Public Utilities Regulatory Authority

PURA

Equity in development

The Gambia: Feed-In-Tariff Implementation

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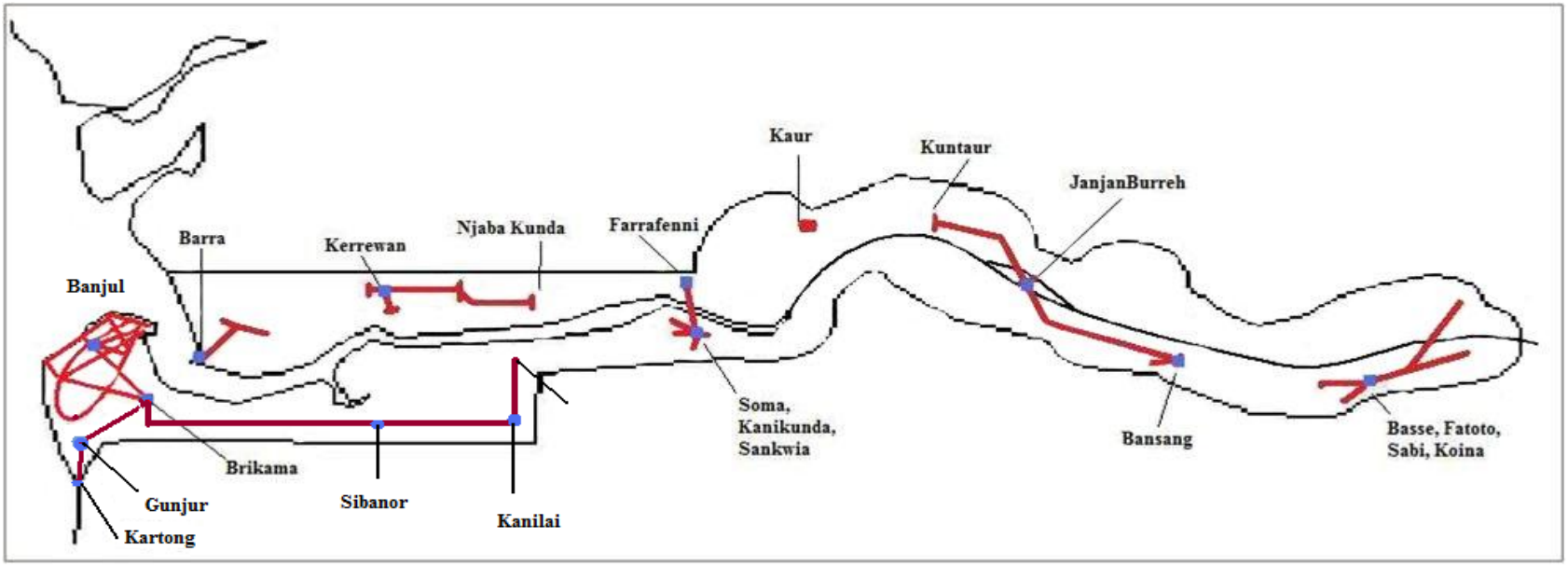
Feed-in-Tariffs

Feed-In Tariffs are payments to renewable energy developers for the renewable electricity they generate.

Presentation

- Electricity sub-Sector in The Gambia
- RE Law development and Regulatory Framework
- Feed – in – Tariffs Rules
- Tariff Model and Indexation Updates
- Feed-in-Tariff Results
  - ACG
  - Investment Cost

National Electrification



- Network more developed along the coast
- Lack of national transmission backbone
  - Limits large scale RE intregration

Challenges for the power sector

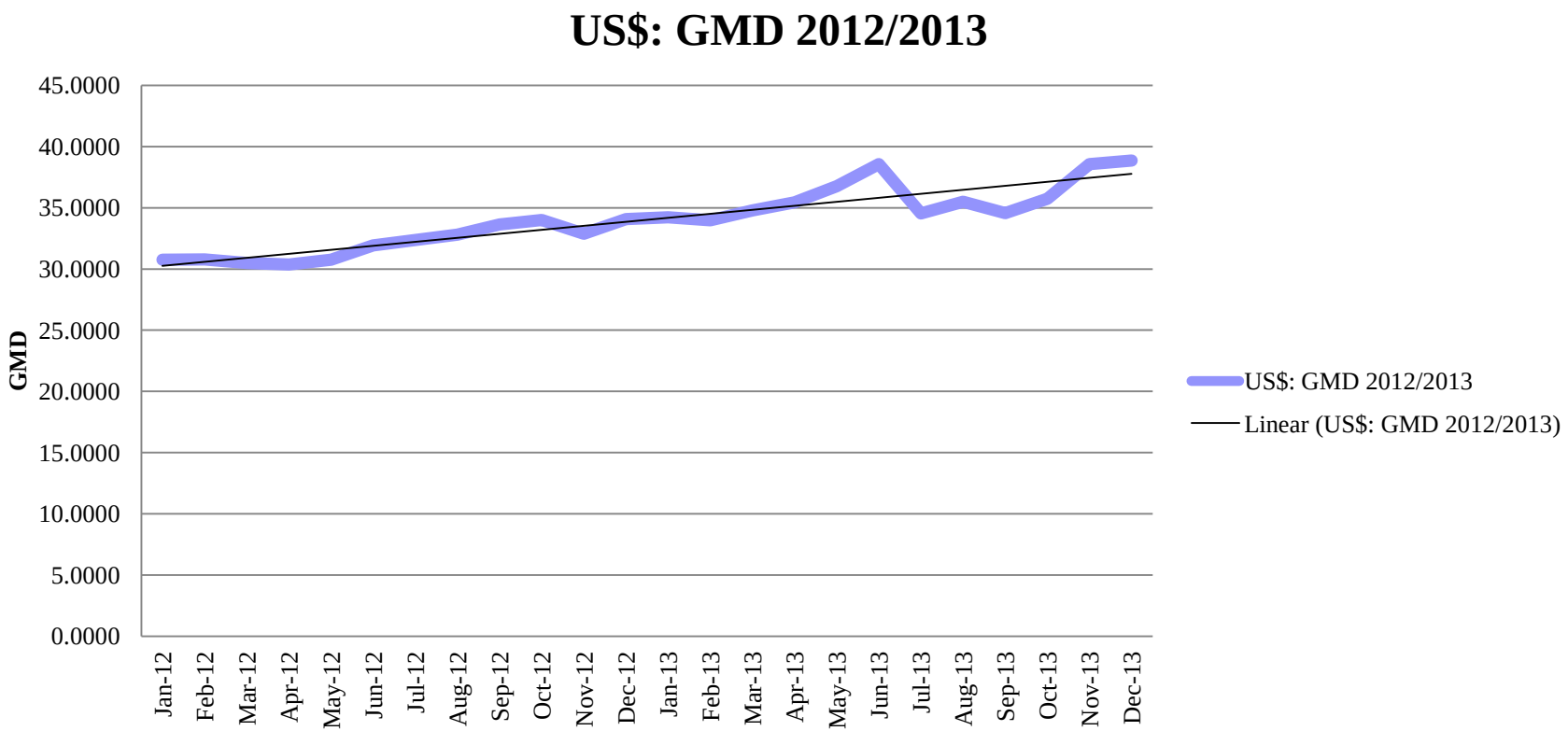
- Insufficient transmission and distribution network
- Insufficient generation to meet demand (suppressed Demand)
- Lack of regional interconnection
- High T& D Losses (22%)
- Insufficient private sector investment
  - Financial credibility of off-taker
- Relatively high tariffs (opportunity)
  - Exposure to international fossil fuel prices

Tariff increase June 2012

Electricity				
Customer Category	**2011 Tariff**	**New 2012 Tariff**	**% increase**	**US ¢ /kWh**
	D/kWh	D/kWh		
Domestic (prepayment flat)	7.20	9.10	26%	0.23
Commercial	8.60	9.70	13%	0.24
Hotel / Club / Industries	8.95	10.40	16%	0.26
Agriculture	8.00	9.10	14%	0.23
Area Councils	8.70	9.70	11%	0.24
Central Government	8.70	9.70	11%	0.24

US $1 = D40

Dalasi Depreciation - 2013

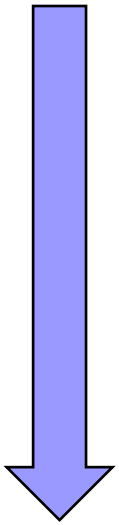


Integrating Renewable

- Standard PPA just for Renewable
- Developed a Feed-in- Tariff Model
  - Using avoided cost of (Mixed HFO & LFO plant)

A regulatory framework

Hierarchy of requirements



Increasing detail and definition, PURA responsible

Renewable Energy Law

Electricity Act 2005

FIT rules

Generation Licence

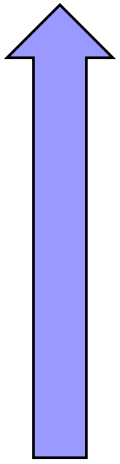
Power Purchase Agreement

Regular tariff announcements

Grid code (will be needed as part of WAPP)

Network connection agreement

Increasing stability (slow to change, greater Ministerial scrutiny)



Net-metering (Renewable)

- Two meters installed
- Same tariff both ways (retail tariff or kWh/kWh)
  - Good for investors
- 2kW Pilot working
- 20kW solar PV installed @ Leo's Hotel
  - www.leos.gm
  - Huge Solar potential

LEMON CREEK

- 66kW Solar Pv Installed
- 8 Hour Battery Back-Up
- Great Potential for Grid Integration
- Net Metering
- Feed-in- Tariffs
- Low usage during Off-season

Feed in Tariffs - Main Features

- No extra cost to consumers:
- The initial support level was to be determined by the avoided cost methodology (LFO/HFO).
- Eligible technologies: solar PV
  - Biomass/Biofuels. (Subject to MOE report)
  - Wind (Awaiting Policy Direction) (Coast)
- Automatically eligible scale: 20kW to 1.5MW.
- Below 20KW, net metering. NAWEC to offer decision. PURA can review

FiT- Rules - Main Features II

- Above 1.5MW, should negotiate traditional PPA.
- Certainty: PPA for 15 years from plant commissioning. Tariffs published 5 years in advance to give certainty to project developers, and thereafter only adjusted based on indexation.
- Simple benchmarking indexation formula linked to local inflation (for a deemed local component) and foreign exchange rate (US $, for a deemed international component).

Cap on overall level

- The system is not well placed to integrate large volumes of variable renewable generation.
  - Currently not stable and suffers from frequency disturbances (affects wind turbines).
  - No central control system /dispatch
  - Initially a cap of 10% of total available capacity. until further technical studies are carried out.
    - Currently about 6 MW.
  - The ultimate decision on the level of the cap is for PURA

Feed in Tariff Rules:

- FIT will be set in Dalasi/kWh of delivered electricity.
- Feed In Tariffs calculated in accordance with a methodology set out by the Authority and approved by the Minister of Energy.
- Generator and NAWEC shall enter into a Standard PPA.
- Generator invoices NAWEC according to the timescales set out in the PPA based on the metered generation.
- Annual Authority Announcement each year, including the adjusted FIT

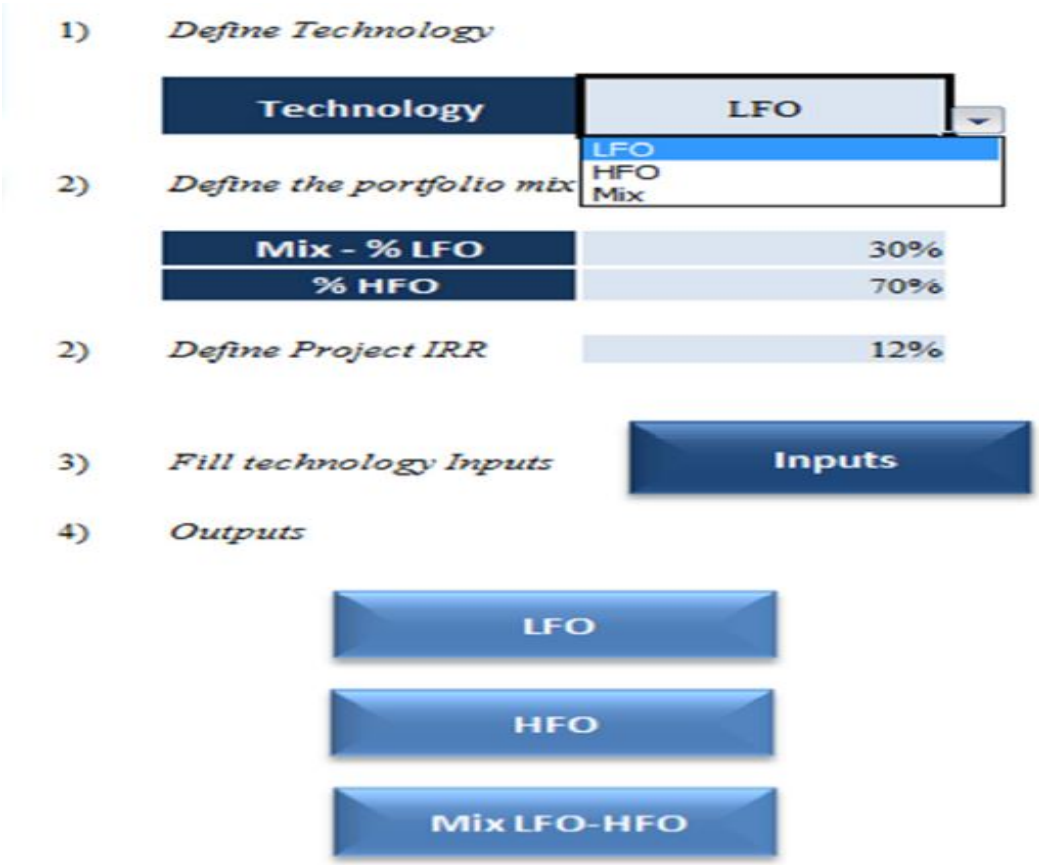
Tariff Setting Approach- 2 Approaches

- Specific Investment cost approach
  - This approach allows costs to be targeted to technologies
  - There is a requirement for high levels of regulatory scrutiny at both the initial tariff setting and regular tariff reviews.
  - Government policy is not to allow any additional costs to consumers.

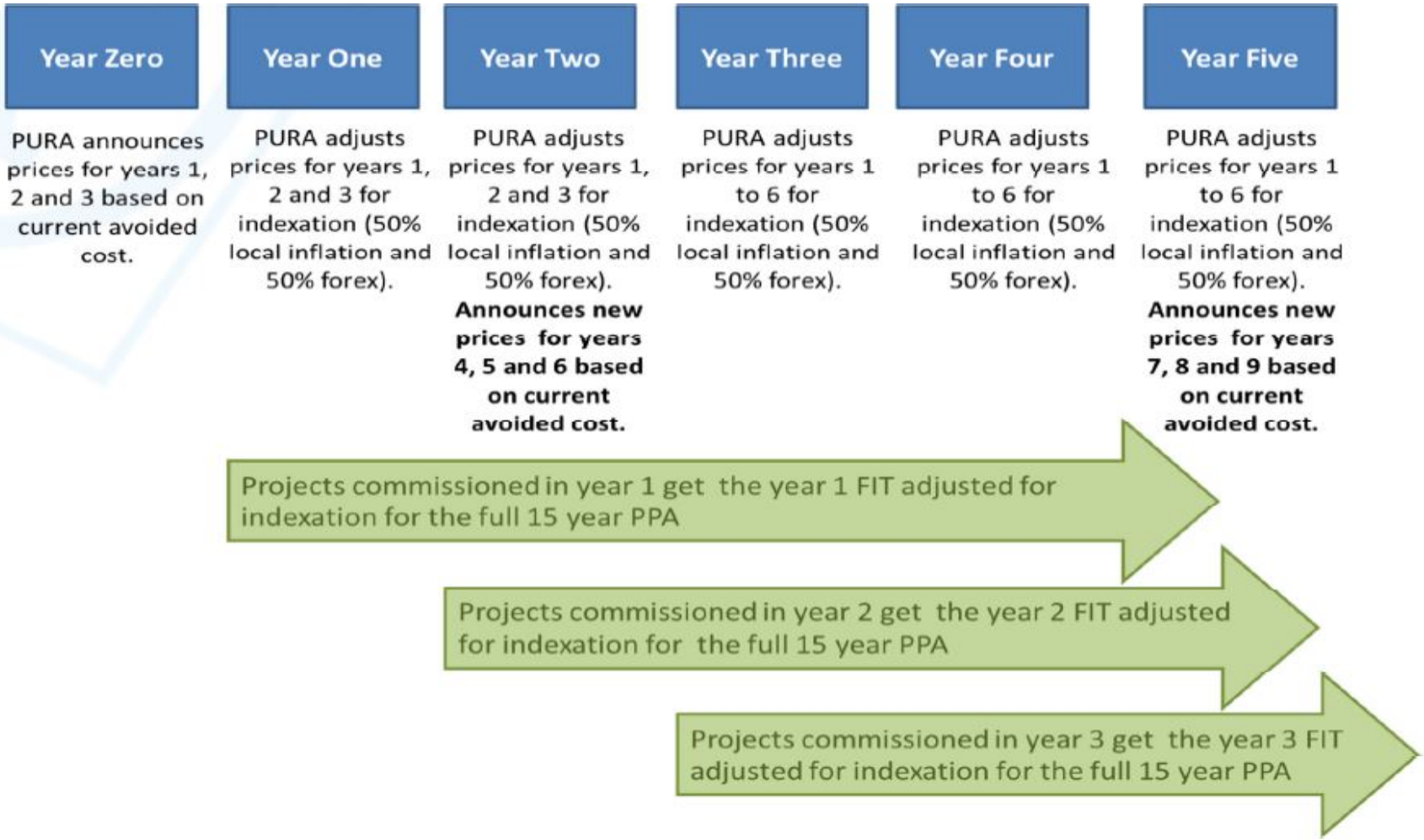
Tariff Setting Approach

- **Private avoided costs methodology** (a single tariff which represents the avoided cost of the alternative form of generation). 10MW Diesel
  - Simplest approach: single tariff based on existing technologies.
  - Estimated on current market costs
  - High cost of current generation means renewables compete more easily

Balanced ScoreCard Model



Annual Tariff Announcements



Example of indexation

- The proposed formula will be

$$T_i = T_{(i-1)}\left[(1 + Inf).LIL + \left(\frac{ExRt_i}{ExRt_{(i-1)}}\right).FL\right]$$

Adjust the "local" component for Gambia inflation

Adjust the "international" component for forex

→ $/ Euro Index

- T_i Tariff for period "i"
- $T_{(i-1)}$ Tariff in previous period (i-1)
- Inf = Local inflation in percentage for the year (i.e. 5%)
- LIL = Deemed Local Inflation Link (in percentage)
- FL = Deemed Foreign Link (in percentage) (LIL + FLC = 1)
- $ExRt_i$ = Exchange rate, GMD/Euro for period "i"
- $ExRt_{(i-1)}$ = Exchange rate, GMD/Euro for previous period (i-1)

Assumptions to calculate tariff

Technology	Units	HFO	LFO
Capacity	MW	10	10
Net Thermal Efficiency	%	40	36
Internal consumption	%	3	3
Calorific value	MKcal/sm^3	7837.5	8662.5
Scheduled Maintenance	days/yr	25	25
Forced Outage	%	10	10
CAPEX	USD/kW	1,400	1,100
Years under construction	yr	2	2
Investment throughout yr	%	45-55	45-55
Useful life	yr	25	25
O&M	USD/MWh	7	7
Fuel Costs	USD/toe	624	850

- Project Finance considering 25 years (assumed useful life).
- Depreciation period: 20 years.
- Income tax & VAT: 0%
- Debt-Equity structure: 50-50
- Loan tenor 6 yr, rate 12%

F.i.T Result (Avoided Cost)

A.C.G	Tariff (US$/kWh)
LFO Plant (10 MW)	0.38
HFO Plant (10 MW)	0.27

F.i.T Result (Specific Investment Cost)

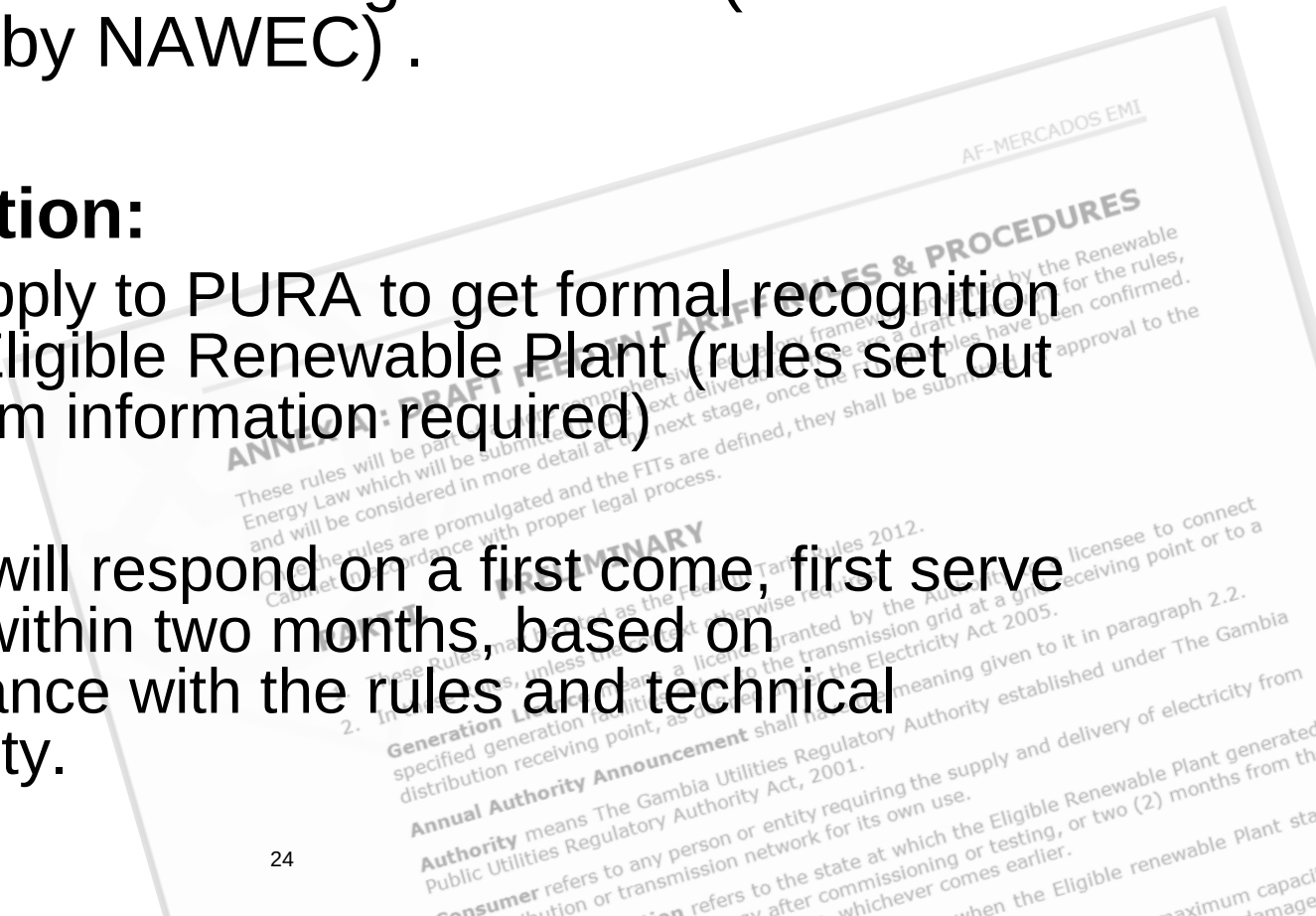
S.I.C	Tariff (US$/kWh)
Solar GBA	0.19
Solar Provinces	0.21

Feed in Tariff Rules:

Administration

- **Reporting:** PURA shall consolidate and report on renewable generation (information provided by NAWEC) .

- **Certification:**
  - Must apply to PURA to get formal recognition as an Eligible Renewable Plant (rules set out minimum information required)
  - PURA will respond on a first come, first serve basis, within two months, based on compliance with the rules and technical suitability.



Settlement

- Paying renewable generators for their power
  - the payments would come from NAWEC as the single grid company and electricity supplier.
- Frequency of Payments
  - 20kW-100kW paid every 3 months.
  - 100kW to 1.5MW paid every month.
- Auditing the scheme to ensure that it is being followed correctly.
  - Where generation from a particular plant seems unusual or fraud is suspected, PURA will have the right to audit the site and ensure that the generation is from the source claimed.

Thanks

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