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FACTSHEET

A SIMPLIFIED FINANCIAL MODEL TO ASSIST MUNICIPALITIES IN THE PROCUREMENT OF SOLAR PV PROJECTS

The Simplified Solar PV Financial Model is an Excel-based calculator designed to appraise the affordability of municipal solar photovoltaic (PV) projects. The model calculates the relevant project metrics and financial ratios as required by investors, municipalities, and the South African National Treasury for public private partnership (PPP) municipal transactions.

MUNICIPAL ENERGY SOURCING: PAST, PRESENT, AND FUTURE

South African municipalities (cities and towns) are increasingly acknowledging the risks associated with climate change and are seeking to mitigate those risks in ways that reduce greenhouse gas (GHG) emissions. Municipalities are considering measures like the use of alternative energies with a focus on renewable energy technologies that are suitable for their respective cities. Using alternative energy can help reduce dependency on the national electric grid, increase energy security, and has seen many metropolitan areas develop either energy or climate change mitigation strategies with targets for the adoption of renewable energy.

Currently, municipalities buy electricity almost exclusively from Eskom, but many municipalities want to purchase electricity generated from renewable sources by Independent Power Producer (IPPs)[1] in order to:

- diversify suppliers and avoid possible supply constraints experienced in the past;
- stabilise costs into the future given the uncertainty of Eskom price increases and declining renewable energy costs;

[1] Sustainable Energy Solutions for South African Local Government: A Practical Guide. Sustainable Energy Africa, Cape Town, 2017.

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- 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
- adopt clean energy technologies as a result of the falling prices of renewable energy technologies, especially solar PV.

Options available for municipalities to engage in renewable energy procurement include:

1. **Own generation of renewable energy**. Energy projects that are developed, financed, and owned by the municipality.
2. **Off-taking of renewable energy**. "Off-taking" refers to municipalities entering into long-term Power Purchase Agreements (PPA) with larger renewable energy developers (IPPs) and selling the power to their customers.
3. **Wheeling of power**. "Wheeling" describes the transportation of power through the grid from the seller to the buyer.

The **Simplified Solar PV Financial Model**[2] has been developed to assist municipalities who wish to enter into a PPA (Option 2 above) with solar PV project developers, which is an ideal option for municipalities that are unable to finance a project from their internal capital expenditure. In a PPA, the private sector partner raises capital to build the power generation infrastrcture and sells the power to the municipality. PPAs usually have a contract period of ten to twenty years to give the generators the necessary certainty for the investment. More information on the developing discussions around municipal purchasing of electricity can be found on the Urban Energy Support website.[3]

BENEFITS OF A MUNICIPAL PPA

A PPA arrangement with an IPP can deliver various benefits:

- **Risk Mitigation:** Where compared to traditional municipal procurements wherein a municipality finances and contracts for a specific solar PV installation and retains much of the risks, a solar PV PPA involves allocating a significant portion of the risk to the IPP;

- **Technology:** Where the IPP would leverage renewable energy technology expertise that the municipality will not be able to deliver independently;

- **Quality of Service:** Where the IPP would significantly enhance the quality of service compared to what the municipality could extend independently;

- **Time:** Where the IPP would expedite the project implementation significantly; and

[2] https://www.climatelinks.org/resources/simplified-financial-model-procurement-solar-photovoltaic-projects

[3] http://cityenergy.org.za/

- **Cost Savings:** Where the involvement of the IPP would considerably reduce the project cost and the service cost.

HOW IS THE SOLAR PV FINANCIAL MODEL USEFUL?

Before a municipality can enter into a PPA, it needs to understand the financial benefits of such a project to the municipality. The **Simplified Solar PV Financial Model** provides a detailed analysis to help municipalities and IPPs understand and evaluate the financial benefits of entering into a solar PV PPA project by determining:

- **Equity internal rate of return (IRR):** the IRR for a private sector equity provider which assumes debt is used for the project (a 15-18 percent return is seen as favorable by investors).

- **Project internal rate of return (IRR):** the IRR for the project as a whole, i.e., if there is no debt in the project. *This is a good guide to the general merits of the solar PV project.*

- **Private sector Net Present Value (NPV)**: this reflects the value in today's money if the costs and benefits of the project were discounted back to today with the private sector discount rate used in the **Inputs** tab of the Model.

- **Public sector NPV**: this reflects the same as the private sector NPV, however, it compares this with a situation where the project was developed by the municipality, hence it uses the public sector discount rate (equivalent to the cost of government borrowing) and also removes the impact of insurance and taxes that are typically not included in a public sector analysis.

- **Public sector cost of risk**: this shows the value of the cost of risk that the public sector transfers to the private sector (this is calculated on the **Risks** tab) and is important in understanding the benefits of the project from the public sector (municipal) perspective.

- **Risk adjusted NPV**: this shows the public sector NPV after adjusting for the risks above.

DETAILED PROJECT FINANCE CONSIDERATIONS

Due to the high initial cost of a solar PV project, detailed financial modelling is essential. The **Simplified Solar PV Financial Model** includes two statement models—an Income Statement and Cash Flow Statement forecast up to 20 years. Important considerations when modelling a solar PV project as incorporated in this model include:

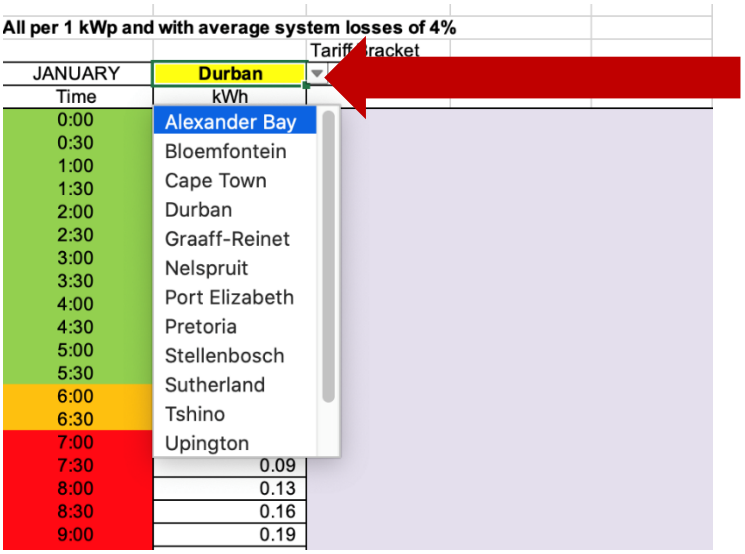
- System specifications (geographical and technical);
- Costs of the project;
- Finance structures;
- Electricity tariff;
- Tax savings and depreciation schedule;
- Scenario analysis and assumptions.

- Key assumptions to enter include:
  - Installed capacities (kilowatt/megawatt)
  - Annual solar yield (selected per region)

- Yearly Performance Degradation
- Lifespan of the project in years
- Phasing plan to simulate a phased construction plan
- Revenue model – sale of energy via a PPA
- Pricing assumptions for each revenue model, staring price including forecasted annual price escalation
- Duration of PPA in years
- Capital expenditure assumptions
- Operations and maintenance cost assumptions
- Debt assumptions: Loan amounts/interest rates and debt repayment
- Discount rates (both equity and public sector discount rates)

NATIONAL SOLAR RADIATION DATA

This model leveraged the Council for Scientific and Industrial Research's national irradiance data. The model allows for its application across different climatic zones in the country by using the drop-down field in the **PV Tariff** tab to select the location of the solar PV project:



WHO SHOULD USE THE SOLAR PV FINANCIAL MODEL?

It is recommended that this model be used by and with people with a basic understanding of project finance principles. This model has been developed for public sector (municipalities, provincial, and national government) entities that would want to enter into PPAs of more than three years, as these sectors are governed by similar procurement restrictions—the Municipal Finance Management Act for municipalities, and the Public Finance Management Act for provincial and national government departments.

HOW TO USE THE SIMPLE SOLAR PV FINANCIAL MODEL

The Excel-based calculator includes user-friendly guidance on how to use it and how to interpret the results. Before using the model, one should read the instructions and guidance on the **Intro & Overview** tab thoroughly.