Issues to be Covered

1. Principles of REFIT and Methodology to estimate REFIT
2. Financial Model for estimating REFIT
3. Indicative REFIT for Eligible Solar PV Projects
4. REFIT: Impacts and Implications
Principles of REFIT and Methodology to Estimate REFIT
Overview: Feed-in Tariff

Introduction

- Feed-in tariff (FIT) is a scheme designed for electric utilities to purchase electricity generated by renewable energy plants at a tariff that is determined by the utilities and guaranteed for a specified period of time.
- Tariff can vary for different renewable energy technologies, locations and sizes.

Key factors for success

- Long term policy stability
- Payments based on cost of producing renewable energy
- Guaranteed grid access
- Guaranteed off-take of all electricity generated

FIT estimation methodologies

- Cost based approach
  - Rate of Return methodology
  - Payment calculated using costs and return expectations of project investors

- Value based approach
  - Marginal Cost/ Avoided Cost methodology
  - Payment calculated on the basis of value of energy delivered

- Fixed Price Incentive
  - Provides fixed price incentive to renewable energy generators
  - Payment is not dependent on energy generation costs or avoided costs

Source: NREL
**REFIT: Cost Based Methodology**

**Introduction**
- Project developers are paid based on costs and return expectations of investors
- Lower transactions costs for small RE projects by fixing a tariff (or cap)
- Tariffs may be differentiated by RE technology, project size and location

**Data inputs Include**
- Unit size
- Operation period & energy output
- Economic life of the plant
- Investment and maintenance costs
- Return on debt and equity
- Loan tenor
- Tax and accounting information
- Macro-economic data

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**Cost based methodology**

- Market research and empirical analysis
- Profitability index method
- Auction/bidding method

**Market Research & Empirical Analysis**
- Detailed analysis of current RE costs to establish FIT payments
- Payment levels are adequate for efficiently operated projects to be profitable
- Tariff set by the govt. itself or in consultation with a third party

**Profitability Index Method**
- FIT prices based on the targeted profitability of a specific RE project
- Ensures profitability due to resource adjusted FIT payments
- Tariff set by the govt. itself or in consultation with a third party

**Auction/Bidding Method**
- Price discovery by market players rather than through third-party analysis
- An auction (separate from the FIT policy itself) is used to inform FIT price setting for projects of various kinds

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Source: NREL, CEC
**REFIT Payment Method**

**Fixed Price FIT**
- Total FIT payment to the project remains independent from the market price for electricity
- Predetermined payments for a guaranteed period of time
- REFIT programs in more than 60 countries around the world

**Advantages of fixed price FIT**
- No price volatility eliminates price risk
- Purchase obligation reduces counterparty risk
- Approximates actual project costs
- Promotes development of RE generation
- Hedge against electricity price volatility

**Advantages of fixed price FIT as a cap**
- Caps the maximum payment payable for RE generation
- Project developers may bid lower than the price cap provided they meet stringent bid specifications
- Combines fixed price FIT with the advantages of market price discovery

**Disadvantages of Fixed price FIT and FIT cap**
- Unresponsive to market prices as tariff is fixed
- Potential to distort electricity markets
- High cost if using higher cost RE technologies
- Little incentive to optimize project location because of guaranteed grid access unless tariff is differentiated based on project location
- Potential for bidders to collude to bid at FIT cap

Source: NREL
Financial Model for Estimating REFIT
Structure of the REFIT Financial Model

Inputs
- Input Data & Assumption
  - INPUTS to FINANCIAL MODEL

Calculations
- Financial Model Calculations
  - TIME & SCHEDULE
  - PROJECT COST
  - TARIFF CALCULATION
  - OPEX CALCULATIONS
  - DEPRECIATION
  - CONSTRUCTION
  - DEBT and DEBT REPAYMENT
  - FINANCIAL STATEMENTS

Model Output
- Financial Model Outputs
  - TARIFF for TARGET IRR & DSCR
  - CASH FLOW ANALYSIS
  - CHECKS for MODEL CONVERGENCE
Inputs to REFIT Financial Model

Key Inputs for Financial Model

EPC & Project Cost Related Information
- Inputs related to project costs, milestone schedule payments and invoicing
  - EPC Costs
  - Non-EPC project costs (contingency, land, connection, project development, IDC, fee and taxes, etc)
  - O&M Costs
  - Plant output methodology
  - Financing terms
  - PPA and Contract terms
  - Tax and Accounting data
  - Macroeconomic data

Project Output & O&M Costs
- Inputs related to project generation
  - Methodology appropriate for RE technology and specific for Zambia
  - O&M costs pre PCOD
  - O&M costs post PCOD
  - O&M mobilization cost

Financing Terms
- Financing terms agreed with the lenders such as leverage, pricing (which includes margin, upfront fee, commitment fee), DSCR, loan term, repayment profile, tax and accounting, etc

Power Purchase Agreement & Contracts
- Inputs related to scope of the project, the payment mechanism, rights & duties and various other terms & conditions agreed between the service provider and the buyer
## EPC Inputs

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Definition / Related Aspects</th>
<th>Impact on Financial Model</th>
</tr>
</thead>
</table>
| EPC Price        | - Fixed, lump-sum, turnkey price for the project  
- Price is a mix of local and foreign (imported) costs  
- Includes EPC and non-EPC Project costs | - Key input for the project capital cost and estimate for funding required  
- The funding requirement is primarily determined based on the total Project cost or EPC Contract  
- Split (foreign & local expenses) helps in determining currency of funding |
| Technical Inputs | - Inputs like peak power, performance ratio, degradation levels, availability and auxiliary consumption are provided by the EPC | - Plant generation factors affect the net electrical output which has a direct impact on the revenue and the the tariff to meet a target IRR |
| Milestone Schedule | - Monthly schedule of works to be completed by EPC contractor  
- Associated payments to be made by Project Company to EPC contractor for such works | - Key determinant for IDC and thus impacts overall project costs, debt & equity levels, and tariff |
## O&M Inputs

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<tbody>
<tr>
<td>O&amp;M Mobilization Payment</td>
<td>Initial payments made to the O&amp;M contractor for mobilization of O&amp;M team and associated facilities</td>
<td>Payable during construction period – impacts debt and equity levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impacts capacity charge rates (if applicable)</td>
</tr>
<tr>
<td>O&amp;M Expenses</td>
<td>Source for O&amp;M expenses pre PCOD and post PCOD</td>
<td>Determines project operating expenses</td>
</tr>
<tr>
<td></td>
<td>Split into fixed and variable expenses</td>
<td>One of the key factors in determining the tariff components</td>
</tr>
<tr>
<td>Payments and Invoicing</td>
<td>Calculation of payments due to O&amp;M contractor</td>
<td>Provides schedule of payments payable to O&amp;M contractor</td>
</tr>
<tr>
<td></td>
<td>Invoicing and payment terms</td>
<td>Impacts number of days of accounts payable outstanding - key determinant of working capital</td>
</tr>
<tr>
<td>Maintenance Reserve Account (MRA)</td>
<td>MRA is amount set aside for expenses to be incurred for future maintenance cycles</td>
<td>Typically projects have levelized payments to O&amp;M contracts as a substitute for MRA</td>
</tr>
<tr>
<td></td>
<td>Options – Cash reserve, LC from shareholders and levelized payments to O&amp;M contractor</td>
<td>Levelized payments flatten the O&amp;M expenses profile for Project Company thus eliminating spikes in payment</td>
</tr>
</tbody>
</table>
### Financing Terms (1/2)

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<tr>
<td>Leverage</td>
<td>Ratio of debt (senior and junior) and equity infused for funding the project cost</td>
<td>Impacts DSCR and IRR levels, thus an important determinant of tariff</td>
</tr>
<tr>
<td>Debt Pricing</td>
<td>Involves various financing costs associated with debt - upfront fee, commitment fee, agency fee, and margins</td>
<td>Key determinant of project cost and DSCR – thus impacts leverage and tariff</td>
</tr>
<tr>
<td>Tenor</td>
<td>Period for which debt funds are available and over which debt has to be repaid</td>
<td>Impacts the principal repayments to be made on every repayment date thus directly impacts DSCR, leverage and tariff</td>
</tr>
<tr>
<td>Repayment Profile</td>
<td>Repayment profile defines the principal payment structure e.g. mortgage style, straight-line or sculpted</td>
<td>Impacts the principal repayments to be made on every repayment date thus directly impacts DSCR, leverage and tariff</td>
</tr>
</tbody>
</table>
## Financing Terms (2/2)

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<tbody>
<tr>
<td>Debt Service Coverage Ratio (DSCR)</td>
<td>- Defined as ratio of net operating profit to debt service amount (principal + interest + fees)</td>
<td>- Key factor in determining the principal repayment, thus determining debt levels, and tariff</td>
</tr>
<tr>
<td>Fees</td>
<td>- Commitment Fee is charged on the total debt left to be drawn</td>
<td>- Commitment fee charged till all the debt has been drawn, added to the loan amount</td>
</tr>
<tr>
<td></td>
<td>- Up-front fee is charged to cover administrative costs and primarily used for reserving of funds for fixed rate and/or discounted rate mortgages</td>
<td>- Upfront fee may be paid separately, added to the mortgage loan, increasing its size</td>
</tr>
<tr>
<td></td>
<td>- Agency fee is fee used to recover cost of appointing various advisors</td>
<td>- Agency fee charged annually during construction as well as operation. Agency fee incurred during construction gets added to the loan</td>
</tr>
<tr>
<td>DSRA Requirement</td>
<td>- DSRA is the amount set aside as reserves for future debt service</td>
<td>- DSRA amount needs to be calculated based on the forward looking interest and debt repayments in the next 6/12 months</td>
</tr>
<tr>
<td></td>
<td>- Generally amounts to debt service for 6 / 12 months</td>
<td></td>
</tr>
<tr>
<td>Hedging Strategy</td>
<td>- Hedging is required to mitigate the interest rate risk exposure for the Project Company</td>
<td>- Key factor in determining the interest rate swaps and hedging percentage used to arrive at final all-in cost of debt</td>
</tr>
<tr>
<td></td>
<td>- Lenders provide the minimum requirement for the construction and the operation period</td>
<td></td>
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</tbody>
</table>
## PPA and Contract Inputs

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<tbody>
<tr>
<td>Scope of the Project</td>
<td>❑ Defines the basic values like capacity of the project, term of concessions period, etc.</td>
<td>❑ Key factors in determining the project economics</td>
</tr>
<tr>
<td>Bonds/Fee/Guarantees</td>
<td>❑ Provides the amount and validity period for requisite bonds/guarantees like bid bond, success fee, performance security etc.</td>
<td>❑ Defines the various cost elements to be included during construction &amp; operation period</td>
</tr>
<tr>
<td>Payments &amp; Invoicing</td>
<td>❑ Invoicing and payment terms</td>
<td>❑ Impacts the number of days of accounts receivables outstanding - key determinant of working capital facility sizing</td>
</tr>
</tbody>
</table>
Indicative REFIT for Eligible Solar PV Projects
Indicative Cost-reflective REFIT for Solar PV Projects Applicable for Phase 1 of REFIT

<table>
<thead>
<tr>
<th>Solar PV Plant Size Range</th>
<th>Tariff (U.S. ¢/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 kW to 1 MW</td>
<td>17.82</td>
</tr>
<tr>
<td>1+ MW to 5 MW</td>
<td>16.76</td>
</tr>
<tr>
<td>5+ MW to 10 MW</td>
<td>15.74</td>
</tr>
<tr>
<td>10+ MW to 20 MW</td>
<td>14.25</td>
</tr>
</tbody>
</table>

Note: base date for REFIT: July 01, 2015; Tariff indexation based on US CPI

- REFIT is proposed as a price cap with price discovery through competitive bidding subject to procurement mechanism legislation and stakeholder consensus
REFIT: Impacts & Implications
Impact of REFIT on ZESCO

- Cost pass though of REFIT in rate base (proposed in REFIT guidelines)
  - Assuming 100 MW of Solar PV projects are developed and the costs are passed through to the rate base, the average increase in customer tariffs would be only be about 0.23 U.S. ¢/kWh

- Increased fuel diversity and greater use of indigenous fuels in the generation mix improves energy security and reliability

- Potential to displace generation from fossil fuel plants

- Small scale RE plants located closer to load centers has the potential to lower line losses
Societal and Economic Impacts

- Solar PV plants can be installed in 6 to 18 months and rapidly increase the availability of electricity for consumers.

- The cost of unserved electricity is much higher than the cost of RE generation/REFIT and the increased provision of electricity has a positive impact on economic output of the country.
  - At a COUE conservatively estimated at 0.67 $/kWh for Zambia, the installation of 100 MW of Solar PV plants benefits the Zambia economy by about U.S.$140m annually.

- Attractive REFIT promotes increased private sector investment in the power sector and reduces the need to provide government guarantees for small power projects.

- Increased generation from RE supports Zambia remain a green economy fueled largely by renewable energy resources.
Fiscal Incentives
- Small scale RE under REFIT is assumed to qualify for tax incentives provided for investments in priority sector projects
- VAT incentives/exemptions for eligible RE technologies could help lower the cost of RE generation. The lower revenue to the State would be offset by higher societal benefits

GET FIT Program
- An incentive mechanism to promote increased RE generation is being evaluated by KfW and the Government of Zambia
- GET FIT can help lower the REFIT by providing a top-up incentive, which will benefit consumers and ZESCO

Concessional Financing
- Concessional financing, partial grants and risk mitigation instruments can help lower the REFIT by lowering financing costs and mitigating risk
Q & A