# Power by All:

## Alternatives to a privately owned future for renewable energy in South Africa

GSI REPORT

IISD International Institute for Sustainable Development

Global Subsidies Initiative

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# Executive Summary

South Africa's electricity sector is dominated by the state-owned utility Eskom. In recent years, private sector actors have invested in renewable energy through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has steadily increased the share of renewables.

Despite this progress, the transition to renewables is not happening at an adequate pace to meet South Africa's commitments toward the 1.5°C target under the Paris Agreement. Nor is it fast enough to offset the energy deficit that will result from the planned decommissioning of coal power plants, as outlined in the country's Integrated Resource Plan 2019. Renewable energy additionally faces substantial opposition due to political interests that support other energy sources and public and institutional resistance to privatization.

In response to these challenges, the goal of this report is twofold: first, to explore new models for renewable energy development that create a greater role for public and community ownership, and second, to consider the implications these business models have for increasing renewable energy deployment in South Africa.

We analyze four international case studies of publicly and community-owned renewable energy projects to inform the debate in South Africa. The case studies include municipal ownership in Germany, state-owned enterprise (SOE) transition in Denmark, public–private partnerships (PPPs) in Morocco, and cooperatives in the United Kingdom. These ownership models have all been developed in an effort to balance the need for investment in renewable energy with the other economic and social needs of the community.

**Table ES1.** Summary of publicly and community-owned renewable energy under various business models and the implications for South Africa

| Business model | Scalability | Centralized vs. decentralized | Political feasibility | Financing the model |
|---|---|---|---|---|
| **Municipal ownership** | Legislative and infrastructural know-how to scale renewable energy.<br>Existing customer base to sell power to. | Well suited to developing both small- and medium-scale decentralized projects as well as large-scale centralized projects. | Already existing appetite for this model in South Africa following amendments to the Electricity Regulations on New Generation Capacity, 2011 in terms of the Electricity Generation Act, 2006. | Subject to certain conditions, municipalities are able to access credit through bonds and loans at competitive rates.<br>There remain questions around what proportion of South Africa's municipalities are in a position to either provide their own equity or borrow in order to develop renewable energy projects. |
| **SOE transition** | Great potential to realize a fundamental shift in the electricity sector on a national scale, as Eskom is currently the most significant actor in the sector in South Africa. | Well suited to developing large-scale, centralized renewable energy projects. | Current minister of the Department of Mineral Resources and Energy's interest in pursuing nuclear, oil, and gas poses challenges to the political feasibility of SOEs transforming to largely renewable energy. | SOEs in good financial shape can use their own equity or borrow against their balance sheet to finance renewables.<br>As Eskom is currently saddled with debt problems, it is unclear how the SOE could finance the large-scale deployment of renewable energy without some sort of reform and/or financial restructuring. |

| Business model | Scalability | Centralized vs. decentralized | Political feasibility | Financing the model |
|---|---|---|---|---|
| **PPPs** | PPPs tend to be associated with large-scale projects, as is currently the case in South Africa through the REIPPPP. | Well suited to developing large-scale, centralized renewable energy projects. | There is significant opposition to increased private sector investment in renewable energy in South Africa from trade unions and political parties. | Financed through a variety of different stakeholders, such as public finance, commercial banks, international finance institutions, and renewable energy developers.<br>A lack of experience may slow access to finance. |
| **Cooperatives** | Limited in scalability due to the organizing nature and small private investment. | Excellent decentralized model that provides opportunities for citizen action through energy procurement.<br>Also promotes social entrepreneurship among communities. | Community ownership already exists to a limited extent in REIPPPP. | Largely financed by raising capital from private individuals (member funded).<br>It is not clear how much of this kind of funding could realistically be mobilized in South Africa. |

## Key Findings

Given South Africa's dual need to accelerate the decarbonization of the energy sector and retain a level of public ownership of the sector, all four alternate ownership models have a role to play.

- Municipal ownership of renewable energy allows public entities at the subnational level to tap into existing customers and to generate and procure renewable energy projects.
- Large-scale, fundamental transformation of the electricity sector cannot take place without the reform of Eskom: reform that must include remaking the utility as a green utility.
- PPPs can offer scale and are perhaps the most easily replicable model, as the current REIPPPP has some elements of this model. However, PPPs can be complicated to

implement and finance. To satisfy most critics in South Africa, the role of the public sector would need to be expanded.

- Cooperatives, although limited in their scalability, could be an important model in South Africa, as they provide opportunities for communities to exercise "active citizenry and democracy"—a crucial factor in light of the opposition to privately owned renewable energy.

## Recommended Next Steps

All of these ownership models are worth pursuing and adapting to meet the unique needs of South Africa's energy sector. Further steps are needed to assess the feasibility of each model in the South African context.

- First, a policy and regulatory gap analysis is needed to see what policies and regulations are missing in South Africa. This should be done against the policies and regulations that have enabled the rollout of each ownership model in our case studies. Initial findings show that, for all models, some form of electricity sector reform and reform of Eskom is required to ensure each ownership model can supply and/or procure its own power.
- Second, a deeper investigation into the political feasibility of each model is needed. Key stakeholders, including government, unions, communities, etc., should be interviewed to determine the extent to which each model satisfies the desire for non-private ownership.
- Finally, questions remain around the extent to which the domestic and international financial sectors will be willing to provide finance for each of these business models, and what form of government support (policy, public finance, etc.) is necessary to help mobilize the necessary finance. A next step is to perform a deep-dive assessment of the roadblocks to financing renewables projects for each model and suggest potential solutions.

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# Abbreviations and Acronyms

| | |
|---|---|
| **AfDB** | African Development Bank Group |
| **CHP** | combined heat and power generation |
| **CPRE** | Campaign to Protect Rural England |
| **CSP** | concentrated solar power |
| **DMRE** | Department of Mineral Resources and Energy |
| **DONG** | Danish Oil and Natural Gas |
| **EEG** | Renewable Energy Law (Germany) |
| **FCA** | Financial Conduct Authority |
| **FIT** | feed-in tariff |
| **IPP** | independent power producer |
| **IRP** | Integrated Resource Plan |
| **ISMO** | independent system and market operator |
| **MASEN** | Moroccan Agency for Sustainable Energy |
| **MSP** | Moroccan Solar Plan |
| **NERSA** | National Energy Regulator of South Africa |
| **NES** | National Energy Strategy of Morocco |
| **PPA** | power purchase agreement |
| **PPP** | public–private partnership |
| **REFIT** | Renewable Energy Feed-In-Tariff |
| **REIPPPP** | Renewable Energy Independent Power Producer Procurement Programme |
| **SOE** | state-owned enterprise |

# 1.0 Introduction

The energy sector in South Africa is currently dominated by coal, with coal-fired power plants generating over 90% of the country's electricity. In recent years, however, there have been significant efforts to diversify the country's energy mix, most notably through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) and the implementation of the 2019 Integrated Resource Plan (IRP).

Through the REIPPPP, renewable energy deployment in South Africa has predominantly followed a private sector business model whereby independent power producers (IPPs) have sold power to state-owned utility Eskom at predetermined rates. This approach has led to the development of a relatively mature renewable energy industry that can deliver additional capacity at prices that are lower than fossil-based alternatives.

With this context in mind, this report addresses the two major outstanding challenges for the energy sector in South Africa. First, the switch to renewables is not happening at an adequate pace to meet South Africa's commitments toward the 1.5°C target under the Paris Agreement. Nor is it fast enough to offset the energy deficit that will result from the planned decommissioning of 24,100 MW of coal power plants. Second, renewable energy faces substantial opposition due to political interests that support other energy sources (most notably nuclear, gas, and new coal) and public and institutional resistance to privatization.

To overcome these barriers, this report explores new models for renewable energy development that both create a greater role for public and community ownership and emphasize social benefits over lowest cost procurement. A model like this has the potential to increase renewable energy deployment and help meet the 1.5°C target.

To this end, the objectives of this report are to:

- Identify and investigate international case studies that present alternative business models for publicly and community-owned renewable energy.
- Consider the implications of these business models for increasing renewable energy deployment in South Africa.

# 2.0 Approach

In this study, we analyze four international case studies of publicly and community-owned renewable energy projects to inform debate in South Africa. The case studies include municipal ownership in Germany, state-owned enterprise (SOE) transition in Denmark, public–private partnerships (PPPs) in Morocco, and cooperatives in the United Kingdom. These ownership models have all been developed in an effort to balance the need for investment in renewable energy with the community's other economic and social needs. A key factor in each of the case studies was the enabling policy and regulatory environment. This is a key consideration in taking lessons from the cases for South Africa—given the vastly different policy and regulatory environment, it is not possible to merely "copy and paste" the business models in order to increase renewable energy deployment. Rather, there is a need to learn from the business models themselves as well as from any reforms that were made to policy and regulation. The policy and regulatory environment can be a key driver for the deployment of these models in Germany, Denmark, Morocco, and the United Kingdom.

The case studies were designed to provide a range of business models of public and community ownership that have been deployed in other countries. They were selected based upon a range of criteria, including a) a model that contains either public or community ownership elements, b) a model for which there has been significant international experience, c) an example for which a strong body of literature exists to enable a comprehensive case study, and d) that the model is broadly relevant to the South African context. However, case study selection does not imply that the models chosen could or should be deployed in South Africa as described in the case study. The aim here is to provoke discussion about the merits of these approaches and place the models in context for subsequent consideration of their feasibility and adaption to the South African political context.

Section 3 provides an overview of the current status of energy policy in South Africa inasmuch as it is relevant to the current energy mix and political dynamics in the sector. In this section, several key questions will be addressed to frame the issue:

- What policy interventions have been, and continue to be, used to promote renewable energy?
- Who owns the generation capacity today?
- To what extent do business models for public or community ownership of renewable energy already exist?

Section 4 presents a series of international case studies of public and community business models of ownership of renewable energy generation. The analysis of the case studies builds upon elements of the concept of the "window of opportunity" for energy sector reform as outlined in Harris et al. (2015). We show how each case has developed by investigating its general context, its champions, key issues and concerns encountered, financing elements, and key impacts. We performed a comprehensive review of the literature and held semi-structured interviews with relevant stakeholders from the case studies presented in Section 4. Interviewees were selected to get a range of views from non-governmental organizations, labour organizations, government, and private sector organizations. As a consequence of the small sample of interviewees, the stakeholder's experiences from the case studies are considered anecdotal. Section 5 considers the implications these business models have for increasing renewable energy deployment in South Africa, and we conclude in Section 6.

# 3.0 Context

## 3.1 Policy and Challenges for Renewable Energy Deployment in South Africa

In 2003, the *White Paper on Renewable Energy* established the Department of Mineral Resources and Energy's (DMRE) focus on "an energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout South Africa, thus contributing to sustainable development and environmental conservation" (DMRE, 2019, p. 1; WWF-SA, 2014). The White Paper set out a target of 10,000 GWh of renewable energy contributed to the energy mix by 2013, approximately 4% of the projected energy demand for that year.

In 2009, taking direction from the *White Paper on Renewable Energy,* the Renewable Energy Feed-In-Tariff (REFIT) program—the first substantial renewable energy program in South Africa—was announced (WWF-SA, 2014). A year after this announcement, several hundred environmental impact assessments for renewable energy projects had been initiated, public consultations were conducted, and decision papers drafted, but no power purchase agreements (PPAs) were signed, and there was a lack of a clear procurement and implementation process (WWF-SA, 2014).

In August 2011, the REIPPPP replaced the REFIT program, aiming for 3.75 MW of renewable energy capacity from IPPs. The REIPPPP is essentially a competitive tender process whereby prospective IPPs present plans for renewable energy infrastructure development to meet the outlined renewable energy target (Power Futures South Africa, n.d.; WWF-SA, 2014).

More recently, in October 2019, the IRP was published under Minister of Mineral Resources and Energy Gwede Mantashe. The IRP was the first energy planning document under the DRME to require a significant increase in renewable energy in the country's electricity mix (Eberhard et al., 2014). The IRP introduced a carbon emissions cap and target to reach 17.8 GW of wind and solar energy by 2030—an 18.4% share of total electricity in 2030.

Despite the policy supporting the deployment of renewable energy, there have been institutions, albeit privately owned, that have delayed projects and potentially deterred prospective renewable energy investors. In 2016, Eskom refused to sign PPAs with 27 renewable IPPs who had been successful in the fourth bidding window. The delay was argued by some as being due to Eskom's conflict of interest as both the buyer of power generated from renewables and a generator of electricity itself. Moreover, some believed that Eskom could not afford the financial burden of buying power from IPPs (due to its already growing debt burden) and that this move would precipitate a major loss of jobs in the coal sector, as the SOE would buy less coal for its coal-fired power plants due to renewables (Creamer, 2018; Khumalo, 2018; Reuters, 2018). At the time, Eskom further contended that they had reached a surplus operating position, and thus there was no longer a need for additional generation capacity (Creamer, 2018). Finally, it was also believed that the delay was indicative of the

Zuma administration's preference to build additional nuclear power plants at the expense of the REIPPPP (Reuters, 2018).

In 2018, after 2 years of delay, as the then Minister Jeff Radebe was due to sign the PPAs, IPPs were faced with another obstacle: the National Union of Metalworkers of South Africa and Transform RSA. Both parties filed an urgent interdict to stop the rolling out of additional renewable generation, arguing that renewables would significantly increase the cost of electricity and, additionally, that the signing of PPAs would result in the substantial loss of coal sector jobs (Creamer, 2018; Khumalo, 2018; Reuters, 2018). The case was dismissed in March 2018, with PPAs finally being signed on April 4, 2018. Alternative models of ownership may help overcome some of these challenges and increase renewable energy deployment in South Africa.

## 3.2 Electricity Ownership in South Africa

### 3.2.1 State-Owned and Private Ownership in South Africa

Eskom, South Africa's national power utility, dominates electricity generation and transmission. The SOE owns and maintains the national grid and manages all imports and exports of electricity to the Southern African Development Community region. Private ownership of electricity in South Africa accounts for just under 10% of total electricity generation, which is planned to increase to over 30% share by 2030 (DMRE, 2019).

### 3.2.2 Community Ownership in South Africa

As part of the REIPPPP tender process, bidders are assessed against the tariff and socio-economic development components, which are weighted 70:30, respectively (Power Futures South Africa, n.d.). Economic development criteria include socio-economic development, enterprise development, job creation, local content, management control, ownership, and preferential procurement. Table 1 provides an overview of the REIPPPP economic development criteria for the most recently concluded fourth round of bidding.

**Table 1.** Assessment criteria for REIPPPP bidding round four

| Requirement | % Economic development score | Minimum threshold and target |
|---|---|---|
| **Ownership** | 15% | • Shareholding by local community: 2.5% minimum; 5% target<br>• Shareholding by black people and enterprises: 12% minimum; 30% target |
| **Job creation in South Africa** | 25% | • Citizens: 50% minimum; 80% target<br>• Black people: 30% minimum; 50% target<br>• Skilled Black employees: 18% minimum; 30% target<br>• Citizens from local communities: 12% minimum; 20% target |

| Requirement | % Economic development score | Minimum threshold and target |
|---|---|---|
| **Local content** | 25% | 40% of total project cost minimum; 60% target |
| **Enterprise development spend** | 5% | No minimum; 0.6% of revenue target |
| **Socio-economic development spend** | 15% | 1% of total project revenues target minimum; 1.5% target |
| **Management control** | 5% | 40% target of black people in top management |
| **Preferential procurement** | 10% | • Broad-Based Black Economic Empowerment (BBBEE) procurement, 60% target<br>• Qualifying small enterprises and small and medium-sized enterprises procurement, 10% target<br>• Women-owned vendor procurement, 5% target |

Sources: Eberhard & Naude, 2016; Power Futures South Africa, n.d.; Wolkas et al., 2012.

A small proponent of the selection criteria for bids is percentage of ownership. At a minimum, prospective projects need to have 2.5% shareholding by the local community with an overall target of 5% (DMRE, 2019; Power Futures South Africa, n.d.). All operational projects to date have structured community ownership through the creation of community trusts. Across all the bidding windows, shareholding in local communities of renewable energy projects has surpassed the 5% target, with an average of 9% shareholding by black people in local communities (DMRE, 2018).

One of the benefits of shareholding by the local community is that it provides communities with a relatively small income during the first half of the project lifetime (which is usually 20 years); the bulk of the income is received during the second half of the project (DMRE, 2018; Wolkas et al., 2012).

Some renewable energy experts have argued that policy could do more to deliver benefits for communities. For example, the World Wind Energy Association moved beyond the simple notion of socio-economic benefits of renewable energy projects as outlined in the REIPPPP bidding process, coining the term "community power" (Wolkas et al., 2017). This idea posits that renewables can only be considered as being "for the community" if they meet at least two of the following three criteria:

1. "Local stakeholders own the majority or all of a project: A local individual or a group of local stakeholders, whether they are farmers, cooperatives, IPPs, financial institutions, municipalities, and schools, own, immediately or eventually, the majority or all of a project,

2. Voting control rests with the community-based organization: The community-based organisation made up of local stakeholders has the majority of the voting rights concerning the decisions taken on the project,
3. The majority of social and economic benefits are distributed locally: the major part or all of the social and economic benefits are returned to the local community." (Wolkas et al., 2017, p. 37)

Despite the REIPPPP's efforts to include mandatory minimum socio-economic inclusion mechanisms, none of the currently operational renewable energy projects in the country can be considered "community power" projects. However, given the scale of the projects in South Africa and the requirements to take part in the bidding rounds, meeting any or all of these criteria in this context would be extremely challenging.

### 3.2.3 Municipal Ownership in South Africa

On a local level, there are a few small-scale municipally owned renewable energy plants, notably the City of Cape Town's Steenbras hydro plant. There is an absence, however, of larger-scale projects, which has prompted municipalities to take legal action to be able to generate or procure their own renewable energy. The City of Cape Town, in particular, has been in court since 2017 in efforts to be allowed the autonomy to procure cleaner energy directly from IPPs (IOL, 2019). Pre-2020, municipalities were required to obtain approval to deviate from the IRP when licensing own-use generation facilities, as well as a Section 34 determination[1] setting out the power to be procured from IPPs. However, despite the policy providing avenues for municipalities to procure their own power, the DMRE failed to respond to requests for ministerial determinations, which the National Energy Regulator of South Africa (NERSA) requires for licensing the IPPs. This is despite the fact that the country has been plagued with severe load shedding and, furthermore, is currently not on track to decrease its reliance on fossil fuels in line with several climate change agreements.

A sign of change came in February 2020, with President Cyril Ramaphosa's State of the Nation address, where he announced that "we will also put in place measures to enable municipalities in good financial standing to procure their own power from IPPs" (Ramaphosa, 2020). This determination was originally published in February and required approval from NERSA prior to being finalized. On October 16, Minister Mantashe gazetted amendments to the Electricity Regulations on New Generation Capacity, 2011 in terms of the Electricity Generation Act, 2006, which will allow municipalities, subject to certain conditions, to apply to the minister for approval to establish new generation capacity through either internal mechanisms or external mechanisms such as IPPs (Brandt, 2020). The key question going forward will be whether these amended regulations do establish an easy path for municipal procurement from IPPs.

[1] DMRE needs to grant a Section 34 in order for NERSA to license the new generation facility.

# 4.0 Case Studies of International Models of Publicly and Community-Owned Renewables

## 4.1 Introduction to the Case Studies

This section presents a number of international case studies of publicly and community-owned renewable energy projects. The case studies have been selected to provide a summary of different models that can inform debate in South Africa, namely:

- Municipal ownership in Germany
- SOE transition in Denmark
- PPPs in Morocco
- Cooperatives in the United Kingdom.

These ownership models have all been developed in an effort to balance the need for investment in renewable energy with other economic and social needs of the community. The case studies are based upon elements of the concept of the "window of opportunity" for energy sector reform as outlined in Harris et al. (2015). This framework is designed to evaluate how transitions happen by focusing on the context, champions, concerns, and impacts. This approach allows us not only to discuss what has happened in these case studies but to start to understand why it has happened. The "why" is particularly important in a context where we are seeking to find models that could be replicated in South Africa. To create case studies, the researchers used a combination of literature review and semi-structured interviews.

## 4.2 Municipal Ownership in Germany

### 4.2.1 Context

Municipal utilities in Germany date back to the middle of the 19th century. Since then, they have evolved into local providers of a range of public goods, such as electricity, water, gas, basic infrastructure (e.g., transmission grids, sewage systems, public pools), and services (e.g., public transportation, garbage disposal, snow removal) (Hockenos, 2013).

Municipal utilities vary widely in terms of their size, ownership structure, and priorities. Out of 1,400 municipal utilities in Germany, approximately 900 are active in the electricity market (Hockenos, 2013). As might be expected, municipal utilities of major cities are far larger in terms of sales and employment (the municipal utility of Munich had a turnover of EUR 6.3 billion in 2013) (Schlandt, 2015).

For most of the 20th century, municipal utilities had a monopoly over a specific geographical area. In 1998, the electricity sector was liberalized, which allowed new suppliers to provide electricity using the same grid and consumers to freely choose their electricity supplier (Agora Energiewende, 2019). Liberalization initially led to mergers between large utilities, and some municipal utilities were partially or fully privatized. However, there has been a trend toward a "recommunalization" of electricity provision as electricity concession contracts ended (TNI, 2020). This has given municipalities the opportunity to grant the right of way to other energy suppliers, take the network operation completely into their own hands (own operation), or grant their own companies (municipal utility) the right of way. According to research carried out by the Wuppertal Institute for Climate, Environment and Energy, 72 new municipal and community services were created between 2005 and 2013 (Berlo & Wagner, 2013).

In most areas, the municipal utility retained (or regained) the status as "default provider," which supplies most household customers within a certain area and must, in principle, supply every customer at least the basic supply tariff (EHA, 2020). According to a joint monitoring report by Germany's Federal Network Agency and Federal Cartel Office, the local municipal utilities supplied 69% of all households in 2018 (Federal Network Agency, 2020). Furthermore, municipal utilities are also able to sell electricity nationwide as a result of the liberalization, allowing them to attract new customers in other parts of the country.

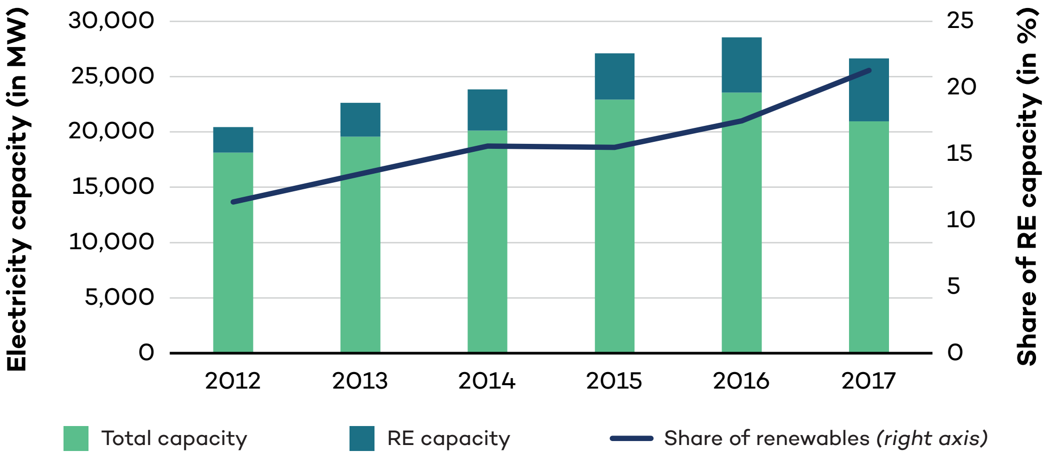
Traditionally, municipal utilities used to procure electricity mainly from large generators for their customers. Increasingly, municipal utilities have also been generating electricity themselves. According to data from the German Association of Local Utilities (2013, 2018), they had a total installed capacity of 26.6 GW in 2017, an increase of about 30% compared to 2012.

In addition, municipal utilities have tended to invest in combined heat and power generation (CHP) and renewable energy. As a consequence, the data provided by the VKU[2] shows that the installed renewable capacity increased by 143% to 5.6 GW between 2012 and 2017, and the share of renewables in their installed capacity went up from 8.7% in 2011 to 21.3% in 2017. In contrast, the total installed capacity in Germany increased only by 21% from 178 GW in 2012 to 216 GW in 2017 and the total installed renewable capacity only by 47% from 76 GW in 2012 to 112 GW in 2017 (BDEW, 2018).

While municipal utilities were only responsible for 12% of the total electricity generation in 2017, and respectively 5% of renewable electricity generation, these numbers show that the growth of their total and renewable generation is more dynamic and gradually increasing.

[2] VKU (*verband kommunaler unternehemen*, in German) refers to an "association of municipal companies."

**Figure 1.** Municipal utilities' renewable energy generation




Source: Data by German Association of Local Utilities, 2013, 2018.

Over the years, the German government has set ever-stricter targets for electricity generation from renewable sources. For instance, the latest reform of the renewable energy law (EEG) set the target to increase the share of electricity generated from renewable energies in gross electricity consumption to 65% in 2030. It stated that all electricity generated and consumed in Germany before 2050 will be greenhouse gas-neutral (Federal Law Gazette, 2000). To implement the targets, the first EEG introduced a feed-in tariff (FIT) scheme that was relatively generous and that guaranteed returns for 20 years (Federal Law Gazette, 2000). This was particularly important for municipal utilities, whose investments require high-security standards. Even though subsequent reforms of the EEG reduced FIT rates, introduced feed-in premiums, and introduced an auction model, a positive business case for municipal-owned utilities to invest in renewable energy generation still remains.

## 4.2.2 Champions

The management teams of municipalities have a very significant role to play in driving the deployment of renewable energy in municipal utilities. For example, the former general manager of the municipal utility of Schwäbisch Hall, a town in southern Germany, understood the opportunities of renewable energy due to the EEG early on and made his municipal utility invest heavily in this area. As a result, Stadtwerke Schwäbisch Hall has, since 2018, been generating as much electricity from renewable energy as they sell to their customers. The former general manager of this utility was awarded the title of Germany's Energy Manager of the Year in 2012 in recognition of his role in driving the change (Stegmaier, 2012; Würth, 2019).

Consumers also play a role in demanding renewable energy. Since 2017, direct local marketing of green power to consumers has helped allow consumers to express a preference to utilities (Deutsche Gesellschaft für Internationale Zusammenarbeit [GIZ], 2017). Green tariffs have been used to fund investment in renewable generation. For instance, customers of the municipal utility of Heidelberg who selected a renewable energy tariff can add the option to support the regional expansion of photovoltaic systems by paying an extra surcharge of 4 cents per kWh purchased (in addition to the costs of their renewable electricity tariff) (Stadtwerke Heidelberg, n.d.).

In addition to their role as consumers, democratic processes allow the public to indirectly influence municipal utilities to take bolder action on climate change and increase investments in renewable energy assets (German Environment Aid, 2012). Members of local governments or city councils are often represented in the supervisory board—with mayors regularly acting as their heads—and hence can bring the political objectives for restructuring the energy supply into the municipal utility's decision-making processes. Moreover, political decisions to scale up renewable energies locally can have a decisive influence on the course of municipal utilities. Given the widespread public support of renewables and implications for potential re-elections, many elected representatives have an interest in presenting themselves as a driver of decarbonizing the municipality and, as part of these efforts, pushing its municipal utility to become a leader in renewable energy.

One such example is the City of Munich. In 2009, a majority of the city council effectively demanded that Munich's municipal utility had to feed as much electricity from renewable energy into the grid by 2015 as consumed by all private households (Die Grünen – Rosa Liste, 2009). In addition, Munich's municipal utility must produce as much renewable electricity as both private households and the city's commercial sector consume by 2025. The municipal utility is well on track to achieving this goal: combining the capacity of its existing plants with proposed new plants, the city was able to power its private households, underground trains and trams, and all electric cars with municipal-owned renewable energy by 2019 (Stadtwerke München, 2019).

### 4.2.3 Key Issues

Municipal utilities are often small organizations with only a limited number of employees in an increasingly bureaucratic operational environment. They are often restricted in the level of risk they can accept and the kinds of business models they can adopt. These restrictions can be a barrier to innovation. A study on large municipal utilities in Germany and Switzerland concluded that even larger municipal utilities tended to be only "intelligent followers" rather than innovators. However, they have been described as "engineers of the energy transition" who translate politically defined goals into local, city-specific technological solutions (Mühlemeier, 2018, p. 294).

In particular, limited space is a barrier to increasing renewable energies because there is not much free land available, especially in densely populated cities. In contrast, solar installations on roof areas, including residential buildings, are a key opportunity for establishing "landlord-to-tenant electricity supply," whereby electricity from rooftop solar installations is sold to residents, particularly tenants, living in the building. Due to costs for billing, sales, and metering, landlord-to-tenant electricity supply has generally not been worthwhile for landlords. However, since 2017, a range of incentives—including reductions in electricity grid fees, grid-side allocations, electricity tax and concession fees, and capital grants—have attempted to promote the practice (Federal Ministry of Economic Affairs and Energy, 2020). Yet, the landlord-to-tenant electricity supply projects only amounted to an installed capacity of around 14 MW by July 2019, which is far lower than the 500 MW cap of this subsidy

(ASEW, 2019). Municipal utilities continue to advocate for additional support in this area, as this shortfall has been attributed to a tenant electricity surcharge that is too low to provide significant investment incentives, as well as regulatory difficulties in developing complex small-scale projects (Wiedemann, 2020).

### 4.2.4 Finance

Investments by municipal utilities in renewable energies have benefited from access to appropriately sized and structured finance offered through low-interest financing programs provided by Germany's state-owned development bank (KfW). Such programs are either particularly targeted toward certain types of organizations, which can include municipal utilities (e.g., municipal utilities, social enterprises, or small–medium enterprises), or more generally support any type of organization that wants to invest in renewable energies (BDEW & KfW, 2020).

Smaller municipal utilities often lack the financial resources to fund large renewable energy projects and can lose out to financially stronger private competitors in the auctions that are required by German law for renewable electricity projects of a certain size. This can prevent municipal utilities from participating in larger projects. To overcome this, some municipal utilities have entered into joint ventures with other municipal utilities to take on larger projects. One such example is Trianel, which was established in 1999 to pool the interests of municipal utilities (more than 50 municipal utilities are involved as shareholders to date) and boost their independence and competitiveness in the liberalized energy market (Trianel GmbH, n.d.). Trianel has brought forward some remarkable renewable energy projects, including an offshore wind farm in the North Sea with 40 wind turbines and a total capacity of 200 MW that went into operation in 2015 as the first purely municipal offshore wind farm in Europe (Trianel, 2016).

### 4.2.5 Impacts

Municipal utilities have established close relationships with power consumers in the region and therefore have excellent knowledge of the local conditions and competence for local solutions (Berlo & Wagner, 2013). Because municipal renewable energy investments tend to be smaller and thus decentralized in nature compared to the large conventional power stations run on fossil fuels or nuclear power, municipal utilities are well equipped to help promote their further expansion.

Due to the relatively generous and long-term returns from investments in renewable energy, municipal utilities are able to extensively contribute to the creation of regional value. Firstly, municipal utilities are often fully owned by the municipality and are hence distributing large parts of their annual profits to this shareholder. As such, they support public finances and contribute to a sustainable budget for the local municipality. According to a study of 89 municipal utilities, roughly 60% transferred profits to their municipalities, which make up 80% of the payments on average (The Public Governance Institute, 2013). However, these profit transfers may limit the investment scope of many municipal utilities, as they result in smaller equity capital that can be used for future investments.

The increased investments of municipal utilities and other project developers have had a large impact on the German electricity market. All over the country, municipal utilities are contributing to the establishment of a decentralized energy system, where energy generation facilities are closer to the sites of energy consumption. This ultimately reduces transmission and distribution inefficiencies and related economic and environmental costs. Consequently, the four largest electricity generators (RWE, Eon, EnBw, Vattenfall), which were still responsible for more than 80% of electricity generation in the early 2000s, continuously lost market share over the years, with their share dropping below 50% by 2016 (Renewable Energies Agency, 2018). Despite the loss in dominance, there has been some active opposition to the rise of municipal utilities and their investments in renewables. A report commissioned by RWE in 2010 concluded that re-municipalization or decentralization worsens the economic efficiency of power generation and grid operation and that, under an optimal corporate landscape, large and privately owned companies would be responsible for all levels of the value chain (generation, transportation/distribution, sales) (Growitsch et al., 2010). These big four companies, however, have also heavily invested in renewable energy since 2010 as a reaction to pressure from third parties, such as households and energy cooperatives but also new private companies and municipal utilities (Enerquire, 2017).

### 4.2.6 Key Findings

In addition to incentive schemes that gave developers and investors long-term revenue certainty (i.e., the FIT scheme that was later replaced by the PPA awarding auction scheme), municipalities were also able to access appropriately sized, below-market-rate debt provided by the state investment bank, KfW. As incentive schemes, like auctions, have shifted to favour gradually larger renewable energy projects, smaller municipalities were able to form joint ventures with other actors in order to source the large upfront capital required for larger-scale projects. While municipal utilities are also well suited to developing small (household) and commercial-scale renewables, smaller-scale projects can be complex, and regulatory and financial barriers remain.

Municipal renewable development has been championed on several fronts: democratic processes allow supportive civilians to indirectly influence municipal utilities to take more action on climate change, customers can selectively move to "green" tariffs that support clean energy development, city councils can set ambitious clean energy targets, and, importantly, municipal management teams have recognized the opportunities of renewables projects and made themselves key drivers of project development.

Due to the long-term returns on investments, municipal renewable energy projects have contributed to sustainable budgets for local municipalities, which use the revenues to support other public services. Finally, municipal utilities in Germany have shown promise in their ability to contribute to the clean energy transition.

## 4.3 The State-Owned Transition of Ørsted

### 4.3.1 Context

Denmark set up a state-owned energy company 45 years ago for energy security purposes, initially called Dansk Naturgas A/S, and subsequently Danish Oil and Natural Gas (DONG). The company became a regional player in the North Sea before expanding into the European electricity-generating market. Over the past decade, however, it has moved away from fossil fuels to become a giant of green energy under the name Ørsted (Clark, 2017).

Dansk Naturgas A/S's core business was to handle gas contracts and explore and produce oil and gas in the Danish sector of the North Sea (Morris, 2018). When it was renamed DONG in 1973, Denmark's primary energy supply was entirely based on oil, mostly imported from Saudi Arabia. Thus, Denmark was hit hard by the global oil crisis. It was hoped that domestic North Sea oil would decrease Denmark's dependence on imported oil (Rüdiger, 2019, 2014).

Over the decades, DONG merged with several Danish companies; the inclusion of Elsam in 2006 was particularly notable (François & Ricardo, 2008). This gave DONG a number of shares in wind power plants as well as CHP. The total generation capacity was around 2,500 MW of wind power and 2,100 MW of CHP (Thomas, 2007). The mergers also allowed DONG Energy (as it was called subsequently) to begin expanding into electricity generation from coal.

From 2008 onwards, DONG Energy invested massively in offshore wind farms in Denmark and abroad. In 2017, it divested from its oil and gas business to focus on clean energy. To reflect this change, Danish Oil and Natural Gas became Ørsted, named after the Danish physicist who laid the foundation for modern electricity generation (Ørsted, 2018).

### 4.3.2 Champions

Back in 2008, DONG Energy was a profitable and stable conventional energy utility. Around 85% of its power and heat production were produced through coal, and only 15% through renewable energy sources, mostly wind. There were several key factors that supported DONG Energy's decision to place renewables at the forefront.

1. The failed attempt to develop a 1,600 MW coal-fired power plant project, called Lubmin, in Northeast Germany. DONG Energy had made substantial investments and spent around six years trying to develop the project. While it was supported by the German Federal Government, the company experienced strong local opposition against the idea of building a coal-fired power plant on the coastline.
2. The strong focus on the global renewable energy agenda in 2009, not least because of the United Nations climate summit in Copenhagen. This was supported both by the Danish government and by the board of directors at DONG. As a host of the UN climate summit, emissions and pollution resulting from Denmark's electricity generation were in the spotlight.

3. During the 2006 merger that formed DONG Energy, the company inherited and continued investing in renewables, particularly offshore wind. Due to the inherited expertise, economies of scale in offshore sites and technological improvements, DONG Energy believed in the future prospects of the offshore market.
4. This was all underpinned by the government's 2008 goals, which DONG Energy was required to support because the government was a majority shareholder in the company (50.1%). These goals were to:
    a. Achieve fossil fuel independence by 2050
    b. Increase the share of renewable energy to 30% of final energy consumption by 2020 as part of EU 2020 targets
    c. Increase the share of renewable energy in the transport sector to 10% by 2020
    d. Reduce primary energy consumption by 4% less than in 2006, by 2020
    e. Reduce emissions in the non-ETS sectors by 20% by 2020 relative to 2005 as part of EU 2020 targets.

In 2009, DONG Energy's executive management members formulated a transformation strategy called 85/15. The 85/15 split reflected the ambition to conduct a complete turnaround of DONG Energy's energy generation mix: from 85% conventional and 15% renewable to 85% renewable and 15% conventional. The management concluded that, since DONG Energy had spent three decades establishing itself as a conventional energy company, a similar length of time would be appropriate for this transformation (Acher & Ringstrom, 2010). This put DONG Energy on a path that was well aligned with the Danish government's goal of fossil fuel independence by 2050.

### 4.3.3 Key Issues

In Denmark in the early 2000s, renewable energy was not considered a viable alternative for fossil fuel-based electricity generation. DONG's transformation faced some opposition from the Danish government and parliament that was centred on concerns around the loss of jobs. According to interviews, the DONG's transition made sure to "not leave anyone behind." This included, for example, offering extensive retraining for oil and gas workers in offshore wind farms.

There was also internal pressure to keep DONG's operations on a business-as-usual path. The company had spent around 30 years transforming into a traditional fossil fuel company where the core business and growth strategies were focused mainly on fossil fuels. Employees of DONG Energy prided themselves on setting an industry benchmark at running coal-fired power plants. According to interviews, this skepticism during the transition was tackled through in-person meetings and strategy explanations.

### 4.3.4 Finance

Back in 2008, deploying large-scale offshore wind presented a step change in DONG Energy's renewable energy activities. The Walney Offshore Windfarm development was, at that time, the largest proposed offshore wind farm in the world. Initially, typical investors were reluctant to back such a large renewable energy project, particularly within the context of the 2007–2008 global financial crisis. The Walney project was one of the first projects to bring in institutional finance at such an early stage in the development, at the “yet-to-be-built” stage of the project. DONG Energy itself was instrumental in establishing this structure, as it used its newly acquired and developed internal expertise to take on many commercial and technical roles, including those of developer, majority shareholder, construction manager, O&M service provider, off-taker, and lender. Investors were sufficiently convinced that project risk had been allocated to those who could manage it successfully, and the project could go ahead. As a result, the project was able to mobilize finance from non-traditional investors, including pension funds (institutional investors) and private equity funds. This structure, including the role of non-traditional investors, has been a regular occurrence in North Sea offshore wind projects ever since (Hervé-Mignucci, 2012a).

### 4.3.5 Impacts

After a long period of consultation and clear communication about the transformation strategy, internal skepticism receded. In 2012, the company’s portfolio of assets and activities had high exposure to gas and gas-fired power plants. As gas prices dropped in the United States, large amounts of surplus American coal were exported to Europe, where it replaced gas as the preferred fuel for power generation. As Ørsted had already started divesting from coal, the financial burden on the company from the market shift from gas to coal helped skeptics accept the new focus on offshore wind and the moves to divest its fossil fuel businesses.

The company had started implementing the new strategy by establishing a wind power business unit. In 2006 only 2% of DONG Energy’s 4,500 employees worked in the wind energy department, but by 2018, half of the 6,000 employees working at Ørsted were employed within business units focusing on wind, such as offshore and onshore wind (Ørsted, 2018).

By 2019, Ørsted had surpassed its target when its share of renewable generation hit 86%, and it became the world’s largest offshore wind generator (McKinsey & Company, 2020). With plans to completely divest from coal by 2023 and make its power generation carbon neutral by 2025, it aims to become a global renewable energy player (McKinsey & Company, 2020).

### 4.3.6 Key Findings

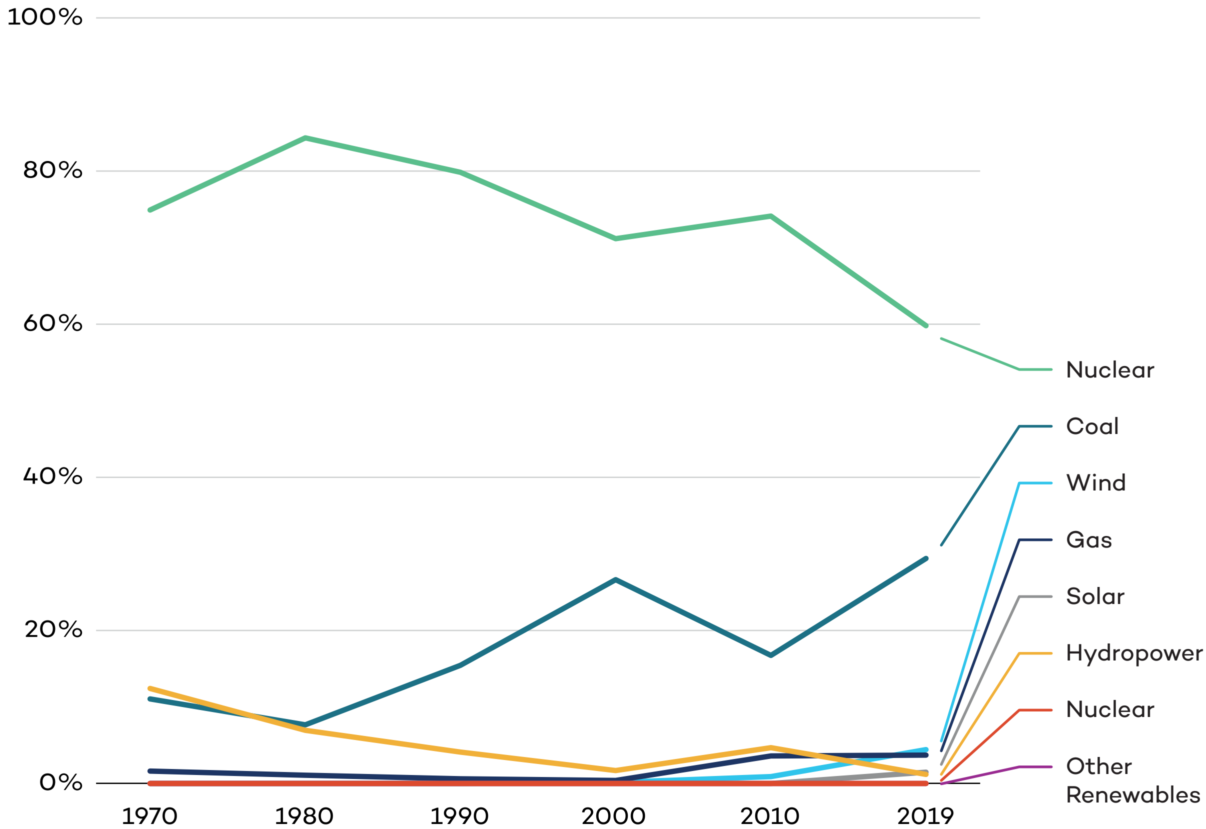
The SOE’s transition was strongly supported by Denmark’s political commitment at the highest level, which included related national energy policy, laws, and regulations. Internal drive and commitment by the SOE’s management team were also key to its transition, along with extensive internal consultations to bring staff on board with the company’s strategy. Developing and acquiring existing renewable projects and in-house expertise helped Ørsted successfully pursue and finance complex technical and large-scale renewable energy projects. Expertise came through mergers and acquisitions of other companies but was also created internally by retraining staff, which equally helped to mitigate job losses. In Ørsted’s case, ensuring financial sustainability and profitability proved a necessary starting point for diversification and transition. It was easier to commit to expanding an existing, performing business unit than to take a step into an unproven area. Ørsted has shown that SOEs have huge potential to contribute to the clean energy transition while also supporting the transition of jobs from the fossil fuel industry to renewables.

## 4.4 PPPs in Morocco

### 4.4.1 Context

Morocco is an energy-deficient country, importing its primary energy demand from its neighbouring countries (Fritzsche et al., 2011; Kousksou et al., 2015a; Rignall, 2016; Vidican, 2015). The country is highly dependent on fossil fuels as an energy source, with oil and coal accounting for 60% and 29% of energy consumption by source in 2019, respectively (BP, 2020). Figure 2 provides a more detailed breakdown of the share of energy consumption by source.

**Figure 2.** Share of energy consumption by source in Morocco




Source: Data from BP, 2020.

As the country is energy deficient, it is extremely vulnerable to changes in international fuel prices, threatening its energy security (International Energy Agency, 2014; Kousksou et al., 2015b; Vidican, 2015). Understanding the future challenges, in 2008, the National Energy Strategy of Morocco (NES) was launched to "develop renewable energy to meet

20% of the country's domestic energy needs and increase the use of energy efficiency to meet 12% by 2020 and 15% by 2030" (International Energy Agency, 2019; Kousksou et al., 2015b, p. 101). To support the renewable energy targets set out in the NES, seven legal reforms were implemented, focusing on such aspects as renewable energy commercialization and exportation, promoting energy efficiency, drafting a law on PPPs, promoting energy conservation, and promulgating the creation of the Moroccan Agency for Solar Energy, which in 2016 became the Moroccan Agency for Sustainable Energy (MASEN) (Kousksou et al., 2015b). "MASEN is a limited liability company, which is publicly owned but governed by private law. It is owned by the Government of Morocco, ONEE, the Hassan II Fund for Economic and Social Development, and the Société d'Investissements Énergétiques" (Global Infrastructure Hub, 2018, p. 6). MASEN demonstrates the Moroccan government's commitment and political will to support solar energy while seeking to minimize potential conflicts of interest that would arise from an outright state-owned entity (Global Infrastructure Hub, 2018).

In 2009, a year after the NES was launched, the government introduced the Moroccan Solar Plan (MSP), an initiative aimed at reducing the country's dependence on imported fossil fuels and to "create a global competitive advantage in renewable energy" (Rignall, 2016, p. 540). The MSP outlined the development of 2,000 MW of solar energy across five regions in Morocco by 2020 (Kousksou et al., 2015a). The first large-scale development to be built under the MSP was the 580 MW Ouarzazate plant, which, after completion, would be the world's largest concentrated solar power (CSP) facility plant (Global Infrastructure Hub, 2018; Rignall, 2016).

At the time of project planning and inception, CSP in Morocco had high capital costs and was commercially immature. The cooperation of multiple stakeholders was thus needed for the project to proceed and ensure commercial viability (Falconer & Frisari 2012a; Global Infrastructure Hub, 2018). The first phase of the Ouarzazate project (hereafter Ouarzazate I) was structured as a PPP that used a tendering process to access finance, fulfill managerial requirements, and seek technological innovation while maintaining oversight of the quality of the project (Falconer & Frisari, 2012a). Typically, a PPP is defined as "a contract between a public sector institution and private party, where the private party performs a function that is usually provided by the public sector and/or uses state property in terms of the PPP agreement. Most of the project risk (technical, financial and operational) is transferred to the private party. The public sector pays for a full set of services, including new infrastructure, maintenance and facilities management, through monthly or annual payments" (South African National Treasury, 2018, p. 153). In a traditional government project, the public sector pays for the capital and operating costs and carries the risks of cost overruns and late delivery" (South African National Treasury, 2018, p. 159). In the case of Ouarzazate I, however, as the public partner (MASEN) is a shareholder of the company (operating the CSP) and a buyer of the service, they are on both the supply and demand sides of the PPP. As such, in Ouarzazate I, the risk is theoretically shifted to MASEN, which grants MASEN active participation and more control in the production of the service (Falconer & Frisari, 2012a).

This PPP was structured on a Build, Own, Operate, Transfer model with ACWA Power consortium, a company based in Saudi Arabia. The PPP is supported through financing from various international finance institutions; concessional finance is provided by the Clean

Technology Fund, a power sales agreement and a PPA. The PPA is a 25-year agreement between MASEN and ACWA Power consortium on a fixed tariff basis (Global Infrastructure Hub, 2018).

### 4.4.2 Champions

The key champion of the Ouarzazate plant was clearly the Moroccan government. The government laid the foundation necessary for an increase in renewable energy deployment by creating the relevant regulatory and legislative framework (notably: NES and MSP). Additionally, the creation of a dedicated entity (MASEN) to realize the goals set out in the MSP was essential and illustrated the government's focus on increasing the share of renewables in Morocco's energy mix. The creation of MASEN and its operational separation from the government (it is governed by private law) further illustrates the government's commitment to ensuring that the MSP is not co-opted by state officials or used as a means to divert funds elsewhere.

### 4.4.3 Key Issues

A major issue that troubled the development of the Ouarzazate plant was land acquisition and insufficient consultation with all affected stakeholders. The site that was selected for the CSP plant was originally owned by the Ait Oukrour Toundout ethnic community. Despite the land being communally owned, due to "bureaucratic legal procedures rooted in colonial dispossession" (Rignall, 2016, p. 550), legally, the sale of the land only had to be negotiated with three collective land representatives from the Ait Oukrour Toundout ethnic community and without any larger consultation or engagement with the community (Hamouchene, 2016; Rignall, 2016). The larger ethnic community was not informed when the site selection process was underway, and, moreover, the terms of the sale had no mandated consultation process with the community. Instead, the three representatives gave their formal approval for the sale in January 2010, with the sale reaching completion in October of the same year.

In late October 2010, King Mohamed VI of Morocco visited the region to officially launch the Ouarzazate CSP project—which was the first time residents of the region were informed about the project. The first public meeting on the CSP project took place in November 2010, but this was widely considered a box-ticking exercise as the land had already been sold and the king had pronounced the commencement of the project. This meeting (which included local officials and non-governmental organizations) merely sought to provide a formal presentation of the environmental impact study of the region without giving local community members an opportunity or channel to comment or ask questions (Hamouchene, 2016; Rignall, 2016).

Aside from the way in which legislation excluded the Ait Oukrour Toundout ethnic community from decision-making regarding the sale of the land, there were also contestations related to the low sale price and the exclusion of the community from the proceeds of the sale (Rignall, 2016). The land for the Ouarzazate CSP project was sold at a rate of MAD 1 per square metre, whereas other collective lands in the Ouarzazate region had been sold for MAD 10–12 per square metre. The low price of the land was based on the fact that, as a desert, the state perceived it to be non-productive, despite the community regarding the land as pasture and holding importance other than its productive value (Hamouchene, 2016). Additionally, the Ait Oukrour Toundout ethnic community was dismayed to learn that the proceeds of the MAD 30-million sale of their land would not be directly shared with them. Instead, the proceeds went to the Ministry of Interior, albeit in a bank account under the community's name, where it would be used to finance future development projects in the Ouarzazate region. On the whole, the community reasoned that "the sale was not a sale at all: it was a transfer of funds from one government agency to another in an expression of the Ministry of Interior's ongoing tutelage over collective lands and the tribes that formally owned them" (Rignall, 2016, p. 550).

### 4.4.4 Financing Ouarzazate I

Ouarzazate I is a prime example of the potential of PPPs to pool financial resources and share risks to build CSP in a context where the technology was not yet commercially viable (Falconer & Frisari, 2012b).

Just over half of the funding for this phase was from international donors, including the African Development Bank, International Bank for Reconstruction and Development and European Investment Bank, and others. The Government of Morocco raised capital almost equal to that of the international finance institutions, with the remaining USD 250 million financed by a private consortium that had a 75% stake in the solar power company (Falconer & Frisari, 2012a). The large number of stakeholders involved in a PPP and the complicated nature of negotiating the partnership contracts to allocate the risks appropriately can be complex, time-consuming, and challenging.

### 4.4.5 Impacts

Ouarzazate I had a few key impacts, which have been noted. First, the project aimed to have 30% of CSP plant costs feature local content (using local community members as staff and local materials) to stimulate the economy within the Ouarzazate region and create jobs (Global Infrastructure Hub, 2018). According to the African Development Bank Group (AfDB) et al. (2015), 2,400 temporary jobs and 250 permanent jobs were created during the construction of Ouarzazate I. Additionally, Ouarzazate I helped to diversify the energy mix in Morocco (toward the goal of 42% renewables by 2020), move the country away from being largely energy deficient, and develop a local renewable energy industry within the country (AfDB, 2015). By developing a CSP plant, the Moroccan government has helped a relatively less proven technology gain a track record in the region. Greater deployment of novel technologies will eventually lower the technology costs, help identify and address novel technology risks, and leverage finance for future CSP plants. Finally, through the reduction of fossil fuel dependence, the entire Ouarzazate CSP project will contribute to a "reduction in CO2 emissions by 762,000 metric tons per year, or 19 million tons over 25 years" (AfDB, 2015, p. 1).

### 4.4.6 Key Findings

PPPs offer a good model for large-scale renewable energy projects, as is evident in the case of the CSP project in Morocco (and the REIPPPP in South Africa). The buy-in of the national government and its willingness to partner with other stakeholders in pursuit of increasing renewable energy deployment is a powerful enabling factor to bring about a shift in a country's energy sector. PPPs are also valuable, as different actors are able to pool their resources to amass the capital needed for projects while sharing the risks. The large number of stakeholders involved can mean projects are complicated and time-consuming to execute; however, collaboration between stakeholders from different sectors enables expertise and skill sharing to strengthen projects. PPPs are not without their challenges, however, as was evident in Morocco with the issue of land acquisition for the CSP project. It is essential that these collaborations are inclusive, particularly of communities who are most often sidelined in the interest of pursuing profits, as seen in the case of Ouarzazate I.

## 4.5 Cooperatives in the United Kingdom

### 4.5.1 Context

This case study explores the emergence of renewable energy generation cooperatives in the United Kingdom. These models have formed a niche of British generation since the 1990s but have never grown to become a substantial part of the generation fleet. Nevertheless, energy cooperatives provide one potential route to broaden ownership of renewable generation assets. As illustrated in Table 2, the benefits of community-owned renewables have included financial benefits to the local community through ownership investments, provision of services such as educational facilities, and cheaper electricity.

**Table 2.** Summary of benefits from renewable energy cooperatives

| Conventional economic benefits | Financial benefits | Contribution to local assets and facilities | Provision of additional services |
|---|---|---|---|
| • Using local resources for construction, such as: contractors, manufacturers<br>• Local business rates and taxes<br>• Rental income or commission to land owners | • Ownership or investment by local community (as profit share or project equity)<br>• Community fund for uses such as promoting energy efficiency<br>• More affordable electricity tariffs<br>• Sponsorship of local facilities and/or events | • Contributions to tourism facilities<br>• Ecological enhancement measures (e.g.: to mitigate for environmental costs of project) | • Educational programs |

Source: Wolkas et al., 2017.

In the late 1990s, Baywind Energy Co-operative (2020) raised funds from the general public to purchase part of a commercial wind farm in Cumbria, marking the first community-owned wind farm in the United Kingdom. By 2020, following Baywind's experience and example, Community Energy England (2020) reported that approximately 265 MW of generation capacity was under community ownership. Community energy is defined as projects that are owned or controlled by a community or not-for-profit bodies and include a high degree of direct citizen participation and control. In the United Kingdom, community energy is a niche. The majority of the sector remains dominated by a small number of large players.

Perhaps the most widely used structure for community energy projects is the cooperative. Cooperative ownership is a compromise between private and public ownership with some of the features of each. The key characteristic of cooperatives is that they are owned by their members, and membership is designed to be inclusive to allow more participation. Cooperatives are generally run with a social mandate as opposed to making the largest possible profit. In practice, this can mean that cooperatives provide discounted membership, pay into community funds, or include greater consultation with local communities in development, construction, and operational phases. On the other hand, cooperatives distribute project returns to their investors and spend surplus returns in accordance with the wishes of their members, not the public at large. Cooperatives have a social mission, so the interests of their members and the wider community may well overlap considerably. To try to reduce barriers to engagement, the cost of joining a cooperative is often relatively small—typically a few hundred pounds (GBP) in the United Kingdom case—but these costs create a barrier to participation.

The publication of the government's Community Energy Strategy in 2014 was a high-water mark for community energy and cooperatives. With a raft of support for community projects and a FIT scheme that provided greater support for small projects, many schemes were developed. More recently, support for smaller projects has been removed as the FIT scheme has been phased out, creating difficulties for small projects and an incentive to develop models that can work at larger scales. As of 2020, the sector is in a state of flux. The loss of guaranteed revenues under the FIT scheme alongside the establishment of considerable numbers of well-organized and resourced organizations keen to develop community projects means there is considerable capacity for scaling up community energy, which could be unleashed if new policy support was forthcoming.

Cooperatives distribute revenues as dividends to members or sometimes as discounts on electricity bills. For members, there are tangible (a regular return and an effective hedge against rising power prices) as well as intangible benefits (a feeling of connection between consumption and the generation asset that they own together with hundreds of others). In practical terms, economies of scale for large projects mean that returns from cooperative-owned, large-scale projects are likely to be superior to small-scale self-generation.

A feature of some but not all cooperatives is to have a geographical link between local residents and cooperative members to create the sense of an opportunity to share in the profits made from a local resource. This is achieved through restrictions on who can buy in to cooperatives or time-limited priority access to local residents. Proponents of cooperative ownership argue that allowing "ordinary" people to buy into renewable projects allows greater participation in the energy system and prevents a small number of private companies from profiting from common resources. Cooperative-owned projects are also more likely to include a greater degree of local subcontracting, meaning more local jobs and economic benefits. Box 1 describes an example of a renewable energy cooperative.

### Box 1. West Solent Solar Cooperative

West Solent Solar Cooperative was formed in 2013. The cooperative is the owner of a 2.4 MWp solar photovoltaic project based on a 5.1-hectare site on a former gravel pit near Lymington in Hampshire in the south of England. The project became operational in July 2014 (West Solent Solar, 2020).

The cooperative was established with support from Energy4All, a cooperative umbrella body that promotes and provides administrative services to community energy projects. Energy4All provides accountancy, share register management, and administration services to the project.

To finance the project, GBP 2.5 million was raised from a public share offer, enabling private citizens from the three neighbouring countries to purchase shares in the project. Following the share issue, the project construction was procured through an Engineering, Procurement and Construction contract. The initial operations and Maintenance Contract was awarded to the principal contractor of the project, Solar Century, a national company. When the contract came up for renewal, it was awarded to Empower Energy, an electrical services company based nearby.

Electricity is sold at a fixed price according to a PPA. After payment of maintenance, security, rent, and administration costs, some of the profits, up to an agreed ceiling designed to provide a reasonable return on investment, are distributed to members as a share interest payment, and an agreed amount is donated to a community fund.

The cooperative is run by a board of directors elected by the members. The board of directors take day-to-day decisions and report to members by way of an annual general meeting. The operations of the cooperative are governed by a set of published rules (West Solent Solar, 2014).

## 4.5.2 Champions

The primary champions of community energy in the United Kingdom were the pioneers who started to develop projects organized around alternative models of ownership. Over the years, these organizations and individuals have campaigned for political recognition and support. Following the Baywind project mentioned above, those involved in the project received numerous approaches from other interested parties asking how it was done. They decided to establish Energy4All to replicate the model and share experiences with other groups that wanted to develop similar models. Energy4All provides advice, a proven model, and administrative services to renewable energy cooperatives. Its presence in the market has reduced the amount of specialist knowledge required to form a renewable energy cooperative (Ethical Consumer, 2019).

Community Energy England estimates that, as of 2020, there are 300 such groups employing 263 full-time equivalent employees. It is also reported that existing organizations linked to energy activism, in particular the anti-nuclear movement, led to efforts to organize around alternatives, including renewable energy (Bauwens et al., 2016).

The government has at various times been both a champion and barrier to energy cooperatives (Bauwens et al., 2016). Government support has grown and then subsequently shrunk. The 2014 Community Energy Strategy set out to embrace the community energy movement. Measures outlined in the strategy include (Department of Energy and Climate Change, 2014):

- GBP 10 million (USD 6.08 million) Urban Community Energy Fund
- GBP 15 million (USD 9.12 million) Rural Community Energy Fund
- GBP 80 million (USD 48.64 million) Green Deal Communities Scheme
- GBP 500,000 (USD 304,000) peer mentoring program for community groups.

The strategy aimed to allow communities and individuals to contribute to the energy transformation, alongside commercial generation, and stated that it should become the norm for communities to be offered some level of ownership by commercial developers. It included modelling that estimated that community energy could make up 2%–14% of the total generation capacity by 2020, up from far less than 1% in 2014.

British politics is noted for its high degree of centralization. Local governments have fewer areas of responsibility and less power to raise their own funds than in many other European countries. Community energy has been driven by organizations and individuals who believe that the oligopoly of the "big six" energy suppliers is unaccountable and not aligned with consumer interests; they seek to demonstrate that another approach is possible. This has taken place against a backdrop of privatization and liberalization (Grubb & Newbery, 2018).

### 4.5.3 Key Issues

The original FIT policy recognized that smaller projects cost more per unit of generation and adjusted tariffs to make all scales of development viable. The eventual phase-out of the FIT was driven by a change in philosophy. Rather than support all forms and scales of renewable energy, the United Kingdom transitioned toward auctions for key technologies, particularly large-scale offshore wind, and the removal of support for small-scale projects, notably solar and wind. As support has been wound down and FITs reduced over time, small-scale projects have struggled. By contrast, large-scale mega projects, such as offshore wind farms, have been awarded "contracts for difference," offtake agreements effectively guaranteeing minimum power prices. Government desire to reduce spending on energy projects has produced a key barrier to the deployment of both privately and community-owned onshore wind and solar projects.

The treatment of cooperatives by the Financial Conduct Authority (FCA)[3] has sometimes raised questions about whether the legislation is well designed for renewable energy cooperatives. For example, in 2014, the FCA reportedly blocked a number of cooperatives from registering as "bona fide" cooperatives because of concerns that members would not participate sufficiently in the operations of these entities. The obvious form of participation, through power sales from cooperatives direct to consumers, was not possible due to

[3] The FCA is the regulatory body that deals with cooperatives under the Cooperative and Community Benefit Societies Act.

permitting issues barring small entities from becoming licensed electricity suppliers (Bauwens et al., 2016). The role of the FCA was subsequently revised to alleviate some of the issues (Department of Energy and Climate Change, 2015).

Opposition to wind farms has led to lengthy planning delays that have made development a costly and lengthy business (Bauwens et al., 2016). The threat of local opposition and high legal costs is likely to have reduced the number of renewable energy projects, including community projects, that have been constructed. On the other hand, community-based initiatives have some claim to being more sensitive to local concerns, so they may be possible in areas that commercial projects would not be.

In the United Kingdom, key opposition comes from national conservation groups, such as the Campaign to Protect Rural England (CPRE), and numerous grass-roots community groups who object to developments in their local area. Principal objections have included noise, visual influence, impacts on house prices, shadow flicker, and wildlife-related concerns (CPRE Oxfordshire, 2020).

The relationship of private renewable energy developers to community energy is complicated. To some extent, support for onshore wind is good for both community projects and private projects, so in this sense, they may well be allies. Where community participation becomes mandatory or expected by host communities, there is a risk that this could make it harder for private projects to proceed. In this case, you could expect opposition.

### 4.5.4 Renewable Energy Cooperatives at Scale

The rise of community energy is, to some extent, a reaction to the liberalization and privatization of the British energy system. The absence of a utility that is operating with a social mandate has led groups of motivated individuals to try to find ways to develop projects that are in tune with the needs of local people and are not exclusively optimized for profitability. Community energy and energy cooperatives can be seen as an attempt to model a kind of energy system that is more sensitive to the needs of the public and consumers.

The overall purpose of energy cooperatives is the subject of some debate. They have proved themselves to be viable players that can demonstrate an alternative to privately owned generation. Many of the cooperatives that have been developed to date have allowed communities living near renewable energy resources and away from population centres to create sustainable businesses that create a reasonable return and provide their members with a sense of ownership of their energy system. However, projects are rarely large scale and are not readily available as an affordable alternative to private power for the majority of people. To get to scale, there are three main routes.

First, community ownership could be supported by policy. The 2015 update to the 2014 Community Energy Strategy included the ambition to back any community group that wanted to develop a project. A raft of funding, fiscal support, and regulatory changes was put in place to support this objective. Second, new technology and business model innovation could make cooperatives become increasingly relevant. For example, businesses models are in pilot stages where cooperative-owned generation assets partnering with retail suppliers are able to offer customers located anywhere in the United Kingdom the ability to easily own small shares of large-scale generation assets that are equivalent to their consumption, effectively offsetting their electricity costs for the life of the project. This could lead to substantial consumer savings and could allow consumers to bypass commercial utilities.

A third approach is to mandate a role for cooperatives in the energy system. This has not been implemented but remains one possible route to scaling up the sector. Such a system could require new projects to make available a portion of their capacity for cooperative ownership.

### 4.5.5 Renewable Energy Cooperative Financing

Investment in renewable energy cooperatives has been enabled by government policy. Government support for community energy has taken several forms. In the early stages of projects, where the highest risk is present, grant funding has been available for feasibility studies to allow projects to get to a stage where they can attract other sources of finance.

Finance for construction of projects generally requires a share issue to project members. Members are required to buy a share of the cooperative in exchange for rights to a share of the profits. In some instances, the investment from members is the sole source of capital. In other cases, projects receive discounted finance from "ethical" banks such as COOP or Triodos and commercial finance from traditional banks.

### 4.5.6 Impacts of Energy Cooperatives

There is much speculation and discussion on the benefits of community-owned energy. The Community Energy Strategy proposed that community energy has energy security and climate change benefits. It could also save money for consumers; bring wider social and economic benefits, including the generation of income for communities; and build confidence and skills (Department of Energy and Climate Change, 2015).

The impacts of community energy projects are diverse, reflecting the decisions taken by the members and the level of engagement with local disadvantaged communities. A report exploring the community impacts of two projects located near Bristol found that there was a risk of community energy projects, with the best of intentions, making decisions that were not in line with the needs and wants of local communities (Lacey-Barnacle, 2020). Specifically, local disadvantaged groups wanted projects to provide routes to skills training and employment in clean energy. This approach has been characterized as creating active participants rather than passive recipients of community energy and the community funds associated with them.

Following proposed cuts to the FITs, in 2015, Community Energy England (2020) produced a report reviewing the impact of community energy in England. The report found that, between 2010 and 2015, 38 energy cooperative respondents had received GBP 7.4 million of FIT revenues. This funding had generated over GBP 50 million in private investment, including:

- GBP 28.6 million in community shares
- GBP 2 million in social and private loans

- GBP 2.8 million in commercial loans
- GBP 16 million in other investment.

In addition, they also generated revenue for the local economy:

- GBP 2.4 million annually from member returns
- GBP 1.9 million annually from ongoing contracts
- GBP 2 million annually from community benefit funds
- GBP 39.1 million from local installation contracts.

The review found that, when local benefits are considered, small community projects create far more benefits in the local community than commercial schemes. However, they struggle to exist without special support in the form of higher power prices than those that are achievable by large-scale commercial projects. This finding shows a key reality in the energy pricing debates. Community energy, with all the local economy and participation benefits it offers, struggles to compete on purely financial terms with large-scale commercial projects. This highlights that community projects will not happen on their own without specific policies designed to favour them.

### 4.5.7 Key Findings

The business model of community energy cooperatives offers members an opportunity to take a more active role in the energy system. Cooperatives have some additional spillover benefits to the wider local community compared to privately financed projects due to their community benefit funds; tendency to favour local contracts, creating local jobs; and returns to members. However, the model tends to rely on continuing government support, as typical projects are smaller and, hence, more expensive compared to average private projects. One limitation on the potential scale of deployment from community projects comes from the need to attract motivated individuals to participate in the projects.

# 5.0 Implications for South Africa

## 5.1 Context Matters

A key factor in each of the case studies was the existence of an enabling policy and regulatory environment. Without appropriate policy and regulatory conditions, the various business models may not have been successful: they may not have been able to precipitate the changes discussed or increase renewable energy deployment.

This is a key consideration when taking lessons from the cases for South Africa. Given the vastly different policy and regulatory environment, it is not possible to merely "copy and paste" the business models in order to increase renewable energy deployment. Rather, there is a **need to learn both from the business models themselves and any reforms that were made to policy and regulation.** The policy and regulatory environment was a key driver for the deployment of these models in Germany, Denmark, Morocco, and the United Kingdom.

In the first instance, the liberalization of the electricity sector (under the 2003 European Directive on electricity) in Germany created a favourable environment for municipal utilities to take control of their electricity supply. Municipal utilities could then choose to grant the rights of way to other energy suppliers, take the network operation completely into its own hands (own operation), or grant its own company (municipal utility) the right of way. The context in South Africa is very different, with the electricity sector still largely monopolized by Eskom, which has limited the extent to which municipalities can control their electricity supply. However, the unbundling of Eskom coupled with amendments to the Electricity Regulations on New Generation Capacity, 2011 in terms of the Electricity Generation Act, 2006 will allow municipalities, subject to certain conditions, to have greater decision-making power in the electricity sector and could very well be a step toward the widespread changes seen in the German case study.

The same 2003 European Directive (2003/54/EC) on electricity that precipitated the liberalization of the energy sector in Germany transformed the electricity sector in Denmark. Under this directive, electricity sector entities—including Denmark's two transmission operators, supply, and distribution—were all unbundled. This market liberalization allowed DONG (which was a wholesaling gas company at that time) to enter the electricity supply and generation market. This move was believed to be due to the company's fear that a sole focus on wholesale gas would increase its vulnerability to marginalization in a liberalized electricity sector (Lockwood, 2015). In the context of South Africa, Eskom's narrow business interest in coal-generated electricity coupled with the unbundling of the entity and a relatively liberalized electricity market could see the SOE expand its investments into a more diversified energy generation mix. This would decrease its vulnerability in the new market and also allow it to take advantage of cheaper and cleaner energy sources.

In Morocco, as in South Africa, the electricity sector was dominated by state-owned operator Office National de l'Electricité et de l'Eau Potable (ONEE), which owns the main retail supplier, most of the distribution network, and all of the transmission network. In the late 1990s, new legislation to allow private investment and the participation of IPPs in the electricity generation sector was introduced. Allowing the participation of private investors helped ONEE to form the Build, Own, Operate, Transfer PPP model used for the capital-intensive Ouarzazate I project.

Finally, a range of regulatory and policy conditions supported the cooperative renewables model in the United Kingdom. Again, projects were made possible against a backdrop of liberalization and private participation (Grubb & Newbery, 2018). In addition, a targeted FIT scheme provided greater support for smaller projects that better suited the cooperative model.

## 5.2 Possible Policy Approaches for South Africa From Case Studies

The case studies present a number of possible approaches, each placing different actors at the heart of the energy transition. This section will explore the extent to which these approaches might be possible and desirable in a South African context.

In Germany, municipalities and municipal utilities have expanded their roles into generation, leading to significant deployment of municipally owned small-scale local projects and large-scale commercial generation. In South Africa, some municipalities already play a role in the electricity business, with 165 municipalities having electricity distribution licences. **Could the expansion of municipal-owned generation lead to significant renewable energy deployments?**

Eskom is at the heart of the electricity system in South Africa and has been seen until now as a barrier to renewable energy deployment. **Could reforms to Eskom lead first to the creation of a dedicated unit for renewable energy generation and deployment and eventually to a large-scale transition along the lines of Ørsted in Denmark?**

In the United Kingdom, renewable energy cooperatives have demonstrated an alternative model that could be used to deploy renewables in a manner that increases local benefits in host communities and prioritizes social impacts. **Could such a model respect social concerns and deliver a more accountable and democratic energy system?**

**Given the concerns over private ownership in the electricity sector and the need for investment, could different models of PPPs have the answer?** In Morocco, the government shared ownership and project risk with private sector companies to benefit from private sector expertise while retaining public oversight and ownership.

**Public ownership of a private sector company could be another alternative to private ownership in the electricity sector**. This was key in Germany to establish a customer focus, increase innovation, and make internal processes faster and simpler—that is, corporatization.

Each of these models can offer something to South Africa. All of these ideas are worth pursuing and adapting to arrive at business models that meet the unique needs of South Africa's energy sector. The following sections discuss the suitability of each of these models to overcome a number of the key challenges facing the sector.

## 5.3 Delivering at Scale

The two main challenges that the energy sector in South Africa faces are related to (i) the slow pace at which renewable energy deployment is taking place relative to the requirements in the IRP and (ii) the public and institutional resistance to the privatization of the energy sector. Delivering renewable energy at scale is a vital approach to addressing the first of these challenges and cannot be achieved without addressing the latter. Without the widespread proliferation of renewable energy projects (in any business model format), it will be virtually impossible for the share of renewables to make up a great enough proportion of the country's energy mix to account for the planned deficit of decommissioned coal plants and, moreover, to limit warming to below 1.5°C.

Municipalities in South Africa and internationally have legislative and infrastructural know-how that would be beneficial in the procurement or generation of renewable energy. Moreover, as municipalities in South Africa already sell power to residents (albeit largely non-renewable power), if they were to expand into renewable energy, they already have a large consumer base. As discussed in Section 3, the City of Cape Town has been attempting to obtain the right to procure its own renewable energy. After years of court cases and battles, in October 2020, Minister Gwede Mantashe finally gazetted new regulations that will allow municipalities, subject to certain conditions, to procure or generate their own electricity. This is a pivotal step in increasing renewable energy deployment in the country while also retaining public ownership of the energy sector.

In terms of addressing the challenge of operating at scale, it is impossible to imagine a fundamental shift without a dramatic change in the most significant actor in the electricity system, Eskom. Eskom generates around 95% of the country's electricity: it is not possible to transform the energy sector without also transforming Eskom. Transforming the SOE includes the unbundling process that is currently underway, which, among other things, will create an independent system and market operator (ISMO) that will be responsible for system operation and buying electricity from electricity generators. An ISMO in this context would bypass Eskom's financial problems and help create an enabling environment for the alternative business models discussed in this report to succeed. As illustrated in the Ørsted case study, with an enabling environment, favourable context, and committed leadership, SOE transition has the potential to transform the energy sector of a country. In the Ørsted case study, the development of a small but capable business unit that developed a functional business model allowed the leadership to make the decision to transition the entire utility. This did not happen overnight, and the context in South Africa is very different. However, this example shows that it is possible for SOEs to fundamentally change, offering inspiration for what could be achieved.

PPPs tend to be associated with the rollout of large-scale infrastructure projects. The large number of stakeholders involved and the complicated nature of negotiating the partnership contracts can mean projects are complex and time-consuming to execute. However, the large-scale nature of the projects means that PPPs have the potential for scalability. Cooperative business models rely on community engagement and small private investments that not everyone can afford, so they are limited in their scalability. Due to the organizational nature of this business model, it generally does not extend itself to a scale large enough to make significant impacts to the energy mix—at least at the scale needed in South Africa. Additionally, the example from the United Kingdom shows that cooperative-owned renewable energy projects do not happen at scale without government support. Funding and efforts to remove regulatory hurdles are both needed to promote energy cooperatives.

## 5.4 Centralized vs. Decentralized

The case studies presented in this report may prompt questions about whether renewable energy deployment should be centralized into a relatively small number of mega projects or distributed at domestic or commercial scales. In South Africa, however, given the dual needs to urgently decarbonize the energy sector and also address the opposition and resistance to private ownership, there is room for models that include both centralized and decentralized business models.

An approach that only favours large-scale centralized renewable energy investment would typically be carried out by either private developers, Eskom, or some form of PPP. However, this will fail to capitalize on the skills and finance that the municipal, commercial, and residential consumers and installers can bring and, moreover, increases the risk of repeating the current problems faced by Eskom (unmanageable debt burden, state capture, mismanagement, etc.). Conversely, an approach that is only decentralized will fail to bring about the scale of change at the pace needed to increase the share of renewable energy in the country's energy mix.

The amendments to the Electricity Regulations on New Generation Capacity, 2011 in terms of the Electricity Generation Act, 2006 highlight a willingness on the part of the minister and national government to accept and support decentralized energy development—an incredibly positive sign amid South Africa's energy crisis (Brandt, 2020; Faku, 2020). This does not put the onus on municipalities alone to increase the share of renewables but instead acknowledges the need for a dual-level approach to addressing the country's energy problems. Municipalities are suited to developing both large-scale centralized and small- and medium-sized decentralized renewable projects.

As illustrated in Section 4.5, cooperatives are an excellent example of a decentralized approach to renewable energy deployment. They provide opportunities often at a scale smaller than municipalities, and in doing so, provide people with a route to play a greater role in their own energy provision by giving communities an opportunity to "exercise active citizenry and democracy." They also promote social entrepreneurship and empower communities to take local action and secure their own energy supplies.

## 5.5 Political Feasibility

There has been a myriad of challenges on a political level in South Africa that have impeded or slowed down the deployment of renewable energy. A few of these include vested interests to pursue other energy types, state capture, and a lack of political will. Historically, political interests in particular energy types (e.g., coal, nuclear, and gas) have hindered the development of renewable energy in South Africa; however, with the change in administration in 2018, this may be beginning to change.

Until recently, energy sector planning in the country has been tightly controlled by the DMRE and Eskom. This has resulted in limitations on how and when other stakeholders can enter the energy sector (e.g., private sector but only through REIPPPP and exclusion of community or municipal energy projects). The amendments to Electricity Regulations on New Generation Capacity, 2011 in terms of the Electricity Generation Act, 2006, however, illustrate a shift as political actors at the national level acknowledge the limitations of a tightly controlled energy sector and, moreover, the benefits of partnering with other stakeholders to meet the goals set out in the IRP.

With this apparent new openness to alternative business models, it appears that some of the barriers to political feasibility may be lowering. It is beyond the scope of this report to assess the political feasibility of the models outlined in this report. However, it can be observed that municipal ownership of renewable energy projects is now in development, and PPPs and community ownership exist to a limited extent through the REIPPPP.

Despite this optimism, there remain real challenges to the development of renewable energy projects outside the REIPPPP. Securing high-level political buy-in for these business models, in particular for those that require large-scale electricity sector reform, remains a key challenge.

## 5.6 Financing the Renewable Rollout

A key barrier to expanding renewable energy generation has been the need to identify business models that can attract finance for investment. The current business model in South Africa, private sector investment made by IPPs, has shown itself to be largely successful at securing finance to date. However, research from Meridian Economics suggests that this may not always be the case, particularly if sovereign guarantees are removed from PPAs (Renaud et al., 2020). Nevertheless, when considering new business models, it is important to consider how they may be financed.

The expansion of renewable energy is also hindered by Eskom being the only off-taker of generated electricity, as well as their current balance sheet requiring continued government guarantees. Establishing a competitive power market where electricity can be traded independently of Eskom (in the case of an ISMO) and also bilaterally would increase renewable energy deployment.

Notably, renewable energy cooperatives stand out in this regard. Member-funded renewable energy projects raise a significant proportion of their capital from individuals. This funding is potentially a new source of finance for the renewable energy sector. However, it is not at all clear how much of this kind of funding could be mobilized in South Africa.

Municipal investment in renewable energy could also potentially drive new renewable financing and deployment. In many countries, municipalities, subject to certain conditions, are able to access a range of credit through loans and bonds at competitive rates. However, there remain questions around what proportion of South Africa's municipalities are in a position to either provide their own equity or to borrow in order to develop renewable energy projects.

PPPs are formed with a range of stakeholders with the aim of creating a financial structure that appropriately shares project risks with each party. They typically involve participation from government agencies, international finance institutions, commercial investors, and renewable energy developers, and they feature a mix of public and private equity and debt. However, negotiating and structuring these deals to allocate the risks appropriately can be complicated, time-consuming, and challenging, and a lack of experience in doing so may slow access to finance providers.

Finally, perhaps the greatest hurdles from a finance perspective are to be found in the proposal for Eskom to take an active role in the development of renewable energy, ultimately leading to a transition away from coal in the utility. Under normal circumstances, this would entail Eskom borrowing money against its balance sheet to finance new investment. However, given the much-discussed debt problems that Eskom is currently facing, it is not at all clear how Eskom could finance a large-scale public deployment of renewable energy (Mahlaka, 2020). At this stage, a prerequisite for large-scale energy transition at Eskom seems to be a restructuring of the utility that includes a solution to the debt problem. However, it may be possible in the short term to lay the groundwork for a transition at relatively little cost by establishing a pilot project that can allow the utility to gain the experience of renewable energy projects without the need for large-scale financial mobilization.

Questions remain around the extent to which the domestic and international financial sector will be willing to provide finance for each of these business models and what form government policy and public financial support could take to help mobilize the necessary finance. A next step is to perform a deep-dive assessment of the roadblocks to financing renewables projects for each model and suggest potential solutions.

# 6.0 Conclusion

Increased renewable energy deployment in South Africa faces significant challenges. A failure to deploy renewable energy will undermine the integrity, reliability, and security of the future electricity supply. At present, in addition to practical and financial barriers, increased renewable energy development faces continued opposition from powerful trade unions, political parties, and government officials who favour other energy types. Furthermore, the switch to renewables is not happening at an adequate pace to offset the energy deficit that will result from decommissioning 24,100 MW of coal plants, as highlighted in the 2019 IRP, and to keep the country within the Paris Agreement's 1.5°C limit.

To address these challenges, this report sought to identify and investigate international case studies that present alternative business models for publicly and community-owned renewables while considering the high-level implications of these case studies for South Africa. Four business models—municipal ownership, SOE, PPPs, and cooperatives—were discussed. Table 3 provides an overview of the main findings of each case and the high-level implications (in terms of scalability, political feasibility, centralized vs. decentralized, and financing) for the country.

**Table 3.** Summary of publicly and community-owned renewable energy under various business models and the implications for South Africa

| Business model | Scalability | Centralized vs. decentralized | Political feasibility | Financing the model |
|---|---|---|---|---|
| **Municipal ownership** | Legislative and infrastructural know-how to scale renewable energy.<br>Existing customer base to sell power to. | Well suited to developing both small- and medium-scale decentralized projects as well as large-scale centralized projects. | Already existing appetite for this model in South Africa following amendments to the Electricity Regulations on New Generation Capacity, 2011 in terms of the Electricity Generation Act, 2006. | Subject to certain conditions, municipalities are able to access credit through bonds and loans at competitive rates.<br>There remain questions around what proportion of South Africa's municipalities are in a position to either provide their own equity or borrow in order to develop renewable energy projects. |

| Business model | Scalability | Centralized vs. decentralized | Political feasibility | Financing the model |
|---|---|---|---|---|
| **SOE transition** | Great potential to realize a fundamental shift in the electricity sector on a national scale, as Eskom is currently the most significant actor in the sector in South Africa. | Well suited to developing large-scale, centralized renewable energy projects. | Current minister of the Department of Mineral Resources and Energy's interest in pursuing nuclear, oil, and gas poses challenges to the political feasibility of SOEs transforming to largely renewable energy. | SOEs in good financial shape can use their own equity or borrow against their balance sheet to finance renewables.<br>As Eskom is currently saddled with debt problems, it is unclear how the SOE could finance the large-scale deployment of renewable energy without some sort of reform and/or financial restructuring. |
| **PPPs** | PPPs tend to be associated with large-scale projects, as is currently the case in South Africa through the REIPPPP. | Well suited to developing large-scale, centralized renewable energy projects. | There is significant opposition to increased private sector investment in renewable energy in South Africa from trade unions and political parties. | Financed through a variety of different stakeholders, such as public finance, commercial banks, international finance institutions, and renewable energy developers.<br>A lack of experience may slow access to finance. |

| Business model | Scalability | Centralized vs. decentralized | Political feasibility | Financing the model |
|---|---|---|---|---|
| **Cooperatives** | Limited in scalability due to the organizing nature and small private investment. | Excellent decentralized model that provides opportunities for citizen action through energy procurement.<br>Also promotes social entrepreneurship among communities. | Community ownership already exists to a limited extent in REIPPPP. | Largely financed by raising capital from private individuals (member funded).<br>It is not clear how much of this kind of funding could realistically be mobilized in South Africa. |

## 6.1 Key Findings

Given South Africa's dual need to accelerate the decarbonization of the energy sector and retain a level of public ownership of the sector, all four alternate ownership models have a role to play.

- Municipal ownership of renewable energy allows public entities at the subnational level to tap into existing customers and to generate and procure renewable energy projects.
- Large-scale, fundamental transformation of the electricity sector cannot take place without the reform of Eskom—reform that must include remaking the utility as a green utility.
- PPPs can offer scale and are perhaps the most easily replicable model, as the current REIPPPP has some elements of this model. However, PPPs can be complicated to implement and finance. To satisfy most critics in South Africa, the role of the public sector would need to be expanded.
- Cooperatives, although limited in their scalability, could be an important model in South Africa, as they provide opportunities for communities to exercise "active citizenry and democracy"—a crucial factor in light of the vehement opposition to privately owned renewable energy.

## 6.2 Recommended Next Steps

All of these ownership models are worth pursuing and adapting to meet the unique needs of South Africa's energy sector. Further steps are needed to assess the feasibility of each model in the South African context.

- First, a policy and regulatory gap analysis is needed to see what policies and regulations are missing in South Africa. This should be done against the policies and regulations that have enabled the rollout of each ownership model in our case studies.

Initial findings show that, for all models, some form of electricity sector reform and reform of Eskom are required to ensure each ownership model can supply and/or procure its own power.

- Second, a deeper investigation of the political feasibility of each model is needed. Key stakeholders, including government, unions, communities, etc., should be interviewed to determine the extent to which each model satisfies the desire for non-private ownership.
- Finally, questions remain around the extent to which the domestic and international financial sectors will be willing to provide finance for each of these business models, and what form of government support (policy, public finance, etc.) is necessary to help the necessary financing. A next step is to perform a deep dive assessment of the roadblocks to financing renewables projects for each model and suggest potential solutions.

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