Recommendations Report

November 2025

Strengthening Skills for a Just Transition:

Recommendations to Support Collaboration

Strengthening Skills for a Just Transition: Recommendations to Support Collaboration

Just Transition Consortium for Research on Employment and Work

November 2025

This project was commissioned by the PCC and implemented in partnership with **Wits REAL** and **Rhodes University**.

PRESIDENTIAL CLIMATE COMMISSION
TOWARDS A JUST TRANSITION

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

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Executive summary

South Africa's commitment to a Just Transition entails an inclusive and equitable shift to a low-carbon economy that addresses both high carbon emissions and persistent inequality. Central to this is the need to facilitate economic diversification, social inclusion and environmental sustainability. Skills development is a critical enabler in preparing the current and future workforce for this transition, ensuring that no one is left behind. This strategic analysis was undertaken to inform the Presidential Climate Commission's (PCC) role in supporting skills development for the Just Transition, by identifying key areas for strategic collaboration.

The importance of strengthening skills development for the Just Transition is emphasised across national policy frameworks, including the National Development Plan (NDP) 2030, the Just Transition Framework (2021), the Just Energy Transition Investment Plan (JET IP) (2022) and the JET Implementation Plan (2023). Some critical recommendations related to skills for the Just Transition emerging from these frameworks include, among others, the following (PCC, 2022: 16; The Presidency, 2023):

- Reskilling and upskilling existing and affected adult workers, including those in the formal and informal economies, by addressing foundational skill gaps, strengthening recognition of prior learning (RPL) and creating new entry-level job opportunities;
- Ensuring foundational skills through the general education system, supported by a responsive and employer-engaged post-school system, with expanded access to workplace-based training and apprenticeships;
- Aligning the skills system with future labour market needs, particularly for green jobs, by improving information flows, developing new occupational standards and curricula, investing in technological capabilities and supporting labour-intensive green industries;
- Building a well-coordinated, responsive, resourced and effectively functioning skills ecosystem, involving communities, businesses, government and other institutions;
- Creating a three-tiered ecosystem to support JET skills development involving the creation of a JET desk in the Department of Higher Education and Training (DHET) and the Human Resource Development Council (HRDC), a National JET Skills Advisory Forum and three skills development zones (SDZ) focused on renewable energies and transmission, green hydrogen and electric vehicles.

While there are significant enablers to support the development of skills for the Just Transition, such as growing global investment in low-carbon pathways, a strong base of occupations with transferable knowledge and skills, and supportive policy developments across the skills ecosystem, challenges continue to persist. These

include fragmented supply systems, weak skills anticipation, limited inclusion, slow curricular responsiveness, underdeveloped understanding of occupational change and a lack of coordination. As such, four collective action priorities are proposed in this document to possibly overcome these challenges and enhance coordination across the skills system:

Collective Action Priority A: Strengthening collaboration, governance and inclusion;

Collective Action Priority B: Understanding occupational needs;

Collective Action Priority C: Supporting and enabling the provisioning of demand-led education and training programmes for changing occupations in key Just Transition priority areas;

Collective Action Priority D: Supporting and enabling demand-led education-to-work transitions in key Just Transition priority areas.

Collaborative efforts to enact these action priorities will ensure more seamless education-to-work transitions, enable individuals in jobs at risk to transition and enhance inclusivity in the wake of the transition to a low-carbon economy. An overview of each Collective Action Priority is provided, describing what is known about this area in the existing Just Transition skills landscape, and is then complemented via a set of actions that propose shorter- and longer-term strategies for collaboration that can be considered by the PCC and other partners. Collaborators are identified for each area. Short-term outputs (1–2 years) and longer-term outcomes (3–5 years) are identified for each focus area.

The document concludes that South Africa's Just Transition offers a critical opportunity to address the country's cross-cutting environmental, social and economic challenges. However, to realise this would require, inter alia, the implementation of the four collective priority actions outlined above: Strengthening governance, Understanding occupational needs, Provisioning of targeted education and training programmes, and Enabling of education-to-work transitions. As such, it is recommended that, in line with the guiding principles, these approaches and their respective key actions are implemented in a collaborative way that requires coordinated effort among multiple stakeholders in the just transitioning space in collaboration with the skills system.

Key strategic recommendations to foster collaboration and ensure the effective implementation of the approaches and actions include integrating skills into national economic and climate policies and aligning sectoral plans with Just Transition goals in ways that support the expansion of clear, accessible learning pathways, including a focus on increased access to workplace learning, mentoring and recognition of prior learning (RPL) for vulnerable groups that include youth, women and informal workers. This also requires improving coordination through data and funding mechanisms to support transparent, demand-led planning and delivery. Related to this, additional actions, such as capacity building across education institutions and municipalities,

coupled with active engagement of civil society and community groups, is critical for fostering inclusive participation and locally relevant outcomes.

In addition, this document recommends some immediate, quick wins that can demonstrate early progress while deeper systems are built. These include fast-tracking solar skills, with the solar sector emerging as a key contributor to job creation, and coal worker reskilling and upskilling, with coal sector jobs being at risk as the transition unfolds, expanding bridging and RPL programmes, rolling out a Just Transition career guide, mobilising Community Education and Training (CET) and Technical and Vocational Education and Training (TVET) hubs, and scaling climate-care jobs through Expanded Public Works Programme (EPWP) and the Community Work Programme (CWP), and micro, small and medium enterprises (MSMEs) incubation. Together, these actions provide rapid job creation, skills pathways and community engagement to anchor the just transition on the ground.

Abbreviations

ALMP	Active Labour Market Programmes
CET	Community Education and Training
CPD	Continuing Professional Development
CSG	Child Support Grant
CWP	Community Work Programme
DBE	Department of Basic Education
DEL	Department of Employment and Labour
DHET	Department of Higher Education and Training
DSBD	Department of Small Business Development
DTIC	Department of Trade, Industry and Competition
EPWP	Expanded Public Works Programme
ESD	Enterprise and Supplier Development
EV	Electric Vehicle
EWSETA	Energy and Water Sector Education and Training Authority
FSD	Financial Sector Development
GDP	Gross domestic Product
GH2	Green Hydrogen
GHG	Greenhouse Gas
HEI	Higher Education Institution
HRDC	Human Resource Development Council
HSE	Health, Safety and Environment
ICE	Internal Combustion Engine
ICT	Information and Communication Technology
ILO	International Labour Organization
IREC	Interstate Renewable Energy Council (US)
JET	Just Energy Transition
JET IP	Just Energy Transition Investment Plan
JET PMU	Just Energy Transition Projects Management Unit

JET SEP	Just Energy Transition Skills for Employment Programme
LMP	Labour Market Policy
MSME	Micro, Small and Medium Enterprise
MSP	Master Skills Plan
NCAP	National Career Advice Portal
NCV	National Certificate Vocational
NDC	Nationally Determined Contributions
NDP	National Development Plan
(N)EV	(New) Energy Vehicle
NPMS	National Pathway Management System
NPNM	National Pathway Management Network
NQF	National Qualifications Framework
NSDP	National Skills Development Plan
NSFAS	National Student Financial Aid Scheme
NT	National Treasury
O&M	Operations and Maintenance
OFO	Organising Framework for Occupations
PCC	Presidential Climate Commission
PPP	Public–Private Partnership
PSET	Post-School Education and Training
PSETA	Public Service Sector Education and Training Authority
PV	Photovoltaic
PYEI	Presidential Youth Employment Initiative
QCTO	Quality Council for Trades and Occupations
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RPL	Recognition of Prior Learning
SAREM	South African Renewable Energy Masterplan
SATIMGE	South African TIMES–General Equilibrium
SDZ	Skills Development Zone

SETA	Sector Education and Training Authority
SEZs	Special Economic Zones
SMEs	Small and Medium Enterprises
SPPs	Social Partner Programmes
TFP	Total Factor Productivity
TVET	Technical and Vocational Education and Training
WIL	Work-Integrated Learning

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Introduction

South Africa has made a significant commitment to achieving a Just Transition that aims to ensure an inclusive and fair shift to a low-carbon economy. The country has some of the highest levels of carbon emissions on the African continent (IMF, 2023) and some of the highest levels of inequality in the world (World Bank, 2022). As such, implementing a Just Transition has the potential to facilitate economic diversification and development while ensuring social inclusivity and environmental sustainability. A range of interventions will be required to achieve this, with a critical focus on skills development to ensure that the current and future workforce are well prepared for the shift and that no one is left behind. This recommendations document therefore focuses on the skills development interventions and initiatives that key stakeholders, most notably the Department of Higher Education and Training (DHET), the Presidency Just Energy Transition Projects Management Unit (JET PMU) and other partners in the Just Transition priority sectors, will need to collectively take forward to ensure that a Just Transition is achieved.

National policy frameworks, such as the National Development Plan (NDP) 2030, Framework for a Just Transition in South Africa (2022), Just Energy Transition Investment Plan (JET IP) (2022) and the Just Energy Transition (JET) Implementation Plan (2023), all underscore the need for approaches that can strengthen skills development. The NDP, for example, highlights the need for investment in skills, technology and institutional capacity for the development of a more sustainable society and the transition to a low-carbon economy (NPC 2012). The Framework for a Just Transition in South Africa makes the following recommendations regarding skills for the Just Transition (PCC, 2022: 16):

- **Reskilling and upskilling existing and affected adult workers so they are better equipped to navigate the transition**, including the provision of training for workers in the formal and informal sectors, overcoming barriers to skills development, such as lower foundational skills levels, strengthening mechanisms for recognition of prior learning (RPL) and creating new job opportunities for entry-level workers.
- **Aligning the skills development system with the anticipated labour force needs of the future**, particularly focused on green jobs to support a Just Transition, by strengthening mechanisms for identifying future skill needs by improving information flows and actionable disaggregated data; strengthening capacity to develop and deliver new occupational standards, curricula and training; investing in technological competencies needed for green jobs and building skills in labour-intensive industries in the green economy.
- **Ensuring foundational skills are supplied through the education system to strengthen the adaptive capacity of the future workforce**, by strengthening the basic education system, ensuring a responsive and employer-engaged post-

secondary education, integrating green skills and climate-related knowledge into higher and post-secondary education, and expanding access to workplace-based training/apprenticeships.

The JET IP (The Presidency, 2022) additionally recognises skills development as a cross-cutting issue and provides investment plans to skill the workforce for the energy transition, breaking down the skills priorities into three main activity areas for a period of five years (2023–2027):

- Skills hub/platform for "Just Energy Transition and the Future of Work" (high level coordination);
- Pilot skills development zones (SDZs) in Mpumalanga, Eastern Cape and Northern Cape:
  - Establishment of three SDZs,
  - Train the trainers and curriculum development,
  - Catalytic funding in the new JET skills programmes;
- Mobilise reallocations to the JET from the existing public and private post-school education and training (PSET) funding per annum.

Chapter 9 of the JET Implementation Plan then builds on these aspects and recommends the following strategies and support for skills development to facilitate JET (The Presidency, 2023):

- **Build a well-coordinated, responsive, resourced and effectively functioning skills ecosystem**, involving communities, businesses, government and other institutions;
- **Develop and strengthen skills anticipatory systems** that differentiate between immediate, medium and long-term skills planning needs;
- **Proactively plan for reskilling and upskilling adult workers**, which requires robust RPL processes, diversified labour market information that examines both entry and intermediate level pathways, and that moves beyond short-term technical exercises (such as short courses) to focus also on processes of identity, psycho-social and community formation as well as consideration of the skills ecosystem in relation to, and integrating with, broader social-economic and social-ecological systems;
- **Support foundational skills development** by training educators and updating curricula in schools, Technical and Vocational Education and Training (TVET) colleges and universities to incorporate JET concepts from early childhood to post-secondary education;
- **Conduct JET skill needs assessments across the core value chains,** including situational analyses for renewable energy, green hydrogen and electric vehicle sectors, and identifying jobs at risk and skills shortages;
- **Create a three-tiered ecosystem to support JET skills development** involving the creation of a JET desk in the DHET/HRDC (Human Resource Development Council), a National JET Skills Advisory Forum and three SDZs

focused on renewable energies and transmission, green hydrogen and electric vehicles.

Based on this backdrop, this Strategic Framework to support collaboration has been developed by the Presidential Climate Commission (PCC) in identifying and supporting concrete collaborative actions that can translate these Just Transition priorities into scalable and inclusive skills development initiatives by outlining mechanisms to coordinate, align and operationalise partnerships across Just Transition stakeholders and actors. In doing this, it recognises that the PSET system and its development is the purview of DHET and that DHET has a full mandate to lead such processes. The PCC's role is therefore mainly to make recommendations, support, facilitate and advocate to help to advance skills development for the Just Transition, given its contribution to both shorter- and longer-term success of the Just Transition.

The analysis used for the framework is based on a large body of research that has been undertaken into skills for the Just Transition in South Africa (see Reference list), including skills system development research undertaken for the PCC to conceptualise how to engage the Just Transition in framing the future of work in South Africa.

Guiding principles for advancing collaboration and cooperation for a Just Skills transition

To foster effective collaboration and coordination across South Africa's skills and training system to support the Just Transition, we have developed a set of guiding principles informed by our analysis of key documents. These principles have shaped the identification of priorities and guided the formulation of actions in this Strategic Framework. They provide a shared foundation for a more unified and coordinated response to inclusive skills development. These principles are especially relevant in the context of South Africa's diverse skills landscape, varying regional development levels and the critical need for climate-resilient and socially inclusive opportunities.

These principles include the following:

A. Recognising the mandate and role of the PCC

In recognising that the key role of the PCC is to oversee and facilitate a just and equitable transition towards a low-emissions and climate-resilient economy, this document is framed in a manner that speaks to the PCC's mandate. This mandate includes providing evidence-based recommendations and aiding in building broad consensus through its convening power.

This, therefore, ensures that this Strategic Framework fosters coordination and collaboration across diverse stakeholders, aligns efforts across sectors and

foregrounds the support of the development of integrated skills and education responses that meet the evolving demands of the transition.

B. Following a systems approach to skills formation

A systems approach allows for the connection of policies, institutions and stakeholders across the entire skills ecosystem, including education, labour, industry and community, to ensure that skills development for the Just Transition is coordinated, inclusive and linked to real challenges and opportunities. This approach reduces fragmentation and strengthens alignment across the skills formation system, supporting a unified national response that meets both climate and social justice objectives.

C. Avoiding overlap and ensuring the clarity of roles

Acknowledging the many actors and ongoing work across South Africa's Just Transition, this document has been developed on the understanding of the need for clear role definitions to avoid duplication and enable strategic collaboration and effective coordination. It aims to complement existing efforts by clarifying mandates and responsibilities across the different stakeholders.

D. Optimal use of existing resources

There are multiple resources that have already been developed to support South Africa's education and skills system, including some specifically aimed at enabling a Just Transition. These include strategic frameworks, planning tools, institutional platforms, initiatives and resource hubs such as the Organising Framework for Occupations (OFO), Sector Skills Plans, Human Resource Development Strategy of South Africa, South African Skills Master Plan, Presidential Employment Stimulus (PES), National Skills Development Plan (NSDP), National Career Advice Portal (NCAP), National Pathways Management Network (NPMN), Just Energy Transition (JET) Implementation Plan and the Just Energy Transition Skills for Employment Programme (JET SEP). Therefore, rather than creating new structures, this framework focuses on strengthening and aligning what already exists to maximise impact, avoid duplication, and ensure that efforts contribute meaningfully to the goals of a just transition.

E. Strengthen collaboration and cooperation

If South Africa's Just Transition is to be successfully supported with the necessary skills, then there is a need to advance collaboration and cooperation. Collaboration between key stakeholders, such as government, industry, labour, civil society, communities and training providers, can enable a more inclusive decision-making process, build trust, align efforts and ensure inclusive opportunities for all. This principle forms the key focus of this collaboration framework.

A collaborative approach to the Just Transition will ensure that skill needs are made clearer, a national plan on skills development for the green economy is developed and implemented, and that the risk of duplicating efforts is reduced. Collaboration is further

able to unlock the planning and support of reskilling and upskilling of workers for emerging sectors, attract investment and ensure local needs are met inclusively.

However, collaboration is not easily achieved because of bottlenecks such as misalignment between skills demand and supply, conflicting interests or agendas, exclusion of marginalised groups, and a lack of trust among stakeholders. Adopting a skills ecosystem approach could help curb some of these limitations. A skills ecosystem approach facilitates coordination and the development of common goals through top-down structures that support coordinated policy alignment, and through the forming of relationships among actors on the ground.

The PCC is well positioned to act as a mediator in this skills ecosystem to support the work of DHET and the JET desk and be a facilitator of cross-sector collaborations between the Just Transition sector and the Education and Training Sector all along the skills value chain.

Aim of the Strategic Framework

The anchor vision guiding this framework is therefore “Advancing skills for a Just Transition through sectoral collaboration and cooperation”, noting that there are many diverse initiatives already underway to support skilling. What is required is stronger collaboration and active management of alignment to maximise impact. Overall, this document places emphasis on the need for flexible models of provisioning that enable individuals and communities to access opportunities within the public skills system. The aim is to enable **reskilling** for occupations that are at risk in the Just Transition, for example, occupations that may be in demise as fossil industries transition to renewables or the transition from internal combustion engine (ICE) vehicles to new energy vehicles (NEVs); **upskilling** for occupations that are changing, for example, agricultural workers needing to be upskilled in climate-smart farming practices, regenerative agriculture, water-use efficiency and carbon accounting; or there may also be a need for **new skills** that are necessary for the Just Transition, for example, climate risk and adaptation analysts who can assess vulnerabilities and advise local economies (see Figure 1 below).

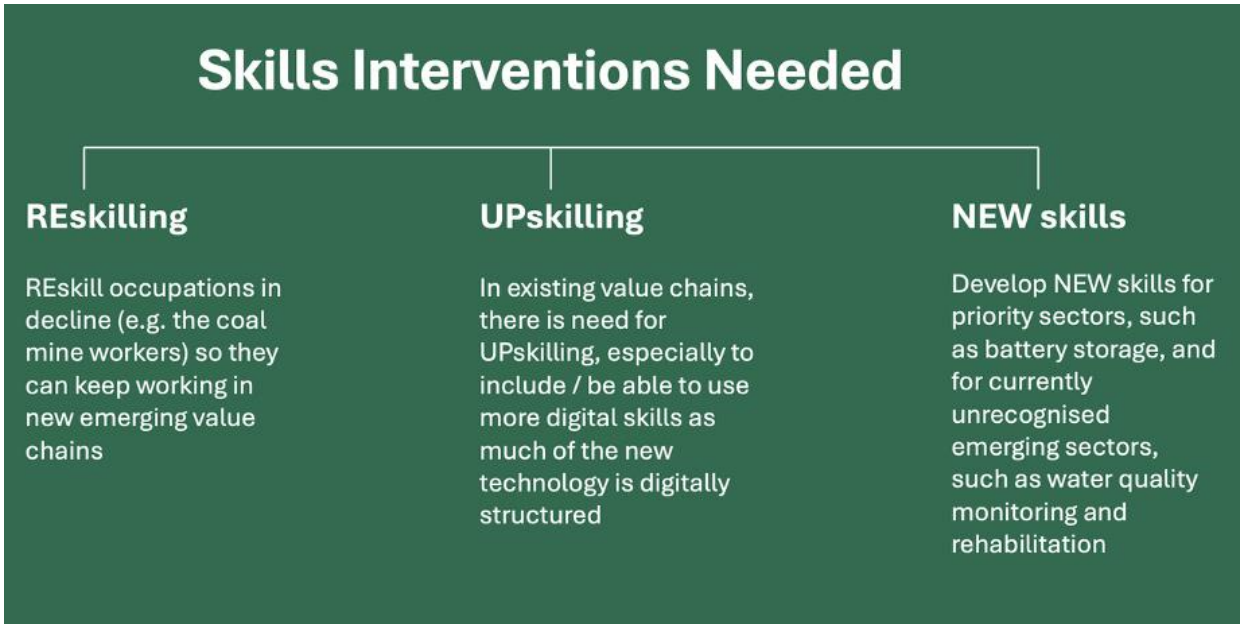

Figure 1: Skills interventions needed for the just transition

To give expression to the principles, while also addressing the contextual conditions and identified challenges, this recommendations document proposes ways to strengthen demand-led public–private sector partnerships for skills development and provisioning, as illustrated in Figure 2 below. These partnerships will foster the alignment of training supply with labour market needs, ensuring that skills development responds to current and future economic demand.

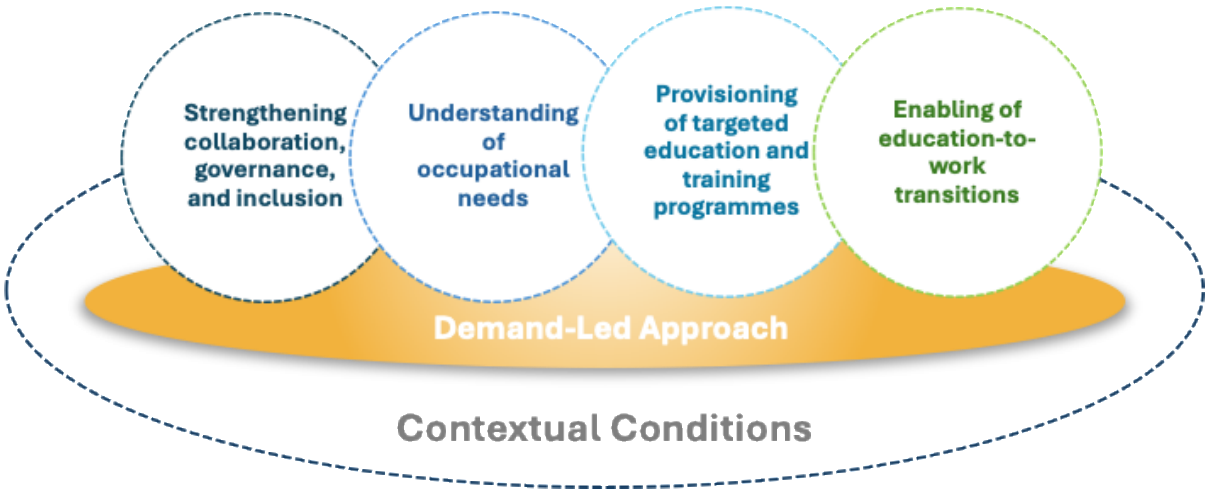

Figure 2: Approach to understanding the Just Transition skills system interventions

Contextual conditions: What needs to be considered in collaborations to support skills formation

Coordination across key stakeholders in the skills formation system is critical to realising sustainable skills development for South Africa's transitioning economy. This section presents an understanding of the skills formation system, as well as the challenges and opportunities that currently exist in South Africa, and how it intersects with the intentions for a Just Transition to a low-carbon future. It starts by explaining the methodology that was used to examine the contextual conditions, which primarily involved modelling and document analysis. It then offers some emerging insights from the modelling and document analysis and concludes with a synthesis of the challenges and opportunities that exist, which then guide the development of skills recommendations that this document proposes.

Approach to contextual conditions

This recommendations document builds on modelling work by Rogan et al. (2025), which applied a relatively new macro–micro modelling approach to assess the potential distributional impacts of South Africa's energy transition. The analysis examined how changes in the labour market could affect individual workers and their households. The study simulated the distributional implications of the energy transition using macro-scenarios from the South African TIMES–General Equilibrium (SATIMGE) model, which combines the SATIM energy model and the ESAGE economic model. Following consultations with the Energy Systems Research Group and the PCC, three emissions reduction scenarios were selected, varying only by emissions cap (8GT, 9GT, 10GT) and total factor productivity growth (1.5% and 3% per year). All scenarios assumed a strong multilateral policy environment with a 2050 net-zero target, and the SATIMGE outputs were used as inputs for the microsimulation analysis to compare distributional outcomes and overall skills implications.

The modelling results were complemented by the analysis of over 90 Just-Transition-related documents across the country that have focused on various aspects of skills formation as Just Transition sectors evolve. The documents mainly included research reports, as well as strategic and framework documents that speak to skills for the Just Transition in South Africa. The documents were analysed across eight focus areas: renewable energy; electric vehicles (EVs); critical minerals; battery storage; green hydrogen; food systems; cross cutting; and frameworks/strategies (see Figure 3 below). The majority of the reports (31) were cross cutting, covering skills research across multiple sectors such as wind, solar, battery storage, bioenergy, green economy, mining and energy efficiency. Renewable energy (wind and solar) was the second highest number (27) as it is considered the fastest emerging Just-Transition-

related sector, with the highest employment creation potential as the transition unfolds (DMRE, 2025; IASS et al., 2022; IRENA, 2023). The least number of reports and therefore data were in the food systems (2), battery storage (2) and critical minerals (1) sectors.

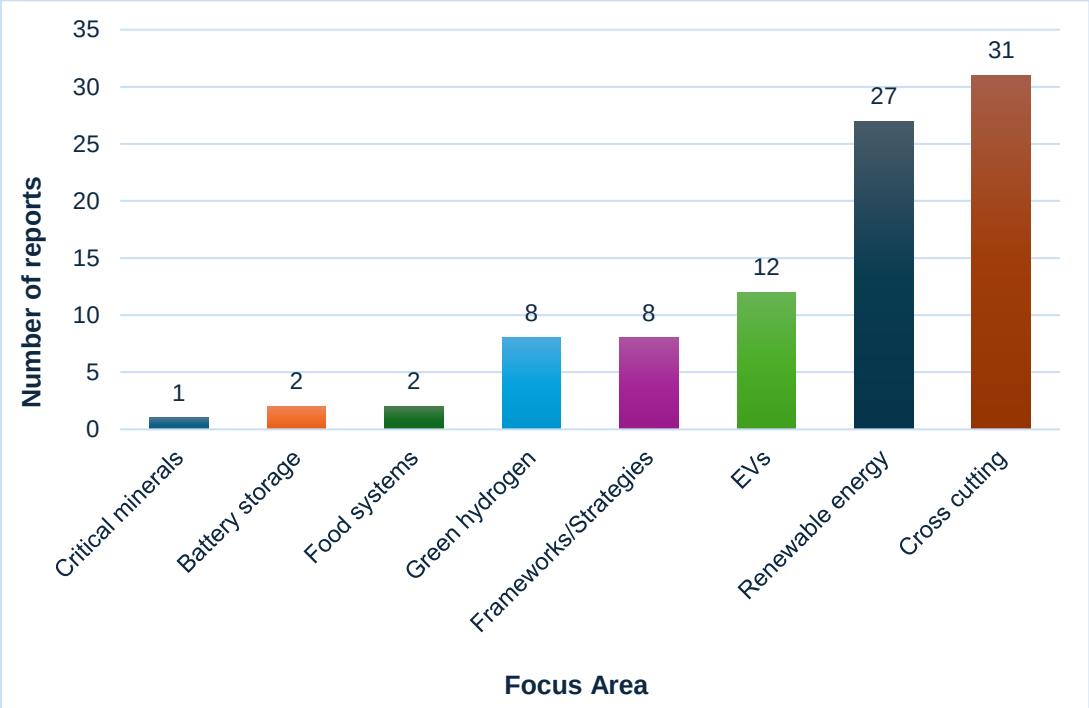

Figure 3: Just-Transition-related skills documents

Modelling insights

When analysed in terms of impact on the labour market, the modelling shows strong aggregate job creation potential, but also warns of risks of deepening inequality, regional decline and a looming skills bottleneck around 2040–2045 if interventions are delayed.

Key insights from the modelling for JET skills include the following (Rogan et al., 2025):

Overall employment

- All SATIMGE model scenarios (8GT, 9GT, 10GT emissions caps) project positive net employment growth, with total employment rising from approximately 17 million in 2025 to 24–36 million by 2050 depending on gross domestic product (GDP) growth assumptions.
- Under high growth (3% total factor productivity (TFP)), employment nearly doubles by 2050. This indicates that it is a supply side constraint that will cause potential bottlenecks, not demand.

Geospatial considerations

- Given the anticipated decline in the coal sector over the long term, it is likely that occupations and jobs at risk will be concentrated in Mpumalanga's coal sector. Many new opportunities may not be in the same province, necessitating deliberate spatially targeted reskilling, together with economic diversification strategies in the province should it be the aim to not have to relocate large numbers of workers.

Gender and youth

- Without intervention, the transition will increase earnings inequality, as white, male and higher-skilled workers are overrepresented in emerging green and "enhanced skills" occupations.
- The risk of exclusion remains acute. Modelling shows that, without intervention, women's share of green jobs will remain below 25% by 2040, even though they represent more than 50% of the unemployed. Women and young people (15–24) are disproportionately at risk of unemployment during the transition, requiring inclusive training and placement pathways.

Sectoral transitions

- Direct employment is expected to decline in mining, with spillover effects in mining-linked manufacturing and services.
- Solar, wind, electric vehicles, battery storage and critical minerals will offset losses at aggregate level, but require higher skills intensity. Critical minerals also link to the geospatial issue raised above, with workers possibly needing to relocate should they wish to stay in the same province.
- A projected "skills bottleneck" around 2040–2045 will most likely occur if anticipatory planning is not accelerated.

Timing considerations

- Risks of unemployment and disruption are not evenly distributed across the transition timeline.
- Segments most easily absorbed / "needed":
    - Unskilled and lower-skilled workers (aggregate): Under SATIMGE, transitions into employment far exceed exits, with a relatively stronger growth in unskilled employment over the period; by late period ~4 million move from "not working" into jobs. This pattern is inequality reducing because it draws in more unskilled workers.
    - Black African workers (by population share): Early in the period, ~92% of transitions into employment are African (tracking their baseline share of strict unemployment), stabilising to ~80%–82% later as the draw shifts from the

broader “not working” pool. This indicates strong absorption potential if pathways are available.
    - Women (via services-led absorption): Women are predicted to gain more from employment opportunities than men because much of the new job creation is in the services complex; the report cautions to unpack services sub-sectors, but the directional result supports designing women-targeted pathways into those functions.
- Segments at higher risk (and needing protection/bridges early on):
    - Overrepresented among early “job losers” are black Africans, women, youth (15–24), and agricultural workers show unemployment transition shares above their employment shares in the first half of the period.
    - Youth are only ~6% of employment but up to ~20% of early job-loss transitions.
    - Agricultural workers are structurally vulnerable (lower education, rural) and are crowded out as services and manufacturing expand.
- Where the largest supply gaps emerge:
    - Skilled labour gap (binding): The microsimulation fails after 2041 if a “skilled job must be filled by a skilled worker”. Only when the constraint is relaxed (allowing unskilled to flow into skilled roles) does the model run to 2050.
    - Many transition jobs are therefore “skilled”, and South Africa lacks enough skilled unemployed to fill them i.e. a structural skills shortage/bottleneck.
- Sectoral dynamic (absorption profile):
    - Renewables drive strong early hiring in construction and operations and maintenance (O&M), but labour absorption declines over time as technologies and processes become more efficient, implying front-loaded skilled hiring needs and later tapering.
    - In later decades, overall employment growth reduces churn into unemployment. This highlights the importance of urgent short-term measures, such as bridging initiatives.
- Skill bottlenecks
    - The modelling projects a “skills bottleneck” around 2040–2045 if targeted interventions are not scaled up now. This bottleneck arises from delayed recognition of emerging occupations and insufficient alignment of qualifications with future labour market needs, including in basic education.

Overall, the modelling says jobs will grow, but who gets them, where and when hinges on fixing a binding skilled labour gap, managing a spatial mismatch (coal jobs lost in Mpumalanga vs new jobs elsewhere) and closing equity risks for women, youth and rural workers during the early “churn” years.

The Strategic Framework should therefore sequence action in defined levels of effort that is cognisant of timing and geospatial issues. These include the following:

- Immediate action over the next three years:

    - Take action to unblock supply fast by front-loading construction-phase intakes in renewables/storage/EV builds;
    - Convert coal-region workers through targeted bridging/recognition of prior learning/work-integrated learning pipelines with reserved intakes and mentoring for women and youth;
    - Add relocation/placement guarantees where work is not local;
    - Use CET (Community Education and Training) hubs to deliver short on-ramps and immediate placements.
- Intermediate action over the next two to five years:
    - Scale services-led women's pathways (set targets and credentials in the National Pathway Management System (NPMS) and NCAP;
    - Support bridging into work programmes, such as short skills courses, work placements, job-readiness training, basic skills;
    - Create agriculture to services/manufacturing bridges to prevent rural crowd-out.
- Longer-term/sustainable action over the next five years:
    - Publish an annual Just Transition skills outlook;
    - Maintain dynamic occupational definitions;
    - Use geospatial heatmaps tied to SDZ/municipal planning so training capacity follows demand.

The modelling suggests that if action is sequenced this way, the Strategic Framework can convert a positive macro jobs story into real, timely absorption, de-risk Mpumalanga, lift women's share above today's trajectory and avoid the 2040–45 skills crunch while diversifying into durable, labour-absorbing sectors.

The recommendations from the economic modelling were included in the action tables for each Collective Action Priority identified in the relevant section below and timing issues were included in the priority recommendations in the section following that.

Insights from document analysis

The document analysis presents a wealth of information regarding the skills landscape required for South Africa's Just Transition. The research conducted shows that as the transition unfolds in the country, the PSET system has begun to respond to the change. Wits REAL (2024a), for example, identified over 220 energy-transition-related courses being offered across training institutions (see Figure 4) with the majority (62%) relating to renewable energy. In terms of geographic distribution, most of the courses were offered in Gauteng (45%) and the Western Cape (32%) provinces, with key transition hotspots such as Mpumalanga and the Northern Cape having very minimal representation, only 1.8% and 0.4% respectively. SANEA (2023) additionally notes that TVET colleges are not sufficiently aligning their programmes with current and projected local skills needs for the transition. In the Northern Cape (the best solar resource area in the country), for example, renewable energy training – particularly in

solar technologies – has limited offering in the TVETs and, in some cases, not at all (Ramsarup et al., 2024).

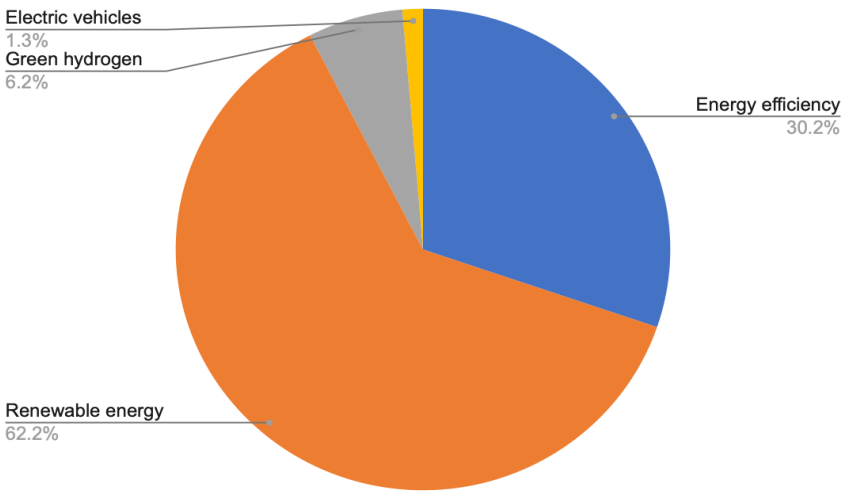

Figure 4: Percentage of energy-transition-related courses on offer

Source: Wits REAL (2024a: 65)

Regarding the type of skills provisioning offered, the research suggests a propensity for short courses that are mainly offered by private providers as shown in Figure 5 (Ramsarup et al., 2024). The research suggests that this narrow focus could restrict career flexibility and progression, and enhance vulnerability if jobs become obsolete. Wheelahan et al. (2022) make a similar argument regarding short learning programmes, which are often perceived as quick solutions for occupational advancement. They note that their impact is limited as they cannot address the broader factors at play, including social structures and power relations, workplace norms and inequalities, and the deeper knowledge demands of a given field of practice.

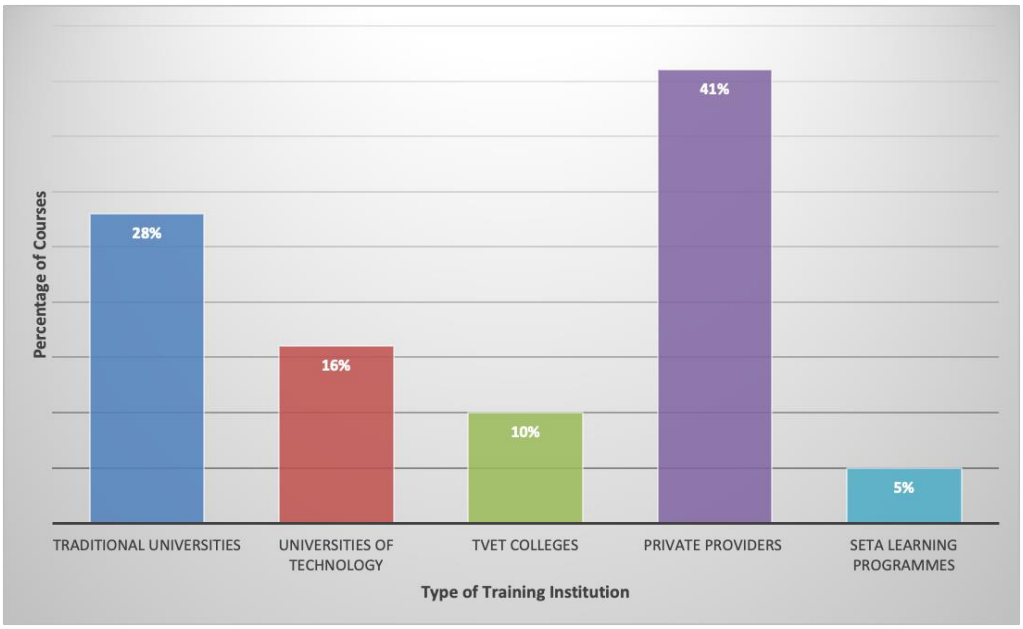

Figure 5: Percentage of core-energy courses offered across various institutions in South Africa

Source: Ramsarup et al., (2024:.4)

Similarly, the transition to sustainable agriculture is also reflected in the skills provisioning landscape, with at least 68 courses identified, such as climate-smart agriculture, agrometeorology, sustainable horticulture, sustainable agriculture, aquaponics and hydroponics (Wits REAL, 2024a). A similar trend to the energy transition is apparent with the majority of the courses being offered by private providers (32 of the 68 courses) and mainly structured as short courses and postgraduate courses (see Figure 6).

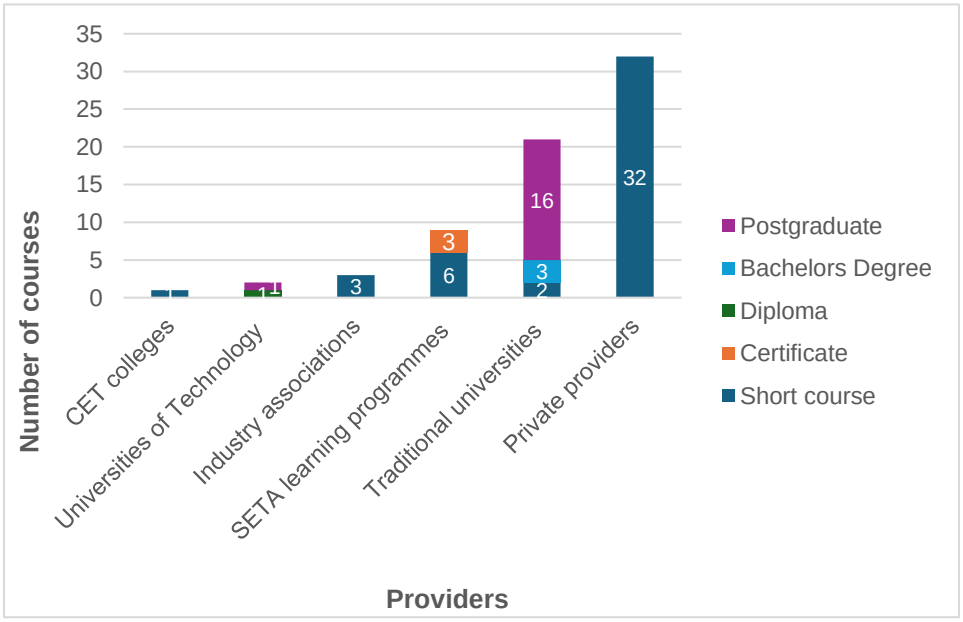

Figure 6: Sustainable agriculture-related courses by provider type

Source: Wits REAL (2024a: 69)

The document analysis also indicates that responses to changes in technology and job requirements across sectors have largely focused on technical roles and skills, with most policy and industry solutions being technology driven (Ramsarup et al., 2024; SANEA 2023; Wits REAL, 2024a), with highlights on specialised training for technicians, engineers, artisans, planners and project managers (Camco and TIPS, 2010; Rivett-Carnac, 2022). The evidence further shows a strong focus on senior and intermediate roles, with entry-level positions receiving minimal attention. For example, research for the Food and Beverage Manufacturing Sector Education and Training Authority (FoodBev SETA) indicates that the key occupations for reducing energy use and decarbonising the sector are senior managers (finance and operations) and engineers and technicians in the electrical, mechanical and renewable energy fields (Ramsarup et al., 2024; Wits REAL, 2023). Ramsarup and Hepplethwaite (2025) further emphasise that many of these jobs are temporary, linked to technology deployment, including roles in design, installation, infrastructure development, regulation and training.

In addition, employment opportunities associated with the Just Transition are presented in broad terms, listing roles such as engineers and artisans without specifying the exact kind and skills required (Ramsarup et al., 2024), and providing little detail on which positions are suitable for youth and women to guide targeted training (Wits REAL, 2025). The analysis further reveals that gender employment dynamics remain a concern, as women continue to have fewer opportunities, although the transition is expected to improve their prospects. For example, the agricultural sector remains male dominated, with the NAMC (2024) reporting 628 000 men and 292 000 women employed. In the fourth quarter of 2023, however, female employment declined by 7 000 (2.4%) and male employment by 28 000 (4.3%) from the previous quarter. Such declines are explained by Rogan et al. (2025) as related to the characteristics of workers in the agricultural sector, who tend to have lower levels of education and are based in the more rural provinces, making them far more vulnerable to transitioning to unemployment than workers in other sectors.

These findings highlight the need for emerging skills to be flexible and able to adapt rapidly to the evolving dynamics and uncertainty of the Just Transition. SANEA (2023) stresses that attention should also be given to transversal occupations and skills that can be applied across multiple national initiatives. As such, Wits REAL and Rhodes ELRC (2025: 102) put forward two key principles for reskilling for the Just Transition under uncertainty: “building strong foundational skills that offer employment stability, and ensuring flexibility through broad application potential”. This means that workers should be equipped with core skills that are broadly useful and can provide stable employment even if specific jobs or technologies change, allowing for their skills to be applied across different roles, sectors or contexts.

The insights from the modelling and document analysis therefore provide a foundation for understanding the contextual conditions shaping the Just Transition, including structural, policy and sectoral factors that influence skills development. They also highlight systemic challenges and opportunities within the skills formation system,

which are explored in the following sections to inform targeted skills recommendations for the Just Transition.

Consolidated challenges identified in the skills system as it intersects with the Just Transition

As South Africa embarks on a Just Transition, there are deep-rooted challenges in the skills system that impact the shift to a low-carbon economy. These encompass critical gaps in which education, training and labour market realities fail to align with the demands of the transition. These gaps include:

- **Supply landscape challenges:** This includes poor infrastructure, inadequate resources and low-quality education in many schools (DHET, 2024). With the transition to a low-carbon economy taking place rapidly, seen through the emergence of new means of production and subsequent skill requirements, the skills supply landscape faces even more strain. The current supply landscape therefore faces constraints in recognising and planning for emerging and new occupations. As a result, the workforce risks redundancy, with missed localisation opportunities as employers turn to foreign labour for project implementation.
- **Ineffective skills anticipation systems:** These have proven to be ineffective for several reasons. Most of the skills intelligence is being framed from international experiences related to the transfer of technologies, and not the local realities. This approach often overlooks the country's economic structures, education systems and labour markets, and the challenges associated with high unemployment rates, which increases levels of inequality and the predominance of informal employment. Further, the prediction of demand scenarios tends to offer high employment predictions with very little emphasis or details on how the creation of jobs is to be achieved at various scales. An additional challenge in the forecasting involves the dependence on employer-generated data that overlooks micro, small and informal businesses, and is often based on current needs that vary by establishment.
- **Timing issues:** While the net aggregate effect of the transition on employment is projected to be positive, driven by solar, wind, EV supply chains and critical minerals, structural risks remain. Labour absorption in renewables is likely to decline over time as technologies mature and become less labour intensive. For instance, renewable energy construction creates many jobs in the short term, but efficiencies reduce labour demand in the long run. The labour market modelling suggests that the first 10 to 15 years are the most precarious, with the bulk of unemployment transitions concentrated in the first 10 to 15 years. The latter half shows very few simulated exits (Rogan et al., 2025).
- **Fragmented funding direction:** This includes the lack of coordination in how funding is allocated and managed across economic sectors. Current investment

streams, whether from the private sector, government or development partners, are not sufficiently aligned to national or sectoral priorities for skills development in the context of the just transition. This misalignment results in resources being spread thinly or directed towards short-term initiatives rather than systemic and sustained capacity building. Without a proper steer, private sector and grant funding often operate in silos, with limited integration into broader national strategies.

- **Lack of social inclusion (MSMEs, community involvement, marginalised groups, etc):** Transitioning systems pose the risk of exacerbating existing inequalities, and even more so in the South African context (Taylor, 2023). Marginalised groups, such as the youth, women, people living disabilities and rural communities who have historically been excluded from skills development and economic opportunities, run the risk of being even more alienated as the shift to a low-carbon economy takes place, resulting in their having minimal learning and employment pathways in transitioning sectors. The skills system currently offers limited access to marginalised groups, a mismatch between training and the labour market realities (informal and micro, small and medium enterprise (MSMEs) prevalence), a lack of flexible and inclusive pathways (Wits REAL, 2024b) and policy and skills planning exclusion. Beyond aggregate job creation, the distributional impacts of the transition are uneven. The SATIMGE modelling (see section above) shows that “green new and emerging” and “green enhanced skills” occupations are disproportionately occupied by white, male, higher-skilled workers, while women, youth and black workers remain under-represented in these groups. Without deliberate equity-driven measures, the transition risks entrenching inequality, increasing the proportion of white workers in the high-demand occupations while reducing the share of black workers (Rogan et al., 2025).
- **Geospatial considerations:** The transition’s spatial impacts will be particularly acute in Mpumalanga, which currently accounts for more than 80% of South Africa’s coal mining and where coal accounts for the largest share of provincial GDP. While coal job losses will be concentrated in the province, evidence suggests that new green jobs, particularly in solar, wind, batteries and hydrogen, are unlikely to be created in the same geography. This mismatch underlines the urgency of place-based skills interventions and deliberate economic diversification strategies in Mpumalanga to reduce dependency on coal while building alternative local employment anchors. Without this, coal-dependent communities risk long-term economic decline despite national job growth (Rogan et al., 2025).
- **Curricula challenges:** The current curricula at various levels of the education and training system, including basic education and PSET, are not adapting or responsive enough to meet the demand of the transitioning economy. At the foundation phase there are gaps in the learning levels of literacy and numeracy. Further, around 40% of learners who enrol in Grade 1 will exit the schooling system before finishing matric (StatsSA, 2023). These challenges are attributed

to a lack of alignment in curriculum, learner textbooks and national assessments, as found by UNESCO (2024). The curriculum further lacks sustainability content at foundational level. The Presidency (2023) additionally notes that there is insufficient Just Transition knowledge at basic education level. These factors therefore impact the ability of learners to transition into PSET and, ultimately, roles in low-carbon sectors. At PSET level the curriculum is not updated rapidly enough to align with the emerging demand. As such, graduates are not prepared for the labour market, resulting in frustration among employers and an over reliance on imported labour.

- **Occupational change not understood:** There is an overall lack of understanding of how exactly occupations are changing with the emergence of Just Transition sectors, such as sustainable agriculture, renewable energy (solar and wind), NEVs, circular economy initiatives and ecosystem restoration. While there is considerable political discourse around socio-technical transitions, the focus is often concentrated on the political, economic and social impacts of system changes. Although jobs, occupations and skills are part of the discussion, they are typically viewed through the lens of technology implementation and are loosely framed within the broader narrative of a changing world of work. As such, it is not clear how exactly the tasks, knowledge, materials, tools, and goods and services produced in relation to specific occupations are changing, and what the skills implications then are of these changes. Without a clear understanding of occupational change, the skills system is unable to effectively respond.
- **Economy, and not only the education system, with a problem:** The education system, and challenges of misalignment, is often described as a key part of the problem of employment, skills and labour-market-related challenges. However, broader economic structures and dynamics also have a significant impact on skills-related challenges. Further, dynamics such as precarious work,[1] informal work, insufficient demand for labour and spatial inequalities all add to the skills challenges in the country.
- **Lack of coordination:** While these challenges are cross cutting, there is a continued concern that there is a lack of coordination across multiple levels and actors within the skills system. This is evident from the interventions happening in silos across the country, often resulting in duplication of efforts, fragmented learning pathways, missed opportunities and unaligned policy implementation. The Presidency (2023) frames this as a sustainable/green skills development paradox, with mismatches in skills supply and demand, and a conflation of skills development strategies that, in turn, impact the quality of the workforce and the justice element of the transition.

[1] Precarious work refers to “work for remuneration characterized by uncertainty, low income, and limited social benefits and statutory entitlements” (Vosko, 2010: 2).

Opportunities and enablers related to skills and the Just Transition

Despite the challenges that have been highlighted, the just transition presents a unique opportunity to reshape the skills system. There are some enablers that can unlock skills development, inclusive learning and employment pathways for the Just Transition. These enablers include the following:

- **Investment and global interest:** The global market is shifting to low-carbon, climate-resilient alternatives, sparking interest and investment in Just Transition initiatives. Further, the cost of renewable energy and other low-carbon technologies has steadily decreased over the years resulting in a rise in demand and investment in these sectors. In South Africa, for example, renewable energy, NEVs and related technologies are on a significant growth trajectory in response to achieving energy security and simultaneously decarbonising the energy sector (Wits REAL, 2024b). Investment opportunities have been unlocked through initiatives such as the JET IP, Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and the South African Renewable Energy Masterplan (SAREM) 2035, which outlines catalytic interventions including actively driving demand for renewable energy in local value and supply chains, focusing on MSMEs and fostering inclusive development and building capabilities to respond to this demand (DMRE et al., 2022). The increased investment and global interest have unlocked skills development and job creation opportunities.
- **Strong base of occupations with core knowledge required for green sectors:** There is a strong base of existing occupations in the country that is, and will be, required in the emerging green sectors. These occupations have the core knowledge, skills and training needed in sectors such as renewable energy, energy efficiency or sustainable agriculture. This is because the skills needed are not entirely new; they exist in current roles. Existing programmes could easily be adapted to meet these needs and then be used to support upskilling and reskilling. For example, electricians already have the technical skills that can be applied to install, maintain and troubleshoot solar photovoltaic (PV) systems. They may, however, need upskilling with aspects such as direct current (DC) commonly used in solar systems, as opposed to alternating current (AC), which is used in grid connected power. This simply requires the addition of sustainability training to ensure adaptive capacity in these rapidly evolving sectors.
- **Skills system policy developments:** The policy environment in South Africa has played a cardinal role in laying the foundation for a shift to a low-carbon economy, with enhanced efforts to ensure that skills development in the country meets the requirements of a Just Transition. This is reflected through various policies, regulations and guiding documents, such as the nationally determined contributions (NDCs), the Just Transition Framework, JET IP, JET

Implementation Plan, the Master Skills Plan (MSP) and the National Skills Development Plan (NSDP) 2030, among others.

Summary of contextual conditions

The evidence highlights that the Just Transition is unfolding in a context of uncertainty, shaped by geospatial risks identified in the modelling and by the varied impacts on specific groups. Without targeted interventions, there is a strong likelihood that high-skilled occupations will capture most of the gains, while women, youth and informal workers risk being left behind. Furthermore, the contextual conditions discussed in this section predominantly reflect an insufficient focus on key sectors beyond energy, underscoring the need for broader, inclusive strategies. Cognisance needs to be given to the fact that other sectors, such as agriculture, water, tourism, manufacturing, construction, waste and the circular economy, among others, support the livelihoods of millions of South Africans both formally and informally, and are equally impacted by climate change. However, without receiving the necessary attention, these sectors are left out of skills planning required for the transition, and hence the interrelations among the sectors and the broader social and economic changes required for an overall Just Transition in the country are ignored.

Added to this is uncertainty around the future demand for skills linked to the transition. To avoid mismatches, it is essential to surface occupational changes and ensure alignment between skills supply and evolving needs. Addressing these challenges requires timely, targeted and coordinated skills planning. Multi-stakeholder collaboration is critical to bridging information gaps, aligning training provision and prioritising interventions that build both immediate and long-term workforce readiness. The next section outlines the collective action priorities necessary to achieve these outcomes.

Collective action priorities

Within the dynamic and complex demand landscape and skills system context presented above, a clear strategic framework and action priorities for collaboration are required to align efforts towards a common goal, maximising the use of resources. Supporting skills development and provisioning for the Just Transition will involve collaboration in the following collective action priorities (see Figure 7):

Collective Action Priority A: Strengthening collaboration, governance and inclusion;

Collective Action Priority B: Understanding occupational needs;

Collective Action Priority C: Supporting and enabling the provisioning of demand-led education and training programmes for changing occupations in key Just Transition priority areas;

Collective Action Priority D: Supporting and enabling demand-led education-to-work transitions in key Just Transition priority areas.

Collaborative efforts to enact these action priorities will ensure more seamless education-to-work transitions and enhance inclusivity in the wake of the transition to a low-carbon economy. An overview of each collective action priority is provided, describing what is known about this area in the existing Just Transition skills landscape. This is then complemented via a set of actions that propose shorter- and longer-term strategies for collaboration that can be considered by the PCC and other partners. Collaborators are identified for each area. Short-term outputs (1–2 years) and longer-term outcomes (3–5 years) are identified for each focus area.

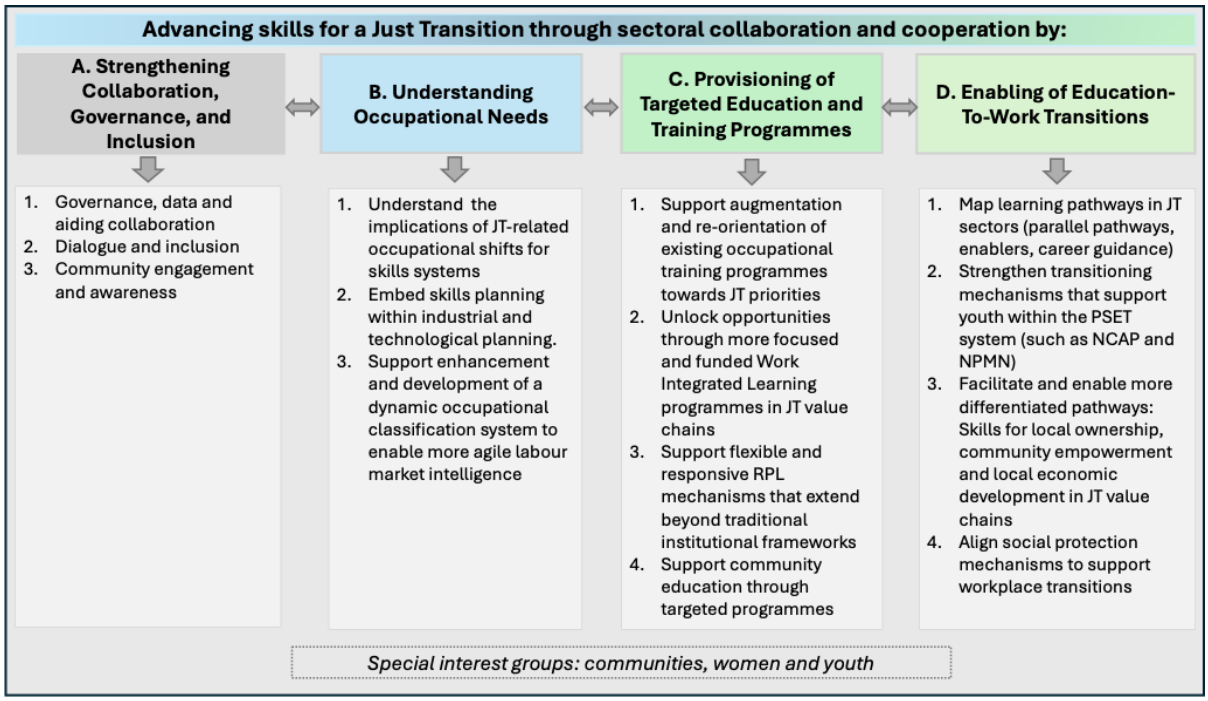

Figure 7: Strategic framework for collaboration

Collective Action Priority A: Strengthening collaboration, governance and inclusion

A successful Just Transition in South Africa requires not only technical and financial solutions, but also strong collaborative governance and inclusive decision-making processes. The PCC, given its mandate as a multi-stakeholder body providing independent oversight, advice and convening power, is uniquely positioned to strengthen coordination, align diverse actors and ensure that the principles of justice, equity and participation are embedded throughout the transition process.

The PCC can play a catalytic role in ensuring that governance arrangements are transparent, inclusive and capable of balancing competing priorities while supporting

policy coherence. This entails building effective social dialogue platforms, enabling the participation of historically marginalised groups, strengthening intergovernmental coordination and creating mechanisms for monitoring accountability. By foregrounding collaboration, governance and inclusion, the PCC will help to create a transition pathway that leaves no one behind while supporting systemic reforms across the skills, industrial, social protection and environmental systems.

Governance, data and aiding collaboration

Effective governance of the Just Transition requires strong coordination across government, industry and labour, backed by transparent data and coherent planning. The PCC's convening role positions it to help to embed accountability and coherence across the system while ensuring that evidence-based decision making supports inclusive and sustainable outcomes. Actions identified in the economic modelling are highlighted in green in Table 1 below.

Table 1: Suggested actions to strengthen governance, data and coordination

ACTION	SHORTER-TERM OUTPUTS (1–2 years)	LONGER-TERM OUTCOMES (3–5 years)	COLLABORATORS
Collaborate to plan design and maintain a National Just Transition Dashboard that assists in co-ordinating all just transition information and data that can inform strategic skills planning	Collaborate with sectors, employers, government departments and other stakeholders to gather data and plan initial dashboard developed with data on skills demand, sector transitions, social protection and local projects	Transparent, dynamic monitoring and reporting Just Transition platform that informs decision making, accountability and public trust	PCC, DHET, JET Skills Desk, DEL, StatsSA, SETAs, Industry Associations
Support and strengthen coordination of funding mechanisms for Just-Transition-related skills and community initiatives	Mapping of Just-Transition-related funding streams and gaps; coordination framework developed	Streamlined, equitable and transparent funding mechanisms supporting Just Transition implementation at scale	JET DESK (Lead), PCC, National Treasury, NSF, DEL, Development Partners, Private Sector

ACTION	SHORTER-TERM OUTPUTS (1–2 years)	LONGER-TERM OUTCOMES (3–5 years)	COLLABORATORS
Help align skills and industrial planning with Just Transition governance nationally	Cross-sectoral working groups established linking PCC processes with DHET, sector masterplans and industry skills councils to facilitate coordinated governance	Skills planning integrated into industrial and technological strategies, ensuring coherence between policy, training and labour markets	PCC, DHET, JET Skills Desk, Industry Bodies, SETAs, DTIC, Employers
Integrate SATIMGE (or similar) modelling) into occupational intelligence systems, sectors skills planning and expand the model to include additional Just Transition areas	Distributional data (region, gender, age, race) added to Just Transition dashboard/ observatories Gather data for additional Just Transition areas	Evidence-based planning that anticipates labour shifts and inequities	PCC, DHET, JET Skills Desk, DTIC, DFFE, Stats SA, SETAs, Research institutions
Map geospatial labour market shifts (e.g. Mpumalanga coal decline vs Northern Cape renewables/critical minerals growth)	Geospatial analysis linking declining and growing sectors	Targeted reskilling and economic diversification in vulnerable provinces and districts	PCC, Provincial Governments, DMRE, Industry, Municipalities
Support Establishment of skills development zones (SDZs) in Just Transition hotspots	Provincial Just Transition economic and skills strategies developed	Locally anchored Just Transition implementation that prevents regional decline	PCC, Provincial Governments, DTiC, Municipalities, COGTA

Dialogue and inclusion

The Just Transition cannot succeed without building trust and ensuring that all voices, including those historically marginalised, are actively shaping South Africa's pathway to a low-carbon economy. The PCC has a pivotal role to institutionalise meaningful social dialogue and support inclusion in Just Transition governance structures. Creating structured dialogue platforms and mechanisms for equitable participation ensures that decisions are co-created, conflicts are minimised and outcomes reflect the diversity of South African society.

Table 2: Suggested actions to strengthen dialogue and inclusion

ACTION	SHORTER-TERM OUTPUTS (1–2 years)	LONGER-TERM OUTCOMES (3–5 years)	COLLABORATORS
Institutionalise structured social dialogue platforms (national and sectoral)	Regular dialogues with business, labour, civil society, youth and communities; annual Just Transition dialogue convened by PCC	Sustained, institutionalised dialogue culture that shapes national and sectoral transition strategies and ensures inclusive participation	PCC, NEDLAC, Unions, Business Bodies, Civil Society, Community-Based Organisations
Develop and oversee mechanisms for inclusion of marginalised groups	Clear guidelines for inclusion (women, youth, informal workers, persons with disabilities); pilot inclusive participation forums	Institutionalised inclusive governance practices with equitable representation across Just Transition planning and implementation structures	PCC, Department of Women/Youth/Persons with Disabilities, NGOs, Community Organisations

Community engagement and awareness

The Just Transition must be understood and owned by communities if it is to be truly just. Local buy-in depends on transparent communication, accessible knowledge platforms and tangible opportunities for participation. By promoting community awareness and supporting place-based dialogues, the PCC can strengthen trust, empower communities to co-design local projects and ensure that people see themselves as active participants and not passive recipients in the transition. This also reinforces social legitimacy, reducing resistance and enhancing the sustainability of Just Transition interventions.

Table 3: Suggested actions for community engagement and awareness

ACTION	SHORTER-TERM OUTPUTS (1–2 years)	LONGER-TERM OUTCOMES (3–5 years)	COLLABORATORS
Continue to promote community engagement and awareness through knowledge platforms	Development of public-facing Just Transition information portal; community dialogues piloted in transition hotspots (e.g. Mpumalanga)	Empowered communities actively shaping local Just Transition projects; enhanced trust and social legitimacy in	PCC, Civil Society, CET Colleges, Municipalities, NGOs

		Just Transition processes	

Collective Action Priority B: Understanding occupational needs

Navigating the country's Just Transition requires a clear understanding of how occupational roles and skill needs are shifting, and where new opportunities for reskilling, upskilling and entry into green and inclusive sectors are emerging. The shift to a low-carbon economy is already reshaping the nature of work across sectors such as energy, agriculture, transport and manufacturing. New types of jobs are emerging, existing occupations are transforming in response to technological and environmental change, new specialisations are emerging in traditional occupations and certain roles, particularly in carbon-intensive sectors, are at risk of decline.

To prepare the workforce for these changes, it is essential to anticipate future occupational demand and understand how these shifts translate into concrete skills requirements. This involves more than simply identifying new jobs with vague projections; it requires clarity on the tasks, knowledge and capabilities that will define future work, as well as the pathways needed to access them. This strategic area emphasises the need to build a comprehensive and accessible evidence base to support more responsive provisioning to ensure alignment with the demands and opportunities of a green and inclusive economy.

Understand the implications of Just-Transition-related occupational shifts for skills systems

There are three primary occupational shifts that are unfolding in light of the Just Transition. These include (i) emerging occupations that encompass new roles that are being created in response to climate responsive technological changes, policies and sustainable practices; (ii) transitioning or transforming occupations that encompass existing jobs that are undergoing changes in occupational tasks, required skills or tools due to shifts in industry practices and environmental regulations; and (iii) occupations that are at risk because of the transition away from carbon-intensive industries. A Just Transition calls for an inclusive shift to a low-carbon sustainable economy that ensures that opportunities are distributed evenly across underserved regions and marginalised groups, such as women, youth, people with disabilities and workers in declining industries. A critical way in which this can be achieved is through the identification of new and evolving occupational roles as the transition unfolds in the country, along with an assessment of reskilling, upskilling and new skills development requirements.

These actions would require the creation of partnerships to support targeted, modular programmes that align with the occupational profiles of changing occupations. These programmes should be informed by occupational analysis and market demand. This in-depth occupational analysis would enable more targeted and focused skills interventions. Emphasis should also be placed on the transferability of occupational skills to adjacent sectors and long-term employability. Several case studies were also analysed to draw out lessons learnt from the existing projects and research aimed at understanding the implications of Just-Transition-related occupational shifts for skills systems. The summary of those case studies is included below and highlighted in Table 4. The full case studies plus some additional insights are included in Appendix 1. The case studies span various sectors. The example of the hemp sector illustrates opportunities for transfer and reskilling and upskilling of occupations at risk into adjacent sectors, such as the agriculture sector. Hemp is an option for biofuels and mine land preparation. The solar PV example illustrates that some emerging occupations are linked to immediate activities such as solar plant controllers, PV technicians, installers, energy auditors and digital roles, such as cybersecurity and AI analysts, while others will grow as transition pathways mature, including green hydrogen technicians, e-waste operators, recyclers and battery specialists. These roles span all levels – from artisanal and technical to professional and support functions – and can provide entry opportunities for marginalised groups if inclusive pathways are designed through bridging programmes, RPL, apprenticeships and community learning. The case study below illustrates this with the solar sector by highlighting opportunities for upskilling, reskilling and new skill development.

In addition, new occupational areas are also emerging in climate adaptation and resilience, particularly in climate and care work. This includes direct support for people affected by climate impacts, indirect services in disaster conditions and environmental care for ecosystems and resources. It also covers care and repair work, both reactive and preventative, and roles in agroecology, pollution remediation and ecosystem restoration. These activities are vital for addressing climate vulnerabilities and resource degradation and could provide meaningful jobs if recognised and supported within the skills system. The actions identified draw from the lessons learnt from these case studies and build on existing knowledge rather than duplication of effort.

The summarised case studies are provided below.

Industrial hemp case study (linked to policy, financing and sectoral alignment)

The industrial hemp value chain can support South Africa's Just Transition by linking land rehabilitation with new green industries. This could include:

- Piloting hemp for mine land rehabilitation through phytoremediation, combining environmental restoration with new job creation in mining regions;
- Developing biofuel and bioproduct training programmes in TVETs and universities to prepare a workforce for emerging green manufacturing;

- Establishing public–private partnership (PPP) hemp processing hubs in rural transition regions to anchor local industrialisation and create sustainable rural livelihoods.

While requiring regulatory clarity and investment, these initiatives could create inclusive rural jobs, diversify livelihoods and anchor local green industrialisation in transition-affected areas.

Solar case study (linked to sectoral alignment and pathway enablers)

The solar sector is one of the fastest growing areas of South Africa's energy transition, with strong potential for immediate and longer-term job creation. Some recommendations from the case study include:

- Fast-tracking solar construction jobs as entry-level opportunities for youth and low-skilled workers, aligned with work-integrated learning (WIL) and quick-win priorities;
- Developing reskilling pathways for coal workers into technical roles, such as welding, electrical and process control, ensuring Just Transition in hotspots;
- Creating occupational profiles and accredited training for new solar roles (installers, recyclers, performance auditors) to strengthen the renewable energy value chain.

Climate and care work case study (linked to community engagement, sectoral alignment and pathway enablers)

Expanding climate-care work creates opportunities to combine adaptation, resilience and social equity. This would encompass the following:

- The expansion of Expanded Public Works and Community Work Programmes (EPWP and CWP) to include adaptation and care roles, such as water monitoring, elder care and ecosystem restoration;
- Developing accredited occupational profiles and learning pathways for care work, ensuring formal recognition within the skills and employment system;
- Promoting public recognition of climate-care and repair work through awareness campaigns and inclusion in Just Transition policies to strengthen legitimacy and gender equity.

These actions create gender-inclusive green jobs while directly improving community resilience.

Some key actions to enhance the understanding of Just-Transition-related occupational shifts for skills system needs are included in Table 4 below. Actions linking to the case studies above are further highlighted in blue in the table while those identified from the economic modelling are highlighted in green.

Table 4: Suggested actions to understand the implications of JT-related occupational shifts

ACTION	SHORTER-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Develop South African scenarios (including the impact of international trends) to help the agility and risk management of skills that can be used to support other more contextual skills anticipation	Scenarios developed collaboratively with stakeholders Scenarios utilised to test for occupational shifts (can also be used for timing, geospatial issues and volume considerations)	More agile skills development processes	PCC, Provincial Governments, Labour unions, Employer bodies, DHET, JET Skills Desk, DSI, DTIC, DFFE, DEE, Academia
Map emerging, transitioning and at-risk occupations across key Just Transition sectors and regions	Nuanced and improved visibility of occupational shifts, particularly in affected regions (e.g. coal towns, auto sector regions, rural districts)	Better labour market information will enable more informed, equitable skills planning and better targeted education and reskilling and upskilling responses	PCC, Provincial Governments, Labour unions, Employer bodies, DHET JET Skills Desk
Map emerging occupational areas in climate change adaptation work, which is largely informal and unrecognised	New occupations identified and defined CCA areas recognised as viable streams of work	Sustainable, accredited learning and employment pathways in emerging occupations linked to climate change adaptation	QCTO, CET and TVET colleges, DFFE
Integrate climate change adaptation work into national skills development and employment frameworks	Formal recognition of climate-related care and repair work as a critical component of South Africa's green and Just Transition	Expansion of decent work opportunities in climate adaptation and community resilience	DHET, DEL, DFFE, QCTO, SETAs, NGOs, PYEI
Promote social recognition and gender transformation in climate change adaptation work	Public awareness campaigns and inclusion of climate-care roles in Just Transition policy narratives and occupational classifications	Inclusive labour market policies and equitable skills development pathways	DHET, Department of Social Development, DEL, QCTO, SETAs, PCC, PYEI, DFFE
Scale retraining for projected growth sectors (solar PV, EVs, AI/automation)	Expanded TVET/SETA curricula and workplace training	Reduced inequality: higher-skill, higher-demand jobs filled	DHET, SETAs, Industry Associations, TVET Colleges, Employers JET Skills Desk

Prioritise reskilling pathways for at-risk coal workers (into renewables, critical minerals, hemp)	Bridging programmes into new value chains	Just Transition for coal workers with sustainable jobs	PCC, DHET, SETAs, Unions, Industry (renewables, mining, hemp) JET Skills Desk
Fast track solar construction jobs	Recruitment and placement of youth and low-skilled workers in solar construction roles	Immediate entry-level job creation and entry pathways into renewable energy careers	PCC, DHET, EWSETA and other relevant SETAs, Industry Associations, Municipalities
Develop reskilling pathways for coal workers into solar	Bridging programmes and short courses for coal workers in welding, electrical, and process control	Just Transition for coal regions with redeployed workers in sustainable jobs	PCC, DHET, SETAs, Industry (renewables, energy), Unions JET Skills Desk,
Pilot hemp for mine land rehabilitation	Demonstration projects using hemp phytoremediation on mine land to help communities and stakeholders understand potential options	Restored ecosystems and new local employment opportunities	DMRE, DFFE, DTIC, DHET, PCC, Mining Companies
Support Development of hemp biofuel and bioproduct training programmes	Curriculum modules and TVET/university programmes in hemp-based manufacturing	Skilled workforce for hemp value chain and diversification of green industries	DHET, TVET Colleges, Universities, AgriSETA, Industry
Establish PPP hemp processing hubs in rural regions	PPP agreements and pilot processing facilities established	Rural industrialisation and sustainable livelihoods through hemp	DTIC, DSBD, Local Municipalities, Private Sector, Development Partners
Expand EPWP/CWP into climate-care and adaptation jobs	New roles added in environmental monitoring, ecosystem restoration, elder and childcare	Gender-inclusive employment in care work and stronger community resilience	DSD, DEL, PCC, Municipalities, NGOs, Community Organisations
Develop accredited pathways for climate-care work	Occupational profiles and accredited qualifications for care and repair work	Formal recognition and decent work in adaptation and resilience sectors	DHET, QCTO, SETAs, DSD, PCC, Community Partners
Promote public recognition campaigns for climate-care work	Awareness campaigns and inclusion of care roles in Just Transition policy documents	Increased social legitimacy and gender equity in climate-related work	PCC, DSD, NGOs, Civil Society, Medi

Embed skills planning within industrial and technological planning

For the just transition to succeed, South Africa's skills system must shift from reactive training approaches to forward-looking, proactive skills planning. This requires building institutional capabilities to anticipate and respond to changing labour market needs across key transition sectors, such as renewable energy, NEV, land rehabilitation and sustainable agriculture. However, the relationship between the current and future labour market is unclear and difficult to establish in uncertain policy and investment environments. Most of the skills intelligence data in the country are being framed from international experiences related to the transfer of technologies and not local realities. Multiple levels of uncertainty regarding various scenarios are being proposed. For example, while promising job projections are being made for emerging sectors, there is a persistent lack of clarity on whether the jobs will be new (or offered to the existing workforce), the ratio of marginalised groups who will come to realise these opportunities and whether these green sectors will take off at all or at the scales predicted.

These complexities in demand forecasting result in skills planning mismatches and inefficiencies, paving the way for possible temporality, planning and investment reluctance and a reactive over simplistic transfer of knowledge and technology that will have an impact on sustainable employment. In a review of current reports related to emerging priority occupations, the type of information emerging reflects a generic and unclear demand landscape. The information reflects a "stacking" against technical occupations, which is unhelpful for skills planning and gives no clear direction related to intermediate level skills.

This calls for a more robust and systemic approach to skills planning that looks at understanding demand across various levels and local contexts, with the involvement of multiple stakeholders, and therefore calls for planning of skills more accurately. Critical to this is to ensure that skills planning is embedded in economic planning processes and, conversely, that economic planning is embedded in skills planning processes. The idea is for economic planning to incorporate issues pertaining to skills supply and demand, and for skills planning to be demand-led and responsive to the needs of the economy. In this way, skills are part of a package of industrial interventions, together with incentives, trade agreements and other interventions, instead of a separate or parallel "add on".

Key action areas are linked to the scenarios above and actions identified in the economic modelling are highlighted in green in Table 5 below:

Table 5: Suggested actions to embed skills planning within industrial and technological planning

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Support development and inclusion of skills planning in economic and technology planning processes for the Just Transition across key growth industries	Endorsement/ verification by employers and industry bodies of identified skills in demand and level of priority/timing for addressing these	Increased capacity of industry bodies to regularly engage with employers on skills in demand and to integrate planning mechanisms into institutional framework	Industry sector partners, Professional bodies, SETAs, DHET, JET Skills Desk
Support inclusion of JT in DHET skills planning programmes	Engage with the LMIP programme of DHET to consider the above priorities in DHET LMIP processes and institutional planning	Up-to-date and regular reporting on emerging skills in demand and identification of institutional requirements for delivery thereof	DHET, LMIP partners, JET Skills Desk
Invest in anticipatory training systems to prevent 2040–2045 bottlenecks by increasing output of matriculated Science, Technology, Engineering, Arts and Mathematics (STEAM) focused youth	Work with DBE on Science, Technology, Engineering and Mathematics (STEM) and bridging into work programmes This should include expanded bursaries, apprenticeships and workplace learning	Continuous supply of skilled workers aligned to demand	PCC, DHET, National Treasury, Development Partners, Industry, Fundisa for Change Network

Support enhancement and development of a dynamic occupational classification system to enable more agile labour market intelligence

Occupational provisioning refers to planning, developing and ensuring the supply of skilled individuals for specific occupations, including through proactive labour market intelligence, dynamic and responsive providers, and occupational curricula development.

These are contingent on a comprehensive and adaptive occupational classification system that lays the foundation to inform the needed targeted provisioning of occupational education and training programmes. The OFO is South Africa's core system for the identification, reporting and monitoring of skills demand and supply in the country's labour market (DHET, 2013). The OFO, however, faces some challenges, such as outdated occupational information, inconsistent application across sectors and employers, and a lack of dynamism required to track fast-evolving

skills needs, particularly in emerging sectors and sectors undergoing transition, such as energy, water, transport, agriculture and the circular economy.

In addition, a key consideration to advance skills for the Just Transition through enhancing targeted education and training programmes is through digitising the OFO. A more user-friendly, accessible, clear and coherent occupational platform will help to aggregate data linked to occupational demand. It will help to align understandings of occupational tasks and can help with better alignment of skills supply and demand. This would be essential for improving the responsiveness, accessibility and coordination of skills data in support of the Just Transition.

A digital, user-friendly platform would ensure more frequent updates to occupational information, better integration with education and training data, and improved coherence between institutions such as DHET, Quality Council for Trades and Occupations (QCTO), SETAs, CET and TVET colleges, and the Department of Employment and Labour (DEL). Digitisation will further support real-time skills demand analysis, strengthen labour market intelligence and enhance public access to information for training providers, learners and jobseekers.

The suggested actions to support the enhancement and development of a dynamic occupational classification system are highlighted in Table 6 below.

Table 6: Suggested actions to support the enhancement and development of a dynamic occupational classification system

ACTION	SHORTER-TERM OUTPUTS (1–2 years)	LONGER-TERM OUTCOMES (3–5 years)	COLLABORATORS
Review occupational tasks and descriptors used in OFO to ensure it reflects changing thinking in the Just Transition sector. This includes reviewing occupational descriptions in the context of Just Transition for potential "greening"	Revised and updated OFO to integrate climate change adaptation and mitigation practices where possible	Mechanism for regular review and updating of OFO in place that facilitates responsiveness to changing Just Transition context	DHET, JET Skills Desk, SETAs, QCTO, industry bodies, TVET colleges
Support the development of a dashboard of clear occupational profiles that can provide clear occupational tasks and national pictures	Engage with key stakeholders on datasets and data requirements related to occupations Map of existing and required occupational	Common framework for occupational data sharing in place, including common classifications	DHET, JET Skills Desk, SETAs, QCTO, Industry bodies, TVET colleges

ACTION	SHORTER-TERM OUTPUTS (1–2 years)	LONGER-TERM OUTCOMES (3–5 years)	COLLABORATORS
of demand linked to that occupation (from available datasets)	datasets prepared so emerging occupational data can be aggregated nationally		
Assist in defining an information and technical architecture for the online occupational system, working with the OFO, as a base for digitisation This will include defining data types, owners, user profiles and roles, data security and data exchange with related systems	Information and technical architecture developed	Fully digitised OFO implemented with appropriate accessibility and security protocols in place	DHET, SETAs, QCTO, Industry bodies, TVET colleges, universities, private TVET and HE providers

Collective Action Priority C: Provisioning of targeted education and training programmes

The effective implementation of South Africa's Just Transition requires targeted skills provisioning, which ensures that the current and future labour force is adequately prepared for emerging market demand. Creating flexible provisioning models enables the fluidity of workers across and within emerging and transitioning sectors. This focus area outlines key considerations for the development, delivery and responsiveness of targeted education and training programmes that address priority skills needed for an inclusive transition. Achieving alignment in this focus area would actualise the justice element of the transition by providing workers, communities and marginalised groups with the necessary skills and opportunities to participate in the emerging green sectors.

To address these needs and ensure inclusive outcomes, the following domains are outlined to inform potential areas of alignment, collaboration and coordination between various key Just Transition stakeholders.

Support augmentation and re-orientation of existing occupational training programmes towards Just Transition priorities

Most occupations that critical for the Just Transition are not entirely new or emerging. Rather, they are transforming, in that existing occupations are being re-oriented, expanded or adapted to meet new priorities in renewable energy, low-carbon

industries and sustainable development. The United States (US) based Interstate Renewable Energy Council (IREC) (in Ghosh et al., 2016), for example, indicates that working with traditional occupational fields that have skills overlap with JET occupations is preferable to training technology-specific specialists to give employees better job security, given the uncertainty around demand for new JET technologies. It can, therefore, be argued that there are better opportunities for skills transfer if knowledge and principles related to new technologies, such as climate-smart agriculture, renewable energy and EVs, are incorporated into existing training and apprenticeship programmes. There is a need to support shifts in existing occupational training programmes and facilitate reskilling and upskilling of jobs and occupations at risk.

Some examples of how existing occupational training can be re-oriented to include Just Transition content include the following:

- **Electrician occupational training programmes:** Electricians, particularly high-voltage technicians, are needed across JET sectors, including renewable energy, transmission and integration, energy storage and electric vehicle maintenance. Existing qualifications are geared towards meeting the needs of traditional coal-based energy sectors and grid systems, with most high-voltage expertise lying within Eskom's transmission and distribution sector. These qualifications and associated curricula need to be re-oriented to include renewable and sustainable energy principles, system integration for hybrid grids and emerging technologies relevant to solar, wind, battery storage and electric transport systems. The restructuring of training programmes should involve a combination of content updates, expanded practical exposure, industry partnerships and trainer capacity development to enable the existing workforce to transition but also unlock opportunities for new entrants.
- **Agricultural extension officer training programmes:** Agricultural extension officers play a cardinal role in supporting and linking farmers and related actors to policy and practice and are therefore key role players in the shift to sustainable, climate-resilient agriculture. Current agricultural training programmes are mainly structured around conventional agricultural systems, with limited integration of climate-smart agriculture, environmental sustainability and circular food systems. However, several initiatives are underway to address this gap, including efforts by the Agricultural Sector Education and Training Authority (AgriSETA), various TVET colleges, agricultural colleges and universities, among other actors, that are incorporating sustainability-focused content into agricultural curricula. There is, however, an additional need to update curricula with sustainability models and ensure practical exposure to community-based and cooperative structures to better equip extension officers to support inclusive and sustainable rural livelihoods.
- **Automotive mechanic training programmes:** With national policy to increase the manufacturing and use of NEVs in place, the skills provision for mechanic service and maintenance should reflect these anticipated changes. Given that

NEV adoption is slow, short-term training can include high-voltage safety training and an additional focus on advanced diagnostics and information and communication technology (ICT) skills. Further, modules and short courses should be more available in key automotive regions (such as the Eastern Cape), in addition to more in-depth specialisations in hybrid vehicles.

- **Electrical, mechanical, mechatronics and chemical engineering training programmes:** There are already several specialisations, modules, short courses and interventions aimed at introducing renewable energy and energy efficiency principles and practice into engineering qualifications (Wits REAL, 2024b). While there are some national certificates, diplomas and postgraduate qualifications, the majority are short courses and are in Gauteng and the Western Cape, indicating a need to extend the depth and scope of these offerings. In addition, new battery technologies, such as vanadium redox flow and lithium-ion batteries, should be incorporated into existing battery training modules within electrical and chemical engineering pathways.

The following actions are proposed to support the re-orientation of existing occupational training programmes towards Just Transition priorities:

Table 7: Suggested actions to support augmentation and re-orientation of existing occupational training programmes

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Map Just-Transition-related content required across key occupational streams	Report identifying content gaps and Just Transition priorities in current occupational training	Clear roadmap for curriculum re-orientation, better alignment of education and training with Just Transition demands	QCTO, DHET, JET Skills Desk, employers, SETAs, training providers (TVETs, CETs etc.)
Integrate Just-Transition-related content into existing occupational curricula	Revised curricula aligned to a low-carbon economy	Broader system alignment with Just Transition priorities; learners equipped with future-relevant skills; improved sectoral transitions	
Strengthen educator and trainer capacity to deliver Just-Transition-aligned content	Professional development programmes for educators and workplace-based trainers developed and implemented	Improved instructional quality and capacity across institutional and workplace settings to support inclusive and responsive Just-Transition-aligned training	
Support bridging into work programmes	Short skills courses, work placements, job-readiness and basic skills training	Improved people reskilling and upskilling programmes	

Unlock opportunities through more focused and funded work-integrated learning programmes in Just Transition value chains

Students exiting TVET colleges with an N6 part qualification are required to complete between 18 and 24 months of workplace experience to obtain their national diploma. However, there has been a persistent challenge in securing these work placements, resulting in many students being unable to complete their qualifications. Relatedly, learners in artisanal training programmes face difficulties with accessing workplace training, preventing them from qualifying for their trade tests. Students from universities of technology may also face similar challenges.

As the transition unfolds, there is a growing disconnect between young people who need practical workplace experience to complete their qualifications or gain employment and companies urgently seeking skilled, work-ready employees. Bridging this gap is essential to realising the goals of a Just Transition and building a pipeline of talent for emerging sectors. Therefore, it is essential to identify the types of workplaces suitable for the emerging and transitioning occupations, particularly for young people who have yet to enter the workforce, and to establish a structured process to quantify the number of WIL placements required to meet demand. This requires collaboration between industry and training providers. Further, collaboration with SETAs is critical to enhancing the coordination of workplace-based learning opportunities, aligning training with sector needs and ensuring that quality assurance and compliance mechanisms are in place.

Opportunities for WIL can be unlocked through the following (actions identified in the economic modelling are highlighted in green):

Table 8: Suggested actions to unlock WIL opportunities

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Identify and quantify the number of WIL positions required for Just-Transition-linked occupations, in target sectors	List of priority occupations, related qualifications and number of WIL positions required, developed and consulted with companies	Database of required WIL, with workplaces offering places developed and managed dynamically to address changing requirements over time	DHET, SETAs, industry associations, TVET colleges
Strengthen collaboration between training institutions, industry bodies and SETAs to expand and support structured workplace-based learning opportunities	Partnership frameworks established between SETAs, TVET colleges, universities of technology and industry in Just-Transition-aligned sectors	Increased access to quality WIL for students and artisanal trainees in Just-Transition-related occupations Improved alignment of sector skills planning,	

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
aligned with Just Transition sectors	Coordinated plans to align discretionary grant funding with Just Transition workplace experience needs Clear guidelines on roles and responsibilities for delivering workplace-based learning in Just Transition value chains	funding and employer needs Strengthened pathways from learning to work, especially for youth and marginalised groups	
Develop targeted pathways for women and youth	Stipends, bursaries, apprenticeships, public works in green sectors	Equitable access to Just Transition jobs for women and youth	PCC, DHET, DEL, DSD, SETAs, Civil Society, PYEI

Support flexible and responsive RPL mechanisms that extend beyond traditional institutional frameworks

Workers across industries in South Africa, particularly in declining or informal sectors, have acquired valuable skills and experience outside of formal education and training systems, yet these competencies often go unrecognised. The current RPL mechanisms are often limited in scope, highly bureaucratic and centred within institutional frameworks that may not be accessible to workers without formal qualifications or those based in underserved areas. As the Just Transition unfolds, this creates a significant barrier to mobility and employment for many who already possess relevant competencies. As such, it is essential to support RPL mechanisms that are both flexible and responsive to occupational changes – particularly in emerging sectors, such as renewable energy, e-waste, sustainable agriculture and NEVs. This includes enabling RPL processes to take place in community settings, workplaces or through industry bodies and social partners that are better positioned to validate informal and experiential learning.

A key area of importance is supporting the linkage of RPL to clear progression pathways, such as access to formal certification, entry into skills programmes or eligibility for reskilling and upskilling. RPL for the Just Transition also requires robust and effective validation processes through the development of assessment centres within communities to ensure that reskilling and upskilling occurs efficiently. For this to be effective, collaboration across SETAs, employers, training providers, public institutions and communities is critical to ensuring quality assurance, sectoral alignment and integration into the national qualifications framework (NQF).

Key action areas to support flexible and responsive RPL mechanisms are captured in Table 9 below.

Table 9: Suggested actions to support flexible and responsive RPL mechanisms

ACTION	SHORTER-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Develop RPL mechanisms for the Just Transition sector	Coordination between education and training providers, government, community partners and private sector on developing RPL access and credit mechanisms into the Just Transition fields of practice	Established RPL access mechanisms into a half/Full occupational qualification Established RPL credit accumulation and transfer mechanisms for the progression / pathways into a Just Transition field of practice via vertical / horizontal articulation	DHET, JET Skills Desk, PCC, SETAs, QCTO, Industry bodies, TVET colleges, universities, private TVET and HE providers, community partners
Develop a clear, aligned and integrated pathway for progression and recognition of credentials in the Just Transition sector	List of Just Transition skills programmes at NQF levels 2–4 for access into qualifications List of Just Transition half/full occupational qualifications at NQF levels 5–7	An accessible database of aligned and integrated skills programmes and occupational qualifications for the Just Transition sector A Just Transition career guide handbook to inform learners and educators about Just Transition qualification pathways and RPL processes in the various fields of practice	SAQA, DHET, PCC, SETAs, QCTO, Industry bodies, NGOs, TVET colleges, universities, private TVET and HE providers, and community organisations
Create validation centres for assessment of RPL	Accessible and accurate verification and validation of prior learning of Just Transition knowledge at delivery level in communities and industries	Improved alignment of Just Transition prior learning and access to formal education Ensuring curriculum alignment to Just Transition objectives through valid assessment practices Ensuring quality assurance of prior learning for Just Transition skills programmes and qualifications	QCTO, industry bodies, TVET colleges, universities, private TVET and HE providers, NGOs, CBOs

Enable community education through targeted programmes

Community education and involvement plays a critical role in building inclusive and place-based responsive learning pathways within South Africa's Just Transition, particularly for youth, women, people living with disabilities, informal workers and others who often have limited access to formal training systems and are at risk of being excluded from emerging opportunities. Targeted education and training programmes can offer flexible, locally relevant opportunities that can support meaningful participation in new and evolving sectors, especially in rural and transitioning communities. However, the potential of community education and involvement has historically been constrained by limited investment, weak institutional capacity and poor integration into the broader skills system. Further, the opportunities made available to affected and underserved communities are often limited in scope, short term in nature and disconnected from longer-term development prospects. Therefore, strengthening and repositioning community education as a core component of the transition through more coordinated planning, resourcing and alignment with local development priorities will unlock opportunities and ensure that the benefits of the economic shifts are shared more equitably and sustainably.

Effective community education will entail a collaborative approach among local structures such as CET colleges, municipalities, traditional authorities, SETA offices, community-based organisations and other locally embedded institutions to co-design programmes directly responsive to local needs and existing knowledge (OECD, 2019). For example, in Just Transition hotspots, such as Mpumalanga, where there is a shift away from coal and the repurposing of coal-fired power stations, community education can focus on renewable energy services, environmental rehabilitation and care work to address local social needs, support climate adaptation and resilience, and create decent work opportunities. These targeted programmes have the potential to create long-term sustainable employment as the region diversifies beyond coal for the affected workforce, women, people living with disabilities, young people and informal workers.

In essence, to ensure that the transition is just, the targeted community education programmes need to reflect the realities and priorities of specific communities and be linked to formal qualifications or recognised learning pathways as much as possible. This will enable progression into additional training and employment opportunities.

Key actions to enable community education are captured in Table 10 below.

Table 10: Suggested actions to enable community education through targeted programmes

ACTION	SHORTER-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Develop targeted community education programmes in green economy sectors through integrated local implementation platforms	Skills development programmes aligned to local social and environmental needs (e.g. renewable energy, social work, disability support services, agroecology, energy maintenance, etc.)	Expanded access to decent work opportunities that support local resilience and climate adaptation	DHET, SETAs, LED units, community-based organisations, CET colleges, local municipalities
Activate CET colleges as community-based training hubs in just transition hotspots	Just-Transition-aligned short courses delivered through CETs in priority regions (e.g. Mpumalanga) Increased enrolment by youth, women and informal workers	Expanded access to place-based, inclusive learning opportunities that support resilience, local employment and skills development	
Align social protection with Just Transition pathways	Grants, ALMPs and public employment linked to Just Transition jobs	Social protection enables vulnerable groups to participate	PCC, DSD, DEL, National Treasury, municipalities

Collective Action Priority D: Enabling education-to-work transitions

This collaboration focus area gives attention to the need to facilitate seamless education-to-work transitions. A focus on strengthening pathways enables a critical restorative justice principle of the Just Transition by actively facilitating pathways for individuals from historically disadvantaged backgrounds and fossil-fuel-dependent regions into the green economy, thereby addressing past inequalities. In the Just Transition context, these pathways encompass education-to-work transitions for new labour market entrants. To ensure inclusive and just outcomes, this focus area will require giving attention to strategic collaborations in the strategic areas identified below, each with associated actions. Again, in each section we indicate what is known about demand in these proposed areas of collaboration and highlight both short-term outputs and longer-term outcomes, as well the main collaborators required.

Map learning pathways in Just Transition sectors (parallel pathways, enablers, career guidance)

Mapping learning pathways within South Africa's Just Transition sectors is critical to ensuring that the individuals who are most at risk because of the transition have access to relevant training and can easily navigate evolving labour market opportunities. Learning pathways refer to the varied, and in some cases non-linear, routes through which individuals learn and navigate learning and work transitions (Ramsarup and Hepplethwaite, 2025). Understanding and supporting these pathways enables more inclusive, flexible and responsive skills systems that can keep pace with technological and policy shifts in key Just Transition sectors.

The landscape of Just Transition occupations reveals significant potential for parallel pathways, including multi-entry and multi-exit options, horizontal and vertical progression, and hybridised skill sets. For instance, learners in the solar sector may enter through different routes (TVET, CET, informal training) and move laterally from general electrical roles to specialised renewable energy roles. However, opportunities for upward mobility remain limited without adequate support, often requiring bridging programmes or supervisory-level training. Similarly, occupations such as solar PV technician or energy performance certificate practitioner offer entry points that, with targeted support, can serve as stepping stones to roles such as energy manager or project planner. These realities point to the need for pathways that are not only technically sound but also articulated well, portable across sectors and responsive to different learner contexts.

The potential of learning pathways for the Just Transition can be unlocked through improving RPL mechanisms, upgrading qualifications and curricula to reflect emerging skills needs and supporting educators with relevant tools and infrastructure. Equally important are career guidance and adequate mentorship (Wits REAL, 2024b). Learners and workers need clear, accessible signposts to help them understand their options, transitions and opportunities at each stage of their learning or career journey.

In addition, the emergence of the short course culture in the country in response to the Just Transition calls for the integration of short learning programmes into the more established full programmes, which could potentially ensure both immediate employability and sustained skills development over time. This requires collaboration between different stakeholders, such as government, training providers, skills regulators and employers.

The actions needed to map learning pathways in Just Transition sectors are captured in Table 11 below.

Table 11: Suggested actions to map learning pathways in JT sectors

ACTION	SHORTER-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Map learning pathways across selected Just Transition sectors, including formal, non-formal, and informal routes	Clearer understanding of existing pathways, gaps and entry/exit points across key Just Transition sectors	A nationally recognised framework of dynamic, inclusive pathways that support horizontal and vertical mobility, recognition and lifelong learning	DHET, JET Skills Desk, QCTO, SAQA, PCC, SETAs, training providers (TVETs, universities, CETs)
Review and update qualifications and curricula to reflect evolving skills needs in just transition sectors, ensuring relevance and alignment with mapped learning pathways	Revised curricula incorporating emerging skills needs	Improved learner employability and adaptability in a changing labour market Stronger alignment between education providers and industry needs, supporting sustainable sector growth	
Strengthen articulation between short learning programmes and full qualifications	Frameworks and guidelines developed for linking short courses with full qualifications Pilot projects implemented to test articulation models	Improved learner progression and retention Enhanced skills development aligned with JT sector needs Increased employability and career advancement opportunities	

Strengthen transitioning mechanisms that support youth within the PSET system, such as NCAP and NPMN

South Africa's PSET system comprises education and training provision for those who have completed school, those who did not complete their schooling and those who never attended school (DHET, 2013). It further includes key digital and institutional mechanisms designed to support learners' transitioning from education into employment, such as NCAP and NPMN. NCAP is an online self-help tool that offers job seekers and students informed career and study guidance, while the NPMN is designed to support young people's transitions from learning to earning by improving access to information, opportunities and support services. A strategic alignment of South Africa's youth empowerment initiatives with its Just Transition goals is crucial to fostering an inclusive and sustainable future. By purposefully connecting the NPMS with the imperative of decarbonising the economy, we can create clear and accessible routes for young people to become active participants and beneficiaries of a low-carbon, climate-resilient society.

Key collaboration strategies under this action area will involve those captured in Table 12 below.

Table 12: Suggested actions to strengthen transitioning mechanisms that support youth within the PSET system

ACTION	SHORTER-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Mainstream green opportunities on NPMS and NCAP platforms	A clearly demarcated and easily accessible section on NPMS for key Just Transition areas Green pathways on the SA Youth Mobi illuminated Career guidance services within the NPMS enhanced with comprehensive information on green and circular economy careers	Expanded information on job profiles and the "green opportunities" to include jobs, learnerships, internships and volunteer opportunities in renewable energy, energy efficiency, waste management, sustainable agriculture and conservation	PYEI, Presidency, PCC, DHET - NCAP
Establish data sharing and analysis on youth transitions	A formal mechanism for sharing data and analysis between the NPMS and just transition monitoring bodies established	Nuanced understanding of the labour market impacts of the transition on young people	

Facilitate and enable more differentiated pathways: Skills for local ownership, community empowerment and local economic development in Just Transition value chains

The Just Transition is not only about decarbonising the economy, but also about reshaping who participates and benefits from it. A critical objective is to enable local ownership of economic opportunities and promote inclusive local development along transition-linked value chains. The complex nature of the socio-economic context in South Africa requires a differentiated approach to pathways, recognising that not all will transition into formal employment.

Facilitating access to skills for entrepreneurship, procurement participation and value addition can help to build resilient local economies, particularly in communities impacted by coal phase-outs and industrial shifts. Research has, however, shown that local communities hold the smallest share in Just Transition projects, often receiving short-term employment opportunities and benefits, linking to a skills mismatch for the most part. Township communities similarly face a disadvantage, with MSMEs

struggling to boost these economies despite having significant potential to boost the local economies. Mlauzi et al. (2025) show numerous challenges associated with skills for local economic development, particularly linked to MSMEs, where they stress limited engagement and collaboration among skills system actors and challenges in accessing skills development opportunities.

This foregrounds the need for strengthened collaboration between actors: training providers, government departments, businesses (at all levels), development agencies, community and employees. Such collaboration would drive coordinated skills provisioning and enterprise support, which integrates marginalised groups and informal economy actors into transition-linked opportunities both in the formal and informal sectors.

A case study on MSME's and skills illustrated that MSME development in Just Transition value chains is central to building local ownership and spreading opportunities across communities. It is critical that MSME actions are considered to localise the Just Transition and ensure small enterprises and communities are included in green value chains. Suggested actions include the following:

- **Scale MSME incubation models** (e.g. Nkangala TVET–RES4Africa solar partnership) to link local training with enterprise development;
- **Link MSME training to financial access** via the JET Funding Platform and enterprise and supplier development (ESD) schemes, coupling skills development with access to capital;
- **Strengthen municipal capacity to support MSMEs** in transition hotspots, enabling local governments to act as delivery hubs for Just-Transition-linked value chains.

Together, these measures foster resilient local economies and ensure that small enterprises are active players in green industrialisation.

Some possible actions to facilitate and enable skills for local ownership, community empowerment and local economic development in Just Transition value chains are highlighted in Table 13 below (actions highlighted in blue are derived from the case studies).

Table 13: Suggested actions to facilitate and enable more differentiated pathways

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Support Just Transition sectors and actors to assess potential for local ownership and development of Just Transition value	Local economic opportunities within the Just Transition value chains assessed and identified DSBD Connect and other comprehensive MSME	Foster systemic reforms in skills planning and anticipation to create continuous pathways into green jobs for	DEDT, DSBD, Industry associations, businesses local and international development agencies

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
chains and encourage the integration of adequate skills planning	databases expanded and used to identify and support small businesses with tailored interventions	MSMEs and communities	
Strengthen industry and educational provisioning relationships in Just Transition priority areas and SDZs to enable more proactive development of localised Just Transition value chains	Existing incubation programmes strengthened to improve access for MSMEs Forums and platforms facilitated for structured engagement between MSMEs, education providers and industry to bridge support system gaps and align supply and demand	Cohesive MSME support skills ecosystems developed to integrate fragmented training courses Local actors and institutions build strong formal and informal cooperative relations with regional and national actors	JET Skills Desk, Educational institutions, industry SETAs, industry associations
Support strong and responsive public–private skills sector partnerships to broaden public sector provisioning innovations and capabilities for the Just Transition	“Ecosystem leadership supported” to nurture, cohere and educate different actors, building a shared mission across policies, strategies and initiatives	Local actors are supported to ensure that their skills development needs are appropriately reflected in regional and national programmes Interventions move beyond short-term reactive measures to programmes that foster long-term systemic change and sustainability for MSMEs through improved coordination	Municipalities, PCC, JET PMU, COGTA, DEDT, DSBD, industry, education providers, SETAs, development partners, JET Skills Desk
Support training capacity to follow demand	Use geospatial heatmaps tied to SDZ/municipal planning	Reduction in skills gaps, improvement in fairness for women and youth, and a more agile and cost-effective system	Municipalities, PCC, COGTA, DEDT, DSBD, industry, education providers, SETAs, development partners, JET Skills Desk
Scale MSME incubation models (e.g. Nkangala TVET–RES4Africa)	Partnerships between TVETs, industry and incubators expanded	Stronger MSME participation in Just Transition value chains	PCC, TVET Colleges, industry, development agencies

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Link MSME training to financial access	Integration of training with financial support platforms (JET Funding, ESD)	Resilient small enterprises capable of driving local green economies	DSBD, SETAs, private sector, development finance institutions
Strengthen municipal capacity to support MSMEs	Training and support units in municipalities to align skills with Just Transition priorities	Local governments act as hubs for MSME support and Just Transition delivery	Municipalities, DSBD, COGTA, PCC, development partners

The case study below further highlights possible mechanisms to strengthen opportunities for MSMEs to support skills development for the just transition and ensure that opportunities are distributed inclusively and equitably.

Align social protection mechanisms to support workplace transitions

The social protection system in South Africa is a key enabler that either increases or limits the ability of individuals to access support for economic engagement, in both the formal and informal sectors. More work needs to be done to understand how the social protection system operates and where the potential lies to promote economic linkages, such as linking child support grant (CSG) beneficiaries to the National Student Financial Aid Scheme (NSFAS) and linking social grant beneficiaries to active labour market programmes (ALMP). The collaboration area will focus on developing a typology that captures the spectrum of engagement in the informal sector and the extent to which social assistance and social insurance is accessible to those in the sector, defining where stronger linkages could be created to support improved access to social protection and social insurance services, and de-risking informal economic activity.

The suggested actions for alignment are captured in Table 14.

Table 14: Suggested actions to align social protection mechanisms to support workplace transitions

ACTION	SHORT-TERM OUTPUTS	LONGER-TERM OUTCOMES	COLLABORATORS
Identify current programmes aimed at linking social grant beneficiaries to ALMPs, training and entrepreneurship programmes	Map of all the ALMPs, Public Employment Programmes and Social Protection Programmes and where they are connected/not connected	Linkages created between social grant beneficiaries and ALMPs, PEPs ad SPPs with improved employment outcomes tracked and analysed	Department of Social Development, Department of Labour, Department of Public Works, SETAs
Research informal sector economic activity and its linkages to social protection systems	Analysis of how social protection systems do/do not support informal economic activity	New policy / programmes implemented which provide specific social protection services to informal sector workers	Department of Social Development, municipalities
Identify the shortcomings in the social protection system that impact on the ability of individuals to access economic opportunities	List of areas on the social protection system that require strengthening with recommendations on how they can be addressed	Specific programmes implemented to address gaps in social protection systems, demonstrating that specific groups are better able to engage in economic activity	Department of Social Development, municipalities
Identify the needs of special interest groups with regards to improved social protection – women, youth, people living with disabilities, rural communities	Identified needs of special interest groups with clear programmes of action to address current gaps	Improved economic outcomes for special interest groups in targeted programmes	Department of Social Development, municipalities, National Youth Development Agency, Department of Women, Youth and Persons with Disabilities

Implementation approach – Priority recommendations

Prioritisation of potential actions

The transition to a just and inclusive economy presents a critical opportunity for South Africa to address structural unemployment, inequality and environmental challenges through a Just Transition. However, this shift demands coordinated and systemic responses across the skills ecosystem to ensure that no one is left behind. This set of recommendations outlines practical, actionable measures to strengthen skills anticipation, skills development and skills utilisation aligned with Just Transition

principles. These recommendations prioritise the actions detailed above (those actions not selected can be addressed through other mechanisms or at another time) using the following criteria:

- Feasibility / Readiness
  - Can the action be implemented with current capacity, policies and institutions?
- Scale of impact
  - How many workers/communities will benefit?
- Inclusivity and equity
  - Does the action prioritise women, youth, informal workers and coal regions?
- Catalytic / Systemic change
  - Does it unlock other opportunities (data platforms, pathways, coordination mechanisms)?
- Alignment with policy and investment pipelines
  - Is it directly linked to existing commitments (JET IP, REIPPPP, NEV Roadmap, SAREM)?

The priority areas align with the letters in brackets below and with the headings in Table 15.

- Feasibility (F)
- Scale of impact (S)
- Inclusivity and equity (I)
- Catalytic/Systemic change (C)
- Policy alignment (P)

The criteria above were applied to the consolidated action set to identify a first tranche of measures that are both doable in the near term and catalytic for system change. The full list of consolidated actions can be found in Appendix 2.

Table 15: Prioritised actions for inclusion in the Strategic Framework

☑ = strong fit ⚠ = partial fit

Action	F	S	I	C	P
National Just Transition Dashboard	☑	☑	⚠	☑	☑
Develop scenarios for skills and labour planning	☑	☑	☑	☑	☑
Map emerging/at-risk occupations (coal, auto, rural)	☑	☑	☑	☑	☑
Map climate adaptation and care occupations	⚠	⚠	☑	☑	⚠
Engage in the strengthening of Just-Transition-related skills programmes	☑	☑	☑	☑	☑
Educator and trainer capacity for Just-Transition-aligned curricula	⚠	☑	☑	☑	☑
Quantify WIL placements needed	☑	☑	☑	☑	☑

Action	F	S	I	C	P
Expand structured workplace learning partnerships	☑	☑	☑	☑	☑
Just Transition career guide handbook	☑	⚠	☑	☑	☑
Create RPL validation centres in coal regions	☑	⚠	☑	☑	⚠
Map Just Transition learning pathways (multi-entry/exit)	☑	☑	☑	☑	☑
NPMS/NCAP – mainstream green career pathways	☑	☑	☑	☑	☑
CET colleges as Just Transition community training hubs	☑	⚠	☑	☑	☑
CET green programmes (resilience, agroecology, renewables)	☑	⚠	☑	☑	☑
Expand EPWP/CWP into climate-care jobs	☑	☑	☑	☑	☑
MSME incubation linked to Just Transition sectors (Nkangala model)	☑	⚠	☑	☑	☑
Link MSME training to finance (JET Funding Platform, ESD)	⚠	☑	☑	☑	☑
Map geospatial labour market shifts	☑	☑	☑	☑	☑
Prioritise reskilling pathways for at-risk coal workers	☑	☑	☑	☑	☑
Develop targeted pathways for women and youth	☑	☑	☑	☑	☑
Invest in anticipatory training systems (prevent future bottlenecks)	⚠	☑	☑	☑	☑
Align social protection with Just Transition pathways	⚠	☑	☑	☑	☑

Identification of pillars of “how-to” actions

To translate these priorities into delivery, the framework is organised into six mutually reinforcing pillars. Each pillar sets out practical “how-to” actions, highlights early wins that build momentum and assigns partnership roles to embed accountability. Together, they create a pathway from data and policy intent to real jobs, skills and inclusion outcomes in places most affected by the transition.

Figure 8: The 6 pillars to translate priorities into delivery

Pillar 1: Policy integration and strategic planning

This pillar recentres skills within economic and technological planning, ensuring Just Transition objectives are embedded in core policy instruments and investment pipelines. It connects evidence (dashboards, scenarios) to decision cycles in municipalities, sectors and national programmes.

Table 16: Priority actions for the policy integration and strategic planning pillar

Priority action	Implementation actions	Quick win
Map emerging/at-risk occupations and link to geospatial and SDZ planning	• Run regional labour-market analysis including consolidating existing work (coal, auto, rural districts) to highlight declining and emergent roles; visualise municipal “heatmaps” of risk/opportunity (includes using SATIMGE modelling)	■
	• Produce quarterly policy briefs for municipalities/SDZ planners translating findings into diversification options (e.g. component manufacturing, agro-processing) and skills requirements and timeframes including anticipatory training to prevent future bottlenecks	

Priority action	Implementation actions	Quick win
Support integration of Just Transition and related skills into other government initiatives and policies	• Map all relevant initiatives and policies and collaborate on aligning skills planning e.g. national climate and energy policies	
	• Assess barriers and challenges in the development and roll out of various master plans in South Africa and distil out from the lessons learnt and relative successes key substantive approaches to an inclusive and just industrial policy development process	
	• Support PSETA to develop curricula and train all government departments on Just Transition and enabling policy options and integration points	■
Scenario development for skills and labour planning	• Facilitate scenario workshops with industry, academia, unions and communities to draft 2–3 plausible pathways; document key uncertainties (demand, water, logistics) and embed scenario updates and feedback as a continual process in the PCC	■
	• Model occupational demand and regional impacts under each scenario; publish an annual “Just Transition Skills Outlook” to inform SETA and bursary windows	

Pillar 2: Sectoral alignment and dialogue

Here the focus shifts to value-chain execution: convening industry-led working groups, aligning curricula to technology change and building shared labour market intelligence so that training volumes and workplace learning keep pace with sectoral demand.

Table 17: Priority actions for the sectoral alignment and dialogue pillar

Priority action	Implementation actions	Quick win
Address data challenges to support economic challenges	• Integrate datasets from SETAs, NSF, EPWP/CWP, UIF and provinces via simple data-sharing agreements and basic APIs; include provenance and quality flags	
	• Publish a public dashboard with downloadable datasets and an open API for municipalities, industry and civil society; include privacy safeguards and versioning	
Co-host Just Transition task teams for key sectors	• Constitute sector roundtables with ToR, inclusive representation (incl. SMEs, women/youth) and quarterly workplans; appoint subject-matter experts to advise on the implementation approach and curricula shifts	■
	• Develop sector talent strategies quantifying demand (roles/levels), critical skills gaps, WIL/apprenticeship numbers and aligned funding calls	
	• Fast track solar-specific skills programmes, construction jobs and reskilling pathways with a focus on coal workers	■
Sector-level social dialogue for new value chains	• Run structured dialogues for renewables, hydrogen, storage, EVs, agro-processing; co-design fair work standards with unions and small-business bodies	■
	• Harmonise sector classification and local demand/supply datasets; commission rapid studies where intelligence is missing and publish open summaries	
	• Integrate outcomes into sector masterplans (energy, agriculture, transport) with clear skills, localisation and inclusion targets plus monitoring	

Pillar 3: Coordination and funding mechanisms

Delivery at pace requires joined-up funding and clear rules of the road. This pillar establishes a single front door for public training funds, codifies Just-Transition-aligned allocation criteria and crowds in private co-funding through incentives and transparent deal flow.

Table 18: Priority actions for the coordination and funding mechanisms pillar

Priority action	Implementation actions	Quick win
National Just Transition Dashboard	• Design a single repository consolidating Just Transition investment, programme delivery and skills pipeline metrics; define a common taxonomy (OFO/ISCO), data owners and a monthly update cadence	
Sectoral specific funding requirements	• Define specific financial requirements for skilling initiatives by working with the Just Transition task teams for key sectors and the special economic zones (SEZs) and SETAs	

Priority action	Implementation actions	Quick win
Coordination mechanisms	● Identify existing initiatives and identify where the Just Transition work can leverage ongoing work e.g. the SA Youth/NPMN platform and existing capacity building initiatives, workplace-based learning and entrepreneurship programmes including identifying partnerships	■
	● Set up a joint platform for inking SETAs, NSF, UIF, EPWP/CWP funding with a central intake and routing process; publish eligibility criteria and service-level timelines	
	● Define common Just-Transition-specific allocation criteria (e.g. coal-affected communities, MSMEs, women/youth thresholds, localisation multipliers) and embed them in grant windows	■
Private sector co-funding partnerships	● Create fiscal/non-fiscal incentives for corporate co-investment in training pipelines (tax rebates, CPD recognition, procurement points for hosting learners)	
	● Launch a matchmaking portal profiling projects needing co-funding, with transparent costs, outputs (learners, placements) and impact indicators	

Pillar 4: Pathway enablers and inclusion

Leaving no one behind means clear, stackable learning pathways and fair access to opportunities. Actions here include mapping and articulating pathways, reducing progression barriers (including the digital divide) and strengthening matching platforms so learners transition to earning.

Table 19: Priority actions for the pathway enablers and inclusion pillar

Priority action	Implementation actions	Quick win
Mainstream green career pathways	● Create new or build on existing initiatives e.g. Power Up to aggregate real-time postings, bursaries, apprenticeships; tag by sector/region/skill level; push SMS/WhatsApp alerts	
	● Build capacity of Employment Services of South Africa (ESSA) to support matching of workers with up/reskilling opportunities to ensure they can remain in the labour market	■
	● Partner with existing matching systems e.g. NPNM (particularly SA Youth) to integrate user profiles and enable them to track transitions from learning to earning to monitor effectiveness	
	● Develop a JET career guide handbook	■
	● Ensure data-free access and provide offline kiosks at TVETs/municipal libraries to reach rural youth and job-seekers	

Priority action	Implementation actions	Quick win
Map Just Transition learning pathways and align TVET/HEI offers	• Work with the Just Transition task teams for key sectors to create a baseline of existing information and publish pathway maps for showing stackable credentials (micro-credentials → NQF → professional designations) aligned with social protection mechanisms where necessary	
	• Develop broad-based occupations and related qualifications and train providers e.g. Mechatronics to allow for easier pathway access and career and job flexibility	
	• Align TVET short courses with degrees/certifications; establish articulation agreements and include RPL routes for experienced workers	
	• Create validation centres and define progression ladders and for informal/RPL candidates with bridging maths/physics/digital literacy and contextual HSE modules	■
Bridging programmes in coal-dependent communities	• Design modular pre-apprenticeship courses linked to jobs in demand in the local economy and pilot in priority districts	■
	• In coal-dependent communities, design modular pre-apprenticeship courses linked to jobs in demand in the local economy and pilot in priority districts and bundle training with career coaching, stipends and employer-linked placements; use TVETs as hubs and mobile units where needed	
	• In short skills courses, work placements, job-readiness and basic skills training e.g. safety, mentorship	
Align social protection with Just Transition pathways	• Develop and implement relocation/placement guarantees where applicable	

Pillar 5: Capacity building and system readiness

System change is only as strong as provider and municipal capability. This pillar develops educator capacity, practical training infrastructure and local project preparation skills so that supply-side readiness matches the speed of demand.

Table 20: Priority actions for the capacity building and system readiness pillar

Priority action	Implementation actions	Quick win
Educator and trainer capacity for Just Transition curricula	• Launch a Just Transition lecturer development programme with industry internships, train-the-trainer modules and a national community of practice at CET, TVET and HEI levels	■
	• Co-develop practical labs and teaching aids (kits, simulators, site visits) with industry partners for hands-on competence	

Priority action	Implementation actions	Quick win
Build municipal capacity	• Build capacity of municipalities by rethinking structure, identifying up/reskilling needs and supporting employing experts to accelerate local green project preparation and financing	
	• Build municipal data/energy planning expertise with toolkits (resource mapping, load profiles, tariff models) and peer-learning	
Build capacity in basic education structures	• Ensure that Basic Education curricula align with Just Transition skills requirements to provide a supportive foundation for PSET	
	• Support teacher upskilling through initiatives such as Fundisa for change	■
Build Just Transition capacity for key stakeholders in the PSET system	• Raise awareness and develop key stakeholders e.g. the QCTO so that they can flexibly respond and implement interventions that address gaps in the short medium and long term	■
Mentor incentives	• Award CPD credits to recognised workplace mentors and maintain a registry of accredited host sites	
	• Work with National Treasury to offer tax or procurement-score incentives to employers hosting learners/apprentices/WIL at scale	

Pillar 6: Community and civil society engagement

Legitimacy and uptake improve when communities co-create the transition. This pillar expands climate-care jobs, grows MSMEs linked to Just Transition sectors and builds open knowledge and participation channels to sustain trust and accountability.

Table 21: Priority actions for the community and civil society engagement pillar

Priority action	Implementation actions	Quick win
Mobilise and engage civil society organisations and community-based organisations	• Launch a Just Transition public portal/knowledge sharing platform with open access to plain-language policy updates, participatory tools, multilingual content; provide mobile/offline consultations	
	• Mobilise CSOs/CBOs as outreach partners and local convenors; publish feedback loops and response trackers for accountability	■
MSME incubation linked to funding platforms and TVET hubs	• Integrate job-readiness, safety and entrepreneurial modules to enable movement into MSMEs or formal employment	
	• Support delivery of community-based green projects e.g. ecosystem restoration, community solar and maintenance programmes through, among other mechanisms, CET colleges	

Priority action	Implementation actions	Quick win
	• Expand and or/map and expand EPWP/CWP climate adaptation and care occupations and jobs	■
	• Scale Nkangala/RES4Africa-type incubation models with technical assistance, seed funding access and supplier-readiness training; embed TVETs as hubs	
	• Connect MSMEs to national JT funding/matchmaking platforms and municipal/private procurement pipelines	

Quick wins

To build momentum and achieve quick, visible outcomes, a set of short-term interventions was identified. This set of proven, scalable measures includes WIL expansion, mentor incentives, bridging and RPL programmes, township MSME upskilling and greened EPWP streams. These can be deployed immediately to demonstrate progress while foundational systems are built.

Table 22: Summary of quick wins with key partners and existing initiatives

Pillar	Quick win	Lead partner	Supporting partners and roles	Existing initiatives/policy
Policy integration	Map emerging/at-risk occupations	PCC	DHET (skills policy alignment), municipalities (local data inputs), SETAs (labour market data)	Labour market analysis at sectoral level and in SETAs
	Support integration of Just Transition and related skills into government initiatives	DHET	DFFE (climate policy), DMRE (energy policy), PCC (oversight and coherence)	Climate Change Bill, Energy Policy
	Support PSETA to develop curricula and train government departments	PSETA	NSG (civil service training), DHET (curricula approval)	Just Transition curricula, policy training
	Scenario development for skills and labour planning	PCC	NEDLAC (social dialogue), academia (modelling), industry/unions (inputs)	Climate-related scenarios
Sectoral alignment	Co-host Just Transition task teams for key sectors	Industry associations	SETAs (skills planning), unions (labour voice), PCC (coordination)	IDC working groups, SAREM, EV roadmap, Green Hydrogen Commercialisation Strategy
	Fast track solar-specific skills programmes, construction jobs and reskilling pathways	DEE	IPPs (demand), SETAs (programme design), DHET (qualification pathways), unions (worker transition)	REIPPPP skills programmes, SEZ programmes, Coal worker transition pilots
	Sector-level social dialogue for new value chains	PCC	Unions (worker protection), industry (implementation), SMEs (localisation), Green Matter and Green Cape (mediation)	SAREM, EV roadmap
Coordination and funding	Coordination mechanisms (linking funding streams and partnerships)	PCC	UIF (funding), EPWP (placement funding), SETAs (training funds), NSF (alignment)	SA Youth, NPMN
	Define Just-Transition-specific allocation criteria	National Treasury	SETAs (grant rules), PCC (criteria development), DHET (implementation)	SETA funding windows
Pathway enablers	Mainstream green career pathways	DHET	ESSA (job-matching), SA Youth (platform access), PCC (oversight)	Power Up, ESSA portal
	JET Career Guide Handbook	PCC	DHET (content validation), career services (distribution)	New initiative
	Create RPL validation centres in coal regions	QCTO	TVETs (implementation), municipalities (facilities, outreach)	RPL pilots

	Bridging programmes in coal-dependent communities	TVET colleges	Municipalities (local support), employers (placements), PCC (funding support)	Mobile training units
Capacity building	Educator and trainer capacity for JT curricula (CET, TVET, HEI)	DHET	TVETs/HEIs (rollout), industry (internships), CETs (community outreach)	Lecturer development programme
	Support teacher upskilling (basic education alignment)	DBE	NGOs (delivery support), PCC (oversight)	Fundisa for change
	Build Just Transition capacity for key PSET stakeholders	DHET	QCTO (flexible qualification frameworks), SETAs (adaptation of funding calls)	SETA awareness and capacity programmes
Community engagement	Mobilise and engage CSOs/CBOs as Just Transition partners	PCC	CSOs (local mobilisation), CBOs (grassroots facilitation)	JT public portal
	Expand/mobilise EPWP/CWP climate adaptation and care jobs	DPWI	Municipalities (deployment), NGOs (training support)	EPWP/CWP climate jobs
	MSME incubation linked to TVET hubs and funding platforms	TVET colleges	Incubators (training), PCC (oversight), NT (funding support)	Nkangala/RES4Africa models
	Support community-based green projects (solar, agroecology, restoration)	Municipalities	CET colleges (training hubs), NGOs (technical support), PCC (coordination)	Local green projects

Prioritising catalytic collaborators for the Just Transition skills agenda

While multiple collaborators are listed for each action, it is important to differentiate between general partners and catalytic collaborators – those with the greatest influence on the Just Transition) and JET agenda, and whose mandates are most directly aligned with the PCC. These actors can unlock systemic impact and enable alignment across the wider collaborator set. To clarify their roles, collaborators are categorised as follows:

- **System architect partners:** Provide strategic direction, policy alignment and institutional frameworks (e.g. DHET, National Treasury, PCC);
- **Delivery partners:** Implement programmes and training on the ground (e.g. TVET colleges, SETAs, industry associations, employers, CET centres);
- **Enabling environment partners:** Create conditions for success through data, funding, advocacy, social dialogue and inclusion (e.g. StatsSA, development partners, NGOs, municipalities, unions).

By distinguishing catalytic collaborators, the PCC can focus engagement where leverage is highest while still ensuring a broad collaborative base. This also reduces duplication and clarifies “who leads vs who supports” for each action.

Catalytic collaborators by strategic area of action

Collective Action Priority A: Strengthening collaboration, governance and inclusion

- *Catalytic*: PCC (convening power), DHET (skills mandate), National Treasury (funding alignment);
- *System Architects*: JET Skills Desk, DEL, DTIC;
- *Delivery*: SETAs, provincial/municipal governments;
- *Enabling*: StatsSA (data), business associations, organised labour, civil society.

Collective Action Priority B: Understanding occupational needs

- *Catalytic*: DHET (skills intelligence), PCC (scenario convening), QCTO (qualification frameworks);
- *System Architects*: DSI, DFFE, unions, employer bodies;
- *Delivery*: TVET and CET colleges, industry employers (e.g. renewables, mining, agriculture);

- *Enabling*: NGOs, community organisations (for climate-care work recognition), academia (research and case studies).

Collective Action Priority C: Provisioning of targeted education and training programmes

- *Catalytic*: DHET (curriculum and programme authority), SETAs (funding and workplace learning), PCC (alignment role);
- *System Architects*: Industry bodies (energy, auto, agriculture), AgriSETA, EWSETA;
- *Delivery*: Universities, TVET colleges, employers offering apprenticeships;
- *Enabling*: QCTO (quality assurance), NGOs and PYEI for youth and women's pathways.

Collective Action Priority D: Enabling education-to-work transitions

- *Catalytic*: DHET (career pathways, NCAP/NPMN), PCC (integration of JT career guidance);
- *System Architects*: SETAs, NPMN partners, DEL (social protection);
- *Delivery*: Employers offering WIL placements, CET colleges, MSME incubators;
- *Enabling*: Development partners, civil society groups (equity and inclusion), local municipalities (place-based pathways).

Grouping collaborators into system architects, delivery partners and enabling environment partners provides a practical mapping tool to manage partnerships and ensure accountability across the skills ecosystem.

Conclusion

This implementation approach provides a practical route to a Just Transition that delivers visible benefits within 12–24 months while laying the groundwork for durable, system-wide change. By anchoring decisions in shared data and scenarios, centring skills within policy and investment pipelines and aligning sector working groups with coordinated funding, South Africa can move from fragmented initiatives to coherent delivery, particularly in coal-affected districts and for women and youth. Quick-start measures will signal early traction; parallel investments in educator and municipal capacity will ensure scale and quality. With the PCC stewarding scenario intelligence and feedback loops, and with transparent public knowledge platforms enabling

genuine participation, this framework links policy intent to jobs, enterprise growth and community resilience, turning the Just Transition from aspiration into accountable action.

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Appendix 1: Additional Case Studies

Case study: Opportunities for reskilling pathways with a focus on industrial hemp

Industrial Hemp value chain development has been one of the priority sectors to hold significant potential for investment, job creation and support for sustainable rural livelihood in the Country Investment Strategy (Presidency, 2022). The industry has potential to create new job opportunities in the various stages of the value chain including but not limited to cultivation, processing, manufacturing and distribution. The potential of this value chain, however, will not be achieved in the absence of substantial capital investment in processing capacity and technology (DTCI, 2023: 45). Thus, the need by the government to invest in socio-equitable and inclusive market transparency models, regulatory frameworks and risk management strategies that facilitate uptake through public–private partnerships. In addition, intensive research and development programmes will facilitate and support programmes from pilot to economically viable value chains that participate competitively within the economies of scale. Those mentioned below represent potential for reskilling pathways.

Mine land preparation for phytoremediation and downstream critical minerals exploration

This value chain segment does not require remedial/interventionist action in the form of upskilling or reskilling. As the required skills fall under the Minerals Act 50 of 1991, that acts as the regulatory authority and framework for mine closure. The prerequisite skills form part of the day-to-day operations and functions of the mine in alignment with the Mine Health and Safety Act 29 of 1996. This is further supported by the Mineral and Petroleum Resources Development Act No. 28 of 2002 and the National Environmental Management Action Act that act as legislative frameworks for mine closures and land rehabilitation. Qualifications in the broad umbrella of chemical and electrical engineering, geology and environmental science provide the foundational knowledge necessary to transition into the emerging sectors and value chains, such as critical minerals.

This will require the understanding of geological formations, resource potential and environmental impacts associated with extraction. Government, policymakers and investors will need to find innovative and internationally competitive ways developing downward value chains related to the sector. International data indicates South Africa’s potential to expand its critical minerals capabilities and compete competitively within international markets. Through sufficient institutional and financial support this value chain segment has the potential to establish a labour market with high absorption capacity. The jobs in the value chain segment are anticipated to be sustainable and good jobs as per ILO standards. More importantly, due to the foundational knowledge (existing) and or gained (upskilling/reskilling)

labour will be exposed to transitional pathways that allows them to navigate different labour markets through the different value chains.

Biofuel

Public provisioning institutions have made substantial strides in curriculum development for biofuel energy, renewable energy and sustainability. Key institutions that have led in this regard have been Stellenbosch University led by the Centre for Renewable Sustainable Energy Studies and the University of Cape Town. SAQA, EWSETA and the QCTO have also acted proactively in developing skills in anticipation of the emerging value chain. However, it must be noted that key qualifications such as electrical and chemical engineering remain central to the foundational knowledge required to facilitate transitional pathways. This value chain segment is highly reliant on STEM qualifications, and the study anticipates that OFO levels 3–7 are most likely to transition into this value chain segment. The absorption rate of labour will be determined by capital investment through private–public investment and market uptake of products that inform supply and demand ratio.

Case study: Unlocking solar sector jobs

The solar energy sector is one of the fastest growing renewable energy segments in South Africa. This has been driven by policy commitments seen through the goal to increase renewable energy from 11% to 41% of the power generation mix by 2030, and initiatives such as the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the Just Energy Transition Investment Plan (JET IP) and Implementation Plan which foreground solar projects, and the approval of and South African Renewable Energy Masterplan (SAREM). These all present significant job creation opportunities across short-, medium-, and long-term horizons. Some of the projections indicate that by 2030 the solar energy sector could create as many as 35 404 jobs in construction and 3 605 in Operations and Maintenance (O&M) (IASS, IET and CSIR, 2022), and furthermore, up to 245 000 jobs in solar technologies (Photovoltaic (PV) and concentrated solar power (CSP)) by 2030, with an additional 245 000 by 2050 (IRENA, 2023). Demand spans various skill levels, from labourers and site workers in construction to technical and engineering roles, and crucial support functions.

Job creation in solar will be concentrated in construction, with growing opportunities in operations, maintenance, manufacturing, logistics, finance and regulation. While formal qualifications (e.g. degrees, national diplomas and certificates) are frequently prerequisites for technical and engineering roles, future green occupations are anticipated to increasingly rely on on-the-job training. Many of the construction-linked jobs, though short-term, can potentially serve as critical entry points into

broader more sustainable renewable energy careers. Skills training for the emerging sector will be required at three levels:

- Upskilling: Will mainly be applicable for transitioning occupations, such as electricians and engineers. Upskilling will be required for aspects such as solar PV/CSP design, installation and maintenance, as well as the transition from alternating current (AC) to direct current (DC) systems.
- Reskilling: Will be cardinal for individuals in declining sectors, particularly those from coal mining in Just Transition hotspots, such as Mpumalanga that has earmarked solar energy as a transition (repurposing) focus area. This can see coal mine workers transitioning into occupations across the solar value chain, such as welders, toolmakers and production process controllers.
- New skill development: Will be required mostly for emerging occupations, such as solar installers and PV/CSP recycling technicians.

Case study: Unpaid work central to climate adaptation and resilience

Given South Africa's economic and socio-economic make-up, the local impacts of climate change will have dire knock-on effects on people's livelihoods, including creating challenges for agriculture, increasing food insecurity, reducing drinking water, threatening biodiversity, affecting the economy, including tourism, damaging infrastructure, increasing displacement and exacerbating poverty and inequality (Johnston et al., 2024; MacGregor et al., 2022). Climate change also increases health threats related to malnutrition, climate-related disease outbreaks (whether water or insect borne), heat stress, death and injuries from climate-related disasters and poor mental health due to trauma, anxiety and loss (MacGregor et. al, 2022). Resource competition and disaster can exacerbate social instability, leading to increased conflict and interpersonal violence, including gender-based violence.

These climate effects are said to increase levels of paid and unpaid care work. Paid care work refers to the work undertaken by "care workers" who generally work in occupations providing health, social and education services through formal and informal paid jobs. This includes a range of workers from doctors and dentists to childcare and domestic workers, as well as emergency first responders (ILO, 2018). Unpaid carers provide care, support and household work within households or in the community with no monetary reward. While this type of unpaid work is generally devalued, even care work undertaken within the sphere of the labour market in the fields of health, education and the personal and household services sectors is undervalued and faces greater "decent work deficits" than in other areas of activity (ILO, 2023). Unpaid care work disproportionately burdens women and girls, especially in rural areas in developing countries such as South Africa, and will increase with climate change impact.

Care work is a generally neglected area of work, learning and skills development in climate change adaptation and climate-resilient development planning and practice. Recognising, valuing and redistributing care work can counter narratives of women as vulnerable victims of climate change while lessening the burden by capacitating diverse members of households and society to care for people and the planet as climate change increasingly threatens human and environmental health (MacGregor et al., 2022).

In the South African public sector, programmes such as the Expanded Public Works Programme (EPWP) and Community Work Programme (CWP) are central to providing meaningful work opportunities for care workers. These two initiatives intersect across infrastructure, social and environmental sectors and are aimed at creating part-time but paid jobs for marginalised groups, especially women and youth, by assigning them roles in environmental restoration, elder care, early childhood development (ECD) and food security in their designated communities to curb unemployment (Sibanda, 2021).

Specific attention needs to be paid to understanding the existing and emerging occupations in climate and care work, developing and accrediting qualifications and defining learning pathways in the context of meaningful work.

Case study: Mechanisms to strengthen opportunities for MSMEs to support the Just Transition

For micro, small and medium enterprises (MSMEs) to thrive within the emerging green economy, a multi-faceted approach focusing on improved coordination, targeted support and stronger institutional linkages is essential. Firstly, a key mechanism is improving access to information. Many MSMEs remain unaware of available interventions and support, highlighting the need for centralised information repositories, such as the DSBD Connect platform. This digital tool could geo-map small businesses and provide critical information on services, particularly those supporting the just transition. Furthermore, leveraging platforms such the JET Funding Platform can act as a matchmaking service, connecting grant funders with potential green economy projects and allowing for an assessment of required skills against existing labour.

Secondly, to address practical barriers, such as distance and time constraints, service delivery modalities for MSMEs should be localised and diversified, offering training sessions during evenings, weekends or in one-day formats. Crucially, linking training programmes directly to financial access can boost financiers' confidence in MSMEs' capacity to manage funds, encouraging greater engagement in skills development.

Thirdly, strengthening intermediaries and municipal capacities is also key. Despite their central role in local implementation, many municipalities lack the technical guidance, capacity and resources to translate broader JET policies into tangible local benefits for MSMEs.

Finally, enhancing MSME–TVET linkages and fostering strategic partnerships is vital for skills development aligned with green opportunities. While institutions such as TVET colleges offer relevant courses, a significant disconnect persists between curriculum content and the rapidly evolving needs of MSMEs, especially in relation to green technologies. In this regard, the National Business Initiative (NBI) is working to establish incubation centres at TVET colleges, aiming to position them as anchor institutions that train young people for MSME needs and provide technical support for their growth. An additional strong example is Nkangala TVET College's partnership with the RES4Africa Foundation, which offers practical training in solar photovoltaic (PV) installation. This directly responds to the growing demand for renewable energy and provides a clear pathway into green jobs. In addition, replicating successful Enterprise and Supplier Development (ESD) programmes such as Exxaro's, which incubate and train local businesses to meet industry standards and secure contracts within the mining sector, could be extended to other green industries. This ensures that MSMEs are equipped with the necessary skills, certifications and business acumen to compete effectively. By integrating training with market access and financial support, MSMEs can move beyond survivalist operations towards scalable, green businesses.

Case study: Regenerative urban agriculture and agripreneurship

Urban agriculture is defined by Food and Agriculture Organization (2022) as a holistic farming system that improves water and air quality, enhances biodiversity, produces nutrient-rich food and stores carbon to mitigate climate change. Within this framework, agripreneurship emerges as an enterprise-driven model enabling individuals to establish agricultural businesses by applying the skills, knowledge and attributes necessary for productive and sustainable farming (Franzel et al., 2022; Mudhara, 2018; Rudolph et al., 2021). Successful agripreneurship demands not only technical expertise but also strong organisational and management abilities (Mudhara, 2018). Consequently, agripreneurship commercialises regenerative urban agriculture, making it a meaningful contributor to local economies and employment (Okonkwo et al., 2023).

Regenerative urban agriculture is often informal and community-based, largely practised by women and marginalised groups seeking pathways to address socio-economic inequalities and participate in the mainstream economy (Kanosvamhira, 2024). Despite its socio-economic significance, urban agriculture, in general,

remains under-recognised in national policies and programmes (Hanna and Comín, 2021; Kanosvamhira, 2024).

Through the agripreneurship lens, there are potentially a spectrum of livelihood and employment opportunities in urban settings. These range from primary production to processing and distribution, offering potential for inclusive economic participation (Ratshitanga, 2017). Due to limited urban spaces, these job opportunities require elements of urban planning and designing, converting and utilising urban spaces into sustainable and efficient food production sites (small scale landscaping) (Gulati and Scholtz, 2020; Kanosvamhira, 2018; Siebert, 2020). Entrepreneurship presents a number of jobs and these include the advertising and marketing of agricultural produce, quality control of produce, accessing various markets, sourcing customers, distributing and selling the produce, maintaining relationships with various stakeholders, and financial and record keeping. The sustainability of these jobs is dependent on the overall agribusiness management. Agribusiness management requires specialised skills and knowledge on management of the overall urban agribusiness (Adeyanju et al., 2023; Thornton and Nel, 2007).

Case study: Untapped employment potential in the circular economy

Waste management encompasses the transformation of waste materials into new, usable products that help to reduce waste, avoid new emissions and mitigate environmental impact. According to the 2018 State of Waste report, South Africa generated 108 million tonnes of waste per annum, comprising 55 million tonnes of general waste, 52 million tonnes of hazardous waste and 1 million tonnes of unclassified waste. Of this, 65% of general waste was landfilled, while 92% of hazardous waste went to landfill (DFFE, 2023). The waste management sector is a critical contributor to employment and currently supports a formal workforce of nearly 30 000 individuals (CSIR, 2025), complemented by an informal sector comprising between 60 000 and 215 000 waste pickers (Schenk et al., 2018). This informal workforce plays an indispensable role, recovering between 80% and 90% of post-consumer paper and packaging and generating substantial savings for municipalities by diverting waste from landfills.

The National Waste Management Strategy (NWMS) of 2020 articulated a vision of increased recycling and beneficiation of waste, with the potential to create up to 150 000 new jobs by 2024. Recent data gathering suggests that this target was not met, due to only 21.59% of waste being diverted, less than half of the target of 45% by 2025 (DFFE, 2020). The creation of jobs in the sector is directly linked to the amount of waste being diverted. Five high priority waste management streams are contained in the Waste Economic Management Plan (WEMP), namely, Organic

Waste, Construction and Demolition Waste, E-waste, and Packaging Waste, and Absorbent Hygiene Products.

An estimated 7 000–18 000 jobs could be created in waste remediation and recycling, with 50% of jobs being unskilled due to the requirement to sort waste at the initial stages of the value chain, where jobs such as cleaners, packers and sorters are found. Investment in specialist technical skills is required for 30% additional jobs in roles such as machine operators, forklift operators and shredding technicians (FSD Africa/Shortlist, 2024). As noted above, the key enabler for job creation is the extent to which waste is being diverted from landfills.

Case study: The electric vehicle transition and its impact on occupations

The transition to new electric vehicles (NEVs) in South Africa is still in its infancy, with national policy, such as the Electric Vehicle White Paper (2023), initially prioritising manufacturing and charging infrastructure rather than demand-side interventions, such as incentives for individual NEV purchases due to the prohibitive cost of NEVs and the government's fiscal constraints. Although only producing plug-in hybrid electric vehicles (PHEVs) at present, the automotive industry has been focused on developing skills in advance of industry requirements to avoid skill bottlenecks that could stunt the growth and development of new industries (DTIC, 2021; DTIC, 2023). South Africa's automotive manufacturing industry is at risk due to its reliance on export markets, such as Europe, where internal combustion vehicles are being phased out over the next ten years – making a transition to NEV manufacturing a priority.

Within manufacturing, a higher degree of electrical engineering and mechatronic skills will be required, particularly in the manufacturing of NEV components, due to NEVs relying more on electrical, electronic and electromechanical systems combined with increasing automation and digitalisation compared to traditional internal combustion engine (ICE) vehicles (Ansara and Davids, 2021; Moshikaro-Amani, 2024). The automotive industry is already facing skills gaps in ICT and digital literacy, which are increasingly important not just for EVs but for modern, increasingly automated and digitised vehicles (merSETA, 2022; NAACAM, 2023). Semi-skilled occupations, such as assemblers who previously worked primarily with mechanical components, would need to be upskilled in electromechanical assembly, and welders would need to upskill to work with lightweight metals and materials. There is concern that the transition to EV manufacturing will result in increased automation, putting semi-skilled jobs at risk (Ansara and Davids 2021; Moshikaro-Amani, 2024).

While some key informants (2024) have expressed that ICE vehicles will still be dominant on South African roads over the next 15 to 20 years, the EV White Paper

and MerSETA flag the need to also upskill professionals in aftermarket services, such as mechanics where the skillset is dominated by work on internal combustion engines (ICE). In terms of the shifting knowledge requirements for NEV maintenance, most petrol internal combustion engine-related skills and knowledge are no longer needed in battery electric vehicles (BEVs) and hydrogen fuel cell vehicles (HFCVs), with the exception of hybrid vehicles that maintain such an engine. Automotive mechanics need additional competency in ICT and digital areas, particularly computerised diagnostics, and to an extent data communication systems (Ansara and Davids, 2021; Automotive Training Centre, n.d.). Although this stands across the maintenance sector, skills gaps may be more evident in informal maintenance sectors where mechanics lack access to advanced diagnostics tools needed to service modern vehicles (Key informant, 2024).

In addition to these areas of knowledge, mechanics working on electric vehicles including hybrids require additional knowledge and skills in high-voltage electrical theory, safety standards for high voltage, power electronics, EV electronics and an understanding of how different systems connect, such as the interaction between mechanical and electrical systems in the case of hybrid vehicles (Automotive Training Centre, n.d; Electronics Technician Association, n.d.).

The scope of tasks is potentially reduced for automotive mechanics since much of their maintenance work is focused on internal combustion engines and components not present in BEVs and HFCVs. They will work on the tyres, the suspension, the wheels and the hydraulic brake systems of EVs, similar to work on ICE vehicles. In addition, new tasks include fixing components related to the electric motors, drivetrain and charging systems; diagnosing and fixing software faults in the vehicles; fixing new kinds of cooling and regenerative braking systems; and testing and replacing lithium-ion batteries. But this kind of maintenance would occur less frequently (Australian National Careers Institute, n.d.; Automotive Training Centre, n.d.). Due to the decreased maintenance demands of EVs, mechanics and maintenance services are seen as at risk of decline (Moshikaro-Amani, 2024). Hybrid vehicles also require awareness of and the ability to maintain the mechanical and electric systems and how they function together.

While some automotive mechanics will deal with the mechanical parts of EVs and some basic electronic diagnostics, others, if working on the electric components such as electric motors, will become more akin to an automotive electrician, though combined with more advanced ICT skills in addition to mechanical skills. This more hybrid EV technician role, due its advanced ICT, high-voltage and multi-system knowledge, would technically be classified as a more advanced skill level compared to the intermediate skill level of the ICE automotive mechanic or electrician.

Appendix 2: Master Action–Criteria Mapping Table

☑ = strong fit ⚠ = partial fit ✕ = weak/long-term fit

Action	F	S	I	C	P	Q	Selected as a priority
Governance, data and coordination							
National Just Transition Dashboard	☑	☑	⚠	☑	☑	⚠	☑
Develop scenarios for skills uncertainty	☑	⚠	⚠	☑	☑	✕	✕
Coordinate funding mechanisms for Just Transition	⚠	☑	⚠	☑	☑	✕	⚠
Align skills and industrial planning with Just Transition	☑	☑	⚠	☑	☑	✕	⚠
Dialogue and inclusion							
Institutionalise structured social dialogue platforms	☑	⚠	☑	☑	☑	✕	⚠
Inclusion mechanisms for marginalised groups	⚠	⚠	☑	☑	☑	✕	⚠
Community engagement							
Just Transition public knowledge platforms	☑	⚠	☑	⚠	⚠	☑	✕
CET colleges as community training hubs	☑	⚠	☑	☑	☑	☑	☑
CET green programmes (resilience, agroecology, renewables)	☑	⚠	☑	☑	☑	☑	☑

Occupational shifts and sectoral alignment							
Map emerging/at-risk occupations (coal, auto, rural)	☑	☑	☑	☑	☑	✗	☑
Map emerging climate adaptation/care occupations	⚠	⚠	☑	☑	⚠	✗	☑
Integrate climate-smart agriculture/agroecology into extension training (V)	⚠	☑	☑	☑	☑	✗	⚠
Solar-specific occupational profiles and accreditation (V)	☑	☑	☑	☑	☑	☑	☑
Targeted education and training							
Map Just Transition content gaps across key occupational streams	☑	⚠	⚠	☑	☑	✗	✗
Integrate Just Transition into existing occupational curricula	☑	☑	⚠	☑	☑	✗	⚠
Strengthen educator and trainer capacity	⚠	☑	☑	☑	☑	✗	☑
Work-integrated learning (WIL)							
Quantify WIL placements needed	☑	☑	☑	☑	☑	☑	☑
Expand structured workplace learning partnerships	☑	☑	☑	☑	☑	☑	☑
RPL mechanisms							
Develop Just-Transition -aligned RPL access and credit mechanisms	☑	⚠	☑	☑	☑	✗	⚠
Just Transition career guide handbook	☑	⚠	☑	☑	☑	☑	☑

Create community RPL validation centres	☑	⚠	☑	☑	⚠	☑	☑
Education-to-work pathways							
Map Just Transition learning pathways (multi-entry/exit)	☑	☑	☑	☑	☑	✗	☑
NPMS/NCAP – mainstream green pathways	☑	☑	☑	☑	☑	☑	☑
Strengthen articulation of short courses → full quals	⚠	⚠	☑	☑	⚠	✗	✗
Case-study-derived: Solar							
Reskilling pathways for coal workers (V)	☑	☑	☑	☑	☑	☑	☑
Fast track solar construction jobs (V)	☑	☑	☑	☑	☑	☑	☑
Develop new skills programmes for installers, recyclers, auditors (V)	☑	☑	☑	☑	☑	⚠	☑
Case-study-derived: Industrial hemp							
Mine land rehab using hemp (V)	⚠	⚠	☑	☑	☑	⚠	⚠
PPP hemp processing hubs (V)	✗	⚠	☑	☑	☑	✗	✗
Biofuel/bioproduct hemp curricula (V)	⚠	⚠	⚠	☑	☑	✗	✗
Case-study-derived: Climate and care							
Expand EPWP/CWP into climate-care jobs (V)	☑	☑	☑	☑	☑	☑	☑
Accredited climate-care occupational pathways (V)	⚠	⚠	☑	☑	⚠	✗	⚠

Public recognition campaigns for unpaid care work (V)	☑	⚠	☑	⚠	⚠	☑	⚠
Case-study-derived: MSMEs							
MSME incubation linked to Just Transition (Nkangala/RES4Africa model) (V)	☑	⚠	☑	☑	☑	☑	☑
Link MSME training to finance (JET Funding Platform, ESD) (V)	⚠	☑	☑	☑	☑	⚠	☑
Build municipal capacity to support MSMEs (V)	⚠	⚠	☑	☑	☑	✕	⚠
Economic modelling derived							
Integrate SATIMGE modelling into occupational intelligence systems	☑	☑	⚠	☑	☑	⚠	✕
Map geospatial labour market shifts	☑	☑	☑	☑	☑	⚠	☑
Establish skills development zones (SDZs) in Just Transition hotspots	⚠	☑	☑	☑	☑	✕	✕
Scale retraining for projected growth sectors (solar PV, EVs, AI/automation)	☑	☑	☑	☑	☑	⚠	☑
Prioritise reskilling pathways for at-risk coal workers	☑	☑	☑	☑	☑	☑	☑
Invest in anticipatory training systems (prevent 2040–2045 bottlenecks)	⚠	☑	☑	☑	☑	✕	✕
Develop targeted pathways for women and youth	☑	☑	☑	☑	☑	☑	☑
Align social protection with Just Transition pathways	⚠	☑	☑	☑	☑	✕	✕
Integrate SATIMGE modelling into occupational intelligence systems	☑	☑	⚠	☑	☑	⚠	✕
Map geospatial labour market shifts	☑	☑	☑	☑	☑	⚠	☑
Establish skills development zones (SDZs) in Just Transition hotspots	⚠	☑	☑	☑	☑	✕	✕

Scale retraining for projected growth sectors (solar PV, EVs, AI/automation)	☑	☑	☑	☑	☑	⚠️	✔
Prioritise reskilling pathways for at-risk coal workers	☑	☑	☑	☑	☑	☑	✔
Invest in anticipatory training systems (prevent 2040–2045 bottlenecks)	⚠️	☑	☑	☑	☑	✖	⏳
Develop targeted pathways for women and youth	☑	☑	☑	☑	☑	☑	✔

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