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Varieties of just transition: Public support in South Africa's Mpumalanga coal community for different policy options

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Abstract

Decarbonization creates a global public good but imposes costs on specific communities such as those employed in the fossil fuel supply chain. "Just Transition" (JT) policies that compensate cost-bearing communities are expected to build political support for decarbonization. In developing countries, JT policies are often financed by foreign aid and managed by governmental actors. To assess public support for JT, we identify four policy types, depending on whether they target individuals or the local government or community, and how quickly individuals receive benefits. These are: individual compensation (individual, quick), financial support to local governments (community, quick), individual reskilling (individual, delayed), and upgrading local infrastructure (community, delayed). To assess public preferences about JT policies, we focus on South Africa which has a large coal mining sector. Our in-depth interviews with 51 coal miners, Eskom power plant workers, and community members in Mpumalanga province reveal that most interviewees favor monetary compensation which provides direct support to individuals in a short period of time. Moreover, given the low trust in the government, interviewees do not want government or the labor unions to administer the JT funds. Instead, they favor independent actors, such as NGOs and the judiciary, to oversee JT disbursal.

Introduction

Decarbonization is a complex contemporary policy challenge. The reason is that while decarbonization creates a global public good (although with positive local spillovers such as reduced air pollution), it imposes costs on specific sectors and communities [1]. This is probably why decarbonization policies are sometimes viewed to be inequitable as revealed in opposition to carbon taxes and cap and trade policies, as well as rural opposition to coal and wind farms [2].

In this paper, we examine the backlash in the context of decarbonization policies that seek to phase out coal from the energy mix. These policies impose costs on fossil fuel and energy-intensive sectors, thereby provoking opposition from the local community in which these

facilities are located, labor unions, and firms. To address this backlash, countries are adopting "just transition" (JT) policies to compensate individuals and communities hurt by decarbonization [3, 4]. JT issues have a high resonance in developing countries [5–8]. because many of them burn coal, the cheapest and often locally available fuel, to generate electricity. Thus, closing coal mines potentially imposes high costs on specific communities. Arguably, workers in declining industries (such as coal) could be expected to move to new emerging industries (such as renewables). Unlike developed countries where the renewable sector has made rapid strides and its employment effects are visible, developing countries' renewables remain in infancy [9].

Moreover, with rising populations and a lack of economic opportunities, many developing countries face high levels of unemployment and widespread poverty. Specifically, the African continent has the fastest-growing youth (15–35 years) population in the world. As per the African Development Bank, only 3 of the 10–12 million youth annually entering the workforce get employed [10]. In South Africa, the country we study in this paper, the proportion of the population absorbed in the labor force is declining [11]. Indeed, South Africa has 34% unemployment rate, the highest in the world [12]. Because mining jobs tend to pay well, especially in the organized sector, shutting down coal mines without a clear path to secure alternative employment for displaced workers has the potential to spark domestic unrest.

How should governments support workers to address disruption from mine closures and facilitate decarbonization? Developing countries often do not have the resources to provide even basic public goods, let alone social safety nets to displaced workers. Thus, it is difficult to see how these governments would be able to mobilize funds domestically for JT policies. Foreign aid could play an important role in this regard, especially because the mines are being closed to address a global problem that developed countries, the aid providers, are largely responsible for. Following this logic, at the 2021 Glasgow Conference of Parties, the Climate Investment Fund announced the *Accelerating Coal Transition Investment Programme*. France, Germany, the United Kingdom, the United States, and the European Union have pledged $8.5 billion to support JT in South Africa [13]. In December 2022, the government of South Africa launched the Just Energy Transition Investment Plan (JET IP) which allocates funds for electricity infrastructure, electric vehicles, green hydrogen, skills development, and municipal capacity [14, 15]. Yet, it is not clear whether JET IP will directly support individuals or take the form of community-level investment. Moreover, given the unstable political and social environment, and the extreme poverty which motivates individuals to focus on solving short-term problems, would the JT package provide the bulk of the support quickly, would be structured as a long-term pension, or directed towards creating new economic opportunities at the community level?

Scholars note that individuals are likely to favor community-level solutions when their trust in political and social institutions is high. The reason is that they expect these institutions to implement solutions equitably and transparently, instead of catering to special interests who might corner private gains under the garb of community support. Moreover, individuals might favor solutions with payoffs in the long term only when they believe that these institutions can be relied on to honor the promises made to individuals. Absent such trust in political and social institutions, individuals might favor policies that provide them private benefits and in the short term [16–19].

Using these theoretical insights, we suggest that JT policies could be viewed along two dimensions: (1) whether they target individuals or communities, and (2) whether they provide benefits in the short term or the long term. Consequently, we identify four ideal types of JT policies, while recognizing that most JT policy packages would probably have a mix of several policies. Nevertheless, if the rationale for JT is to reduce opposition to decarbonization by

lowering the costs of economic transition borne by individuals and communities, this typology could help policymakers to think of the political appeal of different ways to pursue JT.

The first policy type pertains to direct compensation for lost wages and benefits, a well-established instrument of social welfare policy for workers who are injured, laid off, or retired. The beneficiaries can receive monetary payments quickly. The downside is that individuals may be tempted to cater to their pressing, short-term financial needs and neglect to deploy these funds for their long-term financial health. Further, a short-term wealth boost may diminish incentives for individuals to retrain themselves for another industry or to look for new jobs. Hence, the longer-term structural problem of unemployment due to industry decline might not be resolved.

The second policy type pertains to direct financial support to local governments, whose budgets might be affected by the closing down of coal mines. With declining budgets, the government may not be able to support *existing* public services that are critical for public safety, health, and development. Here the benefits are quick but at the community level. Moreover, the effectiveness of this approach depends on how well the government can utilize these funds. While maintaining public services may support the local economy and the quality of life at the community level, it is not clear if the specific needs of the laid-off coal workers will be taken care of.

The third set of policies aims at upgrading the workforce by reskilling for new economic activities. For example, JT policies might involve providing financial aid to miners to enroll in local technical colleges, which will incentivize firms to establish facilities in the area. Or, they could provide incentives for firms to train workers in their factories. While these policies could provide direct support to individuals, their benefits probably will appear in the long run when firms invest in these areas and employ the re-skilled workforce. It is not clear how the displaced coal workforce will take care of itself in the interim.

The fourth set focuses on upgrading the local and regional infrastructure, especially physical infrastructure. This could also include incentives for firms to invest in designated economically depressed areas. These investments could include new roads and broadband infrastructure, the rationale being that improving infrastructure supports economic development by motivating firms to invest in these communities [20, 21]. This would create local jobs, boost government revenues, and help individuals and communities alike to transition from coal dependence to a decarbonized economy. The downside is that benefits are not provided directly to individuals and might take a long time to appear.

While we have provided a framework to identify four ideal types of JT policies, a second-order issue is who will be tasked with administering these policies. If foreign aid is expected to provide funds for JT policies, should governments, the actors that make decarbonization commitments at the global level and enact decarbonization policies at the domestic level, be given the responsibility to distribute JT funds? After all, JT is supposed to address domestic opposition to decarbonization. Yet, given the concerns about aid efficacy and the consequent "aid fatigue." [22, 23], some donors might wonder about the ability and motivations of aid recipient governments to effectively deliver JT aid. Involving governments in managing JT aid could also invite skepticism from citizens given the low trust they often have in their governments [24].

We examine the JT package issue, including who should be given the responsibility to distribute it [25, 26]. In the context of South Africa, the 13th largest emitter of greenhouse gases in the world. Coal provides 86% of the country's electricity and employs around 82,000 workers [27]. To assess preferences about JT compensation among South African coal mining communities, we conducted 51 in-depth interviews with coal mine workers (current and former), Eskom (the largest vertically integrated utility in Africa, supplying 90% of South Africa's

electricity) workers, and other community members in Emalahleni, a local municipality area in Mpumalanga province (henceforth referred to as coal miners). Regarding the type of JT policies, we find that respondents favor direct compensation to individuals as opposed to supporting local government budgets, reskilling, or investment in local infrastructure. Most want lump sum (once-off) payments because given their low trust in political institutions, they are worried that promised future payments might never arrive. However, some support a pension scheme because they believe that many miners may not have the skills and financial literacy to manage large sums. Reskilling for the renewable energy sector is not popular because the interviewees believe that this sector offers few employment opportunities, at least in the short term. Moreover, given the very high unemployment (34% in 2021), the promise of future employment in an unknown industry and without a good sense of the compensation package is not persuasive. Finally, there is scant support for local government budgets or investment in local public goods projects because mining communities believe that such monies will be misspent. Moreover, they believe that governments should use their budgetary resources on public works, and not repurpose the compensation miners receive.

Regarding who should administer JT aid, there is almost a consensus among the interviewees that the government, local or national, should *not be* involved, given the widespread corruption. After all, the media exposé on the misuse of COVID-19 relief funds by governmental actors is still fresh in people's memories. Surprisingly, respondents view even labor unions, who played an important role in the anti-apartheid struggle, with distrust because of their close alliance and support for politicians. This is in contrast with developed countries where workers often view labor unions as credible actors, committed to safeguarding their interests [28]. There was also a perception among the interviewees that unions do not effectively communicate employer's plans to workers. Consequently, workers do not have much say on policies that might affect their employment.

The surprising finding was that coal miners want "independent actors" to administer JT funds because they are not beholden to the political parties. Specifically, they prefer local (as opposed to national or international) NGOs (because they are accountable to the local community) and the judiciary (although it is not answerable to the local community) to be associated with the aid disbursement body. We did not investigate in much depth the notion of NGOs because in some countries NGOs are also part of the political establishment and often receive significant funding from the government. Our key takeaway was that respondents harbor a deep distrust of the government and NGOs seemed a catch-all term for actors that are not a part of the political establishment. Importantly, although judges are appointed by the government and are not answerable to the local community, the judiciary in South Africa is viewed as responsive to public demands and citizens appreciate its willingness to fearlessly take on government officials. In recent years, the country has watched the corruption trial of former President Jacob Zuma, who was accused of accepting more than 700 bribes during the 1995–2005 period [29]. The judiciary has also taken local governments to task. In 2020, the Makhanda High Court ordered the dissolution of the Makana municipality for "violating its constitutional mandate by failing to provide basic services to the community" [30]. This ruling came in response to a petition by the Unemployed People's Movement (UPM) and other NGOs. Thus, the judiciary is viewed as a credible actor, independent of governmental influence.

Just transition in developing countries

Two interrelated political challenges, global free riding [31] and domestic distributional conflicts [1, 2]., impede decarbonization policies. The benefits of decarbonization have features of

global public good, although with local spillovers. Domestically, these policies spread transition costs unevenly among different sectors. The fossil fuel workers and their communities bear the brunt of climate transition costs, especially because they tend to have industry-specific skills, and fewer opportunities to find alternative employment. While technological change working through the market mechanism contributes to the rise and demise of specific industries, government-sponsored decarbonization is perceived (correctly or incorrectly) as imposing unjust costs on these communities [32, 33]., many of which have been historically marginalized. Many unions have framed it as the government declaring war on coal (and therefore on coal communities). Cecil Roberts, the President of United Mine Workers of America (UMWA), notes that his union "does not dispute the science regarding climate change. Our dispute is with how our government is going about addressing it, and on whom the administration is placing the greatest burden in dealing with this challenge" [34]. Thus, coal miners probably view decarbonization policies as job killers. Broadly, blue-collar labor unions have a complicated relationship with decarbonization. [35] although recent developments such as the Blue-Green alliance [36] have sought to bridge this divide.

Decarbonization creates new economic opportunities, but most of them have tended to be located outside coal communities. Moreover, in a replay of the "pollution-haven" [37] and the "race to the bottom" debates [38] and more recently the "China shock" [39] and the "Shanghai effect" [40], miners and unions fear that climate regulations will incentivize companies to move their energy-intensive production to developing countries that are exempt from mandatory emission reduction targets under the 1998 Kyoto regime. And even if these countries have announced net zero targets, miners and unions doubt their political will to implement them. Thus, the narrative is that while the U.S. and European countries shut down their coal mines and power plants (although some are getting revived due to the Ukraine crisis), China, which is the top carbon emitter, continues to build them. This means that concerns about international free riding accentuate domestic distributional concerns about the even burden of decarbonization placed on specific sectors, communities, and actors.

Coal mining tends to be spatially clustered; hence mine closures concentrate costs on specific communities [41]. Moreover, unlike developed countries where the renewable sector has taken off and its employment effects are visible, the prospects of alternative employment in low-carbon industries are weak, at least in the short run [42]. Finally, many countries struggle with high unemployment levels and widespread poverty but lack social safety nets. In these circumstances, mining jobs are highly valued, even when miners recognize the health implications such as Black Lung disease. Renewable energy supply chains also tend to be located abroad with little domestic employment spillovers in the manufacturing sector and weak enforcement of local content requirements by regulators in developing countries. Taken together, shutting down coal mines to serve global climate objectives in the context of high unemployment coupled with the absence of social safety nets, and weak prospects for miners to find jobs in the renewable sector creates conditions for a backlash against decarbonization.

Recognizing the issue of decarbonization's transition costs, many governments have launched JT programs such as the European Green Deal [43]. In the U.S., the 2021 American Rescue Plan provided funding specifically for coal communities [44]. In developed counties, few question the ability of governments to deliver monies to the targeted communities, although nonprofits are often involved in these efforts. In contrast, developing countries often do not have resources to devote to JT, or create social safety nets in general. Thus, unlike developed countries that rely on domestic resources to fund JT policies, developing countries will probably require climate aid from the international community [45].

But how will the JT package be structured and who will distribute climate aid? Broadly, there is a spirited debate in the development policy literature on aid effectiveness, including

the incentives and capacities of recipient country governments to deploy aid [46–48]. Some even use the phrase "aid curse" as a form of resource curse [49, 50] but see [51] to highlight the perverse incentives aid creates for recipient economies. In response, since the 1990s, many Western donors tend to bypass domestic governments and distributed aid through NGOs, which have their own drawbacks [52, 53]. Given the low-trust citizens have in their governments, it is not clear if the concerns of fossil fuel communities about transition costs will be assuaged if foreign aid were to be distributed through the government.

However, delivering aid via non-governmental organizations (NGOs) poses different problems because governments are the key actors in formulating decarbonization policies and establishing net zero commitments. If governments must have the resources to manage the fallout from such policies, routing JT aid through NGOs would both displease governments and undermine them [54, 55]. After all, if non-governmental actors can provide public services (and replace the government), it undermines the legitimacy of the government. Indeed, the massive infusion of foreign aid to Haiti in the wake of the 2010 earthquake and its disbursement via international NGOs is sometimes provided as an example of how too much NGO presence undermines the authority and credibility of local political actors. By some accounts, in response to the political threat posed by NGOs resourced by foreign aid, more than 60 countries have enacted laws restricting the inflow of foreign monies to locally operating NGOs [56]. Thus, in several countries routing JT aid through NGOs could run into legal problems as well. This opens the possibility to explore new forms of multi-sectoral governance for delivering JT-focused aid so that donors are able to serve the political needs of governments created by decarbonization and at the same time, are able to leverage the expertise of local but independent NGOs. That is, aid should still be routed through the government, but local NGOs are involved in crafting policies, and the judiciary in overseeing its disbursement. A new quasi-legal body could be one possible way to experiment with new governance modes. Of course, the governance forms will need to be context specific. This will require that donors study the past experiences of local communities that have received foreign aid, and evaluate what worked, what failed, and why.

Previously we have suggested that JT policies are of four ideal types, depending on whether they target individuals or the community/government, and how quickly the beneficiaries are able to receive economic benefits. This policy typology is presented in Table 1 below.

The most intuitive policy probably pertains to directly compensating miners, similar to payments workers receive when they are laid off, injured, or retire (C11). This could take place in at least two ways: an upfront lump-sum payment and some sort of pension over an extended period. These payments will probably need to take into account factors such as different salary levels and the number of years of employment.

The second set of individual-focused policies, reskilling (C21), could help individuals find new employment but only after some time lag. Moreover, reskilling carries some risk for individuals: unless companies sponsor retraining and promise jobs for the reskilled, individuals

Table 1. Typology of just transition policies.

	Benefits directed to Individuals	*Benefits directed to the community/ government*
Individuals receive benefits in short term	Direct compensation, lump-sum or pension C11	Direct aid to local government budgets C12
Individuals receive benefits in long term	Reskilling C21	Infrastructure development C22

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have no assurance of adequate employment (with a similar compensation as their mining job and located in the same area) even after getting retrained.

Policies creating community-level benefits are of two kinds. Closing coal mines and power plants affect the local economy and local government revenue. As people lose jobs, they spend less. Moreover, instead of receiving taxes, local governments might be obliged to offer assistance to the unemployed. The economic decline also brings along a lot of other social problems such as crime and drug use which make further demands on government budgets. Thus, JT aid could supplement local government budgets (as the U.S. government did for the COVID-19 recovery package) to help them address the issue of both revenue decline and the new obligations that they have to face (C12). The effects of these policies might be visible in the short term, as local governments carry on business as usual even as mines close down. However, their direct effect on individuals who have lost jobs is unclear. Individuals may fear that governments will probably not deploy the funds in appropriate ways to support the unemployed. After all, corrupt governments tend to distribute funding to their supporters, and many times simply siphon it off.

Community-level JT policies could also target the region's economic revitalization by upgrading infrastructure and/or providing subsidies or tax incentives for firms to establish facilities in such areas (C22). The former could take the form of public work projects such as new roads, houses, broadband infrastructure, as well as health clinics. The objective is to transform the economic landscape of the region so that new industries are incentivized to locate there., which could be further supported by subsidies or tax incentives. For example, the recent U.S. Inflation Reduction Act provides $4 billion in tax incentives for renewable energy manufacturers to build factories in coal communities.

However, given the South African political context and its historical trajectory, individuals might expect to observe the impact of such policies on their well-being in the long term only. But for many, the long-term carries enormous risk because citizens view South African politicians as routinely reneging on their promises [57, 58]. Further, even if firms establish new factories, it is not clear for citizens that those who lost mining jobs will get employed by these firms.

Public support for different just transition policies

We examine support for different types of JT policies in South Africa. Given the important role coal plays in the South African economy, the JT issue is very relevant. However, it is not clear what type of JT policy package will garner public support, given the low trust South Africans have in their government. As one commentator noted: "One of the shameful achievements of the African National Congress (ANC) in its 25 years of governing post-apartheid South Africa is that it's living up to the political stereotype of what is wrong with post-colonial Africa–unethical and corrupt African leaders who exercise power through patronage. . . Characteristics include using public office and resources to promote the private interests of ANC politicians and those connected to them" [59]. Corruption Watch [60] reports that 55% of South Africans believe that corruption is on the rise, in both the federal and local governments. The Edelman Trust Barometer [61] finds that only 22% of South Africans trust their government as opposed to 62% trusting NGOs.

For our fieldwork, we focused on Emalahleni (which in isiZulu means the "place of coal"), a local municipality area in the Nkangala District under the Mpumalanga province. The local government website [62] notes: "The southern areas of the Emalahleni Local Municipality form part of the region referred to as the Energy Mecca of South Africa, due to its rich deposits of coal reserves and power stations such as Kendal, Matla, Duvha and Ga-Nala, while the new Kusile power station is located a few kilometers to the east of Phola. The Southward Road and

Rail network connect the Emalahleni area to the Richards Bay and Maputo harbours, offering export opportunities for the coal reserves." Thus, Emalahleni is an excellent case to explore JT issues in the context of South Africa because the economic dislocation from decarbonization will be significant.

To assess public support for different dimensions of JT, we conducted in-depth interviews with 51 current and former coal mine workers and Eskom power plants workers residing in KwaGuqa township at Emalahleni. Our sample of 13 women and 38 men shows substantial variation in terms of age, skill levels, and years of employment. The selection of respondents was facilitated by the local environmental NGO that we closely worked with because of its in-depth knowledge of this community. Given the concerns about physical safety, the NGO agreed to work with us only if we did not identify it in our public presentations or publications.

We employed a snowball sampling method because some of the respondents referred us to others they knew and who will be willing to talk frankly about this subject with us. Anonymized information about the interviewees is provided in Table 2. The synthesis of interview notes is available in the online data repository: https://dataverse.harvard.edu/dataset.xhtml?persistentId = doi:10.7910/DVN/B2SATD

Interview logistics

We developed a semi-structured questionnaire (S1 Text), which was approved by University of Washington's Human Subjects Division (IRB ID: STUDY00015042). The team members affiliated with South Africa's Stellenbosch University, and with in-depth knowledge of the subject, consulted with the local community representatives about who should conduct the in-person interviews. The authors organized a training session for four interviewers (who were paid by the research team) and oversaw the data collection process over five days. Because the interviewees typically work during the day, the interviewers conducted the interviews in the evening at the residences of the interviewees.

A single interviewer conducted 3–4 interviews per day. Every interview lasted for about 30–45 minutes, but some went over this time because of the emotional intensity of the discussion and interest in the issues that were asked about. At the start of the interview, the respondents' permission was taken. They were informed that their participation is voluntary, and they may discontinue participating in the interview at any time. The interviewer recorded the responses to the questions on the interview sheet in English. As a token of our gratitude, as per the advice of the NGOs, we provided gardening tools to the interviewees for distribution and use in the community gardens.

The interview began with questions about family, education, and work. 48 of the 51 interviewees perceived working in coal mining to be hazardous and did not want their children to work in mines. They believe that coal mining and coal burning cause air pollution and harm human health. These are important insights because coal mining is sometimes romanticized and portrayed as a cherished pillar of individual and social identities [63–65]. But at least in the context of our sample, individuals work in coal mines because they have no other choice, and they certainly do not want their children to remain in the profession.

Then the interviewer asked whether they were aware of the government's plans to close coal mines, and if so, what was their source of information. 37 out of 51 respondents had heard about the possibility of mine closures. Most of them received this information from television/radio and some from environmental NGOs. Only three respondents heard about mine closures at their workplace. None received this information from the labour union, which supports the perception that unions are not transparent and hold back important information.

Table 2. Interviewee profile.

	Gender	Age (yrs)	Education	Current or ex-miner	Length worked	Position at work
1	F	33	Office Management (Tertiary)	Current	8 years	Coal Truck Operator
2	M	34	Blasting Assistant Certificate	Current	13 years	Blasting Assistant
3	M	51	Grade 12.	Current	15 years	Water Bouser Operator
4	M	28	N/A	Ex	5 years	Supervisor
5	Female	36	Grade 12. Electrician	Current	5 years	Electrician
6	Male	40	Matric Certificate	N/A	5 years	General Worker
7	Male	35	Qualified Mechanical Fitter	Current	N/A	Mechanical Fitter
8	Female	32	Grade 12. Diploma in Mining	Current	4 years	Safety Officer
9	Male	42	Grade 11	N/A	9 years	Machine Operator
10	Male	53	Grade 3	N/A	30 years	Water-pumper
11	Female	47	Grade 10	Current	15 years	Machine Operator
12	Male	37	Tertiary Level	Current	5 years	Electrical Engineer
13	male	49	Tertiary—College	Current	14 years	Operator Control
14	Male	46	Matriculated	N/A	6 years	Assistant Boilermaker
15	Female	42	Tertiary—Electrician	Current	N/A	Electrician
16	Male	54	Grade 9 and Certified Builder, fitter, tuner and grader operator	Current	5 years	Grader operator
17	Male	39	Grade 12 and Certificates in Supervision and ADT	Current	7 years	ADT Operator
18	Male	52	Grade 10 and Certificate in Boilermaking, Mechanic, Welding and Machine Operator	Current	22 years	Machine Operator
19	Male	65	777 Certificate for heavy duty mobile machine	Ex	20 years	Machine Operator
20	Male	54	Grade 9 and Coal cutter certificate	Ex	8 years	Coal cutter
21	Female	38	Technical and Vocational Education and Training (TVET)	Current	8 years	Assistant Fitter
22	Male	56	Grade 8	Ex	28 years	working at power plant
23	Male	48	Matric and Tertiary ed	Current	14 years	Boiler maker
24	Female	43	Matric	Current	2 years	Electrician
25	Male	32	Matric and Tertiary ed	Current	6 years	
26	Female	47	Matric	Current	18 years	Electrical Assistant
27	Male	46	Tertiary certificate, Welding	Current	10 years	Welder
28	Male	30	Tertiary, HR Assistance	Current	5 years	HR Assistance
29	Female	46	Tertiary, HR Diploma	Current	15 years	HR Officer
30	Male	26	Tertiary, ICT Diploma	Current	3 years	IT Technician
31	Female	45	Matric, certified machine operator, business certificate	Current	5 years	Machine Operator
32	Male	41	Grade 12, Management certificate	Current	18 years	Engineering Supervisor
33	Female	48	Grade 11	Current	15 years	Clerk and data capturer
34	Male	66	No school	Ex	30 years	Machine Operator
35	Male	39	Matric, hospitality and tourism certificate	Current	4 years	Labeller
36	Female	40	Teaching certificate	Current	8 years	Office Admin
37	Male	46	Matric, certified machine operator	Current	12 years	Machine Operator
38	Male	36	Matric	Current	7 years	Boiler maker
39	Male	39	Matric, Certified Electrician	Current	12 years	Electrical engineer
40	Male	55	Matric, Certified Plant Operator	Current	10 years	Plant Operator
41	Male	63	No school	Ex	14 years	Coal cutter
42	Male	42	Matric, Rigger certificate	Current.	12 years	Rigger, Belt attendance
43	Male	40	Grade 12, Crane certificate	Current	6 years	Crane operator
44	Male	53	Grade 12	Current	20 years	Dragline assistant
45	Male	49	Grade 12	Current	25 years	CM Operator
46	Male	36	Grade 12, Diploma in Safety and Environment	Current	12 years	Plant Process Operator

(*Continued*)

Table 2. (Continued)

	Gender	Age (yrs)	Education	Current or ex-miner	Length worked	Position at work
47	Female	42	Grade 12, Business management diploma	Current	5 years	Driver
48	Male	49	Grade 12.	Current	12 years	Machine Operator
49	Male	35	Grade 12, Excavator certificate	Current	8 years	Department supervisor
50	Male	60	Grade 7	Ex	8 years	Underground machine operator
51	Male	40	Grade 12.	Current	15 years	Belt conveyer

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How closure might affect them

The interviewer explored the interviewees' perceptions about how coal mines' closure might affect them and their families. Four interviewees insisted that the closure will come after a long period of time and will not affect them. This may be due to a lack of transparency and an unclear flow of information from management and labour unions to workers about the transition plans. Another seven respondents said that the closure will not affect them much because they will look for other work or they have other plans like farming to make a living. For the rest 40, the key concern was that they will lose their jobs and will not be able to look after their families. Some of the responses reflecting these concerns include the following:

"I won't be able to take my kids to school, the economy will collapse, I will lose my job";

"I will lose my property.";

"Yes, it will affect me because I am a pensioner and relying on my sons that are working in the mines.";

"It will affect me financially, spiritually and physically.";

"It will affect me and the community. We depend on the mines and the workers that rent accommodation from us.";

"I believe that the social grant (monthly government payouts for those in need) I am getting from the government is from taxes of people working in the mines. If they close, my grant will stop.";

"Loss of jobs and my business will suffer as I will lose my customers."

Type of compensation

Regarding the type of compensation, of the 51 respondents, 3 did not answer the question, 38 said that they would prefer to have once-off payments. Three factors seemed to drive the preference for lump sum payments. First, given the extreme poverty, miners have a short shadow of the future. Moreover, some have 'plans' that they want to realize. Thus, lump sum payments can provide immediate economic freedom. Some of the responses received regarding a lump sum once-off payment include the following:

"I prefer a once-off payment so that it would help in my plan";

"Yes, we should get the compensation, it will assist me in my plans. It should be paid once off";

"Once off package because I have ideas that need money to be pursued";

"Once off payment to do whatever I want with it".

Second, they do not trust that promised payments in the future will materialize. Hence, they want to get control of compensation now, lest the government use the funds for needs other than what should be paid to the workers. Some of the responses given to emphasize how the respondent would prefer to have the once-off payment instead of the money being given to the government include:

"No, the government will not spend the money fairly, they will use it on other things or it will disappear";

"The government will not spend money fairly";

Third, some miners want to start new businesses or relocate to new regions or to areas that they came from before getting employment in the coal mines or at Eskom. A lump sum payment will give them the resources to do so as was expressed in the following statements by some of the respondents:

"I would prefer to be given a once off to invest it";

"A once off payment to assist with my farming business.";

"A once off payment to invest in my parent's farming business";

"A once off payment because I have a business idea that I want to pursue in the food industry";

"At least once off package so that every worker can invest the money individually for the family survival."

10 respondents said they would prefer the payments to be spread out over time because many miners may not have the skills and financial literacy to manage large sums. The respondents had a variety of answers concerning why they would prefer to have their payment to be spread out over a period of time. Some of the responses that were given include the following:

"I think this should be given over a number of years because we don't have skills of maintaining money. . .";

"A number of years because a once-off won't work at all—what if it gets finished without having started a sustainable business?" Finally, there was a concern that a large infusion of cash might lead to its misuse by the recipients; as one respondent noted: "Spread out over a number of years so as not to misuse it".

Why is reskilling not popular? The sense is that the renewable sector is still in its infancy and miners are not aware of employment opportunities. Moreover, given the very high unemployment levels in South Africa, the promise of future employment in an unknown industry is less credible.

Finally, the support for investment in public budgets or local public goods projects is low because mining communities believe that such funds will be misspent. Moreover, they believe that governments should spend their own resources on public works, and not repurpose the compensation that rightfully belongs to miners. Respondents made very clear statements citing their opinions that if climate finance funds were allocated for a JT compensation, this should not be invested in public budgets. Some statements made by the respondents include the following:

"Money belongs to those who risked their life in mines. There is budget set aside for colleges or schools";

"No. this money belongs to us";

"We have enough schools and colleges";

"No, it's not supposed to build colleges or schools this compensation is ours, we will be able to start our businesses";

"No, not this money, it's not for that, it should come to us and we will decide what to do".:

Who should administer the aid?

The most complex issue pertains to which actors should administer the JT aid package. There is almost a consensus that the government, federal or local, should not be involved, given the widespread corruption. For example, in expressing their mistrust of the government and favoring immediate lump-sum payment, respondents said the following:

"No, the money should be given to workers. Government will misuse it";

"I don't trust our government";

"Once off lump sum payment before they steal it. Nothing is trusted with our government.";

"Once off because it will get lost with government."

Surprisingly, even labor unions are viewed with distrust by the workers because of their close affiliation to the country's political parties. Miners want "independent actors" who are not beholden to the local power structures and accountable directly to them. This was an illuminating response because labor unions have played an important role in the anti-apartheid struggle. Some of the displeasure expressed about the labour unions representing mine workers includes:

"No, the government won't spend the money [on workers], they will use it on other things or it will disappear. I don't trust unions that they will do better than the government";

"No, the unions and employers have not spoken to us. The compensation policies will not work because they cut our pay without discussion";

"That money belongs to us. They should establish an independent body to control and distribute it";

"I don't trust the government, they are all criminals. Mine workers, their lawyers and community can use the money wisely.";

"No, government, businesses, unions should not be involved. People will not benefit from the money."

Thus, while there is a deep distrust of the government regarding aid disbursal, it is less clear who these independent actors might be, but our sense is that miners want local NGOs with representatives they identify with and the judiciary to be associated with this body.

Conclusion

Social science scholarship on decarbonization and energy transition has many dimensions. Several scholars examine variations within and across countries in mitigation targets, policy instrument choice, and efficacy. In addition to international efforts such as the Kyoto Protocol and various Conference of Party meetings, the literature has examined regional initiatives such as the European Trading and Emission Scheme [66]. Increasingly, scholars have begun paying more attention to climate adaptation [67, 68], including maladaptation [69]. A focus on

adaptation, which emphasizes local action, also meant that scholars focused more on multiple levels of policymaking including cities [70], as opposed to focusing predominantly on the national level [71].

Scholars are also paying more attention to domestic impediments to climate action. Specifically, the subject of climate justice–the uneven distribution of the costs and benefits of both climate action *and* inaction, has gained salience. Climate change imposes disproportionate costs on historically marginalized communities. But decarbonization policies could also impose costs on low-income communities. Take the case of carbon taxes which increase energy costs. Because energy costs constitute a high share of the budgets of low-income households, some groups view these taxes as regressive [72]. Other policies such as cap and trade are viewed as increasing pollution burdens in low-income communities [73]. Consequently, whether it is the "yellow vests" in France or protesting farmers in the Netherlands, some communities have mobilized against decarbonization policies, not because they fear global free riding or question climate science, but because they see these policies imposing unfair burdens on them.

The issue of JT has gained traction because scholars recognize that decarbonization policies concentrate costs on specific communities, many of which are low-income. Indeed, JT reflects the "embedded liberalism" approach Ruggie [74] has noted in the context of trade policy: targeting compensation to those hurt by free trade regimes that create a public good for consumers but impose concentrated costs on import-competing sectors. JT policies could thus be viewed as reflecting "embedded environmentalism" [75], whereby decarbonization policies are accompanied by support aimed at cost-bearing groups.

This paper contributes to the JT literature with an explicit focus on public support for different types of JT policies. Moreover, we seek to highlight the unique challenges developing countries face in this regard. Sometimes the tendency is to assume that solutions that work in developed countries will also be effective in developing countries. We point out that JT is complex because it is not clear how these policies will be designed and who will administer them. Developing countries differ from developed countries (at least) in three critical ways: they are culturally and institutionally more heterogenous, spanning multiple continents, governments tend to have fewer resources to devote to climate action, and the citizen trust in government tends to be low, given widespread corruption and state failures. Thus, instead of examining just transition (in singular), we suggest examining varieties of just transitions (in plural).

Foreign aid to support JT poses important policy challenges. Since the 1990s, scholars have debated the effectiveness of foreign aid, especially the role of governments in the aid delivery process. Developed countries have made aid commitments to support JT in developing country governments as they establish net zero emission targets. But if this aid does not reach displaced workers and support the affected communities, decarbonization might provoke a backlash.

Should then JT aid be delivered through international NGOs? Unlike the development sector where the role of NGOs in service delivery is well established, the role of climate NGOs in JT (as opposed to advocacy) is less clear, at least in developing countries. Furthermore, several countries have enacted laws that place restrictions on foreign funding of domestic NGOs [76]. Thus, it is not clear how involving NGOs in delivering JT aid will address this issue.

Finally, labor unions might have an expectation that they will have a role in the design and delivery of JT packages. If they are excluded, they may become less supportive of decarbonization policies. Thus, future research should explore this subject of union response to different JT packages in the context of multiple countries with different social arrangements and political economies.

We recognize that this paper has several limitations. It focuses on a single country; hence its findings should be generalized with caution. South Africa has a unique historical legacy of

apartheid and is the most unequal country in the world with high poverty and unemployment levels, which may have bred deep distrust in the government. Moreover, trust in government might have declined with the COVID-19 epidemic as countries have struggled to address this challenge. Once COVID-19 is contained, perhaps, trust in the government might improve.

Second, we have focused on policies to address the concerns of fossil communities only. Arguably, decarbonization policies also create a "stranded asset" challenge that imposes costs on shareholders. While we recognize that these shareholders might include labor unions, public pension funds, and other actors who also bear the costs of decarbonization, these actors have the option to divest (certainly at lower costs than fossil fuel workers and communities rooted in specific areas), as many are doing. Thus, future work could examine JT from the "stranded asset" perspective.

Third, we recognize that there is another decarbonization challenge at the community and individual levels: energy security. For the last several decades, coal has provided affordable electricity to these energy-starved economies. If coal is phased out, it is not clear how these countries will be able to supply electricity to their populations at comparable costs. Renewables could help but the uptake of utility-scale renewables is slow. Distributed solar is not popular because most households do not live in houses with appropriate roofs to install them. Future work should also examine JT from the perspective of energy security.

Fourth, much of the discourse in foreign aid to support just transition in developing actors assumes the government to be the key actor in devising JT policies as well as disbursing foreign aid. Indeed, governments are key actors in this regard in the United States and the European Union. The role of local NGOs as alternative mechanisms to construct JT policies and distribute aid is barely discussed. Moreover, as we noted many developing countries have imposed restrictions on the flow of foreign monies to locally operating NGOs. Our interpretation of the interviewees' response is that given their deep dissatisfaction with the government, and the politicization of the labor unions, communities want actors that are not associated with or beholden to the political establishment to oversee the distribution of JT funds. Thus, they are supportive of the judiciary (although it is not clear how exactly this might be done because the judiciary has neither the power nor the expertise to formulate policies and oversee their implementation) because it has taken a strong position on corruption in the political establishment. Furthermore, interviewees mention actors independent of government in broad terms, including NGOs. Future work should take a deep dive into how exactly citizens expect NGOs to work, given that in some countries the NGO sector is also captured by the political establishment.

Finally, while we conducted in-depth interviews with 51 respondents, and sought to recruit a representative sample of a coal region, this is not a representative sample of South Africa. Future work could explore a bigger sample, and in other countries, perhaps using other research techniques as well.

Supporting information

S1 Text. Semi-structured questionnaire.
(DOCX)

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