TRADE & INDUSTRIAL POLICY STRATEGIES

POLICY BRIEF: 16/2020

Metals value chains in a climate-compatible world: A just transition approach

OVERVIEW

This policy brief aims to lay the ground for a just transition in South Africa's metals value chain as it pertains to climate change only. It contributes to understanding: a) the nature of the impacts facing the value chain; b) the characteristics of the stakeholders at risks (namely workers, communities and small businesses); and c) the nature of the resilience plan which is required to ensure a just transition.

Trade & Industrial Policy Strategies (TIPS) is a research organisation that facilitates policy development and dialogue across three focus areas: trade and industrial policy, inequality and economic inclusion, and sustainable growth

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INTRODUCTION

Climate change has been heralded as the most prominent challenge of the 21st century, compounding existing socio-economic problems, such as poverty and inequality. From a socio-economic perspective, addressing climate change and its impacts is a double-edge sword. New economic opportunities are emerging as a result of the need to mitigate and adapt to climate change but many jobs are at risk, dramatically evolving or being phased out. Climate change-related risks are in fact multifaceted, ranging from physical risks, such as droughts, sea-level rise and changing temperatures, to transition risks, such as policy developments, market trends and technological shifts (TCFD 2017; Wei and Chase 2018).

South Africa is particularly at risk. It is one of the most carbon-intensive as well as water-stressed countries, and will be hard hit by both physical and transition impacts of climate change. In addition, South Africa is an extremely unequal society, with persisting high levels of unemployment and poverty, making the transition to a more sustainable economy even more challenging. Yet a transition away from the current, unsustainable model of development is inevitable.

Traditionally, in a transition process, the most vulnerable groups of society, such as unemployed people, unskilled workers, women, the youth, small businesses, and low-income communities bear the brunt of the negative impacts and reap limited benefits. As such, to be socially desirable (and acceptable), a "just transition", which puts vulnerable groups at its core, is necessary. Such a "just transition" requires proactive plans to mitigate the negative impacts and, where inevitable, manage the transition. This requires identifying which sections of the economy and society are particularly at risk (Makgetla et al. 2020).

The metals value chain and the households and businesses relying on it for their livelihoods are one such example. Mining is one of the world's two basic industries (the other being agriculture) at the root of development. The extraction and processing of mineral resources to provide goods and services is as old as human development itself. Mining value chains are at the heart of society's material quality of life, providing resources that are integrated in almost every product and service around the world (ICMM 2012; WEF and Accenture 2014). Correspondingly, the transition to sustainable development will not take place without the metals provided by the value chain. Nevertheless, the transition constitutes a dramatic underpinning that will reshape the metals value chain, from the demand for specific metals to the methods of production to the access to essential inputs, such as energy and water.

Importantly, climate change impacts should not be understood in isolation from other dynamics at play in the value chain. Some industries, such as gold mining are, for instance, on the decline in South Africa due to factors beyond climate change (geology in this case). Others face peculiar cyclical conditions as a result of global dynamics (such as the oversupply of steel and aluminium from China). The global COVID-19 pandemic has furthermore had devastating impacts on both the supply and demand of metal products, triggering massive losses in the value chain (see Dednam 2020 for a discussion on the steel value chain).

The metals value chain will be deeply affected by climate change. Transition impacts linked to technology development and climate policy will dominate, although physical impacts may affect energy and water security.

NO ONE-SIZE-FITS ALL: MULTIFACETED IMPACTS CALL FOR A MULTI-PRONGED APPROACH

The metals value chain will be deeply affected by climate change. Transition impacts linked to technology development and climate policy will dominate, although physical impacts may affect energy and water security. Importantly, metal-specific dynamics have to be differentiated from cross-cutting trends. The impact depends on their timeframe and severity as well as the overall performance of the value chain.

On the supply side, direct policy risks have already started domestically. The manufacturing of metal products accounts for the largest share of industrial greenhouse gas (GHG) emissions in South Africa (74% in 2015), with steelmaking leading (DEA 2018). The introduction of carbon pricing (from June 2019) as well as mandatory carbon budgets (initially expected in 2020) will directly impact firms in the local value chain. In the long run, this will foster modernisation and improve competitiveness, including from a climate perspective. In the short term, such adjustments, by adding direct (financial) and adaptation costs, will have material consequences on subsectors currently facing difficult conditions, such as iron and steel production, aluminium smelting and gold mining.

Indirect policy risks may also impact the value chains on the supply side. Efforts to decarbonise energy supply by reducing the role of taxing and tightening environmental regulations on coal-fired electricity and fossil fuels for transport will, in the short term, add to the input costs of industries. This will compound ongoing energy price increases. While this has triggered material improvements in energy efficiency, it has negatively impacted competitiveness. Further price increases would worsen the impact, particularly on energy-intensive activities and marginal production facilities. Both mining operations (from electricity for underground mines and from diesel for open-pit mines) and refining/smelting activities are energy intensive and would be heavily impacted by further energy price increases (Montmasson-Clair and Ryan 2014).

Bulk commodities, such as copper, iron ore, zinc, manganese and chrome, will furthermore face an indirect impact through increased transport (shipping) costs. Rising fuel prices (carbon pricing) and more stringent environmental regulations (on fuel notably) are set to impact the trade in bulk commodities. While fuel prices have temporarily dropped due to the global shutdown induced by the COVID-19 pandemic, the 2016 decision by the International Maritime Organisation, known as MARPOL Annex VI, to apply a sulphur cap on bunker fuels of 0.5% from 1 January 2020, should lead to a rise in bunker costs worldwide in the near future (Shuaibu 2019).

Shareholders and stakeholders alike are also putting increasing pressure on corporations to disclose environmental impacts and report on climate change-related risks. This is particularly an issue for global and listed companies. An increasing number of firms have taken part in the CDP global climate change-related disclosure initiative, increasing from 220 in 2003 to 6 937 in 2018. In South Africa, 105 companies took part in 2018.[1] As financial institutions increasingly move away from carbon-intensive activities and jurisdictions, this may have a negative impact on some activities in the value chain.

Lastly, climatic events, such as droughts and floods, could have a localised impact on certain facilities and infrastructure. Water security (both from a supply and pricing perspective) would, for instance, have varying impacts. To ensure stable operations in times of drought and water restrictions, in October 2016 mining company South32 built a seawater reverse osmosis desalination plant at its aluminium smelter in Richards Bay, KwaZulu-Natal. Coupled with water efficiency improvements, the plant is also part of a strategy to contain water-related costs (Oliveira 2016). In the case of metals value chains, this risk is, however, marginal compared to transition risks, and remains uncertain and unpredictable.

On the demand side, transition risks, namely market and technological risks, predominate. From a market perspective, customers are increasingly moving away from carbon-intensive products and/or jurisdictions. The European Union has announced the introduction of a border carbon tax from 2023 to level the playing field for its domestic industries in terms of carbon pricing. Other jurisdictions, such as the United States of America, may also follow suit (Montmasson-Clair 2020).[2]

Both are key importers of embedded carbon from South Africa (see Figure 1). Although many of South Africa's facilities operate according to global standards in terms of resource efficiency, this is a critical issue for all industries in the country, given South Africa's carbon-intensive (coal-based) electricity

[1] See the CDP's website, www.cdp.net, for data and further information.

[2] India has also announced its intention to stop the import of thermal coal in the near future. and distributed by municipalities, which is cheaper.

Figure 1: Carbon embodies in South Africa's metals export per country (in MtCo2e

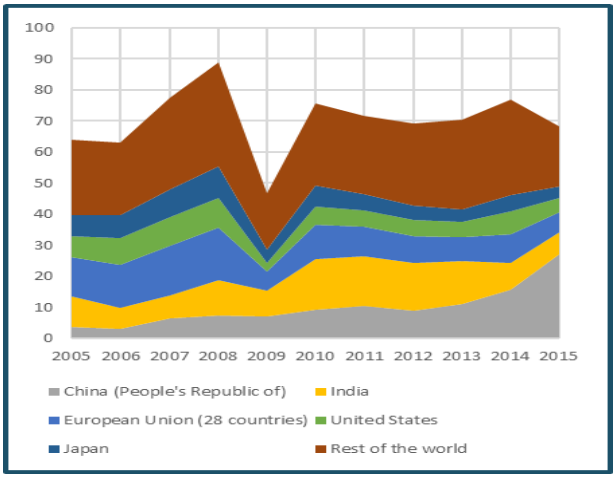
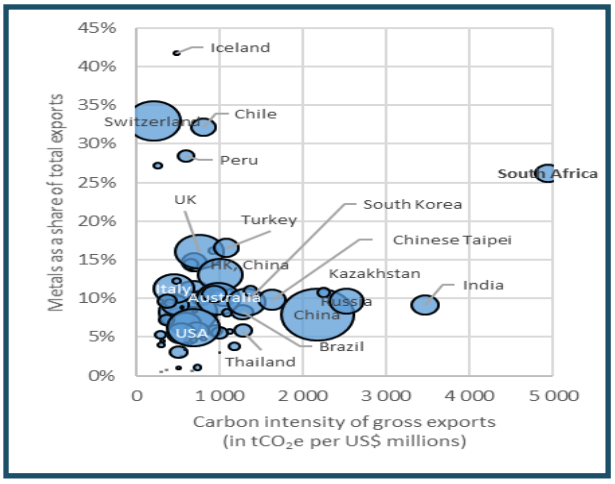


Figure 2: Metals export per country per carbon intensity, share of exports and export value



Source: Montmasson-Clair 2020

supply (see Figure 2). Modelling exercises show that non-ferrous metals (such as gold, platinum, copper, aluminium and cobalt) as well as iron and steel would be South Africa's primary victims of a change in trade patterns and the implementation of border carbon taxes (Cosbey and Wooders 2011; Jooste et al. 2009).

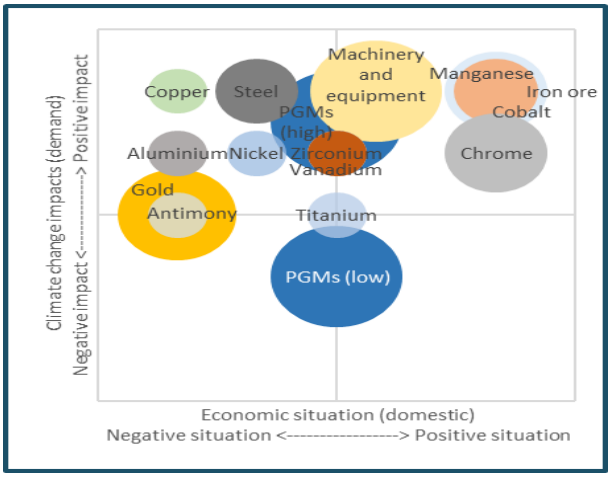
At the product level, innovation and technological change will alter demand for certain minerals and metals. With about 40% of the demand emanating from catalytic converters, for which usage is set to decline, and the growing role of recycling (accounting for 25% of supply), platinum group metals (PGMs) could be on the decline in the decades to come. If new PGM-dependent technologies, such as fuel cells, take off and foster demand, platinum could, however, witness strong growth. In fact, a number of metals are set to benefit at a global level due to increased demand spurred by new technological trends (such as solar panels, wind turbines, lightweight and electric vehicles, batteries and fuel cells). Manganese, iron, steel steel, copper, cobalt, titanium and aluminium are a few examples of metals forecasted to benefit in the long run (Hund et al. 2020; World Bank 2017).

In sum, no one-size-fits-all approach can be adopted. Metals value chains face a diversity of uncertain conditions in front of climate change impacts. Industry-specific dynamics and circumstances also matter. Growing global demand will not necessarily translate into clear-cut opportunities at the South African level. Global supply dynamics as well as local operating circumstances affect the performance and competitiveness of South African operations as well as their ability to seize global opportunities. A differentiated picture is required to understand the vulnerability of the existing metals value chain in the country.

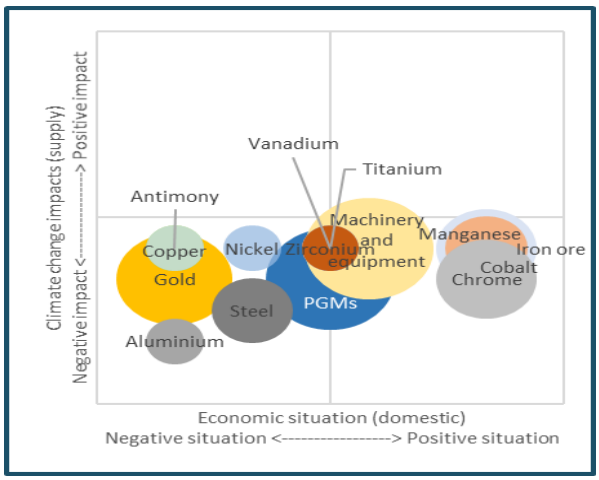
Figure 3 summarises the impact of climate change on both supply and demand and puts such impacts into perspective with the state of the local industry and employment numbers. It highlights that, in the short to medium term, supply-side impacts are expected to be negative, raising input cost for metals value chain. On the demand side, impacts are set to be mostly positive, leading to greater demands for most metals.

Figure 3: Climate change-related impacts on South Africa's metals value chain

Supply dynamics

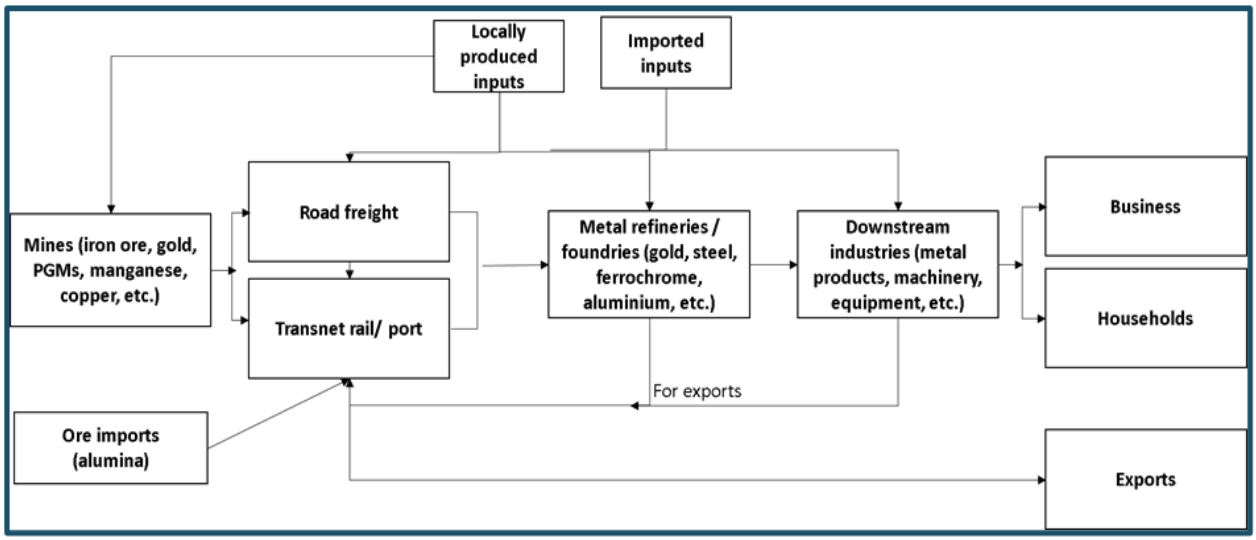


Demand dynamics



Source: Montmasson-Clair et al. 2020. Note: The bubble size indicates the relative size of domestic employment.

Figure 4: South Africa's metals value chain



Source: Montmasson-Clair et al. 2020

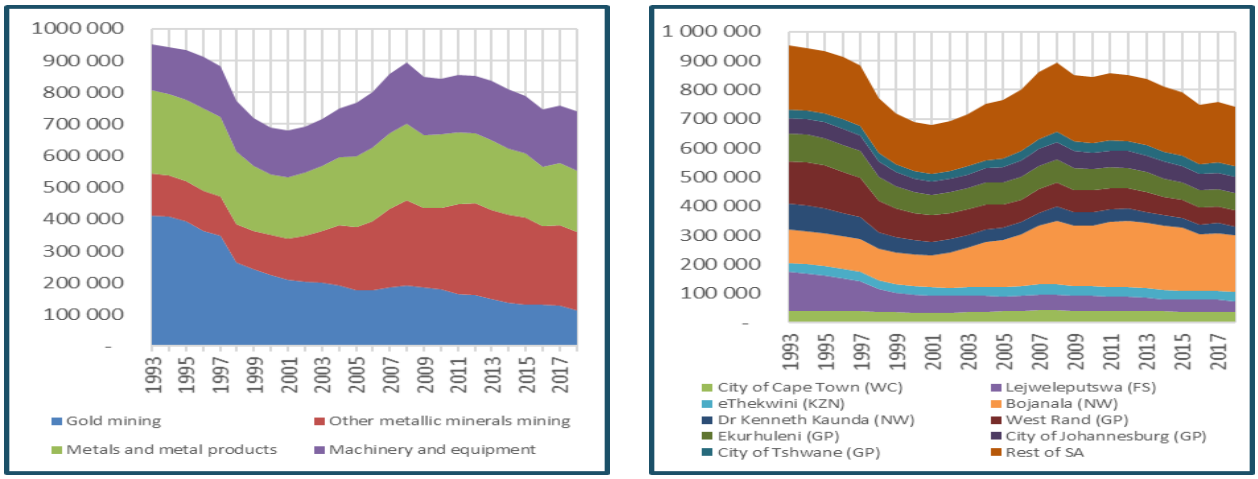
UNDERSTANDING THE VULNERABILITY FROM A JUST TRANSITION ANGLE

A value chain analysis of metals production and export in South Africa (depicted in Figure 4) highlights that climate change impacts will have widespread employment impacts, as a result of linkages with mining operations and other associated businesses, such as transport, equipment and services. Despite some decrease over the last decade, due to the decline of South Africa's gold mining and the end of the commodity boom in 2011, about 750 000 people were directly employed in the value chain in 2018 (see Figure 5). In addition, activities in the value chain support employment in industrial services (such as maintenance), electricity generation, water supply, rail and road transport and port operations. At the community level, many jobs in ancillary services (such as catering, security and cleaning) also depend on the value chain.

Importantly, direct employment in the value chain is functionally and geographically highly concentrated. Employment is located in five municipalities for (non-coal) mining, nine municipalities for metal production and eight municipalities for machinery and equipment manufacturing. As shown in Figure 5, there is significant overlap, with four areas (Bojanala in the North West, Lejweleputswa in the Free State, Dr Kenneth Kaunda in the North West and the West Rand in Gauteng) and five metropolitan areas (Johannesburg, Ekurhuleni, Tshwane, eThekwini and Cape Town) hosting the bulk of the value chain. The key spilt is between the large metros which host employment in metals and mineral products as well as machinery and equipment; and Bojanala, Lejweleputswa, Dr Kenneth Kaunda and West Rand, which host the mining employment.

This geographical split is a function of the concentration of employment in economic activities. Mining accounted for half of the direct employment in the value chain in 2018. Then, PGM and gold mining respectively accounted for half and 30% of the metals mining employment in the same year. Chrome and iron ore mining followed with 6% each. Other metallic minerals, such as manganese and copper, accounted for the remaining 10%.

Figure 5: Employment in South Africa's metals value chain



Source: Montmasson-Clair et al. 2020, based on Quantec data, series on employment and compensation, downloaded from www.easydata.co.za in July 2019

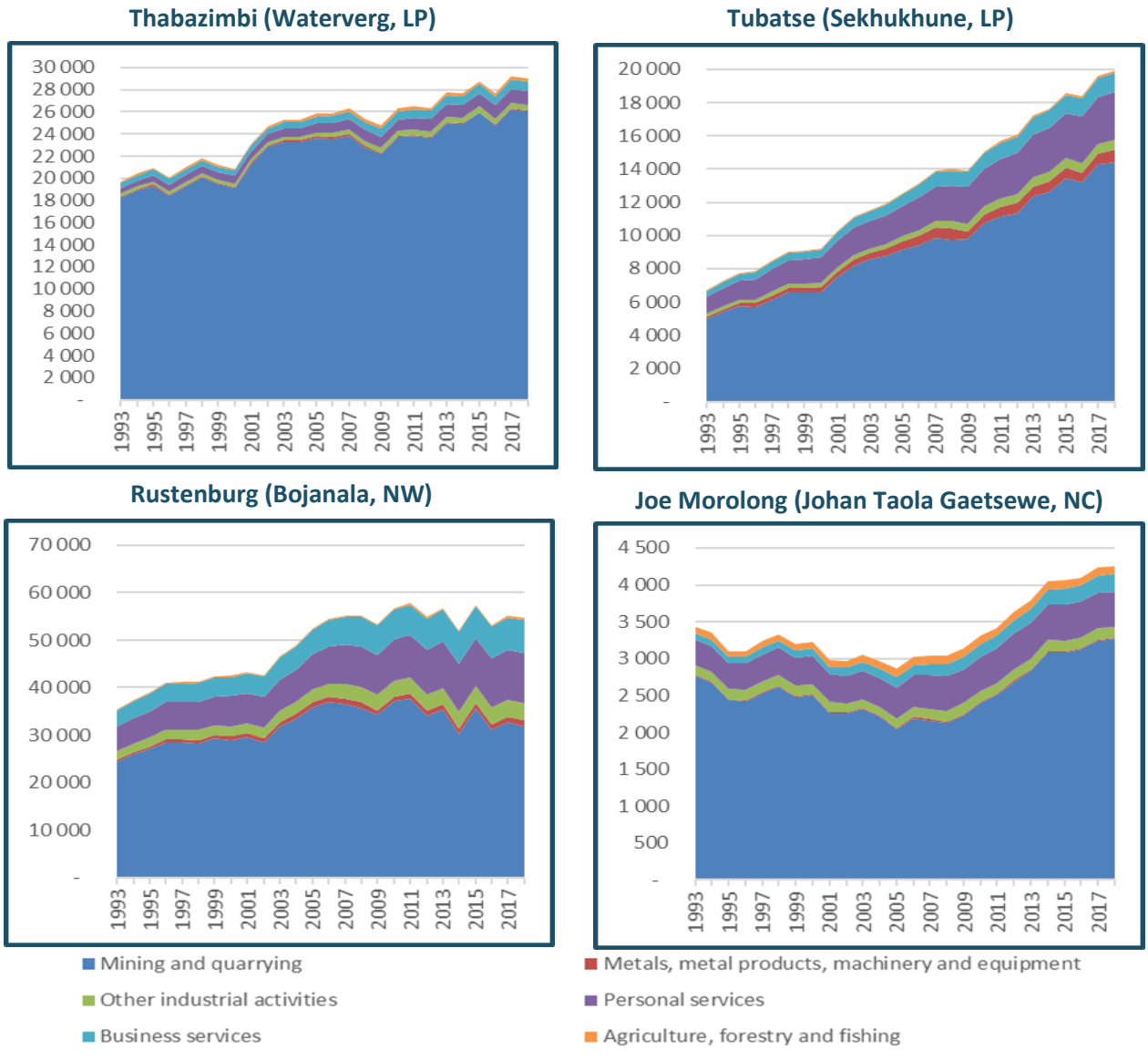
Metals and metal products accounted for a quarter of direct employment in the value chain, driven by the fabrication of metal products (slightly less than half). Downstream, the manufacturing of machinery and equipment (including electrical machinery) employed the remaining quarter of the value chain.

This concentration has deep consequences for the communities relying on such activities, particularly rural areas depending on mining operations. Some municipalities have a disproportionately high share of employment in the metals value chain, essentially in mining. It is particularly so in Thabazimbi (Waterberg, Limpopo) with 50% in 2018, Rustenburg (Bojanala, North West) with 49% and Moses Kotane (Bojanala, North West) with 38%. Greater Tubatse (Sekhukhune, Limpopo) is also notable with 31%, including 7% in metals and metal products, the highest recorded share across the country.

Other municipalities with a high share of employment (above 15% in 2018) located in the metals value chain include Joe Morolong (John Taolo Gaetsewe, Northern Cape), Masilonyana (Lejweleputswa, Free State), Matjhabeng (Lejweleputswa, Free State), Westonaria (West Rand, Gauteng), Merafong City (West Rand, Gauteng), City of Matlosana (Dr Kenneth Kaunda, North West), Madibeng (Bojanala, North West) and Ba-Phalaborwa (Mopani, Limpopo).

In such areas, virtually no other economic activity is taking place beyond the metals value chain. The gross value added is heavily driven by activities from the metals value chain. In addition, such activities and the employment linked to them, drive other economic activities in the region. Government services, retail activities, community, social and personal services are essentially servicing the people (and their households) working in the metal value chain. Business services are similarly attached to activities in the metals value chain. Agriculture and other manufacturing activities are virtually non-existent, as illustrated by Figure 6 for Thabazimbi and Greater Tubatse municipalities in Limpopo.

Figure 6: Gross value added in selected municipalities (in R millions, constant 2010 prices)



Source: Montmasson-Clair et al. 2020, based on Quantec data, series on regional output and gross value added (GVA) at basic prices, downloaded from www.easydata.co.za in July 2019

In addition, Figure 7 highlights that most affected municipalities are vastly under-resourced. For instance, in 2018/2019, Thabazimbi and Moses Kotane both had a budget (capital and operating expenditures) of about R3.9 million per inhabitant. This is significantly less than metropolitan municipalities (R11.4 million per capita on average) as well as below the national average of R4.9 million per inhabitant. Gamagara, in the Northern Cape, emerges as an encouraging exception, thanks to growing iron ore mining as well as strong development in renewable energy.

Furthermore, employment in the value chain is, while relatively more qualified than the rest of the economy, highly specific. The value chain hosts a large share of semi-skilled, technical workers, particularly at the level of metal products (75%). The manufacturing of machinery and equipment displays an even higher skill profile, with highly-skilled workers accounting for more than a third of employment (in addition to semi-skilled workers accounting for 55%). This is reflected in the level of education. Employees in the value chain have higher education levels than the rest of the country. Half of employees at the mining and metal production stages have at least a matric level, with this percentage climbing to 68% at the machinery and equipment manufacturing level (against 28% nationally).

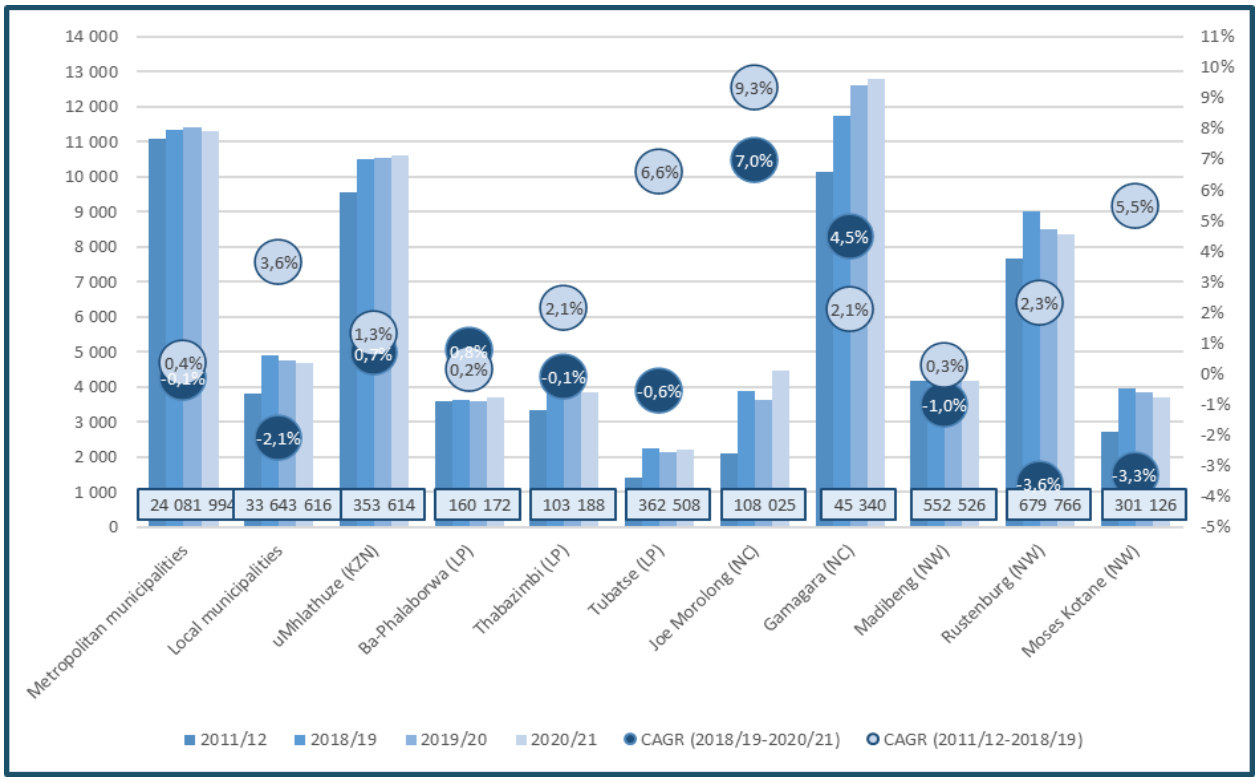
As a result of this multi-layered concentration, workers, communities and small businesses reliant on the sector are highly vulnerable to any transition or downsizing. Compounding other dynamics in the value chains, climate change may well force such transformation. Anticipating such impacts in an attempt to minimise negative socio-economic implications is paramount to ensuring a just transition in the country.

CONCLUSION

Metals value chains make a key contribution to employment and economic development in South Africa. They generate about 750 000 direct jobs. These jobs are moreover relatively well paid and skilled, compared to South Africa's average. In addition, the concentration of these jobs make them even more important where they are located. Communities hosting such jobs are virtually entirely dependent on activities in the metals value chains.

Climate change will have deep impacts on South Africa's metals value chains, potentially putting at risks numerous jobs and livelihood in the country. How each metal value chain will be impacted, however, depends on a variety of circumstances. Indeed, no one-size-fits-all approach can be adopted. The impact depends on the state of the industry, key technological developments driving demand, the carbon intensity of the production process as well as the reliance on energy and water as inputs. Understanding all these factors is critical to forecasting the impact of climate change on specific metal value chains in

Figure 7: Revenue per capita for selected South African municipalities



Source: Author, based on municipal budget data from National Treasury, Series on capital and operating budgets, downloaded from http://mfma.treasury.gov.za in October 2019 and municipal population data from Quantec, downloaded from www.easydata.co.za in October 2019.
Note: rectangles indicate municipalities' population in 2018.

Looking ahead, to provide a conducive platform, a specific resilience plan for the metals value chain should be developed and implemented. As detailed in Table 1, a set of interventions is required to mobilise implementation capacity; promote technological adjustments to minimise the loss of jobs and livelihoods as far as possible; assist towns in the platinum belt as well as other mining towns to diversify their economies; assist miners, through active labour market policies, to transition to alternative activities if necessary; and provide income support to assist miners and their communities during the transition (see Montmasson-Clair et al. 2020 and Makgetla et al. 2020 for more details).

The task at hand is not straightforward and only such a multipronged approach can enable a just transition in South Africa's metals value chains. Yet a short window of opportunity exists to proactively plan, design and implement the required interventions to foster a just transition in South Africa's metals value chain, before the transition truly unfolds. The time to act is now.

Table 1: Key interventions required for a just transition in the metals value chain

COMPONENTS	PROPOSED INTERVENTIONS
MOBILISE IMPLEMENTATION CAPACITY	Establish an independent, multi-stakeholder, state-led structure to oversee the just transition of the metals value chain, including monitoring the effects of climate change on the value chain, deciding on priority responses, mobilising financing, overseeing implementation, and assisting with unblocking and course correction as required
	Strengthen Social and Labour Plans (SLPs) and rehabilitation plans to respond better to the needs of workers and communities, by revising requirements for SLPs and rehabilitation plans to extend to smelters and refineries; ensure stakeholder participation in design and implementation, including communities and workers; and explicitly include the need to address climate-change related downsizing and the need for a just transition.
FOSTER TECHNOLOGICAL ADJUSTMENT	Address the effects of policies that internalise the cost of GHG emissions, by supporting innovation to alleviate supply-side cost pressures, decarbonising energy and transport systems, and aligning industrial policy with the climate change regime.
	Diversify options for PGMs by improving alignment between government and stakeholders to support existing initiatives and stimulating market demand for new technologies, notably but not limited to fuel cells
	Improve water security for the metals value chain through price signals, support programmes for the implementation of water management and an enabling framework for circular economy initiatives.
DIVERSIFY LOCAL ECONOMIES	Diversify the platinum belt economy to build long-term resilience and sustainability, by providing resources for substantive, costed planning for economic diversification by platinum-belt towns.
	Begin to identify opportunities for other rural mining towns, by commissioning an analysis of other rural mining towns (around 25) to identify existing structure of production, skills and infrastructure, as well as likely climate-change related impacts over a 10- and 20-year time horizon.
SUPPORT WORKERS THROUGH ACTIVE LABOUR MARKET POLICIES	Assist miners to transition into other livelihoods where necessary, by implementing active labour market policies (ideally learning lessons from an early roll-out in the coal value chain) and monitoring downsizing that is already underway, in part due to climate-change related impacts, and where necessary assist to strengthen support for affected workers.
PROVIDE SOCIAL PROTECTION	Provide income support for vulnerable workers and communities during transition to new livelihoods (ideally learning lessons from an early roll-out in the coal value chain) and monitor downsizing that is already underway, in part due to climate-change related impacts, and where necessary assist to strengthen support for affected workers and communities.

A short window of opportunity exists to proactively plan, design and implement the required interventions to foster a just transition in South Africa's metals value chain, before the transition truly unfolds. The time to act is now.

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