Chain** | The sequence of economic activities, occupations and supporting functions associated with a particular sector or Transition opportunity, such as renewable energy, New Energy Vehicles or green hydrogen. |
| **Transition-Aligned Employment** | Employment opportunities arising from new or changing economic activity associated with the energy transition. |
| **Reskilling** | Developing new skills that enable workers to move into different occupations or areas of work as existing employment opportunities change. |
| **Upskilling** | Developing or strengthening the skills of workers to enable them to perform new or enhanced functions within existing or evolving occupations. |
| **Recognition of Prior Learning (RPL)** | Recognition of existing knowledge, skills and experience to support progression into further training or employment. |
| **Workplace-Based Learning** | Learning that takes place in a workplace or through practical exposure to occupational environments and employer requirements. |
| **Enterprise and Supplier Development (ESD)** | Support for the development and participation of enterprises within emerging value chains and local economies. |
| **Socio-Economic Development (SED)** | Development initiatives intended to contribute to socio-economic outcomes in communities associated with investment and economic activity. |
| **Project Pipeline** | The portfolio of planned, proposed, awarded or developing projects that provides an indication of future investment and associated skills and economic demand. |
| **Grid Capacity** | The available capacity of the electricity transmission and distribution system to accommodate additional generation and connect new projects. |
| **Green Hydrogen** | Hydrogen produced using renewable energy, forming one of the priority value chains considered in the Report. |
| **New Energy Vehicles (NEVs)** | Vehicles using new propulsion technologies, including battery electric vehicles, and the associated manufacturing and supporting value chain. |
| **Renewable Energy** | Energy generated from renewable resources, particularly solar and wind in the context of the Report. |
| **Battery Energy Storage Systems (BESS)** | Technologies and systems used to store electrical energy for later use, forming one of the priority JET value chains. |
| **Energy Efficiency** | Measures and technologies that reduce the amount of energy required to deliver a particular service or output. |

# List of Abbreviations

| | |
|---|---|
| **BEV** | Battery Electric Vehicle |
| **BCG** | Boston Consulting Group |
| **BUSA** | Business Unity South Africa |
| **CET** | Community Education and Training |
| **DHET** | Department of Higher Education and Training |
| **EPC** | Engineering, Procurement and Construction |
| **ESD** | Enterprise and Supplier Development |
| **EU** | European Union |
| **EV** | Electric Vehicle |
| **GDP** | Gross Domestic Product |
| **GEDSI** | Gender Equity, Disability and Social Inclusion |
| **GH2** | Green Hydrogen |
| **ICE** | Internal Combustion Engine |
| **IPP** | Independent Power Producer |
| **IPPPP** | Independent Power Producer Procurement Programme |
| **IRP** | Integrated Resource Plan |
| **JET** | Just Energy Transition |
| **JET-ATLAS** | Just Energy Transition – Anticipating Talent, Labour and Skills |
| **JET-IP** | Just Energy Transition Investment Plan |

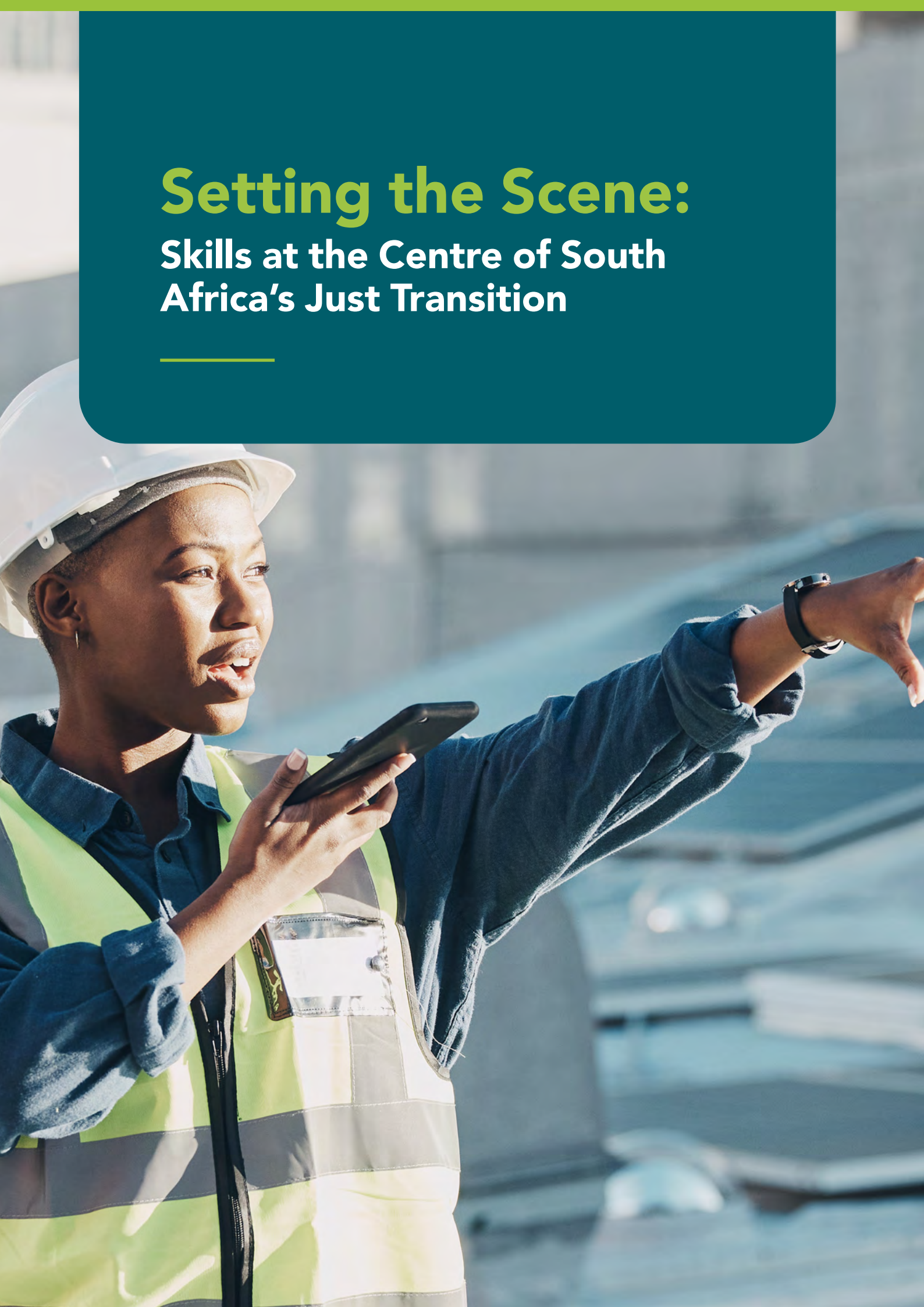
| | |
|---|---|
| **JET SEP** | Just Energy Transition Skilling for Employment Programme |
| **KPI** | Key Performance Indicator |
| **M&E** | Monitoring and Evaluation |
| **NBI** | National Business Initiative |
| **NEV / NEVs** | New Energy Vehicle(s) |
| **OEM** | Original Equipment Manufacturer |
| **PSET** | Post-School Education and Training |
| **PV** | Photovoltaic |
| **REIPPPP** | Renewable Energy Independent Power Producer Procurement Programme |
| **REDZ** | Renewable Energy Development Zone |
| **RPL** | Recognition of Prior Learning |
| **SAWEA** | South African Wind Energy Association |
| **SAPVIA** | South African Photovoltaic Industry Association |
| **SDZ / SDZs** | Skills Development Zone(s) |
| **SED** | Socio-Economic Development |
| **SETA / SETAs** | Sector Education and Training Authority / Authorities |
| **SEZ** | Special Economic Zone |
| **TVET** | Technical and Vocational Education and Training |
| **UK** | United Kingdom |

# Executive Summary

- South Africa's Just Energy Transition (JET) presents a significant opportunity to create jobs, but this will not happen automatically and requires a coordinated, demand-led skills response. This Report analyses and consolidates the existing evidence, policy commitments and stakeholder insights on the Skills Development Zone (SDZ) model across three designated provinces, drawing out the skills and economic opportunities already identified and the implementation enablers emerging from the current ecosystem.
- The JET Implementation Plan 2023 - 2027 commits to piloting three SDZs in Mpumalanga (Renewable Energy and Transmission), the Eastern Cape (New Energy Vehicles) and the Northern Cape (Green Hydrogen) as the localised delivery layer of a national three-tier JET skills ecosystem.
- SDZs are bottom-up coordination mechanisms, not new institutions. They connect existing training providers, employers and communities around a shared, place-based skilling and employment agenda rather than a narrowly defined physical location.
- The Just Energy Transition: Anticipating Talent, Labour and Skills (JET-ATLAS) platform, NBI's geospatial tool forecasting skills supply and demand across South African municipalities, is emerging as a shared resource for the SDZs. Stakeholder workshops convened by NBI's JET SEP have proposed evolving it into a centralised platform layering project pipelines, grid data and skills and enterprise development spend.
- Each province's SDZ opportunity is structurally distinct: Mpumalanga's is predominantly reskilling an existing, ageing coal workforce; the Northern Cape's is scaling a green hydrogen pipeline against a binding grid-capacity constraint; and the Eastern Cape's is protecting an established automotive manufacturing base through the shift to New Energy Vehicles.
- Engagements with the key stakeholders within the JET ecosystem (at a broad level which cascades into the skills ecosystem) point to Mpumalanga and the Northern Cape as natural starting points for a replicable, cross-provincial collaboration model on skills, enterprise and community development.
- The evidence reviewed suggests that decarbonisation investment alone will not address South Africa's Transition challenge unless it is matched by skills pathways that connect people to real and emerging opportunities. Within the scope of the SDZ model, the analysis therefore focuses on how place-based skills planning, employer demand, training provision and local participation can be better aligned, while recognising that these skills interventions sit within a wider ecosystem of economic empowerment, enterprise development and community-level support.
- To ensure a transformative and equitable approach to these opportunities, the principles of Gender Equity, Disability and Social Inclusion (GEDSI) need to be embedded into the design, development and implementation of the SDZs.
- This Report consolidates and analyses existing policy commitments, evidence, stakeholder inputs and provincial context to examine skills development within South Africa's JET, the SDZ model and its application across the three designated provinces, and the cross-cutting enablers that are already emerging from implementation discussions.

# Setting the Scene:

## Skills at the Centre of South Africa's Just Transition



South Africa's Just Energy Transition (JET) represents one of the most significant economic restructuring processes the country will undergo over the coming decades. The Just Energy Transition Investment Plan (JET-IP) 2023 – 2027 sets out a financing requirement of approximately ZAR 1.5 trillion over five years to decarbonise the economy in a manner that is just, inclusive and consistent with South Africa's development needs (The Presidency, 2022). While the Electricity, New Energy Vehicle (NEV) and Green Hydrogen (GH2) sectors carry the bulk of this investment, the JET-IP identifies skills development as a critical cross-cutting enabler, without which the transition cannot be realised at the pace and scale required (The Presidency, 2023).

Modelling undertaken through the NBI's Just Energy Transition Skilling for Employment Programme (JET SEP), captured in Powering Futures: The Green Skilling Opportunity (NBI, 2024), provides the most granular national evidence base available on the scale of this challenge. Drawing on the current project pipeline to 2030 and national targets to 2050, and disaggregating findings across more than 200 municipalities and 35 occupations, the Report forecasts that South Africa's Energy Transition could generate between 400,000 and 600,000 jobs by 2050 across seven priority value chains: Solar, Wind, Transmission, Green Hydrogen, Battery Energy Storage, New Energy Vehicles and Energy Efficiency. Between 120,000 and 200,000 could materialise within this decade. Critically, the Report concludes that the skilling response required is not simply a scale-up of existing training volumes, but a fundamental shift towards an agile, coordinated and place-based skills ecosystem.

This finding is reinforced by NBI's wider body of work on South Africa's skills ecosystem for the Transition, which has consistently identified fragmentation rather than an absence of institutions as the core constraint. Training provision, artisan development, Sector Education and Training Authority (SETA) funded programmes and higher education curricula have not always been sufficiently connected to one another or to the specific and localised demand signals coming from the energy, automotive and green hydrogen value chains. The result is a persistent mismatch between what the Post-school Education and Training (PSET) system produces and what employers in transitioning industries and regions require, even where aggregate training capacity exists (NBI, 2025).

NBI and BCG's Climate Pathways sector studies, undertaken with Business Unity South Africa (BUSA), extend this analysis into the industrial detail of specific value chains (including power sector decarbonisation and the petrochemicals and chemicals sector), confirming that a Just Transition to net zero is achievable by around 2050, provided South Africa leverages its comparative advantages in renewable resource endowment, existing industrial capability and a young, growing population (National Business Initiative, Business Unity South Africa and Boston Consulting Group, 2022). These sector pathways underline that the shape of skills demand differs materially by region and value chain, reinforcing the case for a differentiated, place-based approach to skilling rather than a single national curriculum response.

This points to a broader principle that underpins this Report: the response to South Africa's Energy Transition must be just and responsive, not simply well-funded. No matter how much capital is committed to decarbonising the economy and its constituent sectors, that investment will not, on its own, solve the underlying problem. Without an integrated and deliberate focus on economic empowerment (on actively connecting workers, youth, women and communities in transitioning regions to the real opportunities the Transition creates) South Africa will remain exposed to the same unemployment, inequality and social instability the Transition is meant to resolve.

For women, this requires more than nominal access to training places. It means recognising and addressing the practical, social and institutional barriers that often shape women's participation in technical, artisan and industrial pathways. The urgency of this is underscored by South Africa's labour-market data: in the second quarter of 2026, the official unemployment rate for women aged 15 - 64 stood at 37.5%, compared with the national unemployment rate of 33.6% and 30.3% for men (Statistics South Africa, 2026). These labour-market realities reinforce the need for skills pathways that directly address women's access to career information, training finance, workplace-based learning, safe and affordable transport, childcare and care responsibilities, suitable facilities, gender-sensitive training environments, inclusive recruitment and retention practices, and protection from discrimination or harassment in male-dominated workplaces.

A gender-responsive skills response must therefore move beyond counting women's participation to ensuring that women can enter, complete, progress and lead within the emerging green economy, including through access to mentorship, placement opportunities, enterprise support and progression into supervisory, technical and decision-making roles. A Transition that decarbonises the economy while leaving people behind is not, by definition, a just transition. Skills development must therefore be treated as a precondition and support mechanism for the JET to succeed, not as a downstream consequence of it.

Government's own planning has converged on the same conclusion. The JET Implementation Plan 2023 – 2027 dedicates a full Skills Portfolio to this challenge, built around five flagship interventions: the establishment of a three-tier JET skills ecosystem; the piloting of Skills Development Zones (SDZs) in Mpumalanga, the Eastern Cape and the Northern Cape; value chain-specific skills needs assessments; capacity development for government institutions; and foundational skills interventions in schools (The Presidency, 2023). This architecture was formally activated with the launch of the JET Skills Desk within the Department of Higher Education and Training (DHET) and a National JET Skills Advisory Forum, mandated to anticipate skills needs, align curricula with industry demand, and establish the three SDZs.



This Report focuses on the intended development of a model for the Skills Development Zone and its application in three provinces whose economic bases sit at the centre of South Africa's energy transition: Mpumalanga (Renewable Energy and Transmission), the Eastern Cape (New Energy Vehicles) and the Northern Cape (Green Hydrogen). Each province combines a concentrated industrial exposure to the transition with a distinct opportunity to anchor new, transition-aligned employment. Read together, the JET Investment Plan, the JET Implementation Plan, and the NBI evidenced-base reports make clear that realising these opportunities depends less on generating new national policy commitments and more on building the localised, demand-led delivery mechanisms capable of leveraging off provincial industrial investment and providing the opportunity to create an employable, skilled workforce.

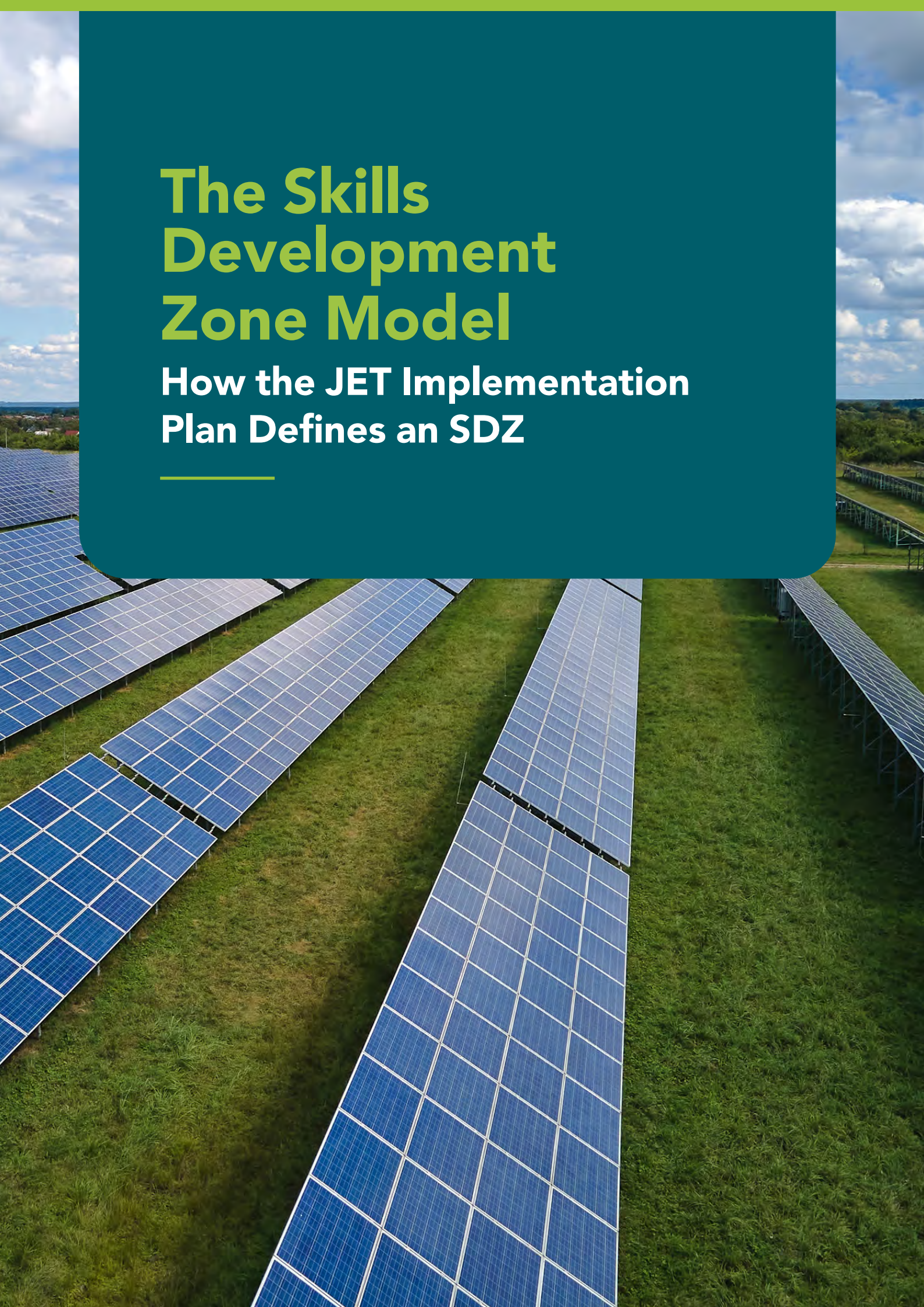
A recurring theme across this evidence base is that good intentions cannot substitute for good data. NBI has sought to close this gap through the Just Energy Transition – Anticipating Talent, Labour and Skills (JET-ATLAS), a geospatial platform that provides signals of skills supply and demand across South African municipalities. The platform is intended to function as a shared resource to guide planning in the SDZs as well as in other regions of the country. As recent engagements with the Independent Power Producer (IPP) community have indicated, the JET-ATLAS can provide a central tool for mapping project pipelines, grid data and enterprise and community development spend. This would assist in facilitating more coordinated planning and resourcing of place-based interventions.

Finally, while this Report focuses on the three provinces formally designated under the JET-IP, it is worth noting at the outset that the opportunity is not necessarily confined to these. Recent NBI-convened engagement with IPPs has flagged the Free State and the Western Cape's Central Karoo region as emerging geographies with early conditions for a workable skills and enterprise development collaboration model due to the significant investment in large-scale renewable energy projects in these regions, extending the logic of the SDZ approach beyond its initial three sites. This reinforces the central argument of this Report: the SDZ is a replicable model for organising a place-based skills response, not a fixed list of three locations.



# The Skills Development Zone Model

## How the JET Implementation Plan Defines an SDZ



The JET Implementation Plan defines Skills Development Zones (SDZs) as "local learning networks", each focused on one of three core JET value chains and anchored in local education institutions in partnership with business, to support community and local economic development initiatives (The Presidency, 2023). The three SDZs are designated: Mpumalanga (Renewable Energy and Transmission), the Eastern Cape (New Energy Vehicles) and the Northern Cape (Green Hydrogen). The Implementation Plan situates the SDZs as the localised delivery layer of a broader three-tier JET skills ecosystem, in which the JET Skills Desk provides central coordination and labour market intelligence, the National JET Skills Advisory Forum provides multi-stakeholder guidance, and the SDZs translate this national architecture into applied, place-based skills anticipation, development and utilisation (NBI, 2024).

According to the Implementation Plan, SDZs are considered to feature the following (illustrated further in Figure 1):

- The anchoring of educational institutions
- Links between these anchor institutions and other local education and training institutions
- Links with local related businesses
- Links to local community organisations to facilitate community-based and youth structures
- Partners working together to develop local demand pictures, identify jobs at risk, and catalyse local skills development.




*Figure 1: The role of Skills Development Zones according to the JET-IP, 2023*

The JET-IP prices the piloting of the three SDZs at approximately ZAR 1.6 billion, forming part of the broader ZAR 2.7 billion allocated to skills development under the Investment Plan (The Presidency, 2022). Government has been explicit that no dedicated public budget line yet exists for this work, and that a blended finance model which combines public investment with private sector, philanthropic and donor contributions will be required to establish and sustain the Zones.

## What an SDZ Is Not

Since the SDZ concept is new and still evolving, it is easily conflated with more established South African spatial development instruments – particularly Special Economic Zones (SEZs) and TVET Centres of Specialisation. Both comparisons are informative, but each obscures a critical distinguishing feature of the SDZ model, which is that it is designed as a bottom-up, place-based coordination mechanism rather than a top-down, spatially-bounded infrastructure investment.

An SEZ is, by definition, a geographically demarcated area in which government applies distinct regulatory, tax and customs arrangements to attract investment and catalyse industrial activity within that defined footprint (Department of Trade, Industry and Competition). South Africa's own experience – including the proposed green hydrogen SEZ anchored around the planned Boegoebaai Port in the Northern Cape – illustrates the model well: an SEZ is a fixed geographic site with its own governance structure, built to house firms and attract capital.

An SDZ, by contrast, has no defined boundary and does not exist to attract companies into a demarcated site. Rather, it functions as a coordination mechanism that builds on and leverages what already exists across a functional labour market, including training and education institutions, employers, communities, project pipelines and spatial platforms such as SEZs where these are present. In this sense, the SDZ does not replace or duplicate an SEZ; it helps connect existing and emerging economic activity to a more coherent, demand-led skilling response. Where an SEZ asks, "what can we build here to attract investment?", an SDZ asks, "what demand is already being created through existing investments and institutions, and how can local skills systems be aligned so that people are prepared to participate in that demand?"

Centres of specialisation – the model piloted by the DHET within selected TVET colleges to build quality, occupation-specific artisan training capacity in a single institution – offer a closer, but still incomplete, analogy. A centre of specialisation concentrates capability and equipment in one institution and functions as a national or regional centre of excellence for a defined trade. An SDZ may well anchor itself in a lead institution or a small number of institutions, but its unit of value is the network, not the campus. A centre of specialisation training; an SDZ coordinates who trains whom, in what, for which employer, and how the outcome is tracked back into local economic development.

This distinction matters practically. It means an SDZ's success is not measured primarily by capital expenditure, floor space or the number of companies located within a boundary, but by the quality of localised labour market intelligence it generates, the degree of alignment it achieves between curricula and employer demand, and the extent to which local institutions and communities – rather than a centrally designed programme – shape its priorities over time.

## Bottom-Up by Design

The bottom-up orientation of the SDZ model is a deliberate response to a documented weakness in South Africa's skills system: the persistent disconnect between national skills planning and the lived, local reality of employers, communities, and education and training institutions in transitioning regions. Stakeholder feedback gathered during the Presidential Climate Commission's 2023 consultations on the JET-IP raised concerns on the levels of inefficiency of the skills development system and highlighted poor coordination among training institutions as a central obstacle to an effective transition (The Presidency, 2023). NBI's own JET SEP stakeholders have echoed this concern from an industry perspective, stressing the importance of appropriate geospatial planning for the SDZs so that they remain accessible to the individuals who most need to access new work opportunities, rather than becoming disconnected from the communities they are meant to serve.

Government's framing of the SDZs reflects this: each Zone is expected to be anchored in local education institutions in partnership with business "to support community and local economic development initiatives", not simply to produce a numeric training output (Presidency, 2023). In practice, this means that each SDZ should be understood less as a bounded development site and more as a locally organised skills ecosystem: one that links institutions, employers, communities and labour market intelligence around the specific transition opportunity in that place.

The design of each SDZ – which institutions convene it, which employers participate, which occupations are prioritised, and how success is measured – is therefore intended to reflect the industrial geography, existing institutional capacity and community context of Mpumalanga, the Eastern Cape and the Northern Cape respectively, rather than being replicated uniformly from a national template.

## The JET-ATLAS and the Value of Data

A bottom-up model is only as effective as the data available to the local actors who must make it work. NBI has sought to close this gap through the JET-ATLAS (Figure 2), an interactive dashboard that makes skills supply and demand forecasting data explorable at the municipal level across South Africa. Built on the same underlying forecasting model that produced the national findings in Powering Futures, the JET-ATLAS allows a user to move from a national jobs number – 400,000 to 600,000 jobs by 2050 – down to how this data applies in a specific municipality, occupation and value chain.

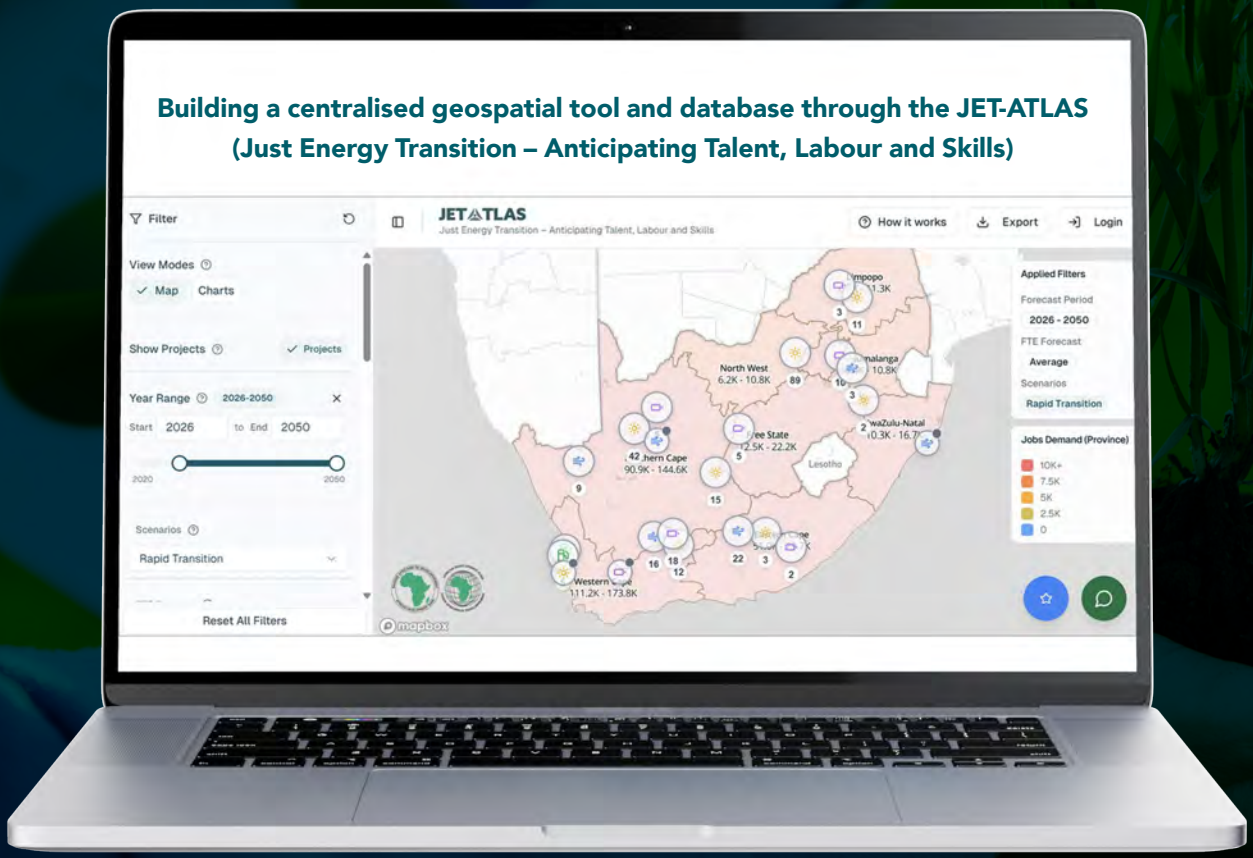



*Figure 2: JET-ATLAS Forecasting tool*

This granularity is what provides an SDZ with the insight it needs to plan and implement appropriate interventions. Local learning networks cannot align curricula, prioritise occupations or direct scarce training capacity without knowing, at a local level, which occupations are growing, which are declining, and where the gap between projected demand and current training output is widest. Equally, effective planning requires an understanding of who is currently participating in these occupations and skills pathways, and who remains excluded. Wherever data allows, disaggregation by gender, age, disability and other locally relevant dimensions of exclusion can help identify participation gaps and inform more targeted and inclusive interventions.

The JET-ATLAS is intended to function as a shared resource for exactly this purpose - giving TVET colleges, universities, SETAs, employers and provincial government a common, place-based evidence from which to plan, rather than each institution working from its own partial picture of the local labour market context. Over time, strengthening the platform's ability to integrate and interrogate demographic and participation data alongside skills supply and demand would provide an even richer basis for inclusive planning. In this sense, data is not only a supporting output of the SDZ model, but it can be considered as one of its foundational enablers: it is what allows a bottom-up network of institutions to act with the coherence that a top-down programme would otherwise have to impose.

## Regional Focus, Opportunity and Skills

Each of the three designated SDZs is built around a distinct value chain, industrial geography and skills opportunity, reflecting the JET-IP's recognition that the Transition's employment effects are concentrated rather than evenly spread as depicted in Figure 3. Mpumalanga's SDZ is anchored in renewable energy, transmission and the growing role of Independent Power Producers (IPPs), aligned to the province's coal-dependent economy and the need to build alternative livelihoods ahead of the staged decommissioning of coal-powered plants over the next 24 years.

The Eastern Cape's SDZ is anchored in New Energy Vehicles, aligned to the province's existing automotive manufacturing base and its exposure to the global shift away from internal combustion engine production. The Northern Cape's SDZ is anchored in green hydrogen, renewable energy and Independent Power Producers (IPPs), aligned to the province's exceptional renewable resource endowment and its emerging role as an export-oriented hub for green hydrogen and ammonia.

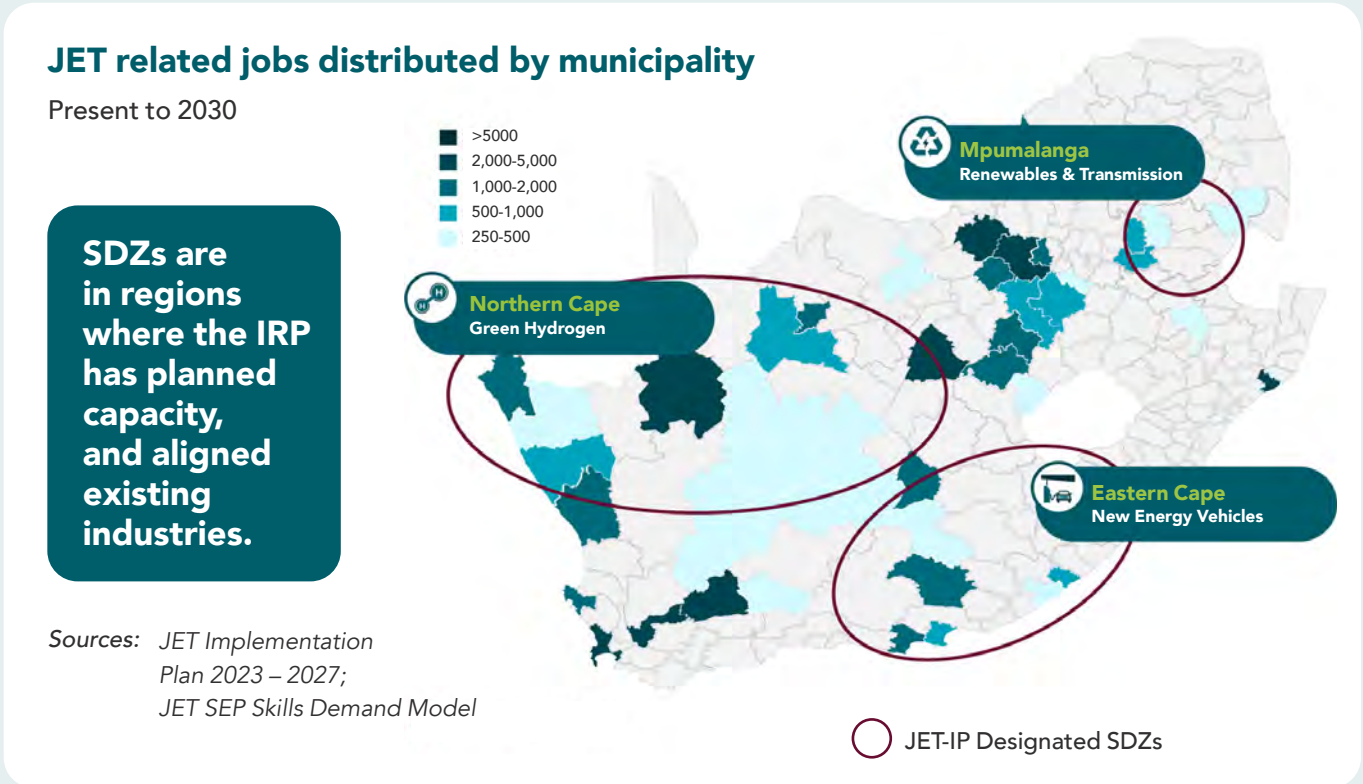
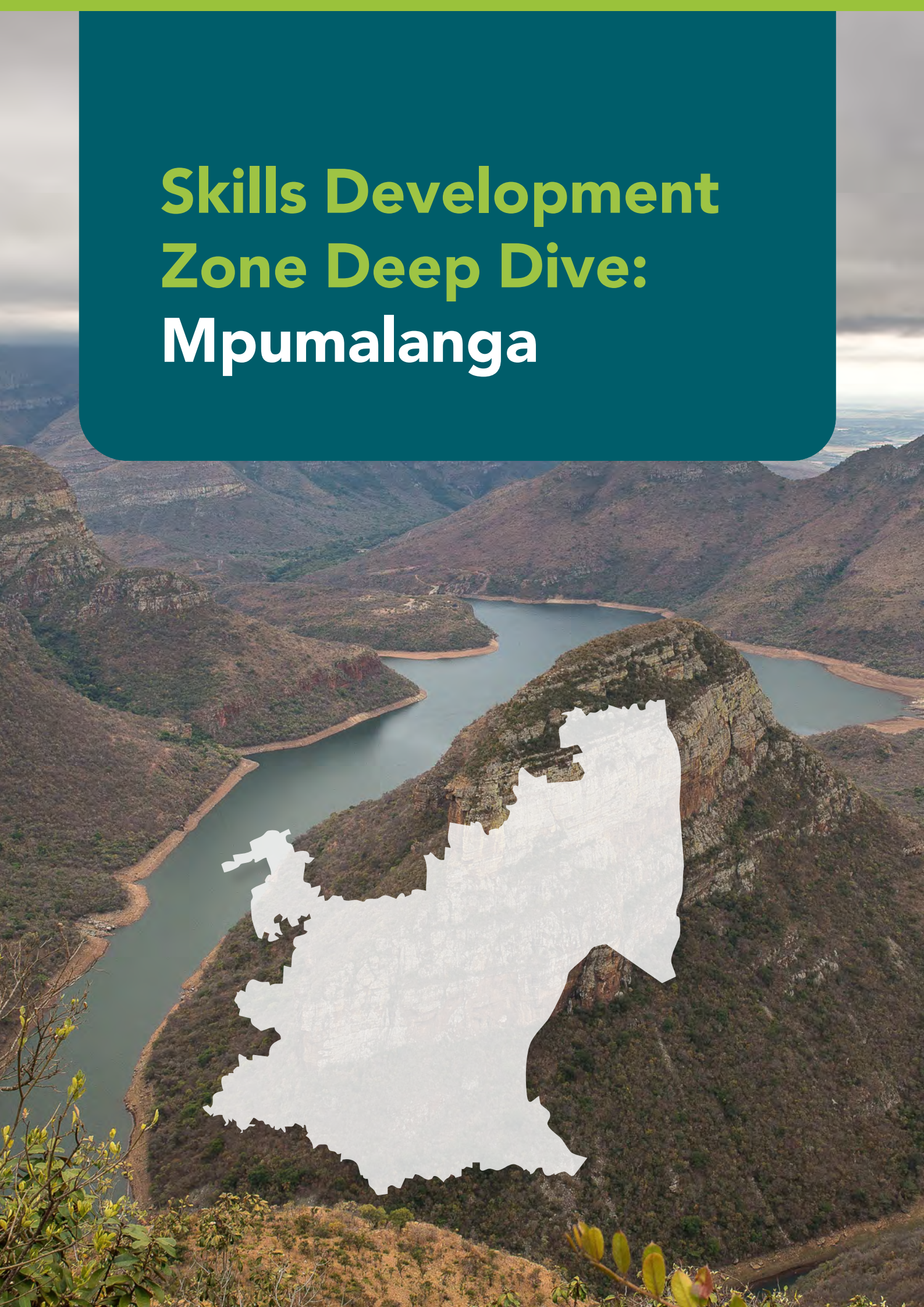



*Figure 3: SDZ regions – Mpumalanga, Northern Cape and Eastern Cape.*



# Skills Development Zone Deep Dive: Mpumalanga



## The Economic and Industrial Profile

Mpumalanga has been the industrial heartland of South Africa's electricity system for more than half a century. The province hosts 11 of Eskom's 14 coal-fired power stations and supplies the majority of the coal that fuels the national grid, with Eskom holding supply contracts with 35 coal mines as at April 2024 (Outlier, 2024). The coal value chain – mining and power generation combined – provides direct employment to approximately 90,000 people in the province, with the electricity and utility industry employing a further 30,481 people in Mpumalanga as of 2019 (Xaba, 2025; ESI-Africa, 2024). An estimated 46,100 coal-dependent households in the province rely on this income, and close to 59% of these households depend on a single coal worker's earnings, leaving them acutely exposed to the pace of decommissioning (ESI-Africa, 2024).

This concentration of economic and employment risk in a single province is precisely why the JET-IP treats Mpumalanga as a standalone Portfolio, distinct from the national Electricity Portfolio, with its own costed transition plan of ZAR 60.4 billion covering the repurposing of coal plants and mining land, infrastructure improvement, economic diversification, support for the coal workforce, and investment in the skills of future generations (The Presidency, 2022). Nine coal-fired power stations are scheduled for decommissioning nationally by 2035 in line with the Integrated Resource Plan and Eskom's roadmap, with seven of Mpumalanga's stations scheduled to start or complete this process by 2030 (Xaba, 2025; Outlier, 2024). Komati power station, whose last generating unit closed in 2022, is the first to be repurposed, supported by the World Bank-financed Eskom Just Energy Transition Project, and is intended to serve as a blueprint for the province's wider transition (World Bank, 2023).

## The Risks and Opportunities

The scale of risk in Mpumalanga is significant: more than half the youth in the province's coal communities are already unemployed, and the JET-IP itself acknowledges that continued decline in the coal value chain will further narrow employment opportunities as the sector downscales (Tamasiga, n.d; Mudiriza, De Lannoy, Anda,. (2024). Community-level reporting from coal towns such as Ermelo – where an estimated 80% of the more than 80 000 residents work for Eskom or Transnet – illustrates how concentrated this exposure is at a municipal level, and how directly livelihoods are tied to the decommissioning schedule of a small number of power stations.

Independent tracking of JET-IP grant funding flows has also found that Mpumalanga's skills and municipal support needs remain significantly underfunded relative to demand, with only a small proportion of allocated grants reaching upskilling programmes despite widespread recognition of a substantial skills mismatch between coal workers and emerging renewable energy occupations (Tamasiga, n.d.).

Against this risk, the province holds a specific and quantifiable opportunity: modelling commissioned for the JET-IP identifies solar photovoltaic (PV) and wind energy as the two technologies that will make the largest contribution to new employment in Mpumalanga, projecting up to 43,000 jobs in solar PV and 28,900 jobs in wind energy by 2030. Eskom has stated that JET implementation could support around 300,000 jobs nationally in the renewables value chain over time, a portion of which is expected to be anchored in Mpumalanga given its existing grid infrastructure, land availability around retiring power stations, and proximity to the Renewable Energy Development Zones (REDZs) prioritised for public procurement rounds under the South African Renewable Energy Masterplan (The Presidency, 2023).

However, the creation of new jobs will not automatically result in more equitable labour-market participation. The Transition provides an important opportunity to address the underrepresentation of women in energy, technical and artisan occupations by deliberately building pathways for women into the emerging renewable-energy workforce. This requires gender-responsive skills planning that considers not only training numbers, but recruitment, access, completion, workplace entry and progression, alongside the practical and structural barriers that may prevent women from participating in these opportunities. Realising this opportunity at the pace communities need requires the reskilling and new entrant skills pipeline to be in place well ahead of each plant's decommissioning date, rather than initiated once closure is already underway – a sequencing challenge that has been widely raised by stakeholders and civil society as a shortcoming of implementation to date.

## Sectoral Positioning within the National Planning Process

Mpumalanga's provincial profile is reflected directly in the design of the national JET skills architecture. The designation of Mpumalanga as a SDZ for renewable energy and transmission follows logically from the province's asset base: existing grid connection points and substations at retiring coal stations, an established workforce with transferable technical and artisan skills, and a live pipeline of solar and wind projects competing for the additional REDZ-linked capacity earmarked under the JET-IP's Electricity Portfolio (The Presidency, 2023).

Government's framing of the JET skills ecosystem places the Mpumalanga zone within the same three-tier structure as the Eastern Cape and Northern Cape – anchored in local education institutions in partnership with business, communities and coordinated nationally through the JET Skills Desk and National JET Skills Advisory Forum. Unlike the other two zones, Mpumalanga's SDZ sits alongside a parallel, province-specific governance structure: the JET-IP's Mpumalanga Portfolio, which has its own secretariat, workstreams and Provincial Government-led coordination, meaning the SDZ in this province must be designed to complement – rather than duplicate – an already-established transition governance architecture, including bodies such as the Mpumalanga Green Cluster Agency.

## Workforce and Skills Demand Findings

At a national level, the clean energy portfolio of the Just Transition – spanning renewable energy, transmission and New Energy Vehicle value chains – is projected to require approximately 21,000 artisans, 25 ,000 engineers and 25,000 technicians by 2030 (National Business Initiative, 2024). Mpumalanga's share of this demand is distinctive in that it is not purely additive: a substantial proportion of the province's future renewable energy and transmission workforce is expected to be drawn from workers currently employed in coal mining and coal-fired generation, with existing artisan, electrical, mechanical and technical trades qualifications potentially offering a partial match in skills to solar, wind and grid-related occupations.

Independent evidence points to a persistent and well-documented skills mismatch between the coal workforce and emerging renewable energy roles, meaning the province's skilling priority is less about building an entirely new pipeline from school-leaver level, as in the Northern Cape, and more about targeted reskilling, recognition of prior learning, and bridging programmes for an existing, experienced, but ageing workforce concentrated in a small number of coal towns (ESI-Africa, 2024; Tamasiga, n.d.).

This gives the Mpumalanga SDZ a materially different design starting point to its Eastern Cape and Northern Cape counterparts with respect to skilling for the renewable energy sector, and reinforces the case made in Section 3 for a bottom-up, province-specific approach rather than a single national skilling template.

## Local Context: Nkangala District and eMalahleni

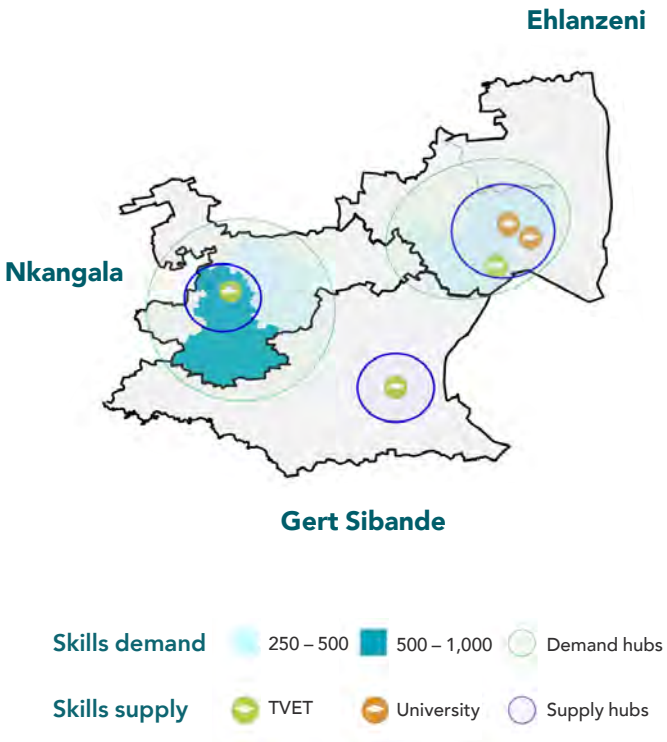
NBI's contextual profiling work has focused the Mpumalanga SDZ's early situational assessment on the Nkangala and Gert Sibande district municipalities, and on eMalahleni Local Municipality in particular. At a high level, this profiling reinforces the provincial picture in Section 4.1 while adding local precision: Mpumalanga's approximately 5.14 million people are youth (28% under 15, 66% economically active), yet Nkangala's official unemployment rate rose from roughly 34.3% in 2019 to 38.9% in 2022 despite hosting a substantial industrial economy, and only 7.6% of adults in the district hold a higher education qualification (Mpumalanga Provincial Government, 2025; Statistics South Africa, 2023; Nkangala District Municipality, 2024). eMalahleni – the district's most populous municipality, with 62.4% of residents under 35 – records youth unemployment of 41.6%, underscoring the urgency of a skills intervention that can absorb a large, young cohort quickly (eMalahleni Local Municipality, 2025).

This local evidence base also broadens the opportunity picture beyond renewable energy and transmission alone. National policy identifies Nkangala as a priority location for renewable energy manufacturing, battery energy storage and green hydrogen development given its existing industrial base and transmission networks, and the district already hosts renewable energy activity through initiatives such as the eMalahleni Renewable Development Zone (Department of Electricity and Energy, 2024; Mpumalanga Green Cluster, 2023). At the same time, provincial and district economic recovery plans place comparable weight on agriculture, agro-processing and food security – sectors in which Mpumalanga is already a national leader, but where an estimated 26.6% of households experienced moderate to severe food insecurity in 2023, driven less by production shortfalls than by unemployment and constrained household income (Statistics South Africa, 2025). This suggests the Mpumalanga SDZ's skills pipeline has scope to extend beyond its core renewable energy and transmission mandate into climate-smart agriculture and agro-processing, where the employment and food security case is equally strong, and the underlying workforce challenge – a large, young, under-qualified labour pool – is the same.

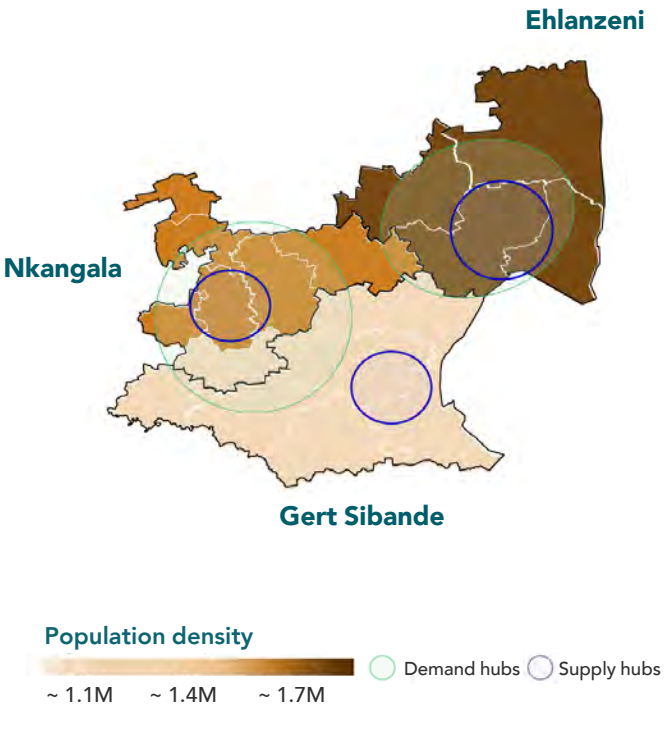


## Skill match: MP SDZ should pilot in Ehlanzeni and Nkangala, but broader demand stimulation is needed to support worker redeployment as coal stations decommission

**Short-term: Ehlanzeni and Nkangala Municipalities present prime locations for SDZ intervention pilots** given skill demand and supply to 2030 overlap



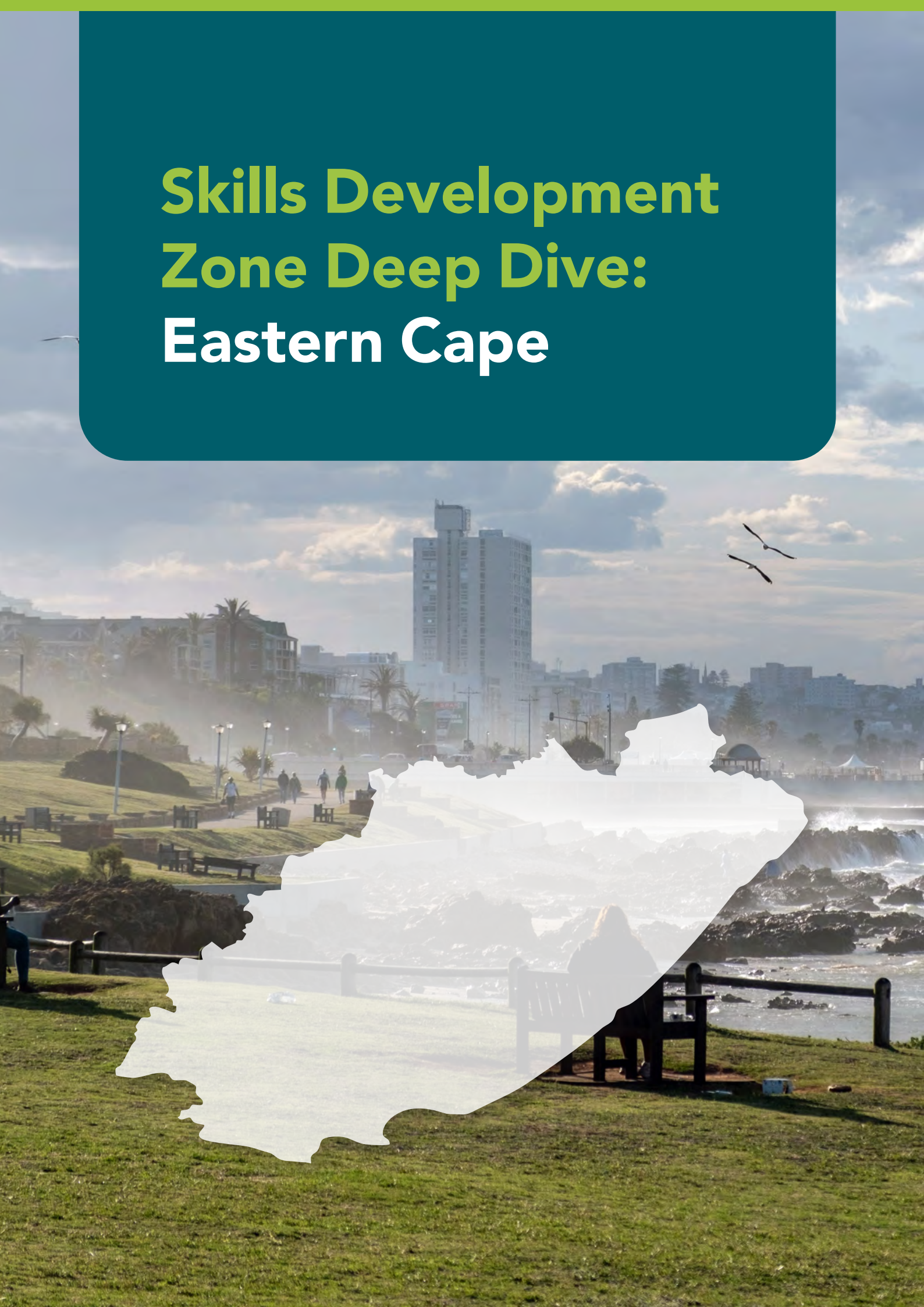

**Long-term: Demand stimulation is required across the province as high overall population** cannot be supported by current project pipelines in the backdrop of decommissioning coal plants




*Source:* *JET Skills Demand Model, Stats SA Mpumalanga Census 2022; JET SEP Analysis*

*Figure 4: Nkangala shown as a prime location for intervention pilots to 2030.*

# Skills Development Zone Deep Dive: Eastern Cape



## The Economic and Industrial Profile

The Eastern Cape is South Africa's most established automotive manufacturing hub, which houses several vehicle Original Equipment Manufacturers (OEMs), including Mercedes-Benz, Volkswagen, Isuzu, Ford and FAW. The region contributes approximately 38% of South Africa's total vehicle production and 50% of the country's vehicle exports. Nationally, the automotive manufacturing value chain contributes approximately 4.9% of Gross Domestic Product (GDP) and 27.6% of manufacturing output. It supports around 116,000 to 457,000 formal sector jobs depending on how indirect and induced employment is counted, generating R227.6 billion (Ojo et al., 2025). The concentration of OEM and export activity places the Eastern Cape at the centre of South Africa's shift toward New Energy Vehicles (NEVs) (DTIC, 2023; Ojo et al., 2025).

The transition to NEVs is informed by the European Union (EU) and United Kingdom (UK) restrictions on Internal Combustion Engine (ICE) vehicle imports from 2035, placing South Africa's export profile (and by extension, the Eastern Cape's economic base) at direct risk unless local manufacturing localises EV production (Ojo et al., 2025). The DTIC's Electric Vehicle White Paper frames the automotive transition as a policy priority specifically because of the regional economic concentration of automotive manufacturing in the Eastern Cape, Gauteng and KwaZulu-Natal, warning that a decline in the industry would have disproportionate effects in these provinces (DTIC, 2023).

## The Risks and Opportunities

The current landscape combines industrial risk and opportunity in the same footprint but capturing the opportunity and managing the risk both depend on a level of political and institutional coordination that does not yet fully exist. On the risk side, the pace of the global shift to electric vehicles (EVs) creates a workforce transition exposure across the automotive value chain: battery electric vehicle (BEV) production is less labour-intensive than internal combustion engine (ICE) manufacturing, and traditional roles in engine, fuel-system, and exhaust assembly are expected to decline as these components are phased out (Ojo et al., 2025).

On the opportunity side, demand for New Energy Vehicle (NEV) technician skills will increase as demand for light vehicles and e-buses (especially for public transport) increases, with new employment also expected to emerge in battery production and electric vehicle manufacturing even as ICE-specific roles decline (Ojo et al., 2025). Realising this opportunity while managing the risk, however, is constrained by governance challenges that cut across the transition. The shift spans trade and industry, employment and labour, transport, and education and skills authorities, with no single department currently holding a clear workforce-transition mandate for the Eastern Cape automotive sector. Political and budget cycles tend to run shorter than the multi-year retraining pipelines the Transition demands, risking support that is front-loaded or withdrawn before displaced workers are absorbed into new roles. The absence of a shared monitoring framework across original equipment manufacturers (OEMs), unions, Technical and Vocational Education and Training (TVET) colleges, and government makes it difficult to track whether new NEV and battery-sector jobs are replacing declining ICE roles at the pace required.

Addressing this will require sustained political and leadership support: continued, visible buy-in from national and provincial government to keep the Skills Development Zone (SDZ) agenda prioritised across changes in political leadership; a clearly mandated coordinating authority with the budget and standing to align OEM investment plans, skills programmes, and labour transition support; and active, ongoing engagement from organised labour and industry bodies, whose buy-in is essential given the direct impact of workforce transition decisions on their members. The industrial case for the transition is well established; what will determine whether the Eastern Cape captures the opportunity is whether governance structures and political leadership can sustain coordinated action over the timeframe the transition requires.

In addition, realising this opportunity requires a coordinated, anticipatory skills response. South Africa's Just Energy Transition Investment Plan (JET-IP) 2023 – 2027 identifies New Energy Vehicles as one of the three JET priority sectors (alongside green hydrogen and electricity) and explicitly includes a Skills Portfolio within its implementation plan[12].

[1] Presidential Climate Commission. (2022a). South Africa's Just Energy Transition Investment Plan (JET-IP) 2023 – 2027. https://www.climatecommission.org.za/

[2] The Presidency, Republic of South Africa. (2023). Just Energy Transition Implementation Plan 2023 – 2027. https://stateofthenation.gov.za/

## Workforce and Skills Demand Findings

As indicated above, there is significant demand for artisans, engineers, and technicians across the green energy value chains. For the automotive or NEV value chains specifically, five priority skills areas have been identified, namely, (1) upskilling the current workforce for EV-specific tasks such as battery; (2) inverter and electric-motor installation; (3) specialised mechanical engineering programmes; (4) ecosystem-wide training for emergency responders managing high voltage and battery fire incidents; and (5) reskilling for roles displaced as BEV assembly which requires fewer labour-intensive processes than ICE assembly.

**Projects are distributed across Eastern Cape...**

**... with greatest demand in Sarah Baartman district**

| Critical employment projects | Construction year | Municipality |
|---|---|---|
| **Wind & RE** | | |
| Wolf Wind Farm | 2025 | Blue Crane Route |
| Coleskop WEF | 2025 | Inxuba Yethemba |
| Additional projects planned but still uncertain | 2025 to 2030 | Various municipalities |
| **Transmission** | | |
| Greater EL phase 3 | 2026 | Nelson Mandela Bay |
| Greater EL phase 4 | 2028 | Blue Crane Route |
| Poseidon South 400/132 kV substation integration | 2028 | Buffalo City |
| Dorper 400/132 kV substation integration | 2030 | Buffalo City |
| **NEVs** | | |
| AIDC-EC Public Charging Network | Underway | Various municipalities |
| Zero Carbon Charge Off-Grid Network | 2025 | Various municipalities |
| Stellantis Coega Automotive Plant | 2026 | Kouga |
| CCIG/SIGA Bus Assembly Plant | TBD | Buffalo City |

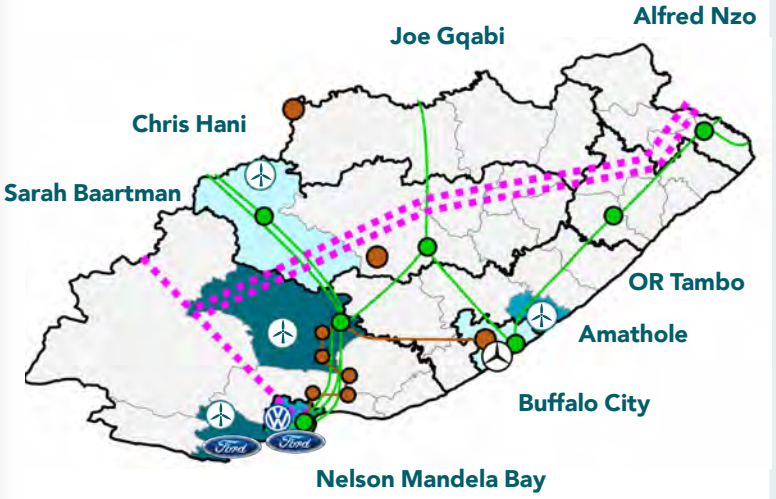



*Figure 5: EC SDZ project pipeline and projected skills demand*

## Local Context: Nelson Mandela Bay and Buffalo City

As with Mpumalanga's Nkangala District, the Eastern Cape SDZ's early situational focus falls most naturally on the two metros where its automotive base is concentrated: Nelson Mandela Bay, home to Coega and the VWSA and Isuzu plants, and Buffalo City, home to the ELIDZ and Mercedes-Benz's East London operations. Both metros illustrate why the skills intervention cannot wait: Nelson Mandela Bay's unemployment rate stood at approximately 29.8% in the first quarter of 2026, with youth unemployment (ages 15 – 34) at around 45.8%, and the province as a whole shed tens of thousands of jobs over the same period (The Herald, 2026). Buffalo City has shown more volatile but similarly elevated unemployment over recent years. A workforce transition strategy premised on retaining and growing OEM investment therefore has to compete with, and ultimately help reverse, an already deteriorating regional labour market – reinforcing the case for an NEV skills pipeline that is demand-led and moving at the pace of investment decisions, not behind them.

## Skills Supply Profile and TVET Partner Landscape

The Eastern Cape's eight public TVET colleges give the SDZ a wider institutional base to draw on than the Northern Cape, but not all are equally positioned for an NEV mandate. Eastcape Midlands TVET College, headquartered in Uitenhage immediately adjacent to the VWSA Kariega plant, and Buffalo City TVET College, based in East London and Mdantsane alongside the ELIDZ's Automotive Supplier Park, are the two colleges with the clearest geographic and employer proximity to the province's automotive cluster, making them the most likely anchor institutions for the SDZ's initial NEV-specific interventions.

Neither, however, currently offers a dedicated, scaled curriculum for the EV-specific occupations identified above – battery, inverter and electric-motor installation, or high-voltage emergency response – meaning the existing partnership between these colleges and their OEM neighbours will need to be extended and repurposed rather than built from nothing.

This mirrors the broader lesson from Mpumalanga and the Northern Cape: the Eastern Cape's SDZ can concentrate scarce curriculum development and equipment investment in a small number of well-placed, employer-adjacent institutions, rather than attempting to build NEV capability across all eight colleges at once.



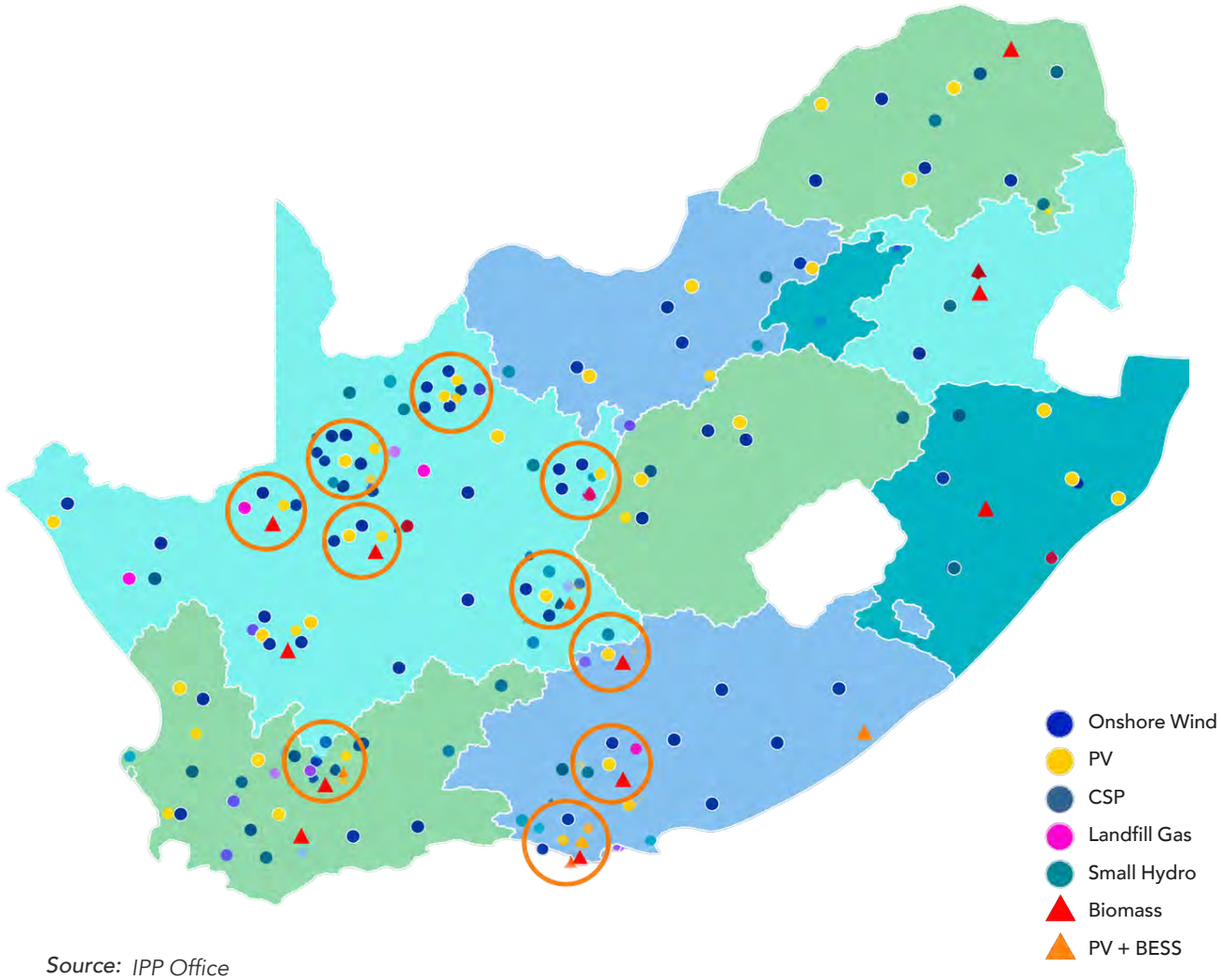
# Skills Development Zone Deep Dive: Northern Cape



## The Economic and Industrial Profile

The Northern Cape is South Africa's largest province by land area and, historically, one of its most sparsely populated and economically marginal. The Energy Transition has begun to reposition the Northern Cape as a critical site for capacity to achieve the country's decarbonisation objectives, as the province holds some of the country's strongest solar and wind resources and has become the geographic centre of gravity for South Africa's utility-scale renewable energy build-out. Analysis of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) shows that the majority of the country's solar photovoltaic capacity procured under the programme has been located in the Northern Cape, and the province is currently hosting over 56 registered renewable energy projects spanning solar, wind and hydro technologies.

### Current IPP Projects Across the Renewable Energy Landscape



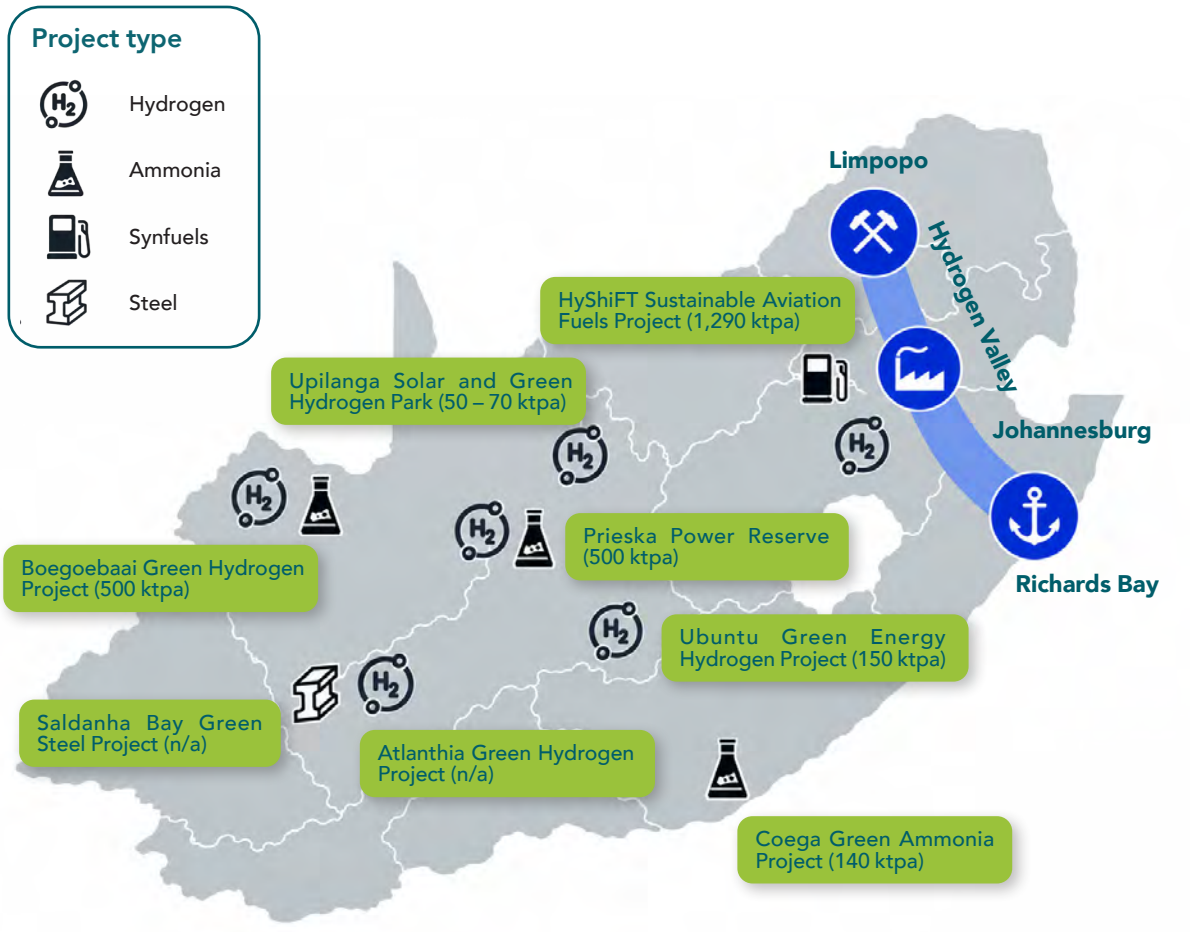

Source: *IPP Office*

*Figure 6: Current IPP programmes across the Renewable Energy Landscape*

This renewable resource base is now the foundation for a second, larger industrial opportunity: green hydrogen. The Northern Cape hosts four of the nine projects published under the national Green Hydrogen National Programme – the Prieska Power Reserve, the Ubuntu Green Hydrogen Project, the Upilanga Solar and Green Hydrogen Park, and the Boegoebaai Green Hydrogen Development Programme.

Boegoebaai, a proposed deep-water export port and rail development approximately 60 kilometres north of Port Nolloth, anchors this pipeline - it is envisaged as a central hub for the export of green hydrogen and ammonia, supported by an adjacent Green Hydrogen Special Economic Zone, and has been named among South Africa's top infrastructure priorities.

**Map of the Hydrogen Valley and planned green hydrogen projects designated as Strategic Integrated Projects (SIPs) by the South African government; hydrogen production capacity by 2050 in parentheses.**




*Source:* *data from DTIC 2022, IEA 2022c.*

*Figure 7: Hydrogen Valley map and planned hydrogen projects*

The emerging green hydrogen pipeline also highlights the interconnected nature of these opportunities across provinces. For example, Hive Hydrogen's Coega Green Ammonia Project is being developed in the Eastern Cape, while its associated 1,430 MW Crossroads Solar PV Cluster is being developed in the Northern Cape to provide renewable electricity to the project. This provides a practical example of how renewable energy generation, hydrogen production and downstream industrial activity can be geographically distributed while forming part of the same value chain.

For the Northern Cape, this reinforces the importance of looking beyond individual projects to understand the wider skills and economic opportunities created across interconnected value chains. Boegoebaai remains a major anchor for the province, particularly given its potential role in green hydrogen and ammonia production, export infrastructure and associated industrial activity. At the same time, projects such as Coega demonstrate how the province's renewable energy capacity can support industrial development beyond its borders.

## The Risks and Opportunities

The province's opportunity is significant but structurally uneven. On the supply side, the Northern Cape's competitive advantage – abundant, high-quality renewable resources – is being increasingly realised; the constraint has shifted to grid capacity and project bankability rather than resource availability. Grid capacity in the Northern and Western Cape has consistently been the binding constraint on further REIPPPP procurement, with recent bid windows unable to accommodate the full volume of solar and wind bids received because of insufficient transmission capacity in the areas of strongest resource. This has direct skills implications - without parallel investment in transmission infrastructure and the skilled workforce to build and maintain it, the province risks a widening gap between its renewable resource potential and the pace at which that potential can be converted into operating capacity and jobs.

On the green hydrogen side, the opportunity is earlier-stage and higher-risk, but potentially far larger in scale, particularly during the construction phase. Provincial ambitions set out by the Northern Cape government target 5 GW of electrolysis capacity supported by 10 GW of renewable generation under construction by 2025 – 2026, alongside the localisation of green hydrogen and renewable energy component manufacturing.

The Prieska Power Reserve project alone is projected to create around 22 000 direct and indirect jobs during construction, with 636 permanent operational jobs, and specific targets for youth (27.5%) and women (35%) participation. However, national reporting also shows that flagship projects such as Boegoebaai have experienced significant delays since their 2021 announcement, with capital procurement advisory work only re-tendered in late 2025. The delays however, provide the opportunity to prepare the province's skills pipeline ahead of the financing and construction timelines of these individual catalytic projects, rather than built reactively once projects reach financial close.

## Workforce and Skills Demand Findings

Green hydrogen is a particularly skills-intensive value chain within this total: electrolyser operation and maintenance, hydrogen storage and safety, ammonia synthesis, specialised welding and piping for hydrogen-compatible infrastructure, and port and rail construction and operations for the Boegoebaai development each represent distinct occupational demand that does not currently have a dedicated, scaled training pathway within the Northern Cape's post-school education and training system. Given the province's low population density and historically limited TVET and university footprint relative to Gauteng, KwaZulu-Natal or the Western Cape, building this pipeline will depend disproportionately on the coordinating function the SDZ model is designed to provide – concentrating scarce training capacity around a small number of well-resourced, employer-aligned institutions rather than spreading it thinly across the province.

Taken together, these developments point to the need for skills planning that is aligned to the emerging value chains rather than individual projects alone. The timing, location and scale of skills demand will be shaped by how renewable energy generation, hydrogen production, industrial processing, infrastructure and export activities develop and connect. This strengthens the case for the SDZ as a coordinating mechanism that can bring together project developers, training institutions, government and industry around a shared understanding of future demand.

## Gender Inclusion in the Emerging Green Hydrogen Workforce

The development of a new green hydrogen workforce also presents an important opportunity to build greater gender equity into the Northern Cape's emerging industrial base from the outset. This is particularly significant because women remain underrepresented in the energy and technical occupations from which much of the green hydrogen workforce will be drawn. South Africa's 2025 Gender Response Guide for the Green Hydrogen Sector notes that women comprise approximately 33.2% of the country's renewable energy workforce, while globally women account for around 32% of the renewable energy workforce and only 21% of the wind energy workforce. The Guide proposes an ambition for women to occupy 45% of green hydrogen jobs across occupational levels by 2030, reflecting women's share of the South African workforce.

Importantly, the challenge is not simply to increase the number of women employed, but to ensure that women are represented across the full occupational and skills spectrum of the emerging value chain. Existing evidence indicates that women in the energy sector remain concentrated disproportionately in lower-level, non-technical and non-decision-making roles. South Africa's Hydrogen Society Roadmap consequently identifies the development of a pipeline of technically skilled women, targeted leadership development, mentoring and networking, opportunities for women-owned businesses in the hydrogen value chain, and sex-disaggregated monitoring and evaluation as important measures for ensuring that the hydrogen economy contributes to women's economic empowerment.

This has direct implications for the design of the Northern Cape SDZ. The province should use the period before green hydrogen projects reach full construction and operation to deliberately build pathways for women into technical, artisan, professional, entrepreneurial and leadership roles, rather than attempting to correct gender imbalances once an occupational structure has already become established. This would include targeted recruitment into relevant TVET and university programmes; bursaries and workplace-based learning; mentorship and career exposure; attention to retention and progression; and partnerships with employers to ensure that training translates into employment. This is particularly relevant given that the Prieska Power Reserve has already established a target of 35% women's participation, demonstrating that gender participation is beginning to be incorporated into project-level ambitions within the province.

There is, however, an important distinction between women entering training and women securing sustainable employment. Research on South Africa's green hydrogen TVET ecosystem found that, despite comparatively strong female participation in TVET education, women continue to experience poorer labour-market outcomes, pointing to a gap between access to qualifications and access to industry opportunities. The implication for the SDZ is that gender-responsive skills planning should follow the full pathway from recruitment and training through workplace-based learning, placement, retention, progression and enterprise participation.

## Independent Power Producer Collaboration and the JET-ATLAS

The Northern Cape's opportunity is being tested in practice through NBI's engagement with the province's Independent Power Producer (IPP) community. Through a process facilitated by JET SEP, various IPPs, the IPP Office, Engineering, Procurement and Construction (EPC) contractors, sector bodies such as the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA), training institutions and provincial government convened to explore what a practical, shared collaboration platform for skills development, Enterprise and Supplier Development (ESD) and Socio-Economic Development (SED) could look like across the renewable energy sector. A consistent finding across both sessions was that individual companies are already running graduate programmes, internships and community initiatives, but that these efforts remain fragmented and largely invisible to one another, meaning the opportunity lies less in starting new projects that create duplication but rather in coordination, shared data and a trusted, neutral convener.

The Northern Cape was identified by participants as the natural starting point for such a pilot, given its concentration of operating and pipeline projects, established IPP presence, and mining-sector linkages, with the Free State, the Western Cape's Central Karoo, and the Eastern Cape's wind-project cluster flagged as further candidate geographies for a replicable model. A central proposal to emerge from this engagement is the development of JET-ATLAS into a centralised, dynamic geospatial platform layering REIPPPP and private project pipelines, Eskom grid and grid-queue data, and municipal-level ESD/SED spend and training provider location.

This will give the Northern Cape SDZ, and any future zones, a live, shared evidence base for meaningful and greater impact rather than each institution and IPP working from its own partial picture of the available opportunities for investment. This is consistent with the broader case made in this Report which underlines that data is not a peripheral output of the SDZ model but a precondition for the coordination it is designed to enable.

The emerging green hydrogen landscape also points to an important evolution in how the SDZ concept should be understood. While the SDZ is place-based, the economic opportunities it seeks to support are not necessarily contained within provincial boundaries. The Northern Cape may host renewable generation that supports industrial activity elsewhere, while projects such as Boegoebaai will depend on connections between energy generation, transmission, hydrogen production, ports, logistics, skills and local suppliers. The SDZ therefore provides an opportunity to coordinate these interdependencies – linking the geography of skills supply with the geography of emerging economic opportunity.

This also strengthens the case for JET-ATLAS as a shared evidence base. Mapping projects alone will not be sufficient; the value will come from understanding how projects are connected, where skills demand will emerge, what training capacity exists, and where opportunities for employment, enterprise development and localisation can be coordinated. In this sense, the SDZ is not intended to create another layer of activity, but to provide the coordination function required to connect existing investments and initiatives to a clearer pipeline of economic and employment opportunities.



# Enablers for Implementation:

## Cross-cutting Themes



## Several cross-cutting themes have emerged through the analysis and stakeholder engagements:

- Shared data infrastructure: a platform such as the JET-ATLAS, and its proposed evolution into a centralised platform layering project pipelines, grid data and ESD/SED spend, can provide a common thread for skills planning across all three SDZs - without it, each institution and employer plans from a partial, disconnected picture of opportunities for livelihood support and creation.
- Specific demand-led training: stakeholders across the Northern Cape situational assessment and the IPP workshops consistently flagged the gap between assumed future "green" occupations (such as solar PV technicians) and the foundational technical skills that are in immediate demand; SDZ curricula must be anchored in current employer demand, not projected occupational categories alone.
- Early coordination between project developers and training providers/enterprise development agencies: skills pipelines are often built too late, after projects are already awarded or under construction; IPPs, EPC contractors, municipalities, training providers and sector bodies need line of sight on project pipelines months to years ahead of construction to prepare local contractors and candidates in time.
- A neutral and trusted convener: fragmentation - not an absence of activity – is the recurring diagnosis across Mpumalanga, the Northern Cape and the IPP community; role as an independent, data-holding convener has repeatedly been identified by stakeholders as what allows existing graduate, ESD and community programmes to be coordinated rather than duplicated.
- Governance clarity: each SDZ must be understood, and communicated, as a coordination and implementation-support mechanism – not a new institution, not a Special Economic Zone, and not a body that delivers training, designs qualifications or assumes SETA statutory functions, in order to avoid mandate overlap and to keep accountability with existing institutions.
- District- and place-based targeting: SDZs work best when focused on specific district and local municipalities with concrete IRP-aligned infrastructure, industrial activity and labour market exposure, such as Nkangala and eMalahleni in Mpumalanga, rather than operating as diffuse, province-wide initiatives.
- Blended and sustained financing: no dedicated public budget line yet exists for SDZ implementation; the JET-IP's costed ZAR 1.6 billion pilot allocation will need to be supplemented by private sector, philanthropic and donor co-funding, mirroring the collaborative financing models already emerging from the IPP and ESD engagements.
- Common measures of success: the absence of standardised KPIs for social and skilling impact across IPPs and institutions makes it difficult to see where support is duplicated, concentrated, or missing; shared M&E frameworks are needed to enable learning and comparison across provinces and pilots.
- Community and household realities: skills interventions succeed or fail on whether they reflect the lived conditions of the communities they serve – municipal plans are not always current, and community needs assessments, transparent recruitment, and visible trust and inclusive ownership structures remain essential to sustained local buy-in.
- Gender equity, diversity and social inclusion by design: A Just Transition requires more than creating new employment opportunities; it requires deliberate and transformative action to ensure that those opportunities are accessible to people who have historically been and continue to be excluded from technical, industrial and emerging green economy value chains. Each SDZ should therefore integrate gender equity and social inclusion into its skills planning, recruitment, training, enterprise development, workplace pathways and governance arrangements. This should include identifying locally specific barriers to participation, setting appropriate targets, ensuring accessibility of training and employment pathways, and disaggregating participation and outcome data by sex, age, disability and other relevant characteristics. Inclusion should be treated as a core measure of SDZ performance.

# The Way Forward:
## Recommendations for Action



- SDZs should be demand-led to succeed, thus requiring strong private sector buy-in. This requires development of a strong value proposition that enables the private sector to achieve their business objectives while also contributing to broader local economic development in their surrounding communities.
- In order to ensure coherence and better measurement of impact – there should be a common framework for SDZ development and implementation. Key outcome indicators around enterprise development, skills development and income generation should be standardised across SDZs so that contribution to achieving a JET can be accurately and coherently tracked and analysed.
- As far as possible, public TVET and CET Colleges should be prioritised as key institutions for delivery of skills and entrepreneurship development. These institutions are the most accessible for young people and adults from local communities. Given their low level of resourcing and capacity, there should be a concentrated focus on building the capacity of these institutions to ensure that the interventions have sustainable impact and are not short-term and project-based.
- Government should shift toward securing blended financing rather than waiting for full fiscal funding, with no dedicated public budget line yet allocated to SDZ implementation. National and provincial government should proactively mobilise private sector, philanthropic and donor co-financing – building on the collaborative funding models already being tested through the IPP, ESD and SED engagements – so that pilot delivery in Mpumalanga and the Northern Cape is not held up awaiting Treasury allocation.
- JET-ATLAS should be fast-tracked from a forecasting tool into a live, shared operating platform: prioritising the data-sharing agreements, governance protocols and confidentiality safeguards needed to integrate IPP project pipelines, Eskom grid and grid-queue data, and municipal-level ESD/SED spend, so that all three SDZs – and any future zones – plan and resource their interventions from one common, place-based evidence base rather than fragmented, institution-specific data.
- SDZ implementation should be driven through a coordinated, time-bound action agenda to accelerate delivery at pace and scale. Given the number of actors, interdependencies and initiatives involved, a clear implementation mechanism is required to align government, private sector, skills institutions, financiers and local stakeholders around priority actions, responsibilities and timelines. This should enable faster identification and resolution of bottlenecks, strengthen accountability across partners and ensure that interventions are sequenced to reinforce one another rather than operating as standalone projects.



# Closing Reflections

The evidence across Mpumalanga, the Eastern Cape and the Northern Cape points to a significant opportunity for the Just Energy Transition to support new economic activity and create jobs, including in the near term. But this opportunity will not translate into employment automatically. The critical question is whether South Africa can build the connections between investment, project pipelines, skills development and the people and communities who need access to these opportunities.

This is the role the Skills Development Zone (SDZ) model is intended to play. SDZs provide a place-based, bottom-up mechanism for bringing existing institutions, training providers, employers and communities together around a shared skills and economic development agenda. They are not new institutions or physical sites; they are a way of strengthening coordination across an ecosystem that is already active, but often fragmented.

The three provinces demonstrate why a differentiated, place-based approach is important. Mpumalanga faces the challenge of reskilling an existing and ageing coal workforce while new renewable energy and transmission opportunities emerge.

The Eastern Cape must position its established automotive manufacturing base to participate in the shift to New Energy Vehicles. The Northern Cape has an opportunity to build a green hydrogen economy, while addressing significant infrastructure and grid constraints. The pathways are different, but the underlying requirement is the same: skills development must be connected to real and emerging economic demand.

JET-ATLAS provides an important foundation for making these connections more visible. By bringing together information on skills supply and demand, investment and project pipelines, infrastructure and development spend, there is an opportunity to strengthen how government, business and other stakeholders plan and respond to the changing requirements of the transition. Used effectively, this intelligence can support more targeted investment and reduce the risk of skills interventions being developed without a clear pathway into economic opportunity.

The next phase is therefore about moving from framework to implementation. The foundations are increasingly in place: the JET Implementation Plan provides the mandate, the three SDZs provide a mechanism for localised delivery, and JET-ATLAS provides an opportunity to strengthen the information and coordination that underpin decision-making. What is required now is sustained collaboration across the ecosystem to translate these foundations into functioning delivery mechanisms.

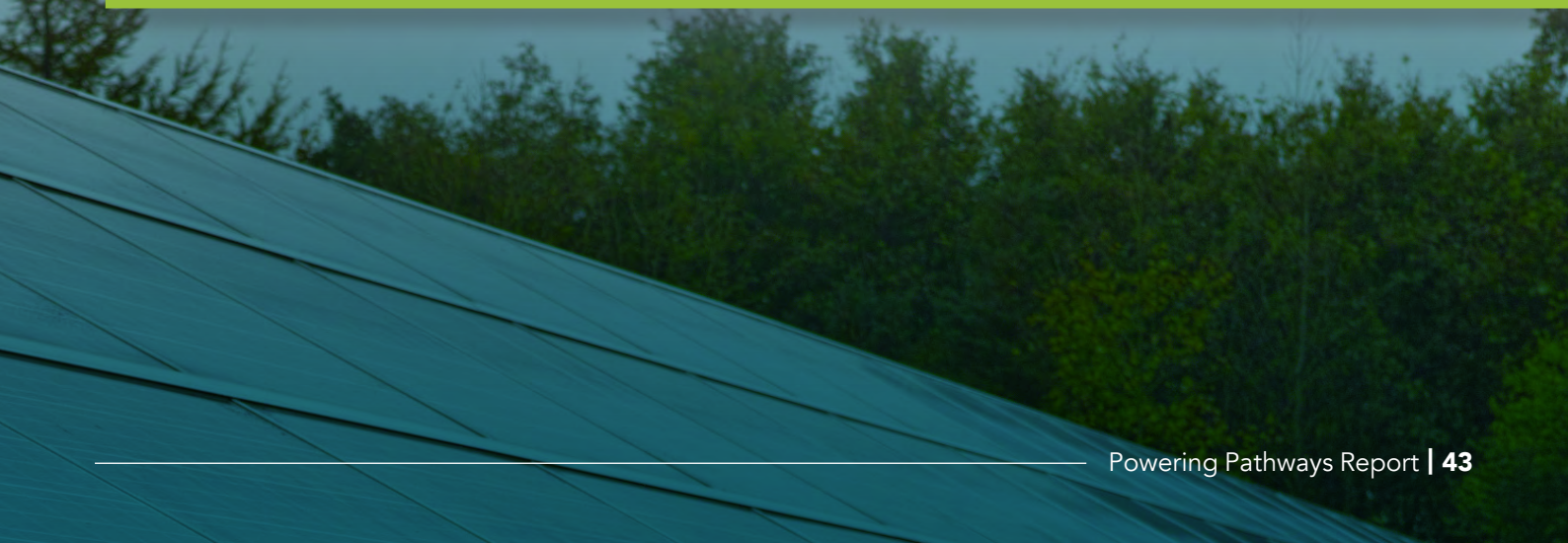
Importantly, inclusion and transformation must be designed into this implementation rather than assumed as an outcome of it. The transition presents an opportunity to create new jobs and skills pathways, and to address persistent patterns of exclusion within South Africa's labour market. Women remain underrepresented in many of the technical, artisan and industrial occupations that will underpin the emerging green economy, while young people, persons with disabilities and other marginalised groups continue to face barriers in moving from education and training into sustainable economic opportunity. The SDZ model provides an opportunity to change this by embedding gender equity, disability and social inclusion into local skills planning from the outset.

This requires moving beyond participation targets alone. SDZs should understand who is entering training, who completes it, who transitions into employment, who progresses within emerging industries, and who participates in new enterprise and supply-chain opportunities. Skills and labour-market data should therefore, wherever possible, be disaggregated by gender, age, disability and other locally relevant dimensions of exclusion, while partnerships with employers and training institutions should actively address barriers to recruitment, training, workplace entry and retention.

The differentiated nature of the three SDZs also creates different opportunities for advancing gender equity. In Mpumalanga, the challenge is to reskill an incumbent coal workforce while deliberately widening entry into emerging renewable-energy occupations. In the Eastern Cape, the transition to NEVs provides an opportunity to broaden women's participation in technical and manufacturing occupations as new capabilities are developed. In the Northern Cape, where a green hydrogen value chain is still taking shape, there is a particularly important opportunity to build gender inclusion into the workforce architecture from the beginning, rather than attempting to correct occupational inequalities once they have become entrenched.

Ultimately, a Just Transition should not only expand the number of opportunities available; it should expand who is able to access and benefit from them. If implemented with this intent, Skills Development Zones can help ensure that South Africa does not reproduce existing patterns of labour-market inequality within a greener economy but instead uses the Transition to build a workforce that is more skilled, more diverse and more representative of the society it serves.

The opportunity is now to strengthen the connections between people, skills, investment and economic opportunity – and to use the SDZs to demonstrate what coordinated, demand-led delivery can achieve in practice. If successful, the model can provide a practical foundation for a more inclusive Transition, while generating lessons that can be applied across South Africa's emerging green economy.



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