# Decision on Non-Conventional Renewable Energy Purchase Tariffs

# 2012-2013

**05 October 2012**

Public Utilities Commission of Sri Lanka

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Public Utilities Commission of Sri Lanka (Commission), exercising its functions under Sri Lanka Electricity Act, No. 20 of 2009 and Public Utilities Commission of Sri Lanka Act, No. 35 of 2002, to regulate electricity purchase costs of the Transmission Licensee in order to ensure most economical and efficient service provision to the consumers. Also in line with the Government policies on promoting indigenous energy resources in Sri Lanka approved and published the Methodology for Feed-In-Tariffs- NCRE on 4th October 2011. The Ceylon Electricity Board as the Transmission Licensee submitted their proposals for Non-Conventional Renewable Energy purchase tariff for year 2012-2013 on 21 June 2012. The Commission also received subsequent detailed information in this regard on 9 July 2012.

This proposal of the Transmission Licensee was published for public consultation in terms of Section 17 (2) of the Public Utilities Commission of Sri Lanka, Act No. 35 of 2002, and that process ended with the oral presentation session held on 28th August 2012. Having perused the representation made by all the parties during the public consultation, existing plant data available with the Commission and expert opinion obtained for certain parameters, the Commission has arrived at the following set of decisions on Non-Conventional Renewable Energy purchase tariff for the period effective from 1st January 2012 to 31st December 2013. The Commission herby directs the Transmission Licensee to offer the approved tariff for any Generation Licensee who wishes operate and sell electricity using a Non-Conventional Renewable Energy based generation plant, having capacities below 10 MW, under the Standard Power Purchase Agreements (SPPAs)signed during this period.

Signed,

Dr. Jayatissa de Costa, P.C.
Chairman

Dr. Bandula Perera
Deputy Chairman

Prof. R.A. Attalage
Member

Mr. Sanjaya Gamage
Member

Mr. Prasad Galhena
Member

Date: 05 October 2012

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# 1. Introduction

The previously published Non- Conventional Renewable Energy (NCRE) purchase tariffs were valid for the period 25th November 2010 to 31st December 2011 and the revision of the NCRE tariffs was due before 31stDecember 2011. The methodology used to calculate these tariffs was documented and published by the Commission on 4th October 2011, incorporating the Government policies and Cabinet Memorandums that prescribed the cost based technology specific purchase tariffs for NCRE plants.

The Ceylon Electricity Board (CEB) as the Transmission Licensee submitted the proposed NCRE purchase tariff for the period 1st January 2012 to 31st December 2013, on 21st June 2012, and the report of the Ministry of Power and Energy appointed Committee that calculated the proposed tariffs was submitted to the Commission on 9th July 2012. Subsequently, the Commission decided to conduct a public consultation on the matter and the relevant consultation document containing the CEB proposal was published on 26th July 2012. The public consultation process ended on 28th August 2012, with the conclusion of oral representation session. Altogether nineteen (19) stakeholders submitted their written and oral comments on the proposed consultation document.

The following sections contain the decisions taken by the Public Utilities Commission of Sri Lanka in relation to parameters that were open for public representations in the Public Consultation. The parameter values published in the Consultation Document were as filed by the Ceylon Electricity Board (Transmission Licensee) and hence, they are referred as 'Proposal of TL'.

The Consultation document consulted the public on the following areas in relation to Non-Conventional Renewable Energy (NCRE) purchase tariffs;

- Proposed Policy of offering cost based technology specific purchase tariffs for five specific technologies (Mini-Hydro, Wind, Biomass (Dendro), Biomass (Agri. and Industrial Waste), Waste Heat) 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 (O & M) Cost,
    - Fuel Cost and
    - Escalation Factors for O & M and Fuel Cost

In addition to the representations made by all the parties during the public consultation, existing plant data available with the Commission and expert opinion obtained for certain parameters, the Commission has considered the elements of the National Energy Policy and Strategies of Sri Lanka (Extraordinary Gazette 1553/10 dated 10th June 2008) in relation to NCRE; Sections 2.4, 3.4, 4.3 and 4.4 in arriving at the decisions.

The decisions cover NCRE plants; Mini-hydro, Mini-hydro-local, Wind, Wind-local, Biomass (dendro), Biomass(Agri. & Industrial Waste), Waste Heat, Municipal Solid Waste and Other, having capacities less than 10MW.

## 1. Capital Costs

The total investment for a typical 1 MW power plant of each technology is to be established, for plants that sign SPPAs during 1st January 2012 to 31st December 2013. The average size of a typical plant constructed in Sri Lanka is considered when arriving at per MW investment cost. The cost components of a typical plant are; project development cost, infrastructure development cost, cost of civil works, cost of logistics, cost of machinery and equipment, fuel handling system cost (where applicable), interconnection cost, working capital and contingencies. Locally published, Institute for Construction Training and Development (ICTAD) indices and international metal price, labor &equipment cost indices are used to update the capital cost, on yearly basis (typical formulae and indices are shown below). The machinery and Equipment cost is estimated in United States Dollars (USD) and converted to Sri Lankan Rupees (LKR). In case of Mini-hydro – Local and Wind-local technologies, an additional 10% of the electromechanical equipment cost allocation in the investment cost is added as an assistance to encourage usage of locally manufactured components.

| **Cost Component** | **Methodology** | **Index Used** | **Source** |
|---|---|---|---|
| Project Development | None | | |
| Infrastructure Development | Factor Multiplication | Road Works Index | ICTAD (1) |
| Civil Works | Factor Multiplication | Minor Irrigation Index | ICTAD |
| Machinery & Equipment | $P_{new} = P_{old}(0.1 + 0.3E_{Components} + 0.4E_{Steel} + 0.2E_{Labour})$ | $E_{Com}$ - HICP Commodity Prices (3) | ECB HICP (2) |
| | | $E_{Steel}$ | CRU SPI (4) |
| | | $E_{Labor}$ - HICP Hourly Labor Cost | ECB HICP |
| Interconnection | | | Allowed Charges (CEB) |

| | | | |
|---|---|---|---|
| Working Capital | Factor Multiplication | Medium Term Bank Interest Rate | Central Bank of Sri Lanka |
| Contingency | Percentage | 4.5% of Total Cost | |

Note :

(1) - Institution for Construction Training And Development

(2) - European Central Bank Harmonized Index of Consumer Prices

(3) - Industry, Construction, Residential Property and Commodity Prices

(4) - CRU Steel Price Index

### a. Proposal of TL

The Transmission Licensee had followed the methodology (refer section 4.1 of annex 1) in proposing the capital cost figures, and the cost component adjustments were done up to December 2011.

### b. Stakeholder Comments

Most of the stakeholders suggested considering rupee devaluation and inflation when calculating the capital cost. Small Hydro Power Developer Association and ESCAS POWER (PVT) LIMITED suggested that capital cost for mini hydro plants should be high because the remaining mini hydro sites are low head sites, and capital cost of low head mini hydro plants are higher. ESCAS POWER (PVT) LIMITED claimed that the capital cost of an already built low head mini hydro plant (Owala MHP) was LKR 772 Million per MW. Small Hydro Power Developer Association suggested a capital cost of LKR 281 Million per MW.

Bio Energy Association of Sri Lanka commented that Value Added Tax (VAT) on materials has to be taken into account when calculating capital cost of projects. VIDULLANKA PLC suggested forecasting indices for year 2012-2013 period in order to adjust the capital cost and also to consider fuel price hike, inflation, and costs of approvals and land when deriving capital cost.

WIND POWER ASSOCIATION OF SRI LANKA claimed that capital cost of a small wind plant is higher than LKR254 Mn per MW.

Energy Forum suggested reviewing capital cost annually based on market prices. BAM GREEN Pvt. Ltd Claimed that Capital cost for solar is LKR267Mn per MW.

### c. Commission Decision

The Commission also examined the internationally published wind turbine cost trends to evaluate its decision. There is a downward trend in international wind turbine costs, the proposed cost of machinery and equipment was USD 1,310 /kW, in the proposal of TL. Considering the relatively smaller size of the plants constructed under SPPA and historical cost basis available with the Commission (extracted from the Audited Accounts of existing wind plants), proposal of TL is reasonable. Similar approach was taken in case of other technologies like mini-hydro as well.

The proposal of TL contained a 3% depreciation of Sri Lankan Rupee against the US Dollar compared to December 2011 (Rs. 113.90/ USD[1]), for Machinery & Equipment component of the capital cost estimates. Considering the stakeholder comments on this parameter and considering the sharp depreciation of the Sri Lankan Rupee in February 2012, the machinery and equipment component of the capital costs were adjusted to reflect the exchange rate variations up to July 2012 (average exchange rate Rs. 132.86/USD[1]). The approved capital costs are shown below.

| **Technology** | **CEB Proposed Capital Cost** (LKR Million/MW) | | **Capital Cost – Commissions' Approval** (LKR Million/MW) |
|---|---|---|---|
| | **Total** | **Machinery and Equipment , %** | |
| Mini-hydro | 209 | 40% | 220 |
| Mini-hydro-local | 214 | 41% | 226 |
| Wind | 223 | 69% | 243 |
| Wind-local | 229 | 70% | 250 |
| Biomass* | 243 | 64% | 263 |
| Agro & Indus | 243 | 64% | 263 |
| Waste Heat | 211 | 64% | 229 |

[1] Source: Central Bank of Sri Lanka website: www.cbsl.gov.lk/

## 2. Cost of Debt (Interest Rate)

### a. Proposal of TL

The approved methodology identifies a Debt: Equity ratio of 60:40 and the guideline on estimating cost of debt is given in section 4.6 of the methodology (see annex 1), the proposal of TL contained this estimation, and has suggested a deviation from the methodology sighting current market conditions. The proposed interest rate was 12.61%.

### b. Stakeholder Comments

Most of the stakeholders suggested using an interest rate based on Average Prime Lending Rate (AWPLR).SILVERMILL HOLDINGS LIMITED suggested an interest rate of 18%, while Bio Energy Association of Sri Lanka suggested that the interest rate should be the rate that commercial banks would like to lend for this type of projects. VIDULLANKA PLC suggested adopting an interest rate of, AWPLR + 3 to 5%. WIND POWER ASSOCIATION OF SRI LANKA stated that since Renewable Energy for Rural Economic Development (RERED) credit lines are not operative in Sri Lanka, a rate base on Average Weighted Deposit Rate (AWDR) and Average Weighted Fixed Deposit Rate (AWFDR) as depicted in the methodology cannot be used. SAPTHAKANYA HYDRO ELECTRIC CO. (PVT) LTD claimed that the current lending rate is 17.5% at development banks. Sampath Bank suggested a rate of at least AWPLR + 3% for these types of projects.

### c. Commission Decision

Commission accepts that the market conditions have changed from the time of methodology preparation and hence the deviation for the methodology is also acceptable.

According to proposal of TL, interest rate for the loan component of the investment is proposed as 12.61%. Considering the comments from the stakeholders, the expert opinion obtained on this parameter and observing the current lending rates, the following interest rate estimate is approved. The latest available Average Weighted Lending Rate (AWLR) is 14.88%[1] (published on 29 June 2012) and by adding atypical risk premium (3%) charged by the local banks, the approved interest rate is 17.88%.

# 3. Discount Rate - Weighted Average Cost of Capital (WACC)

### a. Proposal of TL

This is not a specific parameter for which stakeholder comments were sought during public consultation, since it is a derived figure from Cost of Equity and Cost of Debt, as per the section 4.8 (annex 1) of the methodology. The proposed WACC was 16.37% assuming a 22% Cost of Equity, 12.61% Cost of Debt and 60:40 Debt: Equity ratio.

### b. Stakeholder Comments

VIDULLANKA PLC and Small Hydro Power Developer Association suggested a WACC of 19.1% as discount rate. Consumer consultative committee stated that allowing an Equity Risk Premium as high as 10% in the Cost of Equity as indicated in the Methodology (annex 1) is too high for the industry, since it is a low risk business. VIDULLANKA PLC suggested an Equity internal rate of return of 20.85%, which could be used as Cost of Equity for WACC calculation.

### c. Commission Decision

According to proposal of TL, the proposed WACC was 16.37% (based on 22% Cost of Equity and 12.61% Cost of Debt), which was calculated as per the methodology. Proposal of TL assumes Cost of Equity and project Return on Equity to be same. Commission obtained expert opinion on this parameter. Considering the current risk free returns, the Cost of Equity of 20% is derived based on 20 year Treasury bond rate[1] of 11% and Equity risk premium of 5% and additional project risk premium of 4%. The Cost of Debt was adjusted for corporate tax (28%); which is estimated to be 17.88% (as shown above). The resulting approved Cost of Debt is 12.87% for discount rate estimation. Assuming the typical debt equity ratio of 60:40, the resulting approved discount rate (WACC) is 15.72%.

## 4. Return on Equity (ROE)

### a. Proposal of TL

The proposal of TL did not fully follow the guidelines of the methodology and proposed an escalable Return on Equity for the third tier as an incentive. TL proposed an annual ROE of 22% for years 1-15 and an escalable (at 2/3 of annual O&M escalation rate) incentive of 20% annual ROE for years 16-20.

### b. Stakeholder Comments

Small Hydro Power Developer Association claimed that current post-tax Cost of Equity is 20.85%; they suggested using iterative method as per methodology to arrive at the Return on Equity.

### c. Commission Decision

Commission obtained expert opinion on this parameter and estimated Cost of Equity is 20% (see section 3. above), and considering the plant construction time that result in delayed returns, the Annual Return on Equity of 22% for years 1-15 and an incentive equivalent to non-escalable Annual Return on Equity of 20% for years 16-20, as per proposal of TL, are approved. The escalation rate (4.09% for year 2012) proposed for the incentive for years 16-20 is not approved due to; (1) inadequate justification, (2) Return on Equity is nominal.

## 5. Annual Plant (Capacity) Factor

### a. Proposal of TL

Annual plant factor is used to estimate the annual electricity generation of a NCRE plant as per the methodology (annex 1). TL proposed unchanged (compared to 2010) Annual Plants Factors as per the methodology.

### b. Stakeholder Comments

WIND POWER ASSOCIATION OF SRI LANKA and Sampath Bank claimed that small wind plant in Ambewella will achieve a plant factor of 22-24%, and were in agreement with the proposed plant factor in case of wind plants in the North Western coastal part of the country. Sampath Bank stated that Plant Factor for mini hydro has drastically decreased in recent times. Small Hydro Power Developer Association suggested a Plant Factor of 35.8% for mini-hydro plants.

### c. Commission Decision

Considering stakeholder comments and available past data for Mini-hydro and Wind plants, the Commission arrived at the following decision.

#### *Plant Capacity Factor for Mini-Hydro Technology*

According to proposal of TL, the proposed plant capacity factor for Mini-Hydro technologies was 42%. Based on the submissions by the stakeholders and the actual historical data collected by the Commission; the average plant factor of mini hydro plants during last 15 years is 39%. Considering the above, average plant factor of 39%[2] is approved for Mini-hydro technology.

Plant capacity factor for other technologies shall remain as per proposal of TL (shown below).

| Technology | Annual Plant Factor (Proposal by TL) | Annual Plant Factor (Approved by PUCSL) |
|---|---|---|
| Minihydro | 42% | 39% |
| Mini hydro – local | 42% | 39% |
| Wind | 32% | 32% |
| Wind – local | 32% | 32% |
| Biomass (dendro) | 80% | 80% |
| Agricultural and industrial waste | 80% | 80% |
| Waste Heat | 67% | 67% |

[2] Extracted from audited accounts of all existing mini-hydro plants

# 6. Operation and Maintenance (O & M) Costs

### a. Proposal of TL

As per the methodology (annex 1), the annual plant Operation and Maintenance Costs are taken as a percentage of the total capital cost. The proposal of TL contained the same O & M cost percentages of 2010 NCRE tariff decision except in case of Wind technology. The reason given to reduce the Wind plant O & M cost percentage from 4% to 1.5% were, favorable wind sites and low labor costs.

### b. Stakeholder Comments

Small Hydro Power Developers Association pointed out that 3% O&M cost for a mini hydro is not accurate since it doesn't depend on the capital cost incurred, and suggested to revise annual escalation rate up to 6.93%. They further highlighted that the royalty and taxes should not be completely ignored in tariffs calculations. SAPTHAKANYA HYDRO ELECTRIC CO, pointed out that O&M cost is coupled with the quality of the plant, therefore with the given capital cost the O&M cost exceeds 3% per annum.

Stakeholders representing Wind Power Developers Association pointed out that 1.5% of O&M cost is not realistic and requested to apply last year rate (4%), which is more realistic.

### c. Commission Decision

Although the O & M cost is mostly linked with the Machinery and Equipment cost of a plant, a percentage of the total capital cost is used in the tariff methodology, for simplicity. The past records (extracted from Audited Accounts) available with Commission also supported the change proposed by TL for wind plant O&M rate. The following percentage Operation and Maintenance costs as proposed by TL are approved.

| Technology | Annual O&M Cost as a Percentage of Total Capital Cost (Sec. 1 (c)) | Calculated O&M Base Rate* (Rs./kWh) | |
|---|---|---|---|
| Minihydro | 3.0% | 1.93 | throughout |
| Mini hydro - local | 3.0% | 1.98 | throughout |
| Wind | 1.5% | 1.30 | throughout |
| Wind - local | 1.5% | 1.34 | throughout |
| Biomass | 4.0% | 1.50 | years 1-15 |
| | 5.0% | 1.88 | year 16 onwards |
| Agricultural and industrial waste | 4.0% | 1.50 | years 1-15 |
| | 5.0% | 1.88 | year 16 onwards |
| Waste Heat | 1.33% | 0.52 | throughout |

## 7. Operation and Maintenance Cost Escalation Rate

### a. Proposal of TL

As per section 4.9.1 of the methodology (annex 1), the O & M cost escalation rate is calculated based on Colombo Commercial Price Index (CCPI) and US Dollar Vs. Sri Lanka Rupee exchange rate escalation during past five years. The proposal of TL is in line with this methodology. The proposed rate by TL was 6.14% for year 2012.

### b. Stakeholder Comments

The Energy Forum suggested that O&M escalation rate should vary with the technology. Small Hydro Developers Association requested a 6.93% O & M escalation rate for year 2012.

### c. Commission Decision

Since the NCRE tariffs are applicable for the period 01 January 2012 to 31 December 2013, the Operation and Maintenance cost escalation rates of 6.14% for year 2012 as filed by TL is approved.

## 8. Fuel Cost for Biomass Technologies

### a. Proposal of TL

Proposal of TL contained, Fuel costs; Rs. 6.66/ kg for Biomass - Dendro technology and Rs. 3.33/ kg for Biomass- Agricultural Industrial Waste technology and the biomass consumption rate of 1.84 kg/ kWh (including auxiliary consumption).

### b. Stakeholder Comments

Silverrmill Holding Limited pointed out that 1.75 kg of wood is required to generate 1 kWh of electricity at the 40% of moisture content. They further mentioned that Energy used for internal consumption is approximately 10-12.5% of the generation. According to the methodology the fuel cost escalation using 50% of CCPI was questioned by them and suggested to escalate using full CCPI variation. According to Silvermill Holdings' Gliricidia (Fuel Wood) market has a large potential but still in the introductory stage, with the competition the price can reach Rs.8 to Rs.10 per kg. They further elaborated the fact that intangible benefits of using bio-mass over fossil fuels should also be taken into consideration when setting tariffs.

Bio Energy Association of Sri Lanka also expressed similar view point and proposed to use full CCPI variation to escalate the fuel cost of Biomass. They further suggested that fuel cost should be escalated from the date of signing the SPPA and suggested to treat bio-mass and agri-waste on the same footing.

Consumer Consultative Committee of the Commission mentioned that Bio-mass fuel cost given in the consultation document is too high to justify its use. They strongly pointed out that if any technology is being promoted considering its non-energy value i.e. employment, rural development etc, cost of such activities should not be borne by the electricity consumer alone.

### c. Commission Decision

Fuel costs; Rs. 6.66/ kg for Biomass - Dendro technology and Rs. 3.33/kg for Biomass-Agricultural Industrial Waste technology and the biomass consumption rate of 1.84 kg/ kWh (including auxiliary consumption) as filed by TL are approved.

## 9. Fuel Cost Escalation Rate

### a. Proposal of TL

As per section 4.9.2 of the methodology fuel cost escalation rate is to be 2/3 of the O & M cost escalation rate. The proposal of TL deviated from the methodology and suggested 50% of annual average Colombo Commercial Price Index (CCPI) escalation rate to escalate the fuel cost. The proposed escalation rate for year 2012 was 3.37%.

### b. Stakeholder Comments

Sri Lanka Sustainable Energy Authority and Bio Energy Association of Sri Lanka suggested that fuel cost should be escalated from the date of signing the SPPA. They also requested 100% of annual CCPI escalation rate to escalate the fuel cost.

### c. Commission Decision

The fuel cost escalation rate of 3.37% proposed by TL for year 2012 is approved. This is equivalent 50% if annual average CCPI escalation. The Transmission License has provided adequate justification for the deviation from the methodology (Annex 1).

# 10. Purchase Tariff for Municipal Solid Waste Technology

### a. Proposal of TL

A specific tariff was not proposed for Municipal Solid Waste (MSW) technology in the proposal of TL. MSW was considered a s 'Other' technology in the proposal of TL.

### b. Stakeholder Comments

Orizon Renewable Energy (Pvt) Ltd pointed out that only large MSW projects which have a capacity higher than 10MW are financially viable. They also requested a specific tariff for MSW technology. Renew GEN Enviro Ventures India Pvt Ltd, mentioned that compared to biomass the investment in MSW is significantly higher due to various technical and other requirements. Therefore a premium (at a minimum) of LKR 1.8 per kWh should be added to biomass tariff to arrive at MSW tariff. Further they requested to consider setting a flat tariff of LKR 26.42 per kWh for MSW.

### c. Commission Decision

Since, a specific purchase tariff was published for Municipal Solid Waste (MSW) technology in 2010 (both three –tiered and flat tariff options), the proposal to offer only the highest flat tariff option for MSW technology is inconsistent. In addition, several stakeholders requested a specific tariff for Municipal Solid Waste technology. The following set of specific parameters (based on year 2010 approved tariffs) is approved to calculate the technology specific tariff for MSW technology.

| Parameter | Value |
|---|---|
| Capital Cost | Rs. 399 Million /MW |
| Fuel Cost | Rs. 1.75 /kWh |
| Operation and Maintenance Cost | 7% for year 1-20 |
| Plant (capacity) Factor | 60% |

## 11. Approved Tariffs

The approved purchase tariffs for the Non-Conventional Renewable Energy based generation plants having capacities less than 10MW that signs the Standard Power Purchase Agreements (SPPAs) during the period 1st January 2012 to 31st December 2013 are as shown below. There are two options, and the developers have the option of selecting either a three-tier tariff or a flat tariff;

### a. Option 1: Three-tiered Tariff (LKR/ kWh)

| Technology / Source | Escalable Base O&M rate (year 1-20) | Escalable Base Fuel rate (year 1-20) | Fixed Rate | | | Royalty to Govt, paid direct by the utility (% of total Tariff) Year 16-20 |
|---|---|---|---|---|---|---|
| | | | Year 1-8 | Year 9-15 | Year 16-20 | |
| Mini-hydro | 1.93 | None | 16.81 | 6.38 | 5.80 | 10% |
| Mini-hydro-local | 1.98 | None | 17.27 | 6.55 | 5.95 | 10% |
| Wind | 1.30 | None | 22.63 | 8.58 | 7.80 | 10% |
| Wind-local | 1.34 | None | 23.29 | 8.83 | 8.03 | 10% |
| Biomass (Dendro) | 1.50 (1-15 years) 1.88 (16-20 years) | 12.25 | 9.80 | 3.72 | 3.38 | None |
| Biomass (Agricultural & Industrial Waste) | 1.50 (1-15 years) 1.88 (16-20 years) | 6.13 | 9.80 | 3.72 | 3.38 | None |
| Municipal Solid Waste | 5.31 | 1.75 | 19.80 | 7.51 | 6.83 | None |
| Waste Heat | 0.52 | None | 10.19 | 3.86 | 3.51 | None |
| Escalation rate for year 2012 | 6.14% | 3.37% | None | | | |

Note 1: Escalation of O & M rate and fuel rate shall commence from 1st day of the month of January immediately after the commercial operation date.

Note 2: The applicable escalation rate for each subsequent year shall be the rate announced for that particular year.

Note 3: To compensate for the higher tariffs in tier 1, developers will be required to deliver in tier2, an average amount of energy at least equal to that delivered in tier 1. This obligation will be stipulated in the agreement, with corresponding penalties for non-delivery in tier 2.

Note 4: Biomass (Dendro) means sustainably grown fuel wood.

Note 5: 'Mini-hydro – Local' and 'Wind – Local' are plant that use locally manufactured turbine equipment

## b. Option 2: Flat Tariff (LKR/kWh)

| Technology | All inclusive rate (LKR/kWh) for year 1-20 |
|---|---|
| Mini-hydro | 16.70 |
| Mini-hydro-local | 17.15 |
| Wind | 20.62 |
| Wind-local | 21.22 |
| Biomass (Dendro) | 25.09 |
| Biomass (Agricultural & Industrial Waste) | 17.71 |
| Municipal Solid Waste | 26.10 |
| Waste Heat | 9.19 |

Note 1: The flat tariff will not be escalated for any reason over the entire 20 year period.

Note 2: Extensions after the 20$^{th}$ will be at the same rate as for an option 1 project.

The selection between options 1 and 2 would be at the discretion of the developer, at the time of signing the SPPA. Any other Non-Conventional Renewable Energy technology (electricity produced based on SPPA) that does not have a declared tariff would be offered a flat tariff of Rs. 25.09/ kWh, for 20 years.