

## Purchase of Electricity to the National Grid under Small Power Purchase Agreements (SPPA)

Explanatory notes to the Press Release dated 18<sup>th</sup> March 2008

### 1. Principles of Tariff Fixing

1.1 **Financial model:** The tariffs for Small Power Producers entering into SPPAs from 1<sup>st</sup> January 2008 will continue to be cost-based, technology-specific and three-tiered.

1.2 **Tracking forecast cashflows:** The cost-based tariffs have been designed to alleviate the problems of negative cashflows experienced by many Small Power Producers (SPPs) during the period of loan repayment, when the tariff was technology-neutral and based on avoided costs to Ceylon Electricity Board (CEB). The new tariffs track the actual cash requirements of typical SPPs of each technology to meet the debt commitments, operations and maintenance (O&M) costs and a reasonable return on equity investment.

1.3 **Profits to developers from first year:** Unlike tariffs based on avoided costs that fluctuate with international fuel prices, these cost-based tariffs provide profits to developers from the first year of operation. This provides the maximum tax-free returns to developers as almost all SPPs enjoy at least a five-year tax holiday under Board of Investment concessions.

1.4 **Benefits to Electricity Consumers in the long-term:** This tariff policy provides benefits to the SPPs 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.

1.5 **Principles of tariff structure:** In principle,

- (a) renewable energy should in the long-term produce electricity at prices below the cost of thermal power plants, using oil or coal, or similar fossil fuels.
- (b) renewable energy, which is a natural resource, belongs to the State. Developers are provided with a high tariff to cover their expenses and to earn reasonable profits for an adequately long period (in this case the first fifteen years). Thereafter, the benefit of the resource should flow to the electricity customers, while continuing to provide an operating fee to the SPPs and full recovery of maintenance costs (in this case from years 16 to 20, and beyond).

Therefore, once the developers' costs and profits are paid, it is inevitable that in the long-term, renewable energy should flow into the national grid at prices significantly lower than the cost of thermal energy.

### 2. 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.

### 3. Tariff Revision

It is emphasised that the base rates of tariffs announced for 2008, would be applicable to all SPPAs signed until a new announcement is made in year 2009 or later. The SPPA will contain a schedule of tariffs applicable over the 20-year period of the SPPA. 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, and fuel costs for biomass and agricultural/industrial waste power plants, will be re-calculated and announced every year.

In view of the changes expected in project costs, exchange rates and interest rates, the base rates of cost-based tariffs will be revised on a regular basis as the need arises, typically once a year. New tariffs announced on any date in the future will be applicable to SPPA signed from that date onwards, but not for SPPAs signed between now and such future date of announcement.

### 4. Key Inputs to SPP tariffs announced for SPPAs signed from 1<sup>st</sup> January 2008

#### 4.1 Capital costs and annual plant (capacity) factor:

The capital costs and the plant (capacity) factor used for the calculation of year 2008 tariffs are as follows:

Type of SPP	Capital Costs LKR million/MW	Annual plant (capacity) factor
Mini-hydro	166	42%
Wind	200	32%
Biomass	182	80%
Agricultural and industrial waste	182	80%
Waste Heat	182	67%
Municipal Solid Waste	270	80%
Wave Power	150	68%

**4.2 Debt: equity ratio and Interest rates:** A debt:equity ratio of 60:40 has been assumed. An annual interest rate of  $0.5 \times (\text{AWDR} + \text{AWFDR}) + 5.5\%$  has been used as the interest rate on debts, repayable in equal installments over six years. The Average Weighted Deposit Rate (AWDR) and the Average Weighted Fixed Deposit Rate (AWFDR) is taken to be the average rate of six months ending 30<sup>th</sup> November of the previous year (2007). Therefore, the interest rate used for the calculation of tariffs in this announcement was 17.15% per year.

**4.3 Operations and Maintenance (O&M) Rate (base value):** O&M cost is defined as a per cent of the capital costs. The resulting base rates payable are the following:

Type of SPP	O&M Cost as a percent of capital cost	Calculated O&M Base Rate* (LKR/kWh)	
Mini-hydro	3.0%	1.35	throughout
Wind	3.0%	2.14	throughout
Biomass	4.0%	1.04	years 1-15
	5.0%	1.30	year 16 onwards
Agricultural and industrial waste	4.0%	1.04	years 1-15
	5.0%	1.30	year 16 onwards
Municipal Solid Waste	7.0%	2.70	throughout
Waste Heat	1.33%	0.41	throughout
Wave	4.0%	1.01	throughout

\* see below for escalation rates

**4.4 Escalation of O&M:** The annual escalation rate for O&M shall be the average of the rates of change of Sri Lanka Consumer Price Index (SLCPI) and LKR/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 in 4.3 above will apply, until 31<sup>st</sup> December of that year. Thereafter, O&M paid in the previous year will be escalated by the annually announced O&M escalation rate.

The five-year average SLCPI for the period 2003-2007 was 10.04% and the average depreciation of the rupee against the USD was 3.00% over the same period. The escalation rate for O&M costs would be 6.52% for projects with an SPPA that were in operation before 1<sup>st</sup> January 2008. (Note: There are no such projects because the new SPPAs are offered only from 2008, but this rate will be used to calculate tariffs for the flat tariff option. See subsequent sections of this document.)

**4.5 Third Tier:** The base rate paid from year 16 onwards will be 1.30 LKR/kWh, as of year 2008. From the 1<sup>st</sup> of January occurring after the Commercial Operation Date and on each subsequent year, this third tier rate will be escalated at a rate of 2/3 of the O&M escalation rate calculated in 4.4 above. The escalations will be computed and compounded for fourteen years until the fifteenth anniversary of the Commercial Operation Date, and paid from year 16 onwards.

**4.6 Fuel cost escalation for biomass and agricultural/industrial waste:** The fuel cost of biomass SPPs will be escalated at a rate of 2/3 of the O&M escalation rate calculated in 4.4 above.

**4.7 Return on equity:** In tariff calculations, a pre-tax return on equity of 22% has been allowed every year for a period of 15 years.

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

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

As the debt:equity ratio assumed is 60:40, interest rate is 17.15%, return on equity is 22%, for year 2008 tariff calculations,

$$\text{Discount rate} = \text{WACC} = \frac{60 \times 17.11 + 40 \times 22}{100} = 19.09\%$$

**5 Tariff offered for SPPAs signed from 1<sup>st</sup> January 2008 will be as follows.**

Two tariff options are offered. The selection between options 1 and 2 would be at the discretion of the developer, at the time of signing the SPPA.

**Option 1: Three-tier Tariff**

This will consist of a fixed rate, an operations and maintenance (O&M) rate and a fuel rate (if applicable). All prices are in LKR/kWh.

Technology	Escalable Base O&M Rate	Escalable Base Fuel rate	Non-escalable fixed rate		Escalable Year 16+ Base rate	Royalty to Govt, paid direct by the power purchaser Year 16+
			Year 1-8	Year 9-15		
Mini-hydro	1.35	none	11.80	4.45	1.30	10% of total tariff
Wind*	2.14	none	18.66	7.03	1.30	10% of total tariff
Biomass	1.04	5.74	6.79	2.56	1.30	No royalty
Agricultural & Industrial Waste	1.04	2.87	6.79	2.56	1.30	No royalty
Municipal Waste	2.70	None	10.07	3.80	1.30	No royalty
Waste Heat Recovery	0.41	None	8.11	3.06	1.30	No royalty
Wave Energy	1.01	None	6.58	2.48	1.30	10% of total tariff
Escalation rate for year 2007	6.52%	4.35%	None	None	4.35%	

\* Based on an annual plant factor of 32% for wind power plants. If the annual plant factor is lower owing to uncertainty of wind flow, the tariff per kWh delivered will be proportionately adjusted upwards to compensate for a maximum energy reduction of 15%, on the condition that the developer should agree to supply the excess energy at no cost if the plant factor exceeds 32% by 15%. (ie up to 36.8%). Any further excess energy supplied beyond an annual plant factor of 36.8% will be paid for at the rates published above.

To qualify for this tariff, wind energy developers have to enter into an SPPA before 31<sup>st</sup> December 2008, and reach the Commercial Operation Date within two years from the date of the SPPA.

Note 1: Escalation of O&M rate and fuel rate will commence from the 1st day of the month of January immediately after the Commercial Operation Date.

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

- Note 3: For biomass, and agricultural/industrial waste, the maintenance base rate increases from year 16. The year 16 rate will be the actual rate paid in year 15 multiplied by 1.25, and escalated at the rate announced for year 16.
- Note 4: To compensate for the higher tariffs in tier 1, developers will be required to deliver in tier 2, 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 5: Biomass means sustainably grown firewood.

**Option 2: Flat Tariff**

Technology	All inclusive rate (LKR/kWh) for years 1-20
Mini-hydro	11.77
Wind *	18.61
Biomass	12.77
Agricultural & Industrial Waste	9.90
Municipal Waste **	11.59
Waste Heat Recovery	7.57
Wave Energy	6.82

\* See note above for wind power developers

\*\* As an incentive to the developers to generate electricity from municipal waste, a fixed flat tariff of 18.00 LKR/kWh will be offered, subjected to the developer;

- (a) Obtaining the provisional approval under section 17 of the Sri Lanka Sustainable Energy Authority Act, 35 of 2007 on or before 31<sup>st</sup> March 2008.
- (b) Obtaining the Renewable Energy Permit under section 18 of the said Act within six months from the date of the said provisional approval
- (c) Signing the SPPA within six months from the date of the said provisional approval
- (d) Achieving Commercial Operation Date within two years from the date of such Renewable Energy Permit

- Note 1: The flat tariff will not be escalated for any reason over the entire 20-year period.
- Note 2: Extensions after the 20th year will be at the same rate as for an option 1 project.

**5.1 Interpretation of the 3-tier tariff, based on year 2008 escalation rates**

The progression of the three-tier tariffs, based on the escalations rates applicable for year 2008 would be as follows. It should be noted that the following is only an example to demonstrate the application of escalation rates, where the escalation rates for year 2008 have been applied every year throughout the 20-year period of the SPPA.

## TIER 1

		All inclusive Tariff for SPPAs signed after 1st January 2008 (LKR/kWh)							
Year of operation		1	2	3	4	5	6	7	8
Mini-hydro	Non-escalable	11.80	11.80	11.80	11.80	11.80	11.80	11.80	11.80
	Escalated O&M	1.35	1.44	1.54	1.64	1.74	1.86	1.98	2.11
	<b>Total</b>	<b>13.15</b>	<b>13.24</b>	<b>13.33</b>	<b>13.43</b>	<b>13.54</b>	<b>13.65</b>	<b>13.78</b>	<b>13.90</b>
Wind	Non-escalable	18.66	18.66	18.66	18.66	18.66	18.66	18.66	18.66
	Escalated O&M	2.14	2.28	2.43	2.59	2.76	2.94	3.13	3.33
	<b>Total</b>	<b>20.80</b>	<b>20.94</b>	<b>21.08</b>	<b>21.24</b>	<b>21.41</b>	<b>21.59</b>	<b>21.78</b>	<b>21.99</b>
Biomass	Non-escalable	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79
	Escalated Fuel	5.74	5.99	6.25	6.52	6.81	7.10	7.41	7.73
	Escalated O&M	1.04	1.11	1.18	1.26	1.34	1.42	1.52	1.62
	<b>Total</b>	<b>13.57</b>	<b>13.89</b>	<b>14.22</b>	<b>14.57</b>	<b>14.93</b>	<b>15.32</b>	<b>15.72</b>	<b>16.14</b>
Agricultural & Industrial waste	Non-escalable	6.79	6.79	6.79	6.79	6.79	6.79	6.79	6.79
	Escalated Fuel	2.87	2.99	3.13	3.26	3.40	3.55	3.71	3.87
	Escalated O&M	1.04	1.11	1.18	1.26	1.34	1.42	1.52	1.62
	<b>Total</b>	<b>10.70</b>	<b>10.89</b>	<b>11.09</b>	<b>11.31</b>	<b>11.53</b>	<b>11.77</b>	<b>12.01</b>	<b>12.27</b>
Municipal Solid Waste	Non-escalable	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07
	Escalated O&M	2.70	2.87	3.06	3.26	3.47	3.70	3.94	4.20
	<b>Total</b>	<b>12.77</b>	<b>12.95</b>	<b>13.13</b>	<b>13.33</b>	<b>13.55</b>	<b>13.77</b>	<b>14.01</b>	<b>14.27</b>
Waste Heat	Non-escalable	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11
	Escalated O&M	0.41	0.44	0.47	0.50	0.53	0.57	0.60	0.64
	<b>Total</b>	<b>8.52</b>	<b>8.55</b>	<b>8.58</b>	<b>8.61</b>	<b>8.64</b>	<b>8.67</b>	<b>8.71</b>	<b>8.75</b>
Wave Energy	Non-escalable	6.58	6.58	6.58	6.58	6.58	6.58	6.58	6.58
	Escalated O&M	1.01	1.07	1.14	1.22	1.30	1.38	1.47	1.57
	<b>Total</b>	<b>7.59</b>	<b>7.66</b>	<b>7.73</b>	<b>7.80</b>	<b>7.88</b>	<b>7.97</b>	<b>8.06</b>	<b>8.15</b>

## TIER 2

		All inclusive Tariff for SPPAs signed after 1st January 2008 (LKR/kWh)							
Year of operation		9	10	11	12	13	14	15	
Mini-hydro	Non-escalable	4.45	4.45	4.45	4.45	4.45	4.45	4.45	
	Escalated O&M	2.24	2.39	2.55	2.71	2.89	3.08	3.28	
	<b>Total</b>	<b>6.69</b>	<b>6.84</b>	<b>6.99</b>	<b>7.16</b>	<b>7.34</b>	<b>7.53</b>	<b>7.73</b>	
Wind	Non-escalable	7.03	7.03	7.03	7.03	7.03	7.03	7.03	
	Escalated O&M	3.55	3.78	4.03	4.29	4.57	4.87	5.19	
	<b>Total</b>	<b>10.58</b>	<b>10.81</b>	<b>11.06</b>	<b>11.32</b>	<b>11.60</b>	<b>11.90</b>	<b>12.22</b>	
Biomass	Non-escalable	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
	Escalated Fuel	8.07	8.42	8.79	9.17	9.57	9.98	10.42	
	Escalated O&M	1.72	1.83	1.95	2.08	2.22	2.36	2.52	
	<b>Total</b>	<b>12.35</b>	<b>12.81</b>	<b>13.30</b>	<b>13.81</b>	<b>14.35</b>	<b>14.91</b>	<b>15.49</b>	
Agricultural & Industrial waste	Non-escalable	2.56	2.56	2.56	2.56	2.56	2.56	2.56	
	Escalated Fuel	4.03	4.21	4.39	4.58	4.78	4.99	5.21	
	Escalated O&M	1.72	1.83	1.95	2.08	2.22	2.36	2.52	
	<b>Total</b>	<b>8.32</b>	<b>8.60</b>	<b>8.91</b>	<b>9.23</b>	<b>9.56</b>	<b>9.91</b>	<b>10.29</b>	
Municipal Solid Waste	Non-escalable	3.80	3.80	3.80	3.80	3.80	3.80	3.80	
	Escalated O&M	4.47	4.76	5.07	5.41	5.76	6.13	6.53	
	<b>Total</b>	<b>8.27</b>	<b>8.56</b>	<b>8.87</b>	<b>9.20</b>	<b>9.56</b>	<b>9.93</b>	<b>10.33</b>	
Waste Heat	Non-escalable	3.06	3.06	3.06	3.06	3.06	3.06	3.06	
	Escalated O&M	0.68	0.73	0.78	0.83	0.88	0.94	1.00	
	<b>Total</b>	<b>3.74</b>	<b>3.78</b>	<b>3.83</b>	<b>3.88</b>	<b>3.94</b>	<b>3.99</b>	<b>4.06</b>	
Wave Energy	Non-escalable	2.48	2.48	2.48	2.48	2.48	2.48	2.48	
	Escalated O&M	1.67	1.78	1.90	2.02	2.15	2.29	2.44	
	<b>Total</b>	<b>4.15</b>	<b>4.26</b>	<b>4.38</b>	<b>4.50</b>	<b>4.63</b>	<b>4.77</b>	<b>4.92</b>	

### TIER 3

		All inclusive Tariff for SPPAs signed after 1st January 2008 (LKR/kWh)				
Year of operation		16	17	18	19	20
Mini-hydro	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated O&M	3.49	3.72	3.96	4.22	4.50
	<b>Total</b>	<b>5.96</b>	<b>6.29</b>	<b>6.64</b>	<b>7.02</b>	<b>7.42</b>
Wind	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated O&M	5.52	5.88	6.27	6.68	7.11
	<b>Total</b>	<b>7.99</b>	<b>8.45</b>	<b>8.95</b>	<b>9.47</b>	<b>10.03</b>
Biomass	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated Fuel	10.87	11.34	11.84	12.35	12.89
	Escalated O&M	3.35	3.57	3.80	4.05	4.31
	<b>Total</b>	<b>16.68</b>	<b>17.48</b>	<b>18.32</b>	<b>19.20</b>	<b>20.12</b>
Agricultural & Industrial waste	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated Fuel	5.44	5.67	5.92	6.18	6.44
	Escalated O&M	3.35	3.57	3.80	4.05	4.31
	<b>Total</b>	<b>11.25</b>	<b>11.81</b>	<b>12.40</b>	<b>13.02</b>	<b>13.68</b>
Municipal Solid Waste	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated O&M	6.96	7.41	7.90	8.41	8.96
	<b>Total</b>	<b>9.42</b>	<b>9.98</b>	<b>10.58</b>	<b>11.21</b>	<b>11.88</b>
Waste Heat	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated O&M	1.06	1.13	1.21	1.29	1.37
	<b>Total</b>	<b>3.53</b>	<b>3.70</b>	<b>3.89</b>	<b>4.08</b>	<b>4.29</b>
Wave Energy	Escalated Rate	2.46	2.57	2.68	2.80	2.92
	Escalated O&M	2.60	2.77	2.95	3.14	3.35
	<b>Total</b>	<b>5.06</b>	<b>5.34</b>	<b>5.63</b>	<b>5.94</b>	<b>6.27</b>

All escalations have been shown above using the year 2008 rate of 4.35% and 6.52%, only for the purpose illustration. The actual escalation rate will be calculated and announced every year.

**7 Legal Provision to Guarantee operation in the second tier:** In order to ensure that the SPP operates in the second tier and deliver power amounting to at least the average power delivered in tier 1, the appropriate legal provisions are included in the SPPA.

**8 Mandatory SPPA period:** Non-delivery of energy will not carry any penalty (except non-delivery in years 9-15 for those opting to the three-tier tariff). SPPAs will have a mandatory period of 20 years. If the energy delivered in any month is zero or if the power plant has not operated within a given billing period (usually one month), the SPPA will be extended by the same number of months. If at any time during the 20 year SPPA or the extended period stated above, the cumulative number of billing period (months) of non-operation reaches 12 months, then such power plant will lose the escalation on O&M and fuel costs (in case of biomass and agricultural/industrial waste) for that year. Similarly, the escalation provided for the third-tier will also be reduced by one year.

**9 Extensions after the 20th year:** Extensions of the SPPA will be by mutual agreement, and will be at the same rate as in the 20<sup>th</sup> year in the three-tier tariff, escalated similarly. The policy and tariffs for SPPA extension shall be the same for those opting for the three-tier tariff option or the flat tariff option. There will be no flat tariff option for extensions beyond the 20<sup>th</sup> year.

**10 Power Plant replacement and new SPPAs after the 20<sup>th</sup> year:** Power plant equipment can be replaced or improved any time within the 20-year SPPA at the discretion of the developer, at his own cost. Complete de-commissioning and redevelopment as a new power plant at the same site, qualifying for a new SPPA, will be on the following basis:

Technology	Minimum period of operation from the first commercial operation date, before a new SPPA is issued to the same site
Small-hydro	30 years
Wind	20 years
Biomass	20 years
Agricultural & Industrial Waste	20 years
Municipal Waste	20 years
Waste Heat Recovery	20 years
Wave Energy	20 years

The tariffs for such re-developed power plants on a new SPPA would be based on the policies prevailing at that time.

## 11 Migration of Existing SPPAs based on Avoided-cost Tariffs to the New Tariffs

**11.1 Migration to New SPPA:** Migration of existing SPPAs signed before 1<sup>st</sup> January 2008 which are based on the avoided-cost tariffs to the new SPPA based on cost-based tariffs in this announcement, will be entirely at the discretion of the respective developers. Companies wishing to move to the new tariff should state so in writing before 30<sup>th</sup> April 2008, by a letter addressed to Chairman, SEA upon which they will be invited to sign the new SPPA.

(a) Power plants in commercial operation by 1<sup>st</sup> January 2008 are proposed to be placed in the new tariff, as follows:

Years of commercial operation completed by 1 <sup>st</sup> Jan 2008	Option 1: Three-tier tariff		SPPA period (years) for Option 2: Flat Tariff
	Placement	Remaining period of SPPA (years)	
0-2	Year 1 (considered as a new plant under the new SPPA)	20	20
3-4	Year 2	19	not offered
5-6	Year 3	18	not offered
7-8	Year 4	17	not offered
9 onwards	Year 5	16	not offered

(b) All power plants with a valid SPPA but not commissioned by 1<sup>st</sup> January 2008 are proposed to be placed in the 1<sup>st</sup> year of the three-tier tariff or the 20-year flat tariff.

(c) SPPAs of power plants, in which milestones have been violated, would be cancelled and the new 3-tier tariff or the 20-year flat tariff would be proposed.

**11.2 Existing SPPAs not Migrating to the New SPPA:** SPPs opting not to migrate to the new SPPA by 30<sup>th</sup> April 2008, will be proposed to operate at the tier 3 tariff announced for the relevant technology in the year in which the existing SPPA expires, after their full tenure of 15 years is completed.

## **12 Mechanism for Payment of Tariff**

CEB, as the purchaser of energy will continue to effect payment for electricity purchased from the SPPs. The final tariff paid to the SPPs will involve two sources of funds; the CEB and the SEA.

Interested parties may contact the Sri Lanka Sustainable Energy Authority for further details.

**Sri Lanka Sustainable Energy Authority**

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