

# 20MW Hwekwete Grid Tied Solar Power Plant

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## 1. Context

- This is a model of a 20MW Grid Tied Solar Power Plant for Zimbabwe for Grid Intergration.
- Zimbabwe has an insolation of 5.78KWh/m2 per day
- The major hinderance is legacy debts , lack of long term finance , currency conversion and unstable inflation

## 2. Aim

- To determine project profitabilif if the following Scenarios Change:
  - Increase of inflation to 50% from 10%
  - Increase of corporate tax to 20% from 15%
  - Decrease of production by 20% due to Substandard Products used.

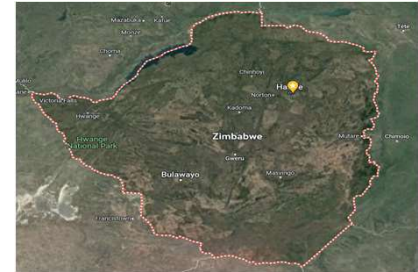


Figure 1. Map of Zimbabwe

## 3. Methods & Scenarios

- Using the Model for Financial Analysis of Electric Sector Expansion Plans(FIINPLAN).

### PROJECT DESCRIPTION

|                            |                           |
|----------------------------|---------------------------|
| Technology                 | SOLAR GRID TIED           |
| Capacity                   | 20MW                      |
| Construction Period(Years) | 3                         |
| Start Year                 | 2023                      |
| First Year of Operation    | 2026                      |
| Finish Year                | 2051                      |
| Urd Inflation Rate %       | 2                         |
| Zwl Inflation Rate %       | 10                        |
| Tax percentage %           | 15                        |
| Local Currency             | Zimbabwean Dollar(ZWL)    |
| Foreign Currency           | United States Dollar(USD) |

### SCENARIO ANALYSIS

Using the Model for Financial Analysis of Electric Sector Expansion Plans (FIINPLAN)

| Number | Scenarios                                 | Key Assumptions   |
|--------|---|---|
| 1      | Increase the inflation to 50%             | Central Government Fails to Contain Inflation to maintain Yearly Inflation to 10%   |
| 2      | Decrease the output of the Plant by 20%   | Plant Equipment is Underperforming  |
| 3      | Increase of Corporate Tax to 20% from 15% | Government increase of base tax to fund consumer programs like road rehabilitation. |

Figure 2 .Project Description and Scenario Analysis

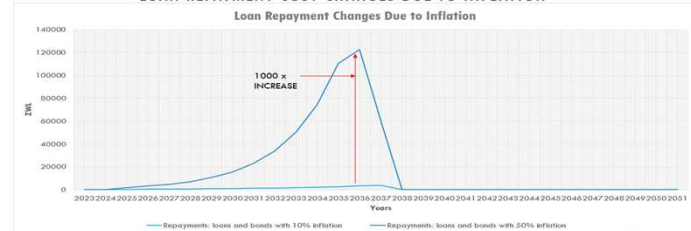
## 4. Results

- The results show the effect that reduction in plant capacity ,increase in inflation and tax increase to 20%

### NPV & IRR RESULTS

| Scenario                           | NPV            | IRR         |
|------------------------------------|----------------|-------------|
| Base Simulation                    | NPV:23756.8355 | IRR: 13.46% |
| 20% Percent Decrease in Production | NPV:8822.87    | IRR: 9.543% |
| Increase of Tax to 20%             | NPV:22058.29   | IRR: 13.166 |
| Increase of Inflation to 50%       | NPV:5015       | IRR: 7.42%  |

### LOAN REPAYMENT COST CHANGES DUE TO INFLATION



### EFFECTS OF DECREASE OF PLANT PRODUCTION

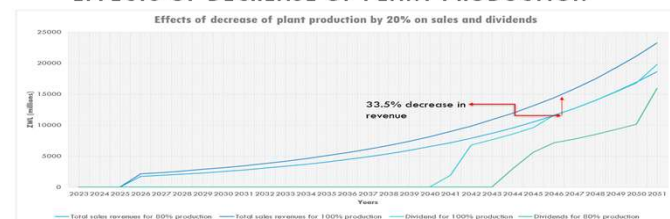


Figure 3. Results of scenario aaylsis.

## 5. Policy insights, conclusions and future work

### CONCLUSIONS AND POLICY INSIGHTS

| Conclusion  | Policy Insights  |
|---|--|
| Increase on corporate tax from 15% to 20% decreases the net profit of a project   | The government needs to create an enabling investment environment in the renewable sector by keeping the corporate tax on 15%                      |
| Increase in inflation to 50% from 10% will increase the cost of loan repayments , overall decreasing the net profits of the project in real money   | Government needs to put stability instruments in place to have a floating inflation that is close to 10% with an allowable deviation of +_5 % only |
| decrease in production to 80% due to plant equipment not being of standards. Pushes the start of paying out dividends by 2 years and decreases the Revenue collected by a factor of 32.5% | Government needs to put more regulation in the Renewable EPC Sector so as to get quality products that bring value on money invested               |

Future work is to be done in creating a holistic model with the aid of OnSSET and CLEWs to determine the most profitable technologies and energy mix of Zimbabwe and Improvements in Policy making

## 6. References

- [1]Solar Photovoltaic Power Potential by Country (worldbank.org)
- [2] climatecompatiblegrowth.com
- [3]<https://www.oecd.org/trade/topics/export-credits/>
- [3]<https://www.oecd.org/trade/topics/export-credits/>