Accelerate the just transition through skills research:

Access and pathways into emerging streams of work

30 October 2024

Learning Pathways in the Context of a Just Energy Transition

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What is a learning pathway?

Objective

- To investigate the nature of learning pathways at intermediate level within the energy sector to illuminate:

  - ✓ *The multi entry and exit models for the emerging sectors.*
  - ✓ *Occupational progression - key jobs and how they are connected in a value chain.*
  - ✓ *Educational progression and how qualifications and training opportunities are articulated to allow seamless progression*
  - ✓ *And an attempt to understand the 'real' transitions people are making as an important lens in constructing the nature of the learning pathways.*

Sectors covered

Electric Vehicles

Solar

Wind

Battery storage

Energy efficiency

Methodology

Back-casting to determine growth demand targets for the energy transition and identify pathways to reach these targets.

Mapping of existing full and part qualifications related to selected sectors relating to JET in South Africa.

Gathering case studies and real-life lessons - learning pathway stories.

Learning pathway mapping - constructing the options, feeder jobs and bridging into higher skills or workplace training as well as potential routes to specialisations, an overall multiple entry and exit model was developed.

Plotting the key pathway elements - The main enablers and constraints for intermediate level learning pathways were identified.

Interventions to facilitate a multi-entry, multi-exit learning pathways model

Findings

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Emerging Insights on Pathways into Sustainable Energy Sectors

- Across all sectors, certain educational and experiential mechanisms allow individuals to transition into intermediate-level roles.
- These pathways generally share common modes of access:
  1. **Formal qualifications**
     - TVET Colleges and Higher Education Institutions (HEIs) provide foundational qualifications, although outdated curricula and access is an issue.
     - Many intermediate roles are accessed through short, sector-specific courses or part-qualifications. These courses provide immediate access to the job market but often limit vertical progression unless followed by further qualifications.
  2. **Work-based learning** is a critical enabler across all sectors. On-the-job training and apprenticeship programs allow workers to gain hands-on experience alongside their formal training.
  3. **Informal learning** is a common pathway in sectors with rapid technological changes where formal qualifications may not yet be aligned with new industry needs.

Emerging Insights on Pathways that Do Not Exist or Are Underdeveloped in the Sustainable Energy Sectors

There are significant gaps in pathways across the examined sectors, particularly concerning vertical progression and entry points for emerging technologies.

1. **Vertical Progression Challenges**: A critical issue across all sectors is the difficulty in moving from intermediate roles to advanced technical or managerial positions.
2. **Lack of Inclusivity in Learning Pathways**: Pathways for upskilling and entry into intermediate-level jobs like *Solar Installers* or *Wind Turbine Technicians* are often absent, leading to a significant skills gap in these communities
3. **Recognition of Prior Learning (RPL):** Individuals with experience in related fields (e.g., general electricians transitioning to solar PV installation) can leverage RPL to fast-track their entry into intermediate roles. However, this mechanism is underutilized due to limited access and poorly structured assessment processes
4. **Missing Pathways for Sustainability and Circular Economy Roles.** There are few training programs for intermediate-level jobs in the circular economy, such as *Battery Recycling Technicians* or *Solar Panel Decommissioning Technicians*. The absence of pathways for these roles limits the sustainability impact of renewable energy technologies

What Needs to Be Done to Strengthen Pathways

Strengthening Multi-Entry, Multi-Exit Learning Models: Encouraging learners to build on foundational education, acquire real-world experience, and then continue their learning and development through progressive qualifications that integrate both theoretical and practical skills.

The creation of **clear pathways for vertical progression** is critical.

Expanding and formalising RPL to enable those with practical, informal experience to gain formal recognition and certification

Improve Policy and Institutional Coordination: A national strategy that links qualifications with real job market demands, including in fast-evolving sectors, will be crucial

Phase One: Rapid Mapping of the JET Landscape

Equipping South Africa's workforce for a just transition through up-skilling and reskilling: Identification of target occupations and skills levels

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Skills For an equitable, just and sustainable Future

Objective

- The overall objective of this project is to improve employment prospects of the South African workforce, through the identification and implementation of transition pathways in selected province's economic sectors and occupations that are particularly affected by the South African Just Energy Transition plans and commitments.
  - ❖ To do this the project will identify specific occupations and skills levels to be targeted through up-skilling and reskilling interventions.

Project Location

Mpumalanga: Historically South Africa's coal hub, Mpumalanga faces job risks with the shift to renewable energy. This region is central for targeted reskilling and upskilling efforts, ensuring a just transition for coal sector workers and surrounding communities.

Eastern Cape: Known for its automotive industry, the Eastern Cape must adapt to the global shift towards New Energy Vehicles (NEVs). This transition offers opportunities for job creation and economic resilience, making it a priority for upskilling to support sustainable growth in clean energy sectors.

Sectors of focus

Electricity

Renewables (solar and wind)

Coal

Transmission

Energy efficiency

Green hydrogen

Electric vehicles

Road to rail

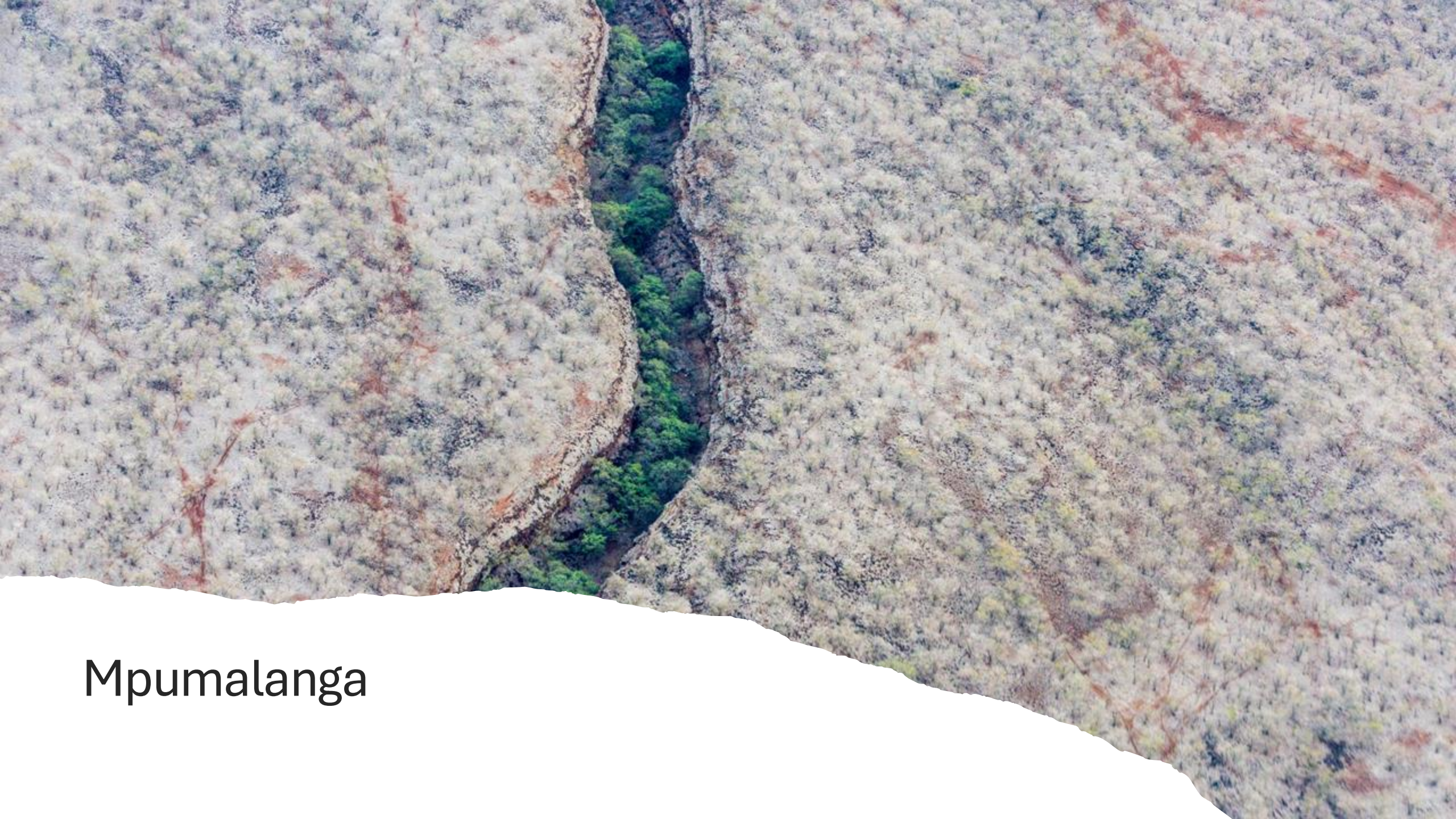
Critical minerals

Research methodology

There are two main phases to the research:

PART ONE: A rapid mapping of sectors, value chains, occupations, and target populations.

PART TWO: An in-depth analysis of skills implications



Mpumalanga

Labour market Context

Focus area		Status
Electricity	Coal	• Majority of coal activity in the country clustered in Mpumalanga • One coal power plant closed down and more planned over the longer term and export market may continue for a longer period of time and some plant may be repowered or repurposed • Restoring and repurposing coal mining land • Concern about how to support workers to transition out of coal
	Renewables	• Has 1 REDZ • Market size for grid connected plant estimated at R21bn and R3.2bn for small scale, plus R2bn for storage • Attractive as there is transmission capacity and existing infrastructure
	Transmission	• Transmission infrastructure has availability
	Energy Efficiency	• Many energy intensive industries and need for energy efficiency measures • SMME development in this area proposed
Green hydrogen		• 3 major projects in the province, with Sasol being the most advanced but which are highly unlikely to be operational at scale within the 5 year time frame
Electric vehicles		• No vehicle manufacturing in the province but some conversion of ICE vehicles to electric • Market for electric tourism and transport vehicles • Charging infrastructure will be required – conversion of current liquid fuel facilities
Road to Rail		• Largest rail infrastructure in the country but availability and condition sub-optimal • Coal is the largest commodity but also includes chrome and ferrochrome, forestry products, chemicals and liquid fuels and grains as exports and manganese ore, lime products and chemicals as imports
Critical minerals		• 13 mines and trading companies in the Province • Projected expansion given the global need for critical minerals

JET skills impact - Coal

Category	Intermediate Occupations

Occupations at Risk	**Low skilled elementary occupations:**
	• Mining and quarrying labourers
	• Helpers and cleaners in offices
	Elementary coal mining occupations including:
	• Miners and quarry workers
	• Agricultural or industrial machinery mechanics and fitters
	• Motor vehicle mechanics and fitters
	• Shot-firers and blasters
	• Sheet-metal workers
	Intermediate level occupations:
	• Technicians
	  ○ Electrical engineering technicians
	  ○ Electronics and telecommunications technicians
	  ○ Safety, health, and quality inspectors
	• Plant and machine operators
	  ○ Mining plant operators
	  ○ Heavy-truck and lorry drivers
	  ○ Crane, hoist and related plant operators
	  ○ Lifting truck operators
	  ○ Earthmoving and related plant operators
	• Clerk
	• Sales and services
	And related occupations in local communities such as:
	• Shop assistants
	• Small business owners
	• Taxi operators

Reskilling potential (window)	Next 10 years to prepare for closures Focus should be on elementary occupations outlined above as well as related occupations.
Occupations in Transition	Upskilling to include impacts of 4IR
Occupations Emerging	• Decommissioning occupations for both power plant and mines - general labourers, artisans etc • Repurposing - linked to renewables and battery installations (see occupations below) • Renewable energy jobs (see occupations below) • Transmission upgrades/construction (see occupations below) • Agri-processing

Priority Occupations	
Wind Energy	Electricians, Riggers, Wind Turbine Technicians
Solar PV	Electricians, Electrical Assistants, Energy Installers, PV Mounters, PV Technicians
Battery Storage	Electricians, Battery Assembly Technicians


Eastern
Cape

Labour market Context

Road to Rail: new rail corridor in planning (DTIC) between Gauteng and Eastern Cape – High Capacity Rail Corridor to service automotive industry

Motor industry – JET-IP labour market transition most pronounced in **at-risk automotive industry and potential transition to NEVs** – approx. 100 000 jobs at risk (dependency on EU and export markets) - component and regional automotive hubs (EC) affected ; component manufacturing for ICE vehicles - can shift to manufacturing of components for NEVs; some progress towards NEVs but slow and uncertain ; charging stations (starting to roll out - 13 stations in the province)

Wind – EC has 18 wind farms, one currently being developed; more potential for development; stalled due to transmission grid limitations

Green Hydrogen - still nacent, but emerging in Coega IDZ – Green Ammonia Plant (Hive Hydrogen)– Green H2 industrial cluster / ENERTRAG's zero carbon methanol - used to fuel ships, provide renewable energy for industry

Solar – private rooftop limited; industrial rooftop solar on the rise at SDZs - new solar projects planned (Parsons Power Park / Thesi Langa pty.); PV manufacturing potential, but industries are currently small (Seraphim factory manufacturing solar modules in EL IDZs) ; at least 2 mini-grids in development

JET Skills Impact - EV Maintenance and Aftercare

Category	Intermediate Occupations
Occupations at Risk	• Automotive Engine Fitter • Diesel Electrical Fitter • Diesel Fitter-mechanic • Diesel Fuel Injection Technician • Diesel Injector • Engine Management and Fuel Injection System Mechanic • Field Service Technician (Diesel) • Fuel Injection Mechanic • Truck Mechanic
Occupations in Transition	• Mechanical Engineering Technician • Vehicle Mechanic • Service Mechanic • Automotive Mechanic • Motor Mechanic • Motorcycle and Scooter Mechanic • Motorcycle / Motorbike Technician • Scooter Mechanic • Automatic Transmission Mechanic • Automotive Mechanician • Mechanical Service Advisor (Vehicles) • Garage Mechanic • Auto Engineer / Mechanic • Brake and Clutch Mechanic / Repairer / Fitter

REFLECTION

1. How can we design learning pathways that genuinely promote inclusivity and access for all communities, ensuring that marginalized groups have clear, equitable entry points into the green economy?
2. Given the evolving skills landscape, what collaborative strategies can we adopt to align education and training programs with the unique demands of emerging green roles and technologies?
3. What roles and responsibilities do each of us—as industry players, policymakers, and government representatives—hold in closing training gaps and advancing structured career development for emerging green occupations?

THANK YOU

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