Overview

This chapter applies only to municipalities that are electricity distributors and manage the distribution grid in their area of jurisdiction.

Currently, municipalities buy electricity nearly exclusively from Eskom but many municipalities wish to purchase electricity generated from renewable sources by local or nationally operating Independent Power Producer (IPPs) in order to

- Diversify suppliers and avoid possible supply constraints as experienced in the past;
- Stabilise costs into the future given the uncertainty of Eskom price increases and declining renewable energy costs;
- Reduce greenhouse gas and other emissions related to electricity generated predominantly from coal;
- Support the establishment of or strengthen a local renewable energy industry as part of local economic development; and
- Respond positively to technical change.

Electricity generated from wind and solar PV has become cost competitive with electricity generated from fossil fuels due to falling costs of wind and solar PV compared to the rising costs of Eskom produced power. Municipalities are required to deliver services in a manner that is financially prudent, does not harm the environment and has a developmental impact (Municipal Systems Act 2003 Section 73). Renewable energy is well aligned to these mandates. The price of electricity produced under the REIPPP programme (bid window 4) is competitive with Eskom pricing if partly off-setting peak electricity costs and future Eskom price increases are taken into account. The purchase of renewable energy can be considered financially prudent within the scope of the MFMA requirements.

As discussed above some municipalities have set renewable energy targets in their Energy or Climate Change strategies that they need to meet. A study undertaken by SEA modelled energy/GHG mitigation scenarios in South Africa’s largest 27 cities and towns. It indicates that by introducing large-scale renewable energy (wind and solar) and small-scale embedded generation, the cities could achieve an electricity mix that supplies 32% of electricity through renewable means by 2050, rather than the 9% envisaged in the national IRP 2010.

Municipalities can engage in renewable energy through:

a. Own generation of renewable energy. This would include projects such as mini hydro within water distribution systems and waste to energy projects that are developed and owned by the municipality.

b. Off-taking of renewable energy. Some municipalities already allow for small-scale renewable energy feed-into the grid from small producers. ‘Off-taking’ refers to municipalities entering into long-term Power Purchase Agreements (PPA) with larger renewable energy developers and selling the power on to their customers.

c. Wheeling of power from renewable sources generators and buyer.

The section on Municipal Initiatives of this manual provides details on municipal engagement in renewable power production. This chapter will look at municipal engagement in PPAs and in wheeling of renewable power. Although some municipalities have already entered into PPAs no legal framework for this exists yet. An overview of the current policy environment is provided in the text box.

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11 The costs of electricity generated by different technologies can be compared through the levelised cost of electricity (LCOE). The LCOE measures the lifetime cost of generation divided by electricity production.

12 SEA (2015), City-wide Mitigation Potential for South Africa
The National Electricity Plan

The Energy Act of 2008, building on the Energy White Paper of 1998, provides for an Integrated Energy Plan (IEP) to guide the country’s energy decisions. The Integrated Resource Plan (IRP) is the national electricity plan – a sub-sector plan of the IEP.

The Energy White Paper of 1998 states government’s intention to introduce competition in the electricity sector:

“To ensure the success of the electricity supply industry as a whole, various developments will have to be considered by government over time, namely:

- giving customers the right to choose their electricity supplier;
- introducing competition into the industry, especially the generation sector;
- permitting open, non-discriminatory access to the transmission system; and
- encouraging private sector participation in the industry.”

The IRP approach and methodology for electricity planning was introduced to determine the mix of sources for new generation capacity, incl. renewable sources, and private sector participation in electricity generation.

A 2003 Cabinet decision allocated 70% of new power generation capacity to Eskom and 30% to Independent Power Producers (IPPs). In 2006 the framework for private sector participation in power generation was created with the enactment of the Electricity Regulation Act (ERA), which made provision for market competition.

Although the ERA made provision for market competition in the power generation sector, a 2007 Cabinet decision designated Eskom as the Single buyer of electricity. This signalled a shift in policy based on the motivation that security of supply is a national priority and takes precedence over a competitive market. The Energy Security Master Plan – Electricity 2007-2025 confirmed the Eskom: IPP split of 70:30, but indicated that there was a ‘very weak case for full competition on a merchant basis, i.e. it is anticipated that any private participation in the electricity industry will be via the Independent Power Producer (IPP) mechanism with a power purchase agreement with Eskom (single buyer model)’ (Reg 3 (1), (2)).

The White Paper on Renewable Energy of 2003 set a national target of 10 000 GWh to be generated from renewable sources by 2013. The IRP details the technology mix for this quantum of renewable energy (in terms of the IRP 2010 this was translated into an installed capacity of 3,275 MW). The Renewable Energy Independent Power Producers Programme (REIPPPP), a joint programme of the Department of Energy and National Treasury, has been designed to achieve the renewable energy target through a competitive bidding process.

The IRP should be updated every few years to accurately reflect changes in demand for electricity, in the costs of supply from various sources and policy changes. Updated IRP documents have been drafted in 2013 and 2016. The IRP 2013 has never been approved. The IRP 2016 is expected to be approved in 2017. The 2016 draft proposes a higher share of renewable energy than the IRP 2010.
Power generation

The IRP guides all decisions regarding the supply mix: new electricity generation capacity must be planned and provided at least cost, while meeting existing ministerial determinations and contractual commitments for any existing new-build, as well as government’s policy objectives.

The Electricity Regulation Act 4 of 2006 (ERA) determines that a license is required to generate, trade, import or export electricity.

The following permits are required for power generation (in terms of Schedule 2 of ERA, and the proposed amendments to Schedule 2: Draft licensing Exemption and Registration Notice (1))

- Small-scale generation (up to 1MW), off grid, or generation for ‘own use’ should be registered with NERSA (via the distributor), but does not require a license to generate;
- Medium scale projects (1 – 10 MW) require a generation license from NERSA; and
- Large-scale generation projects (more than 10MW) require Ministerial Determination (in terms of ERA of 2006 section 34).

Power purchase

The 2007 Cabinet decision determined Eskom as the single buyer within the national IPP process. However, subsequent sets of regulations and on-ground developments have somewhat clouded who is authorised to purchase from private generators. In the IPP procurement framework the ‘procurer’ is not defined and the Draft Second Electricity Regulation Amendment Bill makes provision for ministerial exemption from the single buyer obligation.

NERSA’s Regulatory Rules on Network Charges for Third Party Transportation of Energy (wheeling framework), states that “any load customer shall be free to go into bilateral arrangements with any third-party generator, i.e. non-Municipal and non-Eskom generator” (NERSA, 2012, clause 6.7).

This rule, and the Regulator’s licensing of independent power traders to operate in the market, further indicates that bilateral PPAs are allowed. There is nothing stating that municipalities may not engage in such PPAs. However it seems that ministerial exemption/approval would be required for a generator to sell outside of the single buyer model and for the Municipality to enter into a PPA.

Wheeling of power across national and municipal networks

The Electricity Regulation Act of 2006 (Act No. 40 of 2006) requires that the transmission, distribution and trading functions of electricity be separately licensed and that the transmission or distribution functions shall provide non-discriminatory access to all users of the networks.

NERSA’s Regulatory Rules on Network Charges for Third Party Transportation of Energy (2012) provide guidance on prices and tariffs relating to the wheeling of power. These include guidelines on: General Use-of System Charges, Network Charges, Reliability Service Charge, Service and Administration Charge, Losses Charge and Connection Charges. It also provides direction around ensuring that the subsidy contributions contained within the system charges are included in the wheeling prices.
Implementation

Power Purchase Agreements

A PPA is a contract between a buyer of power (usually Eskom, a municipality or a licensed power trader) and a commercial electricity generator. The contract partners agree on the delivery of power for a set period of time at a set price. The term PPA does not apply to Small Scale Embedded Generators (SSEG), which are residential and commercial customers who have installed renewable energy systems of up to 1MW – usually solar PV systems – for own consumption and feed excess power into the municipal grid. Small Scale Embedded Generation is explained in the chapter on Solar PV in this manual.

PPAs usually have a contract period of ten to twenty years to give the generators the necessary certainty for the investment. A PPA allows the generator to raise finance to build the power generation infrastructure. In a PPA the power purchaser is an electricity distributor (municipalities or Eskom) who sells the electricity on to its customers. It can also be a private power trader or a business large enough to provide the generator and his financier with confidence to honour a long-term contract. In this instance the distributor (Municipality or Eskom) acts as a wheeler of this power (see below).

For municipalities it is most desirable to enter into PPAs with local power producers that feed directly into the municipal grid because this does not require wheeling and benefits the local economy. Some PPAs are already in place between municipality and local power producers. The eThekwini Municipality has entered into PPAs with sugar and chemical industries that generate electricity from industrial waste (see case study).

Some municipalities are being approached by IPPs who wish to build large-scale power generation capacity for them in other parts of the country. These are often projects at advanced state of planning that were submitted to the REIPPPP programme but were not successful. Such projects will be connected to the Eskom transmission network and require a Wheeling Agreement for the electricity to reach the municipal grid.

Barriers and opportunities

As noted, renewable energy purchases offer important opportunities for cities and towns, including local economic development, fiscal savings, greater security of supply through diversification and environmental benefits. However there are barriers and risks that need to be addressed:

- Lack of clear policy around the degree of free market in the sector: The electricity sector is highly regulated and still dominated by Eskom. The current legal framework makes it difficult for municipalities to enter into PPAs with IPPs because of the licensing process that requires Ministerial determination for off-take by anyone other than Eskom. The national government must pursue equity across the country and ensure national power supply, while enabling municipalities to meet local targets and commitments. Close engagement in planning and optimising national and local objectives is required for a workable model to emerge.

- Political will and credit worthiness of municipal off-takers: Renewable energy developments will only achieve ‘bankability’ if the off-take agreement is considered financially and politically secure by financial institutions. This means that the financial institutions must have confidence that the municipality can honour the PPA for the whole agreement period. Municipalities would need a high credit rating and political stability to provide confidence. The procurement process must be fair and transparent. The financial sector has indicated that the bidding process would need to be adjudicated by the national IPP office.

- Contracting challenges: Municipal supply chain management rules are complex for contracts longer than 3 years. Municipalities must procure goods at the lowest price and principally through a competitive bidding process. For procuring electricity municipalities must comply with the:
Governance and Legislation

- Municipal Systems Act of 2000 (MSA) has equity and value for money requirements as well as process requirements for external services (Section 78) and planning requirements (IDP). Section 73 requires that services provided must be financially viable and environmentally sustainable. Section 78 (1) (a) requires municipalities take into account direct and indirect costs and benefits associated with projects (including health and environment, employment creation) and any developing trends in the sustainable provision of municipal services, when deciding on a service delivery mechanism.

- Municipal Finance Management Act of 2003 (MFMA) states that municipal officials are liable for ‘fruitless and wasteful’ expenditure (Section 171 (3)). This requires that the municipality has a fair degree of certainty that a PPA will not lock them in if cheaper alternatives become available. If the PPA is going to impose financial obligations on a municipality for a period longer than 3 years, a process set out in Section 33 of the MFMA must be followed, which requires national and provincial government input and public participation;

- Municipalities must principally procure goods and services on the basis of competitive bidding. IPPs approaching municipalities with projects raise the spectre of ‘unsolicited bids’. Section 113 of the MFMA makes provision for unsolicited bids but municipalities would need to carefully consider this option versus competitive bidding.

In conclusion, no generally applicable solution is in place for how municipalities can contract with IPPs. However, with rapidly falling costs of renewable energy and the global shift in technology towards distributed generation the financial and environmental case is getting stronger. A few municipalities have entered into PPAs from which experiences can be drawn. Examples are presented in the case studies.

Wheeling agreements

The term wheeling describes the transportation of power through the grid from the seller to the buyer. It deals with the use of electricity networks and related costs. Wheeling charges (or network use charges) reflect the costs of using the network, including connection costs, maintenance, operations, refurbishment, customer services, administration, as well as surcharges, such as electrification and rural subsidy charges.

The National Energy Regulator’s (NERSA) Regulatory Rules on Network Charges for Third-Party Transportation of Energy were approved in 2012 and established the broad principle:

"Wheeling of energy shall be allowed, subject to the generator receiving its approvals from NERSA to sell to a third party and the signing of the network service provider’s Connection and Use-of-System Agreement."11

Ongoing discussions around the rules relating to this principle are outlined under Policy Framework.

A few municipalities have entered into wheeling agreements. The Nelson Mandela Bay Municipal Metro (NMBMM) has a Framework Wheeling Agreement in place. This is a generic agreement stating conditions under which the municipality will wheel power and the maximum privately generated power that will be accepted by the municipality. According to this agreement, only electricity traders registered with NERSA may wheel power.

Barriers and opportunities

According to NMBMM opportunities in municipal wheeling of renewable power include:

- Local economic development through facilitating energy sector growth. NMBMM have set a target of 10% of their power to come from wheeled renewable energy of which 80% must represent local developers.

- Direct financial benefits from having a portion of power from local, renewable source electricity: demand charge reductions on power purchased from Éskom, no environmental levy and no carbon tax (in the future).

- Improved grid stability.

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Municipalities have expressed concerns in relation to Wheeling Agreements. These include:

- The regulations open up the electricity market, but long-term implications for the municipal distribution business have not been fully explored.

- The current rules expose municipalities to financial risk as they require the municipality to compensate a generator for losses should the network’s performance drop below the 98% and 95% availability limits for Transmission and Distribution Systems respectively i.e. they must compensate the generator for energy that could not be exported into the network.

- Wheeling Agreements require that municipalities have a full understanding of the real costs of supply and can adjust tariffs and prices accordingly.

- Wheeling Agreements can be an administrative burden on municipalities, requiring complex accounting arrangements and monitoring.

**Establishing Cost of Supply**

Before engaging in wheeling agreements, municipalities should undertake a thorough Cost of Supply study to ensure that the tariffs and prices reflect the costs. Unbundling of tariffs on the basis of cost of supply studies facilitates more accurate tariff setting, which will help municipalities not only with wheeling of power, but also with other processes related to efficiency and renewable energy development.

**Cost of Supply Study**

A Cost of Supply (COS) study is an important tool for power distributors to design electricity tariffs. The objective of a COS study is to understand the real costs of supplying electricity to customers and to apportion them amongst the different groups of customers in a fair and equitable manner.

According to Section 4(ii) of the Electricity Regulation Act 4 of 2003 (ERA), the Energy Regulator (NERSA) must regulate electricity prices and tariffs. Policy position 23 of the Electricity Pricing (GG No. 31741 of 19 December 1998) (EPP) states that:

“Electricity distributors shall undertake Cost of Supply (COS) studies at least every five years, but at least when significant licensee structure changes occur, such as in customer base, relationships between cost components and sales volumes. This must be done according to the approved National Energy Regulator of South Africa (NERSA or ‘the Energy Regulator’) standard to reflect changing costs and customer behaviour.”

NERSA developed the COS Framework in order to promote sustainability of the electricity supply industry while protecting customers against unduly high tariffs. The framework aims to support all licensed electricity distributors to develop COS studies. It can be found here: http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Methodologies%20and%20Guidelines/Cost%20of%20Supply%20Framework.pdf

Another tool that can support this process is ‘The Cost of Supply Study NMB Model Guide’ and related excel spreadsheet tool 11. This study for the NMBMM provides a tool that can be used by other municipalities to undertake COS studies. The Guide and Excel Spreadsheet tool can be downloaded from the www.cityenergy.org.za website: http://www.cityenergy.org.za/uploads/resource_272.pdf.

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Case Study 1: Darling Wind Farm, Western Cape

The Darling Wind Farm is located 10 km north of the town of Darling in the Western Cape, in an area that gets strong and consistent winds. The R75-million project was completed in 2008 by a group of private investors including the Darling Independent Power Producer, the Central Energy Fund, the Development Bank of South Africa, and the Government of Denmark. It was South Africa’s first commercial wind farm consisting of four 1.3 MW turbines. The project was given substantial government support as an important renewable energy pilot project.

In 2006 the City of Cape Town signed a twenty year PPA with the Darling Wind Farm. Through the PPA the City provided financial security as the buyer of all electricity that was going to be produced. The Council approved of the PPA on the basis that the City would sell the electricity on to customers willing to pay a premium for this ‘green’ electricity. In 2008 the premium was set at 25c/kWh above the then electricity tariffs. This arrangement was necessary because at that time the cost of wind generated electricity was significantly higher than the costs of electricity purchased from Eskom and the City was anxious about being charged with ‘fruitless and wasteful’ expenditure in terms of the MFMA.

Initially, some of the wind power was sold on to buyers willing to pay the premium tariff, but the City never managed to sell all power to private buyers. The shortfall was underwritten by the Global Environmental Fund. Currently, the Darling power costs are slightly less than Eskom power. This is an important outcome showing that the cost of electricity from Eskom has caught up even with the relatively high costs of wind power ten years ago.
The electricity from the Darling wind farm is wheeled to the City through a Wheeling Agreement between the City and Eskom. This was the first wheeling agreement and its development involved substantial time and capacity. The wind farm produces a tiny fraction of Cape Town’s electricity (in 2012 just 7,770 MWh, i.e. 0.07% of demand). Its performance over the years has been fairly erratic, but it has provided an important testing ground for processes and technologies. Over the 20-year PPA period, the Darling Wind Farm is expected to save 142 500 tonnes of coal and 370 million litres of water. A significant reduction in pollutants will also result by:

- 258 100 tonnes of carbon dioxide,
- 2200 tonnes of sulphur dioxide,
- 1100 tonnes of nitric oxide,
- 58 tonnes of particulates, and
- 42 200 tonnes of ash.  

Case study 2: 3-year PPA in eThekwini Municipality

In 2012 the eThekwini Electricity Department drafted a standard three year PPA for buying electricity from local power producers. The PPA was developed in response to load-shedding and allows the municipality to use additional suppliers to sustain electricity services to customers. A condition for entering into a PPA is that the generated electricity has less greenhouse gas emissions than electricity provided by Eskom.

The power suppliers are industries that generate electricity – e.g. through cogeneration – beyond their own needs and sell the excess to the municipality. The municipality can only enter into PPAs with companies who can invoice the municipality. The municipality cannot accept invoices from private residents. PPAs have been signed with a number of companies.

The contractual conditions reflect the restrictive policy environment of municipalities:

- The price at which the municipality purchases electricity does not exceed the (Megaflex) tariff at which the municipality buys electricity from Eskom.
- The contract period is restricted to three years after which the PPA can be renewed.
- The generator is responsible for getting a generation license from NERSA and must comply with all applicable laws, by-laws, regulations and requirements.
- The generator must install a bi-directional meter at his cost. The municipality provides half-hourly meter readings that are the basis of accounting for the electricity purchased.
- The generator provides the municipality with monthly tax invoices for the electricity fed into the grid.

The PPA can be found at: http://www.durban.gov.za/City_Services/energyoffice/Pages/Embedded-Generation.aspx

The eThekwini Electricity Department is considering managing energy purchased from local generators through a tariff/off-set process in the future. However a PPA will remain necessary if the value of exported power is higher than the value of power purchased from the grid because municipalities are only allowed to make payments on the basis of a contract.

Governance and Legislation

Case study 3: Wheeling agreements explored

Currently only one private company, POWERX (previously Amatola Green Power) holds a NERSA-issued licence to trade electricity countrywide. The company buys Wind, Hydro, Solar, Biogas, Biomass, or any other green power from IPPs and sells it to consumers. The company offers the IPPs long term PPAs of up to 20 years.

POWERX negotiates and pays wheeling fees to the owners of the transmission and distribution grids, namely Eskom and municipalities. The wheeling fees compensate them for the cost of the grid/network use and for the administrative expenses of monitoring and undertaking the billing process of the wheeling transaction. Well-structured wheeling fees should ensure that Eskom and the municipalities do not incur losses when a customer selects to purchase green power through its network.

POWERX (still operating as Amatola Green Power) signed a 20 year, non-exclusive wheeling agreement with NMBMM. To date some 5,000 MWh are being wheeled from the Electrawind’s Coega wind turbine project alone every year.

POWERX believe that their wheeling agreements can stimulate municipalities as ‘green nodes’, while ensuring that the process is revenue neutral for municipalities. POWERX provides a Balance Sheet to IPPs to make their projects bankable.11

Another wheeling agreement project is the Bronkhorstpruit Biogas Project. This is the first large scale animal and other organic waste-to-energy project in South Africa, based at the Beefcor feedlot in Bronkhorstpruit.

Figure 1: Bio2Watt Biodigester


The feedstock of the biogas plant is cattle manure supplemented by chicken abattoir waste, vegetable and fruit market waste, and diary waste. As a by-product the plan produces 20 000t of fertiliser per year.

The project developer, Bio2Watt, obtained a generating licence from NERSA that allows for the export of 4.2 MW of power (with the possibility of increase to 5 MW). Initially the project considered the municipality as off-taker, but this did not materialise given the absence of clear policy and procurement concerns. Instead BMW South Africa signed a PPA as off-taker with the project developer. BMW is based in Rosslyn, Pretoria. Therefore, the power needs to be wheeled through the Eskom and City of Tshwane networks. Wheeling agreements have been signed with both network providers. The plant started producing and wheeling power in October 2015.

The developer notes that obtaining the various licences required for biogas plants and negotiating the agreements with the off-taker and the network providers was a complex and lengthy process due to the lack of a regulatory framework at the national level – both in relation to the power purchase and the wheeling by municipalities
