RB9.1.12/31-03-2022 RENEWABLE ENERGY POLICY

Manager Electro-Technical Services: R September

PURPOSE OF THE REPORT/DOEL VAN VERSLAG IS AS FOLLOWS:

I. To ask that Council take note of the draft policy.

II. That Council refer the draft policy to a workshop with all councilors.

III. That Councill instructs the Municipal Manager to resubmit the policy to Council in May 2022 for final approval.

BACKGROUND

This Renewable Energy Policy strives to provide direction on how Cederberg Municipality can best meet the future demand for energy in the changing energy landscape and create an enabling environment for the execution of viable energy infrastructure projects. Cederberg Municipality have no policy guiding the processes of developing sustainable Renewable Energy platforms as per the latest drive of the Western Cape Government to build energy security to buffer households and businesses from load shedding in the Cederberg Municipal area.

The Policy includes Cederberg Municipality Integrated Resource Plan (CIRP), the CIRP will guide Cederberg's choice of energy generation to maximize the Municipality's ability to provide least-cost, reliable electricity to all our citizens and businesses, stimulate economic diversification and job creation while supporting environmental sustainability.

Cederberg Municipality is suffering huge financial expenses due to Eskom's frequent power outages that easily lasts up to 12hours at a time.

FINANCIAL IMPLICATIONS / FINANSIËLE IMPLIKASIES

None.

RELEVANT LEGISLATION / RELEVANTE WETGEWING

NERSA Framework.

COMMENTS: DIRECTOR COMMUNITY SERVICES AND PUBLIC SAFETY

ITEM FULLY SUPPORTED

COMMENTS: DIRECTOR SUPPORT SERVICES

ITEM FULLY SUPPORTED

COMMENTS: DIRECTOR TECHNICAL SERVICES

ITEM FULLY SUPPORTED

COMMENTS: MANAGER LEGAL SERVICES

ITEM FULLY SUPPORTED

COMMENTS: ACTING MUNICIPAL MANAGER

ITEM FULLY SUPPORTED

SUMMARY

I. The renewable energy policy is fundamental to set Cederberg municipality on a path toward least-cost, reliable clean electricity that supports our local economic development while reducing our CO2 footprint.

II. Cederberg Municipality currently has no policy in place.

III. This renewable energy policy proposed by this report will serve as a guideline on the implementation and operation of renewable energy sources across the Cederberg municipality.

RECOMMENDATION

The recommendation is that Council:

a) Take cognizance of the draft policy.

b) That Council refers the draft policy to a workshop with all councilors.

c) That Council instructs the Municipal Manager to resubmit the policy to Council in May 2022 for final approval.

Cederberg Municipality Renewable Energy Policy

2022-2023

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Abbreviations

AC - Alternating Current

DC - Direct Current

DMRE - Department of Mineral Resources and Energy

DSM - Demand Site Management

LED - Light emitting diode

IPP - Independent power producers

IRP - Integrated Resource Plan

MW - Megawatt

NERSA - National Energy Regulator of South Africa

NG - Natural Gas

O&M - Operations and Maintenance

PPA - Power Purchase Agreement

PPP - Public-Private Partnerships

PV - Photovoltaic

REIPPPP - Renewable Energy Independent Power Producer Procurement Programme

SOE - State-Owned Enterprise

SSEG - Small-Scale Embedded Generation

Introduction.

1. This policy strives to provide direction on how Cederberg Municipality can best meet the future demand for energy in the changing energy landscape and create an enabling environment for the execution of viable energy infrastructure projects.

2. Cederberg Municipality is committed to developing sustainable Renewable Energy platforms as per the latest drive of the Western Cape Government to build energy security to buffer households and businesses from load shedding in the Cederberg Municipal area.

3. Due to rising urbanisation, population growth and energy demand, the opportunities around renewables in municipalities are increasingly recognised in South Africa. Common drivers for renewables include reducing poverty, inequality and boosting the resilience and reliability of power systems, including addressing cost effective energy access and energy poverty.

4. Cederberg Municipality are committed to a more sustainable approaches towards energy generation and usage there off, so doing promoting local economic development and meet the ever-present social needs, while contributing to the drive to reduce our environmental impact.

5. This policy aims to incentivise local renewable energy generation and efficiency consumption projects, by supported urban community energy projects; and facilitated co-operation among different stakeholders.

6. The Policy includes Cederberg Municipality Integrated Resource Plan (CIRP), the CIRP will guide Cederberg's choice of energy generation to maximize the Municipality's ability to provide least-cost, reliable electricity to all our citizens and businesses, stimulate economic diversification and job creation while supporting environmental sustainability.

Energy Vision for Local Government in South Africa.

7. The latest Government gazetted amendments to the Electricity Regulations on Generation Capacity (2011) of the Electricity Regulation Act of 2006, now provides opportunity to municipalities to implement their own energy generation projects and acquire power directly from IPPs and/or through PPPs.

8. On 10 Jun 2021 President Cyril Ramaphosa announced an amendment to Schedule Two of the Electricity Regulation Act. This was a significant new step in further reforming our electricity

sector towards achieving a stable and secure energy supply. Following an extensive public consultation process and technical work undertaken by the Department of Mineral Resources and Energy (DMRE), amendments to Schedule 2 of the Electricity Regulation Act increased the NERSA licensing threshold for embedded generation projects from 1 MW to 100 MW. This removed a significant obstacle to feasible investment in embedded generation projects. Power Producers will also be allowed to wheel electricity from different locations through the transmission grid, subject to wheeling charges and connection agreements with Eskom and relevant municipalities.

9. Municipalities now have the discretion to approve applications for grid connections onto their network, based on Grid Impact Assessment, Environmental Impact Assessment, and all other statutory requirements and standards of existing legislation.

10. Cederberg Municipality now has the opportunity to embark on precuring energy at a more reliable, sustainable, and possible more cost-effective energy purchase cost. This will ensure that Cederberg's renewable energy targets can be achieved, supplying residents and businesses in their supply area.

Goals of Cederberg Integrated Resource Plan (CIRP).

11. The CIRP proposed a long-term clean energy strategy for Cederberg to ensure that it is far less reliant on energy from the national grid and to hopefully have renewable energy with a flexible mixed energy generation portfolio.

12. Cederberg Municipality, as the owner and operator of the municipal's Electrical Utility strives to;

    - Provide reliable sustainable clean energy supply to support the Municipal's economic development,
    - Reduce customers' electricity bills,
    - Develop the local energy industry to create jobs and diversify the Municipal's economy,
    - Provide a flexible energy system with a diversified energy generation mix, and
    - Increase renewable energy supply to Cederberg Municipality as a contribution to global climate action – aiming to achieve at least a 40% renewable energy generation by 2030 and complete provision by 2050.

13. Cederberg Municipal goals and targets within this strategy are summarised as:

    SUMMARY OF RENEWABLE ENERGY TARGETS

    13.1 25% renewable energy generation by 2024.
    13.2 30% of streetlight to be LED energy efficiency by 2025.
    13.3 100% of municipal-owned facilities to use efficient lighting, alternative water heating, climate control with latest energy saving technology by 2023.
    13.4 12% increase in energy efficiency in all municipal buildings by 2024.
    13.5 10% increase in energy efficiency in local commercial and industrial facilities by 2025.

13.6 10% of all households to have solar water heaters by 2024 and insure all new developments shall only use efficient water heater source, i.e., Solar or Gas.
13.7 30% of all domestic geysers to be on Load Ripple-control system by 2026.

Economic Imperative of Renewable Energy.

14. Presently, Cederberg Municipality purchases almost all its power from Eskom, except for a small private Turbine generation (IPP). Coal-fired generation makes up most of Eskom's generation capacity, therefore the current electricity supply in the municipality has a very low percentage of renewable power.

15. Renewable energy benefits can play a critical role in forming policy and encourage and facilitating low-carbon investments. Energy cost is a contributing factor to nearly every product and/or service in the economy and do influence the economic activity across all market sectors.

16. Accelerating the deployment of renewable energy in the municipality are likely t0 fuel economic growth, creating new employment and business opportunities, enhance social welfare, and contribute to an environment safer future.

17. Economic impacts are manly based on the consumption, employment and local investment; Social impacts do contribute to local expenditure on health and education; and Environmental impacts, are normally measured as greenhouse gas emissions and waste materials from consumption. Business opportunities in renewable energy in the area for equipment, investment goods and different services will increase because of the increasing deployment in power generation and the end-user sectors demand.

Cederberg Integrated Resource Plan (CIRP).

18. "Integrated Resource Plan (IRP)" refers to a planned schedule aim at generation expansion and enhancing energy efficient with demand-side management programmes, incorporating multiple different criteria to meet local electricity demand. The IRP should be updated regularly as technologies keeps on advancing and Municipality energy demands increases.

19. Cederberg Municipality Energy CIRP includes an selection of short and long-term implementation programmes to explore the latest renewable and energy saving technologies.

19.1 Purchase power from renewable IPPs and through PPPs with Power Purchase Agreement (PPA)
19.2 Undertake a comprehensive demand study to quantify the existing markets and future developments for potential green energy implementation within the greater municipal area.
19.3 To facilitate and encourage the implementation of renewable electricity generation systems connected to the municipal grid- (e.g., solar photovoltaic, Hydro, Biomass, and Wind), and establish the necessary guidelines or standards required.

19.4 Secure “Use-of-System Agreements” also known as “Wheeling Agreements” with Eskom for the transfer of power over the Eskom grid to the Five Municipals areas within greater Cederberg area, and also if any excess energy is generated to be made available to neighbouring Municipalities, or to larger Industrial or businesses with presently has Eskom accounts (i.e., Mines, Manufacture plants and/or large Agricultural consumers)

19.5 Audit of all existing municipal building’s energy consumption, to implement a Municipal energy efficient plan.

19.6 Municipality to continue monitoring its own total internal electricity consumption.

19.7 To develop a holistic Energy Efficiency and DSM Strategy for Cederberg Municipality, aligning with National policies and strategies in this regard.

19.8 Establish and dedicate resource within the Municipality to develop and manage energy efficiency and DSM initiatives and strategies, ensuring that goals are met.

19.9 Roll-out energy efficiency programmes (e.g., Building Energy efficiency retrofit, Domestic geyser ripple-control, Solar PV – rooftop, LED streetlights and Solar water heater)

19.10 To monitor the latest natural gas development in the West Coast area and undertake feasibility studies.

19.11 Establish feed-in tariffs for privately owned SSEG as compensation of surplus electricity fed into the Municipal grid, assisting Cederberg Municipality with their renewable targets.

19.12 Making provision for local Power Storage facilities from IPP’s, mitigating the eminent constant load sheading from Eskom.

19.13 Establish a feasible “Wheeling tariff” to enable local IPP’s to secure remote energy off-takers, thereby encouraging generation projects in the greater Cederberg municipal area.

Multi-Stakeholder Integration.

20. There are different financial models or funding offering which are utilised very successfully globally such as, Public-Private Partnerships, Independent Power Producers and State-Owned Enterprise. These ownership models have all been developed in an effort to balance the need for investment in renewable energy, with the economic and social needs of the community. Cederberg Municipality is open for stakeholder engagement in this regard.

21. Cederberg Municipality will submit applications to the DMRE requesting Ministerial support for the upfront feasibility, development, and preparation cost and/or the funding of new generation capacity projects, to fulfil the strategic goals of providing least-cost, reliable energy to all the Municipality’s customers, thereby achieving renewable energy goals.

22. Launch a renewable information dissemination campaign on renewable energy possibilities and energy efficient measurements in partnership with organised business, with Public Consultation.

23. Engage with service providers, when the renewable structures are in-place to develop local power storage solutions to shield the municipal residents and business from the risk of future load shedding outside the generation windows. Demand Side Management (DSM) within the Municipality will be utilized only for contingency measures as requires.

24. Cederberg Municipality to engage with National Treasury to structure, if possible, more market related long-term PPA models favourable to attract IPPs to invest and develop in the Municipal area.

Cederberg Municipality's required Key Steps in the Technical Design

25. This section outlines the technical and commercial processes required when applying for grid connection to the Cederberg Municipality's Electrical Department. Approved grid connections, implies that all key aspects have been accounted for, it complies with environmental assessments, statutory requirements and is safe to feed into the Municipal network.

26. The process of designing a successful renewable energy project is not linear, but iterative. During the technical design process, the following considerations need to be addressed, implementation cost, operations and maintenance (O&M) requirements, the capability to deliver Energy on demand, safe integration into the grid, load efficiency and load flexibility, and the potential to optimize the load profile. A decision made in a later step can influence a choice made in an earlier step. Following sizing the system, project developers should consider the cost and availability of energy resources.

    26.1 Defining the Geographic factors - the first step is to identify the project's geographic location, incorporating the number, load requirements and usage behaviour of customers in the Cederberg Municipality area. It is possible for a renewable energy plant to provide power to multiple off takers, existing residential, commercial, or industrial customers, supplied by the Municipal electrical distribution network. Choosing the best suitable resource and power generation technology normally depends on the number and types of customers (residential versus commercial and industrial). System design will also be influenced by characteristics such as land topography and accessible resources.

    26.2 Assess to available Energy Resources in Cederberg Municipal Area. - Once the project's geographic scope has been defined, developers will have to evaluate local energy resources, including capacity, availability, generation cost, sustainability, and potential conflicts. Energy resources for renewable energy facilities must be reliable and affordable enough to meet the off takers power demands. Different renewable energy resources have different advantages and disadvantages. As an example, a renewable energy facility in a region where biomass is available seasonally could provide peak demand power to an anchor off taker, such as a factory of larger agricultural production facility, but because its seasonal will not provide all-year-round electricity for residential customers in the Municipal area. Additionally, hydropower may also not be a sustainable year-round resource in the drought-prone regions in the Cederberg Municipality area. Developers should consult with local communities during the assessment process. It is possible to obtain valuable information about the availability and conflicts of utilising local natural resources of the community. Energy generation technology (or technologies) are selected after the most promising resources have been

identified. Developers have the option of selecting different technologies according to the energy resource.

Guidelines of a Renewable Energy Plant's Distribution System

27. It is important that the developer considers the requirements for the Cederberg Municipality's "Small-scale embedded generation requirements for Cederberg Municipality" when designing a facility. The developers of the distribution system must first design the layout of the system, select functional elements of the system before designing the distribution system. Based on the preliminary design and system characteristics, the next step is to model the efficiency of the system.

28. Developers can then calculate conductor sizes based on the amount of load requirements of the distribution system once they have defined the model for the distribution system. After the base case model is created, project developers can model different grid connection intake points (if the developer wants to utilize the Municipality's existing electrical distribution system to wheel) and loads. In terms of the design of the distribution system, an electrical consultants will determine the structural features (as opposed to the electrical features) of the system. To compute the total route of the distribution line or supply cables, providing a list of materials, based on the load and length required. A route survey would be required by a land surveyor to set-out the grid termination point, determine the type of structures, and other requirements. Often, the "wheeling agreement" that uses the Cederberg Municipality's distribution system connected to the renewable energy facility are more complex than those connected to "private distribution networks", therefor the Municipality will require from the developer a Network Impact Study compiled by a ECSA registered Engineer before any grid connections will be approved.

29. Hybrid systems require separate controllers for each power source, and the renewable energy facility needs an inclusive management system to integrate the different sources. When designing the distribution network, developers should ensure compatibility to the end-user system, including Smart meters as per Cederberg Municipality standards. Choosing the appropriate metering technology will be determined by the Municipality as part of the feedback from the completed application form to the Cederberg Municipality. Developers will be responsible for all cost associated with the metering system requirements.

Cederberg Renewable Energy Independent Power Producer Procurement Programme

30. CEIPPPP is aimed at bringing additional Energy onto the Municipal's electricity system tailor made through Public and/or Private sector investments into renewable energy projects as set out below:

    30.1 Photovoltaic.

A PV plant consists of an array of photovoltaic (PV) panels converts sunlight into electricity, mounted on support structures, which are interconnected suppling power to power conditioning subsystems. The panels cells are usually made from silicon alloys and are the technology most people have become familiar with. Although many plants use fixed structures mounting solar modules at an inclination, calculated to provide the optimum yield, other Single or Dual axis trackers are also utilised, able to track the sun's movement during the day, to provide a greater optimal widow of generation. Power conversions form the Solar panels DC generated electricity to network required AC is done by inverters connected as Centralized or String configurations, as required. Step-up transformers are used to supply the required network voltage as per the grid requirements. In hybrid facilities, PV systems can be combined with wind turbines or diesel generators and batteries for storage, to provide intermittent power supply for the hours the sun is not shining. The use of PV in alternative energy applications is becoming more and more financially viable. PV panels and related equipment were once very expensive but have decreased drastically from year to year, and tare expected to continue falling in price. PV generation plants are perfectly suitable for Cederberg Municipality and are looking forward to proposals on this regard.

30.2 Micro-hydro generation turbines.

A hydropower process is where flowing water is converted into energy by converting the water's energy into electricity. It is a type of energy source that is site dependent containing a reservoir/dam or retaining wall, even a waterfall, equipment such as a water turbine, an electrical generator, and a transformer if Grid requires a higher voltage. The amount of energy produced is directly proportional to the water in-flow and/or the height (called head) providing pressure to turn the turbines. Developers who identify sustainable water resources may find that mini-hydro's to be the more feasible option, with a lesser water course disruption. However, all relevant environmental legislation needs to comply too, this could be a lengthy process. Different turbine types and designs can be chosen by developers to maximize performance in different conditions. The Cederberg Municipality welcomes Hydro Generation plant in their area as a renewable energy source.

30.3 Wind turbines.

Wind's energy can be converted into electricity by wind power turbines. Despite its variable nature, wind can be a reliable resource that is easy to manage by different turbine aliment systems. The wind conditions vary greatly according to geography of the area, wind-based renewable energy facilities can only be used in areas where wind resources are proven constant. Mountains and coastal regions with persistent trade winds are favourable locations for wind-generation systems. Wind turbines of different sizes are utilised in the market, with either vertical or horizontal axes, most commercial used are the large three-bladed horizontal-axis wind turbines mounted on high towers, as are already installed in the Western Cape area. Modern wind turbines generally consist of several main components; a Tower, Rotor Blades, a Nacelle that contains a set of Gears and a Generator, complete with Controls and switchgear, and if required a transformer to comply to Grid voltage. Wind-resource assessment is critical as part of the feasibility study, various articles released over

the years, earmarked the Western Cape coastal areas as a favourable location for Wind farms, which is perfectly suitable for Cederberg Municipality.

30.4 Biomass and Agricultural waste.
The biomass power generators can produce electricity either from solid biomass, such as wood chips from the timber industry or crop waste from agriculture production or from liquid biomass i.e., biodiesel, or they can also generate electricity from gaseous fuel, like methane from organic waste. The biomass power plant produces heat by burning of waist produces, producing steam used for power generation, via a steam turbine and generator. Fortunately, the latest technologies of combustion engineering have developed various pollution controls systems, to the point that emissions from burning biomass are lately less than the emissions from fossil fuels, like coal. Biomass power generators are feasible in areas with reliable sources of biomass at a reasonable cost, where electricity is expensive, and where industries are responsible for disposing of waste biomass, biomass-based electricity can become a viable option. Cederberg Municipality's welcomes Biomass power generation plant in its network.

30.5 Natural Gas.
As one of the cleanest options for fossil fuels, the addition of natural gas (NG) as an energy generation plant is also welcome in the Cederberg Municipality's network. This technology transitions gas into energy by burning natural gas as fuel. Most natural gas plants utilise gas turbine; where natural gas is mixed with oxygen, which combusts causing a generator to spin and generate electricity. However natural gas power plants do produce a considerable amount of carbon dioxide, although its much less than coal plants mainly used by Eskom, but is a factor to consider. The benefit of Natural Gas plants is the constant supply not dependent on the sun or wind and are considered as a renewable energy source.

31. Promote and educate local residential and business consumers to implement private SSEG electricity projects to assists Cederberg in attaining its renewable energy targets.

32. Municipal Programmes and Projects planned over the next five years;

32.1 Solar PV - rooftop municipal buildings/facilities,
32.2 Electricity Savings Campaign, Building Energy Efficiency Retrofit Programme,
32.3 Smart electricity meters (AMRs) in administrative buildings, with real-time access for DSM.
32.4 Solar Water Heater (SWH) programme,
32.5 The Cederberg Municipality needs to investigate the feasibility to roll-out a ripple-control system controlling domestic geyser. Ripple-controlled switches off geysers at peak load periods. Ripple-control technologies further assist to minimise staggered re-energisation delays after Eskom's load shedding. Potential savings in the Cederberg municipal area are as high as 8.5MW if all geysers are turned off in peak load periods.
32.6 LED Street light replacement program.

Create favourable environment for investors.

33. Municipalities still require permission from the national government to procure electricity from IPPs and need to obtain the required permits from NERSA. Cederberg Municipality will apply for permits as soon as possible, to encourage and assist possible power producers, to develop in the area.

34. On a smaller scale, Cederberg municipality has just implemented a SSEG Policy with requirements to guide potential customers who wants to generate their own energy and assist with the application process, and to adhere to specifications and statuary compliance.

35. The present tariff for excess generated energy is not a significant incentive for renewable energy endeavours. Cederberg municipality will strive to provide a more feasible tariff structure thereby allowing consumers to connect to the electricity grid to offset it against their electricity purchases, at the time of generation. Smart meter technology will be utilised to facilitate this credit function.

Conclusion

36. The Renewable Energy Policy is fundamental to set Cederberg municipality on a path toward least-cost, reliable clean electricity that supports our local economic development while reducing our CO2 footprint.

37. The cost of renewable energy projects continues to decrease in South Africa, with the latest offerings producing a levelized cost of energy of less than R 0.61/kWh. Cederberg municipality must begin the implementation of renewable energy now, or the municipality will risk losing a significant share of the electricity market to privately owned renewable power producers.

38. The Cederberg Municipality looks forward to engaging with the community, and to receive your comments on the proposed “Cederberg municipality Renewable Energy Policy”.

39. Let’s work together to assist Cederberg municipality with its National Renewable Energy drive.