



**BEFORE THE TAMIL NADU ELECTRICITY REGULATORY COMMISSION**  
**CHENNAI**

**Amending Order No 5 dated 18-5-2006**

In the matter of amendments to be issued to the Commission's Order No. 3 dt. 15.05.2006 with respect to "Power purchase and allied issues in respect of Non-Conventional Energy Sources based Generating Plants and Non-Conventional Energy Sources based Co-Generation Plants"

In order No.3 dt. 15.05.2006, the following amendments, indicated in the Table below shall be made, namely:-

**Table**

<b>Sl.No.</b>	<b>Reference</b>	<b>Existing</b>	<b>Amended as</b>
1	The CUF value mentioned against Row No. 2 and Column No. 2 of the table in page No.70 of the order no. 3 dt. 15.05.2006	25.29	25.90
2	The CUF value mentioned against Row No. 3 and Column No. 2 of the table in page No.70 of the order no. 3 dt. 15.05.2006	26.7	27.46
3	The capital cost value mentioned against Row No. 3 and Column No. 5 of the table in page No.90 of the order no. 3 dt. 15.05.2006	4.00 Crores / MW	3.5 Crores / MW

4	The CUF/PLF value mentioned against Row No. 4 and Column No. 2 of the table in page No.90 of the order no. 3 dt. 15.05.2006	25.29% with de-rating at 1% every year after 10 years	25.90% with de-rating at 1% every year after 10 years
5	The CUF/PLF value mentioned against Row No. 4 and Column No. 3 of the table in page No.90 of the order no. 3 dt. 15.05.2006	26.70% with de-rating at 1% every year after 10 years	27.46% with de-rating at 1% every year after 10 years
6	Annexure VII – B1 of the order no. 3 dt. 15.05.2006	Annexure VII – B1 (All contents in the Annexure)	The enclosure in annexure VII – B1 (modified) of this order 5 dated 18-5-2006 shall substitute.
7	Annexure VII – B3 of the order no. 3 dt. 15.05.2006	Annexure VII – B3 (All contents in the Annexure)	The enclosure in annexure VII – B3 (modified) of this order 5 dated 18-5-2006 shall substitute.
8	Annexure VIII (3 Nos.) of the order no. 3 dt. 15.05.2006	Annexure VIII (All contents in the three page Annexure)	The three pages enclosure in annexure VIII (modified) of this order 5 dated 18-5-2006 shall substitute.

Sd....  
**B.Jeyaraman**  
Member

Sd....  
**S.Thangarathnam**  
Member

Sd....  
**A.Balraj**  
Chairman

(By order of the Tamil Nadu Electricity Regulatory Commission)

**R.Balasubramanian**  
Secretary

**Annexure - VII-B1 (Modified)**  
**Estimated Annual Generation for New Machines (With Type Certificate)**  
 Corrected for Air Density, Array Efficiency, Grid & Machine Availability and Internal Losses

Location	SUZLON	NEPC	NEG	NEG	ENERCON	ENERCON	GE WIND	VESTAS	PIONEER
	1250 KW	225 KW	750 KW	1650	330 KW	800 KW	1500 KW	500 KW	850 KW
<b>Muppandal Pass</b>									
Kanan Kulam	3202827	523096	1628924	4900636	902869	2324592	3750857	1405414	2243687
Sankaneri	3451177	566542	1765938	5268364	975489	2479825	4047019	1518963	2428292
Muppandal	4416505	686704	2327682	6430864	1155467	2925402	5225924	1783381	3022393
Shenbaka Raman Pudur	3403383	522159	1747313	5130744	901816	2244734	4003455	1405509	2386181
Kumara Puram	3076372	510635	1577788	4745571	877621	2188508	3596618	1373158	2212365
Kattadi Malai	3896682	598355	1991109	5884891	1035250	2560094	4586386	1620590	2760132
Panakudi	3189564	521623	1712959	4687561	865196	2078638	3754403	1331932	2180030
Puliyamkulam	2963237	435902	1488895	4632268	767849	2005287	3478559	1202142	2112725
Average	3449968.375	545627	1780076	5210112.375	935194.625	2350885	4055402.63	1455136.125	2418225.6
For 1000 KW	2759975	2425009	2373435	3157644	2833923	2938606	2703602	2910272	2844971
<b>Average for 1 MW for this Pass</b>			<b>2771937.44</b>						
<b>CUF for this Pass</b>			<b>31.64</b>						
<b>Shencotta Pass</b>									
Nettur	2883763	477916	1539787	4082584	803514	1927777	3413688	1222158	1871505
Thalayuthu	2483619	409811	1349360	3545611	676762	1645517	2908854	1024369	1670574
Gangaikondan	2413543	399531	1276316	3463406	674498	1672915	2826705	1025033	1622014
Alagia Pandipuram	3191647	500438	1705083	4576922	842849	2111923	3774362	1278716	2098925
Ottapidaram	2458097	380540	1283910	3673186	650910	1648313	2867679	996468	1687623
Kayattar - II	2446798	407977	1292001	3545060	685722	1663319	2864417	1044275	1652756
Kayattar - I	2676459	429464	1426675	3852424	723892	1748321	3141089	1102622	1780353
Achankutam	2774557	438726	1482849	3884339	734798	1828975	3275966	1116876	1812064
Onamkulam	2278005	380005	1201180	3378972	650658	1558255	2659469	994963	1570374
Ayakudi	3710023	568603	1960292	5343643	967629	2455231	4399755	1471073	2411729
Mangapuram	3291703	524250	1740286	4763848	885449	2142199	3875167	1360406	2216306
Average	2782564.909	447023.7273	1477976.273	4009999.545	754243.7273	1854795	3273377.36	1148814.455	1854020.3
for 1000KW	2226052	1986772	1970635	2430303	2285587	2318494	2182252	2297629	2181200
<b>Average for 1 MW for this Pass</b>			<b>2208769.33</b>						
<b>CUF for this Pass</b>			<b>25.21</b>						
<b>Palaghat Pass</b>									
Myvadi	2820648	438877	1482499	4087443	747757	1868172	3314212	1142472	1886054
Andiyur	2597233	394530	1325478	3981544	689317	1737005	3028128	1069599	1821364
Pucharipatti	2406758	384795	1199719	3848077	681581	1744199	2786040	1069373	1794121
Pulavadi	3229658	499718	1704126	4694174	850155	2137694	3814840	1294612	2147500
Arasan Pallayam	2680715	410859	1353577	4169738	720571	1782634	3114481	1127645	1974238
Sulthanpet	1647412	275915	883735	2495628	471239	1001161	1902474	740221	1268045
Edayarpalayam	3101280	483064	1612606	4564045	829404	2031763	3628343	1270972	2116766
Kethanur	2854378	444650	1482807	4209905	764415	1874809	3337265	1171010	1958520
Mettukadai	2318485	353181	1188819	3493407	618246	1549612	2713844	947782	1615268
Pongalur	2522864	388530	1305183	3747482	671445	1674493	3582486	1028132	1728159
Average	2617943.1	407411.9	1353854.9	3929144.3	704413	1740154.2	3122211.3	1086181.8	1831003.5
for 1000KW	2094354	1810720	1805140	2381300	2134585	2175193	2081474	2172364	2154122
<b>Average for 1 MW for this Pass</b>			<b>2089916.89</b>						
<b>CUF for this Pass</b>			<b>23.86</b>						

Machine Availability - 95%  
 Array Efficiency - 95%  
 Internal Losses - 2%

**Abstract**

Muppandal Pass 700 MW

Average CUF 31.64

<b>Weighted Average CUF</b>	<b>27.46</b>
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Shencotta Pass 500 MW

Average CUF 25.21

Palaghat Belt 500 MW

Average CUF 23.86

**Annexure - VII-B3 (Modified)**  
**Estimated Annual Generation for Lower Capacity Machines**  
 Corrected for Air Density, Array Efficiency, Grid & Machine Availability and Internal Losses

Location	FLOVEL	KENETECH	REPL	ELECON	NORDIAMK	NORDEX	DIS	AMTL	NEPC	NEPC	TTG	VESTAS
	600 KW	410 KW	320 KW	300 KW	300 KW	250 KW	250 KW	250 KW	250 KW	225 KW	250 KW	225 KW
	H=50 D=43	H=36.5 D=33	H=40 D=33	H=40 D=30	H=30.5 D=31	H=41 D=29.7	H=36.5 D=27	H=31 D=25	H=30 D=27.6	H=30 D=28.6	H=31.3 D=28.5	H=31.5 D=27
<b>Muppandal Pass</b>												
Muppandal	1793548	1097326	986339	863386	812355	763110	711487	706244	693338	674343	648863	631790
Shenbaka Raman												
Pudur	1326347	773446	749727	638331	593847	579479	530000	530566	514493	528973	475953	477255
Kumara Puram	1520882	909909	856744	732338	689150	657973	610959	610108	591544	592263	550402	545825
Kattadi Malai	1509551	876004	864536	730670	684190	663574	606376	608007	589153	610868	544468	548362
Puliyamkulam	1114730	602073	619179	509991	451426	479521	428251	422035	394335	410902	366718	373795
Average	1453011.6	851751.6	815305	694943.2	646193.6	628731.4	577414.6	575392	556572.6	563469.8	517280.8	515405.4
For 1000 KW	2421686	2077442.927	2547828.125	2316477.33	2153978.667	2514925.6	2309658.4	2301568	2226290.4	2504310.2	2069123.2	2290690.7
<b>Average for 1 MW for this Pass</b>	<b>2311165</b>											
<b>CUF for this Pass</b>	<b>26.38</b>											
<b>Shencotta Pass</b>												
Nettur	1239343	851844	701972	640585	631163	539740	524657	534332	548431	523383	504212	485481
Thalayuthu	1067387	700631	583809	524618	519566	469938	446261	458411	446954	416747	419616	400568
Alagia Pandipuram	1329145	842678	715439	647306	606857	564341	532974	526572	526766	507790	488786	473955
Kayattar - II	1113012	720406	623240	553819	535559	488422	464740	471349	467272	454689	431612	421637
Onamkulam	944893	590668	544105	463951	448796	427887	399268	413616	398093	397448	366619	364121
Ayakudi	1516391	937430	819639	735298	671488	636263	594594	582926	581682	572867	540035	592574
Average	1201695.2	773942.8333	664700.6667	594262.833	568904.8333	521098.5	493749	497867.67	494866.33	478820.67	458480	456389.33
for 1000KW	2002825.3	1887665.447	2077189.583	1980876.11	1896349.444	2084394	1974996	1991470.7	1979465.3	2128091.9	1833920	2028397
<b>Average for 1 MW for this Pass</b>	<b>1988803.4</b>											
<b>CUF for this Pass</b>	<b>22.70</b>											
<b>Palaghat Pass</b>												
Poosariipatti	995652	514289	549584	447028	393360	437936	383756	382388	346465	369574	323513	334196
Pulavadi	1318345	815095	711483	637690	591218	561474	524749	517735	516278	505986	477495	467040
Arasan Pallayam	927563	508890	540453	435432	411582	428776	382903	394966	363219	387871	336025	345778
Sulthanpet	723072	443169	444840	363830	374917	350640	325335	347441	330615	347774	300750	306304
Edayarpalayam	1255051	761940	695775	609163	565704	550212	506078	512631	498449	502304	461414	458744
Kethanur	1194692	732914	662809	581457	546352	525251	487484	491953	480034	481730	444365	4401230
Mettukadai	906025	521977	499106	427842	394769	397180	360614	359771	347125	357140	319468	321266
Pongalur	937276	579352	539373	466395	435890	428491	393730	369454	381084	385827	352862	352917
Average	1032209.5	609703.25	580427.875	496104.625	464224	459995	420581.13	422042.38	407908.63	417275.75	376986.5	873434.38
for 1000KW	1720349.2	1487081.098	1813837.109	1653682.08	1547413.333	1839980	1682324.5	1688169.5	1631634.5	1854558.9	1507946	3881930.6
<b>Average for 1 MW for this Pass</b>	<b>1859075.6</b>											
<b>CUF for this Pass</b>	<b>21.22</b>											

Grid Availability - 95%  
 Machine Availability - 95%  
 Array Efficiency - 95%  
 Internal Losses - 2%

**Abstract**

**Muppandal Pass**

CUF for Large Machine	31.10	Weighted Average CUF	27.87
CUF for Small Machine	26.38	using CUF for Larger machine	
Average CUF	28.74		

**Shencotta Pass**

CUF for Large Machine	24.96	Weighted average CUF	23.93
CUF for Small Machine	22.70	using CUF for small machine	
Average CUF	23.83		

**Palaghat Belt**

CUF for Large Machine	24.92	Weighted average CUF	25.9
CUF for Small Machine	21.22	using average CUF	
Average CUF	23.07		

<b>Average CUF</b>	<b>25.90</b>
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## Annexure - VIII (Modified)

Wind Energy Average Tariff for existing units

1	Project Cost	<b>4.50 Crs</b>
2	O & M Charges	1.10% with 5% escl.every year after five year
3	Insurance	0.75% with reduction of 0.5% every year after five years
4	Interest On Loan	9.00%
5	Loan Repayment	10 years with one year moratorium
6	Depreciation	4.5% in SLM
7	ROE	16%
8	CUF	25.90% with de-rating @ 1% for every year after ten years
9	Average Tariff Rate	<b>2.76</b>

Wind Energy Average Tariff for Future units

1	Project Cost	<b>5.0 Crs</b>
2	O & M Charges	1.10% with 5% escl.every year after five year
3	Insurance	0.75% with reduction of 0.5% every year after five years
4	Interest On Loan	9.00%
5	Loan Repayment	10 years with one year moratorium
6	Depreciation	4.5% in SLM
7	ROE	16%
8	CUF	27.46% with de-rating @ 1% for every year after ten years
9	Average Tariff Rate	<b>2.90</b>

**Annexure - VIII (Modified)**  
**Average Unit Cost (Wind Energy) based on cost**  
**(For future unit)**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
O & M Charges 1.10% with 5% escl.every year after five year	550000	550000	550000	550000	550000	577500	606375	636694	668528	701955
Insurance 0.75% and reduction of 0.5% every year after five years	375000	375000	375000	375000	375000	373125	371259	369403	367556	365718
Interest On Loan 9.00%	3150000	3150000	2835000	2520000	2205000	1890000	1575000	1260000	945000	630000
Depreciation 4.5%	2250000	2250000	2250000	2250000	2250000	2250000	2250000	2250000	2250000	2250000
ROE 16%	2400000	2400000	2400000	2400000	2400000	2400000	2400000	2400000	2400000	2400000
<b>Total Cost</b>	<b>8725000</b>	<b>8725000</b>	<b>8410000</b>	<b>8095000</b>	<b>7780000</b>	<b>7490625</b>	<b>7202634</b>	<b>6916097</b>	<b>6631085</b>	<b>6347673</b>
Generation Units (27.46%) de-rating @1% for every year after ten years	2405496	2405496	2405496	2405496	2405496	2405496	2405496	2405496	2405496	2405496
<b>Per Unit Cost</b>	<b>3.627</b>	<b>3.627</b>	<b>3.496</b>	<b>3.365</b>	<b>3.234</b>	<b>3.114</b>	<b>2.994</b>	<b>2.875</b>	<b>2.757</b>	<b>2.639</b>

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
O & M Charges 1.10% with 5% escl.every year after five year	737053	773905	812600	853231	895892	940687	987721	1037107	1088962	1143410
Insurance 0.75% and reduction of 0.5% every year after five years	363890	362070	360260	358459	356666	354883	353109	351343	349586	347838
Interest On Loan 9.00%	315000									
Depreciation 4.5%	2250000	2250000	2250000	2250000	2250000	2250000	2250000	2250000	2250000	2250000
ROE 16%	2400000	2400000	2400000	2400000	2400000	2400000	2400000	2400000	2400000	2400000
<b>Total Cost</b>	<b>6065942</b>	<b>5785975</b>	<b>5822860</b>	<b>5861689</b>	<b>5902558</b>	<b>5945570</b>	<b>5990830</b>	<b>6038450</b>	<b>6088549</b>	<b>6141249</b>
Generation Units (27.46%) de-rating @1% for every year after ten years	2381441	2357627	2334050	2310710	2287603	2264727	2242079	2219659	2197462	2175487
<b>Per Unit Cost</b>	<b>2.547</b>	<b>2.454</b>	<b>2.495</b>	<b>2.537</b>	<b>2.580</b>	<b>2.625</b>	<b>2.672</b>	<b>2.720</b>	<b>2.771</b>	<b>2.823</b>

**The Sum of the per unit cost for 20 years = 57.953**  
**The average per unit cost = 2.90**

**Annexure - VIII (Modified)**  
**Average Unit Cost (Wind Energy) based on cost**  
**( For Existing Units )**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
O & M Charges 1.10% with 5% escl.every year after five year	495000	495000	495000	495000	495000	519750	545738	573024	601676	631759
Insurance 0.75% and reduction of 0.5% every year after five years	337500	337500	337500	337500	337500	335813	334133	332463	330800	329146
Interest On Loan 9.00%	2835000	2835000	2551500	2268000	1984500	1701000	1417500	1134000	850500	567000
Depreciation 4.5%	2025000	2025000	2025000	2025000	2025000	2025000	2025000	2025000	2025000	2025000
ROE 16%	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000
<b>Total Cost</b>	<b>7852500</b>	<b>7852500</b>	<b>7569000</b>	<b>7285500</b>	<b>7002000</b>	<b>6741563</b>	<b>6482371</b>	<b>6224487</b>	<b>5967976</b>	<b>5712906</b>
Generation Units (25.90%) de-rating @1% for every year after ten years	2268840	2268840	2268840	2268840	2268840	2268840	2268840	2268840	2268840	2268840
<b>Per Unit Cost</b>	<b>3.461</b>	<b>3.461</b>	<b>3.336</b>	<b>3.211</b>	<b>3.086</b>	<b>2.971</b>	<b>2.857</b>	<b>2.743</b>	<b>2.630</b>	<b>2.518</b>

	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
O & M Charges 1.10% with 5% escl.every year after five year	663347	696515	731340	767907	806303	846618	888949	933396	980066	1029069
Insurance 0.75% and reduction of 0.5% every year after five years	327501	325863	324234	322613	321000	319395	317798	316209	314628	313055
Interest On Loan 9.00%	283500									
Depreciation	2025000	2025000	2025000	2025000	2025000	2025000	2025000	2025000	2025000	2025000
ROE 16%	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000	2160000
<b>Total Cost</b>	<b>5459348</b>	<b>5207378</b>	<b>5240574</b>	<b>5275520</b>	<b>5312303</b>	<b>5351013</b>	<b>5391747</b>	<b>5434605</b>	<b>5479694</b>	<b>5527124</b>
Generation Units (25.90%) de-rating @1% for every year after ten years	2246152	2223690	2201453	2179439	2157644	2136068	2114707	2093560	2072624	2051898
<b>Per Unit Cost</b>	<b>2.431</b>	<b>2.342</b>	<b>2.381</b>	<b>2.421</b>	<b>2.462</b>	<b>2.505</b>	<b>2.550</b>	<b>2.596</b>	<b>2.644</b>	<b>2.694</b>

**The Sum of the per unit cost for 20 years =**  
**The average per unit cost =**

**55.299**  
**2.76**