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Abstract

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Auctioning a 'just energy transition'? South Africa's renewable energy procurement programme and its implications for transition strategies

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ABSTRACT

Clean energy is going transnational. Following the COP21 UN Climate Change Conference in December 2015, a roll-out of clean energy schemes in the global South is fostering a global energy transition. One such case is South Africa, where a policy innovation – the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) – was introduced in 2011. While REIPPPP seems to be a success story in terms of renewable energy capacity, it is unclear how the instrument is shaping the overall course of South Africa's green transformation regarding the influence of transnational actors, participation in local ownership, and socio-economic benefits. Based on expert interviews and empirical process tracing of the renewable energy projects during the five bidding rounds of REIPPPP (2011–2016), the article analyses the design and effects of REIPPPP and discusses its implications for transition strategies, such as a 'just transition'.

KEYWORDS

Transition theory; just energy transition; South Africa; renewable energy; investment patterns

MOTS-CLÉS

Theorie des transitions ; transition énergétique juste ; Afrique du Sud ; énergie renouvelable ; modèles d'investissement

Mettre aux enchères une « transition énergétique juste » ? Le programme sud-african d'approvisionnement en énergies renouvelables et ses implications pour les stratégies de transition

RÉSUMÉ

L'énergie propre devient transnationale. À la suite de la COP21 Conférence des Nations Unies sur les changements climatiques de décembre 2015, un déploiement de programmes d'énergie propre dans le Sud global est en train de favoriser une transition énergétique mondiale. C'est notamment le cas de l'Afrique du Sud, où une innovation politique – le Programme d'approvisionnement des producteurs indépendants d'énergie renouvelable (REIPPPP) – a été introduite en 2011. Si le REIPPPP semble être une réussite en termes de capacité d'énergie renouvelable, la manière dont l'instrument façonne le cours général de la transformation verte de l'Afrique du Sud n'est pas claire en ce qui concerne l'influence des acteurs transnationaux, la participation à la propriété locale et les avantages socio-économiques. Sur la base d'entretiens avec des experts et d'un

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suivi empirique du processus des projets d'énergie renouvelable au cours des cinq cycles d'appel d'offres du REIPPPP (2011–2016), l'article analyse la conception et les effets du REIPPPP et discute de ses implications pour les stratégies de transition – et particulièrement celle d'une « transition juste ».

Introduction

Clean energy is going transnational. Following the Paris Agreement, we are currently seeing a roll-out of clean energy schemes worldwide. Such processes have gained momentum also in the global South, as indicated by the rising number of countries that have adopted clean energy policies (IRENA, IEA and REN21 2018; REN21 2018).[1] One such case is South Africa. Here, an innovative auction instrument – the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) – was introduced in 2011 (Department of Energy 2011, 2012a, 2012b, 2012c, 2013a; Eberhard, Kolker, and Leigland 2014). This has resulted in the creation of more than 100 renewable energy projects, orchestrated by consortia made up of transnational investors, local civil engineers, national creditors and, not least, local communities. As a competitive bidding scheme, REIPPPP facilitates investment in South Africa's renewable energy sector by creating a more beneficial procurement environment for foreign investors, yet with strong inducements to meet socio-economic needs such as job creation, education and training all at the same time. While auction instruments are gaining popularity across the African continent (Müller et al. 2020), this turn towards a market-led transition has important implications with regard to the justice dimension of a clean energy transition. South Africa is a pertinent case, due to its being an early adopter, and due to the unique combination of market-stimulating nudges and socio-economic demands. The South African case demonstrates how an auction instrument can be used to restructure a nascent energy market in relation to patterns of ownership, green finance flows, and new economic dependencies. While the assumption that REIPPPP would give rise to transnational investors has overall been confirmed (Baker, Newell, and Phillips 2014; Baker 2015; Baker and Sovacool 2017; McEwan 2017; Claar 2020; GreenCape 2021), less is known about the ways in which the instrument shapes the course of South Africa's transition pathway in closer detail, especially with regard to the concrete stakeholder consortia, the degree of local ownership and participation, and the distribution of socio-economic benefits. Evidence on these empirical gaps closely corresponds with questions of social justice, which feature prominently in recent debates on a 'just transition' and 'energy justice' in the global South (Swilling and Annecke 2012; Newell and Mulvaney 2013; Swilling, Musango, and Wakeford 2015; Avelino et al. 2016) and the wider debate on a deep transformation. In this context, our understanding of 'energy transition' refers to 'a change in an energy system, usually to a particular fuel source, technology, or prime mover (a device that converts energy into useful services, such as an automobile or television)' (Sovacool 2016, 203). When speaking of 'transformation' or 'transformational change', this points to the large-scale, complex and often unpredictable outcomes that accompany said processes (Roggema, Vermeend, and van den Dobbelsteen 2012, 2530). While a 'just

transition' requires deep-reaching societal change, we follow Mark Swilling in pointing out that opportunities for 'radical incremental change' (Swilling 2019, 5, Chapters 5 and 6) may serve as important points of departure. In this sense we aim to contribute to this debate by investigating to what extent a specific auction instrument may enhance or endanger energy justice and the prospects for a just transition.

Against this backdrop our article analyses the design and effects of REIPPPP, guided by the following research questions:

- How does REIPPPP as a policy innovation shape and structure South Africa's energy transition pathway?
- Which investment patterns can we identify and what are their socio-economic implications for a just transition?
- Which repercussions for other auction-based transitions processes in the global South can we identify? What is necessary to ensure energy justice along the course of transition?

Our research design draws on transition management literature, especially the ongoing debates on a 'just transition' and 'energy justice'. We deploy empirical process tracing and cross-sectional analysis of 82 renewable energy projects over the five bidding rounds of REIPPPP (2011–2016) that have taken place so far, regarding the location of the projects, the type of investment, public–private ownership and the shareholders' relative amounts.[2] This was supported by expert interviews with policy-makers, environmental think tanks, research institutions, social entrepreneurs and non-governmental organisations (NGOs) carried out in Johannesburg and Pretoria in 2018. Based on our findings we introduce a typology which distinguishes between three project patterns that have evolved as a result of REIPPPP's regulative powers. This allows the identification of REIPPPP's potentials and shortcomings for a 'just energy transition' and for the application of auction instruments in a wider sense.

Theorising renewable energy transitions: transition management and the claims for a 'just transition'

The design of sustainable transformations has become a major research issue especially in European countries since the 1990s. A history of successful cases – for instance the introduction of feed-in tariffs[3] around the world based on Spanish and German examples – provides an empirical base for the design, potentials and caveats of sustainable transition strategies. The 'transition management literature' investigates governance and evaluation of such processes and aims at developing policy recommendations (see Avelino et al. 2016; Kern and Markard 2016). A transformation on this scale involves a broad range of actors and comprises a time span of 40–50 years due to the need to restructure public institutions and industry (Swilling and Annecke 2012; Swilling, Musango, and Wakeford 2015; Swilling 2019). Transformation processes are characterised by an 'evolution of technological change, consumption behaviour and the institutional reforms that are required to embed the new technologies in society' (Swilling and Annecke 2012, xvi). The transformation of energy systems follows these logics, as 'decarbonising' a nation's energy system translates to transforming production chains, occupational skills and consumer habits.

In the African context, one approach – the concept of multi-level perspective (MLP) (Geels 2004, 2011) – has frequently been used to analyse such processes (Newell and Bulkeley 2016; Newell and Phillips 2016; Power et al. 2016; Hansen et al. 2018). The MLP seeks to grasp transformational dynamics by differentiating between three transformative concepts: the interplay of landscape, regime and niches. First, landscape refers to external factors, i.e. the global or regional policy environment. In our case this comprises aspects such as access to green finance, climate policy undertakings, or interactions within the global energy governance sphere (Müller 2017). Second, shifts in landscape focus on belief systems and norms and occur incrementally, but provide room for regime change. Third, niches form 'protected spaces' within which transformative policies – including frugal innovations – can flourish. Renewable energy alternatives emerged out of such a niche and represent an almost archetypal case of sustainable innovation. If a niche technology gains broader attention and landscape reconfigurations exude pressure on the regime, this eventually results in its destabilisation, leading to large-scale transformations and (eventually) paradigmatic change (Geels 2004, 2011).

Discussing transition processes on the African continent, several authors have engaged with the MLP approach for the analysis of transformational activities under conditions of developmental statehood, or transformations towards a 'green economy' (Newell 2011; Swilling and Annecke 2012; Newell and Mulvaney 2013; Swilling, Musango, and Wakeford 2015). For this, questions of justice have become an important point of reference – all the more given that they used to be downplayed in classical transition management, which relied on trickle-down logics, yet mostly failed to engage with questions of justice and ethical considerations (Monyei et al. 2018). In this context, the concept of energy justice is of particular value as it questions to what extent the mere greening of a nation's energy mix also considers the justice dimension, thereby promoting universal access to safe, affordable and sustainable energy. Drawing on the earlier concept of environmental justice, which calls for equal access to a clean environment and protection from environmental hazards (Hofrichter 1993; Hockman and Morris 1998; Bullard 2000), energy justice points to the availability, accessibility and affordability of clean energy (Jenkins et al. 2016), but also to trade unionism, as a just transition needs to safeguard job transfers as well as an equal distribution of ecological benefits (Bird and Lawton 2009; Newell and Mulvaney 2013, 2). In closer detail, energy justice points to the fact that a societal transition towards a lower carbon future has to be outspoken about issues of equity and justice, given that 1.6 billion people worldwide still not only lack access to energy, but also see their livelihoods adversely affected by a fossil fuel economy (Swilling and Annecke 2012).

On a more abstract level, that is, from the perspective of justice theories (Rawls 1971; Fraser 1999), energy justice can be defined as a threefold concept (see Fuller and Bulkeley 2013; Jenkins et al. 2016), wherein a need is expressed for distributional justice (questions of access and pricing), procedural justice (questions of fair and equal participation and decision-making) and recognitional justice (questions concerning the needs of particularly vulnerable populations). Several authors have started to discuss the ways in which African energy transitions should consider questions of justice. Monyei et al. (2018) stress the need to diversify the energy justice framework by highlighting Western narratives in the energy debate and differentiating between access to energy in the global North (affordability and path dependency) and global South (clean

energy for domestic use). Sovacool, Burke et al. (2016) relocate energy justice in norm sets stemming from Southern cosmovisions, such as ubuntu, so as to overcome built-in Eurocentric notions in the Western-liberal set of norms which underpins most energy justice concepts. In this sense, Swilling, Musango, and Wakeford (2015) too assess the ways in which a 'green economy' is promoted in South Africa, and whether this may result in – partially unexpected – social costs in terms of job losses and requalifications, unequal distribution of ecological benefits, or new geopolitical dependencies along global production chains. Typically, challenges to a just transition refer to the question of whether to fight energy poverty with the help of cheap coal or to quickly switch to renewables. For the regime level they argue that South Africa largely follows the lines of the liberal green growth paradigm on its course towards a green economy, but that it has also embarked on a green jobs initiative in order to prevent job losses (Death 2015; Swilling, Musango, and Wakeford 2015, 9). On the niche level, energy justice points to the danger that such niches may become exclusionary, in that their innovations merely correspond to the needs of societal elites, fail to provide more beneficial, inclusive innovations, and may even create new environmental externalities (Sovacool, Perea et al. 2016; Monyei et al. 2018). Following Baker and Burton (2018, 95), REIPPPP's transformative potential is targeting the niche level, yet repercussions on the regime level also form part of the picture.

It is in this light that we refer to REIPPPP as a as a successful niche innovation which is currently unlocking South Africa's renewable energy potential and may greatly increase access to and affordability of renewable energy. However, this may in parallel also widen existing gaps in terms of affordability, access and ownership of technologies, which means that the dimension of energy justice may be affected. Recent studies on REIPPPP have so far concentrated on discussing its spatial implications, and its meaning for South Africa's political economy of energy. In two early assessments Lucy Baker delineates how REIPPPP contributes to financialisation and transnationalisation of the renewable energy sector, due to the pressure for least-cost project design and the overarching goal of bankability (Baker, Newell, and Phillips 2014; Baker 2015). McEwan (2017) has provided a rich empirical analysis of REIPPPP's geospatial implications from the perspective of critical geography and discusses how REIPPPP creates a centre–periphery dynamic, with renewable energy clusters in some villages, whereas other municipalities seem unable to tap the potential. Focusing on public assemblies that accompany the REIPPP planning procedures, Holle Wlokas' in-depth account demonstrates how the integration of municipalities often fails to fulfil its democratic promises, with conflicts arising over the distribution of revenues, as well as fair participation of municipalities (Wlokas 2015; Wlokas, Westoby, and Soal 2017). In a recent article, Sovacool et al. (2019) conclude that REIPPPP serves as a form of political experimentation which however goes in parallel with both democratic and economic tensions and features an emerging energy elite's needs while downplaying racial inequalities, which still pervade South Africa's political economy of energy.

While this body of literature has contributed greatly to our understanding of REIPPPP as a successful yet socially controversial niche innovation with multiple unintended effects, less is known about the ways in which REIPPPP has privileged certain renewable energy project constellations and investment patterns, and how these may bear concrete implications for energy justice and a just transition (for an overview on the contribution

of policy frameworks energy in 34 African states, see Müller et al. 2021). Current research on REIPPPP has demonstrated that, by and large, the influence of transnational investors has increased – which is indeed the intended outcome of auction instruments – yet there still is a lack of research regarding the concrete effects in comparative perspective. Providing a comparison of renewable energy projects and creating a typology of REIPPPP's project patterns in relation to finance flows, ownership and transnationalisation, and systematically addressing their justice dimensions, we are able to bridge this research gap and give evidence on how REIPPPP alters the course of South Africa's energy transition on the regime level.

Welcoming renewables: South Africa's energy policy environment and the REIPPPP programme

In the context of transforming their energy systems, many developing countries face an 'energy trilemma' (Falkner 2014), due to the need to match three mutually exclusive demands: securing energy supply, mitigating climate change, and reducing energy poverty.[4] Like many other emerging powers South Africa is struggling to meet these three objectives. While energy access has been safeguarded in the post-apartheid era thanks to a fossil-based energy regime (the 'minerals–energy complex': see Fine and Rustomjee 1996), attempts to decarbonise the economy face a long-standing path dependency. Still, with renewables having reached the point of cost-efficiency also in developing countries, synergies and benefits start to outweigh the trade-offs, which means that greening the energy mix offers a viable strategy for escaping the energy trilemma, also in South Africa. Furthermore, this would add credibility to South Africa's ambitious climate diplomacy agenda (Knodt, Piefer, and Müller 2015).

South Africa's first steps towards an energy transition were made in 2003, but it was not until 2008 that the Integrated Resource Plan (IRP) made way for a comprehensive energy policy (Pegels 2010). According to the IRP for Electricity 2010–2030, the aim was to increase renewable energy generation capacity to 9%/17.8 GW by 2030 (Pegels 2010; Department of Energy 2013b). The 2018 IRP aims at a share of 36% for renewables by 2030 (Department of Energy 2018). Up until this date, independent power producers (IPPs) should contribute nearly 20 GW to the nation's total energy need, with wind at 11.4 GW (15%) and solar energy at 8.5 GW (11%) (Department of Energy 2018). The most recent update, the 2019 IRP, demands that South Africa expand its procurement capacity further and decommission 11 GW of coal-fired power stations, thereby reducing coal generation capacity to 43% by 2030 (Department of Energy 2019a).

In order to achieve these goals, South Africa has adopted a comprehensive policy framework, including several direct policies such as subsidies for solar heaters and for basic energy supply, but also broader schemes such as a feed-in tariff. However, a broad roll-out of renewable energy only took place after the introduction of the highly competitive auction instrument, the REIPPPP, that is aimed at domestic and international energy companies, who can apply for tenders within a fixed bidding window. As of June 2021, five bidding rounds have taken place and 92 projects have reached financial closure (GreenCape 2021, 22). Altogether they will feed 6.42 GW of renewable energy into the national grid (Department of Energy 2011, 2012a, 2012b, 2012c, 2013a, 2018, 2019a). In the first round, mainly European firms of Spanish, Irish or Dutch origin

became involved, among them BioTherm Energy (see more in Claar 2020), Mainstream Renewable Power, Abengoa and AMDA energía as the most successful bidders. In the following bidding windows the diversity of investors increased, with Italy (Enel's subsidiary, Enel Green Power) as one of the most active investors. To apply, the IPPs need to submit an expression of interest as well as a project proposal, which is then reviewed by the IPP Office. The IPP Office is an agency situated at the Department of Energy, but it is in a relatively autonomous position as regards accountability, decision-making and design of overall tendering procedures. Using a list of criteria and related scoring system,[5] the office chooses the most convincing bidders and starts negotiations on the respective feed-in remuneration (Baker and Wlokas 2014, 5; Eberhard, Kolker, and Leigland 2014, 13). Bidders have to fulfil both local content requirements[6] and socio-economic requirements by demonstrating that there is a considerable level of local ownership (minimum 2.5%, target 5%). The target was overachieved to a significant degree, with local ownership of up to 40% (ZA_RE_Invest Database 2018, cited in this document as Claar and Müller 2021). In addition, local content requirements of 25%–35% were applied during the first rounds, and raised to 40%–45% in the later rounds. As a proportion of project costs, a minimum of 45% for solar and 40% for other technology project costs had to be spent in South Africa.

These requirements appear to have served as a bottleneck rather than a stimulant for local industries, as the restriction on minimum spend in South Africa was not coupled with incentivising industrial policies (Council for Scientific and Industrial Research Officer, interview, 1 February 2018; Trade and Industrial Policy Strategies and Partnership for Action on Green Economy representatives, 31 January 2018). However, in the last round, local content requirements finally reached 44.4% for wind turbines and 62.3% for solar photovoltaic (PV) (GreenCape 2021, 45). This may serve as a stimulus for local lamination and assembly in solar PV manufacturing, on condition that 400–500 megawatts in power generation are built each year.

As of June 2021, REIPPPP has so far awarded tenders to 112 renewable energy projects, of which 92 have reached financial closure. In terms of job creation this has resulted in 40,134 direct, full-time equivalent job years (Department of Energy 2019b, 2). During the previous bidding rounds the instrument mainly focused on tenders for large-scale installations (over 5 MW), but a tranche of 100 MW was dedicated to small-scale projects (between 1 and 5 MW), which are administered under the umbrella of the Small Projects Renewable Energy IPP Programme. Over the timeframe of the successive bidding windows, pricing has dropped considerably, from 2.52 rand per kWh in the first bidding round to only 0.82 rand per kWh in the fourth round, which means that renewable energy became more affordable over those rounds (Department of Energy 2016, 17). This demonstrates that, overall, renewable energy is cost competitive with conventional power sources. The geographic spread of projects across South Africa is unequal, with most projects (59 out of 112) located in Northern and Western Cape provinces, but few in Limpopo (3), Mpumalanga (2), KwaZulu-Natal (1) and Gauteng (1) (McEwan 2017, 4). While this is mostly due to favourable resource conditions for wind and solar energy in the Northern, Eastern and Western Cape provinces, it also demonstrates a hesitation on the part of investors to implement projects in the more remote and poorer parts of South Africa and on former homelands, often due to land titles (Sosibo 2015). Moreover, the creation of eight Renewable Energy Development Zones (the so-called REDZs), where more

favourable investment conditions apply, meets investors' needs but will increase spatial polarisation, as six out of eight are located in the Northern, Western and Eastern Cape (Department of Environmental Affairs 2018).[7] This will concentrate the energy value chain geographically by clustering large manufacturers, smaller enterprises and adjacent energy services, and will speed up grid connection time, which had proven to be a major setback up to this point (Slabbert 2015; Baker and Sovacool 2017; McEwan 2017; Moyo 2018). However, the new focus on REDZs also means that REIPPPP's potential for job creation in precisely those regions which will be hit most by coal decommissioning was not considered. This affects especially Mpumalanga province, where seven coal plants are scheduled to be decommissioned by 2030 (Department of Energy 2018, 63; SAWEA 2018, 10; Friedrich-Ebert Foundation, interview, 2 February 2018).

Despite these socio-economic challenges, the instrument itself has been evaluated as a highly successful and transparent programme for establishing renewable energy in a hitherto quite adverse energy market (Eberhard, Kolker, and Leigland 2014; GreenCape 2021).

Energy transitions patterns

REIPPPP is restructuring South Africa's energy transition path. Yet, although it is already clear that REIPPPP has attracted transnational investors, resulting in an overall share of 25% for foreign capital, and a dominance of large international bidders increasing from round to round (Filipova et al. 2019, 46–48), only a comparison between the project consortia is able to shed more light on the project patterns that are privileged by REIPPPP's policy design. We therefore assessed which investment patterns materialised over the five rounds of bidding. Our ZA_RE Invest database (Claar and Müller 2021) builds on 82 project portfolios, which were evaluated according to the following set of categories:[8]

- form of financial investment (debt versus equity);
- transnational embeddedness (role and origin of transnational companies involved);
- ownership (share of transnational shareholders versus share of domestic shareholders and share of local community trusts);
- socio-economic impact (aims and scope of socio-economic projects).

The projects were coded in accordance with these categories. To ensure intercoder reliability during the coding process each coding was discussed (and potentially re-adjusted) between the authors. At the final step, we were able to identify several repeating effects, which play out in three distinct investment patterns. In being 'ideal types', these patterns address the specific demands, strategies and risks of transnational renewable energy investment in an emerging market, but also foreground implications with regard to South Africa's transition towards a green economy. These patterns are illustrated in Figure 1, but also set out in in our database of research findings at Claar and Müller 2021.

(1) Transnational capital

The first pattern, transnational capital, is characterised by complex shareholder consortia, involving multiple international partners, and an exceptionally high share of

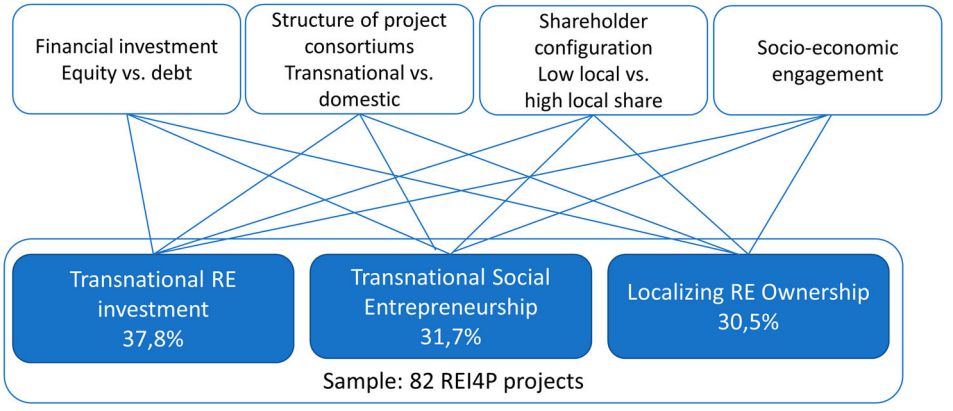

Figure 1. REIPPPP project patterns.
Source: own compilation/ZA_RE_Invest Database 2018 (Claar and Müller 2021).

inter- and transnational capital, ranging between 40% and (mostly) 60%, with private equity playing an important role. This is complemented by a lower share of local capital and low involvement of local communities. Overall, 31 out of 82 projects (37.8%) fall under this category, and in the second and fourth rounds, this pattern applies to 44% and 50% respectively of the total number of projects in these rounds. In most cases we find one transnational shareholder with a blocking minority who manages all the operative processes. In many cases, companies with a long-standing history in conventional sources are now seeking to tap the potential of the renewable energy market, for instance Enel or Anisol, a subsidiary of the French oil company Total. Local community trusts are kept at a minimum share of 2.5%–5% ownership. While this may keep the investment risk and upfront costs for local actors at a lower level, this also limits their profits and their participation in terms of defining and meeting community needs. In all of these cases investment takes place on land that was individually owned, so that company access can be facilitated easily. The construction work itself is often outsourced to specialised South African engineering companies, whereas the high-tech components of solar and wind projects derive mainly from European and Chinese firms (Walz and Delgado 2012; Grimes and Sun 2014). Meanwhile, equity shareholding in several projects from this pattern has been sold and repackaged as an asset by other green funds (see Filipova et al. 2019, 50), thus demonstrating the strong focus on bankability in this particular pattern.

(2) Transnational social entrepreneurship

This investment pattern is characterised by a high share of transnational investors, complemented by an almost equally high share of community trusts, ranging between 10% and 40% of community ownership. A typical example is the Prieska Solar Power Plant, involving Spanish company Gestamp (60% share), but also the South African renewable energy developer and strategic equity investor Mulilo, with a share of 40% divided equally between the company and a community trust. This pattern involves South African project developers, pension funds, life insurance and black equity

investors, but also development aid agencies and international finance institutions, such as Norad or the World Bank. Socio-economic responsibility is often outsourced to specialised agencies, such as Sofisa Phillips or the University of Cape Town's (UCT's) start-up Knowledge Pele, that aim at business consultancy, socio-economic needs assessments and community development programmes.

This pattern was found in 26 out of 82 projects (31.7%), and was exceptionally prominent in the first and third rounds, with 33% and 50% respectively. Combining transnational investment, domestic black capital and community trusts all at a high share, this pattern can be considered a liberal success story building on the idea of African entrepreneurship, while opening up towards transnational investors' interests. Still, the higher share of local community trusts does not necessarily guarantee full participation, as renewable energy projects often lack an adequate, transparent, and fair participation mechanism (Wlokas 2015; Wlokas, Westoby, and Soal 2017). Furthermore, it goes hand in hand with significantly increased economic risk and higher upfront costs to be shouldered by the community.

(3) Localised renewable energy ownership

Localised renewable energy ownership applies in 25 out of 82 projects (30.5%). These consortia involve smaller, South Africa-based project developers or joint ventures which hold the blocking minority. In these cases, engineering and construction work is performed by domestic companies, thereby guaranteeing a higher rate of local content. The shareholder amount of community trusts is much higher than the 2.5% required by the REIPPPP directives, ranging between 15 and 40%. In contrast to the first and second pattern, projects within this pattern are more likely to be financed through debt from national and developmental banks than through equity. Several projects involve traditional leaders and communities on collectively owned land, for instance Tsitsikamma Community Wind Farm, Cookhouse Wind Farm, and Grassridge Wind Farm. Socio-economic programmes are more likely to be designed according to public consultation, with college courses, entrepreneurial education or agricultural consultation as typical features. Despite increased competition the share of projects with high levels of local ownership remained stable throughout the rounds.

Overall, our analysis of investment patterns confirms the assumptions from earlier works (Baker 2015), indicating that REIPPPP neatly corresponds to the needs of transnational investors, which have become the dominant actors in two-thirds of the projects (transnational capital and transnational social entrepreneurship). Obviously, the strategy to make use of a high blocking minority, to combine transnational and domestic equity and depth capital, and to complement this with a relatively low share of local community trusts seems to be a fruitful option for foreign investors accessing the South African market and aiming at bankability of renewable energy. At the same time, combining a dominant transnational investor and a domestic social-entrepreneurial counterpart proves to be a successful match that meets socio-economic needs but is also competitive in terms of pricing. Beside this dominance, the localised pattern was able to maintain its share, albeit on a smaller scale. The design of the REIPPPP scheme also appears to attract projects that are driven by corporate social entrepreneurship motivations and distribute a higher amount of shareholding power to local communities.

Discussion: REIPPPP's potentials and pitfalls for a 'just energy transition'

Overall, REIPPPP has proven to be a successful policy innovation which has significantly influenced the shape and direction of South Africa's energy transition. Currently we are witnessing the emergence of a flexible public–private investment scheme, built on the 'green growth' narrative (Death 2014; Duit, Feindt, and Meadowcroft 2015), yet in the shadow of monolithic infrastructures such as the minerals–energy complex (Fine and Rustomjee 1996; McDonald 2011) that seem unfit for reform. This type of transformation from a protectionist and state-centred energy policy regime is prone to political tensions. It is in this light that we see the need to consider REIPPPP's repercussions for the course of South Africa's green transformation. If we understand a 'just energy transition' as an initiative that seeks to contribute to both social and environmental sustainability, our findings give way to critical reflection regarding (1) distributive justice; (2) recognitional justice; and (3) procedural justice.

(1) Distributive justice

A distributive justice perspective points to questions of access to and affordability of renewable energy. REIPPPP has indeed succeeded in adding a remarkable amount of renewable energy to the national grid at cost-efficient pricing, thereby making clean energy more affordable to large parts of the population, so in generally affordability aspects match REIPPPP's policy design. Our investigation of REIPPPP patterns, however, shows that the dimensions of ownership and technology transfer may be at risk especially in the first REIPPPP pattern. Throughout the bidders' rounds, many of the successful bidders such as Enel and SunEdison have enlarged their portfolios and are mobilising their South African projects as an anchor for entering the broader African renewables market. This comes at a time where auction instruments are rapidly gaining popularity (for example in Zambia or Rwanda: see IRENA 2018 for an overview) and correspond to the ideal of scalable and bankable transition projects. At the same time, national bidders see themselves being forced out of the market, as they were unable to compete with the tightening pricing regime. These dynamics – demonstrated especially by the selling and purchasing of equity shares among several projects in our first investment pattern – illustrate that despite of an average level of 33% black ownership (Department of Energy 2019b, 33), there is a built-in tendency to transnationalise and financialise this transition process. Also, the average level of 9% local community ownership (Ibid., 33) overshadows that the variance is quite large between the three patterns, with the transnational pattern mostly only meeting the minimum requirements.

Equally relevant for the justice dimension is REIPPPP's contribution to technology transfer. The reliance on transnational investors could result in an only partial knowledge transfer, given that scalable projects building on technological knowledge are mostly situated in the global North. So far, South Africa's technology policies continue to place emphasis on clean coal technologies and have created a lavishly subsidised research and innovation sector based on carbon (ASSAf 2014, 49, 64–68). Furthermore, REIPPPP's local content requirements have not yet worked as stimulants for a higher share of African-based value creation along the renewable energy production chains due to the overarching Chinese competition, and have even resulted in adverse effects,

such as the manipulation of content declarations (Baker and Sovacool 2017; Council for Scientific and Industrial Research Officer, interview, 1 February 2018).

(2) Recognitional justice

In contrast, recognitional justice focuses on the needs of particularly vulnerable populations. This points especially to the design of socio-economic projects. So far, mostly the socio-economic projects that have been developed in the third pattern actively contribute to an enhanced technological literacy, as they address energy engineering skills, technological education, and specific programmes for female engineers or entrepreneurship (Parshotam and van der Westhuizen 2018, 37–38).[9] Again, scalability seems to work as a hindrance for tailor-made solutions that mirror the needs articulated by the local communities. Thus, despite its unique socio-economic requirements, the mere existence of REIPPPP can only partially contribute to a green knowledge economy. While the unequal distribution of transformation knowledge expresses a general and global dilemma, attempts to decrease this kind of divide in the South African context have not yet been successful.

Furthermore, this dimension also refers to the distribution of projects across South Africa. The unequal spread of projects means that socio-economic benefits such as job creation, access to renewable energy education and training programmes, or yields from energy proceeds, are not evenly distributed, but are subject to the entrepreneurial decisions of the project consortia (Department of Energy 2019b, 43–46). Only a few decisions on project localisation seem to follow a bottom-up logic, for instance when projects are implemented on former homelands, or close to a former coal mine. Regrettably, in precisely those regions (Mpumalanga, Limpopo, KwaZulu-Natal) that will undergo a decommissioning of dated coal power stations and see a loss of about 35,000 mining jobs (SAWEA 2018, 10), the labour absorption capacity of renewable energy is still at minimum, as very few projects are located in this area. The introduction of REDZs may even add to these concerns, as it may play out in a deepening dichotomy between prospering renewable energy zones and derelict coal zones (McEwan 2017, 9–10). However, REDZs may also facilitate the localisation of solar PV and wind turbine manufacturing facilities, which may serve as a stimulus for diversifying South Africa's renewable energy value chain (GreenCape 2021, 47).

(3) Procedural justice

Finally, procedural justice assesses whether participation and decision-making are guaranteed within the REIPPPP projects, that is, during project planning and implementation, and especially concerning the mandatory socio-economic programmes within the 50-kilometre zone. A minimum level of local ownership, as is commonplace under the transnational investment pattern, indicates that project planning is implemented in a top-down direction with the participatory opportunities of local actors being marginal. Very few projects under the transnational investment pattern provide information on how they involved the local community in the planning process; also, in most cases, their socio-economic projects have not been specified in greater detail. Instead, some project developers have outsourced all questions concerning socio-economic outcome

to specific agencies. This plays out in local communities whose interests are not met and whose benefits from renewable energy remain limited (Wlokas 2015; Wlokas, Westoby, and Soal 2017). Furthermore, the dynamic financial transfer of equity capital between green funds (Filipova et al. 2019) demonstrates a strong focus on bankability, which may further downplay public participation.

In contrast, the social entrepreneurship and the localised renewable energy ownership patterns demonstrate more willingness to involve local communities. This refers to aspects such as skills training, women's empowerment and long-term job creation. A number of projects also include educational programmes that support students in acquiring degrees on energy engineering, thereby directly contributing to knowledge transfer, for example the Ngodwana Energy Project (the only project in Mpumalanga so far) and Konkoonsies Solar Facility. Another project – Kathu Solar Park – has purposely been constructed on the site of a former coal mine, thereby supporting a reskilling of unemployed coal miners. Within this pattern we also find specialised agents that facilitate participation and development of socio-economic programmes, UCT's Knowledge Pele being the most popular of these. The example of the Cookhouse Wind Farm demonstrates that specific training programmes for trustees within a community trust allow for more inclusive community outreach (Wlokas and Soal 2016).

While the degree to which procedural justice is promoted by the three patterns, it is the overall design of REIPPPP that effectively prevents an early and transparent outreach towards local communities, due to the competitive and therefore highly discreet bidding process. Unfortunately, for project developers, any form of local participation is in the first place considered to be an entrepreneurial risk (Wlokas 2015, 30–31).

Concluding recommendations

South Africa's green transformation is shaped by ambivalences and tensions, although it overall demonstrates South Africa's aspirations to take responsibility as a frontrunner in global climate governance. Still, on the domestic side, the case of a coal monopolist rapidly greening and diversifying its energy mix and aiming at decarbonisation on a larger scale is prone to generate conflicts with the existing modes of fossil energy production. Against this backdrop the built-in distortions, such as the lack of investment in poorer, rural provinces, as well as the low level of local ownership and local content, may give rise to a downgrading of social interests within a future green economy.

Our analysis provides empirical evidence for these dynamics, by showing how REIPPPP's policy design has materialised in two largely transnationalised project patterns and one pattern that is mostly shaped by domestic actors. While this reflects the liberal narrative of South Africa opening up to global investors, a largely transnationalised transition can only to a limited extent contribute to greater energy justice and to a just energy transition both on the niche and the regime levels. With design and parameters largely being geared towards shareholder interests (easy access to land, quick environmental impact assessments) on the one hand, REIPPPP only indirectly caters to wider socio-economic goals. We thus situate our findings alongside other studies (see Baker and Wlokas 2014; Baker 2015; Wlokas, Westoby, and Soal 2017; Baker and Burton 2018; Filipova et al. 2019), suggesting that the rise of project capital and equity in the two transnational patterns underlines the financialisation of the renewable

energy sector. On the other hand, the localised renewable energy ownership pattern corresponds to distributive and procedural energy justice, due to a higher level of local ownership, opportunities for technology transfer and, not least, socio-economic programmes based on people's needs.

To redesign REIPPPP in a way that contributes to distributive and procedural energy justice in a more favourable way, we see potential for a number of policy recommendations that would make a significant contribution to integrating justice criteria during the long awaited fifth round. In light of the current debate on a 'just recovery' during and after the Covid-19 pandemic, we see the need to concentrate more intensely on renewable energy's potential for job creation and proceed on a green growth path (Davis and Morris 2020). A regional bidders' round may result in provinces such as Mpumalanga or Limpopo gaining more entrepreneurial attractivity and profiting from renewable energy job creation. In addition, higher rewards for the inclusion of local actors beyond the minimum threshold could be a viable option and would support the competitiveness of South African renewable energy entrepreneurs, as well as provide a more predictable localisation of clean energy production units. This should be backed by larger domestic capacities for renewable energy research funding that increase South Africa's knowledge production. Also, a larger framework of green industrial policies should complement REIPPPP's local content requirements, so as to systematically redesign South Africa's renewable energy value chain (Green Skills Programme, interview, 5 February 2018; Pegels 2014; GreenCape 2021, 54). Therefore, a widening of South Africa's 'green skills' programme or their expansion specifically to the REDZs would be fruitful. In terms of procedural energy justice, a close collaboration between project developers, local government and civil society, for example through stakeholder dialogue, would enhance public participation. Local trustees could greatly benefit from training in community development, as could international project developers, whose staff are normally not specialised in such activities (Wlokas 2015, 44–48; SALGA 2018).

Undoubtedly REIPPPP is changing the South African 'energyscape' and mirrors both hopes and challenges of a future green economy. The current enthusiasm over auction instruments in the global South emphasises the attractiveness of this policy innovation, yet from the perspective of distributive and procedural energy justice a number of caveats occur. Auction instruments, even if enjoying widespread popularity, are no 'one-size-fits-all' solution that is universally applicable. Especially for rural regions there is a risk that auction instruments and tendering outnumber off-grid solutions. Overall, this once again reveals difficulties in combining the competing goals of market competition, energy access for all and civil society participation. To further the goals of a just transition, REIPPPP would therefore need careful redesign.

Notes

1. REN21 (Renewable Energy Policy Network for the twenty first century) is a think tank whose mission is the promotion of renewable energy and a transition to 100% renewables. REN21 issues the Renewables Global Status Report, which gives an annual account of the current transition processes.
2. Officially the rounds that have taken place so far are labelled as Round 1, Round 2, Round 3, Round 3.5 and Round 4. Round 5 was opened in March 2021, aiming at another 2.6 GW wind and solar photovoltaic energy (GreenCape 2021, 2).

3. Feed-in tariffs are incentives which facilitate investment in renewables, by offering renewable energy producers (including private households) a financial compensation for their investment. After introduction in Spain and Germany, feed-in tariffs have spread to more than 100 countries.
4. Falkner (2014) refers to fossil fuel subsidies to illustrate the trade-offs that characterise the 'energy trilemma': while a reduction in fossil fuel subsidies helps to reduce carbon emissions, incentivises energy efficiency and promotes renewable alternatives, a reduction might at the same time adversely impact energy access, especially for communities reliant on energy subsidies.
5. Each project company needs to demonstrate a minimum of 40% South African participation, a minimum black ownership of 12% with a target of 20%, and a minimum of 2.5% ownership by communities living within a 50-kilometre radius of the project site. Site selection was carried out by the private sector, resulting in an uneven distribution of projects.
6. Local content requirements are policies which aim at stimulating domestic industries, by demanding that a certain percentage of goods and services along a value chain be domestically manufactured.
7. See map at https://sfiler.environment.gov.za:8443/ssf/s/readFile/folderEntry/19030/8afbc1c75aea91ba015b66b85c0d4ad8/1492009145253/last/REDZ_251016.png (Department of Environmental Affairs 1994).
8. Data were not retrievable for all 112 projects.
9. Positive examples of training programmes in energy engineering and related subjects are those provided by the Konkoonsies II Solar Facility or Solar Capital Orange.

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