Ameliorating the Consequences of Coal Job Destruction:
A Just Transition Policy Matrix Approach

By Haroon Bhorat, Jabulile Monnakgotla, Ayesha Sayed, and Françios Steenkamp

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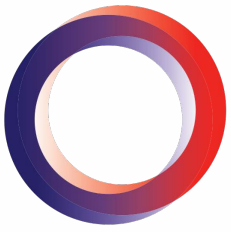

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Abstract

A key element to ensuring that South Africa's energy transition is just is to provide workers the necessary support that would enable them to absorb the negative shock of the transition. Key to this is the design and formulation of an adequate social protection policy package for these workers. This paper advances a method and approach, namely the *just transition policy matrix* approach, which can be applied in designing a comprehensive social protection policy package for coal mining industry workers. This approach uses micro data to inform the formulation of a basket of policy responses that are tailored to the respective needs of different groupings of at-risk workers. Using five policy scenarios, representing alternative policy orientations, we cost a set of social protection policy packages for coal workers. The five costing scenarios exhibit total costs that range between R2.2 and R10.3 billion – equivalent to between 0.6 and 2.7 percent of South Africa's current social protection budget. The temporary income support policy drives total costs across all five costing scenarios, with education and training support policy being the next most costly policy component. We contend that existing social protection policies, such as the Unemployment Insurance Fund and labour activation programmes, such as the Temporary Employer-Employee Relief Scheme, can be leveraged, both in terms of financial and administrative resources, to support a social protection policy package for displaced workers. However, when hypothetically applied to coal workers, funding gaps requiring additional fiscal resources remain. When we hypothetically apply these policies to our five costing scenarios, we observe that the application of these policies to displaced workers would entail a substantial rise in social protection expenditure.

Keywords

Just Transition, social protection, coal mining, South Africa, social insurance

JEL codes

H55, J65, J68

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

South Africa is going through the early stages of an energy transition away from a coal-orientated energy consumption and production pathway. Coal's footprint within the South African economy is disproportionately large, with coal accounting for 82 percent of South Africa's energy supply and 82 percent of its CO_2 emissions in 2023 (Ritchie & Rosado, 2020; Ritchie et al., 2020).[1] However, given the Paris Agreement commitments, South Africa is on a pathway toward decarbonisation. Over and above explicit decarbonisation efforts, the coming decades should witness the closure of the majority of South Africa's aging coal power plant fleet – with close to a third of the country's coal energy capacity set to recede by 2030.

The decline in demand for coal will adversely impact on the coal mining industry in particular but, also more broadly, the regional economies where the broader coal value chain is concentrated. The impending decline in the demand for coal is driven by contraction in both domestic and export demand. The former due to the aforementioned closure of coal power plants, and the latter due to global decarbonisation efforts and thus the declining use of coal as a utility scale power source. The reduced demand for coal will bring about the closure and scaling down of coal mining activity, which in turn will lead to the retrenchment of coal mining industry workers. Indeed, these workers, and their households, face unemployment and the loss of livelihood.

However, the just transition is about addressing the dual responsibilities of reducing greenhouse gas (GHG) emissions as well as addressing the socio-economic challenges of those affected by the transition. A key element to ensuring that South Africa's energy transition is *just* is to provide workers with the necessary support that would enable them to absorb the negative shock of the transition and provide the means to sustaining their livelihoods and remain attached to the labour market. Key to this is the design and formulation of an adequate social protection policy package for coal mining industry workers.

In this paper, we advance a method and approach for designing a comprehensive social protection policy package for coal mining industry workers.[2] Detailing lessons learnt from past coal mine closure episodes, Cunningham & Schmillen (2018) note that the effectiveness of social protection policy to mitigate the potential social and labour impacts of job loss are best achieved when the needs and

[1] The corresponding estimates for the global economy stand at 35 and 41 percent, respectively (Ritchie & Rosado, 2020; Ritchie et al, 2020).

[2] Due to measurement limitations using available microdata, we restrict our analysis to workers in the coal mining industry. Bhorat et al. (2024a; 2025) provide detailed discussions on these data limitations. However, we note that several industries across the coal value chain – as detailed in Makgetla & Patel (2021) – are likely to be adversely impacted, and that we exclude these industries from our analysis. Nevertheless, subject to acquiring the necessary microdata that would allow for the requisite measurement and profiling of workers from these industries, our approach can be replicated for these worker groupings.

preferences of different groups of workers are understood and accounted for in the policy design. As such, using what we term the *just transition policy matrix approach*, we determine an appropriate basket of policy responses tailored to the respective needs of different groupings of at-risk coal mining industry workers. We then cost this basket of social protection policy responses for a set of potential employment loss scenarios set to occur by 2030 – the period aligned with the first major phase of coal power plant closure. Further, to show how different policy objectives and orientations shape the costing of social protection, we formulate and cost several social protection policy package scenarios. Based on this costing, which points to the funding requirements of this social protection policy package, we investigate the potential financing options available to the policymaker and measure funding gaps associated with the basket of social protection policies.

A key contribution to emerge from our *just transition policy matrix approach* is that we develop a basket of social protection policy responses tailored to different worker groups where the policy allocation is shaped by the analysis of microdata. It is evident when reading the energy transition literature that there is a set of common social protection policy responses available to the policymaker, including: temporary income support packages; early retirement packages; mobility assistance; and education and re-training programmes (World Bank Group, 2018; Patel et al., 2020; Krawchenko et al., 2021). However, what is often missing is the microdata-based analysis that informs the allocation of these responses, and which is based on the characteristics – and hence needs – of the at-risk workers.

This research is also motivated by the need to provide timely input into the formulation of social protection policy linked to the just energy transition in South Africa. Krawchenko et al. (2021) note that in many energy transition episodes, it is often the case that social protection policies designed to assist and protect workers are reactive and only emerge after the fact. Often these policies only emerge after workers, and the communities to which they belong, have already been adversely affected by coal mine closure. This study attempts to contribute proactively to the formulation of social protection policy for South Africa's just transition.

The paper is structured as follows: In Section 2, we provide an overview of South Africa's social protection system architecture. The purpose is to determine whether the existing structures of the social protection system can be leveraged to assist displaced coal mining industry workers. Section 3 details our methodological approach – the *just transition policy matrix approach* – to formulating and costing a basket of social protection policy responses designed to assist displaced workers. In Section 4 we provide a comparative costing of several just transition social protection costing scenarios. Section 5 evaluates potential financing options needed to support a just transition social protection policy package and identifies potential funding gaps. Section 6 concludes.

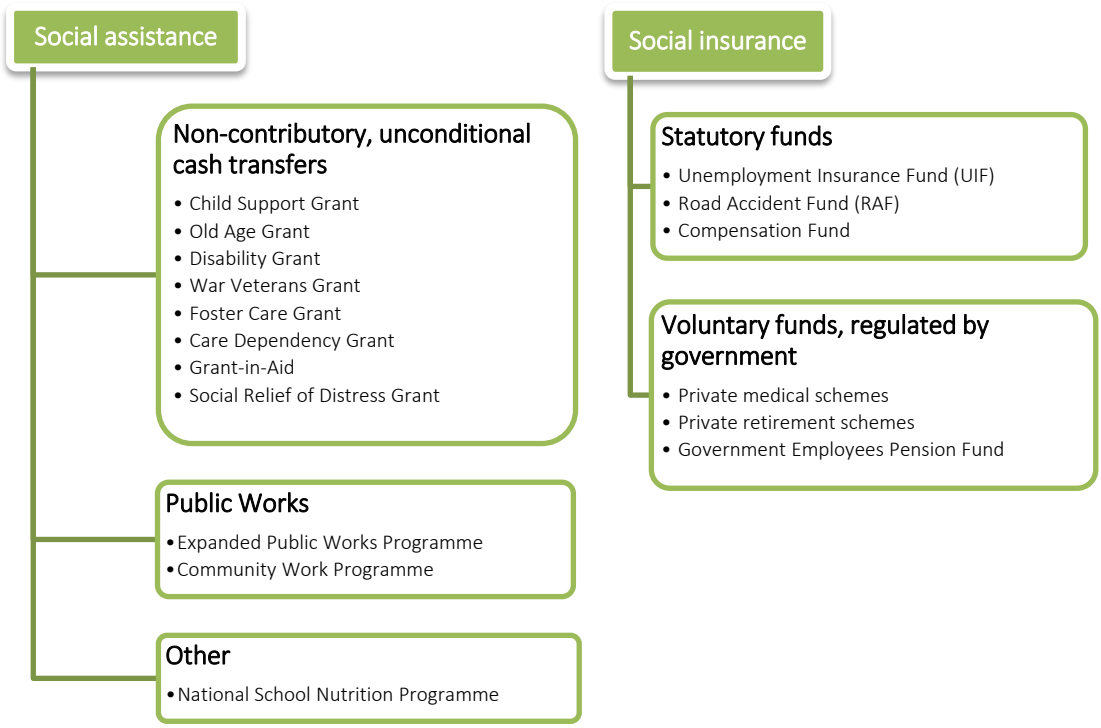
2 SOUTH AFRICA'S SOCIAL PROTECTION ARCHITECTURE

In this section, we examine South Africa's social protection architecture in the context of the just energy transition. In particular, we are interested in whether existing social protection policies can be leveraged to support displaced coal workers. Understanding whether existing social protection policies can be leveraged for these workers becomes important when we discuss the potential funding sources (see Section 5) for our basket of social protection policies (see Section 4).

2.1 An overview of South Africa's social protection system

Given its level of economic development, South Africa has a relatively well-developed social protection system (Bhorat et al., 2024b; Oosthuizen, 2021). South Africa's social protection system consists of two pillars: first, social assistance, and second, social insurance (see Figure 1). The social assistance pillar is primarily tax-financed, unconditional, and mostly means-tested cash transfers that support vulnerable groups (Bhorat et al., 2024b; Gronbach, 2022; Moore & Seekings, 2019). The main objective of the social assistance policy interventions is to protect the poor using cash, or in-kind, transfers through social grants, public works programmes, and school feeding schemes (Bhorat et al., 2024b).

Figure 1: The South African Social Protection System



Source: Bhorat et al. (2024b)

The social insurance pillar consists of contributory programmes where beneficiaries receive benefits or services based on their contributions to an insurance scheme. These contributory schemes are either mandatory or voluntary. The main objective of social insurance is to protect individuals from

adverse events (Bhorat et al., 2024b). There are three main statutory social insurance funds. Two of these programmes are linked to the labour market, namely the Unemployment Insurance Fund (UIF) and the Compensation Fund (Oosthuizen, 2021). Voluntary funds are divided into those that protect against health risks and those that provide retirement benefits (Oosthuizen, 2021). These include private medical aid schemes, private retirement schemes, and the Government Employees Pension Fund (Bhorat et al., 2024b).

In the context of the just transition, understanding the roles of both the social assistance and social insurance pillars becomes critical. Stanley et al. (2018) argue that a key aspect to developing a support package for displaced workers is to leverage off existing social protection measures and instruments and supplement where necessary. A large number of coal mining industry workers are facing retrenchment and possibly structural unemployment, and these existing social protection programmes may serve as a buffer against sudden income loss and long-term economic exclusion. In the remainder of this section, we discuss these social protection programmes in greater detail and examine whether these programmes can be leveraged to support displaced coal mining industry workers.

2.2 Social assistance

We now focus on the social assistance pillar, which consists of various forms of social grants, public works programmes, and other national social assistance programmes. We focus on the former two as the latter covers the National School Nutrition Programme, which is unlikely to be relevant to displaced coal mining industry workers.

2.2.1 Social grants

South Africa has a comprehensive social assistance system aimed at alleviating poverty and supporting vulnerable groups (Oosthuizen, 2021). Grants are important in supporting households at the bottom of the income distribution that typically lack access to labour income and thus the means to support themselves (Development Policy Research Unit [DPRU], 2024). Social grants are by far the largest component of South Africa's social protection system in terms of coverage (Oosthuizen, 2021). However, coverage for the working-age population is limited (Bhorat et al., 2024b). The system includes eight key grant programmes – Table 1 provides an overview of these eight social grant programmes, outlining their objectives, grant amounts, and the grant amount as a percentage of the median coal mining industry worker's income. All these grants are administered by the Department of Social Development (DSD) through the South African Social Security Agency (SASSA).[3] Social assistance in South Africa is subject to means testing, which implies that SASSA evaluates the

[3] SASSA is an agency of the Department of Social Development and is responsible for the implementation of the social protection policies developed by the department, in particular social assistance programmes.

income and assets of the individual applying for a social grant to determine whether the individual means are below a stipulated amount (SASSA, 2020).

Table 1: Overview of South Africa's social grants (as of April 2025)

Grant	Objective or aim	Value (Rands)	Grant value/coal median wage (%)	Government department/ agency
Old Age	"Aims to financially assist older residents when they can't work anymore."	R2 310 – R2 330	6.4 – 6.5	Department of Social Development – SASSA
Child Support	"Aimed at lower-income households to assist parents with the costs of the basic needs of their child. The grant isn't meant to replace other income but intended to bridge the gap in the cost of living."	R560	1.6	
Foster Care	"Is to temporarily protect and nurture a child in need of care and protection by providing a safe and healthy environment with positive support until the child can be reunified with his or her family of origin."	R1 250	3.5	
Child Support (top-up)	"Is to increase the CSG amount for Orphans and children heading and living in Child Headed Household CHH – introduces a higher value for CSG (50 percent on top of base Child Support Grant."	R840	2.3	
Disability	"Aims to provide financial assistance to individuals that have a physical or mental disability which makes you unfit to work and unable to support yourself."	R2 310	6.4	
Social Relief of Distress (COVID-19)	"Is a temporary provision of assistance intended for persons in such dire material need that they are unable to meet their or their families' most basic needs."	R370	1.0	
Care Dependency	"Provide income support to parent, guardian, foster parent, or custodian of a child under the age of 18 who requires full-time care due to a mental or physical handicap. The child must need and have permanent home care."	R2 310	6.4	
War Veterans[4]	"Provides financial assistance to individuals who served in the Second World War (1939–1945) or the Korean War (1950–1953)."	R2 310	6.4	

Source: Western Cape Government (n.d.); SASSA (2025)

It is important to note that the grant system is not designed to provide income support to workers displaced by adverse economic shocks. Rather, the grant system is a set of redistribution programmes aimed at providing poverty relief to highly vulnerable groups. In fact, there is empirical evidence

[4] The War Veterans Grant (WVG) is a very specific grant that is targeted at individuals who served in the Second World War (1939–1945) or the Korean War (1950–1953) (SASSA, 2020). As of 2019, only 67 individuals were receiving this grant (SASSA, 2020). This grant has little applicability to displaced coal mining industry workers.

showing that the grant system has been effective in reducing poverty in South Africa (Woolard et al., 2011). The Disability Grant provides financial assistance for working-age individuals who have a physical or mental disability that renders them unfit to work.[5] The Child Support Grant (CSG), the Foster Care Grant (FCG), and the Care Dependency Grant (CDG) are designed to assist children in poor households. The Child Support Grant, currently valued at R560 per child per month, is targeted at low-income households to assist parents with the costs of the basic needs of their children. The grant is given to the primary caregiver of the child where they have to meet the means test requirements to qualify.[6] The FCG, currently valued at R1 250 per child per month, is targeted at children in need of protection and placed in foster care (SASSA, 2020). The CDG, currently valued at R2 310 per child per month, is given to caregivers of children under the age of 18 years who are severely disabled and require permanent care and support services (SASSA, 2020). The Old Age Grant (OAG) is a non-contributory means-tested pension that aims to provide financial assistance to financially vulnerable older persons.

Given that the grant system is designed to provide poverty relief to the vulnerable, it is, for the most part, unlikely that displaced coal mining industry workers will be able to access these grants. For instance, it is unlikely that coal mining industry workers, who meet the age requirement (60) for the OAG would apply for the grant. This is because it is most likely that these workers would already have access to a provident or pension fund and be able to, for instance, purchase a life annuity. We know from Bhorat et al. (2024a) that the majority of coal mining industry workers (83 percent) contribute to a pension or provident fund, or something similar. Coal mining industry workers are less likely to be eligible for the grant when taking the means test into account – an applicant cannot earn more than R86 280 per annum (R7 190 per month) if single, or R172 560 (R14 380) if married. Bhorat et al. (2025) show that coal mining industry workers above the age of 60 earn a mean monthly wage of approximately R50 000, which is well above the means test cut-off. Similarly, in the case if the Child Support Grant – where the applicant cannot earn more than R86 280 per annum (R7 190 per month) if single, or R172 560 (R14 380) if married – Bhorat et al. (2025) show that the mean (median) monthly wage for coal mining industry workers is R46 804 (R35 871). In the case of the Social Relief of Distress (SRD) grant, an individual is not eligible if the individual is contributing to, or eligible for, Unemployment

[5] In the event of a disabling injury, it is unlikely that a coal mining industry worker would need to access this grant since belonging to a pension or provident fund, such as the Mineworkers Provident Fund, affords a coal mineworker access to disability benefits (Mineworkers Provident Fund, 2025).

[6] To qualify, the recipient must not earn more than R63 600 per annum (or R5 300 per month) if single, or more than R127 200 per annum (R10 600 per month) if married.

Insurance Fund (UIF) benefits.[7] Taking into account this eligibility criteria, displaced coal mining industry workers are not likely to qualify for the R370 monthly grant since approximately 99 percent of workers in the industry contribute to the UIF (Bhorat et al., 2024a).

Finally, in the instance where a coal mining industry worker is retrenched and the worker's income falls to zero, and the worker becomes eligible for certain grants, the grant payout is unlikely to provide sufficient support to the average coal mining industry worker. In column 4 of Table 1 we show the grant value as a share of the median monthly wage of coal mining industry workers. As noted in Bhorat et al. (2025), coal mining industry workers are relatively well paid, with mean and median wage levels well in excess of those earnt in other industries and sectors. Thus, even if a coal mining industry worker is eligible for a grant that is applicable, the grant payouts are a fraction of what the median worker is used to living off. For example, the SRD grant, which is a form of temporary income assistance, is only one percent of the monthly wage received by the median coal mining industry worker.

2.2.2 Public works programmes

Public works programmes are central to the National Development Plan's (NDP) aim to counter poverty and increase employment (Donaldson, 2022). Three key priorities were highlighted in the development of the programmes: first, raising employment though faster economic growth; second, improving the quality of education, skills development, and innovation; and third, building the capacity of the state to play a developmental and transformative role (Donaldson, 2022). The public employment programmes (PEPs) are short- to medium-term interventions that are intended to address seasonal and cyclical challenges (Department of Public Works and Infrastructure [DPWI], 2022).

There are two public employment programmes, the Expanded Public Works Programme (EPWP) and the Community Works Programme (CWP), and they form a crucial part of the South African social protection system (South African Cities Network [SACN], 2022). Measured on a full-time equivalent basis, the EPWP and CWP contributed 2.6 percent of total employment and just over R12 billion in wages in the 2019/20 period (Donaldson, 2022). Table 2 provides an overview of these public employment programmes, outlining their objectives, grant amounts, administering departments, and the grant amount as a percentage of the median coal mining industry worker's income.

[7] The Social Relief of Distress (SRD) grant is intended to be temporary assistance for individuals in dire need who are unable to meet their or families' basic needs (SASSA, 2020). This grant is available to South African citizens, refugees, asylum seekers, and special permit holders aged 18 to 60 who have no income, do not receive any other social grants, are not contributing to or eligible UIF benefits, and have no other form of financial support (SRD-SASSA, n.d.).

Table 2: Overview of South Africa's public works programmes

Programmes	Objective or aim	Value (Rands)	Public work minimum wage/coal median wage (%)	Government department
Expanded Public Works Programme (EPWP)	"The EPWP is a medium- to long-term government-funded programme that promotes the use of labour-intensive methods to create work opportunities, services and assets; thus contributing towards poverty alleviation and reduction of unemployment thereby contributing to development. All spheres of government and SOE [state-owned enterprises] are expected to implement the programme."	Minimum wage R2 500	7.0	Department of Public Works and Infrastructure
Community Works Programme (CWP)	"The CWP is an innovative offering from the government to provide a job safety net for unemployed people of working age. It provides a bridging opportunity for unemployed youth and others who are actively looking for employment opportunities. The programme provides them with extra cash to support them in their search for full-time or part-time employment. Programme participants do community work thereby contributing to improvements that benefit all community members."	Minimum wage R2 500	7.0	Department of Cooperative Governance Traditional Affairs

Source: DPWI (2022); SACN (2022)

Expanded Public Works Programme

The EPWP is a government initiative aimed at offering temporary employment to unemployed South Africans, while simultaneously providing a basic level of social protection (SACN, 2022). By engaging participants in productive, and often labour-intensive work, the programme seeks to achieve three main goals: short-term income support; improved employability through skills development; and the delivery of public infrastructure and services (SACN, 2022). An important feature of the EPWP is its emphasis on labour-intensive approaches, which are designed to increase job creation (SACN, 2022). Importantly, the programme also prioritises providing participants with practical work experience and training, helping to improve their chances of securing formal employment once the project comes to completion (SACN, 2022).

The EPWP is implemented in all nine provinces, across all their constituent district and local municipalities, and is focused on four sectors: infrastructure; environment and culture; social; and non-state (SACN, 2022). The DPWI facilitates the EPWP and provides national policy leadership and direction on the design, framework, and implementation of the programme (SACN, 2022). As of March 2025, the minimum wage for the EPWP stands at R15.16 per hour (or approximately R2 500 per

month) (Department of Employment and Labour [DoEL], 2025). In stark contrast, in 2022, the mean monthly wage in the coal mining sector was R35 871, which is more than 14 times higher than the EPWP minimum wage (Bhorat et al, 2025). Thus, the take-up of EPWP job opportunities by displaced coal mining industry workers, while offering a form of temporary income support, would be accompanied by a substantial reduction in earnings (i.e. the minimum wage is only seven percent of the median coal mineworker wage).

The Training Framework for Phase 5 of the EPWP provides a blueprint for training within the programme. The aim of this framework is to provide guidance on the implementation of the EPWP training component (DPWI, 2024c). EPWP training comprises structured learning interventions, which will advance the employability of EPWP participants to engage meaningfully in the economy (DPWI, 2024c). These training interventions include both accredited/non-accredited skills development initiatives and capacity building initiatives (DPWI, 2024c). Accredited programmes consist of skills courses or artisan training, while non-accredited initiatives often focus on capacity building, such as financial literacy or job readiness (DPWI, 2024c).

In terms of funding, there is no budget allocation by the National Treasury to support EPWP training initiatives (DPWI, 2024c). However, training is financed through a combination of external sources and contributions from the budgets of public bodies (DPWI, 2024c). Potential external funding sources include: the National Skills Fund (NSF); grants for accredited training from Sector Education and Training Authorities (SETAs); bursaries from Technical and Vocational Education and Training (TVET) colleges and universities; support from the Department of Basic Education for adult education and training; and contributions from private providers or non-state actors for capacity building programmes (DPWI, 2024). In addition, public bodies are required to allocate between two and five percent of their annual project budgets to support EPWP training (DPWI, 2024c). In the context of the just transition, it is worth considering whether funds from the EPWP training initiatives could be leveraged to support education and training initiatives for displaced coal mining industry workers.

Community Works Programme

The CWP is designed to support those who are unemployed, or underemployed, by providing them with a specific number of paid workdays each month (South African Government, n.d.). Rather than serving as a substitute for full-time employment, the CWP is intended to supplement existing livelihoods and offer a basic level of income support, particularly for individuals unable to meet their daily needs (South African Government, n.d.). The programme targets adults of working age who are actively seeking job opportunities, including unemployed youth. This programme pays the minimum wage with the aim of sustaining them as they pursue full- or part-time work elsewhere (South African Government, n.d.). Consistent with the EPWP, as of March 2025, the CWP minimum wage stood at R15.16 per hour (or approximately R2 500 per month) (DoEL, 2025).

Participants in the CWP engage in work that directly benefits their communities, such as supporting schools, caring for vulnerable individuals, or maintaining public spaces (South African Government, n.d.). The programme is organised at the local level, typically covering two or more municipal wards per site (South African Government, n.d.). A fully operational site is designed to accommodate up to 1 000 participants, each working two days per week, or about eight days a month, totalling approximately 100 days annually (South African Government, n.d.).

Both the EPWP and the CWP provide a source of temporary employment and income. They thus have the potential to offer a displaced coal mining industry worker with a work opportunity and a source of income. However, the level of remuneration is significantly out of line with what coal mining industry workers are accustomed to receiving – the minimum wage equates to seven percent of the median coal mining industry wage – and the question is whether these reduced wages levels are sufficient to sustain the livelihoods that coal mining industry workers are accustomed to living.

2.3 Social insurance – statutory funds

The social insurance pillar aims to insure workers against the risk of income loss and includes the following statutory funds: the Unemployment Insurance Fund (UIF); the Labour Activation Programme (LAP) funded by the UIF; the Compensation Fund; and the Road Accident Fund (RAF). During the 2023/24 period, aggregate assets held by the UIF, Compensation Fund and RAF stood at R287.3 billion, with each comprising 52.7, 41.2 and 6.1 percent of these total funds, respectively (National Treasury, 2025). The UIF offers short-term financial relief to eligible unemployed workers. Complementing and funded by the UIF, the Labour Activation Programme constitutes active labour market interventions, which aim to address poverty and unemployment through initiatives such as training for the unemployed, support for distressed companies, and enterprise development. The Compensation Fund provides compensation to workers who are injured or contract diseases in the course of their employment. The RAF serves a distinct role by offering compensation to individuals injured in road traffic accidents.[8] In this section, we do not discuss the RAF as it is not a social insurance programme designed specifically to address labour market challenges. Table 3 provides an overview of these statutory fund programmes, outlining their objectives, grant amounts, and the grant amount as a percentage of the median coal mining industry worker's income.

[8] The RAF offers financial support to all users of South African roads who suffer loss or injury due to the negligent operation of motor vehicles within the country's borders (RAF, n.d.).

Table 3: Overview of South Africa's employment programmes

Programmes	Objective or aim	Amount (Rands)	UIF programme/ coal median wage (%)	Government department
Unemployment Insurance Fund (UIF)	"The UIF has been established to provide short term relief to workers, subject to certain conditions leading to unemployment. For instance, unemployment due to: retrenchment, retirement, dismissal, illness leave, maternity, adoption leave, reduced working time, and relief to the dependents of the deceased contributors."	Depending on the number of credit days and salary, with a maximum payout of R6 639 per month.	18.5 (of the maximum payout)	Department of Employment and Labour
Labour Activation Programme	"Labour Activation Programme (LAP) provides active labour market programmes through the funding of poverty alleviation schemes by achieving the following strategic objectives: (i) training of the unemployed; (ii) assisting companies in distress; (iii) enterprise development; and (iv) partnering with other government departments, state owned entities, DFIs, NGOs and the private sector."	R1 050 – R16 359.28 per month depending on the programme.	2.9 – 45.6	Unemployment Insurance Fund, Department of Employment and Labour
Compensation Fund	"Provide compensation for disablement caused by occupational injuries or diseases sustained or contracted by employees, or for death resulting from injuries or diseases, and provide for matters connected therewith".	Earnings-based compensation of R5 844 per month or lump sum or maximum benefit of R65 158.	16.3 (monthly payout)	Compensation Fund, Department of Health
Road Accident Fund (RAF)	"The RAF is only obliged to pay compensation if an injury or death is due to the negligent or other wrongful act of the driver or owner of a motor vehicle, or his or her employee in the performance of the employee's duties as an employee."	Varies	–	Road Accident Fund, Department of Transport

Source: Compensation Fund (n.d.); RAF (n.d.); UIF (2023); DoEL (n.d.)

2.3.1 Unemployment Insurance Fund

The UIF is an integral part of the South African social protection system and is designed to serve as a safety net for vulnerable workers, as well as to foster job creation and retention in the formal private sector (UIF, 2023; Bhorat & Tseng, 2011). The UIF provides social insurance benefits to vulnerable workers contributing to the fund (UIF, 2023). It provides short-term relief to workers, subject to certain conditions, when they become unemployed; or unable to work because of illness, maternity leave, as well as to provide relief to the dependants of deceased contributors (UIF, n.d.-a). However, the fund does not apply to certain groups of workers: workers employed for less than 24 hours a month; workers employed in learnerships; public servants; foreigners working on contract; and workers who only earn a commission (UIF, n.d.-a). In addition, voluntary unemployment due to resignation or disciplinary dismissals disqualifies employees from claiming UIF benefits (Bhorat & Tseng, 2011).

The mandate of the UIF is stated in the Unemployment Insurance Act of 2001 (Act No. 63 of 2001) as amended (UIF, 2023). The UIF was established in terms of Section 4(1) of the Act. The Act empowers the UIF to register all employers and employees in South Africa and pay those who qualify for unemployment insurance benefits. The Unemployment Contributions Act of 2002 (Act No. 4 of 2002) empowers the South African Revenue Service Commissioner and the UIF Commissioner to collect monthly unemployment insurance contributions (UIF, 2023).

The UIF has extended its social insurance support during extreme adverse economic shocks. During the 2020 COVID-19 pandemic, the UIF established the Temporary Employer/Employee Relief Scheme, or the COVID-19 TERS, which contributed money towards the support of workers, businesses, and the economy (UIF, 2023). The COVID-19 TERS provided support to businesses that were in distress due to the pandemic and provided benefits to employees who were temporarily unable to work at normal capacity due to the lockdown (UIF, 2023). The UIF also extended support to employees impacted by the July 2021 riots through the Workers Affected by Business Unrest (WABU) temporary financial relief scheme (UIF, 2023).

During the 2022/23 period, there were 1.2 million UIF claims. Of these claims, 85.7 percent were for unemployment benefits, 3.2 percent were for reduced work time, 8.7 percent were for maternity benefits, 1.3 percent for illness, and 1.2 percent for other benefits (UIF, 2023). The total number of approved claims was 983 606, which translates to an 84.1 percent approval rate (UIF, 2023).

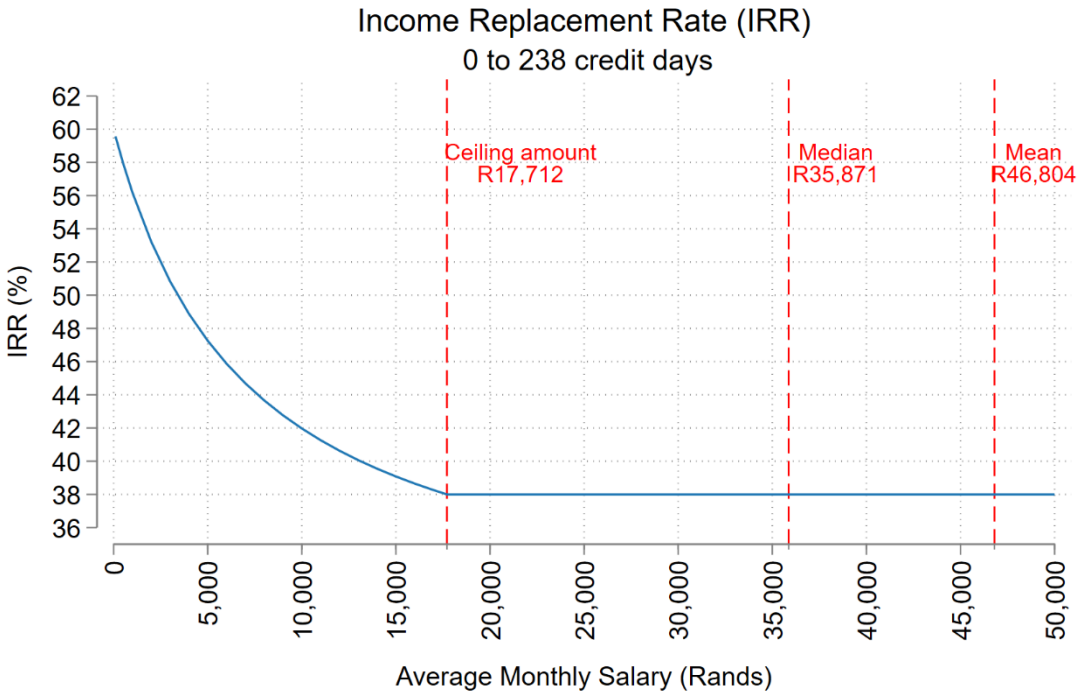
UIF benefits are determined using a sliding scale, with the Income Replacement Rate (IRR) ranging from 38 to 60 percent (UIF, n.d.-b). Employees accumulate one credit day for every four days worked, this is approximately eight credit days per month, or 91.25 credit days per year (UIF, n.d.-b). UIF benefits can be paid to a maximum of 365 credit days within a four-year cycle, assuming the employee contributed throughout and did not make any claims (UIF, n.d.-b). For 0 to 238 credit days, benefits

are paid according to a sliding scale (38 – 60 percent). Thereafter, for 239 to 365 credit days, benefits are paid at a flat rate of 20 percent (UIF, n.d.-b).

Figure 2 illustrates the income replacement rate for UIF recipients for 0 to 238 credit days, and average monthly salary amounts. There is an inverse relationship between the IRR and income – that is, low-income earners receive higher IRR compared to high-income earners. The first vertical line represents the ceiling threshold amount of R17 712, which means that for average monthly salaries beyond the threshold, the IRR remains flat at 38 percent. Put differently, UIF payments are capped beyond this threshold, where higher earnings do not translate into higher benefit payouts.

To put this into perspective, let us consider a case where an employee earns R 5 000 per month and has worked for one year. The IRR for an income of R5 000 is 47.26 percent. To calculate the UIF daily benefit, we first estimate the employee's daily income (R60 000 per year divided by 365 days) and then apply the 47.26 percent IRR. This means that the daily UIF benefit would be R77.68 (or R2 330 per month). An employee who contributed for one year, would have accrued 60 credit days for every four days worked in a year. Therefore, the employee would receive R4 661 as a total UIF payout.

Figure 2: UIF Income Replacement Rate (IRR) by average monthly salary



Source: Own calculations, UIF (2024)

In the case of coal miners, in 2022, the mean monthly income was R46 804 (see third vertical line), while the median wage was R35 871 (see second vertical line) (Bhorat et al., 2025). During the same period, coal miners had an average job tenure of 7.5 years, while the median tenure was five years

(own calculations, Statistics South Africa, 2022). This means that, on average, coal miners would have accrued the maximum credit days of 238 for UIF benefits. Therefore, their daily UIF benefit would be R221 at 38 percent IRR. As noted above, for average monthly salaries beyond the ceiling threshold, the IRR remains flat at 38 percent. Thus, the maximum UIF monthly payout would be R6 638. This translates to 14.2 percent of the mean wage and 18.5 percent of the median wage of a coal miner. Therefore, in the case of the energy transition, the average coal mineworker who is eligible for UIF benefits would – at most – receive benefits that are no more than a fifth of their average monthly wage.

2.3.2 Labour activation programme

The UIF Board identified the opportunity to participate in the labour market programme supported by the Unemployment Insurance Act (DoEL, n.d.). In accordance with Section 48 of the Unemployment Insurance Act, the UIF Board recommended to the Minister of Labour the implementation of Labour Activation Programme (LAP). The policy interventions within the LAP are intended to support unemployed UIF beneficiaries by helping them re-enter the labour market (DoEL, n.d.). The main objective of the LAP is to strengthen the UIF's contribution to poverty alleviation and employment restoration across the country (DoEL, n.d.). The LAP achieves its objective through the following key areas: Training of the unemployed; supporting companies in distress; enterprise development and business skills; and partnerships with various stakeholders (DoEL, n.d.).

During the 2022/23 period, the Labour Activation Programme's total expenditure was R347.1 million, increasing to R676.1 million in the 2023/24 period (National Treasury, 2024). Furthermore, the number of beneficiaries participating in employment programmes through the LAP was 8 457 in 2022/23, decreasing to 5 302 in 2023/24 (National Treasury, 2024).

The Employability Scheme (formerly known as the Training of the Unemployed scheme [TOU]) focuses on providing skills development programmes for unemployed UIF beneficiaries and young individuals looking for employment (DoEL, n.d.; UIF, 2023). These programmes are designed to give participants the opportunity to either (re)enter the labour market or establish their own businesses (DoEL, n.d.). By offering training in various sectors, the initiative aims to enhance employability and support entrepreneurial ventures, helping individuals gain the skills necessary for sustained employment or successful enterprise creation (DoEL, n.d.). The training programmes are delivered in partnership with several key institutions such as state-owned and public entities, SETAs, TVETs, and private sector training providers (DoEL, n.d.).

The Temporary Employer/Employee Relief Scheme (formerly known as the Training Lay-Off scheme) is a temporary suspension of work for employees who face the risk of retrenchment due to financial

distress in the company of their employ (DoEL, n.d.; UIF, 2023). [9] This programme allows employees to participate in training while temporarily foregoing their regular wages, in exchange for a training allowance during the course of the training (DoEL, n.d.). For employers, the scheme offers the opportunity to reduce payroll expenses for a specified period while improving the skills of their workforce at a lower cost to the company (DoEL, n.d.). This arrangement provides a "recovery period" for companies, helping them navigate through economic challenges while investing in employee development (DoEL, n.d.). The scheme is based on an agreement between employers and workers, ensuring that employment will continue after the training period and that the employer will cover all social security contributions during the training phase (DoEL, n.d.). Typically, the TERS intervention may not exceed 12 months, with the UIF paying 75 percent of the employees' basic salaries, which may not exceed the threshold earnings as determined by the Minister in terms of the section 6(3) of the Basic Conditions of Employment Act (UIF, 2023). As of April 2025, the earnings threshold was R21 812.37 per month (or R261 748 per year) (DoEL, 2025b). Therefore, the maximum amount a worker may receive under this scheme is R16 359.28 per month (basic salary of R21 812.37 X 75 percent), which equates to approximately 45 percent of the median coal mining industry wage. Training for this programme is facilitated through the relevant SETAs (DoEL, n.d.).

The UIF and Productivity South Africa (PSA) entered into a three-year funding agreement (2013– 2015) (DoEL, n.d.). Under this agreement, the UIF committed to providing financial support to the PSA in stages to fund the Turnaround Solution Programme (DoEL, n.d.). The primary objectives of this programme are to prevent job losses; to manage the retrenchment process in cases where job losses are inevitable; and to help reintegrate retrenched individuals into the mainstream economy wherever possible (DoEL, n.d.). The Turnaround Solutions Programme works by identifying jobs that can be saved and implementing strategies to facilitate this outcome (DoEL, n.d.). This initiative is primarily targeted at companies, typically with around 50 or more employees, that are facing the threat of large-scale retrenchments (DoEL, n.d.). Assistance provided through this programme is available to companies across all sectors of the economy and in all provinces, aiming to mitigate the impact of retrenchments and help save employment where feasible.

The enterprise development programmes offer business skills training to both unemployed UIF beneficiaries and young people who are seeking employment (DoEL, n.d.). The primary goal of this programme is to support South Africa's national effort to develop entrepreneurs, thereby contributing to the country's economic growth and the creation of new employment opportunities (DoEL, n.d.). One of the key objectives of the programme is to promote self-employment, which reduces reliance

[9] This TERS should not be mistaken for the COVID-19 TERS, which is a separate scheme administered directly through the UIF (CCMA, 2023).

on government-led job creation initiatives (DoEL, n.d.). By empowering individuals to start and manage their own businesses, the programme seeks to foster greater economic independence (DoEL, n.d.). Additionally, it aims to build more sustainable communities by addressing the dominance of foreign traders in local markets, helping to stimulate local economies and support local entrepreneurs (DoEL, n.d.).

The just transition framework aims to reskill and retrain coal mining industry workers facing retrenchment. The LAPs could play a critical role in providing this support. According to Bhorat et al. (2024a), 99 percent of coal mining industry workers contributed to the UIF in 2019, indicating that almost all coal mineworkers would be eligible to participate in these programmes, particularly the youth. As such, these programmes could be leveraged to support retrenched coal mining industry workers by providing them with the requisite skills needed to transition into jobs in other industries.

2.3.3 Compensation Fund

The Compensation Fund provides compensation, or financial assistance, to employees who are injured or contract diseases during the course of their work (Compensation Fund, n.d.). It also covers cases were an employee dies due to work-related incidents (Compensation Fund, n.d.). This fund is administered by the Department of Health under the Compensation for Occupational Injuries and Diseases Act (Act No. 130 of 1993) (COIDA), which outlines provisions for these compensations and related procedures (Compensation Fund, n.d.). The fund generates its revenue from levies paid by employers, and this consists of annual assessments paid by registered employers on a basis of a percentage, or fixed rate, of the annual earnings of their employees (Compensation Fund, n.d.).

The Compensation Fund provides financial support to three main groups of individuals (CCMA, 2022): First, it covers employees who suffer temporary disabilities, with support available for up to 24 months (CCMA, 2022); Second, it assists workers who are permanently disabled. Those assessed with a disability of 30 percent or less receive a once-off lump sum, whereas those with more severe disabilities are granted an ongoing monthly pension (CCMA, 2022). Lastly, the fund extends benefits to the dependants of employees who lose their lives due to occupational injuries or diseases (CCMA, 2022).

Furthermore, due to the risks associated with the mining industry, certain diseases are covered under the Occupational Diseases in Mines and Works Act (Act No. 73 of 1973) (ODIMWA) (National Treasury, n.d.). In the case were mining related diseases are not covered by this Act, the COIDA applies and with Rand Mutual Assurance being responsible for all diseases listed under the Act (National Treasury, n.d.).

In addition to these benefits, the fund also pays for reasonable medical treatment related to work-related injuries (CCMA, 2022). These medical expenses are typically covered for up to two years. However, coverage may be extended if continued treatment is likely to improve the employee's condition or reduce the severity of the disability (CCMA, 2022). In 2024, earnings-based compensation

was set at R5 844 per month, and lump sum or maximum benefit was set at R65 158 (Department of Health, 2024).

2.4 Social insurance – voluntary funds

Two types of voluntary funds are part of the social insurance pillar, namely, retirement funds, and medical aid schemes.

2.4.1 Retirement Fund

South Africa has a well-developed private occupational retirement fund system, but this system does not cover the majority of the population (Pillay & Fedderke, 2022). Voluntary pension funds are made up of the following: private sector pension and provident funds; public sector pension; and individual funds (Department of Social Development [DSD], 2012). All retirement funds are registered in South Africa and are governed by the South African Pension Funds Act (Act 24 of 1956).

Private Pension Funds

Private pension funds constitute occupational pensions, which are privately managed, fully or partially funded, with mandatory participation set up by employers for the benefit of their employees (DSD, 2012). The funds are based on contributions from employees and employers, taking account of the recommendations of independent actuaries (Exxaro, 2021). Bargaining unit employees pay a contribution of eight percent with the employer's contribution of 15 percent, while all other members generally pay a contribution of seven percent with the employer's contribution (Exxaro, 2021). In 2017, there were 2 982 privately administered retirement funds in South Africa, with 6.3 million contributing members and 376 752 pensioners in receipt of regular payments (Financial Sector Conduct Authority [FSCA], 2017).

Mineworkers Provident Fund

The Mineworkers Provident Fund (MWPF) is a defined contribution fund, which currently operates within the gold, coal and platinum sectors (MWPF, n.d.-a). The majority of coal mineworkers are covered by the privately administered MWPF, but there are other miners in Exxaro Provident Fund, Sasol Coal Provident Fund, and Sentinel Retirement Fund. In 2017, there were 175 650 total members covered in the Mineworkers Provident Fund, with more than R30 billion in assets (FSCA, 2017). During the same period, contributions received by the fund totalled R1.6 billion (MWPF, 2017). The MWPF benefit structure offers members with disability, death, income for life product, retirement, housing loan surety, and dismissal/retrenchment benefits (MWPF, n.d.-b). Every month the employer deducts a percentage of the employee's salary as a contribution to the fund. For example, the coal mining industry workers' salary contribution ranges between 14.5 and 16.5 percent towards retirement and 6 percent towards risks (MWPF, 2025).

The Mineworkers Provident Fund indicates that the retirement age for underground workers is anytime from the age of 55 until 63, and the retirement age for all other workers is 65 (MWPF, n.d.-c). In addition, members can retire in the case of disability due to accident or illness, assuming that the Trustees are satisfied that the members cannot perform their duties or any duties in the category of work in which they are employed (MWFP, n.d.-c). Members will receive the following upon retirement, where applicable: total credit in the vested component; total credit in the savings component; total retirement contributions; total voluntary contributions, if any; total transferred portion, if any; and net investment return (MWPF, n.d.-c). In the case of retirement, members can take their vested component and savings component in cash and use their retirement component to buy an annuity. If the total of their retirement component is R247 500 or less, the full amount may be taken as a taxable cash lump sum (MWFP, n.d.-c). Furthermore, members can use their vested, savings, and retirement components to buy an annuity (MWPF, 2025). That is, the member may receive up to one-third of the total value as a cash lump sum, while the remaining two-thirds must be used to buy an annuity (MWPF, 2025).

In terms of disability, members who are permanently unfit to continue in or resume employment receive a disability benefit (MWPF, n.d.-e). The members' fund will be credited from: total retirement contributions; total voluntary contributions; total transferred portion; and net investment return (MWPF, 2025). In the case of disability, members can either use their entire fund credit to buy an annuity in the fund, or the member may receive up to one-third of the total value as a cash lump sum, while the remaining two-thirds must be used to buy a compulsory annuity (MWPF, 2025). If the total of their non-vested component is R247 500 or less, the full amount may be taken as a taxable cash lump sum (MWFP, 2025).

In terms of retrenchment, the benefit payable is identical to the benefits payable on dismissal or resignation (MWPF, n.d.-d). The members' fund credit will be the: total retirement contributions; total voluntary contributions; total transferred portion; and net investment return (MWPF, n.d.). The member may elect to take the benefit in cash or transfer the tax-free benefit either to an approved provident fund, retirement annuity, or preservation provident Fund (MWPF, n.d.-d). There are four payment options in case of retrenchment. First, the member may take full fund credit in cash, but it will attract tax on a portion of the money (MWPF, n.d.-d). Second, the member may transfer their full benefit tax free to an approved provident fund or retirement annuity fund (MWPF, n.d.-d). Third, the member may transfer their benefit to an approved preservation fund. However, this is subject to the requirements of the revenue authorities (MWPF, n.d.-d). Last, the rules of the Fund encourage members to defer their benefits until retirement age, or resignation, dismissal and retrenchment (MWPF, n.d.-d).

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Public Pension Fund

Public sector pension funds consist of contributions from civil servants and some large public entities pension schemes (DSD, 2012). The Government Employees Pension Fund (GEPF) is a defined benefit fund that manages pensions and related benefits on behalf of government employees in South Africa (GEPF, n.d.). The fund benefit structure offers members with withdrawal, retirement, ill-health or disability and death benefits (GEPF, n.d.). In 2017, there were 1.3 million total members covered in the GEFP, with more than R1.8 trillion in assets (FSCA, 2017).

2.4.2 Medical Schemes

Access to healthcare is provided either through the public health system, funded by general taxes, or through contributory medical schemes that cover employees in both the public and private sectors (International Labour Organization [ILO], 2016). Contributory medical schemes provide coverage for nearly four million individuals, with four million contributing members and 4.955 million dependants (Oosthuizen, 2021). In 2022, over two-thirds of coal mineworkers in the formal sector contributed to medical aid (69 percent), this is substantially higher than the national average of 37.81 percent (own calculations, Statistics SA, 2022). This highlights that coal mineworkers enjoy better access to benefits compared to the broader South African labour market. In the case of the just transition, coal miners might forgo higher wages and also risk losing access to medical aid if their employment status changes.

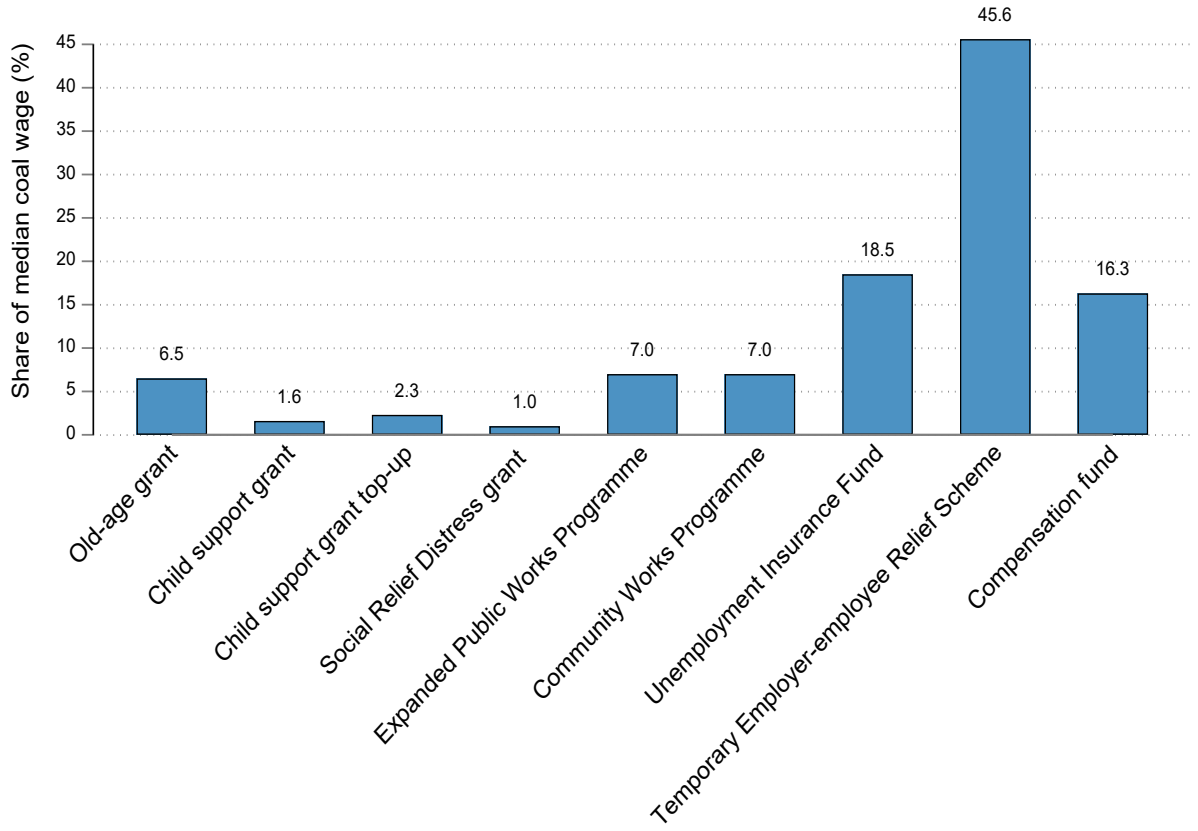
2.5 Applicability of existing social protection to displaced coal mining industry workers

Stanley et al. (2018) advise that when devising a social protection support package for displaced workers, it is prudent to leverage existing social protection measures and supplement where necessary. Through this lens we have examined South Africa's social protection system, and the following key takeaways emerge: First, the grant system is going to be of limited use to displaced coal mining industry workers. The grant system is geared toward providing social assistance to individuals living in poverty or on the border thereof, while coal mining industry workers are well renumerated workers in the formal economy. As summarised in Figure 3, the value of the SRD grant is approximately one percent of the median coal wage, while the EPWP and the CWP wages are only 7 percent. These payments are insufficient to sustain the livelihood of the average coal mining industry worker. However, there is potential to access funding from the education and training component of the EPWP, which may supplement an education and training intervention for displaced workers.

Second, given available funding and existing administrative infrastructure, the social insurance pillar of South Africa's social protection system, with some additional fiscal support, is best placed to assist displaced coal mining industry workers. The UIF is designed to provide short-term relief to workers, such as those retrenched from their jobs. Given UIF coverage and job tenure levels among coal workers, it is likely that displaced coal workers will be eligible for the maximum UIF monthly payout

for the period of a year. However, given the relatively high average wage for these workers, these benefits are likely to be insufficient. For example, our estimates above suggest that the maximum UIF payout translates to 18.5 percent of the median coal mining industry wage. This suggests that a just transition social protection policy approach could leverage the existing UIF administrative infrastructure managed by the Department of Employment and Labour. However, such an approach would require additional funding to provide a social insurance payout that would help maintain the livelihoods of the displaced coal mining industry workers.

Figure 3: Grant/programme support as a share of median coal wage



Source: Western Cape Government (n.d.); SASSA (2025); DPWI (2022); SACN (2022); Compensation Fund (n.d.); RAF (n.d.); UIF (2023); DoEL (n.d.)

Similarly, there is potential to leverage the existing administrative infrastructure associated with the Labour Activation Programme, such as the Temporary Employer-Employee Relief Scheme. This policy becomes important when considering efforts to provide education and training support to displaced coal workers. In the case of the just energy transition, the policy would need to operate outside its initial design since it may be the case that the coal mining firm is closing down (rather than seeking financial reprieve), in which case there is no job for the worker to return to. Nevertheless, the upskilling objective of the policy, in its original form, could be achieved by providing education and training to displaced workers to equip them to transition to an alternative job opportunity elsewhere

in the economy. From a funding perspective, if the original design of the policy is applied, then, given that the median coal mining wage is well above the wage threshold for the policy, displaced workers would receive around R16 359 per month, which equates to approximately 45 percent of the median wage for the industry. This suggests that a just energy transition policy that leverages off the Temporary Employer-Employee Relief Scheme, for example, would need to be adapted and receive supplementary financing to cover the income support gap, be it in full or part.

Third, as shown in Bhorat et al. (2024a), pension coverage among coal mining industry workers is high, which means that there is an existing source of funding to support the older cohort of displaced workers. In previous energy transition episodes in other countries, early retirement packages are a key policy tool used to assist displaced coal workers (Krawchenko & Gordon, 2021). Given pension coverage in the South Africa coal mining industry, it is well positioned to adopt such a policy. However, the use of early retirement packages would require additional funding to cover the gap in contributions incurred by workers who retire before their due retirement age.

3 METHODOLOGY: JUST TRANSITION POLICY MATRIX APPROACH

In the section, we detail a methodological approach used for costing social protection policy for the just transition, namely the *just transition policy matrix approach*. This approach is a microdata-based method that informs the allocation of social protection policy responses according to the characteristics – and hence needs – of displaced workers. In this paper, we apply the *just transition policy matrix approach* to coal mining industry workers, which is a grouping of workers that are set to be adversely affected by South Africa's energy transition.

3.1 The policy matrix – identifying policy relevant cohorts of *at-risk* workers

The policy matrix divides the coal mining industry workforce along two dimensions. First, coal workers are divided into three skill groupings – skilled, semi-skilled and unskilled. Second, coal workers are divided into three age groups – 15–34 (youth), 35–54 (middle age) and 55 plus (near retirement). We thus divide the coal mining industry workforce into nine groupings, or cohorts, within our policy matrix. We divide workers into skill–age groupings because these characteristics provide information relevant for policy design for workers facing the adverse employment affects arising from the energy transition. Skill level speaks to a worker's ability to successfully navigate the labour market and transition to a new job. It can be assumed that skilled workers are more easily able to find a new job opportunity, whereas semi-skilled and unskilled workers would require some degree of skills intervention to make the transition to a new job in a new industry viable. Age is important because it speaks to the length of time that a worker is expected to remain in the labour force. Those nearing retirement would require a different intervention to those at the early stages of their working life.

Thus, we use skill and age information to determine a nuanced policy response for each of the nine worker cohorts in our policy matrix. The policy matrix is depicted in Figure 4.

Figure 4: A just transition employee policy matrix

Occupation profile		**Age profile**		
		Youth 15–34	Middle age 35–54	Near retirement 55+
Skilled	Managers; Professionals; Technicians and Associate Professionals			
Semi-skilled	Clerical support workers; Service and sales workers; Craft and related trade occupations; Plant and machine operators and assemblers			
Unskilled	Elementary occupations			

A worker's skill grouping is determined by his/her occupation. The Quarterly Labour Force Survey (QLFS) – our relevant microdata dataset – categorises workers into occupations at the 4-digit level of the South African Standard Classification of Occupations (SASCO). These 4-digit unit groups (of which there are 440 categories) are aggregated into nine 1-digit major groups.[10] These major occupation groups are then assigned a skill category based on the Department of Higher Education and Training's (DHET) guidelines for the Organising Framework of Occupation (OFO) (DHET, 2013). In Table 4 we show how these major occupation groups are assigned skill levels, which we use to categorise workers into the three skill groupings.

We use worker age data from the QLFS to divide workers into three age groupings. The *near retirement* age group captures workers aged 55 years of age and older. We use the 55-year cut-off because the Mineworkers Provident Fund (discussed in Section 2.4.1) indicates that the retirement age for underground workers is anytime from the age of 55 until 63, and the retirement age for all other workers is 65 (Mineworkers Provident Fund, 2025). Thus, workers who are 55 years of age and above would be up for an early retirement intervention. The *youth* age group captures workers between the ages of 15 and 34 – as defined by Statistics South Africa. These workers (should they be underground workers) have between 20 and 40 years of their working life ahead of them and would thus require a

[10] For example, drawing on the four 2023 QLFS datasets, we find that nine percent of coal mining industry workers fall under the 4-digit unit group, *Mining plant operators* (SASCO 8111). These workers then fall under the 1-digit major group *Plant and machine operator*.

policy intervention that affords them the opportunity to remain in the workforce for the foreseeable future.

Table 4: Linking occupation categories to skill levels

Skill level	Occupation major group
Skilled	• Managers • Professionals • Technicians and associate professionals
Semi-skilled	• Clerical support workers • Service and sales workers • Craft and related trade occupations • Plant and machine operators and assemblers
Unskilled	• Elementary occupations

Source: Adapted from Figure 2 in DHET (2013)

We use worker age data from the QLFS to divide workers into three age groupings. The *near retirement* age group captures workers aged 55 years of age and older. We use the 55-year cut-off because the Mineworkers Provident Fund (discussed in Section 2.4.1) indicates that the retirement age for underground workers is anytime from the age of 55 until 63, and the retirement age for all other workers is 65 (Mineworkers Provident Fund, 2025). Thus, workers who are 55 years of age and above would be up for an early retirement intervention. The *youth* age group captures workers between the ages of 15 and 34 – as defined by Statistics South Africa. These workers (should they be underground workers) have between 20 and 40 years of their working life ahead of them and would thus require a policy intervention that affords them the opportunity to remain in the workforce for the foreseeable future.

3.2 Quantifying the coal mining industry workforce

To cost a social protection policy package, we need to generate a per worker costing for each policy response for each age-skill cohort within the policy matrix and then multiply these costs out by the number of workers within each cohort. This necessitates the quantification of the coal mining industry workforce along the age and skill (occupation) dimensions.

As detailed in Bhorat et al. (2024a) and Bhorat et al. (2025), quantifying the coal mining industry workforce, using publicly available data, is not without its challenges.[11] Statistics South Africa conducts a firm-level Mining Census every four years and provides an employment estimate for the coal mining industry of 95 863 workers in 2022. This employment estimate includes mine employees, capital

[11] We restrict our analysis to workers in the coal mining industry and thus exclude workers from the broader coal value chain due to challenges in measuring the number and profile workers in these other industries using existing microdata. Bhorat et al. (2024a) and Bhorat et al. (2025) provide more detail on these measurement issues associated with existing microdata.

employees, employees employed through sub-contractors, and employees employed through labour brokers. While these data may provide a relatively accurate point estimate for employment in the industry, these data do not provide worker-level information, particularly that relating to worker characteristics, such as age and occupation. Bhorat et al. (2025) draw on employer-employee level administrative tax data. They show that these data allow for the generation of a point estimate for employment that aligns closely with the summation of mine and capital employees from Statistics South Africa's Mining Census estimates – i.e. these estimates are capturing employment linked to direct employment relationships and exclude employment linked to indirect employment relationships associated with sub-contracting and outsourcing.[12] Further, the administrative tax data, while containing age information for each employee, do not contain information on employee occupation, and thus one cannot divide the workforce along the age-skill (occupation) dimensions.

Therefore, drawing on Bhorat et al. (2024a) and Bhorat et al. (2025), we quantify the coal mining industry workforce using data from Statistics South Africa's Quarterly Labour Force Survey. The QLFS assigns a worker's industry of employment according to the Standard Industrial Classification (SIC) nomenclature. In the case of coal mining industry workers, the appropriate SIC code is *SIC210: Mining of coal and lignite*. Bhorat et al. (2024a) note that the QLFS data are designed to be representative at the 3-digit industry level when estimating labour market statistics at the national level. We thus focus on national-level employment estimates for the coal mining industry.[13] The key advantage in using the QLFS data is that the individual-level data contain information on worker age and occupation, which allows one to segment the workforce along the two dimensions of the policy matrix – this is key to our *just transition policy matrix approach*.[14]

An additional advantage to using the QLFS data is that these data contain worker wage information. Information on earnings is used to inform the costing of certain components of the social protection policy basket. For example, temporary income support can be offered to coal mineworkers that are to be retrenched, and the level of income support can be a percentage of their monthly wages.[15]

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[12] The summation of mine employees and capital employees in the coal mining industry from Statistics South Africa's Mining Census sums to 50 870 employees in 2022. This aligns closely with the corresponding administrative tax data estimate of 53 133 employees receiving an IRP5 (income tax form) from a coal mining industry firm.

[13] It is worth noting that the coal mining industry is concentrated within the Mpumalanga province, and it is thus likely that the adverse employment effects will be concentrated within this regional economy.

[14] The QLFS coal mining industry employment estimate for 2022 stands at 71 851 workers, which lies below the Mining Census estimate of 95 863 (capturing both direct and indirect employment relationships) and above the Administrative tax data estimate of 53 133. We have to balance the precision of the employment point estimate with the need to have information on worker age and occupation, which thus necessitates the use of the QLFS data.

[15] Given concerns associated with the QLFS earnings imputations, documented by Kerr and Wittenberg (2019; 2020), our earnings estimates are revised based on the imputation method applied by Kohler and Bhorat (2023). We use 2023 prices to generate our mean real wage estimates for each policy matrix group.

Therefore, our baseline employment estimates for the coal mining industry are obtained from the QLFS.

3.3 Energy transition scenarios and timing

To cost a social protection policy package for South Africa's energy transition, we require information on, firstly, the phasing of the energy transition, and secondly, how the transition is expected to impact on the labour market. It is the decommissioning of South Africa's aging coal power plant fleet that will precipitate a fall in coal demand, which will result in the closing of coal mines and the retrenchment of coal mineworkers. The phasing of these adverse employment effects and their magnitude is subject to variability. We adopt an approach where, firstly, our energy transition scenario is aligned with South Africa's Just Energy Transition Implementation Plan (JET IP). Secondly, we build in a degree of flexibility into our costing scenarios to take into account variability in the manner in which the transition unfolds.

The first key date for our just transition social protection costing exercise is 2030. This is motivated by the following: First, South Africa's Nationally Determined Contribution (NDC) commits the country to reducing its emissions to within a range of 420 to 350 megatons carbon dioxide equivalent ($MtCo_2$-eq) by 2030. This target is consistent with a fair contribution to the Paris Agreement's long-term temperature goals, where the 420 and 350 Mt targets are consistent with the 2- and 1.5-degree temperature goals, respectively (The Presidency, 2022). Second, it is noted in the JET IP that in the run up to 2030, Eskom is set to retire the Komati, Camden, Hendrina, Grootvlei, and Arnot coal power plants, and by the end of 2030 Tutuka and Kriel will also be closed (The Presidency, 2022). Consequently, the overall capacity of Eskom's coal fleet will reduce from approximately 38.8 gigawatt (GW) in 2021, to 29.3 GW by the end of 2030 (a 32 percent decrease). Given that, on average and in volume terms, domestic sales of coal account for around 82 percent of coal production, of which Eskom accounts for 69 percent, the retirement of these coal plants is set to trigger a substantial reduction in coal demand. This reduced domestic demand for coal is expected to trigger job losses in the coal mining industry, which will be concentrated around the 2030 period. The JET IP predicts job losses to commence as the demand for coal declines over the period 2020 to 2030, with most of the job losses occurring from 2025 onward (The Presidency, 2022:49). Therefore, 2030 becomes a key date as the expected adverse employment effects are likely to cluster around this period, which means that the implementation of a just transition social protection policy package would activate around this time.

The second key date for our social protection costing is 2050. South Africa's NDC aims to reach net zero CO_2 emissions by 2050. By 2050, as currently planned, only the Kusile, Medupi, and Majuba (only one unit) power stations will be operational. Put into context, between 2034 and 2042, approximately 15 GW of coal fleet capacity is set to exit the system (DMRE, 2024). As a result, a key source of domestic coal demand, Eskom's coal fleet, will be reduced substantially. This is likely to lead to further

job losses in the coal mining industry, which would require continued social protection policy interventions.

It is important to note that the manner in which the energy transition will unfold, and the resultant adverse labour market effects, are characterised by a degree of uncertainty. First, the exact phasing of coal power plant closure has been subject to adjustment. Given electricity supply constraints and political-economy considerations, a number of the older power plants have had their decommissioning date shifted outward (Strambo et al., 2024). For example, in the 2019 Integrated Resources Plan, the decommissioning of the final unit at Grootvlei power station was scheduled for 2020 (DMRE, 2019). As per Eskom's 2035 Strategy, this has been shifted out to 2027 (The Presidency, 2022). The more recent 2024 Integrated Resources Plan considers a *delayed shutdown* scenario where the shutdown period for the Kendal, Majuba, Lethabo, Matimba, and Tutuka power plants – all set to retire after 50 years of operation sometime between 2031 and 2042 – are all shifted out by 10 years (DMRE, 2024). Second, the extent to which coal mining jobs decline in response to the declining demand of coal from coal power plants is not clear. For instance, it is possible that export demand may compensate for reduced domestic demand, and thus job losses will be curtailed. It may also be the case that the first coal mine closures are going to be mines characterised by low productivity, labour-intensive production methods, and low reserves, while the latter closures will be mines characterised by high productivity, capital-intensive production methods, and high reserves. In such case, the intensity of the job losses is likely to be higher in the early period relative to the latter period.

Given the difficulty in predicting the magnitude and timing of coal mining job loss resulting from coal power plant closure, we adopt a flexible costing approach that draws on the best available employment loss predictions. Our approach considers how varying employment loss scenarios impact on the costing of the social protection policy package. In particular, we draw on the JET IP estimates, which predict that over the period 2020 to 2030, net job losses resulting from reduced coal demand will lie between 3 000 and 9 000 jobs, with most of the job losses occurring after 2025 (The Presidency, 2022).[16] Assuming a national estimate of around 78 000 coal mine industry workers, this job loss range corresponds with between 5 and 12 percent of the workforce losing their jobs by 2030. To simplify, we consider employment loss scenarios where 5, 10 and 15 percent of the coal mining workforce is retrenched by 2030. Further, given that we do not know the manner in which job losses will occur over time, and for the purpose of simplifying the costing approach, we assume that all predicted job losses occur once-off in 2030. This means that we cost a social protection policy package for this hypothetical once-off retrenchment episode, and all policy benefits commence in 2030.

[16] These employment loss predictions are modelled by the Energy Systems Research Group (ESRG) at the University of Cape Town. They use the SATIMGE modelling framework to generate these estimates, which are in turn used to inform and guide the JET IP (The Presidency, 2022).

3.4 Social protection policy responses – Assumptions and per worker costing

We formulate and cost four policies that comprise our basket of just transition social protection policy responses. These are drawn from past energy transition experiences in other countries and include: mobility assistance in the form of a job relocation grant; a temporary income support grant; education and training support in the form of a skills development grant; and an early retirement package. We detail the assumptions and per worker costing of each policy below.

3.4.1 Mobility assistance

Mobility, or job relocation, assistance has featured as a form of worker support in energy transition plans across a number of countries – including Germany, Poland, Russia and the United States – that have undergone an energy transition episode (Green & Gambhir, 2020; Pollin, 2023). Workers facing retrenchment might be able to find alternative employment opportunities outside the locality of their current employment. This is especially useful in instances where the local labour market is stagnant and/or where the closing coal mine dominates local employment demand, and where employment opportunities are located elsewhere in the country (Cunningham & Schmillen, 2021). Mobility assistance provides support to these workers by covering the costs of moving to a new location.

The cost of this employment service intervention is the summation of a temporary housing allowance and a cost of removal lump sum. This is summarised in equation (1):

$$MA_i^g = TempH_{it}^g + M_i \quad (1)$$

Where the mobility allowance, MA_i^g, for worker i in policy matrix group g is the sum of a temporary housing allowance, $TempH_{it}^g$, for worker i in policy matrix group g and moving cost, M_i, for worker i. The temporary housing allowance, $TempH_{it}^g$ is calculated as a share of the mean monthly wage for worker i falling in policy matrix group g for t periods – as shown in equation (2).

$$TempH_{it}^g = \alpha \bar{Y}_i^g \quad (2)$$

With respect to the temporary housing allowance, $TempH_{it}^g$, the relocating worker is supported with a temporary housing grant. This should afford the worker time to find an appropriate place to live in their new locality and thus ease the financial burden associated with such a move. In terms of costing this component, we calculate this component of the grant value as a share, α, of a worker's income, $\bar{Y}_i^g$ (the real mean wage of workers falling within policy matrix group g within which worker i falls). We base our share (α) upon findings from the most recent Income and Expenditure Survey (IES), which shows that, for the average South African household, approximately a third of total household

expenditure is committed to housing (Statistics South Africa, 2025a: 48).[17] Thus, for each coal mining worker cohort, g, this component of a job relocation grant is based on the average real monthly wage for workers within each cohort, g. We follow Cruywagen et al. (2020) and apply this for one month (or 1/12th of a year if annualised).

The second cost component, M_i, covers the cost of moving for the relocating worker. Here we draw on an estimate from a national moving company, which provides a range of average cost estimates for houses of varying sizes. We use the estimate pertaining to a three-bedroom house of R15 500, which is the mid-point of the removal cost range provided by the moving company – between R11 000 and R20 000. We use the estimate pertaining to a three-bedroom house as this aligns best with the mean household size for coal mining industry workers of 3.4 (Bhorat et al., 2024a). This cost is applied evenly to workers across the various worker cohorts and does not vary by income.

The other costing consideration regards who to allocate the mobility assistance to, as this would allow one to estimate the overall cost of this specific policy. It is likely that there is going to be a degree of variability in the number of workers opting or able to relocate. However, in our costing approach we adopt a simplifying assumption where we restrict mobility assistance to workers that are most able to relocate to a new labour market in a new locality. Arguably, skilled workers are the most mobile of the cohorts and are thus more likely to find new employment opportunities in other localities in South Africa. We cost this policy only for the skilled group of workers within the youth and middle-age groups.

It is worth noting that job relocation assistance may provide an incentive to workers to search for new job opportunities outside of the regional labour market. The closing of a coal mine(s), and the subsequent reduction of economic activity linked to the coal mine(s) would reduce employment demand in the regional labour market. Allowing, or incentivising, mobile workers to find jobs elsewhere and relocate may alleviate pressure on the local labour market to absorb these displaced workers.

3.4.2 Temporary income support

Temporary income support is another form of worker support typically included in polices responding to the adverse labour market effects emerging from energy transition episodes. Stanley et al. (2018) note that there are four main instruments of temporary income support, namely, severance or other forms of termination payment; unemployment insurance; social assistance payments; and early retirement incentives. Here we detail a costing approach associated with the former of these. Krawchenko and Gordon (2021) compare just transition policies across 25 advanced OECD

[17] The IES results show that, on average, South African households spend close to a third (34.7 percent) of their total annual household consumption expenditure on housing, water, electricity, gas and other fuels. This share estimate provides a decent proxy for what a worker would need to spend on housing.

economies and show that temporary income support interventions have been applied close to universally across these countries. It is thus a key worker support intervention in response to energy transition episodes. Cunningham and Schmillen (2021) emphasise that the objective of temporary income support is to sustain the livelihoods of retrenched workers in such manner that it does not inhibit labour market attachment – and preferably promotes it. In the costing scenarios that we formulate in Section 3.5, we alter the magnitude of income support between being a form of income replacement or a form of livelihood protection. The former provides income support in such magnitude that it replaces lost income in its entirety, while the later provides income support at such a level – lower – so as to maintain a certain degree of livelihood for the worker.

The costing of temporary income support for displaced workers is summarised in equation (3):

$$TempInc_{it}^{g} = \gamma^{g}\left(\bar{Y}_{i}^{g}\right) \quad (3)$$

Where worker i will receive temporary income support that is a share of the real mean wage for workers in policy matrix group g within which worker i falls, $\bar{Y}_{i}^{g}$. To balance the dual objective of sustaining the livelihoods of retrenched workers while maintaining labour market attachment, we can vary the share factor, γ^{g}, the duration of the support, and how this is applied to different age group cohorts. The share factor, γ^{g}, determines the share of a worker's income that s/he will receive for a period t after being retrenched. If the share, γ^{g}, is too high, all else being equal, then the worker may be less incentivised to remain attached to the labour market, while if the share is too low, then the worker may not be able to sustain his or her livelihood. Similarly, if the period, t, is too long, then there is less incentive to remain attached to the labour market. If the period is too short, or not long enough to allow the worker time to find a new job opportunity, or upskill suitably, then s/he may enter unemployment, which would adversely impact on his or her ability to sustain a livelihood. The age of the worker also needs to be factored in. Arguably, one would want to incentivise younger workers to remain attached to the labour market, and thus the size and duration of temporary income support to this group should not be at a level that disincentivises labour market attachment. Older workers may find it harder to adjust and find new employment opportunities, and they are likely to have relatively more household expenses given life stage, and thus one could argue for income support that is larger in magnitude and longer in duration for this cohort of workers.[18]

In Section 4.5, where we define a set of possible costing scenarios, we provide scenarios where we adjust the magnitude, duration and targeting of the temporary income support assistance.

[18] As noted above, we assume that all predicted job losses occur in 2030, and we provide a social protection costing for this once-off retrenchment episode. Benefits that last for several years will commence in 2030, and last for the policy determined period – for example, three years of temporary income support will run from 2030 to 2032.

3.4.3 Early retirement package

Stanley et al. (2021) classify early retirement incentives as another instrument of temporary income support. They note that the purpose of such an instrument is to incentivise older coal mining industry workers to exit the labour market. This instrument also provides a solution to older retrenched workers who have a lower probability of finding alternative employment opportunities (Stanley et al., 2021).This may be particularly important in the South African case where both the national and the regional labour markets linked to coal production are characterised by already high levels of unemployment.[19] Cunningham and Schmillen (2021) note a political objective of such an instrument in that it helps to minimise labour disputes and lessen damage to morale. Krawchenko and Gordon (2021) show that early retirement package schemes, or pension support, feature almost universally in just transition policy packages across the 25 advanced OECD economies that they surveyed.

We summarise our costing approach for an early retirement package in equation (4):

$$ER_i^g = \sigma\left(\bar{Y}_i^g\right) \times Funding\ gap\ period \quad (4)$$

Where worker i – an early retiree – receives an early retirement benefit which is a share, σ, of the real mean wage for workers in policy matrix group g within which worker i falls, $\bar{Y}_i^g$, and this is multiplied by the funding gap period. The share parameter σ represents the retirement fund contribution rate paid by the employer, which sits at 15.5 percent.[20] This share is then multiplied by the mean annual wage for the policy matrix group g within which the worker i falls, $\bar{Y}_i^g$, and this results in the workers' annual retirement contribution. This is then multiplied by the funding gap period. Early retirement schemes induce workers to retire earlier than the prescribed retirement age. This means that by retiring early, the worker would forego the retirement fund contributions that s/he would have accumulated if s/he continued working until retirement age. We envisage this policy to cover these foregone contributions. We factor this in by multiplying the annual contribution by the funding gap period, which is calculated as the difference between the prescribed retirement age for the worker and the mean age of the workers within policy matrix group g within which the worker falls. Drawing on information from the Mineworkers Provident Fund we apply a 65-year retirement age for above

[19] In quarter 4 of 2024, South Africa's official unemployment rate stood at 31.9 percent, and the estimate for Mpumalanga, where the coal mining industry is concentrated, was 34.7 percent (Statistics South Africa, 2025b). The corresponding expanded unemployment rate estimates, which take into account discourage work seekers, is 41.9 percent nationally and 47.2 percent in Mpumalanga (Statistics South Africa, 2025b). These estimates point to a labour market struggling to provide employment opportunities for a growing number of labour market entrants.

[20] Our retirement fund contribution rate is informed by the Mineworkers Provident Fund, which covers a number of coal mines, including those owned by some of the larger coal mining companies, such as Exxaro, Seriti and Thungela. An employee in the coal mining industry will contribute between 14.5 and 16.5 percent of his/her salary as a retirement contribution – we apply a rate in the middle of this range (Mineworkers Provident Fund, 2025). These contributions are then invested in the Mineworkers Provident Fund for the worker's retirement benefit.

ground workers and a 63-year retirement age for underground workers (Mineworkers Provident Fund, 2025). As we do not know whether a worker is an above ground or underground worker, we proxy for this by assuming that skilled workers are the former, while semi-skilled and unskilled are the latter.[21],[22]

3.4.4 Education and training support

The coal mining workforce is relatively young. Drawing on Bhorat et al. (2024a) and Bhorat et al. (2025) we know that between 38 and 51 percent of the coal mining industry workforce falls within the youth age grouping, while between 44 and 51 percent of the workforce can be classified as middle-age.[23] To maintain their livelihoods and support their households, workers within these age groupings need to remain attached to the labour market. However, for a number of these workers, it is likely that their current skillset does not align with the skills required in other industries, which limits their ability to transition to new job opportunities in these industries. These workers are at risk of becoming structurally unemployed. To address this challenge, it is necessary to provide education and training support to these workers, thereby better equipping them to transition to alternative employment opportunities in other industries.

We summarise our costing approach for worker education and training support in equation (5):

$$EdTr_i^g = CostEdTr_i^g \times Duration^g \quad (5)$$

Where worker i in policy matrix group g receives an education and training grant, which is costed as the product of the cost of the education and training programme multiplied by the duration of the programme.

In our costing approach, which has aggregated workers into three skill (occupation) groupings, we are costing the 'average' education and training programme for the 'average worker' within each grouping. This is summarised in Table 5.

[21] We assume that workers in plant and machine operator, craft and related trade and unskilled occupations are more likely to be performing underground activities, while professional and managerial occupations are more likely to be engaged in surface activities. This proxy is not perfect as workers operating in clerical occupations, which is an above ground activity, would fall within the semi-skilled category, and thus be incorrectly defined as underground. However, the bias emerging from this is marginal since the share of clerical workers falling within the near retirement age grouping is very small. In fact, the QLFS estimates do not capture any near-retirement age clerical workers in 2023.

[22] In practical terms, in 2030, when we assume a once-off retrenchment, there will be a certain number of workers within each early retirement cohort across the three skill groups. We calculate a mean age for each of these cohorts and then subtract these from the corresponding cut-off retirement age, which is 63 in the case of the semi-skilled and unskilled early retirement cohorts, and 65 for the skilled early retirement cohort.

[23] Bhorat et al. (2024) use QLFS data and show that 6 and 44 percent of the coal mining industry workforce fall within the near-retirement age and youth age groups, respectively. Using administrative tax data, Bhorat et al. (2025) provide corresponding estimates of 10 and 51 percent, respectively.

In our skilled grouping, the 'average' worker operates in a professional occupation (e.g. mining engineer and metallurgist; mechanical engineer; physical sciences technologists) where s/he has some form of tertiary qualification.[24] Given the 'average' education level and 'average' occupation, we assume that this 'average' worker will then get a skills top-up by doing a Post-Graduate Diploma in Engineering in a speciality (e.g. Metallurgy; Welding design) that would afford the worker a chance to successfully enter a job in a new industry.[25] The duration and costing of this education and training support are detailed in Table 5.

We know from Bhorat et al. (2024a) that the bulk of the coal mining industry workforce operates in semi-skilled occupations as craft and related trade workers or plant and machine operators, and as such, this is where much of the education and training interventions will be focused.[26] To cost education and training for the 'average' worker within this grouping, we identify an occupation that accounts for a substantial share of workers within this grouping; we then identify related occupations for workers within this occupation – i.e. based on underlying skill sets, occupations that a worker in this occupation could feasibly transition to; we then identify tertiary institutions that provide education and training for this related occupation; and finally, we use information from this institution to cost the education and training for what we call an 'average' education and training intervention for this group. In our case, the two main occupations are *Mining and quarry workers* and *Mining plant operators*.[27] Drawing on the Occupation Information Network (O*NET) Related Occupations data module[28], we

[24] Over a third (36.9 percent) of these workers have some form of tertiary education (Statistics South Africa, 2023a; 2023b; 2023c; 2024).

[25] In our costing, we use information from the Postgraduate Diploma in Engineering from the University of Witwatersrand, which is the closest university to Mpumalanga. Notably, the University of Mpumalanga does not have an engineering programme. The duration of this programme is a one-year (full-time) and it costs R80 000.

[26] Bhorat et al. (2024a) show that 40 percent of the workforce operate in craft and related trade occupations, while 35 percent operate as plant and machine operators, thus comprising around three-quarters of the workforce.

[27] *Mining and quarry workers* and *Mining plant operators* are the two modal 4-digit occupations for the semi-skilled grouping, and account for 26 and 17 percent of employment within this grouping, respectively (Statistics South Africa, 2023a; 2023b; 2023c; 2024).

[28] The Occupation Information Network (O*NET) is a comprehensive database of job characteristics and worker attributes developed in the United States with the purpose of understanding the rapidly changing nature of work and how it impacts the workforce and economy. We use the *Related Occupations* data module, which uses task content data to measure the similarity between occupations. For each of the 923 occupations in the data, as set of related occupations are identified.

identify a *millwright* as a related occupation.[29] [30] A millwright qualification is a three-year trade qualification typically attained through an apprenticeship programme combined with classroom instruction, where the classroom and on-the-job training phases constitute three and nine months of the year, respectively.[31, 32]

We follow a similar approach when costing the education and training support for unskilled workers who comprise approximately 15 percent of the workforce. The modal occupation for the unskilled grouping is a *Mining and quarrying labourer*, and using the O*NET Related Occupations data module, we identify *bricklayers* and *carpenters* as two related occupations.[33] A bricklayer or carpenter qualification are both three-year trade qualifications typically attained through an apprenticeship programme combined with classroom instruction, where the classroom and on-the-job training phases constitute three and nine months of the year, respectively.[34, 35]

Table 5: Education and training support for 'average' worker, by skill group

Skill group	Course	Cost p.a.	Duration
Skilled	Post-Graduate Diploma in Engineering	R80 000	1 (full time)
Semi-skilled	Millwright Apprenticeship programme	R49 000	3 (full time)
Unskilled	Bricklayer/Carpenter Apprenticeship programme	R44 000	3 (full time)

In addition, workers receiving training will also be provided with temporary income support throughout the duration of their training. This is to ensure that the worker can sustain his/her

[29] A millwright is a skilled tradesperson who installs, maintains, repairs, and dismantles stationary industrial machinery, often in production, construction and manufacturing environments. They work with a variety of equipment, including power generators and assembly line machinery.

[30] We map the occupation codes for *Mining and quarry worker* and *Mining plant operator* from the QLFS – coded using the International Standard Classification of Occupations 1988 revision (ISCO-88) – to the O*NET occupations – coded using the Standard Occupation Classification – within the *Related Occupations* data module. *Millwright* features as a related occupation in both instances. While there are other related occupations linked to the two modal occupations, we choose a *millwright* as it is an occupation that fits across the construction, production and manufacturing industries – all industries that – demand dependent – could offer employment opportunities for these workers in the future.

[31] The entrance requirement for a millwright apprenticeship is a complete secondary (grade 12) education. This aligns well with the 'average' semi-skilled worker, where more than two-thirds (67.6 percent) of these workers have a complete secondary education or more (Statistics South Africa, 2023a; 2023b; 2023c; 2024).

[32] We use information from Africa Skills – an artisanal training institution located in Centurion – to inform our costing of the education and training intervention.

[33] We map the occupation codes for *Mining and quarry labourers* from the QLFS – coded using the International Standard Classification of Occupations 1988 revision (ISCO-88) – to the O*NET occupations – coded using the Standard Occupation Classification – within the *Related Occupations* data module. *Helpers-carpenters* and *Helpers-Brickmasons* feature as related occupations. We choose these two related occupations as they link with the construction industry, which is an industry that typically offers an employment pathway for coal mineworkers.

[34] The entrance requirement for a bricklayer or carpenter apprenticeship is a grade 9 education. Unskilled workers within the coal mining industry will easily meet this requirement as at least 44 percent of these workers have a complete secondary education (Statistics South Africa, 2023a; 2023b; 2023c; 2024).

[35] We use information from Africa Skills – an artisanal training institution located in Centurion – to inform our costing of the education and training intervention.

livelihood and continue to provide financial support to the household. This is costed as per Section 3.4.2.

3.4.5 Total cost

To generate a total cost for a just transition social protection policy package we sum the four policy interventions detailed above.[36] There are several steps in this process: First, as detailed in Sections 3.4.1 through 3.4.4, we generate annualised per worker costing for each policy. Second, for each policy matrix group g, we multiply the annualised per worker cost for each policy by the number of displaced workers within each group. To generate an estimate of the number of displaced workers, we start by quantifying the coal mining industry workforce – detailed in Section 3.2 – and then based on a given energy transition scenario – detailed in Section 3.3 – we estimate the number of displaced workers within each policy matrix group g. As noted earlier, we assume a once-off retrenchment episode in 2030 and cost for the entire quantum of retrenched workers. Finally, the product of the number of displaced workers for each policy matrix group g and the annualised cost for each policy within each policy matrix group g are then summed across all four policies to reach an estimated total cost of a just transition social protection policy package. This is summarised in equation (6):

$$Total\ cost_s = \sum_g \left(MA_i^g \times N^g\right) + \sum_g \left(TempInc_{it}^g \times N^g\right) + \sum_g \left(ER_i^g \times N^g\right) + \sum_g \left(EdTr_i^g \times N^g\right) \quad (6)$$

Where the total cost of each social protection scenario s is the summation of total costs for each of the four policies. For each policy, we multiply the annual per worker cost for each policy matrix group g by the number of displaced workers in group g, N^g, and then sum across these groups. While we include policies that will be implemented across a number of years, such as temporary income support, we do not report these costs over time, but instead report an aggregated cost.[37]

It is important to note that we consider several different social protection scenarios, s, and cost these accordingly – we detail these in Section 3.5. Based on different policy objectives and assumptions, these social protection scenarios will activate, or deactivate, certain of the policies for different groupings of

[36] We do not include administrative costs into our costing approach. We envision that the social protection programmes to emerge from this approach would leverage existing administrative resources and structures. Thus, while further administrative funding would be required, it is difficult to determine the exact value.

[37] For example, if a three-year temporary income support policy commences in 2030, it will run until 2032 and each of those periods will have an annual cost. In such cases in our reporting, we aggregate the costs for the three years.

workers. Thus, while we generate a method of costing for each policy for each policy matrix group g, it is not necessarily the case that each policy will be applied to each policy matrix group g.

We now turn to discussing five potential social protection policy packages, which we then provide a comparative costing and discussion in Section 4.

3.5 Costing scenarios

As mentioned above, we provide a costing approach that can be used to cost a social protection policy package for displaced workers. The approach is flexible in that it allows one to adjust the various costing parameters. The adjustment of the cost parameters would be informed by the objectives and assumptions of the policymaker. Given that we do not know these objectives and assumptions, we define and cost five social protection policy package scenarios. For each policy package we emphasise a different policy objective with underlying assumptions. The purpose of the exercise is to get a sense of how the costs of a social protection policy package vary, based on different policy objectives. To achieve a specific policy objective, each scenario differs along the following parameters: First, the targeting parameter, which determines whether a given policy is (de)activated for a certain group in the policy matrix; second, the magnitude parameter, which governs the intensity or magnitude of a given policy; and third, the temporal parameter, which defines the duration of a given policy.

We now define the parametrisation, and underlying assumptions and policy objectives, for each of the five social protection policy package scenarios. For each scenario we provide a table that summarises the targeting of each policy – i.e. which policy matrix group a policy applies to – the magnitude of each policy (where applicable) – and the duration of the implementation of each policy.

3.5.1 Costing scenario 1: Universal transition payment approach

Of the five policy package scenarios that we define and cost, the *universal transition payment* approach is the simplest and easiest to implement and cost. The policy package consists solely of a once-off lump-sum payment, or equitable severance package, for all displaced workers. The policy emphasis is on full income replacement, where workers in all nine of the policy matrix groups receive this once-off lump-sum payment equal to one year's annual salary. In our costing, workers within each of the nine policy matrix groups receive a grant equivalent to the real mean annual wage for workers within their respective group. We show this in Table 6 as a version of temporary income support: the temporary income support policy is 'switched on' (i.e. equal to 1) for all nine groups (see column 6). The once-off lump-sum grant payment is equal to one year's annual salary (i.e. $\gamma^g = 1.0 \; or \; 100\%$) – columns 7 and 8.

Table 6: Policy matrix activation for *universal transition payment* approach – scenario 1

Policy matrix groupings		**Social protection policies**					
Skill category	**Age cohort**	Early retirement	Mobility assistance	Education and training	Temporary income support		
		on/off	on/off	on/off	on/off	Share of income (γ^g)	Duration (years)
Skilled	Youth	0	0	0	1	1.0	1
	Middle age	0	0	0	1	1.0	1
	Near retirement	0	0	0	1	1.0	1
Semi-skilled	Youth	0	0	0	1	1.0	1
	Middle age	0	0	0	1	1.0	1
	Near retirement	0	0	0	1	1.0	1
Unskilled	Youth	0	0	0	1	1.0	1
	Middle age	0	0	0	1	1.0	1
	Near retirement	0	0	0	1	1.0	1

The *universal transition payment* approach has two main objectives embedded in its design: First, the temporary income support is designed to provide full income replacement and thus immediate financial relief and stability for displaced workers; second, the design of the approach is simple and offers cost certainty, thus making it relatively easy for the policy planner to implement. In terms of limitations of the approach, the limited duration of the support means that it risks providing insufficient financial support to workers, particularly in the case of the relatively more vulnerable unskilled cohort of workers.

3.5.2 Costing scenario 2: Big grant approach

Our second costing scenario – the *big grant* approach – bolsters the magnitude and duration of the temporary income support policy lever, while incorporating an early retirement package for the older cohort of workers. Along the targeting parameter, temporary income support is provided to workers from the youth and middle-age cohorts across all skill categories – see column 6 of Table 7. To address the risk of insufficient financial support associated with the universal transition payment approach, the duration parameter of the temporary income support policy is extended to cover the period of five years. As with the universal transition payment approach, non-retiree workers receive income support equivalent to 100 percent of their current real wage level (i.e. $\gamma^g = 1.0 \; or \; 100\%$), and thus receive

full income replacement for a duration of five years.[38] Older workers in the near-retirement age cohort – aged 55 years and over – receive an early retirement package (see column 3).

The primary objective of the *big grant* approach is to provide full income replacement to displaced workers. As detailed above, this is achieved through providing an extensive income support package – substantial in duration and magnitude – to the younger age cohorts, and offering an early retirement package to the older cohort. A key risk to this approach is that while the extent of the temporary income support package will support worker livelihoods (at least for five years), it may inhibit labour market attachment.

Table 7: Policy matrix activation for *big grant* approach – scenario 2

Policy matrix groupings		**Social protection policies**					
Skill category	**Age cohort**	Early retirement	Mobility assistance	Education and training	Temporary income support		
		on/off	on/off	on/off	on/off	Share of income (γ^g)	Duration (years)
Skilled	Youth	0	0	0	1	1.0	5
	Middle age	0	0	0	1	1.0	5
	Near retirement	1	0	0	0		
Semi-skilled	Youth	0	0	0	1	1.0	5
	Middle age	0	0	0	1	1.0	5
	Near retirement	1	0	0	0		
Unskilled	Youth	0	0	0	1	1.0	5
	Middle age	0	0	0	1	1.0	5
	Near retirement	1	0	0	0		

3.5.3 Costing scenario 3: Tailored policy approach

Our initial two costing scenarios have been orientated toward providing a blanket temporary income support grant to as many workers as possible. However, the advantage of the *just transition policy matrix approach* is the ability to tailor social protection policy to different groupings of workers based on their respective characteristics. Our third costing scenario – the *tailored policy* approach – provides a more nuanced social protection policy package as policies are aligned to the specific needs and characteristics of workers within the policy matrix groupings – see Table 8.

[38] Given that we assume a once-off retrenchment in 2030, the temporary income support will run for five years from 2030 to 2034.

There are four elements to the costing of the *tailored policy* approach: First, an early retirement package is offered to all workers 55 years and over across all three skill groupings – see column 3 of Table 8. Given that the near-retirement age cohort is set to receive early retirement packages, the other policies comprising the social protection policy package are focused on the youth and middle-age cohorts.

Second, mobility assistance is provided to skilled workers falling within the youth and middle-age cohorts (see column 4). It is assumed that, given their skill level, these workers are more likely to find employment opportunities elsewhere. Notably, given their skill level and likelihood of finding alternative employment, they are not eligible for any other social protection intervention. For example, it can be argued that it is unnecessary to direct fiscal resources toward the further skilling and training of this group of high-skilled workers.

Third, semi-skilled and unskilled workers are offered education and training support (see column 5). It is assumed that these workers will require a skills top-up in order to remain attached to the labour market. Further, given their age, it is vital that these workers remain attached to the labour market and generate income to sustain their livelihoods and their households for several decades.

Table 8: Policy matrix activation for *tailored policy* approach – scenario 3

Policy matrix groupings		**Social protection policies**					
Skill category	**Age cohort**	Early retirement	Mobility assistance	Education and training	Temporary income support		
		on/off	on/off	on/off	on/off	Share of income (γ^g)	Duration (Years)
Skilled	Youth	0	1	0	0		
	Middle age	0	1	0	0		
	Near retirement	1	0	0	0		
Semi-skilled	Youth	0	0	1	1	0.5	3
	Middle age	0	0	1	1	0.6	3
	Near retirement	1	0	0	0		
Unskilled	Youth	0	0	1	1	0.7	5
	Middle age	0	0	1	1	0.8	5
	Near retirement	1	0	0	0		

Fourth, temporary income support is offered to the youth and middle-age cohorts across both the semi-skilled and unskilled groups (see column 6). Contrary to the skilled worker group, the displaced semi-skilled and unskilled workers have a lower probability of finding alternative employment opportunities. As such, while these workers receive education and training support, which will equip them to remain attached to the labour market, they will receive a level of temporary income support

to sustain (to a degree) their livelihoods. The magnitude parameter of the temporary income support – see column 7 – provides youth workers with less income support than middle-age workers. For example, in the case of the semi-skilled group, displaced workers in the youth cohort receive 50 percent of their income, while those in the middle-age cohort receive 60 percent of their income. This is designed to incentivise this younger age cohort to remain attached to the labour market. Further, when considering life stage, it is likely that living costs for middle-age workers are greater, thus necessitating more support. We also adopt a support package aiming to be more progressive in policy orientation, where the vulnerable unskilled cohort receive a higher magnitude of income support relative to the less vulnerable semi-skilled cohort. A sliding scale of income support is evident in column 7.

With respect to the duration parameter – column 8 – temporary income support is provided such that it, at least, covers the expected duration of the education and training support. Referring back to Section 3.4.4, education and training support for both semi-skilled and unskilled groups is three years. Given their vulnerability, the unskilled group receive an additional two years of income support.

The overall objective of the *tailored policy* approach is to provide social protection support in a nuanced manner that takes into account the needs and contexts of each worker group. The advantage of such an approach is that one is able to provide relatively substantial social protection support to vulnerable workers, while at the same time reducing costs by limiting support to less vulnerable workers. The remaining costing scenarios build off this approach but emphasise different policy objectives and assumptions.

3.5.4 Costing scenario 4: Progressive approach

Our fourth costing scenario – the *progressive* approach – applies the needs-based structure of the *tailored policy* approach but orients toward directing fiscal resources to workers who are most vulnerable.

There are several key elements that distinguish this approach from the *tailored policy* approach (see Table 9): First, no support is given to worker cohorts that are deemed less vulnerable. This includes the entire skilled worker cohort, as well as the middle-age semi-skilled worker cohort. Under this scenario, it is assumed that these workers have the requisite skills and resources needed to suitably adjust to impending job loss. Second, early retirement packages are only offered to semi-skilled and unskilled worker cohorts (again we assume that the skilled cohort are able to adjust). Third, support in the form of temporary income support and education and training support is directed toward the more vulnerable workers cohorts. By virtue of their skill level, this scenario assumes that the unskilled cohort are less able to adjust to the adverse effects of this economic shock, and are thus more likely to detach from the labour market (i.e. enter unemployment). Similarly, given their limited period in employment, it is assumed the semi-skilled youth may not have acquired enough work experience and

on-the-job skills to enable a shift to alternative employment opportunities. The semi-skilled youth cohort will receive a level of temporary income support that can support their livelihood while receiving education and training support for a period of three years. The unskilled youth and middle-age cohorts receive a level of temporary income support that is in line with income replacement, and this support lasts for an additional year after their three years of education and training support. As such, fiscal resources are orientated toward these relatively vulnerable workers cohorts.

Table 9: Policy matrix activation for *progressive* approach – scenario 4

Policy matrix groupings		**Social protection policies**					
Skill category	**Age cohort**	Early retirement	Mobility assistance	Education and training	Temporary income support		
		on/off	on/off	on/off	on/off	Share of income (γ^g)	Duration
Skilled	Youth	0	0	0	0		
	Middle age	0	0	0	0		
	Near retirement	0	0	0	0		
Semi-skilled	Youth	0	0	1	1	0.5	3
	Middle age	0	0	0	0		
	Near retirement	1	0	0	0		
Unskilled	Youth	0	0	1	1	0.9	4
	Middle age	0	0	1	1	1.0	4
	Near retirement	1	0	0	0		

3.5.5 Costing scenario 5: Early retirement orientated approach

Our final costing scenario – the *early retirement orientated* approach – adopts the exact same costing structure as the *tailored policy* approach. The only difference is that the age cut-off for receiving an early retirement package is reduced from 55 years of age to 45 years of age. This results in a larger near retirement age cohort and a smaller middle-age cohort.

This approach is concerned that older workers will battle to remain attached to the labour market and it would thus be better to phase these workers out of the labour force by incentivising them to take an early retirement package.

Table 10: Policy matrix activation for *early retirement orientated* approach – scenario 5

Policy matrix groupings		**Social protection policies**					
Skill category	**Age cohort**	Early retirement	Mobility assistance	Education and training	Temporary income support		
		on/off	on/off	on/off	on/off	Share of income (γ^g)	Duration
Skilled	Youth	0	1	0	0		
	Middle age	0	1	0	0		
	Near retirement	1	0	0	0		
Semi-skilled	Youth	0	0	1	1	0.5	3
	Middle age	0	0	1	1	0.6	3
	Near retirement	1	0	0	0		
Unskilled	Youth	0	0	1	1	0.7	5
	Middle age	0	0	1	1	0.8	5
	Near retirement	1	0	0	0		

3.6 Limitations

There are several limitations to our costing approach that are worth bearing in mind. The first is the aggregation limitation. The *just transition policy matrix approach*, applied with the survey data that are available to us, aggregates coal mining industry workers into nine policy matrix groups. This means that we are devising policy for the 'average' worker within each group.[39] However, there is a degree of worker heterogeneity within each group that one would want to account for when devising the social protection package that will ultimately be implemented in the next few years. For example, in the case of the education and training support, we are costing a single training course for the modal occupation within a policy matrix group. However, in reality, there are multiple occupations within each of these groups. Each of these occupations are related to a number of other occupations, and thus coal mining industry workers will be presented with several potential education and training pathways that would hopefully upskill them to a level that would enable them to enter the jobs they have been upskilled for. Ultimately, a more accurate approach would be to use unit level employer-employee data taken directly from coal mining industry firms. This would allow one to generate exact estimates based on the population of workers in the coal mining industry.

[39] This is necessitated by the fact that we're using a sample of data from the nationally representative QLFS, where the unweighted data consists of 301 observations that corresponds with 78 464 workers. Cutting the data into too many groups, thus becomes problematic due to small sample bias.

Second, there is a temporal limitation associated with our approach. We adopt a relatively simplistic approach by costing a once-off loss in employment in 2030. However, we know that the closing of coal mines and the resultant retrenchment of workers are likely to be phased over time, with an acceleration in job losses as one approaches 2030 when most of the scheduled coal power plant closures are clustered. Further, we do not take into account the natural churn of workers as they enter and exit coal mining firms.

Nevertheless, the purpose of our approach is to present a method for devising a social protection plan that meets the varying needs of different worker cohorts, and the application across several costing scenarios shows how different policy objectives and orientations impact costs. It thus provides a basis for further thinking and refinement by the policymakers according to his/her policy objectives.

4 COSTING SOUTH AFRICA'S JUST TRANSITION POLICY RESPONSE: COMPARATIVE COSTS

In this section we apply the *just transition policy matrix approach* and provide a costing of the five social protection costing scenarios. Each of the scenarios emphasise a different set of policy objectives and assumptions and, through the costing, we evaluate the fiscal implications of each of these scenarios. We estimate total package costs by scenario, including the costs of each of the four policy components: temporary income support, mobility assistance, education and training, and early retirement. We present the results under three employment loss scenarios, reflecting a range of potential job displacement estimates by 2030. As mentioned above, we do not annualise these costs but rather present the total summed costs of these policies that would span several years when implemented.

Further, to assess the relative cost and fiscal viability of these social protection policy packages, we benchmark the total cost of each scenario against existing social spending commitments as per the national budget.[40] To do this we calculate the total cost of each scenario as a share of the overall social protection budgetary allocation for South Africa in 2024/25.[41] This budgetary allocation reflects South Africa's commitment to income support, welfare grants, and social insurance, and thus offers a conceptually relevant yardstick for contextualising the fiscal magnitude of our social protection policy package cost estimates.[42]

[40] When we consider these shares, we take the total cost of the social protection policy package and divide this by the national budget allocation to social protection. This total cost is not an annual cost but a lump-sum cost that, depending on the composition of the policy package, will take several years to implement. The purpose of this exercise is to simply get a sense of the relative magnitude of each policy package in relation to the current social protection budget.

[41] The budgetary allocation to social protection is the sum of the allocation to *Social Protection* (R298.3 billion) and *Social Security Funds* (R89 billion), amounting to R387.3 billion (National Treasury, 2024).

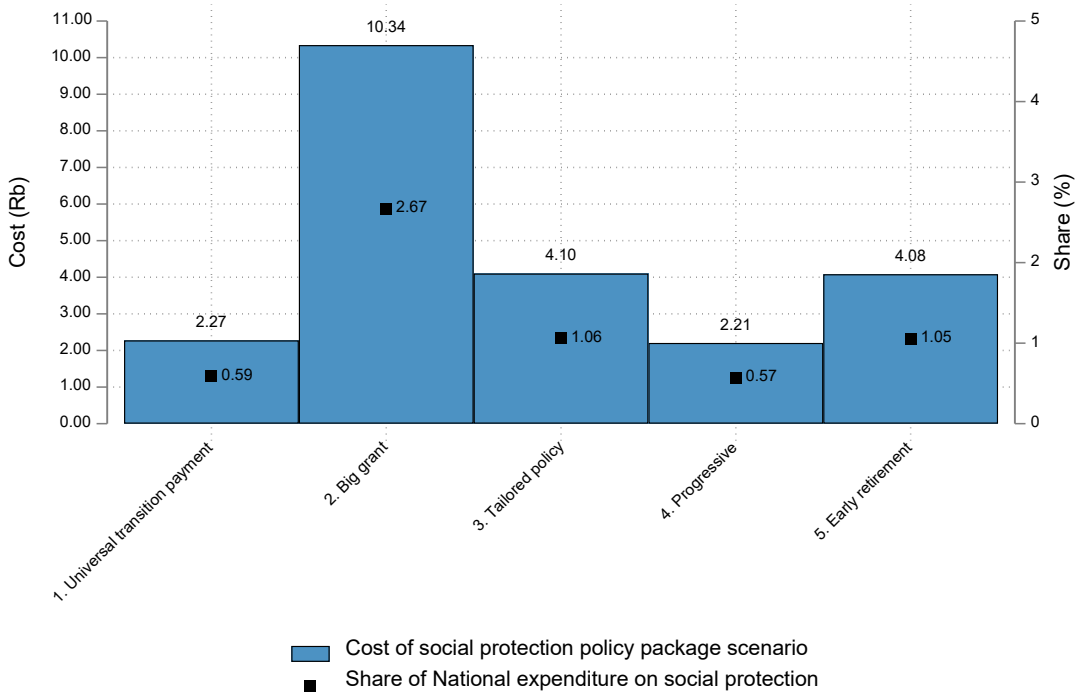
[42] In Appendix Table A 1, we report these shares for each social protection scenario applied to each of the energy transition employment loss scenarios.

We start by looking at the most costly of the five scenarios – the *big grant* approach – which is orientated toward providing full income replacement to retrenched workers.[43] As depicted in Figure 5, with a total cost of R10.34 billion, the *big grant* approach (scenario 2) is by far the most costly of the five social protection policy scenarios – more than double the next most costly scenario and representing 2.67 percent of South Africa's national budget on social protection. Notably, it is the manner in which the temporary income support policy is applied that is driving the cost of this scenario. As detailed in Section 3.5.2, aside from workers qualifying for an early retirement package, all other workers receive temporary income support covering the full extent of their current wage level for the duration of five years.

We now consider two sets of scenarios that achieve similar cost outcomes but with different policy objectives. First, we consider the next two most-costly scenarios – the *early retirement orientated* (scenario 5) and the *tailored policy* (scenario 3) approaches. Both these scenarios are costed in the region of R4 billion and represent approximately 2.2 percent of South Africa's national budget on social protection. These scenarios are near identical in policy targeting, magnitude and duration, and only differ with respect to the cut-off age for early retirement package eligibility. The *early retirement orientated* approach (scenario 5) is designed on the assumption that older coal workers may find it relatively more difficult to find alternative employment, and that this may even be the case despite these workers receiving education and training support. The composition of the support is orientated away from education and training, and corresponding temporary income support, and rather toward early retirement package support. Thus, while the *tailored policy* approach (scenario 3) orientates toward reskilling and reintegration into the labour market, the *early retirement orientated* approach design achieves comparable fiscal outlay by permanently withdrawing a cohort of older workers from the labour market. The policymaker faces a trade-off: invest in active labour market reintegration or subsidise permanent labour market exit for a cohort that, depending on one's assumptions, is unlikely to be re-employed. The equivalence in cost, despite this structural divergence, is a critical insight for policy design, particularly in the context of capacity constrained labour markets where older displaced workers encounter prolonged unemployment or limited reabsorption into formal employment.

[43] In this discussion we use the 10 percent retrenchment rate, which aligns with the upper bound of the predicted employment loss modelled in the JET IP.

Figure 5: Total cost of social protection policy package scenario (10% employment loss)



Source: National Treasury (2024)

Notes: Black square markers represent total social protection cost for each scenario as a share of total social protection budgetary allocation as per the 2024/25 National Budget.

Second, we consider the two lowest cost scenarios – the *universal transition* (scenario 1) and *progressive* (scenario 4) approaches. Both these scenarios cost approximately R2.2 billion and represent about 0.58 percent of South Africa's national budget on social protection. However, while being near equal in cost, these two scenarios represent two very different sets of policymaker assumptions. The *universal transition* approach prioritises income replacement by providing a once-off lump-sum payment to all workers that is equal to a single year's salary. Under this scenario, while all workers are treated the same under this policy – a full year's salary – it is the least-vulnerable skilled worker groupings that fair best (in absolute terms) since they receive 100 percent of their higher relative wage levels. This approach is thus relatively regressive in outcome.[44] The *progressive* approach directs resources towards the vulnerable groupings within the workforce, in particular, the unskilled worker cohorts and the youth, while the skilled worker cohort receives no support. Under this scenario, older workers within the semi-skilled and unskilled cohorts receive early retirement packages; semi-skilled youth receive education and training support coupled with temporary income support designed to support livelihood;

[44] Under this scenario, the skilled workforce, while comprising 15 percent of retrenched workers, would receive 25 percent of the fiscal resources. In contrast, the unskilled workforce, while comprising 16 percent of the workforce, would receive 10 percent of the fiscal resources.

and unskilled non-retirees receive education and training support coupled with temporary income support designed to replace income for this lower-wage group. Consistent with the name, the latter approach is relatively more progressive in design and outcome.[45]

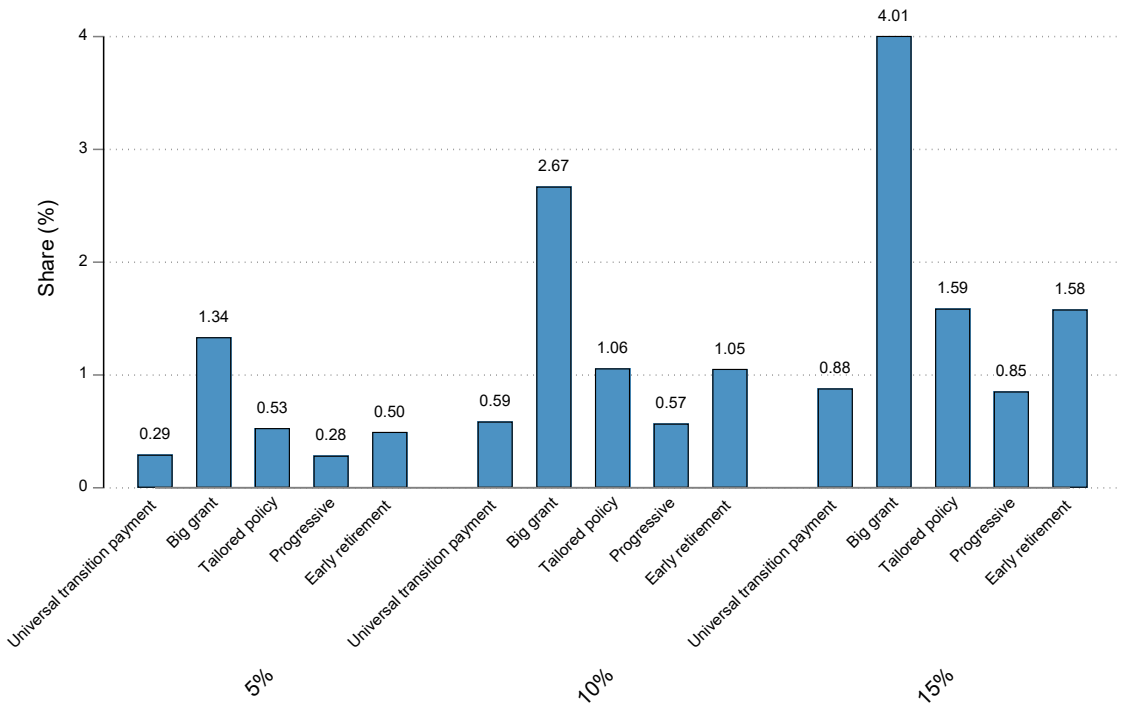
When we consider the relative cost and fiscal viability of these social protection policy packages, we note that despite variations in policy design, the total cost of each scenario's policy package remains modest when positioned against the national budget for social protection. In Figure 5 we see that the highest-cost scenario – the *big grant* approach – represents only 2.67 percent of the current social protection budgetary allocation. Further, even when assuming a 15 percent retrenchment rate among coal mining industry workers – see Figure 6 – the financial demands of the highest-cost scenario – sitting at 4.01 percent – fall well within the bounds of existing redistributive capacity.

More moderate interventions such as the *tailored policy* approach (1.06 percent) and the *early retirement* approach (1.05 percent) deliver differentiated support with more constrained budgetary implications. Intriguingly, these two scenarios yield nearly identical total costs**,** despite relying on distinct mechanisms. The former prioritising active labour market re-entry through training and time-bound support, and the latter enabling an early labour market exit for older workers. This suggests that removing a large cohort of older workers, up to 20 years before retirement, can be achieved at roughly the same cost as retraining them and providing temporary income support. This represents a policy trade-off between workforce reintegration and dignified labour market withdrawal, both of which have merit under different macroeconomic and demographic constraints.

At the lower end of the cost spectrum, the *universal transition payment* approach (0.59 percent) and the *progressive* approach (0.57 percent) register below 1 percent of the benchmark. Again, the policymaker can decide between two approaches that equate in terms of fiscal cost, yet differ with respect to distribution across worker cohorts.

[45] Under this scenario, the unskilled workforce, while comprising 16 percent of the workforce, receives 45 percent of the fiscal resources.

Figure 6: Policy package cost as a share of national social protection budget, by policy package and employment loss scenario



Source: National Treasury (2024)

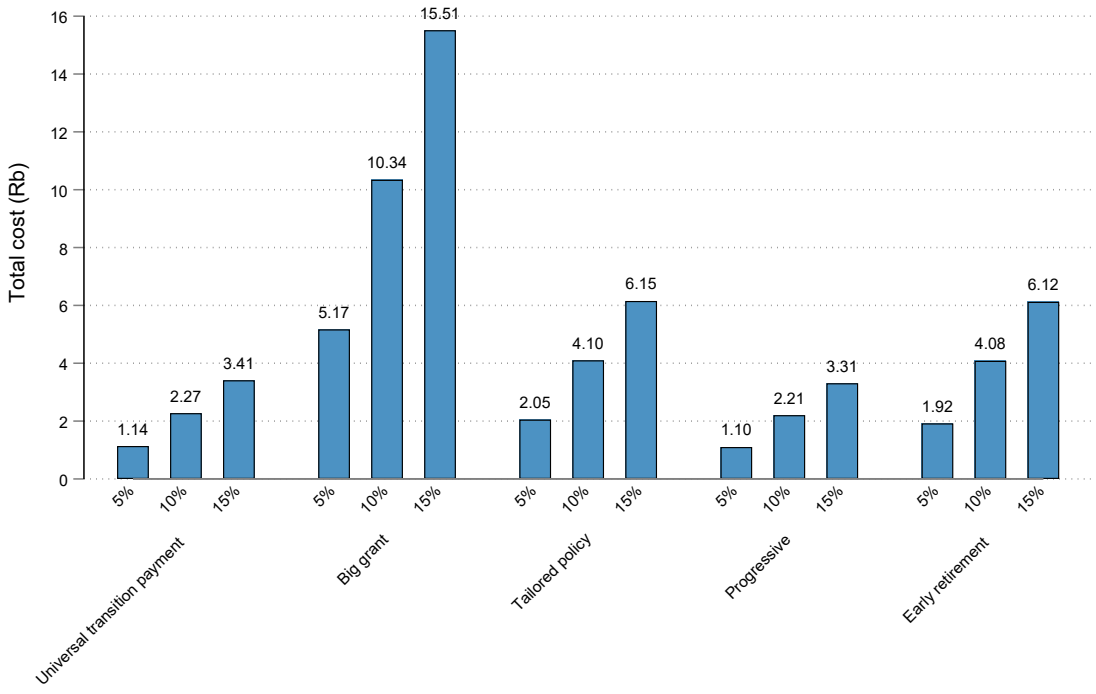
Notes: Shares represent total social protection cost for each scenario as a share of total social protection budgetary allocation as per the 2024/25 National Budget.

To examine the scalability of fiscal commitments under varying transition stress levels, we evaluate total scenario costs under three labour market shock scenarios: 5, 10, and 15 percent retrenchment rates. This approach tests the resilience of policy packages against a progressively worsening employment transition and provides insight into how total expenditure scales with the number of displaced workers. In Figure 7 we show the costing for each of the five scenarios and include the costing for different employment loss outcomes associated with the energy transition – as discussed in Section 3.3.

It is evident that the costs of the various social protection policy packages under each scenario increase as coal mine closure-induced retrenchment rates increase. The *big grant* approach consistently emerges as the most expensive design, with total costs rising from R5.17 billion under a five percent employment loss, to R10.34 billion at 10 percent, and peaking at R15.51 billion at 15 percent. This reflects the compound effect of the generous benefit level associated with this scenario, most notably being long-duration income support combined with universal application. Other scenarios follow similar proportional trajectories. The *tailored policy* approach grows from R2.05 billion at five percent, to R4.10 billion at 10 percent, and R6.15 billion at 15 percent. The *progressive* approach increases from R1.10

billion to R2.21 billion, and R3.31 billion, while the *universal transition payment* scales from R1.14 billion to R2.27 billion, and R3.41 billion. In short, the scale of employment loss is a primary driver of total cost and must be a central consideration in both policy calibration and budgeting.

Figure 7: Total cost of social protection policy package by scenario by extent of employment loss



Now we turn to a discussion regarding which social protection policy components are driving overall policy package costs across the five scenarios. We do this by showing the cost breakdown – in levels and shares – for each scenario in Figure 8.

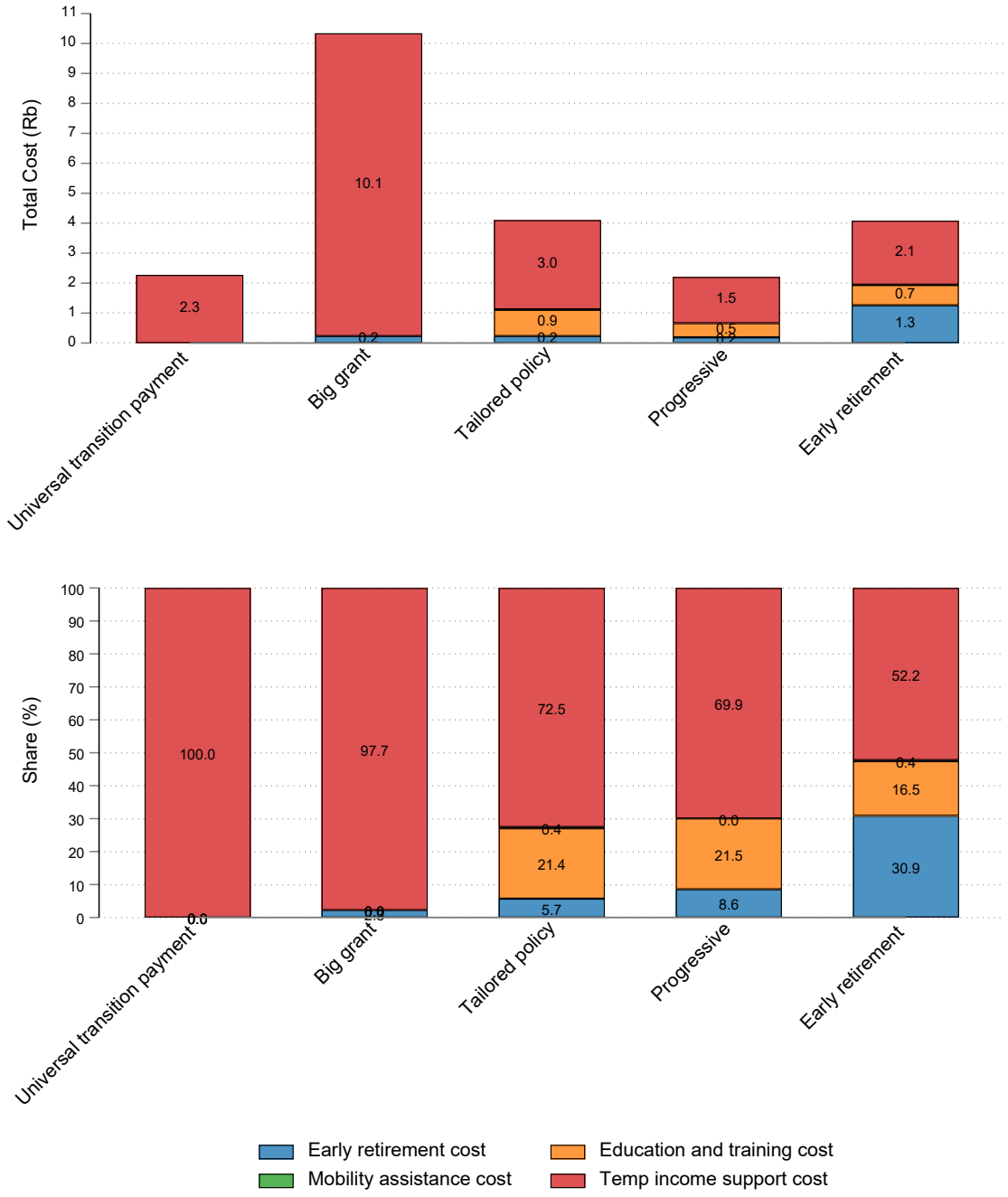
Looking at both levels and shares, the temporary income support policy response is the largest cost component and is driving much of the variation in total cost across the five scenarios. The cost of this component depends on the level of support along the three dimensions – targeting, intensity and duration – detailed in Section 3.5. The intensity and duration margins are particularly important in shaping the overall cost. For example, the *big grant* approach has a similar targeting structure to that of the *tailored policy* approach, and the *early retirement orientated* approach – i.e. temporary income support offered to semi-skilled and unskilled workers in the youth and middle-age groups. However, the duration – five years – and, in particular, the intensity – 100 percent of current income – offered in the *big grant* approach exceed those offered in the two other scenarios. As such, total temporary income support under the *big grant* approach totals R10.1 billion, while the corresponding levels for the other two scenarios total R2.9 and R2.1 billion, respectively. The duration of the support becomes important in shaping the differences between the *universal transition payment* approach and the *big grant*

approach. Even though the *universal transition payment* approach targets all workers for temporary income support and at the same intensity, the total cost of this scenario is less than that of the *big grant* approach because the duration of the *big grant* approach is five years instead of one year. Another factor shaping the level of temporary income support is the targeting of the *early retirement orientated* package offering. As noted above, the *tailored policy* approach and *early retirement orientated* approach exhibit the same policy package structure, but the cut-off age for early retirement package eligibility is lower for the latter. Given that these two scenarios have the same total cost, the outcome of this policy orientation is a shift of the costs away from temporary income support and toward early retirement packages. Finally, the magnitude of the cost of the temporary income support policy is also driven by the quantum of workers that are assigned this form of support. Across all five scenarios temporary income support is offered to the semi-skilled worker groups (except in the case of semi-skilled middle-age workers in the *progressive* approach), which comprise the bulk share of employment in the coal mining industry.

Education and training support is the second largest cost component. Notably, the temporary income support component is tied to the education and training support component, as it is important that workers maintain their livelihoods while undergoing the retraining needed to remain attached to the labour market. This cost component adjusts primarily along the targeting dimension.[46] For example, the targeting for the *tailored policy* approach and the *progressive* approach differs, and thus the cost of this policy component differs, with the cost for the former being R876 million and the latter being R474 million. This is because semi-skilled middle-age workers do not receive this support under the *progressive* approach policy structure. The cost of the education and training component falls in both absolute and relative terms when the age cut-off for the early retirement package is reduced to 45 years – as applied in the *early retirement orientated* approach. When compared to the near identical *tailored policy* approach, we observe that the cost of the education and training component drops from R876 to R676 million, or alternatively, from 21.4 to 16.5 percent of the total cost of the policy package (see Figure 8).

[46] At least this is the case in our costing exercise. However, in reality, different workers will opt for, or be directed toward, different education and training interventions that are going to vary in terms of duration and cost. Nevertheless, our education and training support for the 'average' coal mining industry worker within a given skill grouping provides a broad, and useful, approximation of the costs of such a policy.

Figure 8: Social protection policy package costs by component by scenario – levels and shares (10% employment loss)



In policy package scenarios where it is present, the early retirement policy response is the third largest cost component. The cost of the policy adjusts according to the targeting. The *tailored policy* approach provides early retirement packages to near-retirement-age workers across all three skill groupings, while the *progressive* approach limits this support to only semi-skilled and unskilled workers. This translates into the former scenario providing early retirement support to the value of R234 million, and the latter providing support to the value of R126 million. If we adjust the targeting of the policy by

adjusting the cut-off age for being eligible for an early retirement package, then the costing will adjust accordingly. In the case of the *early retirement orientated* approach, we adjust the cut-off age from 55 to 45 and this results in the cost of the early retirement package increasing from R234 million (in the case of the *tailored policy* approach, which exhibits an identical targeting structure) to R1.3 billion. Again, comparing scenario 3 to scenario 5 is informative because they exhibit identical structures but different targeting and achieve a similar cost outcome. This suggests that one can adjust the targeting of these social protection policies based on one's assessment of the labour market, and still potentially achieve a similar cost outcome. For example, one may feel that, given already high levels of unemployment in South Africa, older workers are unlikely to find alternative employment opportunities, in which case, the *early retirement orientated* approach is the optimal approach.

Mobility assistance support, which only features in the *tailored policy* and *early retirement orientated* approaches, represents the smallest cost component. This policy costs R16 million and R14 million in the *tailored policy* and *early retirement orientated* approaches, respectively, which represents less than a percent of the total cost in each of these scenarios. Seemingly, the lower cost, and hence the allocation of fewer funds toward the policy, makes intuitive sense since the policy is targeted toward the skilled worker groups who are best placed to absorb the adverse employment shock. An objective of the social protection framework should be toward orientating funds to those least able to absorb the adverse employment shock. Nevertheless, the cost of this policy could shift higher should the policymaker feel that a greater cohort of workers would be both willing and able to relocate, which would be closely linked to where alternative employment opportunities are located, and whether coal mining industry workers can access these opportunities.

Overall, our findings underscore the trade-offs between comprehensiveness, equity, and fiscal prudence. Scenarios designed to improve long-term protection and provide full income replacement such as the *big grant* approach, inevitably entail higher costs, while more selective and efficiency-driven frameworks, such as the *tailored policy* and *progressive* approaches, deliver relatively moderate fiscal exposure but require stronger implementation and labour market absorption.

5 FINANCING SOUTH AFRICA'S JUST TRANSITION SOCIAL PROTECTION POLICY RESPONSE

In this section, we provide a discussion on the potential financing of a social protection response to the energy transition. Our discussion is guided by Stanley et al. (2018), who advise that when devising a social protection support package for workers set to be displaced by a future energy transition, it is prudent to leverage existing social protection measures and supplement where necessary. In particular, we take the costing, or funding requirements, of the five social protection policy scenarios (detailed in Section 4) and investigate the extent to which the various social protection policy components can be funded by existing social protection policies in South Africa. In comparing the funding requirements to

the funding that is accessible in existing social protection measures, we can identify funding gaps associated with the basket of social protection policies.

5.1 Funding gaps

Our approach is as follows: First, for each of the policy interventions that comprise our policy package, we assess whether any of the existing social protection measures, detailed in Section 2, align in terms of objective and application. Second, we apply the existing social protection measure to the relevant policy matrix grouping and estimate the funding that could emerge, or become accessible, from the application of the policy. Third, to calculate the policy funding gap, we subtract the funding amount that is potentially accessible from the required funding, as per our costing in Section 4. Fourth, we sum the estimated funding gaps across the polices that comprise the policy package, and this gives us a total funding gap for the policy package as a whole. We do this for each policy package costing scenario and present our calculations in Table 11. It is important to note that we do not annualise the policy costs, but rather deal with the total policy cost, and hence the total funding gap associated with each policy. We do this for each costing scenario.

We start by considering the funding of the largest policy component across all five social protection policy packages – the temporary income support offering. As noted in Section 2, the grant system is not designed to assist relatively well-paid workers, such as coal mining industry workers. For example, the SRD grant – representing one percent of the median coal mining industry wage – would provide insufficient livelihood support. The social insurance system offers more income support and is designed to support workers facing job loss through retrenchment. In particular, for the *universal transition payment* and *big grant* approaches, we apply the UIF policy, administrated by the Department of Employment and Labour, to provide temporary income support. For the other three scenarios, we apply the TERS policy, administered by the Department of Employment and Labour and the Unemployment Insurance Fund. We explain the difference in application below. In our calculations we apply the policy according to its design – as detailed in Section 2.4.

To support the temporary income support policy, we apply the UIF policy to the two grant-orientated costing scenarios – the *universal transition payment* and *big grant* approaches. Here we take the number of displaced workers within the relevant policy matrix grouping and multiply by the maximum monthly payout and the maximum duration of the policy. For example, the *universal transition payment* approach provides temporary income support to all displaced workers for one year, which means we take the

maximum monthly payout of R6 638 for a period of 12 months and multiply this by the number of displaced workers at a 10 percent retrenchment rate (7 847).[47]

In Table 11 we show the required funding for each policy for each costing scenario, the accessible funding available through existing social protection policy, and the funding gap (the difference between the two). We show that the *universal transition payment* (scenario 1) approach can leverage (access) R625 million in funds from the UIF, and given that the policy requires R2.3 billion to provide temporary income support, there is a funding gap of R1.7 billion.[48] This is also the total funding gap for scenario 1, since it only provides temporary income support in form of a severance package.

In the case of our most-costly social protection policy package scenario – the *big grant* approach – R569 million can be leveraged from the UIF for temporary income support, while the package requires R10.1 billion for this policy, leaving a funding gap of R9.5 billion.[49] As noted above, the size of the funding gap is driven by the generous level and duration of temporary income support. The UIF only provides funding for one year, while the *big grant* approach requires temporary income support for five years, and we thus assume that we can only access one year's worth of UIF funding. It is worth noting further that in addition to providing a portion of the funding to cover temporary income support for displaced workers, a key contributing factor to using the UIF is that one can leverage the administrative infrastructure and systems developed by the DoEL and the UIF.

For scenarios 3 to 5 we use the TERS to contribute to the temporary income support policy. The TERS are more applicable in the case of these scenarios because they offer both temporary income support and education and training support to displaced workers, which aligns with the structure of the TERS support – see Section 2.3.2.[50] With respect to temporary income support, we take the maximum monthly support amount for the full period of support (12 months) and multiply it by the

[47] By way of simplification, we take the maximum UIF payout, since the median monthly wage for coal mining industry workers (R35 871) is well above the UIF threshold (R17 712), and the average job tenure of coal mining industry works is 7.5 years; thus, on average, affording them the full payout period of 12 months. See Section 2.3.1.

[48] Details on calculation provided in Appendix Table A 3. The duration of the UIF and the universal transition payment approach is the same at one year.

[49] Details on calculation provided in Appendix Table A 4. The funds leveraged from the UIF are smaller in relation to scenario 1 because the total number of workers receiving temporary income support is less, which is because the older worker cohorts receive an early retirement package.

[50] Conversely, we do not apply the TERS to scenario 1 and 2 because the policy package for these scenarios does not include education and training support – a funded element of the TERS.

number of workers for which the policy applies (as per the policy matrix).[51] The TERS only provide one year of funding, and thus the accessible funding represents only one year of this funding.

Table 11: Funding gaps by policy for each social protection policy package scenario

Scenario	Funding (Rm)	Temporary income support (Rm)	Education and training support (Rm)	Mobility assistance (Rm)	Early retirement package (Rm)	Total funding gap (Rm)
Universal transition payment	Required (A)	2 275				1 650
	Accessible (B)	625				
	Gap (A - B)	1 650				
Big grant	Required (A)	10 109			234	9 774
	Accessible (B)	569				
	Gap (A - B)	9 540			234	
Tailored policy	Required (A)	2 974	876	16	234	2 614
	Accessible (B)	1 194	292			
	Gap (A - B)	1 780	584	16	234	
Progressive	Required (A)	1 542	474		188	1 389
	Accessible (B)	657	158			
	Gap (A - B)	885	316		188	
Early retirement	Required (A)	2 132	676	14	1 261	2 664
	Accessible (B)	1 194	225			
	Gap (A - B)	938	451	14	1 261	

Notes: Costing applied at the 10 percent retrenchment rate.

In Table 11 we show the funding gaps pertaining to the temporary income support policy for the *tailored policy*, *progressive* and *early retirement orientated* approaches. The *tailored policy* approach (scenario 3) requires R2.9 billion in temporary income support, and is able to leverage R1.2 billion from the TERS, leaving a funding gap of R1.8 billion.[52] The *progressive* approach (scenario 4) cuts temporary income support substantially to approximately R1.5 billion, and after accessing TERS funding of R657 million, and at approximately R885 million, the funding gap is smaller.[53] Given that the *early retirement orientated* approach (scenario 6) provides temporary income support to fewer workers than the structurally

[51] We take the maximum TERS payout, since the median monthly wage for coal mining industry workers (R35 871) is well above the UIF threshold (R21 812), and the policy offers income support that is 75 percent of the threshold (R16 359). See Section 2.3.2.

[52] Details on calculation provided in Appendix Table A 5.

[53] Details on calculation provided in Appendix Table A 6.

similar *tailored policy* approach (scenario 3), at R2 billion, the required funding is relatively lower, and after taking into account funding accessible from the TERS, the funding gap is R938 million.[54]

For education and training support one could leverage off the TERS. As part of the TERS, the relevant SETA covers the cost of the training for a full year, which means that one could access these funds to cover a portion of the training costs envisioned in our education and training support policy. Since the SETA covers one year of training, and our envisioned policy provides three years of training support (in the case of semi-skilled and unskilled workers to which this policy applies), we assume that the SETA will cover a third of the estimated costs of the education and training support policy. As per the policy structure of the costing scenarios, education and training support only applies to scenarios 3 through to 5.

The funding gaps pertaining to the education and training support policy correlate with quantum of workers receiving this policy intervention. The *tailored policy* approach, which provides this type of support to all workers within the semi-skilled and unskilled groups, requires R876 million, is able to access R292 million, and thus has a funding gap of R584 million. The *early retirement orientated* approach offers this support to the same groupings of workers, but because of the lower early retirement age threshold, fewer workers require this support, and so the funding gap (R451 million) is lower for this policy package scenario. The *progressive* approach offers education and training support to fewer workers – when compared to the *tailored policy* approach, it excludes middle-age semi-skilled workers. As such, this costing scenario requires R474 million, is able to access R158 million, and with a resultant funding gap of R316 million.

With respect to the mobility support policy, we are unable to find a funding source within South Africa's existing social protection system. As a result, the entire cost, albeit small in comparison to the other policy elements, is marked as a funding gap.

Similarly, in the case of the early retirement package policy. The approach to our costing of this policy means that the entire cost can be considered a funding gap. Provident or pension fund contributions are paid by the firm and the employee, and these contributions continue until retirement, whereupon the employee proceeds to access these retirement savings. As per Section 3.4.3, the costing of the early retirement packages is structured such that, should an employee decide to accept the package, the remaining contributions that the employee would have accumulated in the fund – should s/he have continued to work until retirement age – would be covered as part of the package. There is no existing social protection policy that covers this scenario, which means that the entire cost of the policy is considered as a funding gap.

[54] Details on calculation provided in Appendix Table A 7.

In summary, the funding gaps vary across the five policy package scenarios, with the total funding gaps being driven by the largest cost component – the temporary income support policy. The *big grant* approach, being the costliest of the five scenarios, has the largest funding gap of R9.8 billion. The magnitude of the funding gaps follows the magnitude of costs of the policy packages, which is evident when we look at the four other policy package scenarios.

5.2 Fiscal perspective of funding gaps

We have detailed the costing of several social protection policy packages and identified existing policies, and associated institutional infrastructure, that could be leveraged to assist in terms of funding and implementation. By applying these policies to displaced coal mining industry workers, we have estimated a level of funding that could emerge from these existing policies and, in doing so, we have measured funding gaps for each of the policy package scenarios. We now examine our cost estimates in relation to budgetary information from the relevant institutions responsible for these policies. This offers a perspective on the relative magnitude of the funding requirements of these social protection policies aimed at supporting displaced coal mining industry workers.

As discussed in the previous section, we apply the UIF policy to support the temporary income support policy within the two grant-orientated costing scenarios – the *universal transition payment* (scenario 1) and *big grant* (scenario 2) approaches. Our aim is to show the actual UIF coverage and expenditure on social insurance linked to unemployment (columns 2, 3, and 4 of Table 12), and then show, hypothetically, the extent to which the UIF coverage and expenditure is required to increase to cover the costs of the temporary income support policy for coal mining industry workers – as per scenarios 1 and 2 (columns 6 to 11 of Table 12). This information is summarised in Table 12 where we use the 10 percent retrenchment rate scenario. In this section, we annualise the policy package costs in order to align with the institutional budgets that we are comparing our cost estimates to. [55]

[55] Note that for this earlier analysis we did not annualise the costs for each policy package scenario but instead looked at the lump sum cost of the policy package. The purpose of which was to gain an overall sense of the funding gaps before considering the costs at an annual level, which we do in this section.

Table 12: UIF-approved claims and amount paid and hypothetical application of scenarios 1 and 2

UIF	Actual levels as of 2022/23			Hypothetical percentage increase resulting from temporary income support offered to retrenched coal mining industry workers						
	Approved claims	Amount paid (Rm)	Cost per claim	Scenario	Requisite increase in approved claims		Increase in amount paid		Increase in cost per claim	
					Level	%	Level (Rm)	%	Level	%
Unemployment-related UIF claims and costs	873 222	12 417	14 220	1	7 847	0.90	2 274	18.31	2 454	17.26
				2	7 142	0.82	2 021	16.28	2 180	15.33

Source: UIF (2021; 2022; 2023)

Notes: 1. Scenario 1 = universal transition payment approach; Scenario 2 = big grant approach. 2. The increase in the approved claims assumes that all workers set to receive temporary income support in scenarios 1 and 2 receive this support, and the percentage increase is based on these level increases. 3. The percentage increase in the amount paid draws upon the cost estimates in Section 4 and measures how this value increases the amount paid and the percentage increase (detailed estimates provided in Appendix Table A 2). 4. The cost per claim is measured as the amount paid divided by the number of approved claims. This is done for the hypothetical scenario based on the estimated increase in the amount of UIF paid to coal mining industry workers. 5. In the case of the big grant approach, which spans five years, we annualise the costs.

Given this hypothetical scenario, we note that the number of unemployment-related UIF claims would increase marginally, but that the level of expenditure to support workers would have to increase substantially. The *universal transition payment* approach requires temporary income support for 7 847 workers, and the *big grant* approach requires income support for 7 142 workers.[56] Hypothetically, if one were to add the aforementioned number of coal mining industry workers requiring temporary income support to the overall number of approved unemployment-related UIF claims, the number of claims would increase by approximately 0.9 and 0.82 percent for scenarios 1 and 2, respectively.

While the number of workers (claims) would rise marginally, the financial resources directed toward claims from coal mining industry workers would increase overall costs substantially. In value terms, the *universal transition payment* approach and the *big grant* approach require R2.2 and R2 billion for temporary income support, respectively. Again, hypothetically, if one were to add these temporary income support costs to the actual UIF expenditure levels, shown in Table 12, we would get a sense of how much the UIF spend would need to increase to cover the social protection policies provided to displaced coal workers. We observe that for scenario 1 and 2, UIF spend on the unemployed would need to increase by 18.32 and 16.28 percent, respectively. Relatedly, the cost per claim would rise by 17.26 and 15.33 percent, respectively. It is important to note that the increase in UIF coverage and spend would be for one year in the case of the *universal transition payment* approach. However, while the annual increase in UIF coverage and spend would be slightly less under the *big grant* approach, this increase will extend for five years.[57]

As detailed in Section 5.1, we apply the TERS component of the Labour Activation Programme to support the temporary income support policy for scenarios 3 to 5. Again, we aim to show the actual coverage and expenditure of the LAP (column 2 of Table 13), and then show, hypothetically, the extent to which this coverage and expenditure would need to increase in order to cover the costs of the temporary income support policy for coal mining industry workers – as per scenarios 3 through to 5 (columns 4 and 5 in Table 13). Recall, we apply the TERS support in scenarios 3, 4, and 5 because the TERS support comes with an education and training support component. This information is summarised in Table 13 where we use the 10 percent retrenchment rate scenario.

In applying our hypothetical case, we observe that the coverage, in terms of number of recipients, and the level of expenditure on the LAP, would both need to increase substantially to cover the temporary

[56] The *big grant* approach requires temporary income support for fewer workers than the *universal transition payment* approach because the latter offers this support to all retrenched workers, whereas the former offers early retirement packages to the older worker cohorts.

[57] Again, for the purposes of simplicity, we assume a once-off retrenchment in 2030, which means that in the case of the *big grant* approach, for the years 2030 to 2034, UIF coverage and costs would have to increase by our estimated amounts detailed in Table 12.

income support for coal mining industry workers. The number of recipients would need to increase by 6 084 recipients in the case of scenarios 3 (72 percent increase), 3 348 recipients in the case of scenario 4 (40 percent increase) and 4 688 recipients in the case of scenario 5 (55 percent increase). Notably, such an increase would bring the number of beneficiaries in line with the targeted number of beneficiaries (15 000). The expenditure on the LAP, including TERS, would require a large increase to cover the requisite temporary income support. Across the four applicable scenarios, expenditure would need to increase by between R445 and R883 million, or between 52 and 103 percent. Depending on the structure of the policy package, this annual increase would need to be sustained for between three and five years. Notably, the actual budget for LAPs is R3.1 billion and the actual spend is R854 million. Thus, there appears to be budgetary space to use a policy such as TERS to support displaced coal mining industry workers. However, it is notable that, should such scenario materialise, a disproportionate chunk of the budget would go to between 3 000 and 6 000 coal workers. We also note that the cost per beneficiary would rise substantially – depending on scenario, between 31 and 43 percent on an annual basis.

Table 13: Labour Activation Programme targets, outcomes and spending and hypothetical application of scenarios 3 to 5

Labour activation programmes	**Actual levels based on report for period 2022/23**	**Hypothetical percentage increase resulting from temporary income support offered to retrenched coal mining industry workers, by scenario**		
		Scenario	Requisite increase	
			Level	%
Target beneficiaries	15 000			
Actual beneficiaries	8 457	3	6 084	71.94
		4	3 348	39.59
		5	4 688	55.43
Budget (Rm)	3 156			
Expenditure (Rm)	854	3	883	103.40
		4	445	52.11
		5	664	77.75
Cost per beneficiary	100 948			
		3	44 187	43.77
		4	31 967	31.67
		5	40 690	40.31

Source: UIF (2021; 2022; 2023)

Notes: 1. Scenario 3 = Tailored policy approach; Scenario 4 = Progressive approach; Scenario 5 = Early retirement orientated approach. 2. Actual levels in column 2 include the targeted number of beneficiaries and associated budget. They also include the actual number of beneficiaries and associated expenditure. Our hypothetical increases are based on the latter. 3. Column 4 shows the requisite increase in the number of beneficiaries, the increase in annual expenditure, and the increase in expenditure per beneficiary.

Education and training support features as a key policy in three of the five social protection costing scenarios. In particular, education and training support is attached to temporary income support in scenarios 3 through to 5. In Section 5.1 we note that the TERS policy is potentially applicable in these

scenarios as it offers both income support and education and training support. The education and training support is covered by the relevant SETA, which is funded by the skills development levies paid by firms within the relevant industry. To gain a fiscal perspective on the education and training support, we compare our cost estimates for this support (annualised) to the current skills development expenditure by the Mining Qualifications Authority (MQA) – the SETA covering the mining sector. In Table 14 we provide information from the MQA on total expenditure and total participants linked to the provision of MQF discretionary grants.

Table 14: Mining Qualifications Authority SETA expenditure, 2023/24

MQF discretionary grants	Actual levels reported in MQF annual report 2023/2024	Hypothetical percentage increase resulting from education and training support offered to retrenched coal mining industry workers, by scenario		
		Scenario	Requisite increase	
			Level	%
Actual beneficiaries	16 427	3	6 084	37.04
		4	3 348	20.38
		5	4 688	28.54
Expenditure (Rm)	1 274	3	292	22.92
		4	158	12.40
		5	225	17.69

Source: MQA SETA (2024)

Hypothetically, should the MQA be employed to provide education and training support to displaced coal workers, this would require an increase in activity and cost. Currently, the MQA provides education and training support to 16 427 individuals. Should the MQA be required to provide such support, then the number of beneficiaries receiving this support would increase by 6 084, 3 348, and 4 688 in the case of the *tailored policy*, *progressive* and *early retirement orientated* approaches, respectively. Scenario dependent, this corresponds with a percentage increase in beneficiaries of between 20.38 and 37.04 percent. Expenditure on discretionary grants for education and training would need to increase by between R158 million and R292 million on an annual basis, which corresponds with a percentage increase of between 12.4 and 22.92 percent. As per the duration of these education and training interventions, these increases would last for three years.

In summary, in hypothetically applying the UIF to displaced workers, we observe that while the number of worker claims would rise marginally, the financial resources directed toward claims would increase overall costs substantially. Similarly, in applying the TERS, we observe that the number of recipients and the level of expenditure on these recipients would both need to increase substantially to cover the temporary income support for coal mining industry workers. A key concern for the policymaker is that the application of these policies to coal workers would entail that a large chunk of fiscal resources are disproportionately directed toward a relatively small group of beneficiaries. In the case

of education and training support, the provision of such support for displaced coal workers by the relevant SETA would require a substantial increase in skills development provision and spend.

6 CONCLUSION

Given South Africa's current energy transition, the demand for coal is set to decline. The reduced demand for coal will bring about the closure and scaling down of coal mining activity, which in turn will lead to the retrenchment of coal mining industry workers. These workers, and their households, face unemployment and the loss of livelihood. The just transition is about addressing the dual responsibilities of reducing GHG emissions as well as addressing the socio-economic challenges of those affected by the transition. A key element to ensuring that South Africa's energy transition is just, is to provide workers the necessary support that would enable them to absorb the negative shock of the transition. Key to this is the design and formulation of an adequate social protection policy package for coal mining industry workers.

In this paper, we have advanced a method and approach that can be applied in designing a comprehensive social protection policy package for coal mining industry workers (or other groupings of workers set to be adversely affected by the energy transition). We refer to this method as the *just transition policy matrix* approach. Taking into account lessons from past mass coal mine closure episodes, detailed by Cunningham and Schmillen (2018), this approach formulates a basket of policy responses that are tailored to the respective needs of different groupings of at-risk coal mining industry workers. Using this method, we cost a basket of social protection policy responses for a set of potential employment loss scenarios. To examine how different policymaker objectives and assumptions impact on overall costing, we formulate and compare several social protection policy package scenarios where each orientates toward a different policy objective. This costing exercise provides us with a sense of the potential funding requirements of a just transition social protection policy package. We then take these funding requirements and investigate the extent to which the various social protection policy components can be financed by existing social protection policies in South Africa. Measuring the difference between the funding requirements and the funding that is accessible in existing social protection measures, we identify funding gaps associated with the basket of social protection policies.

We examine South Africa's social protection architecture in the context of the just energy transition with the purpose of ascertaining the extent to which existing social protection policies can be leveraged to support displaced workers. We note that the grant system is going to be of limited use to displaced coal workers because it is geared toward providing social assistance to individuals and households that are in close proximity to the poverty line. The social assistance support offered by the grant system would be inadequate to sustain the livelihood, even in part, of the coal mining industry worker. Given available funding and existing administrative infrastructure, the social insurance pillar – with additional fiscal support – is better placed to assist displaced coal workers. In particular, we find that the UIF and

the LAP, and specifically the TERS, offer the greatest potential for being leveraged to support displaced workers. We also find that, given high pension coverage among coal mining industry workers, South Africa is well placed to include an early retirement package policy as part of a just transition social protection policy package. However, the use of early retirement packages would require additional funding to cover the gap in contributions incurred by workers who retire before their due-retirement age.

The *just transition policy matrix approach* is a microdata-based method that informs the allocation of social protection policy responses according to the characteristics – and hence needs – of displaced workers. Using microdata, we generate age-skill worker cohorts, which form the structure of our policy matrix. For each cohort, we assign a policy that addresses the respective needs of that group of workers. Informed by social protection policies applied in previous energy transition episodes in other countries, the basket of social protection policies includes four main policies: temporary income support; mobility support; education and training support; and early retirement packages. The policy matrix comprises a basket of social protection policies, which we cost based on our costing methodology. To see how different policy orientations impact on costs, we provide five costing scenarios that differ by policy orientation. These are all costed for three retrenchment rate scenarios.

The five costing scenarios exhibit total costs that range between R2.2 and R10.3 billion. When benchmarking these social protection policy basket scenarios against existing social spending commitments in the national budget, we observe that the total cost of each scenario remains relatively modest. As a share of South Africa's current social protection budget, the lump sum costs of these social protection policy baskets range between 0.6 and 2.7 percent, and in the higher retrenchment rate scenario, between 0.8 sand 4 percent.

The highest-cost scenario – the *big grant* approach – costing R10.3 billion is orientated toward complete income replacement by providing temporary income support that is extensive both in duration and magnitude. The lowest cost scenario – the *universal transition payment* approach – costing R2.2 billion prioritises policy simplicity and consists solely of a once-off severance package for displaced workers. However, this policy package, which distributes temporary grant income that is proportional to worker income, generates a regressive outcome. The *progressive* approach provides an example of how social protection policy can be tailored to target vulnerable cohorts of workers and thereby achieve a more progressive distribution of fiscal resources, yet at the same cost. Comparing the *tailored policy* and the *early retirement orientated* approaches is informative. The composition of the support of the latter is orientated away from education and training and temporary income support, and rather directed toward early retirement package support. Thus, while the *tailored policy* approach invests in reskilling and labour market attachment, the *early retirement orientated* approach design achieves comparable fiscal outlay by permanently withdrawing a cohort of older workers from the labour market. In effect,

the policymaker faces a policy trade-off: invest in active labour market reintegration or subsidise permanent labour market exit for a cohort unlikely to be re-employed. The equivalence in cost, despite this structural divergence, is a critical insight for policy design, particularly in the context of capacity-constrained labour markets where older displaced workers encounter prolonged unemployment or limited reabsorption into formal employment.

Temporary income support drives total costs across all five costing scenarios. This is due to this cost component being a function of worker income and, as pointed out in Bhorat et al. (2025), coal mining industry workers earn comparatively high wages. The education and training support component is the next most-costly policy. The temporary income support component is tied to the education and training support component as it is important that workers maintain their livelihoods while undergoing the retraining needed to remain attached to the labour market. Together these two polices drive the overall social protection policy basket cost. The next most-costly policy component is the early retirement package. However, it is worth noting that, if the policymaker feels that a greater cohort of workers should be offered such support, then this cost component can increase substantially – as evidenced in the costing of the *early retirement orientated* approach. The least-costly policy component is the mobility assistance support policy. This makes sense since the policy is targeted toward the skilled worker groups who are best placed to absorb the adverse employment shock, and the objective of the social protection framework should be toward orientating funds toward those least able to withstand such a shock.

To gain insight into potential sources of financing for a social protection support package for displaced workers, we examine whether existing social protection measures can be leveraged and, if insufficient, the extent to which they require supplementing. We contend that there is potential for the UIF and labour activation programmes, such as the TERS, to be leveraged to support displaced workers. When applying these policies to our costing scenarios, we find that there are funding gaps present across all five policy package scenarios, and that these funding gaps are driven by the most-costly policy component – the temporary income support policy. The *big grant* approach, being the most-costly of the five scenarios, has the largest funding gap of R9.8 billion. The magnitude of the funding gaps follows the magnitude of the costs of the policy packages. Given these funding gaps, additional fiscal resources are required to finance a social protection policy package for displaced workers.

In hypothetically applying the UIF to displaced workers, while the number of worker claims would rise marginally, the financial resources directed toward claims would increase overall costs substantially. Similarly, in applying the TERS, we observe that the number of recipients and the level of expenditure on these recipients would both need to increase substantially to cover the temporary income support for coal mining industry workers. In the case of education and training support, the provision of such support for displaced coal workers by the relevant SETA would require a substantial increase in skills

development provision and spend. A key concern for the policymaker is that the application of these policies to coal workers would entail that a large chunk of fiscal resources are being disproportionately directed toward a relatively small group of beneficiaries.

The above *just transition policy matrix approach* then has attempted to measure the potential cost and funding of a just transition out of coal production and consumption. It should be clear that the just transition pathway chosen – as represented by our different scenarios – bring with them heterogenous outcomes in terms of cost, funding gaps, and also institutional involvement. It is to the design of an exact policy response, based on administrative data, that the next phase of this research needs to turn to.

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APPENDIX I

TABLE A 1: SUMMARY OF SOCIAL PROTECTION POLICY SCENARIOS AND RELATIVE COST

Scenario	Description	Cost (Rb)			Share of total social assistance and social insurance budget		
		5%	10%	15%	5%	10%	15%
Scenario 1: *Universal transition payment* approach	A once-off transitional assistance package in the form of a severance grants equal to one year's wage for all affected workers. It is simple, easy to administer, and offers cost certainty. However, its short duration may inadequately support re-employment, particularly for unskilled workers.	1.137	2.275	3.412	0.29%	0.59%	0.88%
Scenario 2: *Big grant* approach	This scenario increases the duration of income support to five years and adding early retirement benefits for mature workers. While this maximises financial relief, it imposes a substantial fiscal burden and risks reducing incentives for labour market reattachment, particularly among younger displaced workers.	5.172	10.343	15.515	1.34%	2.67%	4.01%
Scenario 3: *Tailored policy* approach	Applies differentiated support based on worker needs. For example, unskilled workers receive extended training and income support, while skilled workers receive only mobility assistance.	2.051	4.102	6.152	0.53%	1.06%	1.59%
Scenario 5: *Progressive* approach	Directs support toward the most vulnerable cohorts of the workforce, thereby curtailing costs while directing fiscal resources to those least able to absorb the employment-loss shock.	1.103	2.205	3.308	0.28%	0.57%	0.85%
Scenario 6: *Early retirement-oriented* approach	Reduces the retirement age threshold to 45, increasing the pool of eligible older workers for early exit. This may help pre-empt prolonged unemployment among older cohorts but shifts the fiscal burden forward. Further, it does not address reintegration for the remaining workforce.	1.920	4.083	6.123	0.50%	1.05%	1.58%

Source: National Treasury (2024)

Notes: Shares represent total social protection cost for each scenario as a share of total social protection budgetary allocation as per the 2024/25 National Budget.

Table A 2: Social protection policy package costs by component by scenario (10% employment loss)

Scenario	Mobility assistance cost	Temp. income support cost	Early retirement cost	Education and training cost	Total cost
Universal transition payment		2 274 792 568 1,0			2 274 792 568
Big grant		10 109 283 058 0,98	234 007 104 0,02		10 343 290 162
Tailored policy	16 437 326 0,00	2 974 856 547 0,73	234 007 104 0,06	876 251 700 0,21	4 101 552 677
Progressive		1 542 389 107 0,70	188 872 664 0,09	474 074 4000 0,21	2 205 336 171
Early retirement	14 442 092 0,00	2 131 903 820 0,52	1 260 637 281 0,31	675 561 000 0,17	4 082 544 192

Notes: Top number represents cost level (Rb) for each respective social protection policy component for each scenario, while the bottom number represents that component's share of total cost for a given scenario.

Table A 3: Funding gap for Scenario 1 – *Universal transition payment* approach

Policy	Existing policy and dept. responsible	Coverage (see section 2)	Funding		
			Required (A)	Accessible (B)	Gap (A - B)
Temporary income support	UIF administered by the DoEL and UIF	R6 638 per worker (7 847) for 12 months	R2 275m	R625m	R1.650b
Education and training support	N/A				
Mobility assistance	N/A				
Early retirement package	N/A				
Total			R2.275bn	R625m	R1.650bn

Notes: Accessible funding informed by discussion in Section 2 and Section 3.5.1. Required funding informed by discussion in Section 4.1. Cells shaded in grey mean that policy does not apply in given scenario.

Table A 4: Funding gap for Scenario 2 – *Big grant* approach

Policy	Existing policy and Dept. responsible	Coverage (see section 2)	Funding		
			Required (A)	Accessible (B)	Gap (B-A)
Temporary income support	UIF administered by the DoEL and UIF	R6 638 per worker (6 084) for 12 months	R10.109bn	R569m	R9.540bn
Education and training support	N/A				
Mobility assistance	N/A				
Early retirement package	Provident/pension fund manager	All retirement age employees contributing to a provident/pension fund	R234m		R234m
Total			R10.343bn	R569m	R9.774bn

Notes: Potential funding informed by discussion in Section 2 and Section 3.5.2. Required funding informed by discussion in Section 4.1

Table A 5: Funding gap for Scenario 3 – *Tailored policy* approach

Policy	Existing policy and Dept. responsible	Coverage (see section 2)	Funding		
			Required (A)	Accessible (B)	Gap (B - A)
Temporary income support	TERS administered by the DoEL and UIF	R16 359 per worker (6 084) for 12 months	R2 974m	R1 194m	R1 780m
Education and training support	TERS administered by the DoEL and UIF	Tuition covered for one year by SETA	R876m	R292m	R584m
Mobility assistance			R16m		R16m
Early retirement package	Provident/pension fund manager	All retirement age employees contributing to a provident/pension fund	R234m		R234m
Total			R4 100m	R1 486m	R2 614m

Notes: Potential funding informed by discussion in Section 2 and Section 3.5.3. Required funding informed by discussion in Section 4.1

Table A 6: Funding gap for Scenario 4 – *Progressive* approach

Policy	Existing policy and Dept. responsible	Coverage (see section 2)	Funding		
			Required (A)	Accessible (B)	Gap (B - A)
Temporary income support	TERS administered by the DoEL and UIF	R16 359 per worker (3 348) for 12 months	R1 542m	R657m	R885m
Education and training support	TERS administered by the DoEL and UIF	Tuition covered for one year by SETA	R474m	R158m	R316m
Mobility assistance	N/A				
Early retirement package	Provident/pension fund manager	All retirement age employees contributing to a provident/pension fund	R188m		R188m
Total			R2 204m	R815m	R1 389m

Notes: Potential funding informed by discussion in Section 2 and Section 3.5.5. Required funding informed by discussion in Section 4.1

Table A 7: Funding gap for Scenario 6 – *Early retirement orientated* approach

Policy	Existing policy and Dept. responsible	Coverage (see section 2)	Funding		
			Required (A)	Accessible (B)	Gap (B-A)
Temporary income support	TERS administered by the DoEL and UIF	R16 359 per worker (6 084) for 12 months	R2 132m	R1 194m	R938m
Education and training support	TERS administered by the DoEL and UIF	Tuition covered for one year by SETA	R676m	R225m	R451m
Mobility assistance	N/A		R14m		R14m
Early retirement package	Provident/pension fund manager	All retirement age employees contributing to a provident/pension fund	R1 261m		R1 261m
Total			R4 083m	R1 419m	R2 664m

Notes: Potential funding informed by discussion in Section 2 and Section 3.5.5. Required funding informed by discussion in Section 4.1

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