TRADE & INDUSTRIAL POLICY STRATEGIES

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A case for renewable energy in South Africa's post-lockdown economic recovery stimulus package

OVERVIEW

As South Africa responds to COVID-19 and aims to stimulate the economy post lockdown through an infrastructure-led package, an opportunity exists to address many of the electricity-related challenges in the country by unlocking the potential of renewable energy technologies. This policy brief looks at the benefits of including renewable energy in the country's stimulus package and considers possible avenues to do so.

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

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INTRODUCTION

The COVID-19 pandemic, which led the South African government to enforce a nationwide lockdown, has resulted in a dramatic decline in electricity consumption of about 5 800 gigawatts (GW) from 27 March to 27 April 2020 and as much as 10 000 MW in some hours (Eskom 2020). This has provided temporary relief to the national electricity system. The electricity crisis is, however, still present. Warnings that loadshedding would restart once the lockdown is eased have already made headlines (see, for instance, Hosken 2020), with the potential to jeopardise any economic recovery. In addition, declining sales will have long-term, negative impacts on the financial stability of the utility as well as municipalities.

A focus on renewable energy as part of the country's economy recovery strategy would be a beneficial intervention at multiple levels. Beyond contributing to energy security, renewable energy would deliver the most cost- and time-effective rollout of generation capacity. That alone would bring massive socio-economic opportunities by improving security of supply and reducing electricity costs. Co-benefits associated with renewable energy technologies would generate significant socio-economic spillovers from employment creation and community empowerment to industrial opportunities. Positive environmental impacts would also trigger additional socio-economic benefits in the long run, primarily by decarbonising the economy.

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South Africa has been grappling with a longstanding electricity crisis for more than a decade. The national power utility, Eskom, has been unable to guarantee the security of supply since 2007, resorting to regular rotational power cuts. Crippled by mammoth investments in new coal-fired power stations as well as years of maladministration and mismanagement, Eskom is furthermore on the brink of financial collapse. Eskom effectively relies on state support to operate. It has already received R133 billion in recapitalisation from the state (over the 2008/2009-2019/2020 period), a number set to rise to R245 billion by 2022/2023 (NT 2020).

Historically-low electricity tariffs have risen rapidly, quadrupling in 10 years in nominal terms, in order to cover Eskom's exponential expenditure. This is compounded by increasing pressure to reform South Africa's electricity supply industry, i.e. Eskom, to a) unbundle the vertically-integrated utility and open up the sector to other generators (and distributors); and b) decarbonise an electricity system which is heavily based on coal-fired electricity generation. While historically resisted by the utility, the need to fundamentally reform South Africa's electricity supply industry and Eskom has recently been acknowledged by its Chief Executive Officer André de Ruyter (Yelland 2020).

MULTIPLE BENEFITS OF FOCUSING ON RENEWABLE ENERGY

Unlocking renewable energy investments as part of the post-lockdown stimulus package would bring multiple benefits, from fostering inclusive growth to stimulating industrial development and sustainable energy systems.

Renewable energy technologies would directly contribute to South Africa's energy security, protecting the economy and livelihoods from costly energy shortages.

First, renewable energy technologies would directly contribute to South Africa's energy security, protecting the economy and livelihoods from costly energy shortages. By diversifying South Africa's electricity mix, renewable energy technologies would meaningfully increase the resilience of the system and the country overall to external shocks (Montmasson-Clair and Deonarain 2017).[1] The Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the main avenue used to introduce renewable energy in South Africa, has since its inception in 2011 made a material contribution to the country's electricity supply, procuring 6.4 GW of renewable energy-based generation capacity from 112 Independent Power Producers (IPPs). In addition, the sector has contributed to reducing costly and damaging loadshedding. The cost of unserved electricity is estimated between R43 and R86 per kilowatt-hour (kWh) by the Council for Scientific and Industrial Research (CSIR).[2] For instance, over the first quarter of 2019, without renewable energy, loadshedding would have been more severe, increasing by 46% from 769 to 1 126 GWh and moving from stage 4 to stages 5 and 6 (Wright and Calitz 2019). Accordingly, about 3 876 megawatts (MW) of renewable energy in the system reduced the estimated economic impact from R72.6 billion to R49.6 billion.[3]

Second, renewable energy technologies represent the most cost-effective pathway to electricity security.[4] This is moreover without including the cost of externalities associated with coal, estimated at US$31.1 billion in 2017 (8.8% of GDP) by the International Monetary Fund (IMF 2018). The 2019 Integrated Resource Plan (IRP) acknowledges that a mix of renewable energy, complemented by gas-based generation, constitutes the least-cost pathway for the country (DoE 2019).[5] Accordingly the IRP includes a significant push for renewable energy technologies by 2030, including 6000 MW of solar photovoltaic- (PV) and 14 400 MW of wind-based generation. The IRP also anticipates 4 000 MW from own-use distributed and/or embedded generation technologies between 2023 and 2030.[6]

Unlocking renewable energy technologies furthermore primarily relies on projects developers, businesses and households investing in new generation capacity. Even though investment would be required to improve and strengthen the grid infrastructure at the transmission and distribution levels, this drastically limits the capital expenditure requirement on the state (government and Eskom alike). Renewable energy technologies have moreover the added benefits of not relying on price-volatile fossil fuels, effectively locking in cost savings for decades on completion of the plants. In fact, the inclusion of the two coal-fired IPPs in the country's IRP will lead to an increase of R1.9c/kWh by 2030 (on a projected electricity tariff of R119c/kWh), i.e. a cumulate R23 billion (Creamer 2018).

Of smaller size than large-scale coal power plants, renewable energy plants can furthermore be commissioned quickly. The average lead time for the 64 projects already completed under the REIPPPP has been 1.9 years (DoE, NT, and DBSA 2020). This makes renewable energy technologies flexible and well-suited to respond to changing needs and technological trends, avoiding costly over- or under-construction of new capacity.

Third, increasing the share of renewable energy-based electricity contributes to transitioning to a low-carbon pathway and reducing the carbon intensity of the South African economy. Many calls have been made by global and local institutions to align any economy recovery package with the transition to sustainable development (see, for instance, IRENA Coalition for Action 2020). This is particularly relevant for South Africa, which is one of the most carbon-intensive economies in the world, mainly due to 86% (in 2016) of its electricity generated by coal-fired power plants. This is also in line with the National Development Plan, which aims for South Africa to achieve a low-carbon, climate-resilient and inclusive economy by 2030 (NPC 2011).

This is also consistent with reaching a net-zero carbon economy by 2050, as required to maintain climate change within manageable boundaries (Altieri et al. 2015; IPCC 2018). These goals

[1] In the face of pandemics like COVID-19, an added benefit of renewable energy-based systems, compared to fossil fuel-based plants, is their ability to operate with little human contact.

[2] The relatively large range is due to the difficulty in estimating the cost of unserved energy to the economy.

[3] Estimates calculated based on an average cost of unserved energy of R64.5 per kWh.

[4] In addition to decreasing technology costs, this is enabled by South Africa benefitting from one of the best renewable energy potential worldwide, largely thanks to high solar irradiation and wind patterns.

[5] Importantly, a mix of technologies is required to maximise the resilience of the system and deliver all required services, such as peak capacity, dispatched ramping, sync power, system strength, frequency and voltage.

[6] Over the 2019-2022 period, no specific allocation has been included in the IRP. This indicates that the allocation will be "to the extent of the short term capacity and energy gap." The gap has been estimated between 2000 and 5000 MW.

South Africa risks losing access to markets as well as finance if the economy does not transition to a low-carbon pathway.

are effectively conditioned on decarbonising the electricity supply industry through renewable energy technologies. Looking forward, the carbon intensity of the South Africa's economy is also increasingly a risk factor. As countries and companies embark on their own transition, South Africa risks losing access to markets as well as finance if the economy does not transition to a low-carbon pathway (Montmasson-Clair 2016). In turn, not investing in renewable energy technologies increases the risk of delivering stranded assets, both in the energy system (coal-fired power plants) but in the economy overall (any energy-intensive facility).

Fourth, increasing the role of renewable energy, while reducing the prevalence of fossil fuels (particularly coal) in electricity generation, generates significant health benefits. Up to 44 million people are exposed to air pollution from coal-fired power plants in South Africa. The harmful nature of coal-fired power plants in South Africa is compounded by plants not complying with air quality standards (themselves far more lenient than in other countries) (Sguazzin and Ramalepe 2019). Annual health costs related to coal-based greenhouse gas (GHG) emissions are forecast to reach up to R45 billion in 2022. As many as 2080 premature deaths annually are predicted due to air pollution from power plants in South Africa. In absolute terms, the rollout of renewable energy in the country could decrease health costs by R3.8-R12.7 billion by the year 2035, depending on the scale of the rollout (N. Naidoo et al. 2019). The International Monetary Fund further estimated the cost of local air pollution externalities in South Africa to US$17.7 billion in 2017 (IMF 2018).

Fifth, renewable energy technologies can trigger positive impacts on poverty and inequality reduction. Renewable energy technologies, particularly solar-based systems, are a cost-effective avenue to electrify households, small businesses and entire communities, especially in (rural) areas which do not have an easy access to the grid. Besides the health, safety, developmental and financial benefits of increasing access to electricity through renewable energy technologies, they can enable the productive use of electricity in communities that do not have adequate access to energy. Furthermore, although imperfect on this front, the REIPPPP has also unlocked meaningful socio-economic benefits for marginalised communities hosting large-scale projects. Local communities own an average of 9% of active IPP projects, while Black South Africans own, on average, 33% of projects to date (DoE, NT, and DBSA 2020). An ambitious rollout of the REIPPPP could, by 2050, deliver multiple benefits to marginalised communities, through access to education-related programmes for up to 30 000 individuals, support to more than 3 000 local enterprises and the creation of more than 10 000 local jobs (Mthembi et al. 2019).

Sixth, renewable energy technologies have an overall positive impact on job preservation as well as job creation.[7] As of December 2019, a total of 48 334 job-years have been created for South African citizens, of which 39 312 were in construction and 9 021 in operations (DoE, NT, and DBSA 2020).

A recent study by the Institute For Advanced Sustainability Studies and the CSIR shows that electricity pathways with higher shares of renewable energy lead to higher net employment in the power sector (Hartley et al. 2019). In addition, increased deployment of renewable energy in South Africa and the associated changes it creates in the economy (most notably lower electricity prices, either directly through distributed generation, or over time through the grid) would lead to net increases in overall employment. Employment gains are mostly anticipated in the service sector, with manufacturing employment gains expected to be mostly indirect, through lower electricity prices.

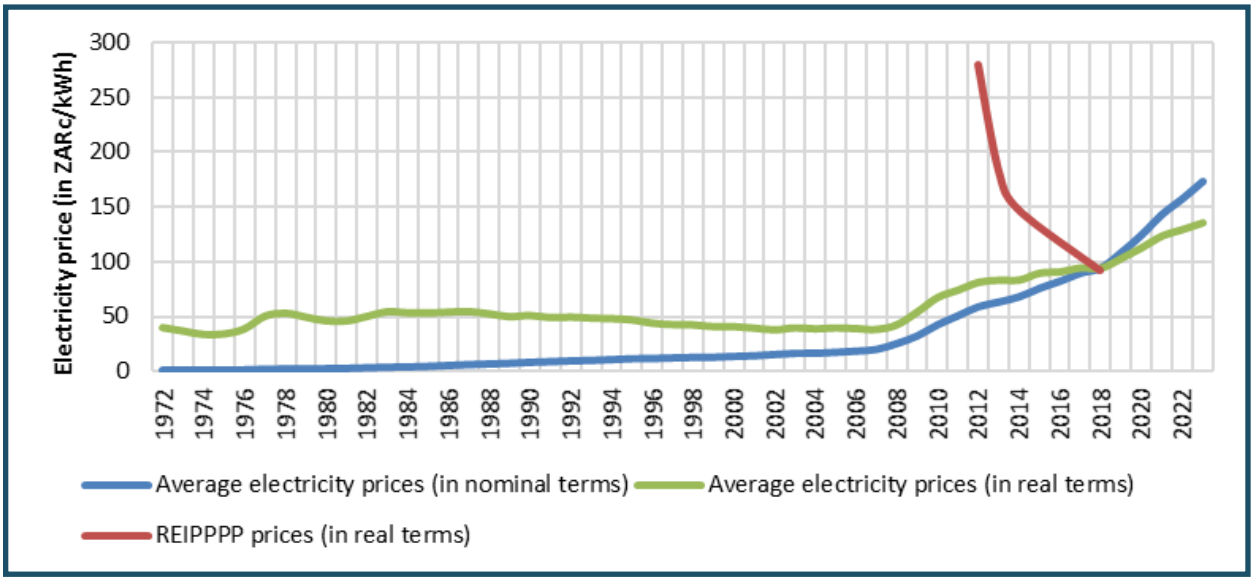
Renewable energy investment would also positively contribute to a just transition in the country's energy sector. As South Africa phases out coal-based power generation and the associated mining value chain, the livelihood of about 80 000 coal miners, and a number of entire communities, from households to small businesses, are directly threatened. eMalahleni, Steve Tshwete, Msukaligwa and Govan Mbeki in Mpumalanga are particularly at risk because of their high reliance on the coal value chain.

The development of renewable energy technologies is part of a strategy to improve the resilience of vulnerable groups. Renewable energy is an important component (among other opportunities) to diversify and reinvigorate the economy of Mpumalanga, where unemployment is already higher than the national average. Accordingly, eMalahleni has been identified as a potential Renewable Energy Development Zone (Patel et al. 2020; Makgetla et al. 2019).

Last but not least, the rollout of renewable energy technologies has positive spillovers for industrial development. It opens the door for new

[7] Estimates on the job creation potential of renewable energy technologies vary widely and definitions should be considered carefully. See Tyler and Steyn (2018) for a detailed explanation of the challenges. Numbers are included in this brief to give an idea of the quantum of employment.

Figure 1. South Africa's average electricity price compared to renewable energy technologies



Sources: Author, based on electricity prices for Eskom, producer price index from Statistics South Africa, REIPPPP prices from the DoE-NT IPP office*; Note:* Real prices in 2018 terms.

manufacturing opportunities and supports economic activities across the board through increased security of supply and, over time, lower electricity prices. The REIPPPP has, for instance, generated R53.7 billion of local content expenditure, achieving 50% local content (DoE, NT, and DBSA 2020).

While much of the industrial capacity created on the back of the REIPPPP has disappeared due to the stalling of the programme, a phased restarting of procurement rounds, involving consistent annual commissioning, could help rebuild this capacity, as highlighted by the fledging South African Renewable Energy Master Plan. Beyond the REIPPPP, opportunities exist to leverage the rollout of small-scale embedded generation (SSEG) in the country, for which industrialisation benefits are currently not harnessed. The manufacturing of components for smart grids, particularly smart meters but also batteries, carries high potential in South Africa, both for the domestic and export markets (see, for instance, Montmasson-Clair, Wood, et al. 2017; EScience Associates, Urban-Econ Development Economists, and Ahlfeldt 2012; Ernst & Young and enolcon 2013).

The rollout of renewable energy is furthermore aligned with the country's Strategic Infrastructure Projects (SIPs). Besides SIP 8, which directly targets the promotion of renewable energy technologies, the other two energy-related SIPs (SIP 9 and SIP 10) as well as a number of other SIPs are aligned with an increasing role for renewable energy technologies (DoE, NT, and DBSA 2020).

AVENUES FOR INCLUDING RENEWABLE ENERGY IN THE STIMULUS PACKAGE

Three main avenues exist to unlock the potential of renewable energy technologies as part of an economic recovery package for the South African economy: restarting the REIPPPP; enabling SSEG; and unlocking third-party transactions. These three avenues would advance the creation of a sustainable energy system that is diverse and modernised to support the long road to economic recovery.

Restarting the REIPPPP

Unlocking the REIPPPP is the first avenue to support a large-scale rollout of renewable energy technologies in South Africa. The REIPPPP has been heralded as a world-leading programme for its design and implementation. Since its inception in 2011, it has led to the procurement of 6.4 GW of renewable energy-based generation capacity, including 2 292 MW of solar PV and 3 357 MW of wind energy. Looking ahead, the REIPPPP is consistent with South Africa's IRP and is the primary vehicle to deliver about 20 GW of renewable energy generation capacity included in the plan over the 2019-2030 period.

The REIPPPP has spearheaded the least-cost, corruption-free, on-time and on-budget commissioning of power generation in South Africa. The bidding approach and the ongoing refining of the process have led to massive reduction in prices over time. Effectively, as shown in Figure 1, REIPPPP prices are on average lower than Eskom's average electricity price from 2018 and will, going forward, contribute to lower electricity prices as part of a mix of technologies.[8] With Eskom's average prices going

[8] Importantly, technologies cannot only be compared on the basis of their levelised cost of energy. Any technology should be understood as part of the energy mix. This is required to maximise the resilience of the system and deliver all required services, such as peak capacity, dispatched ramping, sync power, system strength, frequency and voltage. The IRP and other independent modelling includes these system analyses to ensure a reliable system comprising a portfolio of technologies.

up and REIPPPP prices decreasing, the differential is furthermore expected to widen going forward. Effectively, the rollout of the REIPPPP would provide South Africa with affordable and clean energy for decades to come (compared to coal-fired power generation). In addition, by relying on IPPs, the programme primarily relies on private capital and reduced the pressure on the fiscus or Eskom's financials.[9] As of December 2019, the REIPPPP has attracted about R210 billion of investment into the country. While still only reaching 52% overall, local ownership has also grown over time (DoE, NT, and DBSA 2020).

In addition, through its design (weighing bids at 70% on price and 30% on economic contribution), the REIPPPP has delivered noteworthy socio-economic benefits. The programme has led to the creation of 48 334 job-years. Before the hiatus experienced from 2015, which was a result of Eskom's resistance, the programme also fostered the development of industrial capacity.[10] Firms, such as inverter manufacturer SMA, wind tower manufacturer DCD and solar PV manufacturer Jinko, had for example established production facilities in the country. While imperfect in its delivery, the REIPPPP also contributed to local economic development in the communities hosting the various plants. The projects procured as of December 2019 are expected to generate R26.9 billion (11.5 billion in real terms) of net income for communities over the 2013-2038 period (DoE, NT, and DBSA 2020).

The REIPPPP rapidly led to the procurement of 4.1 GW of generation capacity from 2011 to 2014. This came to a halt in 2015 with Eskom refusing to enter into new power purchasing agreements (PPAs) with IPPs. In early 2018, 27 projects in the pipeline, totalling about 2.3 GW, were eventually unlocked. Since then, no new capacity has been procured. This is despite the promulgation of South Africa's new IRP in October 2019, which provides for significant new generation capacity to address the shortfalls expected over the coming years.

The process was reignited in February 2020, when the Minister of Mineral Resources and Energy submitted to the National Energy Regulator of South Africa (NERSA) the ministerial determination required for the REIPPPPP to move ahead. The determination covers the specific generation technologies outlined for procurement in the IRP, including 6 800 MW of solar PV and wind capacity for the years 2022 to 2024.[11] The regulator indicated that a period of six months would be required to provide concurrence on the determination. [12]

Beyond the REIPPPP, the procurement of large-scale renewable energy-based generation capacity could be fast-tracked through the procurement of emergency power aimed at closing the immediate supply gap of 2 000 MW identified in the IRP 2019 for the years 2019 to 2022. The Minister submitted a ministerial determination to that effect in February 2020, along with the determination pertaining to the REIPPPP. The regulator indicated that it would follow a so-called "fast-tracked" process of three months to provide its concurrence on this "emergency" determination[13] (Creamer 2020b; 2020a).

It is crucial that the procurement processes under the REIPPPP are initiated without any more delays. Many years have been lost, including since the publication of the IRP in October 2019. Given the urgency of procuring new generation capacity, the process currently under way is indeed long overdue. The followed methodology (i.e. consultation papers), the indicated timeframes, and the closure of NERSA's operations during the COVID-19 lockdown, also appear vastly out-of-sync with the emergency at hand.

In addition, in order to spur sustainable industrial development and employment creation, procurement should be conducted on an ongoing, continual basis to avoid any "boom and bust" phenomena. Providing policy certainty to the industry is indeed critical to rebuild trust in a programme that has lost credibility since the 2015 hiatus. In doing so, the design of the REIPPPP should be actualised in line with South Africa's and the industry's new environment.

[9] As raised , investments would be required to improve and strengthen the transmission and distribution infrastructure, including sub-stations.

[10] Over the course of the programme, local content targets progressed from a minimum of 25-30% in the first procurement round to 40-45% in the fourth round.

[11] The determination also includes 513 MW of storage to be procured and generated for the year 2022; 3 000 MW of gas for the years 2024 to 2027; and 1 500 MW of coal for the years 2023 to 2027.

[12] The determination is required before new power generation capacity can be procured and built in South Africa. As required under Section 34 of the Electricity Regulation Act 4 of 2006 (ERA), NERSA has to grant its concurrence on the determination after a public participation process. On 18 March 2020, NERSA officially launched the public participation process required by the Act by releasing a consultation paper on the determination.

[13] NERSA has similarly released a consultation paper for this determination.

There are about 400 small, medium, and micro enterprises active in the distributed generation space with the potential to create more than 100 000 jobs over the next 10 years.

First, given the current fiscal context and the maturity of the sector, the reliance on government support (particularly sovereign guarantees)[14] should be considerably reduced (if not completely removed) going forward.

Second, to increase socio-economic benefits and prevent excessive rent seeking, the empowerment component of the programme should be restructured and aligned with the broader requirement for a just transition. This should include materially raising expectations on the part of financial institutions and projects developers in terms of socio-economic empowerment. Further emphasis should moreover be paid to rolling out small-scale projects, which have been neglected to date (C. Naidoo 2020). The benefits of geographically-specific procurement, particularly in Mpumalanga, should also be explored in order to maximise just transition outcomes and the use of the existing grid infrastructure.

Unlocking SSEG

The second avenue to unlock renewable energy technologies would be facilitate the rollout of small-scale embedded generation at the residential, community as well as commercial/industrial levels. By turning consumers into prosumers, SSEG would bring multiple benefits to the country.

First, SSEG generates material cost savings. SSEG has been recognised for years as the most cost-effective mechanism to bring electricity to remote communities. As part of the Integrated National Electrification Programme, 160 307 households have been electrified (from 1994 to 2018) through non-grid technologies (DMRE, n.d.). With rising electricity prices and decreasing costs of solar-based systems, SSEG is cost-competitive for most applications. SSEG provides an avenue to electrify households and commercial activities, both in urban or rural settings. The versatility of the technology makes it relevant for both high- and low-income households. Due to the upfront cost , SSEG would primarily be taken up by high-income households and businesses. To avoid increasing inequality and jeopardising sustainability of the electricity system, a programme aimed at rolling out SSEG in low-income communities should accompany the introduction of an enabling framework.[15] In addition to financial benefits, rolling out at community levels (through mini-grids) can enable the productive use of energy, empowering communities. For residential prosumers, monthly savings can range from R200 to R543 for a two-kilowatt (kW) system. This would result in annual savings ranging from R2 400 to R6 500. For a typical 60-kW commercial system, average annual savings of R20 000 can be realised over the system's lifespan (Senatla et al. 2019).

Second, SSEG can make a meaningful contribution to energy security. While the lack of a clear policy and regulatory framework (and therefore verified data) makes it difficult to track the growth of SSEG, the number of installations is estimated at about 60 000, totalling 400 MW. There is little knowledge of "grey" installations, but African Rainbow Energy and Power estimates a conservative figure of 700 MW of privately-owned solar PV (Rycroft 2019). According to Senatla et al. (2019), in the metropolitan municipalities alone, rooftop solar PV has an economic potential of 15 GW between now and 2030, including 11.2 GW in residential areas.

Third, SSEG is at the core of the development of smart grids, enabling a fundamental restructuring of the electricity sector towards increased sustainability, flexibility, reliability and efficiency (SASGI 2017). Despite the lack of an enabling policy framework, an increasing number of municipalities have responded to the increasing investment in solar-based systems. As of October 2018, 41 municipal electricity distributors (out of 165) in the country allowed SSEG installations; 29 had an official application system; and 25 had SSEG tariffs allowing prosumers to sell back into the grid (SALGA 2018). The rollout of SSEG does, however, raise questions about the sustainability of the funding model of municipalities, which use their electricity sales margin to cross-subsidise their operations. New business models for municipalities should be explored to ensure financial sustainability (see Montmasson-Clair, Kritzinger, et al. 2017 for a discussion on this).

Fourth, SSEG can positively contribute to employment creation and the development of small businesses. According to a CSIR/South African Photovoltaic Industry Association (SAPVIA) study, there are about 400 small, medium, and micro enterprises (SMMEs) active in the distributed generation space with the potential to create more than 100 000 jobs over the next 10 years (Creamer 2020c). Beyond meaningful job creation in installation and maintenance, the rollout of SSEG could support local industrial development, through the assembly of solar-based systems and the manufacturing of numerous parts and components, such as meters and mounting

[14] NERSA has similarly released a consultation paper for this determination.

[15] To be sustainable financially, the rollout of SSEG would most probably come with a complete restructuring of electricity tariffs, with an increasing share of fixed charges.

structures. This is over and beyond the employment creation generated from the provision of electricity to previously under-served communities.

Despite these multiple benefits and its immense potential, SSEG remains marginal in South Africa. Uncertainty still exists around the regulation. As highlighted by the South African Photovoltaic Industry Association (see Creamer 2020c and Cliffe Dekker Hofmeyr 2020), four key challenges could easily be unlocked to enable SSEG in the country:

1. A clear, explicit allocation for distributed generation is required in the IRP. For the 2019-2022 period, the IRP does not determine a specific allocation for SSEG, simply stating that the allocation will be "to the extent of the short term capacity and energy gap" (DoE 2019: 42). For the 2023-2030 period, an allocation of 500 MW per annum is granted. However, distributed generation shares this volume with other projects, including cogeneration, biomass and landfill. The lack of an explicit allocation does not provide a strong mandate for NERSA to grant licences to entities wanting to generate electricity outside of the proposed state procurement process. The 500 MW limit is furthermore highly out of the sync with the potential of SSEG in South Africa and the part it could play in alleviating supply constraints.
2. Lifting the licensing exemption threshold from 1 MW to 10 MW would enable many more projects. As of April 2020, according to Schedule 2 of the ERA for licensing exemption, while SSEG with a capacity below 1 MW only requires registration, SSEG with a capacity greater than 1 MW but less than 10 MW needs to be licensed by NERSA. Generation plants with a capacity superior to 10 MW need to be licensed and part of a ministerial determination. The 1 MW threshold makes the development of projects up to 10 MW difficult for SMMEs. In addition, projects with a generating capacity of just over 1 MW must adhere to the same onerous application system as large-scale projects (i.e. a public participation process and hearings on a per project basis) to be licensed, making them impractical. This leads project developers to cancel or reduce the size of projects.
2. Ensuring there are clear guidelines on how to register and license projects and that NERSA has the resources and capacity to process applications timeously and efficiently. There is still confusion around the regulatory process. More effort should be made to clarify that projects need to first apply to the licensed distributor (i.e. Eskom or the municipalities) for connection of the generation facility and the use of the distribution system, and then apply for registration or licensing by NERSA. Industry has also proposed that, due to the volume involved, distributors take over registration of smaller SSEG on behalf of NERSA. In addition, the process to obtain a generation licence for projects above 10 MW in size should be clarified.
4. Making it a requirement for projects to register with the regulator by submitting an independent certificate of compliance against which the allocation to embedded generation can be measured, and ensuring that the database of installed megawatts is public and updated. This is crucial to ensure the rollout of SSEG is adequately managed by municipalities and the utility.

Unlocking third-party transactions

The third avenue to release the power of renewable energy technologies would be to enable third-party transactions. This would consist in allowing IPPs, municipalities as well as other possible generators, to produce electricity for self-use as well as for sale to a third party, which could be a municipality, a business, a household or any other customers, including Eskom.

In the near future, this would primarily allow large industrial and mining operations as well as municipalities to procure electricity from IPPs rather than Eskom. This would also enable companies with a renewable energy and/or climate change commitment to move to low-carbon sources of electricity. This could also be an avenue for Eskom to invest in renewable energy technologies.[16] However, such an avenue is currently not authorised by the policy and regulatory framework and is, in essence, linked to the unbundling of Eskom and the restructuring the electricity supply industry overall.[17]

Third-party transactions have the potential to unlock completely different market segments, compared to the REIPPPP and SSEG. Unlocking third-party transactions would open the door for customers to choose their suppliers, i.e. Eskom, a municipality or an IPP. Firms and municipalities may be interested in procuring power from IPPs to ensure security of supply, reduce their electricity costs (or in the case of municipalities, increase their electricity sale margin), and/or procure low-carbon electricity. This could be done through two main vehicles:

a. Procurers would have the possibility of making PPAs with third-party generators to supply energy on a take-or-pay basis. This model does not require companies/municipalities to expend capital and transfers in what would have been a balance sheet investment to an operating expenditure. The responsibility is shifted to the generator, which provides power at a rate reflecting its levelised cost of electricity including all installed capital costs, its own cost of capital and the plant operating expenses, effectively reducing the risk for off-takers.

[16] In the long run, third-party transactions would also enable the development of aggregators and virtual power plants.
[17] A change in the constitutional mandate of municipalities would also be required for them to fully leverage such opportunities (Montmasson-Clair, Kritzinger, et al. 2017).

The rollout of renewable energy technologies is core to creating a sustainable energy system able to support the long road to economic recovery in South Africa.

b. Companies or municipalities could directly, or via a wholly-owned holding company, invest in renewable energy projects, generally through a turnkey engineering, procurement and construction solution. While this option requires companies/ municipalities to carry the capital expenditures on their balance sheet,

c. It offers higher and faster returns, reducing intermediaries (as no separate IPP is used) and financing costs (as the one-time fixed cost is capitalised and depreciated on the balance sheet). From a fiscal perspective, such projects, which benefit from specific depreciation rules, could also be used to offset income taxes on core business activities. Concessional finance from development finance institutions could additionally reduce the cost of capital and improve the profitability of on-balance-sheet projects (Montmasson-Clair and Ryan 2015).

Some pioneering projects, such as the 3-MW Sol Plaatje and 4-MW Merino hydroelectric power plants, which sell their power to the municipality of Bethlehem in the Free State as well as Eskom, have historically paved the way (Montmasson-Clair, Kritzinger, et al. 2017). However, the current regulatory framework does not allow such projects to go ahead. Unlocking third-party transactions requires several measures.

First, a specific space for such project should be carved out in the IRP. In the current iteration of the IRP, third-party transactions, if allowed, would most likely fall in the "other" category of 500 MW per annum (from 2023 to 2030) for distributed generation, cogeneration, biomass and landfill-based generation. Alternatively, such projects could be counted under the existing technology-specific allocation in the IRP, which is currently earmarked for the REIPPPP. In any event, no clarity exists at this point on how such transactions would be included in the country's electricity plan.

Correspondingly, enabling such transactions requires to define them adequately. Most likely, the ability of projects to sell to multiple customers and/or change customers over time should be permitted to make such projects financeable. Electricity trading, which is currently limited to one pilot project (POWERX, previously Amatola Green Power), would also have to be allowed.

Second, fair and equitable access to the grid in order to wheel power is required. This is centred on the creation of an unbundled (i.e. independent of Eskom) Independent Systems and Market Operator (ISMO) to invest, operate and maintain the country's high-voltage transmission grid. This is a prerequisite for establishing a "willing buyer, willing seller" market. The creation of an ISMO outside Eskom, although remaining fully-owned by government, would contribute to levelling the playing field by eliminating the potential bias created by the current structure in which the Department of Mineral Resources and Energy (DMRE) procures energy and trading within Eskom. The creation of an ISMO was first considered in South Africa in 2011, with the proposed ISMO Bill. Never enacted, it was reintroduced without success in Parliament in February 2019. The creation of a Transmission System Market Operator, contemplated in the Department of Public Enterprises' *Roadmap for Eskom in a Reformed Electricity Supply Industry* (DPE 2019), would be a step in this direction.

Third, the registration and/or licensing process must be clarified, similarly to SSEG. Regulations (i.e. the ERA) technically allow, since 20 March 2020, the trading of electricity as well as projects for third-party transactions under 1 MW (such projects are exempted from licensing but must be registered with the regulator). Projects larger than 1 MW remain out of the current regulatory framework. An amendment to Schedule 2 of the ERA would be required to enable such transactions (Cliffe Dekker Hofmeyr 2020). At the municipal level, a draft amendment to the ERA, released on 5 May 2020, potentially opens the door for municipalities meeting certain conditions to procure their own power, by applying to the Minister for authorisation (Creamer 2020d). In any event, as of May 2020, the process to implement such projects remains unclear and convoluted, in effect hindering rather enabling third-party transactions.

CONCLUSION

The rollout of renewable energy technologies coupled with demand management, primarily energy efficiency interventions, the use of storage technologies and the management of flexible load, should be a core component of South Africa's (green) economic recovery strategy. It is core to creating a sustainable energy system able to support the long road to economic recovery in South Africa. Unlocking this potential mostly lies in providing the policy and regulatory framework and addressing existing bottlenecks and impediments to unlock investment. An increasing share of renewable energy technologies, if managed adequately, would be financially beneficial for the state. Investment would mainly be carried out by households and the private sector, and economic benefits resulting from a least-cost, reliable electricity supply industry would far outweigh any short-term costs.

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