

Alternative Energy Possibilities in KDM

Project: Electricity Network Masterplan

KwaDukuza Municipality



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Introduction

- Part of Masterplan scope to look into Alternative Energy Possibilities in KDM
- Workshop conducted to establish criteria and objectives
- Study conducted and consultation with industry experts to deliver proposed approach

Objectives and Drivers

The Objectives and Drivers for KDM wanting to explore Alternative Energy possibilities include:

1. The current national energy challenges and energy security
2. National targets for Renewable Energy eg 20GW by 2030 from IRP
3. National government objectives and targets within the energy sector
4. That although there are national shortages and grid constraints, to be proactive to ensure continuing development and growth in the municipality
5. To develop solutions that are sustainable (considering environmental, economic and social aspects) for the municipality

The outputs of this element of the Masterplan should deliver

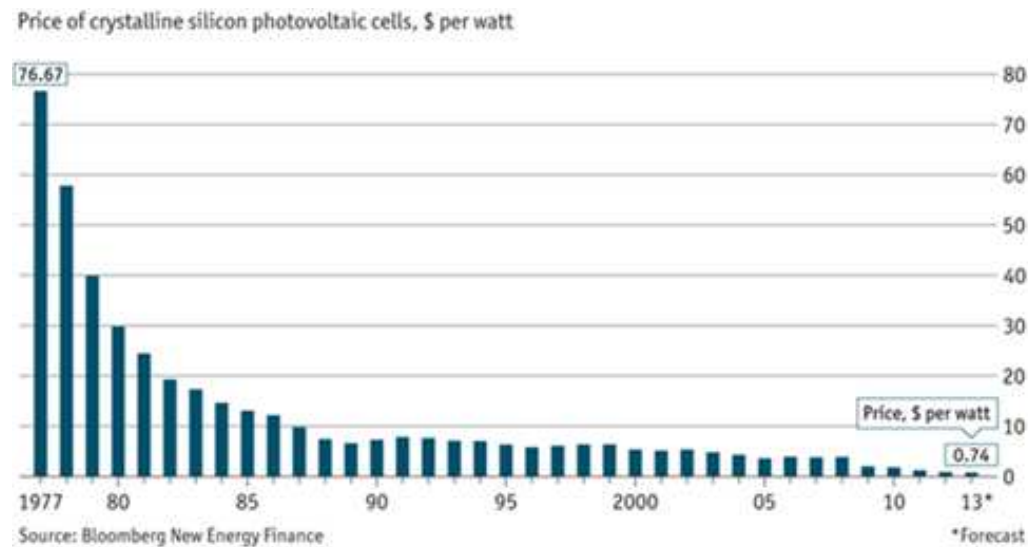
- a. Analysis of processes to unpack and unlock potential options
- b. Provide an understanding of the environment/setting so that KDM positioned to know what can be done

Background and context

- The energy market is rapidly changing due to various reasons including clean energy, influences of climate change, cost of energy, customers moving off the grid etc. In some more detail:
 - Renewable Energy, Energy efficiency, Demand side management and storage technologies (decreasing traditional kWh sales from utility)
 - Customers are getting smarter (behind the meter initiatives) such as smart mini-grids, storage and embedded generation enabling disconnection from the grid
 - Financial changes such as reduced technology costs and reduced financing costs (more affluent customers can choose alternatives due to financial considerations eg rooftop solar PV)
 - Enabling policy such as Renewable Energy and Energy Efficiency policies and subsidies (external influences impacting on kWh business of municipality)
 - Tax incentives such as the Section 12B, K and L for efficiencies and renewables
- Many of these are currently not yet reducing the required network capacity
- This has and will result in many non-utility players entering the market creating new competition and a risk of stranded assets for utilities
- The distributed generation and renewable energy will introduce variability into the network where a safe, reliable and clean supply of electricity is a key pre-condition for sustainability and economic prosperity

Background and context contd

- Typical illustration of reduced costs:



Background and context contd

- Some of the challenges with municipalities becoming generators include:
 - The definition of an IPP in the new NGR and MSA effectively means that local government cannot hold a direct or indirect controlling interest in an IPP
 - In addition currently municipalities do not have the ‘competency’ as a generator of electricity
 - The reduction in energy tariff and the need to assess tariff structures based on leased lines and networks
 - Safety concerns from embedded generation
 - Current poorly formulated policy to deal with embedded generation
- All, if not most of these items need to be addressed in order for municipality’s to embrace opportunities and minimise potential threats posed
- Therefore the existing utility business model and role requires a review

Proposed Approach

In order to address the objectives in the current context three main themes are envisaged

1. **Reduction of Demand** (including energy efficiency and DSM)
2. **Create Local Sustainable Generation** (including Renewable Energy, Distributed Generation)
3. **Create an enabling structure / environment** (including business strategy, tariff, signalling, technical capabilities, operational structures and policy)

Theme 1: Reduction of Demand

- If demand can be reduced and/or shifted this addresses a number of the objectives
- Reduction of own (KDM) demand:
 - Energy efficiency roll outs (lighting, cooling, heating, controls and sensors etc)
 - Rooftop PV solar on municipal buildings
 - DSM initiatives within KDM (operate heavy machinery out of peak)
 - Solar water heating (municipal buildings)
- Reduction of customer demand:
 - Energy efficiency programmes incentivisation and awareness
 - Reinstatement of ripple control geyser devices and/or solar water heating
 - Tariff signals to effect customer behaviour change and energy usage patterns
 - Implement an ISO 50001 energy efficiency management system
- Possibility of being exempted from load shedding (as per NRS 048-9:2010) if can show reduction in usage. This has many obvious positive benefits including:
 - Industry not affected by power cuts therefore will not have operational losses (this includes KDM)
 - KDM revenue from electricity sale will be less effected
 - Energy in KDM can be secured and potentially attract further investment and development

Theme 2: Create Local Sustainable Generation

- If an increase in generation can be achieved this addresses a number of the objectives
- Options to consider:
 - Renewable Generation (such as solar PV, Wind, Ocean, Biomass and Hydro) owned by KDM, private individuals, industry or partnerships
 - Distributed Generation (can include large scale ground or rooftop PV) including partnerships
 - Gas fired power station (peak or baseload)
 - Solid Waste to energy from the KDM landfill site
 - Liquid Waste to energy (municipal/district, farm/home owners)
 - Cogen take off from mills / industry in the area
- Generation at distribution level closer to load centers will decrease losses and alleviate load on (backbone) infrastructure:
 - This could include mini-grids islanded at rural locations (off-grid electrification) or
 - Generation at constrained points eg Groutville area
- Potential challenges include approval processes incl EIA's, generation licences, grid code compliance, land ownership etc

Theme 2: Create Local Sustainable Generation contd

- A high level comparison for some of the options

Option	Technology maturity	Resource Locally avail	Economic impact	Environmental Benefits	Social Benefits	Effects on network
Solar PV	Good	Fair, better options avail within SA	High capital, lower O&M costs	Good	Minimal	Introduces variability
Wind	Good	Minimal, better options avail within SA	High capital, lower O&M costs	Good, although local impact to fauna	Medium	Introduces variability
Hydro	Good	Minimal	High capital, lower O&M costs	Good	Minimal	Introduces variability
Ocean	Low – medium	Medium	Very high costs associated	Under assessment	Minimal	Introduces variability

Theme 2: Create Local Sustainable Generation contd

Option	Technology maturity	Resource Locally avail	Economic impact	Environment al Benefits	Social Benefits	Effects on network
Biomass	Medium to good	Good	High capital, high O&M	Medium to good	Good	Addresses baseload constraints
Gas fired power station	Good	Medium (future plans?)	Medium capital, medium O&M	Medium	Medium – good	Can address baseload and peak
Solid waste to energy	Medium to good	Good	High capital, medium O&M	Good	Good	Can address baseload
Liquid waste to energy	Good	Medium	Medium capital, medium O&M	Good	Medium	Can address baseload and peak
Cogen	Good	Medium	Medium capital, medium O&M	Good	Medium	Can address baseload

Theme 3: Creating an enabling Structure/ Environment

- In order to achieve specifically theme 2 an enabling environment/framework/structure needs to be created – this may be quite a departure from current business (buy and sell of kWh) operations/models
- The role of the distributor / utility is migrating from electricity (kWh) supplier to electricity networks service provider and value added services requiring:
 - Role to be redefined depending on the business strategy that the municipality wishes to follow
 - The municipality will need to become more flexible, providing multiple products and services to specific segments (e.g. support for Dx generation, rooftop solar, metering services etc.), including appropriately structured pricing options
 - Tariff should be restructured/unbundled to allocate the appropriate fixed and variable costs i.e. Cost Reflective
- A key role and focus area will be the control and balancing of the distributed electricity grid where the distributed generation and renewable energy have introduced variability into the network
- The municipality will need to commit to investing in new technologies to meet energy demand and fluctuations
- The two key innovation trends and requirements focus on the smart grid and business and financing models

Theme 3: Creating an enabling Structure contd

- This can be addressed by exploring a number of dimensions to limit risk and identify opportunities including:
 - Different tariffs for varying customer needs as well as targeting the balancing of the load
 - Residential customers
 - Industrial customers
 - Users of the network ie IPP's etc
 - Demand notifications to ensure NMD not breached
 - Ensuring quality of supply and availability of network to optimise situation
 - Smart metering to say top 50 energy users with options to curtail usage (underpinned by metering strategy)
 - Policy and guidelines of how to deal with IPP's or similar
 - Incentives for green developments/developers
 - Considering a different model, i.e. instead of selling electricity, the municipality sells energy solutions, i.e a solar rooftop solution
 - Securing the services of a Certified Energy Manager for ISO 50001 implementation

Theme 3: Creating an enabling Structure contd

- Supply Chain Management in terms of the MFMA and Municipal Supply Chain Management Regulations is seen as a barrier for a munic to purchase from a non-organ of state
- Financing of Municipal Capital Projects: the MFMA sets out the budgetary implication with which long term contracts are also obliged to comply
- Therefore to try and penetrate the market, the municipality would need to:
 - Enter into agreements with private entity under certain conditions (eg PPP arrangements)
 - Or allow IPP's to wheel power through the local grid
 - Unless the Minister by virtue of a determination, authorises a municipality directly to "establish new generation capacity"
- Financial, legal and regulatory input would certainly be required

Proposed Way Forward

Theme	Description	Timeline	Outcome
Reduction of Demand	Conduct energy audits and reduce own internal demand and/or shift load	24 months	Reduce own demand
Reduction of Demand	Conduct awareness campaigns and facilitate energy efficiency programmes	18 months	Reduce customer demand
Reduction of Demand	Investigate potential for exemption from loadshedding	9 months	Understand if this can be achieved and detailed requirements
Sustainable Generation	Conduct Pre-feasibility study to determine best RE type to explore	24 months	Selection of Renewable Energy options to explore further
Sustainable Generation	Engage with industry for Cogen take off options	12 months	In principle agreements about use of Cogen in KDM

Proposed Way Forward contd

Theme	Description	Timeline	Outcome
Enabling Environment	Decide and develop business strategy to be adopted by municipality	18 months	Clarity on role for the future
Enabling Environment	Develop service offerings, unbundled tariffs	12 – 24 months (12 month lag)	New services and tariffs for market
Enabling Environment	Invest in network capabilities to accommodate RE	36 + months	Network capable of accommodating new RE
Enabling Environment	Develop internal guidelines on dealing with IPP's or similar	18 months (12 month lag)	Ability to quickly respond to market
Enabling Environment	Develop strategy on participation in PPP 's	18 months (12 month lag)	Ability to quickly respond to and drive market

Thank you

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