

A feasibility study exploring energy access through community-led socially owned renewable energy development in South Africa

SUMMARY DOCUMENT

1. Introduction

A major energy transition is underway globally with the transformation of the energy model from a centralized fossil fuel-based system to a decentralized renewable-based system. This transition involves a meeting point of technology, infrastructure, institutions and people. It is enabled by new technologies and has resulted in new social practices and governance methods. It provides fertile ground for the emergence of new solutions with an enormous potential to stimulate local economies, create social cohesion, and increase the overall resilience of cities and countries. Renewable energy, with its adaptability and decentralised nature, encourages increased citizen participation in the energy transition.

The benefits of renewable energy are numerous. These include lower energy costs (for countries, corporates and households), increased grid reliability, reduced environmental and climate impacts, improved air quality and public health, employment creation, fuelling economic development and enhancing the welfare of citizens. Municipalities and their communities are thus able to actively participate in energy supply, distribution and energy efficiency.

Access to a reliable and constant supply of electricity is key for development. Modern economic activities, new technologies and the provision of public services all depend on energy. With adequate electricity, families can meet their important energy needs- lighting, heating/cooling (stoves, fridges, washing machines etc), media and communication (television, radio, Wi-Fi, cell phones). Energy systems need to be clean, safe, reliable, affordable and equitable, which means urgently scaling-up renewable energy interventions at the local level and empowering cities and their citizenry is pivotal.

Against this backdrop, this study set out to explore the feasibility of community-led socially owned renewable energy development in South Africa, with a focus on eThekwini Metro (KwaZulu-Natal Province) and Emalahleni Local Municipality (Mpumalanga Province).

The study is undertaken as part of the broader project: "Mobilising Social Movements for Energy Democracy and Sovereignty in South Africa: Towards socially owned[1] renewable energy solutions" supported by the Urban Movement Incubator (UMI) fund. The project is conducted in a partnership of leading community-based and non-governmental organisations, namely South Durban Community Environmental Alliance (SDCEA), Vukani Environmental Movement (VEM), Abahlali baseMjondolo (AbM), Sustainable Energy Africa and coordinated through groundWork. The project aims to empower communities to engage effectively with local government, and other relevant actors to access clean, safe, reliable and affordable energy through pursuing community-led socially owned renewable energy solutions.

2. Background

The recent United Nations Intergovernmental Panel on Climate Change (IPCC) report (2021) by the world's leading climate scientists warns 'a code red for humanity'. The report alerts that the pace of

[1] This includes options of state ownership, employee ownership, co-operative ownership, citizen ownership of equity in private companies, individual ownership, and collective ownership.

global warming is rapidly increasing, and Sub-Saharan Africa has been experiencing temperature increases well above the global average.

Climate change presents serious health, environmental and economic risks for our country, which have damaging effects on human health, water availability, food production, infrastructure and migration. South Africans are already feeling the effects of climate change through drought and flooding, and other extreme weather events associated with global warming, which have already caused enormous damage to infrastructure and livelihoods, and displaced thousands of people. As such South Africa has a raft of key national climate response policy commitments in place and a dedicated Presidential Climate Commission to build an environmentally sustainable, climate change resilience, low-carbon economy and a just society. More recently to signal the country's increased climate ambition, Cabinet approved our updated Nationally Determined Contribution (NDC), which sets out our greenhouse gas emissions (GHG) targets towards net-zero carbon emissions by 2050.

While South Africa is vulnerable to climate change impacts, it is also one of the most carbon-intensive economies in the world, contributing more than one per cent of global GHG emissions (global warming gases causing climate change) despite its comparatively smaller population and gross domestic product (GDP) (TIPS, 2019). The energy sector accounts for the majority of these emissions. More than 80% of the sector's emissions arise from the production of coal-fired power (coal-fired plants generate 92% of the electricity) and coal liquefication from Sasol, the country's coal to liquid fuel plant (TIPS, 2019). South Africa is the highest GHG emitter on the African continent and the 14th highest global emitter due to its high dependency on coal for energy and the high emissions from the mining and industrial sectors (Carbon Brief, 2018).

Simultaneously, the country wrestles with the deep-rooted historical challenges of inequality and poverty which also exposes the country to the impacts of climate change, disproportionately affecting the poor. South Africa is also recognised as the most unequal country in the world in regard to income distribution (World Bank, 2018). Approximately half the population live below the poverty line with unemployment at 46.4% in the 2nd quarter of 2021 (StatsSA, 2021). With, 80,000 direct jobs in the coal sector (most of which are in a single province, namely Mpumalanga) and many of the projected 100,000 jobs in renewable energy in different geographic locations throughout the country, it becomes patently clear that a just energy transition is not an option as the country moves to decarbonise the economy. It becomes imperative that the energy transition underway in South Africa must be just if political unrest and deepening economic inequality are to be avoided. However, a just transition is not exclusively about jobs, it is also crucially about addressing and engaging meaningfully with communities affected by the environmental impacts of coal power, tackling the distribution of employment in different local economies and reducing energy poverty. It also involves empowering and involving different communities which are impacted in the decision-making processes.

The global energy transition however is driving fundamental changes in South Africa ahead of national policy responses. Old and newer coal power plants will increasingly be replaced by renewable energy according to government. An energy transition signals radical and accelerated changes to the energy system, associated with a shift from traditional energy resources and related technologies to cleaner and renewable sources. Renewable sources are by their nature dispersed (e.g., sun and wind conditions across spaces), and renewable technologies are far more modular than traditional fossil

fuels and can be efficient at very different scales. Decentralised energy systems (distributed renewables) are more dynamic and flexible, and therefore suitable to being locally managed and governed and including a range of public and private investors, owners, and operators, right down to the household level (SEA, 2020).

In response to the energy transition underway and the country's pursuit of a low carbon development path, South Africa has seen some significant policy shifts over the last 2 years supporting low carbon pathways and promoting the uptake of renewable energy. Among these include enabling municipalities to play an active role in shaping energy supply ensuring energy security within their jurisdiction and extending citizen participation in energy planning and investment. Communities are energy consumers and their role in this new energy model may be in planning energy systems and owning energy infrastructure appropriate to the local contexts. Local governments need to enable the participation of "ordinary citizens" in energy policy, planning, ownership, and use. Local government also has a role to play in educating the community through, awareness campaigns about distributed renewables work, and training workshops with community organisations and local entrepreneurs (SEA, 2020).

As a result of the decarbonising of the economy and democratising energy, the focus of this study in exploring community-led socially owned renewable energy development becomes extremely significant.

3. Overview of the 2 study municipalities

The municipalities selected for this feasibility study were determined on the basis of varied geographies and contexts they represent in South Africa, the strong social movements working on related issues that are active in the respective municipalities and the differential municipal structures.

Emalahleni Local Municipality, located at the heart of coal mining and power generation in the country, is at high risk with the imminent decline in coal production activity and/or coal-based electricity, as the country transitions from coal to renewable-based energy. Given the municipality's high dependence on coal mining and Eskom power plants, it will be most vulnerable to rising unemployment and reduced economic activity.

eThekwini Metropolitan Municipality, one of the 8 largest cities in the country with substantially more resources than a local municipality is among the leading cities in its climate response efforts. As early as 2011, the metro pioneered the process of allowing grid-connected solar PV. It has since established a Renewable Energy Roadmap which provides the strategic direction for renewable energy development in the municipality. More recently in 2021, the metro launched its decisive Climate Action Plan (CAP), in which it set ambitious renewable energy objectives to accelerate RE development in the metro.

As such, the 2 study municipalities are both readily poised for exploring community participation in the energy transition through community-led renewable energy projects, implemented in partnership with municipalities to accelerate the transition towards clean, resilient and inclusive energy systems for meeting energy needs affordably, creating jobs and improving health and well-being.

3.1 Municipal electricity supply status quo in the 2 study municipalities

Mandate as electricity distributors

Municipalities in South Africa are mandated by the Constitution to distribute electricity thus municipalities are the key distributors of electricity (alongside Eskom) to households and businesses. One of the Government's directives is to electrify all households and provide free basic electricity to poor households. Electricity distribution is pivotal to municipal operations as revenue from electricity sales accounts for roughly a quarter of a typical municipality's total income and is key to funding service delivery.

Household energy service delivery status

Electricity is the safest and cleanest source of energy for households to use for cooking, heating and lighting. While South Africa's electrification programme has been successful in expanding the grid to increase access to electricity, thousands of households still do not have a formal connection to the grid.

eThekwini Metro is actively expanding its electricity network to connect more households to the grid. The municipality has a backlog of over 300 thousand households awaiting a formal grid connection. eThekwini Metro has a target of electrifying 10 thousand households each year.
Emalahleni's Local Municipality is having challenges connecting new customers as the grid capacity of their Eskom intake points has been reached. Accommodating new connections will require expensive infrastructure upgrades and the municipality is currently encouraging off-grid alternatives to minimise grid congestion.

Status of municipal renewable energy uptake

The massive global investment in renewable energy over recent years has driven down the costs of these technologies, both globally and in South Africa. Renewable energy lends itself well to modular, scalable design – ranging from large megawatt-sized renewable energy plants to as little as kilowatt-sized rooftop PV panels suitable for the residential sector, thus making it suitable for the private sector participation at all levels.

Typically, renewable energy generators are either large-scale utility generators connected to Eskom's transmission network or embedded generation (i.e. typically rooftop solar PV) connected directly to a customer's load. Utility-scale renewable energy generation is often procured at national government level to sell directly to Eskom, who then sells to municipalities. Such developments have been made possible by South Africa's Integrated Resource Plan (IRP, 2019), which describes a massive renewable energy build program through the 2020s, to be driven by utility-scale generators. As such, the carbon intensity of municipal electricity supply will steadily decrease as the national grid sees more renewable energy connecting.

An alternative renewable energy arrangement is when the systems are connected "behind-the-meter" directly to a customer's load. These systems are referred to as small-scale embedded generation (SSEG). South Africa has seen an exponential uptake of SSEG since 2017 (SALGA, 2020; SEA, 2021). SSEG systems are typically privately owned, and the business case is built off reducing the customer's

municipal (or Eskom) electricity bill. Municipalities have a key role to play in enabling the uptake of SSEG in their jurisdictions. eThekwini Metro has a comprehensive SSEG process and has connected several megawatts of solar PV to their grid. Despite being a far smaller municipality, Emalahleni Local Municipality has made good progress in getting their SSEG process running and they too have connected many solar PV systems to their grid.

Tariffs and subsidisation mechanisms

Municipalities set their electricity tariffs following the guidelines provided by the National Energy Regulator (NERSA). Municipal tariffs need to take into account the cost of bulk electricity purchases based on the Eskom tariff increases, as well as the increases in wages, repairs and maintenance, and other municipal operating costs. While electricity remains unaffordable for many South Africans, municipalities face the very real challenge of recovering sufficient revenue for business sustainability.

Cities use municipal surcharges, high-income household tariffs and commercial tariffs to cross-subsidise low-income household tariffs and for FBE (Free Basic Electricity) allocations. Progressive cross-subsidisation is assisted through electricity tariff structures that have low connection fees, no fixed charges (i.e., a set daily charge for the use of the grid, regardless of whether electricity is being consumed) and inclining block tariffs, where the cost per unit of electricity increases, as the customer uses more. Substantial pro-poor subsidies exist within the electricity industry and were estimated to be at least R8 billion per annum in 2010 (Eberhard, 2018). Therefore, it can be argued that indigent tariffs for services are the most fiscally efficient form of social transfer and one of the best ways citizens can help each other.

While tariff cross-subsidisation has been reasonably successful for the last decade, the continued sustainability of this tariff structure is being questioned. While municipalities continue to do the brilliant work of electrifying households, the number of commercial and high consuming customers – those that fund the cross-subsidisation – remains unchanged. Municipal officials are therefore pleading for an increase in the Local Government Equitable Share[2] grant from National Treasury. This dilemma is most pronounced in poor, rural municipalities with only a few commercial and industrial customers.

4. Scalable community renewable energy development in South Africa

Collective energy ownership enables the democratisation of energy access, empowers end-users to participate in the energy value chain, provides affordable and clean energy for communities and is a catalyst for local economic development.

Community energy projects can be designed in a range of arrangements – solar home systems, grid-tied solar PV systems or mini-grids. They are typically focused on generating benefits to the community (economic, social, environmental) in addition to financial profits. The main purpose of a community energy project influences its implementation, as different models may be better suited to different objectives.

[2] In order to provide basic services to poor households and as a substitute for own revenues, local municipalities are accorded an 'equitable share' of tax revenues raised at national level by the South African Revenue Service in terms of section 214 of the Constitution.

4.1 Types of renewable energy systems

Community energy projects should vary according to the specific needs of the local community. Renewable energy systems, either in combination with the electricity grid or as standalone off-grid systems, can provide a range of electricity services depending on their configuration. Costs also vary significantly depending on the configuration. Table 1 shows the types of renewable energy systems and describes their attributes.

Table 1: Type of community energy systems

Types of energy systems	Solar home system	Rooftop solar	Wheeling
Image			
System configuration	Off-grid system	Onsite grid-tied system	Offsite grid-tied system
Energy services	Basic energy services (lighting, Wi-Fi) while awaiting grid connection.	Grid provides full modern energy services including cooking.	Grid provides full modern energy services including cooking.
Value proposition	Allows households to use electric devices in the absence of the grid.	Solar reduces the electricity bill since solar energy is consumed during the day.	Solar reduces the electricity bill since solar energy is consumed during the day.
Typical system size (power output)	100 – 500 watts	1 – 5 kilowatts	50 kilowatts and upwards
Cost per unit installed	R40 000/kW and upwards (including basic storage[3])	R20 000/kW	R12 000/kW
Cost per household	R5 000 – R20 000	R50 000 – R80 000 or R1 – R1,30/kWh	R30 000 – R60 000 or R0,70 – R0,90/kWh
Payback period when compared to municipal grid electricity	Never – grid is cheaper than off grid solar	13 years	5 years
Suitable ownership models	Homeowners typically rent the systems from the developer for a daily or monthly fee.	Financed by a bank with monthly repayments or financed by a developer with a power purchase agreement.	Facilitated by a developer who will arrange a power purchase agreement to cover the bank's monthly load repayments.

[3] Because solar home systems do not have the grid as back up, they require battery storage in combination with a solar panel to store the energy so that it can be used at night when the sun is not shining. This battery storage drives the cost of the systems up significantly. The grid is a far cheaper back up power source, but for households without grid connection this is the only option.

Types of energy systems	Solar home system	Rooftop solar	Wheeling
Air quality improvements	Solar home systems can significantly improve air quality when they replace paraffin lights	Reduce consumption of grid electricity and reduce coal burn in Mpumalanga leading to considerable air quality improvements.	Reduce consumption of grid electricity and reduce coal burn in Mpumalanga leading to considerable air quality improvements.
Socio-economic co-benefits	Installation and maintenance of solar home systems is an employment opportunity for a few community members.	Installation and maintenance of the grid-tied solar system is a considerable employment opportunity for local community members.	A solar farm is a massive socio-economic opportunity for local communities, depending on where the solar farm is located.
Hurdles to overcome	Systems are typically on an individual household level making community participation challenging. Could be suitable for a community hall or similar shared space.	Could work on an apartment block but submetering will be a major hurdle to determine which household consumed the energy during the day.	Requires the municipality to have a wheeling tariff and upgrade metering and billing systems to measure the amount of solar energy consumed by each household.

Each of the above community energy systems (or a variation thereof) would be suitable in a specific community.

4.2 The challenges with low-income household rooftop solar PV

While many industry stakeholders are passionate about the idea of putting solar PV on every household rooftop, **the feasibility study shows that due to economies of scale the financial feasibility of large solar farms far outweigh that of rooftop solar PV**. This is especially the case in lower income communities where household energy consumption is low, meaning that these rooftop solar PV systems need to be even smaller, and are thus further challenged by economies of scale. An oversized solar PV system would generate more energy than a household can consume. If the solar PV system is grid-tied, this surplus energy can be fed into the grid. Many municipalities in South Africa now compensate customers for surplus energy fed into the grid, including eThekwini and Emalahleni, however, the model has shown that the compensation rates, or "export credits", are insufficient to create a business case for low-income solar PV. This is because the compensation remains a credit, meaning that households still need to consume enough power to have their monthly bill credited for these export credits. The municipality may not, due to the limitations of the Municipal Finance Management Act (MFMA), take a customer's bank details and pay them money for the energy fed into the grid. The regulations for power generators are far more complex, and there is a need for solar PV customers to remain *customers.* As such, the business case for rooftop solar PV needs to be built on self-consumption of the energy generated, meaning that rooftop solar PV generally only makes sense for customers who have a substantial daytime energy demand, which most households do not have. Batteries can be used to store the energy for consumption in the evening, but storage systems are still very expensive and further diminish the financial viability of the systems for low-income households.

There are several alternative arrangements that enhance the financial viability of renewable energy. These are typically via larger installations coupled with aggregated demand profiles of a group of low-income households, for example in social housing projects or apartment blocks. Transporting the power from the larger solar farm to the households requires use of the municipal power grid, otherwise known as "wheeling". The above table illustrates that the financial viability of a wheeling system far outweighs the other alternatives.

4.3 Envisioning a scalable community energy model for South Africa

In the South African context, the primary purpose of introducing collective ownership of a renewable energy system would be to overcome the challenges community members have in accessing capital to install their systems. Collectively, however, these community members could generate a far more attractive case for finance.

Many communities in South Africa are still not connected to the electricity grid, therefore addressing their immediate energy needs is most critical. Off-grid systems and solar home systems would provide these basic services. In the long term, the government's intention is for all households to receive a connection to the grid; the challenge of energy access then becomes ensuring electricity is affordable. Already, many South African households that are grid-connected are struggling to fund their monthly electricity needs. Grid-tied renewable energy systems can reduce the costs of grid electricity and possibly form the basis of scalable community energy projects in the long term.

Until now, grid-tied solar systems have been usually in the form of rooftop solar PV, which are feasible for large commercial customers that consume significant amounts of electricity during daytime hours. When installing a rooftop solar system, customers consume solar electricity to reduce their consumption of grid electricity. Their business case for solar is therefore built upon the savings they make on their municipal electricity bill. The challenge with residential – especially low-consuming households – is that they do not consume enough electricity during the daytime hours to warrant the installation of a rooftop solar system. The generation of energy during daytime does not coincide with the time of typical household energy needs i.e., in the morning before work and in the evening after work. When households are pooled together, their collective electricity demand does have a substantial daytime load, and this collective load is far better suited to that of solar energy generation.

Why wheeling?

South Africa's energy regulatory environment has developed to allow more private sector participation in electricity generation. Specifically, recent amendments to Schedule 2 of the Electricity Regulation Act mean that larger generators (up to 100MW) can connect to the grid without needing to obtain a generation license. In addition, the amendment explicitly allows for the wheeling of electricity between willing sellers and willing buyers.

> Wheeling is the delivery of electricity generated by a private generator in one location to a buyer or off-taker in another location via a third-party network (Eskom or municipality).

By utilising the grid to transport electricity, wheeling allows customers to procure energy directly from large energy generation facilities offering several benefits over smaller rooftop systems:

- Due to economies of scale, large generation facilities are cheaper on a per-unit basis (R/kW) than smaller rooftop solar systems.
- Larger solar farms can be located in areas where the solar resource is the highest meaning that the solar panels generate more electricity.
- Wheeling may also allow for the collective electricity loads of households into a single community energy customer meaning that the electricity load profile matches that of solar far better than a single household. This cumulative load of households is key to the community energy model and municipalities will need to be engaged to determine the required metering arrangement.
- Cleaning and maintenance costs are lower for larger systems.
- Safety concerns and the risk of theft of panels is reduced when solar farms are fenced off and located outside of cities.

As a result, wheeling represents the ideal technical configuration for community participation in renewable energy generation. The envisioned community energy model for South Africa relies on the collective energy load of a community of households. These households would need to form an organisation that procures energy from a willing generator via a wheeling agreement through the municipal grid. The generator would be reimbursed monthly for the energy delivered to the community, as shown in Figure 1 below.

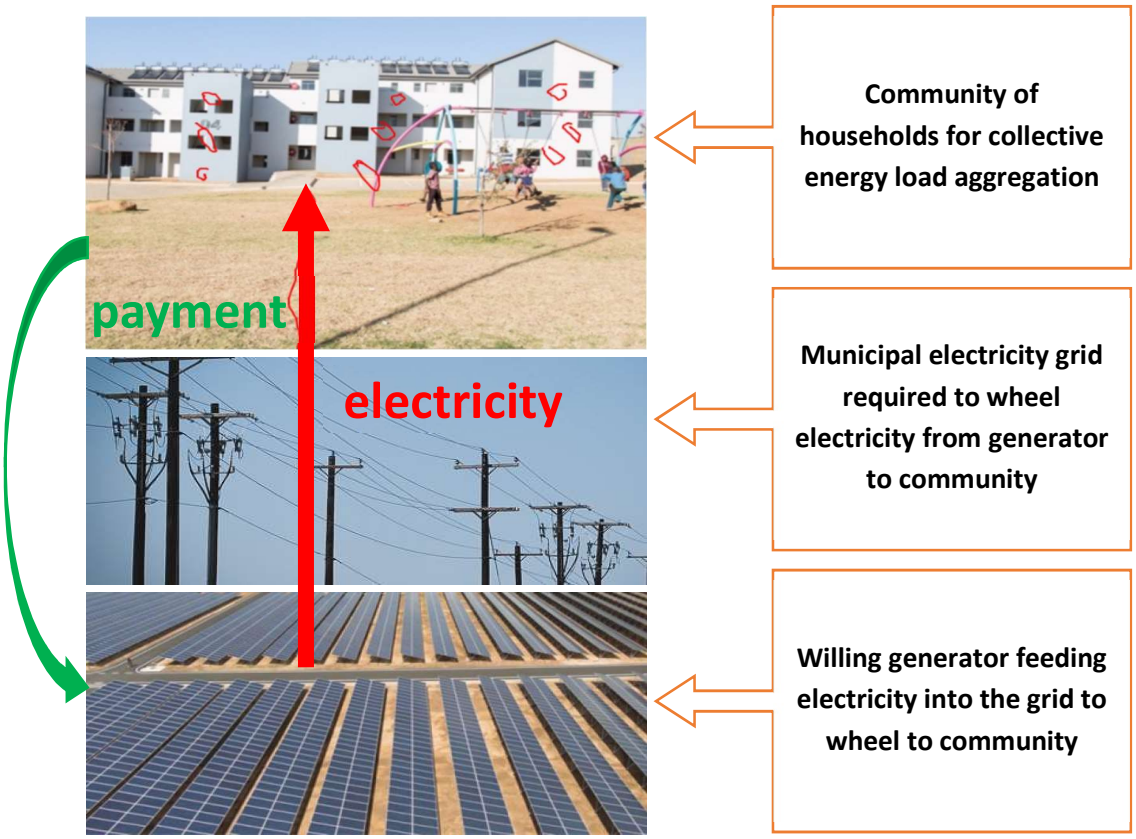

Figure 1: Envisioned community energy wheeling project

When communities consume electricity from solar, they reduce their consumption of South Africa's highly polluting grid electricity. This reduces carbon emissions arising from the burning of coal in the

Mpumalanga province, leading to improved air quality for the local communities. Depending on where the solar farms are located, they also offer major socio-economic benefits for the local communities. As such, the most impactful wheeling arrangement would locate the solar farm on a vacant piece of land nearby a decommissioned coal mine to create employment opportunities for the local community members during the construction of the plant. While solar farms may generate more energy if located in the desert of the Northern Cape, the socio-economic co-benefits of a Mpumalanga solar farm are likely to outweigh the energy generation difference.

This is a potentially transformational concept and a key approach for communities to meaningfully participate in the energy transition through co-owning energy generating assets.

4.4 Practicalities of a scalable community energy model for South Africa

The concept of community energy is drawn from the global north and among the key contributors to its success is the aspect of property ownership – owners of the energy system often own their properties and are within the middle to high-income group. Homeowners create community energy cooperatives or trusts, through which the SSEG system is developed. The affordability level coupled with tenure, creates an attractive case for bank finance, in some instances, garnering government funding.

In South Africa however, where community energy has yet to become mainstream, accessing development capital also poses challenges. The low-income landscape, in particular those households characterised by below poverty line to minimum wage levels, lack of land tenure, and poor credit profile make up the lion's share of communities that make a case for collective energy ownership initiatives. Typically, the municipality is the custodian of the land wherein their homes lie. To fully explore collective energy ownership within the South African context, the following factors need to be considered:

- Access to property ownership (residential or land)
- Access to capital
- Access to technical, financial and organisational skills
- Knowledge about utility regulation (system sizes, licencing, tariff development, reticulation)
- Ability to have a legal structure for the ownership of the system,

Though an ideal model for a community-led energy generation system does not yet exist in the South African community context, it does not completely exclude their participation. South Africa has a growing number of informal settlements that also require energy access, thus addressing their immediate energy need remains critical. While grid connection is pivotal and the ultimate service level for energy access, the other concern is to ensure affordable access. Off-grid systems and solar home systems provide an alternate interim energy service for non-electrified communities at affordable rates.

In the above-described South African context, the role of municipalities (as electricity distributors) is central to facilitating access to energy at scale. By enabling social wealth transfer among citizens, the role of electricity distributors is unavoidable and underpins optimal energy access.

4.5 The critical role of electricity distributors in community energy futures

Many communities have become intolerant of their municipalities due to lack of service delivery, constantly increasing tariffs, repeated cases of corruption, and for ignoring the voice of the community members. Despite this, electricity distributors do still have a critical role to play in enabling a transition to a just, community-led energy future. The mandate of municipalities is to equally protect the interests of all their constituents. They do this by facilitating social wealth transfers from rich to poor in the form of tariff cross-subsidies.

As we have discovered through this feasibility study, the notion of rooftop solar PV on every low-income household is not financially feasible. Further, engaging in power purchase agreements with private electricity generators is no simple task. Establishing a fair agreement with a private power generator requires significant legal expertise, financial security, and technical know-how. As such, most communities are not best placed to lead these engagements. While there may be certain communities who have the capacity and contacts to establish such a power purchase agreement, most communities will benefit from the municipality representing the community's interest.

By virtue of being an electricity distributor, municipalities already aggregate the loads of several thousand customers. As such, they have the ideal load profile to engage with renewable energy generators. Most municipalities also have the technical know-how and financial viability to establish these power purchase agreements. The only question remaining is whether municipalities will pass through the cost savings of these energy procurement agreements to their customers, i.e. if a municipality saves money through procuring renewable energy privately, will this mean that electricity tariffs will come down to reflect these cost savings? Some industry stakeholders feel that municipalities' finances are already so constrained that any cost savings will be absorbed by the municipal coffers. As such, the importance of ringfencing the electricity business to ensure that all renewable energy cost savings are passed through to communities in the form of reduced electricity tariffs cannot be overstated. Municipalities must perform transparent cost of supply studies to show their customers that their tariffs are fairly calculated. Municipalities must also prove that they are actively seeking ways to improve their operational efficiency to reduce electricity tariffs for their customers. Finally, municipalities must develop action plans to swiftly increase the amount of renewable energy on their local grids. These renewable energy generators should be built in the local areas to maximize the socio-economic co-benefits of these projects.

Having emphasized the critical role of electricity distributors in the energy transition, it is important to clarify that while this role is currently held by municipalities and Eskom, other institutional arrangements could still enable this social wealth transfer. The critical point is that large-scale grid electricity provision enables social wealth transfer and thus allows for a financially viable electricity grid business which far outperforms any other form of energy service provision, especially in the South African context.

Conclusion and Summary of key findings

While no single ideal community energy approach exists as yet, there will be a combination of approaches/models that would be adopted to adequately meet the household needs of underserved communities.

- Off-grid systems could serve as a temporary solution for interim energy service provisions while awaiting electrification.
- A grid-connected household can reduce its consumption of grid electricity by installing rooftop solar. However, this is not a financially viable option for low-income households as the solar panels are costly and only generate electricity during the daytime, when typical household energy consumption is low.
- **It is not financially viable to have solar panels on every house – grid electricity is far cheaper and far more reliable.**
- Purchasing electricity through the municipality is by far the best way to enable affordable energy service delivery to communities.
- An alternative to municipal supply is to purchase electricity directly from an independent power producer and 'wheel' the electricity to the community across the municipal grid. While this is technically possible, it will require the aggregation of loads i.e. a bulk municipal meter will need to be installed upstream of the community to facilitate the wheeling transaction, and the community will be sub-metered by a private entity. This approach has a high-risk profile (due to risk of non-payment) but remains a viable option in communities where payment history is good. An energy trader will need to drive this process on behalf of the community. It is complex, and therefore has not been done in South Africa, but it remains feasible, and we expect energy traders to explore this approach in the coming years.
- **Purchasing electricity from the municipality is likely to remain first prize.** The municipality has a critical role to play in the just energy future, since it represents the communities and protects the well-being of its constituents. The municipality is the custodian of the electricity grid for the public good. The electricity grid is the fabric that connects all households and enables cross subsidies from rich to poor.
- To provide access to clean and renewable power, municipalities must rapidly decarbonise their electricity supply through facilitating renewable energy grid connection.