

# Consultation Document

## Proposed Non-Conventional Renewable Energy Tariffs - 2012

### General

The Non-Conventional Renewable Energy (NCRE) purchase tariffs are cost-based and technology-specific. The technology applicable would be the “Type” of project stated in the “Permit” issued by the Sri Lanka Sustainable Energy Authority (SLSEA). For this tariff revision, Mini-hydro, Wind, Biomass (dendro), Biomass (Agricultural and Industrial Waste), Waste Heat Recovery technologies, are proposed. In addition, in order to encourage local industries who manufacture equipment used in the plants, Mini-hydro- Local and Wind-Local technologies are also proposed.

Purchasing tariffs for Municipal Solid Waste based power generation other exotic technologies like Solar, Wave, Geothermal, and Ocean Thermal are not specifically proposed due to following reasons;

- Due to their relative novel nature, it is difficult to establish parameters used for tariff determination
- Resulting purchase tariff are too high and does not justify their procurement in achieving Energy policy targets, which could be achieved with cheaper options
- Best economies of scale could be achieved with larger power plants (having capacities higher than 10 MW)
- In case of Municipal Solid Waste; the plant outputs like recycled waste could be the major income source, and they are difficult to quantify. Also availability of many technology variants makes it is difficult to determine common parameters.
- Inability to accommodate special financing arrangements available for such technologies

Hence, highest flat tariff among the specifically proposed technologies is proposed for these technologies; Municipal Solid Waste, Solar, Wave, Geothermal, Ocean thermal (for a 20 year period).

### Tariff Determination Process

In terms of Section 17 (b) of Public Utilities Commission of Sri Lanka Act, No 35 of 2002, Public Utilities Commission of Sri Lanka (PUCSL) has decided to consult the stakeholders in determining Feed-In-Tariffs for Non-Conventional Renewable Energy (NCRE) based electricity generation. In addition to the stakeholder representations, PUCSL will consider the General Policy Guidelines issued to the Commission and other Policies of the Government of Sri Lanka when determining the final tariffs to procure NCRE based electricity under Standardized Power Purchase Agreements (SPPA) for capacities less than 10 MW. The purchase tariffs determined through this process would be valid from 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2013.

### Areas for Stakeholder Representations

Stakeholder representations are sought for the items shown below. The representations shall be in writing and are expected only on the areas shown below.

- Proposed Policy of offering cost based technology specific purchase tariffs for aforementioned five specific technologies and the proposals for Municipal Solid Waste and other exotic technologies.
- Parameters used for proposed tariff calculations;
  - Interest Rate,
  - Annual Return on Equity,
  - Capital Cost,
  - Annual Plant (Capacity) Factor,
  - Operation and Maintenance Cost,
  - Fuel Cost and
  - Escalation Factors

The proposed parameters to be used to calculate tariffs and how escalations are applied are given in the sections below. The excel model used to tariff calculation is available as *Annex 1* and the resulting Feed-In-Tariffs (see summary sheet) can be changed by varying the parameter cells marked in yellow (in the ‘technology’, WACC and Escalation worksheets).

### Principles of Tariff Fixing

**Profits to developers from first year:** The cost-based, tiered tariffs provide pre-defined cash flows to developers.

**Benefits to Electricity Consumers in the long-term:** Tiered tariffs provide benefits to the developers and the electricity customers through (a) predictability of the tariff and (b) lower-cost energy from Non-conventional Renewable Energy (NCRE) in the long term, respectively.

### Tariff Setting Methodology

PUCSL has approved and issued a Methodology for Non-Conventional Renewable Energy purchase Tariffs (available as *Annex 2*) and the proposed tariff in this revision has deviated from the methodology in the following main areas;

- A Return on Equity is proposed instead of the incentive payment for the third tier
- A specific tariff is not proposed for Municipal Solid Waste technology
- Special adjustments have been made to accommodate auxiliary energy consumption of Biomass technologies.
- Escalation rate for biomass fuel is proposed to be ½ of Colombo Consumers Price Index (CCPI) change during the preceding year.

### Principles of tariff structure:

There are two tariff options for the developer for each specified technology; 1) Tiered tariff option and 2) Flat option.

#### 1) Tiered option

- a) Tier 1 (first 8 years):Cash outflow will include, loan repayment for 6 years, annual O &M cost, Return on Equity and Fuel cost
- b) Tier 2 (next 7 years):Cash outflow will include, annual O &M cost, Return on Equity and Fuel cost

- c) Tier 3 (next 5 years):Cash outflow will include, annual O &M cost, Fuel cost and an Return on Equity

In all three tiers, escalations will be applicable for O & M cost and Fuel cost and the incentive payment/ Return on Equity in the third tier.

## 2) *Flat option*

This option is a constant tariff over 20 years, where the same cash outflows are taken with the year 1 estimated escalation applied to total SPPA period, and a single all inclusive tariff is determined for each technology.

## Capacity Limit of SPPs

The SPPAs will continue to be limited to NCRE-based power plants with installed capacity up to 10 MW. Projects larger than 10 MW will not qualify for these tariffs or the SPPA, and they will be entertained through a separate process.

## Implementation of NCRE Tariffs

The SPPA contains a schedule of tariffs applicable over the 20-year period. Commencement of the year one in the tariff schedule of the SPPA shall be the Commercial Operation Date.

The escalation rates for operation and maintenance costs for all types of power plant, and fuel costs for biomass and agricultural/industrial waste power plants, will be re-calculated and announced every year.

## Key Inputs to this NCRE tariff calculation

This section gives the proposed benchmarks that may be used to develop the tariffs.

**Capital costs and annual plant (capacity) factor:** The proposed capital costs and the annual plant (capacity) factor to be used for the calculation of tariffs are as follows:

Technology	Capital Costs Rs. million/MW	Annual plant (capacity) factor
Minihydro	209	42%
Mini hydro - local	214	42%
Wind	223	32%
Wind - local	229	32%
Biomass (dendro)	243	80%
Agricultural and industrial waste	243	80%
Waste Heat	211	67%

**Debt: equity ratio and interest rates:** A debt:equity ratio of 60:40 has been assumed. An annual interest rate of 12.61% has been used as the interest rate on debts, repayable in equal

installments over six years. The interest rate on debts (12.61%) is the current market interest rate applicable to NCRE projects.

**Annual Return on Equity (AROE):** In tariff calculations, a pre-tax annual return on equity of 22% is proposed to be allowed every year for a period of 15 years.

**Discount rate:** The discount rate used to levelise tier 1 and tier 2 tariffs as well as to calculate the 20-year levelised tariffs is the Weighted Average Cost of Capital (WACC) as calculated below:

$$WACC = \frac{\text{debt \%} \times \text{interest rate\%} + \text{equity\%} \times \text{Annual ROE\%}}{100}$$

As the debt:equity ratio assumed is 60:40, proposed interest rate is 12.61%, proposed annual return on equity is 22%,

Discount rate = **16.37%**

**Operations and Maintenance (O&M) Rate (base value):** The annual O&M cost was defined as a per cent of the capital costs. The proposed base rates to be used are the following:

Technology	Annual O&M Cost as a percent of capital cost	Calculated O&M Base Rate* (Rs./kWh)	
Minihydro	3.0%	1.70	throughout
Mini hydro - local	3.0%	1.74	throughout
Wind	1.5%	1.19	throughout
Wind - local	1.5%	1.23	throughout
Biomass	4.0%	1.39	years 1-15
	5.0%	1.73	year 16 onwards
Agricultural and industrial waste	4.0%	1.39	years 1-15
	5.0%	1.73	year 16 onwards
Waste Heat	1.33%	0.48	throughout

\* see below for proposed escalation rates

### Escalation of O&M

The annual escalation rate for O&M is proposed to be the average of the rates of change of Colombo Consumers Price Index (CCPI) and the Rs./USD rates of change, for the five preceding years. The escalation rate in percent will be taken to two decimal places. The annual escalation rate announced for any year will be applied to all operational SPPs on the cost-based, three-tier tariff. In the year of achieving Commercial Operation, the base value of O&M stated above will apply, until 31<sup>st</sup> December of that year. Thereafter, O&M paid as of 31<sup>st</sup> December will be escalated by the annually announced O&M escalation rate.

The five-year average rate of change of CCPI for the period 2007-2011 was 10.94% and the average depreciation of Sri Lankan Rupee against the USD was 1.34% over the same period.

Therefore, the proposed escalation rate for O&M rate would be 6.14% for projects which were in operation before 1<sup>st</sup> January 2012.

Note: For new SPPAs, these notes provide guidance to how the escalation rates will be calculated in the future, once their projects are operational. For SPPs already operational as of 31<sup>st</sup> December 2011, these notes provide the calculation of the escalation rate applicable to the O&M rates paid from 1<sup>st</sup> January 2012.

Escalation rate for the third tier Return on Equity is proposed to be 2/3 of the yearly O&M escalation rate, which is estimated to be 4.09% for year 2012.

**Fuel cost escalation for biomass and agricultural/industrial waste:** The fuel cost of biomass SPPs payable on the Commercial Operation Date shall be the base rates proposed in this tariff revision.

Technology	Fuel Cost (Rs./kg)
Biomass (Dendro)	6.66
Biomass (Agricultural and Industrial Waste)	3.33

Estimated fuel consumption would be 1.6 kg / kWh (excluding the additional 15% allocated for internal/ auxiliary consumption).

Fuel costs are proposed to be escalated at a rate of ½ of the CCPI rate of change for the preceding year, starting from the 1<sup>st</sup> day of January occurring after the Commercial Operation Date. Hence the fuel cost escalation rate for year 2012 is estimated to be 3.37%.

**Third Tier:** In order to attract small power developers to operate the plant after 15 years, it is proposed to offer 20% return on equity after 15 years instead of the incentive payment recommended in the methodology.