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SUSTAINABLE ENERGY PLAN 2030

Date: September 2022

1. Objectives

The objective of this document is to raise the awareness and importance for the NMBM to proactively pursue the relevant renewable energy opportunities, to solicit the relevant approval, and delegation of authority, to proceed with the implementation of the Sustainable Energy Plan 2030, subject to the associated compliance requirements. Furthermore, the objective of the Sustainable Energy Plan 2030 is to provide strategic direction to potential investors, customers and the NMBM to inform the operational alignment that will ensure a sustainable energy future.

2. Problem Statement

The electricity industry in its current form seems to be taking a downward trend where the sustainability of the business is under threat. The industry is characterized by the declining sales (at a local level), rising electricity cost, unreliable supply from the sole provider, while it is imperative to protect the environment which is being compromised by the continuous fossil fuel emissions. The constitutional mandate of the NMBM is clear, to provide critical services to our communities in a sustainable manner. Sustainability has to be considered from both a financial and environmental point of view.

The electricity industry therefore finds itself in an unprecedented changing landscape. Now, more than ever before, it is important to provide thought leadership, to keep staff motivated and focused on the opportunities at hand and to build stakeholder confidence through ethical conduct, transparency and service excellence. Furthermore, it is essential to give customers, potential renewable energy producers, energy traders and investors strategic guidance in respect of the envisaged future of the NMBM. In these trying times, the pressure on business to perform at benchmarked standards will increase. Structural alignment is essential to effectively respond to the challenges and to capitalise on the opportunities at hand. The resource profile will have to be addressed, as additional funding requirements are evident.

3. Energy Landscape

Coal is the largest energy fuel source in South Africa with over 85% of the generated electricity in the country coming from coal. While coal has been successfully deployed in generating electricity, it has also placed South Africa amongst the top ten greenhouse gas emitters in the world. Furthermore, the adverse impact of deferred coal-fired power generation plant maintenance must be addressed to improve the generation plant availability and capacity reliability. Considering that municipalities are predominantly dependent on Eskom for the bulk of their capacity and energy procured, it implies that municipalities indirectly contribute to the pollution created by Eskom through their coal-fired power stations.

In the historic electricity and energy business, which was fundamentally a volumes business i.e. the selling of kilowatt hours (kWh's), the focus was on energy procured from Eskom, some own generation capacity, the increase of sales volumes sold at a higher price and some cost reduction. This approach did contribute to an improved return on investment, however, the current business landscape is much more complex and no longer provides the luxury of only pursuing this simplistic approach. High costs associated with bulk energy procurement, loadshedding and competition



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from renewable energy options, more efficient and reliable energy related solutions, customer choice and industry reform initiatives significantly affect the current business model. While some historic practices are still relevant, new business opportunities (inclusive of new products and services) must be explored which require the business focus, practices and structures to be reviewed to provide for the required business agility.

It is globally recognised that sustainable energy provision forms an integral part of the key economic enablers. The relationship between sustainable energy provision and the impact on the environment / climate cannot be ignored. The demand for clean, reliable, and affordable energy is rising. In establishing sustainable energy sources, it is essential to pursue an optimised energy portfolio that will complement the clean energy and zero carbon objectives. Furthermore, the electricity supply industry is confronted with numerous sustainability challenges culminating the need for radical industry reform. This is the backdrop against which the broader stakeholder base must be mobilized and sustainable energy solutions be explored. There is no “one size fits all” solution, hence local requirements must be considered and solutions tailored to provide the most optimal solutions from a local perspective within the broader national context.

In summary, the NMBM has to consider the following:

- a) Diversify the energy portfolio within the NMBM, over-reliance on Eskom is not sustainable from an economical and environmental point of view.
- b) Decarbonize the energy portfolio by introducing renewable energy sources into the NMBM energy mix.
- c) Diversify the product and service offerings in order to generate new revenue streams.

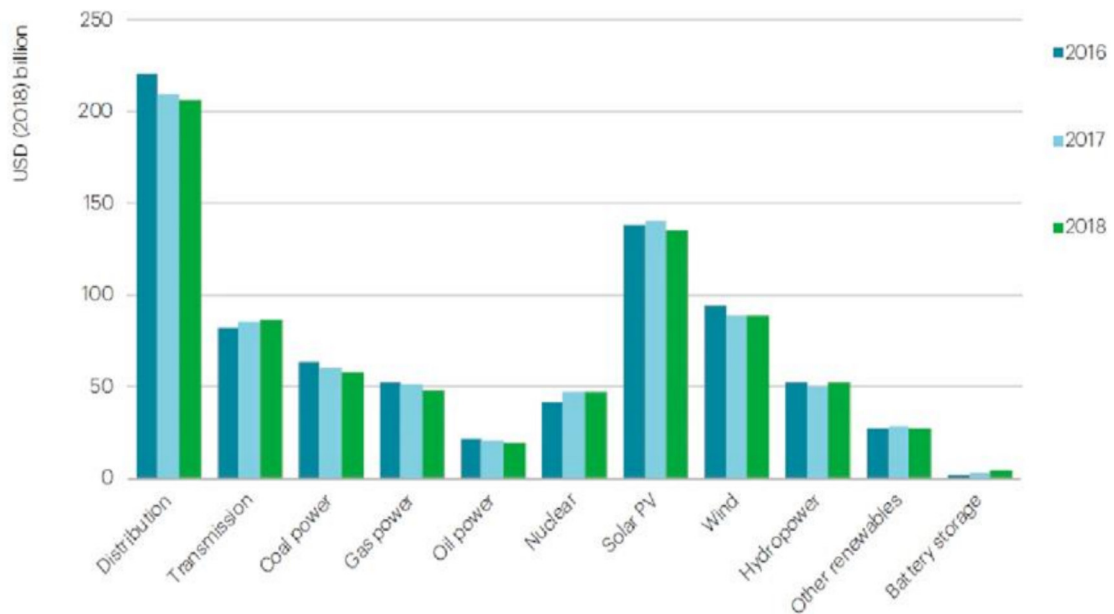
4. Proposed Renewable Energy Solution and Potential Benefits

From a global perspective, the indications are that a wider portfolio of energy solutions is endorsed, as is evident from the global investment in the power sector by technology for the period 2016 to 2018 measured in US Dollars – see **Figure 1** below. From the investment analysis, it is evident that the global focus is on the distribution sector. This favours the NMBM, on condition that the existing infrastructure be effectively leveraged. The investment in the distribution sector is of importance and demonstrates the need for having reliable infrastructure to support the energy delivery to end customers. **Figure 1** further shows that solar photovoltaic and wind are the preferred energy provision areas from a renewable energy perspective. Infrastructure stability will assist in positioning the NMBM to become the energy carrier of choice, irrespective of who the provider or source of the energy supplied to the grid is.



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Figure 1: IEA analyses – Global investment in the power sector by technology 2016 – 2018



Furthermore, the investment in renewable energy not only assists in decarbonizing the energy sector, but it also corroborates to the decline in the cost associated with renewable energy technologies which underpin the migration of customers from the traditional grid dominated energy supply to renewable energy solutions. The transition to renewable energy and the building of a sustainable carbon free green economy must be encouraged. Benefits to customers must be such that it incentivises customers not to deflect from the grid. Creating an environment where both customers and the NMBM can realise benefits is possible through, among others, dynamic tariff structures, indiscriminate energy wheeling, bi-directional energy flow incentives and appropriate technology deployment. The effective integration of renewable energy options could contribute to energy loss reduction, improved network loading and capital investment deferment. These are the kind of interventions that will promote customer loyalty, foster trust and demonstrate transparency.

In fourteen years, the Eskom electricity tariffs have increased more than five-fold in real money terms. The tariff increases experienced to date are expected to continue for the foreseeable future. Therefore, the NMBM is compelled to diversify the energy mix and to source a greater percentage of the energy and capacity requirements from renewable energy sources. However, energy procurement and energy consumption must also be considered within the National energy context being cognisant of climate change realities and an optimised energy mix. To this effect, the strategy underpinning the Sustainable Energy Plan 2030 considers supply, technology, procurement, cost and efficiency of all energy options. Furthermore, the skills required to support a diversified and decentralised energy portfolio must be addressed. It is acknowledged that the sustainability of the existing business is under threat. Through the Sustainable Energy Plan 2030, the strategy is to leverage prudent technologies, own resources, partnerships, private sector initiatives and customer renewable energy investments to diversify the energy mix and to leverage economies of scale in the interest of customer choice and business sustainability. The latter will not be pursued at the cost of the environment, while the customer diversity, inclusive of the needs of the poorer customers, will not be ignored. An integrated approach is required since energy is a commodity paramount to economic growth that cuts across all societies, the entire business and



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all activities underpinning a sustainable society. Energy security, bi-directional energy flow and the need for energy diversity is becoming the new power system norm. The deregulation of private sector power generation and the ramping up of IPP's or exemption thereof is also crucial to South Africa's energy security and the NMBM will support these initiatives to diversify the energy supply. From the above, it can be concluded that the power system redundancy and reliability, inclusive of the transmission, distribution, and reticulation infrastructure, must be central in the development of regional and local network interconnectors to facilitate energy exchange and energy source diversity in the interest of security of the power supply.

5. Legislative Framework

By its nature, the electricity and energy sector in South Africa is a regulated sector. The nature of the business, the role that it is playing in the economy, as well as its functions and responsibilities in the context of service delivery and social responsibilities, require effective legislation, policy and regulation. To this end, it is important to consider the Constitution of the Republic of South Africa Act 108 of 1996, the Bill of Rights, the Municipal Systems Act 32 of 2000, the Electricity Regulation Act 4 of 2006 and the local Integrated Development Plan (IDP).

The Bill of Rights provides that: "Everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation, (ii) promote conservation, and (iii) secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development." Chapter 2 of the Bill of Rights of the Constitution further states: "The State must respect, protect, promote and fulfil the rights in the Bill of Rights".

Furthermore, the Municipal Systems Act 32 of 2000 provides that a municipality is an organ of state within the local sphere of government exercising legislative and executive authority within an area determined in terms of the Local Government: Municipal Demarcation Act 117 of 1998. The Municipal Systems Act 32 of 2000 establishes that a municipality has all the functions and powers conferred by or assigned to it in terms of the Constitution and must exercise those powers subject to Chapter 5 of the Municipal Structures Act 117 of 1998, Section 83, refers to the functions and powers of a municipality as being those assigned to it in terms of Sections 156 and 229 of the Constitution. The Constitution empowers a municipality with the executive authority and the right to administer certain local government matters and any other matter assigned to it by national or provincial legislation. In terms of Section 156(1) of the Constitution, these matters are listed in Part B of Schedule 4 and Part B of Schedule 5 of the Constitution. The Constitution provides in Section 155(6)(a) and (7) and Schedule 4B, that electricity reticulation is a municipal competency. This means that a municipality is responsible for providing electricity reticulation services to the customers within its jurisdiction. Reticulation is defined under the Electricity Regulation Act 4 of 2006 as "trading or distribution of electricity and includes services associated therewith." Distribution of electricity is defined in the Electricity Regulation Act 4 of 2006 as "the conveyance of electricity through a distribution power system excluding trading, and "distribute" and "distributing" have corresponding meanings." The electricity reticulation function extends to the obligation on municipalities as licensed distributors to provide open and non-discriminatory access to the municipal distribution system. Accordingly, its electricity reticulation function includes, *inter alia*, administering the connection of generation systems to the municipal distribution system. Section 11 of the Municipal Systems Act 32 of 2000 states that a municipality must exercise its authority by *inter alia* (a) developing and adopting policies, plans, strategies,



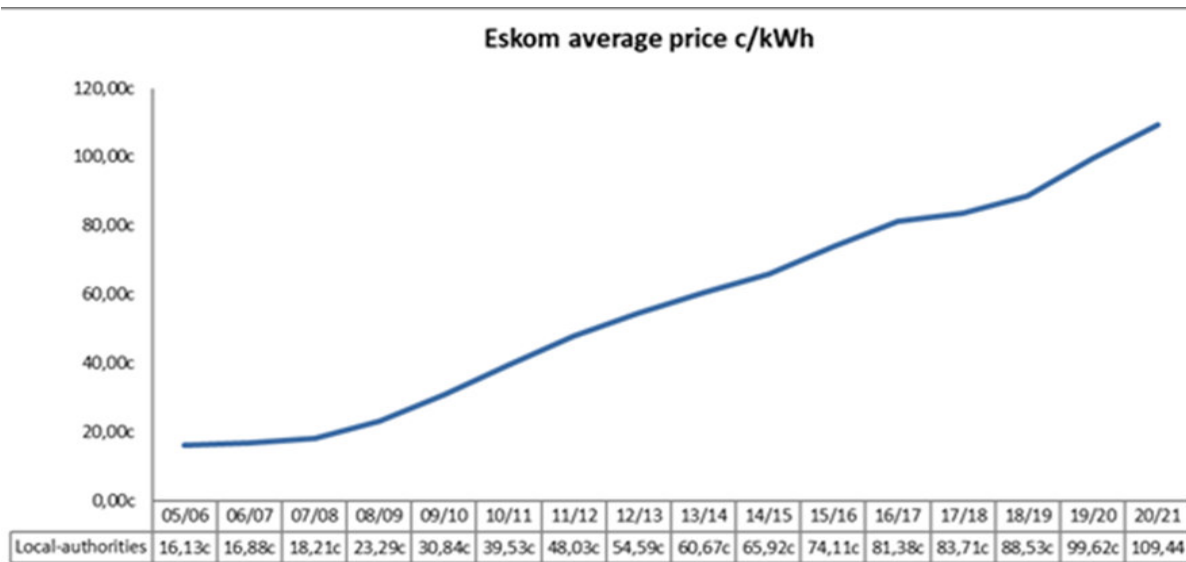
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and programmes, including setting targets for delivery implementing applicable national and provincial legislation and (b) implementing applicable national and provincial legislation and making by-laws. Authorised municipalities therefore have the duty to develop by-laws to effectively administer their electricity reticulation function, which includes, *inter alia*, the connection of generation systems to the distribution system and to develop the required policies relating to the connection of generation systems to its distribution system.

6. Benefits from Renewable Energy from a Cost of Supply Perspective

The procurement of energy remains the dominant cost associated with the NMBM. The graph (**Figure 2**) below reflects the average Eskom tariff increase for the period 2005/06 to 2020/21.

Figure 2: Eskom average price increase



The latest indications are that Eskom might approach the National Energy Regulator of South Africa (NERSA) for a tariff increase in the order of 20,5%. Based on the Cost of Supply Study conducted by the NMBM, this presents an unsustainable business challenge. It is therefore essential to pursue renewable energy procurement to reduce the average energy procurement costs.

The example below reflects the business potential should renewable energy be procured at a more competitive rate than the energy procured from Eskom. Using the 2021/22 financial year purchase from Eskom as reference and projecting 30% renewable energy purchases by 2030, will provide the following indicative energy purchase savings:



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Example of impact of RE on the electricity purchase price

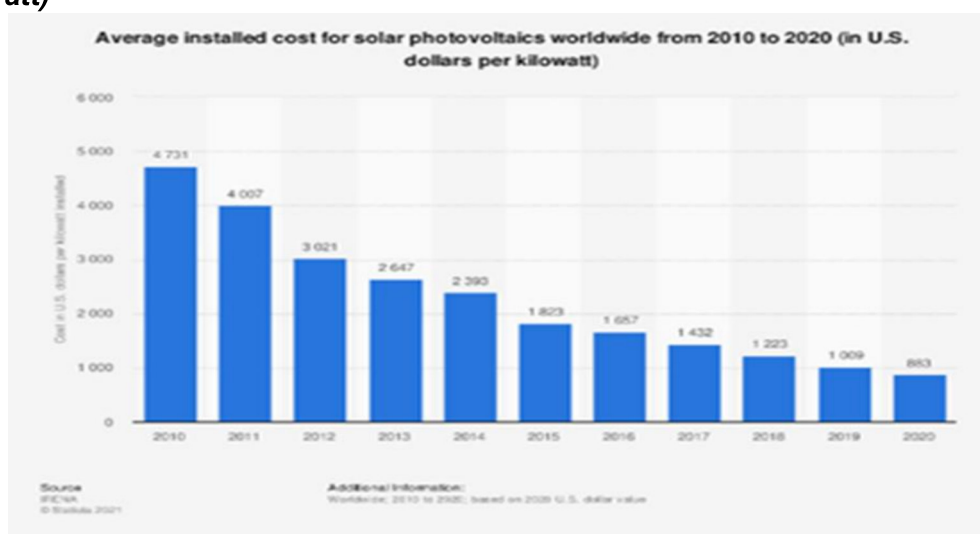
2030 in today's rands		kWh	
Purchase from Eskom currently		3 341 076 614	
If convert 30% to RE by 2030		1 002 323 984	
Average Eskom Purchase price	R	1.30	
Average RE purchase price	R	0.62	
Purchases in 2030 at today's rands		kWh	R/kWh
Eskom (less RE kWh)		2 338 752 930	1.30
Renewable Energy		1 002 323 684	0.62
Total kWh and revenue		<u>3 341 076 614</u>	<u>3 661 819 493</u>
Average purchase price in 2030	R	1.10	
Saving on Eskom purchase price		16%	

NOTE: There are some informed sources forecasting that the price of renewable energy can drop to 32 cents per kWh by 2030.

7. Technology Availability and Costs

Customers currently have access to a wide range of energy efficient and alternative energy options. These options include higher efficiency equipment and appliances, as well as access to alternative energy solutions. The cost of these options is decreasing at a remarkable rate in contrast to the cost of traditional grid electricity, which is experiencing a steep increase. **Figure 3** indicates that the price of solar photovoltaic reduced by 536% over the past ten years.

Figure 3: Average installed cost for solar PV worldwide from 2010 to 2020 (in US Dollars per kilowatt)



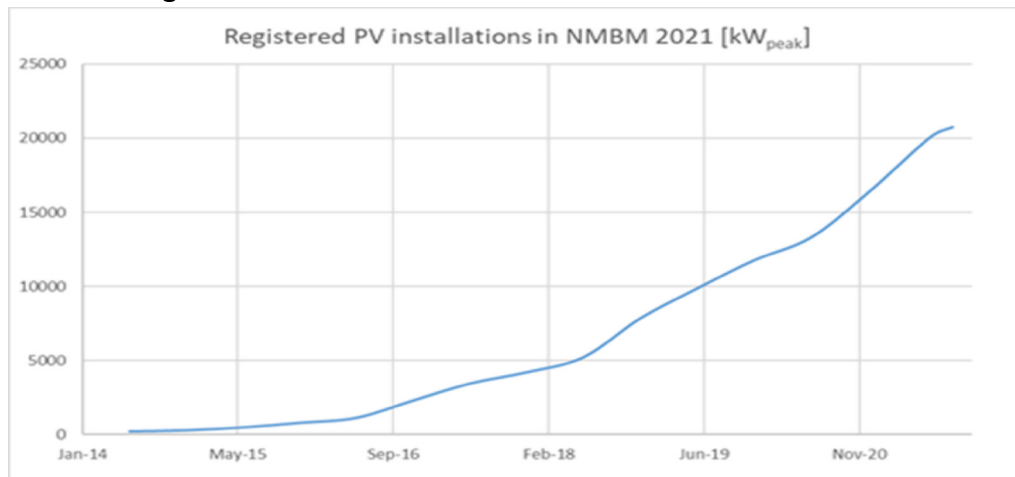
In contrast to the decline in the price of solar photovoltaic as reflected in **Figure 3**, a 277% increase in Eskom’s average price over the past sixteen years was experienced. These industry



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dynamics make it attractive for customers, who can afford it, to invest in alternative energy solutions like photovoltaic installations. Within the NMBM area of jurisdiction there is a strong growth in solar photovoltaic installations as is evident from **Figure 4** below.

Figure 4: NMBM Registered PV Installations



The opportunity for the NMBM is in the ability to leverage these customer investments, which will improve the energy mix and decrease the cost of energy procured for distribution to end customers.

In the context of technologies available to the NMBM, it is recommended that solar, wind and energy storage opportunities be proactively pursued.

It is important that the NMBM do not restrict their options to a limited number or a specific technology.

There is no “one size fits all” solution, hence local requirements must be considered, solutions and technology options be tailored to provide the most optimal solutions from a local perspective within the broader national context.

8. Procurement Strategy

a. Preferred procurement option

While legislative, regulatory and policy constraints are acknowledged, the opportunities are embedded in finding business solutions within the constraints of the existing business operating regime. The NMBM is duly licensed and therefore authorised to generate, distribute, trade in energy and to retail energy to end customers. The opportunities can be realised through leveraging the Constitutional authority, the NERSA licence, the demarcated area of jurisdiction of the NMBM, the local IDP and the infrastructure footprint to create an environment where the NMBM takes the lead in developing an energy business environment conducive to growth and sustainability. Electricity Regulation Act 4 of 2006, Schedule 2, changes, presents a significant opportunity to contract with IPP's for capacity up to 100 MW, with substantial regulatory registration flexibility. It is envisaged that the NMBM will issue during the 2022/23 financial year, a request for proposals for the first phase of renewable energy to be procured directly from IPP's as well as a request for proposals for embedded energy storage solutions.

Using the 2020/21 maximum demand figures as reference, the table (**Figure 5**) below reflects the renewable energy target to be achieved as measured against the 2021/22 reference figures.



Figure 5: Renewable Energy Target

Renewable Energy Target						
	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
	Reference	Target	Target	Target	Target	Target
Demand (kVA) from Eskom	652262,52	615300,00	596953,00	597032,00	593852,00	579185,00
Demand (kVA) shaving through improved energy management		5000,00	7000,00	6000,00	5000,00	5000,00
Demand (kVA) shaving through shifting municipal own consumption to municipal owned RE installations		7000,00	10000,00	15000,00	15000,00	15000,00
Demand (kVA) shaving through procurement from IPP's		8000,00	58000,00	64000,00	75000,00	100000,00
Total demand (kVA) from	652262,52	635300,00	671953,00	682032,00	688852,00	699185,00

b. Alignment with Integrated Development Plan (IDP)

Based on the 2021 data available, the estimated own consumption for the NMBM is 90MW. This presents a significant opportunity to shift a substantial portion of this load to renewable energy solutions. These renewable energy solutions can include municipal owned installations, Private Public Partnerships (PPP's) or IPP's. The shifting of this load to renewable energy solutions can directly contribute to an improvement in the load profile, a reduction in the Eskom bill and a reduction in the average cost of energy. Enablers such as net billing and energy wheeling will be leveraged in the short to medium-term to promote the efficient use of energy. Under the direct control of the NMBM is the enhancement of the business integration across directorates. These interventions will ensure a positive contribution to the local IDP. Furthermore, delegation, accountability and responsibility must be key focus areas in the drive towards attaining the energy sustainability and enhanced energy mix objectives. To this end a multifunctional Sustainable Energy office needs to be established, reporting directly to the Executive Director: Electricity and Energy.

c. Approach to renewable energy procurement

In the interest of energy sustainability and effective energy procurement, it is essential to pursue a diversified energy mix. It is unsustainable to continue with an arrangement where the procurement of capacity and energy is dominated by a single supplier using coal-fired power stations as their primary energy source. Therefore, the NMBM must diversify the energy supply portfolio, proactively search for and contract with new energy providers. Procurement preference should be given to local renewable energy opportunities inclusive of photovoltaic, wind, hydro and energy storage. The NMBM should also consider scalable gas opportunities that might develop in the future and could complement the objective of the Electricity & Energy Directorate's.

The effective integration of renewable energy into the distribution network / grid can also contribute to the reduction in technical losses through voltage improvement. Renewable energy procurement, complemented with energy storage solutions, can further contribute to grid management flexibility, as well as capital deferral. These factors can directly yield improved revenue realisation, facilitate the introduction of new products and services and ultimately decrease electricity supply costs for customers. It is essential that the NMBM not only facilitates the connection of renewable energy to its grid, but also actively participates in the opportunities



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offered by these new technologies, inclusive of investment in municipal owned renewable energy solutions.

Although the cost of renewable energy related solutions is on the decrease, depending on the capacity and technology choice, the capital required to develop the projects could still be substantial. Despite the availability of bankable projects, access to capital remain a barrier to entry in some cases and the NMBM is not excluded. It is therefore essential that partnerships and longer-term power purchase agreements be considered. The benefits to be derived from such arrangements include long-term electricity security at a lower cost and manageable risk. Agreements exceeding three years are regarded as a legislative challenge from a municipal perspective. However, Section 120 and Section 33 of the Municipal Finance Management Act 56 of 2003 prescribes a process to be followed to obtain the required permission to enter into longer-term agreements. It is essential that any contracts longer in duration of five years be subjected to five year review cycles with a clause aimed at the reduction of the contracted price. This is important and in the interest of effective competition in the energy sector. Furthermore, through PPP's, it might be a prudent and secure approach to obtain the required project funding. Leveraging land owned by the municipality to secure an interest in a PPP arrangement is a very worthy consideration. In the event of the NMBM entering a PPP arrangement, the PPP process as prescribed by the National Treasury must be complied with. The process requires, amongst others, documentation pertaining to: inception phase, feasibility study, procurement, and PPP agreement.

d. Department of Mineral Resources and Energy (DMRE) application process for additional capacity

The amendment of Schedule 2 of the Electricity Regulation Act 4 of 2006) that was published on 19 August 2021, allows IPP's to install generation facilities of up to 100 MW without a generation license and permits electricity wheeling to multiple customers. This serves as testimony of Government's commitment to renewable energy. Considering the NMBM requirements in respect of renewable energy, it is not envisaged and neither recommended that single installations exceeding the 100 MW threshold should be pursued. The focus should remain on the diversity in energy procurement from a multiple of reputable renewable energy providers.

9. Conclusion

The NMBM need to acknowledge the importance to grow a green economy, to eradicate energy poverty and to ensure that customers receive reliable energy at a realistic price. The NMBM should further acknowledge that business sustainability is critical and in the interest of stakeholders, customers, investors, employees and shareholders. The decisions and actions taken now will shape the environment, impact on our climate and the business dispensation that will dictate the future. Therefore, the Energy Procurement Strategy 2030 to be deployed must lay the foundation for an energy dispensation that will work in harmony with the environment, facilitate bi-directional energy transfer, contribute to a sustainable and inclusive economy, attract investors, facilitate job creation, enhance the quality of living conditions and provide a sustainable low carbon energy future.