



REFiTs for Small Hydro Projects

Under the GET FiT Zambia Programme

9 November 2018

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Presentation Outline

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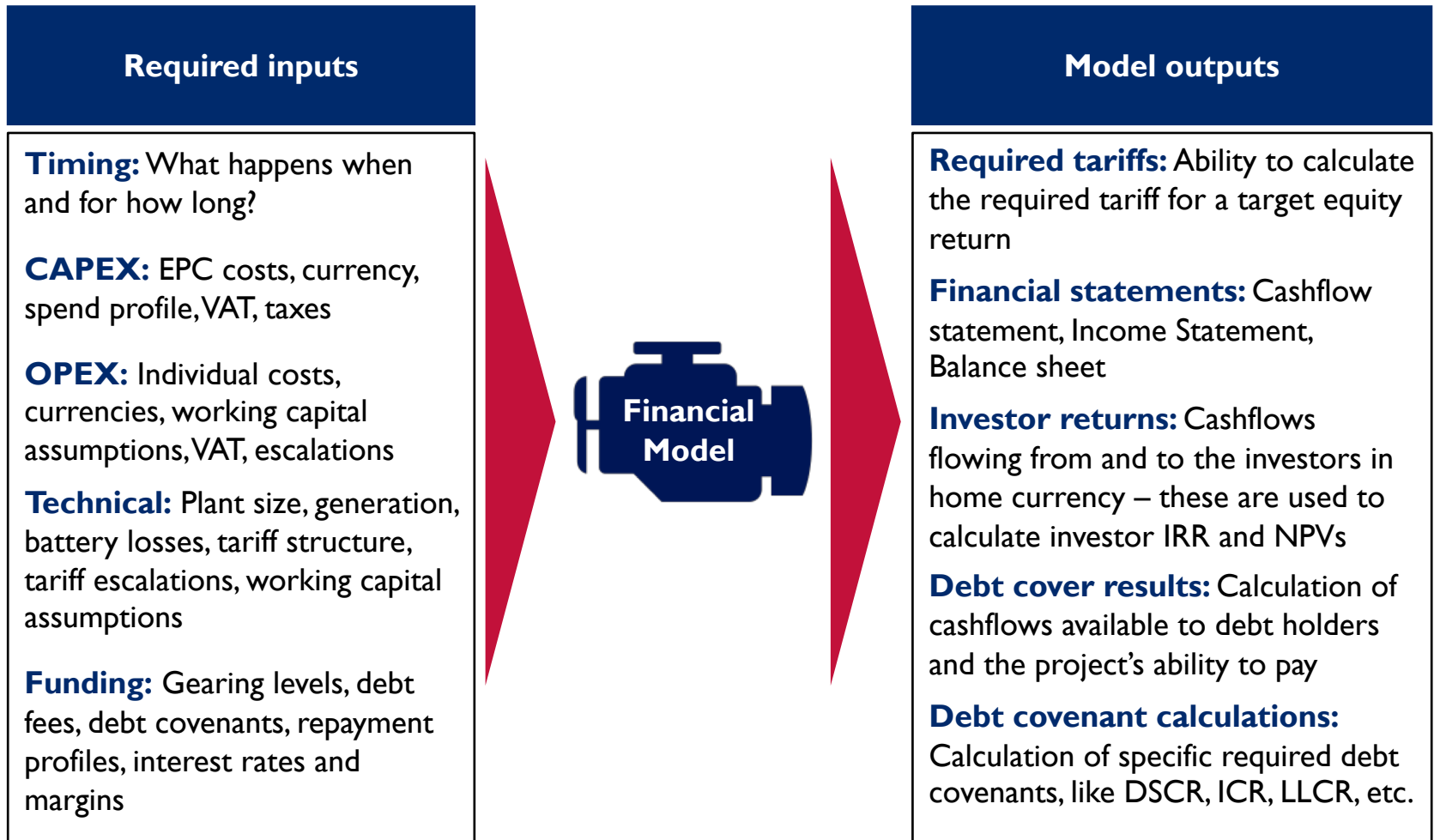


I.0 Background – REFIT Strategy

- i. Government of the Republic of Zambia (GRZ) officially adopted the Renewable Energy Feed In Tariff (**REFIT Strategy**) in October 2017;
- ii. The Energy Regulation Board (ERB) was charged with **responsibility to determine REFITs**;
- iii. To date **solar PV REFITS** have been determined;
- iv. In 2016/17, **Initial, Mini Hydro REFITS** were calculated by ERB but it was agreed that further **stakeholder consultation** was required before adoption.
- v. After stakeholder consultations, **ERB has now calculated REFITs** for mini-hydro power projects of between 500 Kilo Watt (KW) and up to maximum capacity of 20 MW to be implemented under the KfW sponsored GETFiT Zambia programme;
- vi. The ERB in May 2018, received **Technical Assistance (TA)** from USAID Power Africa, under the Southern Africa Energy Programme (SAEP) working in partnership with KfW;
- vii. GETFIT Zambia will provide the **premium payments** over and above the computed generation tariffs.

2.0 REFiT Computation - Building Blocks

A dynamic financial model converts the various inputs and assumptions into financial results that provide the required feed-in tariffs



3.0 Refit Data Sources

Various sources were utilized to obtain multiple documents, used as inputs to the financial model

Source - Information

OPPI • Project List

ZESCO • Existing project list
• Existing project OPEX (5 projects)
• CAPEX (Aggregated, 3 projects)

GETFiT Zambia/ ZRA • Baseline Tax
• PPA

GETFiT Uganda • Uganda Capex
• Uganda Funding
• Uganda Equity returns




Private developers • Actual OPEX (2 projects, RSA)

Commercial banks and development finance institutions • Series of interviews where lender was asked to provide indicative, non-binding terms

Information was obtained from a representative list of public and private sources

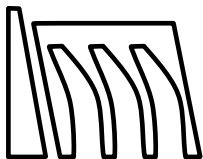
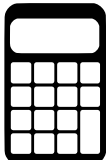
4.0 REFIT Model Inputs.

A range of inputs are prescribed by various policies and statutes

 <p>Timing</p>	<ul style="list-style-type: none">• Construction duration• PPA duration
 <p>Macro-economic forecasts</p>	<ul style="list-style-type: none">• Interest rates• Exchange rates• Inflation rates
 <p>Taxes</p>	<ul style="list-style-type: none">• VAT• Income tax rates• Withholding taxes• Depreciation allowances

4.1 Model Inputs....Continued

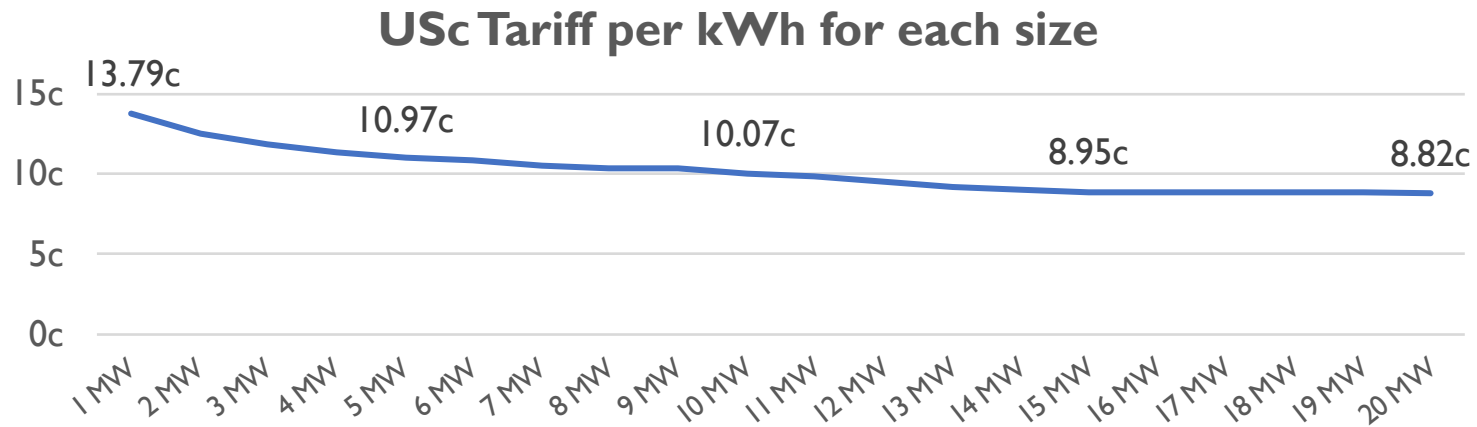
Other inputs are best captured as a range, rather than a single value

 <p>Operational</p>	<ul style="list-style-type: none">• CAPEX• OPEX• Production: Load factor• Production: Plant size• Production: Technical losses• Production: Seasonality of generation• Tariff: Escalation
 <p>Funding</p>	<ul style="list-style-type: none">• Gearing levels• Cost of debt• Debt tenor• Target equity IRR

5.0 Stakeholder Consultative Process

- ERB held two consultative engagements; the first was on 24 September and the second on 11 October.
- Participants in the consultative engagements included the following: Ministry of Energy; Ministry of Finance; ZESCO; REA; IDC; CEC; IPPs; DFIs; and commercial banks.
- Following the first engagement, ERB received input from both local and international developers.
- Additional input on fees was also gathered from the Water Regulator - WARMA.
- External stakeholders were also consulted on some key inputs.
- Note that no tax changes have been made to the model based on the 2019 budget speech as parliament has not yet approved the budget. However, given that some of these changes could be material, ERB may need to update the REFiTs in early 2019 once the budget is finalized.

6.0 Final Generation REFiTs



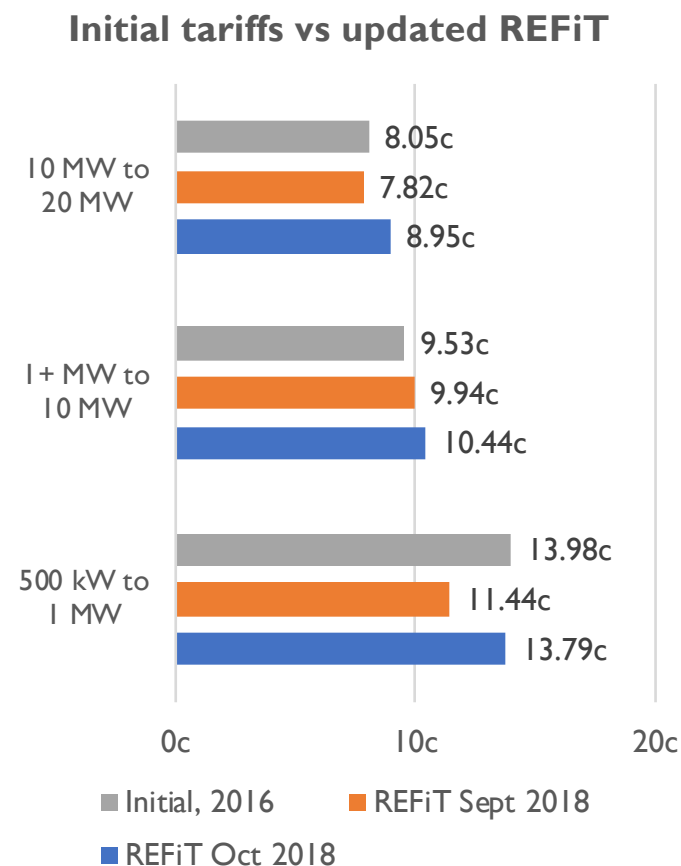
Plant Size (MW)	1 MW	2 MW	3 MW	4 MW	5 MW	6 MW	7 MW	8 MW	9 MW	10 MW
Tariffs (USc/kWh)	13.79c	12.46c	11.82c	11.36c	10.97c	10.92c	10.62c	10.44c	10.36c	10.07c

Plant Size (MW)	11 MW	12 MW	13 MW	14 MW	15 MW	16 MW	17 MW	18 MW	19 MW	20 MW
Tariffs (USc/kWh)	9.83c	9.54c	9.25c	8.97c	8.95c	8.92c	8.89c	8.86c	8.84c	8.82c

**Tariffs in 2021 terms, with only 15% escalated component*

6.1 REFITs – Regional Country Comparisons and Initial and Updated tariffs Comparisons

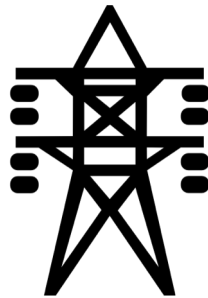
Country	500 kW to 1 MW	1+ MW to 5 MW	5+ MW to 10 MW	10+ MW to 20 MW	Currency / kWh
Updated – Zambia Oct 2018	13.79	10.97	10.44	8.95	US\$c
Zambia Sept 2018	11.44	10.21	9.94	7.82	US\$c
Zambia 2016	13.98	9.53	9.53	8.05	US\$c
Uganda	11.50	8.5 - 11.5	8.5 - 11.5	8.50	US\$c
Kenya	10.50	8.25	8.25	8.25	US\$c
Nigeria	15.47	15.47	15.47	15.47	US\$c
Rwanda	11.80	6.7 - 11.8	6.7 - 11.8	N/A	US\$c
Ghana	53.62 ¹	53.62	53.62	53.88	GHp



¹53 GHp is roughly equal to 11 US\$c

Transmission To Be Addressed Subsequently

- Note that the REFITs presented today are for **generation only**;
- **Transmission costs and losses will be addressed in a separate fee schedule** for the PPA. ERB is engaging with other stakeholders including Ministry of Energy, ZESCO and GET FiT Zambia to finalize this schedule; and
- *The next presentation will present principles for transmission charges.*

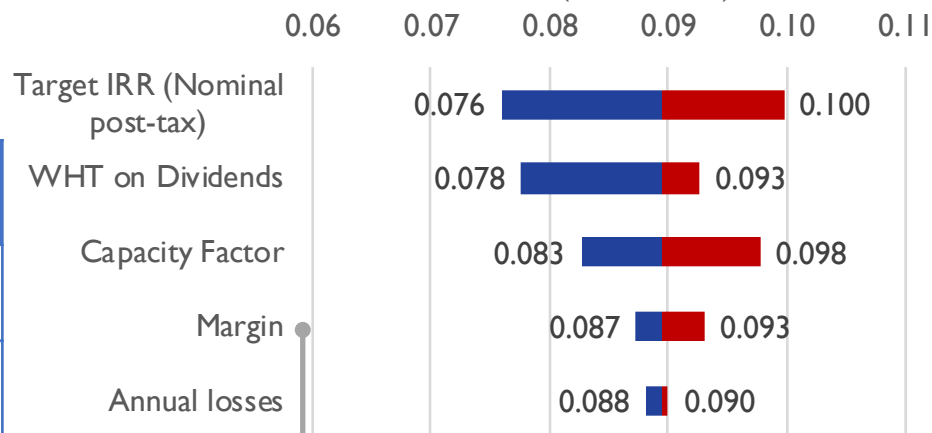


7.0 Conclusions - Sensitivities Showing Which Inputs Have The Largest Impact

- It is necessary to test the impact a change in certain inputs will have on the resulting tariff

Variable	Unit	Min Value	Base Value	Max Value
Capacity Factor	%	55%	60%	65%
WHT on Dividends	%	-	15%	20%
Interest rate margin	%	4%	5%	6%
Target IRR (Nominal post-tax)	%	10%	12%	15%
Annual losses	%	-	1.50%	2.00%

Effects of variance in inputs on required tariff
Tariff (USD / kWh)



This Chart shows by how much the tariff would change when the inputs are changed to their minimum and maximum values (as in the table to the left).

For example, for a 15MW plant the tariff under the current values is 8.95c. If the Capacity Factor was to decrease to 55%, the tariff would rise to 9.8c.