FINAL REPORT

Feasibility of community-owned renewable energy models in South Africa

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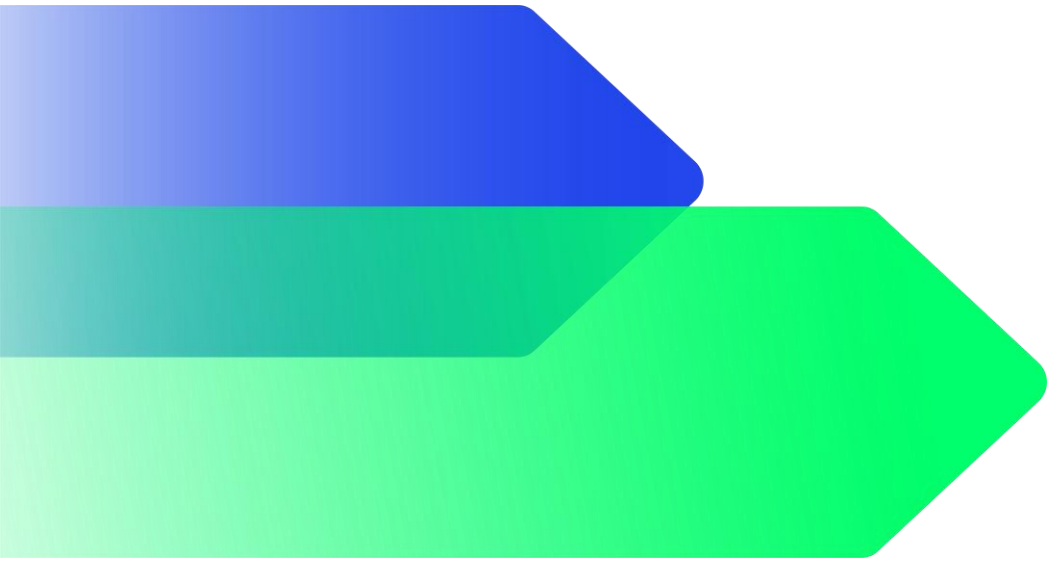

The Carbon Trust's mission is to accelerate the move to a decarbonised future.

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Abbreviations

CAPEX	Capital expenditure
CORE	Community-owned renewable energy
CSO	Civil Society Organisations
DEVEX	Development expenditure
DFI	Development Finance Institutions
DRE	Decentralised Renewable Energy
ECD	Early Childhood Development
IPP	Independent Power Producers
IRENA	International Renewable Energy Agency
IRR	Internal rate of return
JET	Just Energy Transition
M&E	Monitoring and evaluation
MDB	Multi-lateral Development Banks
MTLC	Minimum threshold level of consumption
NPO	Non-Profit Organisation
PARI	Public Affairs Research Institute
PCC	Presidential Climate Commission
PV	Photovoltaics
RE	Renewable energy
REEEP	Renewable Energy and Energy Efficiency Partnership
REIPPP	Renewable Energy Independent Power Producer Procurement
ROI	Return on investment
SME	Small and Medium Enterprise
SPV	Special Purpose Vehicle
SSEG	Small-scale Embedded Generation

Executive summary

Recent amendments to regulations in South Africa allow for a more open and competitive electricity market. As part of stakeholder consultations on the initial Just Energy Transition Investment Plan (JET-IP), many

stakeholders, particularly in organised labour and civil society, have called for clarity on models and funding for CORE. In light of this, Carbon Trust Africa, a trusted entity in the field, studied the feasibility and precedents for independent community-owned models for RE generation. We examined implementation, governance, and funding models that can potentially be used to implement CORE in South Africa and beyond. The objective was to identify models appropriate for the South African context, considering issues such as affordability and the potential for surplus power to be used by the community, further alleviating poverty and creating development opportunities for productive household use. The literature was then assessed against five core assessment criteria that we determined to be critical: energy access, affordability, ownership, governance, and finance, as well as community awareness and engagement.

Key takeaways

Our literature review and engagements have been distilled into the following key takeaways:

- ★ Where the goal is sustainable economic and social development, **poverty alleviation is key**. This can only be meaningfully achieved through **universal access to electricity that meets the minimum threshold level of consumption (MTLC)** for productive use.
- ★ **Affordability** is a **critical barrier to energy access and the productive use of electricity**.
- ★ While renewable energy (RE) technologies are proven, the unique Community-Ownership Renewable Energy (CORE) ownership models, governance structures, and community benefit models **are still considered risky. Project viability across these facets must be proven** to secure buy-in and funding.

Based on the insights provided by these findings, our core recommendation is the implementation of **CORE model demonstration pilot projects** in the following manner:

- ★ A pilot project that is **set within a peri-urban setting** and designed **to test a series of assumptions and key questions** related to the range of factors identified in this report that can influence ownership, governance, and participation for renewable energy.
- ★ **A second pilot project** that will be implemented **within a rural setting**, using similar assumptions, and testing similar questions to those outlined for the peri-urban setting, but taking into account the **lived realities and nuances of communities in such areas**..

Critical assessment criteria

Energy access and affordability

Four in five people in sub-Saharan Africa currently lack access to energy, and one in four people are forced to use unsafe and inefficient cooking systems. Despite its 86% electrification rate, South Africa is not immune to this crisis. Many impoverished households in the country lack access to electricity, and even those with a physical connection point often cannot afford electricity, especially in the quantities required for cooking and heating. As a result, these households must resort to alternative, unsafe energy sources to meet their heating and cooking needs. Affordability is a critical barrier to energy access and the productive use of electricity and a problem that demands immediate and urgent attention.

Our study found that ownership is often equated with access, i.e. communities believe that the development of a RE generation facility of which they had ownership (i.e. through a Community Trust) guarantees them access to electricity (free, subsidised, or discounted to affordable levels). In reality, for many of these cases, ownership brought late, limited benefits and did not necessarily provide access to the affordable, reliable,

and sustainable electricity supply that these communities require. This also highlighted the importance of community awareness and engagement for successful RE and community-owned renewable energy (CORE) projects.

Where the goal is sustainable economic and social development, poverty alleviation is critical. This can only be meaningfully achieved through universal access to electricity that meets the minimum threshold level of MTLC consumption (MTLC)[1] for productive use.

The benefits of universal access to affordable, reliable, sustainable, and modern energy are numerous and well-known. We want to highlight some of these RE-related co-benefits in the South African context:

- **Improved nutrition/eradication of hunger**—Electricity and clean cooking solutions allow food to be safely stored and cooked, giving households more nutritional food options.
- **Improved health**—Clean electric energy means improved indoor air quality and fewer related illnesses and chronic conditions.
- **Education**—The nutritional and health benefits listed are likely to improve children's attendance and performance in school.
- **Employment/Entrepreneurship**—The improvements will mean fewer workdays are missed. Furthermore, electricity allows for home-based businesses—either supplementary or as the primary source of income. This is especially important for women and women-headed households, as women are more likely to start businesses from home.
- **Safety** – Increased lighting in communities supports the safety of residents and aids in deterring crime.

Where electricity is affordable, a higher proportion of household income can be spent on more nutritious food, transport, education, and other necessities. Therefore, while energy access is a crucial SDG in and of itself, it is also a critical enabler for others, including:

Figure 1: Selected SDGs

Ownership, governance, skills, and finance

Any generation facility faces challenges in urban or peri-urban areas, such as limited space. In addition, many communities already have connections to the grid (legal or illegal). These unique contexts must be considered in the context of the knock-on challenges they create to affordability, safety, and supply interruptions. A more traditional mini-grid solution appears to have merit in rural settings without access.

[1] A minimum electricity consumption level that is required to facilitate priorities such as increased living standards and access to economic activities for households and small enterprises.

However, the interdependency of the ownership model, governance structure, available and required skills, and finance options is fundamental in all settings.

Many communities, especially poorer ones, do not have access to commercial funding; they do not know where or how to access grant or concessional financing. Education and literacy may be limited, meaning that the skills required to own, manage, operate, and maintain a facility or installation may be likewise limited. Despite these barriers, this does not preclude the viability of CORE or community benefits associated with the supply of affordable, reliable, sustainable, and modern energy. Properly planned and implemented pilots and successive projects could provide crucial opportunities for sustainable community development, growth and diversification of skills and employment, and broader buy-in for RE and other clean technologies.

Access to finance was found to be a barrier for RE in general as well as for CORE, despite seemingly high interest in supporting electrification, and RE in particular, by Development Finance Institutions (DFIs), Multi-lateral Development Banks (MDBs), philanthropic organisations, and private sector financial institutions. Finance is more readily accessible for established project developers and viable projects. While RE technologies are proven, the unique CORE ownership and community benefit models are considered risky. In these models, there is not always a straightforward paying customer, making assurance of financial return on investment (ROI) unclear.

Community awareness and engagement

Community awareness and engagement are crucial for successful CORE projects, with activist organisations significantly facilitating this process. While global institutions like the International RE Agency (IRENA) offer guidance on community engagement, tailored resources for the Global South, particularly South Africa and other emerging markets, are lacking. Comprehensive engagement, particularly with municipal officials and community leaders, is essential for understanding local energy needs and gaining support. However, municipalities often lack the understanding and capacity to effectively engage with RE projects, highlighting the need for capacity building and funding support.

Larger-scale CORE projects require careful consideration of funding mechanisms, ownership, governance models, and community capacity. A bottom-up approach to understanding community needs and preferences is recommended to ensure alignment with local priorities. Additionally, greater emphasis is needed on identifying and addressing specific community skills deficits to effectively manage and operate CORE projects. Understanding community ownership expectations, needs, and existing skills is essential for determining suitable support, benefits, financing, and governance models to foster buy-in and ensure successful project implementation.

Opportunities

We identify three critical opportunities for developing CORE projects in South Africa.

- **Opportunity 1** focuses on implementing pilot projects in peri-urban and rural communities to gather data and insights tailored to each context. These projects aim to address energy access challenges and assess the suitability of different models for different community types. The outcomes include valuable information on affordability, energy access, policy implications, capacity deficits, and innovative practices.
- **Opportunity 2** emphasises the need for detailed energy demand and MTLC audits in various community settings. Developers can effectively design RE systems to meet current and future demand by gathering quantitative data on energy consumption patterns. These audits can complement pilot projects and enhance the evidence base supporting CORE initiatives.
- **Opportunity 3** involves identifying the skills required for implementing CORE projects within communities. Mapping key roles and responsibilities will empower community members to make informed decisions about pursuing CORE initiatives. This information can mobilise community members, educate stakeholders, and develop training programs to build the necessary skills locally.

These opportunities aim to strengthen the foundation for CORE development in South Africa by providing empirical data, addressing capacity gaps, and fostering community engagement and empowerment.

Recommendations

Our main recommendation is the implementation of CORE model demonstration pilot projects to develop and test our understanding and assumptions of archetypal CORE models and RE-related community benefits based on the findings of this report. Implementing the two pilot projects allows us to:

1. **Conduct Additional Research:** Allocate resources for research on affordability, energy access, and skills deficits within African communities to assess the viability and appropriateness of CORE. This research will inform interventions to address capacity constraints and ensure the alignment of CORE initiatives with community needs.
2. **Provide Project Development Funding:** Secure project development funding to support the conceptualisation and design of CORE projects. This funding, sourced from development finance institutions, international donors, and philanthropic organisations, will enable communities to access training, services, and authorisations necessary for project viability. Blended finance mechanisms combining public and private sector resources offer flexibility and lower capital costs for project implementation.
3. **Develop Knowledge Products:** Create manuals, toolkits, and guidance documents to disseminate best planning and implementation practices for different CORE models suited to African contexts. These knowledge products will evolve as lessons learned and best practices from CORE projects in South Africa and across the continent are collated, facilitating stakeholder engagement and project development.

These opportunities and recommendations, which also represent critical next steps for developing African CORE discourse, are centred around securing context-specific data, practices, and insights that can facilitate CORE adoption in South Africa and across the continent.

Opportunity	Recommendations
Opportunity 1: pilot projects in peri-urban and rural communities to gather data and insights tailored to each context	*1. Conduct Additional Research* *2. Provide Project Development Funding*
Opportunity 2: detailed energy demand and MTLC audits in various community settings	*1. Conduct Additional Research* *2. Provide Project Development Funding* *3. Develop Knowledge Products*
Opportunity 3: identifying the skills required for implementing CORE projects within communities	*1. Conduct Additional Research* *3. Develop Knowledge Products*

The table above illustrates how the opportunities and recommendations mutually reinforce each other. Implementing these recommendations will foster the growth of CORE initiatives, address energy access challenges, and promote sustainable development in South Africa and beyond.

1. Introduction

1.1. Background

In recent years, planned power outages (load shedding) in South Africa have increased in occurrence and duration. The installed generation capacity is increasingly variable, unreliable, and unable to meet the current and growing demand for energy in South Africa. This has motivated society and governments to rethink their approaches to energy supply. The transition to a low-carbon energy system challenges balancing supply with equitable access and affordability. Achieving this balance requires effective policy, robust regulatory frameworks, and new business and financing models. Private investors/Independent Power Producers (IPPs) are crucial in transitioning to a low-carbon energy supply to alleviate fiscal pressure on the South African government and provide much-needed financial capital. However, IPPs have faced significant challenges in developing and generating RE. This is mainly because, until recently, the regulatory landscape in South Africa was designed to benefit the vertically integrated state-owned monopoly power generator and supplier.

Few Community-Owned Renewable Energy (CORE) generators are operating in South Africa. The original state-run Renewable Energy Independent Power Producer Programme (REIPPP) model (2011–current) relies on Community Trusts being set up in response to the social development requirements under the procurement terms to benefit local communities. It is a broadly held view that this model yields few benefits to local communities, and consequently, the sustainability of these benefits is questionable. As such, recent studies have concluded that, in many cases, this model does not, in its current form, align with the principles of a just transition, which are core tenets of South Africa's energy transition efforts.[2]

Previously, procedures and approvals required for independent generators, particularly those outside of the REIPPP, were onerous and lengthy to the point of being prohibitive. However, since 2020, several regulatory changes have created a more favourable policy environment for IPPs and a more competitive electricity market. For example, amendments were made to determine which technologies and capacity thresholds require a generation licence. These amendments have removed the threshold and exempted installations for generation for own use. Other amendments allow for willing buyer/seller arrangements across third-party distribution networks ('wheeling'). The licencing and registration process has also been simplified with reduced timeframes and costs, making market entry easier for IPPs.

In light of the recent changes to the energy landscape in South Africa, which include changes to regulation and increasing energy security challenges, there is an opportunity to consider which types of CORE operating models may be suitable, given the country's unique context and challenges. South Africa's profound developmental challenges – deep inequality, poverty, and high unemployment – make the need to transition the country's energy system justly and sustainably even more acute. A CORE model envisages, simplistically, that communities would own and operate the RE plant (likely solar Photovoltaics (PV)) through a Non-Profit Organisation (NPO) Special Purpose Vehicle (SPV) for own use by the community and/or selling the power generated to a Distributor or third-party, whereby the community benefits from access and sales revenue.

In theory, this model creates the potential for poverty alleviation and development opportunities for productive use. Ideally, the revenue generated would be reinvested into further community development through, for example, entrepreneur and Small and Medium Enterprise (SME) development, skills and business development hubs, infrastructure development, and smart agriculture. The community-ownership model aligns with South Africa's principles for a just energy transition, as set out in the cabinet-approved Just Energy Transition Framework, and investments identified in the country's Just Energy Transition Investment Plan (JET-IP).

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[2] Intellidex, 2021. Communities in Transition: The Role of Community Ownership in South Africa's REIPPP Programme; Overy, N., 2018. The Role of Ownership in a Just Energy Transition; World Wildlife Fund, 2015: A review of the local community development requirements in South Africa's renewable energy procurement programme

Due to our experience supporting key stakeholders to incorporate South Africa's decarbonisation targets and transition imperatives into future energy planning, Carbon Trust Africa was commissioned to undertake a study examining implementation, governance, and funding models that could be used to implement CORE in South Africa and beyond. The objective was to identify models appropriate for the South African context, specifically focusing on maximising benefits and opportunities for vulnerable and disadvantaged communities. In particular, key considerations were affordability and the potential for surplus power for community use, further alleviating poverty and creating development opportunities for productive household use.

This report presents the study's key findings, drawing on the diverse case studies and bodies of literature reviewed and the valuable insights from various stakeholders with expertise or experience in CORE that can be applied within the South African and broader African contexts. Based on these insights and findings, we have developed recommendations for pilot projects to inform practical case studies. These will help to facilitate the development of CORE on the continent, considering the various overall contexts and the specific socio-economic conditions that prevail in different countries. This work also highlighted the need for more independent studies on the opportunities and limitations of CORE for countries located within the Global South to help society and policymakers make informed decisions.

2. Overview of methodology and approach

The project team reviewed international and local literature guided by internal and external experts. A comprehensive list of expert and experienced stakeholders was also identified. For both, an initial assessment was undertaken to prioritise the more in-depth review and engagement. This assessment included a review of relevance against the selected criteria, as well as the experience and expertise of stakeholders. Consideration was also given to ensuring a diversity of views.

The methodology is described in further detail below.

2.1. Stakeholder mapping and prioritisation

An initial stakeholder mapping exercise was conducted to identify key experts and stakeholders from relevant sectors to consult (see Appendix 1). These sectors include:

- Consultancies, research groups, and think tanks
- IPPs
- RE developers
- Industry associations
- Organised labour
- NGOs, Civil Society Organisations (CSOs) and community representatives
- Policy makers and regulators
- Investors and financial institutions
- Development agencies and philanthropies
- Utilities

2.2. Stakeholder consultation

Stakeholders were invited for 30-90 minute consultations over Microsoft Teams or Zoom. These consultations were semi-structured and guided by the following questions aligned with the chosen assessment criteria:

1. *What are your sentiments regarding community ownership? Do you feel that ownership is the necessary driver of development and growth?*
2. *Do you believe that community ownership is an affordable ownership structure for electricity production or that community ownership can allow for affordable electricity for communities engaged in community ownership structures? Are there any specific considerations or inclusions that need to be made in community ownership structures that could improve affordability?*
3. *Do you believe that there are ways in which community ownership structures could improve energy access for included communities, and what considerations and inclusions need to be made to drive sustainable energy access in this regard?*
4. *Are there any specific considerations that need to be made regarding stakeholder engagement within community ownership schemes?*
5. *What, in your opinion, would be the most beneficial ownership model (assuming ownership is the best driver of development)?*
6. *Do you feel that any specific considerations or mechanisms need to be incorporated into the overall design of this model to increase its likelihood of success? Examples could be specific financial provisions relating to establishing an NPO or SPV, mechanisms for effective community engagement, and governance.*
7. *Are you aware of any existing literature, studies, or programmes on community or social ownership?*
8. *What are the main benefits to the community of a local IPP outside of ownership (co-benefits)?*
9. *What challenges do you foresee in community ownership?*

Ten stakeholder consultations were conducted to ensure that at least one engagement per stakeholder group was held. The time and availability of stakeholders limited the number of interviews that could be undertaken. Nevertheless, the consultations shed light on the complexity of community ownership in the South African context. This challenged some of the early assumptions made in developing the concept for this work and highlighted the context of the systemic, developmental, and economic challenges many communities in South Africa face, for example, that “communities need and value ownership.”

While ownership has clear benefits, some complexities require intentional intervention. Some challenges highlighted include the skills and capacity within communities necessary for the effective governance of a generation facility. In many cases, communities value what we have termed ‘co-benefits’ of a generation facility within the community more than ownership, such as a facility's ability to provide affordable, clean electricity to a community that lacks access to or cannot afford on-grid electricity.

Assuming this access is sufficient to meet the MTLC[3] and allow for productive use; the community could benefit from more entrepreneurship opportunities. Another ‘co-benefit’ flagged was the possibility for such a facility, under an SPV, to provide a source of affordable financing to the community, driving innovation and entrepreneurship. It was also proposed that such a facility could be a ‘hub’ for innovation, business planning and development, and a funding pool for communities.

[3] A minimum electricity consumption level that is required to facilitate priorities such as increased living standards and access to economic activities for households and small enterprises.

2.3. Literature review and focus areas

The main objective of the review was to identify and analyse local, regional, and international case studies of CORE projects. Online searches of academic publications and grey literature were conducted, with guidance on reputable and relevant sources and sites provided by experts and senior team members. The resources were assessed for relevance against five core assessment criteria selected at the outset of the study and served as the key focus areas for the in-depth review conducted as part of this study. The assessment criteria/focus areas and their interpretations within the study context are described below.

Table 1: Literature review assessment criteria

Assessment criteria	Meaning
Affordability	*Whether the literature sources reviewed considered affordability in the conceptualisation and planning of CORE projects.* The literature review's affordability assessment probed whether communities with access to RE through the related infrastructure (on or off-grid) can sustainably bear the cost.
Energy Access	*Whether the literature sources reviewed considered facilitating increased energy access for communities in rural and urban settings.* The literature review's Energy Access assessment examined the extent to which communities (rural, urban, peri-urban) have access to RE from on—or off-grid infrastructure.
Ownership Models and Governance	*Whether the literature sources reviewed considered ownership or governance types and structures, as well as practices or procedures that can be used to facilitate the design and implementation of CORE projects.* The literature review's ownership model assessment explored the different ownership models and accompanying governance structures that can be used to implement CORE initiatives sustainably.
Finance	*Whether the literature sources reviewed considered funding, financing or business models that could be adopted to initiate and operate various CORE projects.* The Funding Models assessment of the literature review investigated the financing mechanisms and options that can potentially be deployed to give effect to CORE projects that have been identified as potentially viable within different community contexts.
Engagement	*Whether the literature sources reviewed considered approaches, mechanisms or best practices required to facilitate the development and implementation of successful CORE projects.* The Engagement assessment of the literature review studied the methods and processes that should be considered and deployed to obtain the buy-in of all key stakeholders who have a role in facilitating planning and development for CORE initiatives.

3. Results and findings

Using the methodology outlined as the foundation, we then assessed the critical literature on CORE as one of the Decentralised RE (DRE)[4] pathways being pursued globally. A key priority that framed our review of the myriad sources assessed was the linkage or applicability of each socio-economic condition and context in South Africa and the rest of the continent. This was to ensure that CORE models and approaches that are appropriate for these regions could be identified in a systemised manner.

In addition, our assessment of the literature was supplemented by the insights and perspectives from the stakeholder consultations. This resulted in a more comprehensive and nuanced view of CORE as a concept that could transform energy access and autonomy in Africa.

Our assessment identified a series of significant findings that we believe are vital to accelerating the adoption and use of CORE in South Africa and the rest of the continent. Energy access and affordability are critically intertwined, and the governance, ownership, and funding aspects are also fundamental to the effective planning and eventual implementation of CORE initiatives.

3.1. Affordability

The discussion around affordability mainly emphasised how it acts as a barrier for communities seeking access to energy. While there is widespread agreement on the importance of RE for providing clean and affordable energy, there is limited exploration of why affordability is crucial. Although affordability is frequently mentioned, it is not thoroughly examined. It is often used as a brief framing or descriptive tool to establish the context for justifying the use of RE. From our perspective, this was meant to underline the significance of CORE projects as potentially viable options.

Scholars in the Global North developed existing affordability models, but their usefulness in the Global South is limited. Expenditure-based models using a benchmark of household expenditure are not appropriate for the South African context, where extreme poverty levels prevail and limited income must cover food, education, transport, and electricity. Cheaper generation does not always mean affordable electricity for people with low incomes.

Therefore, further study of affordability in the South African and continental context is needed to build a body of quantitative data upon which policymakers can create the enabling framework. This is particularly important as the planning and implementation of CORE projects continue to be adopted worldwide and increasingly in emerging economies.

The review found that technology can be used to ensure that communities can afford the required energy levels for their consumption needs. For example, in the UK, the use of smart meters alongside the establishment of schemes such as Energy Local Clubs[5] has led to a reduction of RE electricity prices for the communities involved, thereby improving affordability. The cost of the smart meters is recovered through energy bills over time. While this example is in the Global North, it does illustrate the vital role that accurate data plays in determining real-life considerations.

Stakeholders noted that, among communities selected for inclusion in Community Trust systems, there is an expectation that the RE facility will provide them with accessible or affordable electricity. Should the RE facility be unable to directly supply a community with [free or subsidised] electricity, the revenue generated by the facility should be used to deliver financial benefits to offset the costs of electricity that the community currently incurs or other co-benefits linked to socio-economic development. It is crucial that RE production is cost-effective and balances community benefits with competitive electricity prices.

[4] Also referred to in some instances as Distributed Renewable Energy (DRE).

[5] Cooperative of households and small-scale renewable generators that have come together as members.

When conducting affordability assessments, it is crucial to consider the appropriate energy access levels. This comprehensive approach, which considers household income and spending on essentials like food, education, and transport, ensures a more accurate analysis. It also guarantees that the minimum energy levels for productive use (MTLC) are viewed in a holistic context of household expenses.

Stakeholders highlighted that while CORE systems can provide a range of benefits to communities, the most valuable benefits would be the provision of affordable electricity or at least subsidised electricity for communities to offer an MTLC at which households can leverage meaningful socio-economic benefits and allow for productive use.

3.2. Energy access

Access to energy is critical for communities and comprises several aspects: physical connection to energy sources, affordability, and access to a reliable energy supply. This study highlights that energy access in South Africa is inextricably linked with affordability; affordability facilitates adequate access rather than merely theoretical access to energy. A physical connection to energy sources and the cost of connection and using energy are significant concerns, especially for low-income households. When cost is examined within the context of communities characterised by low-income households, there is a consensus that affordability is the single most significant barrier to energy access for many African communities. The conceptualisation and design of CORE projects should ensure that these are considered jointly and holistically.

Reliability of supply is another crucial aspect of access to energy. The initial scepticism and general lack of awareness and understanding of RE in some communities underscore the importance of reliability in energy supply. To foster greater acceptance of RE, these systems must provide tangible and visible benefits to communities through a continuous and reliable energy supply. This approach helps to improve the general social acceptance of RE production in the country.

Several stakeholders identified improved community energy access as a social imperative for CORE. For community ownership to be deemed successful or socially beneficial, it should play a role in the upliftment of communities. Again, stakeholders highlighted that there is often an expectation from communities that they will benefit from improved access to electricity (free or subsidised) as a result of the construction of these facilities. Stakeholders also stressed that not responding to this expectation could impact community buy-in and acceptance of RE development and potentially cause hostility.

Under the typical Community Trust model, dividends from the operation of RE facilities are paid into the Trust, and it can often take several years before financial reserves are large enough to provide communities with some form of tangible benefit. Another critical flaw in this model is that the needs assessment is often top-down and misaligned with the community's real needs, hamstringing spending once funds are available. In place of initial financial benefits that could be provided to community members via dividends from the Trust, providing free, subsidised, or affordable access to electricity for a community could satisfy the expectations of community members that the development of an RE facility will deliver tangible improvements to their lives. Importantly, not all communities are the same or have the same needs; a community-led, bottom-up needs assessment is critical to ensure that projects align with actual needs.

Lastly, there is a pressing need for additional contemporary case studies and data on energy access in South Africa and the rest of the continent. An increase in the case studies would increase the body of literature and information available to inform the planning and implementation of CORE projects. Informed decisions can then be made, such as determining the correct energy capacity required to match the current and future energy use patterns and needs of the community/users.

CORE projects must ensure that the RE generated will be supplied reliably and of sufficient quality regardless of the CORE ownership and implementation methods and modalities eventually adopted. Failing to do so could result in an undesirable outcome that could jeopardise the viability of CORE projects if the proposed consumers of the generated energy opt to either forgo energy from the projects or pursue alternative sources in the face of unstable or low-quality supply. Reliability must be demonstrated to gain the acceptance of communities seeking to achieve energy access through RE projects such as, but not limited to, appropriate CORE models. A proper needs assessment, aligned with the principles of a just

transition, is required to understand the actual needs. It is also essential to ensure that the community is appropriately and fully engaged and that whatever benefits arise from the RE facility reach all community members.

3.3. Ownership models and governance

Various literature sources were examined to understand the ownership models that could be used to implement CORE projects in South Africa. The literature shows few examples of successful CORE projects in South Africa or the continent compared to other regions like Australia, Europe, the UK, Ireland, and the US. Though limited, case studies cover Africa (with a focus on South Africa). Though many of these authors believe CORE could work well in Africa, it has not been widely adopted.

This points to barriers, including specific policies or laws in each country, the involvement of communities and government, and where the projects are located. Despite these barriers, there has been a rise in small-scale energy projects like micro- and mini-grids[6] for small communities, rooftop solar panels for homes, and pilot CORE projects. These projects suggest that CORE could be an effective way to make energy more affordable and secure.

3.3.1. Diverse CORE models are required to suit multiple contexts

When considering CORE ownership models, the literature distinguished between CORE projects implemented in the Global North and those in the Global South. Our review highlighted the importance of considering local contexts, such as socio-economic conditions, location, geography, population density, and laws and customs.

Communities in rural or peri-urban areas can also be subject to unique contexts and challenges. These can affect the types of CORE projects that can be implemented and the associated designs and governance structures that must be implemented. For instance, off-grid RE solutions are more appropriate for rural areas. In contrast, communities in urban or peri-urban areas will likely have some form of grid access (sometimes through illegal connections to existing grids) or proximity to grid infrastructure.

Implementing different CORE initiatives in various South African community contexts also addresses challenges. Implementing a mini-grid electrification project in a rural setting will likely improve the impacted communities' socio-economic conditions. The same approach within urban and peri-urban settings may relieve communities from unplanned electricity outages while simultaneously creating scope for communal or economic activities. Communities with the resources and willingness to fund RE projects where the benefits can extend to low-income households in the same or adjacent communities would also need to adopt a fitting model. Consideration must, therefore, be given to the most appropriate governance and ownership models that can be applied to each community.

Thorough consideration of the unique characteristics of communities' local contexts is required to narrow down the most appropriate models. These factors will affect each community's technologies, governance structures, and ownership models.

3.3.2. Categories of CORE models for the South African context

Some sources identified CORE models with the potential to work in the South African context. Four broad categories of CORE ownership models emerged from the literature, which can be applied to benefit communities within rural and peri-urban locations. These four are summarised as follows:

1. **Mini-grid projects in rural areas or informal settlements without access to the primary power grid owned by communities.** Members benefit from an allocation of free electricity, with the possibility of

[6] Microgrids are smaller systems preferred for localised energy management, often in urban or commercial settings, and can be connected to the grid. Mini-grids are larger systems designed to provide electricity to off-grid or remote areas.

selling extra power to small businesses. This helps rural households and peri-urban settlements without grid access.

2. **CORE projects in informal settlements that can feed into the city's power grid.** Households can form groups or cooperatives that benefit through, for example, revenue from the feed-in tariffs for the sale of surplus energy to third parties or the national grid via wheeling (if a connection exists or is established later). Community members can be upskilled (or contracted by a third-party entity) to operate and manage the generation.

3. **Large-scale CORE generation on land that is wholly or substantially community-owned.** The local community can benefit from, for example, revenue from electricity sales, rental payments from the use of their land, or lease income and dividends from share ownership in a project.

4. **Small-scale Embedded Generation (SSEG)[7] projects where workers or community members have a share or direct ownership** of, for example, rooftop installations in their workplace. This category of CORE ownership seeks to advance the objectives of South Africa's Just Energy Transition (JET) in attempting to create avenues for historically coal-dependent workers and communities to benefit from the potential of RE projects.

There has been a proliferation in the development and deployment of microgrids, championed by different actors, including activist organisations that support local community efforts to improve energy access. There has also been a significant increase in electricity generation by private households and small businesses through a massive adoption of rooftop solar installations to alleviate the impact of the electricity load shedding that has worsened in recent years across the country.

Stakeholders highlighted a variety of ownership models during the consultation process. For example, a large manufacturing workers' union in South Africa championed the model described in point 4 above. The union has supported the roll-out of solar PV installations on factory rooftops where union members work. These solar installations are owned by the union and, by extension, the union members, and electricity generated by these installations is sold to the factories on which they are installed. The revenue derived from the sale of this electricity is invested in various financial structures for the ultimate benefit of union members, such as education trusts that can provide bursaries for the children and other dependents of union members engaged in this CORE ownership model.

Another model outlined in the literature included a lower middle-income community that relies on prepaid meters and spends R750 monthly on electricity. These communities would have six household solar panels, an inverter, and a battery to generate and store electricity. Rooftop space would be rented from community members and paid for by providing participating households with prepaid electricity. This would result in electricity cost savings of approximately 40% for each household. It offers additional benefits such as increased safety through streetlights staying on and ensuring that schools and Early Childhood Development (ECD) centres can remain open even when power goes out, as the project includes a community battery. By helping to prevent adverse events such as theft and vandalism, this project has a clear and equitable benefit to the community, even though the community does not directly own the power generation in this model.

While these categories of CORE models can be applied to the locations and high-level contexts outlined, further information is required on legal structures, governance, and funding options. This would provide policymakers, project developers, and communities with more robust guidance on viable options.

[7] SSEG refers to power generation facilities (including renewable energy sources) located at residential, commercial, or industrial sites, where electricity is also consumed. These facilities can also be connected to the national electricity grid.

3.3.3. Governance arrangements

Whether a community can own a whole CORE project or a large part of it depends, among other factors, on the legal structures available. However, it is challenging to attain meaningful ownership if the community does not have the necessary skills or resources, like management, land, and funding. Without these, community ownership would be impractical or result in ineffective and unsustainable CORE projects.

Communities can adopt several legal structures for CORE projects' governance and ownership. The structures that were commonly highlighted within the literature are:

- **Cooperatives** are entities established for a common purpose (economic, social, or otherwise) and jointly owned by their members.
- **NPOs** are formed by members responsible for their investments and financing. However, profits are not taken and instead are reinvested.
- **Association**: private NPOs established for a shared common purpose. Decisions are taken by the members using the applicable statutes or by-laws.
- **Community Trust**: Trusts are established to facilitate broader community benefit, and investment returns are directed towards specific local purposes for all community members.
- **Partnership** (formal/legal): individuals establish these to achieve a shared business purpose. A further distinction can be made between general partnerships and limited partnerships.
- **Corporations are** stand-alone legal entities that their shareholders own. They have voting rights and can benefit from profits, such as dividends.
- **Limited Liability Company (LLC)**: LLCs have the characteristics of corporations and partnerships.

From a South African perspective, the legal structure garnering the most attention in the literature is the Community Trust model. This focus reflects the high prevalence of its use by REIPPP developers. Section 3.3.5 discusses our findings on this legal structure's use.

There was some recognition of the importance of choosing the proper legal structure for a CORE project. However, no specific consideration was given to establishing a relationship between the most appropriate legal structure and the availability of skills and expertise within a community. This is an important consideration, as specific skills and expertise may be required to implement an appropriate governance structure.

The chosen legal structure would directly impact the type of ownership and associated authority a community can have over a project. The legal structure adopted also affects the financing models that communities can access for CORE project planning and implementation.

3.3.4. Regulatory and policy requirements

Our review found some discussion of the policy and regulatory framework required for South Africa to adopt and use different CORE models. The literature emphasised the importance of appropriate regulatory frameworks across all spheres of government – national, provincial, and municipal levels. The potential negative impact on municipal revenues that the rise of CORE projects could contribute to and the knock-on effects on other service delivery areas were recognised. Local government is closest to communities; the literature acknowledged this and the fact that further work to change the ways of working is needed on the role of municipalities and their business models so they can facilitate the integration of more Distributed RE (DRE) and community benefits.

It was also noted that network restrictions can be barriers to developing DRE. For example, technical and other constraints limiting the number of DRE connections that can be made, bureaucratic compliance requirements, and uneconomic pricing for grid access or system use can all serve to restrict the development of DRE generally, including CORE projects.

An enabling policy framework is required to ensure more integration of DRE into the grid, particularly at the municipal level. The framework must espouse the principles of the JET Framework to ensure that all communities, particularly low-income and vulnerable communities, benefit from the development of DRE. At the same time, the local government's role and business model must be reviewed to avoid any unintended socio-economic consequences of increased DRE, CORE or other.

3.3.5. REIPPP and Community Trusts

We found extensive commentary on the country's REIPPP in South Africa through various sources. To expand the country's generation capacity by sourcing this from the private sector (both RE and non-RE sources), the Independent Power Producer Office established, in theory, the framework and conditions for CORE initiatives to thrive. Much of the literature assessed focussed on areas such as the successes and challenges of the REIPPP, opportunities that can enhance the potential impact of the programme (including from a JET viewpoint), and lessons from the ownership models that have been deployed for RE projects to date, particularly Community Trusts.

It was frequently held that Community Trusts have had limited success as effective and sustainable ownership vehicles for communities. However, they have the potential to facilitate broader community development by using the proceeds set aside from a project's operation.

A series of challenges were identified, including a perception that project developers in South Africa establish Community Trusts with a focus on compliance with the procurement rules of REIPPP rather than a genuine intention to address socio-economic challenges in communities. This may inhibit the potential for community ownership models to deliver their maximum potential benefit.

Persistent skills deficits were also raised, and some trustees were perceived to have misguided agendas that negatively impacted their ability to represent their communities' interests effectively. In addition, the absence of effective monitoring and evaluation (M&E) frameworks and mechanisms for accountability and transparency was frequently mentioned.

On the other hand, some examples showed that using Community Trusts as an ownership vehicle has been successful. For example, Community Trusts were established under the REIPPP by solar and wind energy project developers; the Trusts then acquired ownership in the form of an equity stake in the respective projects by organising loans. Once the projects began operating, the dividends due to the Community Trusts were used to pay off the loans over several years and eventually settled in full in each case. Since then, the Community Trusts have continued using their dividends from the projects to uplift their surrounding communities through investments or interventions, for example, bursaries for adult education, building taxi ranks, and renovating community halls.

Other sources recommended steps and actions that can be taken to improve the viability of community ownership using the Community Trust model so that the communities can realise true and sustainable benefits from effective participation in them. Steps that can be taken in this regard include harmonising interventions so that they complement and support each other to avoid duplication of efforts, developing a shared commitment across the different stakeholders and actors within the CORE ecosystem, and empowering communities to ensure that they have agency to guide and influence projects and interventions that are designed to benefit them. Whether there is sufficient appetite for this amongst key stakeholders and actors from public and private sectors was not evident from the data and would require further assessment.

Furthermore, there are examples from other regions, such as Europe, where the use of Community Trusts has resulted in the establishment of large and sustainable RE projects that use their income to support local social, cultural, educational, and environmental development. These offer valuable lessons that can be applied to the African context and potentially across different ownership models.

However, stakeholders have also raised concerns that models adopted in the Global North might not suit the socioeconomic profile of South African communities, particularly those living in poverty or with a low income. Such communities do not have access to the same avenues of capital investment required for RE development as those in the Global North. So, while ownership has clear benefits, a like-for-like model is not

applicable in most Global South contexts. Strong emphasis was placed on the imperative that ownership models effectively reflect and respond to a South African context.

An issue repeatedly raised by stakeholders is the potential for elites within the community or actors outside of these communities to capture community ownership. The benefits that communities could accrue through a community ownership scheme would then be diverted to these actors.

Some stakeholders questioned whether owning RE systems would deliver a net benefit or harm to a community. One perspective suggests that, given South Africa's history of oppression and economic inequality, increasing ownership of RE facilities could empower previously disadvantaged members of society and promote economic inclusivity. However, others argue that while there has been a focus on ownership by previously disadvantaged South Africans since apartheid ended, this approach may have only benefited a select few and failed to bring about widespread or meaningful socio-economic development. In some areas, it may even have worsened poverty and inequality. This prompts us to consider whether a community ownership model rather than one more focussed on benefits and co-benefits to the community would genuinely improve the lives of community members.

There is no 'one-size-fits-all' approach to community ownership or Community Trusts. The literature and stakeholder engagements clearly show that more information is required to allow decision-makers to determine whether and where ownership may indeed be the best model to improve the lives of South Africans. A needs-based approach must be leveraged to understand CORE's viable and beneficial options, engagement, structure, governance, and financial options.

3.4. Funding models

3.4.1. Financing as a barrier to entry vs project viability

Our review of the extensive literature on funding mechanisms found broad recognition that many communities in South Africa and beyond lack the financial resources and related knowledge required to fund CORE projects. Case studies highlight that international CORE projects use various financing mechanisms depending on project size, technology, and community ownership preferences. Even projects with very similar characteristics may require different funding mechanisms.

Public financing options include earmarking taxes from carbon-intensive industries or issuing green bonds for project funding. Private options encompass financing from commercial banks, private equity, DFIs, and institutional investors. Public, donor, or philanthropic support can also fund projects with significant environmental or social benefits, even if they lack commercial financial viability. However, careful consideration is needed for public funding, especially regarding its appropriateness and potential impact on taxation levels and fiscal stability, particularly in challenging macroeconomic conditions.

We also found examples of CORE projects leveraging blended finance, where public funding is used to attract private investment and reduce risk. In these instances, private funding supports project stages like development, capacity building and technical support.

Cities, for example, leverage public funds to incentivise DRE projects like solar PV through rebate schemes and shared systems. Blended finance mechanisms, which use concessional or grant finance to unlock private capital and leverage public finance mechanisms, are effective for CORE projects in South Africa and beyond. This framework offers flexibility tailored to diverse stakeholder needs and project contexts.

Regarding funds from the DFI and other donor sectors, our review found that national, regional, and international development funds have also been deployed as financing tools for DRE and other RE project types. These funds have used instruments including equity, debt, loans, and grants to finance RE projects or specific portions. In some cases, DFI and donors have also cooperated with government entities and the private sector to leverage their collective scope of funding sources.

Stakeholders discussed concerns about funding CORE models, particularly regarding realistic pricing environments and financial sustainability. Selling electricity at profitable prices to municipalities might make it unaffordable for end customers, hindering sustainability. Energy and procurement regulations in South Africa could further limit financial benefits, with the typical length (20+ years) for power purchase

agreements conflicting with municipal contracting periods (limited to 3 years with onerous approval required to deviate from this). One proposed solution involves establishing SPVs to provide credit to community members, facilitating further sustainable economic development.

The importance of project development funding for RE projects was also highlighted, as these projects require specific expertise and planning in early phases to attract financing. However, private sector hesitancy due to perceived risks could hinder viable projects. Grant funding from public or donor sectors was identified as a potential solution to address this issue and reduce risk.

3.4.2. Commercial loans for equity stakes in projects

Acquiring loans to facilitate ownership through equity was another financing option for CORE projects that surfaced during our review. As previously discussed, in some Community Trusts, the communities succeeded in reaping the positive benefits of CORE project ownership. Trusts representing the host communities acquired equity stakes in projects through loans from a combination of project developers and a local DFI. Both loan instruments in each case were subsequently successfully paid off by the Trusts.

Furthermore, the South African Community Trusts that successfully paid off loans acquired to obtain ownership stakes in local RE projects demonstrate the viability of this financing mechanism, provided that it is implemented correctly. The key lessons and best practices from these and other case studies where the Community Trust model has been used effectively would need to be incorporated in any other CORE projects using this funding model.

3.4.3. Retail funding

Crowdfunding and retail investor funding are other potential funding sources that have grown in recent years within the context of impact investment. For instance, we identified retail investment platforms that have enabled individual European investors to invest in solar PV projects in several African countries. Notably, in these funding mechanisms, the ownership of the RE energy projects lies outside of beneficiary communities where the projects will be implemented. This type of funding is more prevalent in the Global North, where individual investors can access the resources required to invest ‘offshore.’ The benefits of this model include increased access to clean energy for the community and the developmental gains that this affords, such as education, clean cooking (addressing hunger), and entrepreneurship.

Financing poses a significant challenge for RE projects, including CORE, and it is crucial to consider the options during the planning stage. Funding sources can influence ownership: external financing may lead to ownership outside the community, while crowdfunding can enable community ownership, especially for smaller projects. Other mechanisms, such as loans, may transfer ownership to the community after debt repayment. Understanding these ownership implications is vital to aligning funding mechanisms with community ownership structures.

While some argue that funding is readily available for viable projects, others emphasise the importance of demonstrating financial feasibility to attract investment. CORE projects must prove their viability to secure financing, typically by showing a positive internal rate of return (IRR) and economic feasibility. This positions them to attract funding from both private and public sectors. Project development financing and support can help CORE projects attract necessary funding instruments for further development and implementation and to mitigate risks.

3.5. Community awareness and engagement

Community awareness and engagement are vital for any CORE project, and activist organisations are pivotal in facilitating this. Many are already engaged with communities; some have supported establishing small-scale CORE projects through awareness-raising and community engagement.

Guidance on community engagement does exist, although resources are often published by global institutions, such as IRENA, and tailored advice for the Global South is lacking. Developing such tools for South Africa and other emerging markets would be invaluable for project developers and communities.

Comprehensive engagement, particularly with municipal officials and community leaders, is essential for understanding local energy needs and gaining support. Insights derived from surveys undertaken in select South African local communities dealing with energy access have demonstrated that, given the prevailing socio-economic conditions, municipal officials have a role in sharing information and education with communities. Communities may look to municipal representatives for support to engage with a new concept, such as CORE, that can provide them with clean energy. However, municipalities often lack the understanding, skills, and capacity to deal with DRE, whether community-owned or otherwise. There is, therefore, a need to support capacity building at this level of government to allow municipalities to engage and support their communities effectively. Funding is also required for effective engagement, including establishing forums or hubs and processes and mechanisms for engagement.

As mentioned, the mechanism chosen to fund CORE projects will also affect the ownership and governance models. Guidance and support during the planning stages are crucial to inform the community and obtain their support and buy-in properly. A bottom-up approach to understanding community needs and preferences is recommended to ensure that benefits align with local priorities.

Similarly, the need to ensure that communities have the requisite skills and capacity to participate effectively in managing or operating a CORE project cannot be overemphasised. Our review found that, while there is consensus on the severe skills and capacity deficits that persist within South African communities, insufficient attention has been given to examining and highlighting the specific nature of these deficits to address them. Significantly greater attention has been paid to sensitisation and education on the CORE concept, with far less emphasis on highlighting the specific skills communities would require to manage and operate a CORE project effectively.

Understanding community ownership expectations, needs, and existing skills is necessary to determine suitable support, benefits, financing, and governance models for community ownership (if deemed the best option for that community), fostering buy-in and effective project implementation.

4. Opportunities

As our findings from the literature assessment and stakeholder consultations took shape, we recognised a series of preliminary opportunities that can be explored as a basis for advancing the development of CORE in South Africa. These preliminary opportunities can be viewed as interventions that could demonstrate the relevance and viability of CORE in South Africa to different actors and stakeholder groups, from policymakers to activist organisations and financiers. These opportunities have the potential to provide invaluable information on critical facets of CORE model design and implementation within the African context.

4.1. Opportunity 1: Peri-urban and rural CORE pilot projects

Given the substantial number of communities within peri-urban or rural informal settlements, it is essential to establish a better understanding of what works and what does not in terms of interventions to support the development of CORE within each of these contexts. Our research suggested that the optimal CORE model may vary according to the type of community due to the unique challenges each faces. Still, developing a wider body of evidence in this area would be valuable.

Communities in peri-urban areas are likely to have access to grid electricity, but this may be unreliable (e.g. in the case of illegal connections) or insufficient to meet their needs. Conversely, using a mini-grid to facilitate energy access is more appropriate for communities in rural contexts, given the limited or lack of grid access in rural areas and the lack of space in urban areas. As a result, collaborative CORE pilot projects with participation from different actors and which are tailored to the needs of the peri-urban and rural contexts, respectively, can provide the following:

- Data on affordability and energy access within each community type, which goes beyond the anecdotal evidence that currently prevails in the literature, providing crucial insights and awareness of the significance of the research.
- Learnings and insights on potential policies and support interventions that can be used by policymakers facilitating CORE development within each community type by different actors.
- Information on the skills or capacity deficits each community may face.
- Innovative practices and approaches which can be refined and replicated in other provinces and locations to benefit other communities.

In addition, it is essential to note that the pilots may demonstrate that the existing CORE models prevalent today are not yet appropriate for use in South Africa or the rest of the continent. We believe that there is a possibility of finding that communities value energy access and affordability rather than ownership. Nevertheless, they may provide empirical evidence to support the RE agenda by, for example, emphasising the co-benefits to communities that are possible from their participation in these.

4.2. Opportunity 2: Detailed energy demand and MTLC Audits for different community types

A critical need identified in the literature is the availability of quantitative, empirical data on energy demand and consumption by peri-urban and rural community members within the context of the MTLC. Currently, literature in this area is limited. This is because a qualitative approach has been adopted to gain insight into the consumption patterns of communities facing energy access or affordability challenges. While this approach provides valuable information, it does not provide the required data to plan CORE or other RE energy projects. This presents an exciting opportunity for learning and growth in our understanding of energy demand.

Specifically, quantitative data on the MTLC and energy demand of communities in each type of setting (peri-urban and rural) would provide CORE and other RE project developers with insights into how their proposed energy systems can be designed to meet the current and future energy demands of the communities in question. These energy audits could occur as part of the proposed pilot projects outlined in Opportunity 1 above. This will further strengthen the body of evidence supporting CORE in South Africa.

4.3. Opportunity 3: Skills identification by communities to implement CORE projects

A mapping of the critical roles, responsibilities and related skill sets required for CORE projects would be helpful for community members and other stakeholders. While there is consensus that many African communities lack the requisite skills needed to implement CORE projects, insufficient attention has been given to identifying the specific skills they lack. Clarity and openness are essential because, while educating communities on the benefits and potential of CORE initiatives is necessary, any decision to pursue a CORE project must be informed by a complete understanding of the skills and competencies required to make it a reality.

Sensitising communities on these skills is essential for two reasons. Firstly, it allows them to understand better the skills required to pursue a CORE project. Secondly, it will enable communities to decide whether to pursue capacity building and training to develop the skills internally or outsource these skills and responsibilities to an external party. Therefore, information from the mapping exercises can be used for

various purposes. For instance, community members can use the information to explore opportunities to acquire some or all the skills needed (e.g., with external development partners).

In addition, information from these mapping exercises could also be used by activist organisations that work with communities or by RE project developers seeking to partner with neighbouring communities for their proposed project sites. The information could also serve as a template for establishing incubation and training programmes to transfer specific RE-related skills and competencies to the CORE context. A starting point for identifying the relevant skills and competencies would be a detailed review of the planning and implementation arrangements deployed in CORE models successfully implemented in other regions, as well as interviews and engagement with individuals involved in implementing these.

5. Recommendations & next Steps

Based on our review and findings, and where we believe key opportunities exist, we have recommended three key steps to advance the understanding and implementation of CORE in South Africa and across the continent. We recommend investing in developing and implementing a few CORE model demonstration pilot projects to test some fundamental unknowns. The selected pilot CORE models should be designed and applied to specific community contexts such as rural and peri-urban geographies. Importantly, their design must be guided by the insights captured in this and other studies into the feasibility of CORE in the Global South. Piloting projects can de-risk projects and demonstrate their viability. It can also obtain buy-in and support from future host communities, project developers, policymakers, and other stakeholders. This will further strengthen the adoption of CORE in Africa.

5.1. Recommendation 1: Additional research on affordability, energy Access and skills deficits faced by communities within the African CORE project conceptualisation and implementation

Resources should be allocated towards specific research to assess how the affordability and energy access contexts of different communities in South Africa and other African countries determine the viability and appropriateness of CORE for these communities. In addition, research should be conducted into the specific skills and capacity constraints communities face when seeking to explore CORE opportunities and interventions that could potentially address these.

5.2. Recommendation 2: Provision of CORE project development funding to establish the viability of projects

Project development funding is a fundamental requirement for conceptualising and designing CORE projects. Communities could use the funding for training, services, support, and authorisations required for the project. DFIs, international donors, philanthropic organisations, and other grant or concessional finance-making institutions with a record of or interest in supporting CORE projects or RE projects can provide this funding. Projects that have completed a project development process have a greater chance of attracting additional financing from the private sector and other sources that can be used to fund its formal implementation and operation. The socialisation of development expenditure (DEVEX) can also be explored to determine alternatives to donor funds for project development, creating a longer-term option.

Blended finance that combines financial resources from the public/philanthropic/development sectors, on the one hand, and the private sector, on the other hand, is well-suited for financing CORE projects. A key benefit of blended finance is its flexibility, demonstrated by the scope of combining different instruments at different ratios to create a bespoke financing package for a CORE project. Another benefit is the lower cost of capital for blended finance, which can be facilitated when instruments such as grants, guarantees, and concessional loans are included in the package.

5.3. Recommendation 3: Development of manuals, toolkits and guidance on CORE planning and implementation adapted to the regional context.

Educational resources will be required during the preparation and implementation of CORE projects. These resources should be designed explicitly for CORE model implementation within South and broader African contexts. Much of the information required will be developed over the coming years as lessons and best practices from the increased number of CORE projects in Africa are recorded and collated. These resources will also be valuable tools for implementing the stakeholder engagement required at the various stages of a project's development as the learnings are shared and published.

APPENDIX

Appendix 1: Who we are

Carbon Trust's mission is to accelerate the move to a decarbonised future.

We have been climate pioneers for over 20 years, partnering with leading businesses, governments, and financial institutions globally. From strategic planning and target setting to activation and communication - we are your expert guide to turning your climate ambition into impact.

We are one global network of 400 experts with offices in the UK, the Netherlands, South Africa, Singapore, and Mexico. We have helped set 200+ science-based targets and guided 3,000+ organisations in 70 countries on their route to Net Zero.

Carbon Trust designs and delivers catalytic programmes across emerging African and Southeast Asian economies to expand access to clean energy and mobilise low-carbon innovations. Such programmes seek to enhance contributions to wider SDGs and Just Transition principles.

Appendix 2: Stakeholder list

Sector	Organisation
Consultancies	KD Strategy
Consultancies	Carbon Trust
Development agencies and philanthropies	African Climate Foundation
Development agencies and philanthropies	Global Energy Alliance for People and Planet
Development agencies and philanthropies	RTI (PowerAfrica Partner)
Development agencies and philanthropies	Mpumalanga Green Cluster Agency
Development agencies and philanthropies	GreenCape
Development agencies and philanthropies	Southern Africa Trust
Industry Association	South African Photovoltaic Industry Association (SAPVIA)
Industry Association	South African Wind Energy Association (SAWEA)
Independent Power Producer Representatives	SOLA Group
Independent Power Producer Representatives	Enerlogy
Investors and Financial Institutions	Development Bank of South Africa (DBSA)
Investors and Financial Institutions	World Bank
Investors and Financial Institutions	Industrial Development Corporation (IDC)
Investors and Financial Institutions	Energise Africa
NGOs, CSOs, and community representatives	Groundwork
Organised Labour	COSATU
Organised Labour	NALEDI
Policymakers and Regulators	South African Local Government Association
Policymakers and Regulators	Presidential Climate Commission
Policymakers and Regulators	Presidential Climate Commission

Sector	Organisation
Policymakers and Regulators	NERSA
Research Groups and Think Tanks	Intellidex
Research Groups and Think Tanks	Public Affairs Research Institute
Research Groups and Think Tanks	Initiative for Social Performance in RE
Research Groups and Think Tanks	The Center for Renewable and Sustainable Energy Studies (CSRES)
Research Groups and Think Tanks	Sustainability Institute (Stellenbosch)
Research Groups and Think Tanks	Sustainable Energy Africa
Research Groups and Think Tanks	Trade and Industry Policy Strategy
Research Groups and Think Tanks	Brazilian Center of Analysis and Planning (CEBRAP)
Research Groups and Think Tanks	Energy Systems Research Group - University of Cape Town
Research Groups and Think Tanks	Water Research Commission
Utility	Eskom

Appendix 3: List of CORE-related literature sources consulted

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Topic report	Presidential Climate Commissions (PCC) Report - A Framework for a Just Transition in South Africa	PCC	2022	Africa	South Africa	Multiple
Case study	C40 Exploring the Just Transition South Africa	Neil Overy; Richard Halsey; Nadia Shah; Jazmin Burgess; Gifti Nadi	2021	Africa	South Africa	Multiple
Case study	Distributed RE: A pathway for resilient recovery in cities	Resilient Cities Network; ARUP	2022	Multiple	Multiple	Funding models
Case study	Funding social justice in the energy transition: A role for private sector financing at scale	Intellidex	2023	Africa	South Africa	Funding models
Case study	Funding social justice in the energy transition: Capital Market developments to scale private sector mobilisation	Intellidex	2022	Africa	South Africa	Funding models
Case study	Communities in Transition: The Role of Community Ownership in South Africa's REIPPP Programme	Intellidex	2021	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Case study	Innovation landscape brief: Community ownership models	IRENA	2022	Multiple	Multiple	Ownership models (incl. governance and inclusivity)
Topic report	PCC Report - Recommendations from the PCC on South Africa’s Electricity System	PCC	2023	Africa	South Africa	Multiple
Topic report	South Africa’s Just Energy Transition Investment Plan (JET-IP) for the initial period 2023–2027	Presidency of South Africa	2022	Africa	South Africa	Multiple

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Case study	Unlocking Urban Energy Access and Poverty - Research Report	Global Covenant of Mayors for Climate & Energy	2023	Africa	South Africa	Energy Access
Case study	A review of the local community development requirements in South Africa's RE Procurement programme	World Wildlife Fund (WWF)	2015	Africa	South Africa	Multiple
Website content	Energise Africa: About Us (Available at: https://www.energiseafrica.com/about)	Energise Africa	2023	Africa	DRC; Uganda; Nigeria; Mauritius; Senegal; Kenya	Funding models
Topic report	Stimulating investment in community energy: Broadening the ownership of renewables.	IRENA	2020	Multiple	Multiple	Funding models
Case study	Swansea Community Energy and Enterprise Scheme	Welsh Government		Europe	UK	Ownership models (incl. governance and inclusivity)
Topic report	Community and RE Scheme Project Development Toolkit Establishing a Community Group Module	Ricardo AEA and Local Energy Scotland	2015	Europe	Scotland	Ownership models (incl. governance and inclusivity)
Case study	Energy Local: About Us (https://energylocal.org.uk/about-us)	Energy Local		Europe	UK	Affordability
Topic report	Community Energy Toolkit	IRENA Coalition for Action	2021	Multiple		Multiple
Topic report	Community ownership models. Innovation Landscape Brief	IRENA	2020	Multiple		Ownership models (incl. governance and inclusivity)

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Book/book chapter	RE Communities in Africa: A Case Study of Five Selected Countries	Actinia, M.A, Adu, K.O, and Diawuo, F.A	2023	Africa	South Africa, Malawi, Cameroun, Togo, and Côte d'Ivoire	Multiple
Academic article	Imagining RE: Towards a Social Energy Systems approach to community RE projects in the Global South	Cloke, J, Mohr, A, and Brown, E	2017	Multiple	Multiple	Ownership models (incl. governance and inclusivity)
Case study	Infrastructure financing in sub-Saharan: Africa Opportunities and impact for institutional investor	Mercer, MiDA Advisors and Standard Bank	2021	Africa	Multiple	Funding models
Case study	Africa's Energy Future Is Renewable Res4africa Flagship Publication	Renewable Energy Solutions for Africa (RES4AFRICA)	2023	Africa	Multiple	Multiple
Topic report	Draft South African RE Masterplan (SAREM)	Departments of Minerals Resources and Energy; Science and Innovation; and Trade, Industry and Competition	2023	Africa	South Africa	Multiple
Annual report	Renewable Energy and Energy Efficiency Partnership (REEEP) Annual Report 2021	REEEP	2021	Asia	Nepal	Multiple
Case study	Report on Best Practice Legal Framework / Ownership models for Community Energy Projects	Local Energy Communities (LECo)	2019	Europe	Finland; Germany; Ireland; Sweden	Ownership models (incl. governance and inclusivity)

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Case study	Guidance on community ownership models under the Feed-in Tariffs scheme	UK Department of Energy & Climate Change	2015	Europe	UK	Ownership models (incl. governance and inclusivity)
Academic article	Towards inclusive community-based energy markets: A multiagent framework	Reis, I.F.G, Goncalves, I, Lopes, M.A.R, and Antunes, C.H	2022	Europe	N/A	Ownership models (incl. governance and inclusivity)
Case study	A Review of Energy Communities in Sub-Saharan Africa as a Transition Pathway to Energy Democracy	Ambole, A., Koranteng, K., Njoroge, P., and Luhangala, D.L.	2021	Africa	Multiple	Ownership models (incl. governance and inclusivity)
Case study	Unlocking Africa's Mini-Grid Market Draft Final Report - USAID Scaling Up RE Program (SURE)	USAID	2021	Africa	Democratic Republic of Congo, Ethiopia, Kenya, Morocco, Nigeria, Rwanda, Senegal, Tanzania, Tunisia, and Zambia	Multiple
Case study	UCT thesis - Socio-economic analysis of community-based micro hydroelectric schemes in Kenya	Karumba, M.M	2017	Africa	Kenya	Multiple
Case study	AfDB SEFA 2016 Annual Report	AfDB	2016	Africa	Kenya	Multiple
Topic report	Renewables 2016 Global Status Report	RE Policy Network for the 21st Century	2016	Multiple	Multiple	Ownership models (incl. governance and inclusivity)

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Case study	Interreg Europe - Empowering Citizens for Energy Communities - A Policy Brief from the Policy Learning Platform on Low-carbon Economy	Interreg Europe	2022	Europe	Multiple	Multiple
Case study	Power by All: Alternatives to a Privately Owned Future for RE in South Africa	International Institute for Sustainable Development (IISD)	2021	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Academic article	Implementing a just RE transition: Policy advice for transposing the new European rules for RE communities	Hoicka, C.E., Lowitzsch, J., Brisbois, M.C., Kumar, A., and Camargo, L.R.	2021	Europe	Multiple	Multiple
Case study	Community-based RE Models - Analysis of existing participation models and best practices for community-based RE deployment in Germany and internationally	German Federal Ministry for Economic Affairs and Energy	2016	Europe	Germany	Multiple
Case study	Guidance for developers, local communities & decision-makers Local and shared ownership of energy projects in Wales		2022	Europe	Wales	Multiple
Topic report	Scoping and environmental impact assessment for GreenTech in Zone Two of the Atlantis Special Economic Zone, Atlantis, Western Cape	CSIR (Kelly Stroebel, Rirhandzu Marivate and Paul Lochner)	2019	Africa	South Africa	Multiple
PowerPoint presentation	Low and middle-income rooftop solar PV approaches in SA	GIZ	2018	Africa	South Africa	Multiple
Media article	Shack dwellers look to RE to power informal settlements	groundUp	2023	Africa	South Africa	Engagement
Website content	Electrifying Economies https://www.electrifyingeconomies.org/	The Rockefeller Foundation; RMI; SE4ALL	2023	Multiple	Multiple	Energy Access

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Book/book chapter	Hungry for Electricity: A new Public Affairs Research Institute (PARI) publication https://pari.org.za/hungry-for-electricity-a-new-pari-publication/	Public Affairs Research Institute	2022	Africa	South Africa	Multiple
Topic report	Roadmap to Zero-Carbon Electrification of Africa	Columbia Center on Sustainable Investment (CCSI)	2022	Africa	Multiple	Multiple
Website content	Mobilising Social Movements for Energy Democracy and Sovereignty in South Africa: Towards socially-owned RE solutions https://www.sustainable.org.za/project.php?id=63	Sustainable Energy Africa	2023	Africa	South Africa	Energy Access
Topic report	Measuring Energy Access	SE4ALL		Multiple	Multiple	Energy Access
Academic article	Quantifying the local economic supply chain impacts of RE investment in Kenya https://www.sciencedirect.com/science/article/abs/pii/S0140988323003080?CMX_ID=&SIS_ID=&dgcid=STMJ_AUTH_SERV_PUBLISHED&utm_acid=118801601&utm_campaign=STMJ_AUTH_SERV_PUBLISHED&utm_in=DM385143&utm_medium=email&utm_source=AC_	J. Larson et al.	2023	Africa	Kenya	Engagement
Website content	Swansea Community Energy & Enterprise Scheme	Swansea Community Energy & Enterprise Scheme	2023	Europe	United Kingdon	Ownership models (incl. governance and inclusivity)
Media article	How RE can help uplift small, poor South African towns. https://www.dailymaverick.co.za/article/2023-05-29-how-renewable-energy-can-help-uplift-small-poor-south-african-towns/	Boitumelo Malope	2023	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Academic article	An assessment of community RE as one of the options for transition to low-carbon energy in South Africa (Gauteng)	Monare, K.S.	2020	Africa	South Africa	Multiple

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Academic article	Does the South African RE programme exclude Black woman-owned businesses?	Stuurman, F.N.	2018	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Academic article	An analysis of collective ownership models to promote RE development and climate justice in South Africa	Bode, C.C.	2013	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Guide	Applying monitoring & evaluation in the IPP sector: Themes and Recommendations	USAID INSPIRE	2022	Africa	South Africa	Engagement
Guide	The Case for Community Trusts	Synergy Global	2020	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Academic article	Learning from the literature on community development for the implementation of community renewables in South Africa	Wlokas, H.L., Westoby, P., and Soal, S.	2017	Africa	South Africa	Multiple
Case study	The Role of Ownership in a Just Energy Transition	Overy, N. (Project 90 by 2030)	2018	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Case study	Scaling the just transition for community-based and community-placed projects	Mthembi, F. (Knowledge Pele)	2021	Africa	South Africa	Multiple
Guide	Respecting the human rights of communities: A business guide for commercial wind and solar project deployment	Columbia Center on Sustainable Investment (CCSI)	2022	Africa	South Africa	Multiple

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Guide	M&E in the context of REIPPP's community investments: Frequently Asked Questions	USAID INSPIRE	2022	Africa	South Africa	Engagement
Guide	Community engagement and benefit sharing in RE development: A guide for RE developers	Victoria State Government, Australia	2021	Oceania	South Africa	Engagement
Topic report	Energy Transition Skills Project: Report	Student Energy	2022	Multiple	South Africa	Skills development
Case study	A feasibility study exploring energy access through community-led, socially-owned RE development in South Africa	groundWork	2022	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Academic article	Quantifying the local economic supply chain impacts of RE investment in Kenya	Jared, Woollacott/Henry, Candise et al.	2022	Africa	Kenya	Residual benefits of RE investment to communities
Case study	Socially owned RE models. Report for the Presidential Climate Commission	Cherry, J.et al.	2023	Multiple	Germany, Spain, Italy, South Africa	Ownership models (incl. governance and inclusivity)
Media article	Microgrid roll-out gaining traction. https://www.engineeringnews.co.za/article/microgrid-roll-out-gaining-traction-2023-08-25	Engineering News (South Africa)	2023	Africa	South Africa	Energy Access
Media article	Massive bottom-up response to the power crisis sees a spike in private energy generation. https://www.dailymaverick.co.za/article/2023-08-22-massive-bottom-up-response-to-the-power-crisis-sees-spike-in-private-energy-generation/	Mark Swilling	2023	Africa	South Africa	Ownership models (incl. governance and inclusivity)

Type	Title	Author(s)	Year	Region	Country	The main topic considered
Media article	Shack dwellers look to RE to power informal settlements. https://www.groundup.org.za/article/social-movements-and-ngos-spearhead-community-owned-renewable-energy-projects/	Lucas Nowicki (GroundUP)	2023	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Website content	"Point and Sandwick Trust website http://www.pointandsandwick.co.uk/"	Point and Sandwick Trust	2023			Ownership models (incl. governance and inclusivity)
Annual report	Sibona Ilanga Trust annual update 2023	Sibona Ilanga Trust	2023	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Annual report	Letsatsi Borutho Trust annual update 2023	Letsatsi Borutho Trust	2023	Africa	South Africa	Ownership models (incl. governance and inclusivity)
Annual report	Amandla Omoya Trust Annual Update 2023	Amandla Omoya Trust	2023	Africa	South Africa	Ownership models (incl. governance and inclusivity)

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