RENEWABLE ENERGY LOSS MITIGATION POLICY

Item A-F (17-2017) **CM 25/05/2017**	**REVIEWD INTEGRATED DEVELOPMENT PLAN (IDP) AND MEDIUM TERM REVENUE AND EXPENDITURE FRAME WORK (MTREF): 2017/2018 TO 2019/2020**

Resolved:

5. **That** to guide the implementation of the municipality's annual budget, the Council of the EMM **APPROVES** the policies as set out in the following Annexures of this document:

Annexure D1 Medium-term Budget Policy Statement (reviewed)
Annexure D2 Pricing Policy Statement (reviewed)
Annexure D3 Property Rates Policy (reviewed)
Annexure D4 Provision of Free Basic Electricity Policy (reviewed)
Annexure D5 Waste Management Services Tariff Policy (reviewed)
Annexure D6 Consumer Deposit Policy (reviewed)
Annexure D7 Indigent Policy (reviewed)
Annexure D8 Credit Control & Debt Collection Policy (reviewed)
Annexure D9 Provision for Doubtful Debtors and Debtors Write Off (reviewed)
Annexure D10 Budget Implementation and Monitoring Policy (remains unchanged)
Annexure D11 Municipal Entity Financial Support Policy (reviewed)
Annexure D12 Accounting Policy (reviewed)
Annexure D13 Funding and Reserve Policy (remains unchanged)
Annexure D14 Borrowing Policy (remains unchanged)
Annexure D15 Cash Management Policy (remains unchanged)
Annexure D16 Policy on electricity metering for residential and small business customers in the EMM (reviewed)
Annexure D17 Policy for the Vending of Pre-paid Electricity (reviewed)
Annexure D18 Policy for Correction of Meter Reading and Billing Data (reviewed)
Annexure D19 Electricity Tariff policy (reviewed)
Annexure D20 Virement Policy (remains unchanged)
Annexure D21 Consumer Agreement Policy (reviewed)
Annexure D22 Renewable Energy Revenue Loss Mitigation Policy (unchanged)
Annexure D23 Supply Chain Management Policy (Reviewed)

CONTENTS

RENEWABLE ENERGY REVENUE LOSS MITIGATION POLICY

1. BACKGROUND

The policy aims to mitigate against revenue loss as a result of the traditional electricity grid no longer being the only option in supplying electricity to a captive group of customers. Technology and new materials advances are now creating the opportunity for customers to supplement grid supply with alternative energy, at installation costs that are continuously becoming more affordable.

The policy is not created to take a stance against renewable and alternative sources of energy, but rather to embrace these technologies and adopt them as part of the CITY OF EKURHULENI grid.

In South Africa, a further driver is the current and foreseen constraints of the electricity supply system that is prompting the acceleration of the renewable energy IPP portfolio and embedded/distributed generation including solar PV. Even though some technologies, such as small scale solar PV has not yet reached grid parity in South Africa, they empower customers with greater resilience and adaptability to power constraints and rolling blackouts.

Distributed or embedded generation is one of the most mentioned “disruptive” forces in the energy industry, globally. Distributed generation refers to generation facilities that is geographically distributed and typically located close to the consumer. Distributed generators may include any of the generation options available.

Geographically distributed generation plants that are smaller and closer to the end user offer numerous technical benefits for the electrical network, but also bring complications related to the integration and management thereof.

To date, in South Africa this has been occurring without regulatory clarity and without a fully considered enabling environment.

Dispersed resources present a further challenge for planning, forecasting demand requirements for a supply area, planning for infrastructure requirements and development and for balancing supply and demand, amongst many others. If connected to the grid for supplemental supply, these facilities require network infrastructure and maintenance, with reduced energy sales thereby impacting revenue and bringing the relevant tariff approach into question.

A further risk for the traditional utility will arise with storage options becoming more readily available, more reliable and more affordable. As conventional power prices continue to rise, the power utility may become completely redundant.

“Absent” demand growth or “slowed / stagnant” growth and even negative growth has been seen in developed countries since 2009. This is partly ascribed to a slower economy, but also to greater efficiencies and increased self-sourcing of supply.

The energy system that will support the new city landscape will have to transform from the historic, one-directional energy system, to one that can accommodate a more integrated, participatory and complex energy system.

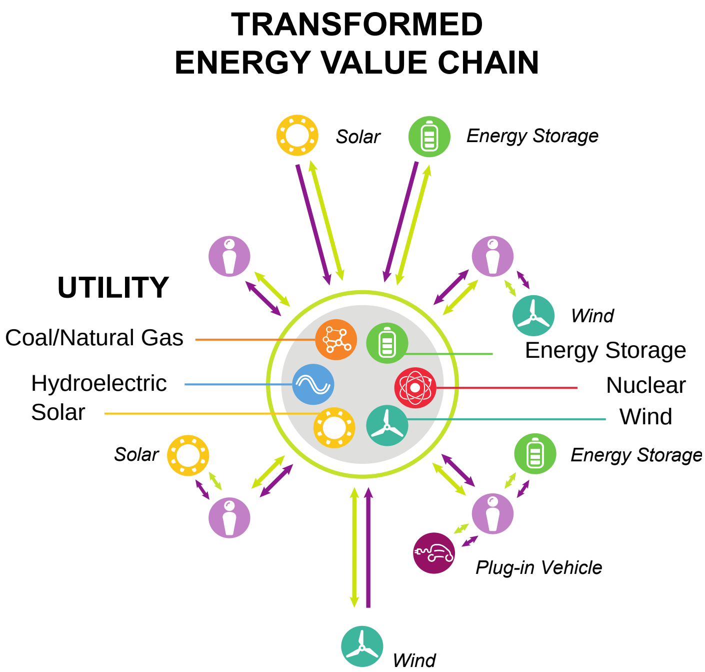

Figure 1: Future energy system (conceptual).

The energy landscape will change profoundly with the rapid market penetration of cost effective, distributed generation solutions. The change is inevitable and likely to accelerate with resolution of policy issues, electricity price increase, downward technology prices and frustrations with national supply constraints. Opportunities to embrace and leverage the change are key to survival:

- Consumers are increasingly empowered to become involved in their own supply needs;
- Consumers, especially large users, are not only reducing their electricity consumption but they are starting to expect value added services. Failure to provide these may result in them disengaging by decreasing their reliance on the system or extracting themselves from it entirely through distributed energy solutions;
- The changing environment is bringing enormous operational and market uncertainty. A capable, flexible and robust distribution platform will be essential for successful navigation in the dark - smart grid implementation must be prioritized and accelerated;
- The old business model of volumetric sales is becoming obsolete and the new paradigm is value, that is, “from volume to value”. This can only be achieved by building a robust IT platform which facilitates transactions and ensures the system remains balanced;

The focus will have to be on building new relationships with customers and partners, balancing the growing complexity of supply and demand requirements, for which it will have to rely on more sophisticated grid intelligence.

2. DEFINITIONS

Cost of supply Study	:	Standard procedure for deriving and allocating costs for the design of tariffs. This does not include determining the connection charge.
Cross-subsidy / Cross-subsidisation	:	Over-recovery of revenue from customers in some tariff classes, whether intentional (e.g. electricity levies) in order to balance the under-recovery of revenue from customers in other tariff classes (i.e. electricity subsidies) as informed by a cost of supply study, or unintentional by way of un-identified surcharges.
Distributed Energy Resources (DER)	:	Distributed generation is defined as the installation and operation of electric power generation units connected directly to the distribution network or connected to the network on the customer side of the meter. Small, self-contained energy sources located near the final point of energy consumption. The main distributed generation sources are: • Solar PV • Combined heat & power (CHP) • Small-scale wind • Others (i.e., fuel cells).
Distribution Use of System (DUoS) charges		Unbundled regulated tariffs charged by the Distributor to the distribution network services customers for making capacity available and for use of the distribution system.
Embedded generation (self-sourcing of supply, self-generation, on-site generation)	:	An approach that employs small-scale technologies to produce electricity close to the end users of power. Technologies often consist of modular (and sometimes renewable-energy) generators, and they offer a number of potential benefits. Embedded generation plants are embedded in a Distribution network and is often equated to on-site generation, self-generation or self-sourcing of supply). Cogeneration would qualify as embedded generation, subject to the same legal and regulatory framework relating to grid connection, tariffs and contracting.
Embedded generator		A legal entity that operates one or more unit(s) that is connected to the Distribution System. Alternatively, a legal entity that desires to connect one or more unit(s) to the Distribution System.
Tariff		A combination of monthly charges, each at a particular rate, that are usually escalated annually and are applied to recover the costs of measured quantities such as consumption and capacity and the costs of unmeasured quantities such as customer service and administration.
Time of Use		The time of day, or season during which electricity is used.

Time-of-Use tariff	A tariff with energy charges that change during time-of-use periods and seasons.

3. STRATEGY

3.1 ADVANCED METERING INFRASTRUCTURE (AMI) – SMART METERING

Most electricity systems are still managed today in the same way that they were operated in the early part of the 20th century and are largely mechanically and manually operated. “Smart Grid” refers to the computerisation of the electrical system to allow better monitoring of the system and quicker response to faults in the system.

This involves installing sensors at various locations on the grid to collect information on grid operating conditions and transmission of this information to the service provider’s computers. These sensors and communications devices enable monitoring and much faster response to problems on the grid than a traditional grid with no computerisation.

Smart meters are only one component of a smart grid.

REASONS FOR INVESTING IN A SMART GRID, INITIALLY FOCUSING ON AUTOMATED METERING INFRASTRUCTURE

- A smarter grid (starting with smart metering) is a key enabler to manage the addition of distributed energy resources (DER). Without a smart grid, CITY OF EKURHULENI will have no visibility of the distributed energy resources added on a daily basis by customers’ existing in all CITY OF EKURHULENI revenue segments;
- Reduce unplanned interruptions to ensure electricity service reliability;
- Have quicker response times for outages and other network problems;
- Reduce overall purchases from Eskom to create space for new development (energy efficiency);
- Reduce cable and copper theft;
- Reduce controllable energy losses;
- Utilization of time of use and dynamic tariffs to provide customers with financial incentives to reduce their electricity usage during peak demand times;
- Better usage of data for planning purposes;
- Increase system efficiencies
  - Reduced costs for manual meter readings
  - Reduced costs for remote connections and disconnections
  - Reduced costs for disconnect and revisit notifications
  - Reduced costs for warning notifications
- Critically, enable the City to deal with Renewable Energy grid connections, and
- Critically, enable the City to deal with electric vehicles (both the threats to the grid, as well as the possibilities of using the electric vehicle battery as storage device).

Smart metering is required to enable several of the key interventions noted in this policy.

3.2 GENERAL RULES RELATED TO ANY EMBEDDED GENERATION (including Residential, Commercial and Industrial, <1000 kVA)

The following rules will be applied:

- The provisions of NRS 097-2-1:2013 Grid Interconnection of Embedded Generation Part 2: Small-scale embedded generation (or latest version), shall be adhered to, as well as provisions contained in the South African Distribution Code.
- This section of NRS 097-2 applies to embedded generators or embedded generator systems of nominal capacity less than 1000 kVA, connected to a single-phase, dual phase, or three-phase low-voltage utility network.
- NRS 097-2 aims to provide a practical specification for utilities to facilitate the incorporation of embedded generation on low-voltage networks while ensuring compliance of the utility interface with the requirements documented in this specification.
- This document does not guarantee that CITY OF EKURHULENI will allow connection of the EG at the customer's preferred location and current terms and conditions; additional requirements may be set by the utility to ensure safety and quality of supply on the network.
- Part 1 of the same document, when available, shall also be adhered to (Part 1: Distribution standard for the interconnection of embedded generation. The specification sets out the minimum technical and statutory requirements for the connection of embedded generators to medium-voltage and high-voltage utility distribution networks. The specification applies to embedded generators larger than or equal to 100 kVA and is in the course of preparation).
- The South African wiring code, with extensions for being applicable to small scale embedded generation, apply (SANS 10142-3 and SANS 10142-4).
- CITY OF EKURHULENI must be informed by the customer, that embedded generation exists and certain parameters must be provided.
- CITY OF EKURHULENI will maintain a register to record a limited number of details, for statistical and future use, as well as reporting to NERSA.
- Grid connected installations shall have an automatic disconnecting device for safety purposes.
- Metering shall not be by means of a conventional meter (only prepayment, or advanced metering).
- The meter shall prevent off-peak generated energy (very low cost to the own generator) from being "stored" in the grid and then being used during another time period (e.g. peak, at a very high cost to CITY OF EKURHULENI).
- A visible sign shall indicate the presence of own generation capacity and shall state: "ON-SITE EMBEDDED GENERATION (EG) CONNECTED. THE EG IS FITTED WITH AN AUTOMATIC DISCONNECTION SWITCH WHICH DISCONNECTS THE EG IN THE CASE OF UTILITY NETWORK DE-ENERGIZATION".
- The label shall be permanent, coloured red, and with white lettering of height at least 8 mm.

3.3 TARIFF COMPONENTS

A significant part of protecting CITY OF EKURHULENI revenue, is contained in dealing (in a fair manner) with tariff related matters. It remains a fairly unknown fact that there is a significant mismatch between (all) municipal purchase tariffs structures and municipal sales tariff structures.

#	Tariff components to add
1	Residential time of use, once metering can accommodate this tariff structure TO MITIGATE: CITY OF EKURHULENI peak hours purchase rates versus sales rates mismatch
	DISCUSSION • CITY OF EKURHULENI purchases at time of use rates from Eskom, that is, electricity is much more expensive during certain hours of the day (reflecting the hours of a day when generation capacity is constrained and peak generators are operating at very high cost to Eskom) • The City has only 2 tariffs selling at time of use rates, and these are for large customers • Specialised metering is required to levy time of use based tariffs to customers that are not on time of use tariffs • Residential and small business customers account for roughly 30% of CITY OF EKURHULENI sales and are levied at single, or 2 part tariffs • Vulnerable residential customers are served by the IBT and form part of the 30% mentioned above, this loss cannot be mitigated by a time of use tariff, it has to be accepted as is.
	TO RESOLVE THE PROBLEM: • CITY OF EKURHULENI needs to install smart meters, especially at higher consumption customers, as discussed earlier in this document • Residential time of use tariffs can then be used to encourage shifting consumption away from peak periods • IMPORTANT NOTE: The NERSA IBT (inclining block tariff) cannot be changed to time of use.
#	**Tariff components to add**
2	Network Access Charges for residential customers (NAC) TO MITIGATE: Off-grid customers accessing the grid only in emergency situations.
	DISCUSSION • NAC values are already in use in the larger CITY OF EKURHULENI tariffs • These values record the highest demand from the grid, over any 30-minute period

- The highest value recorded remains in place for a period of 12 months and has a specific monthly tariff rate associated with the value
- The aim is to reserve electricity capacity, at a cost (customer pays CITY OF EKURHULENI for this capacity, and CITY OF EKURHULENI, in turn, pays Eskom for the cumulative capacity of all CITY OF EKURHULENI customers)
- The charge recovers network costs (including capital, operations, maintenance and refurbishment) associated with the provision of the network capacity required
- NAC values for residential customers may be implemented in a blanket format to all non-IBT customers, or as a targeted value to customers with own generation capacity
- The aim of this charge is to mitigate against CITY OF EKURHULENI maintaining a massive grid, with only a few customers using the grid over long periods
- However, all these customers may at any instant time access the grid again for a limited period of time
- Typically, this scenario relates to photovoltaic installations, with battery storage, using only, or mostly the sun as a source of power
- During a rainy spell, solar power will decline drastically, forcing all these off-grid customers back onto the grid for a few days only
- The above may be especially problematic if the grid demand now exceeds available capacity, causing large scale trips.

TO RESOLVE THE PROBLEM:

- The tariff component must be added in future to have the best effect to both CITY OF EKURHULENI and its customers

#	Tariff components to add
3	Notified Maximum Demand Charges (NMD) TO MITIGATE: Large off-grid customers accessing the grid only in emergency situations.

DISCUSSION

- CITY OF EKURHULENI never applied this tariff component, as there was no specific use for NMD in a distribution grid
- Larger customers pay NAC values, reserving capacity for a 12 month period
- NMD charges will reserve capacity for periods exceeding 12 months and will need to BE DECLARED by customers requiring reserve capacity to be kept available
- It is envisaged that this tariff component will be used upon request from individual large customers

TO RESOLVE THE PROBLEM:

- Introduce a NMD tariff to be applied when a customer requests this

#	Tariff components to add
4	Design best option tariff to purchase off-grid kWh units, taking into account future National Policy: • Add electricity purchase rate for CITY OF EKURHULENI to purchase from small own generators with excess capacity

DISCUSSION

- The rate should be at a level beneficial to CITY OF EKURHULENI, taking into account time of use factors, position in grid plus more factors.

TO RESOLVE THE PROBLEM:

- Design best option tariff in line with future National Policy to guide process and rates.

3.4. REDUCE LOSSES

Opportunity exists for making more power available to customers without procuring additional supply. The City should continue to focus on improved operational efficiency, billing of all customers and related activities.

3.5. ENERGY EFFICIENCY

Improving the efficiency with which energy is consumed should be a priority as it supports greater economic activity in the City using less natural resources and at lower costs. For the power utility driving energy efficiency improvements amongst customers is typically in conflict with the reduced revenue from lower electricity sales.

Implementing energy efficiency is however aligned with national policy and the City's sustainability objectives. In the current environment where supply is constrained, there is limited risk of losing sales of energy that is not available to sell. In this and the potential value contribution of energy efficiency lies in assisting with balancing supply and demand.