



National Electric Power Regulatory Authority

Islamic Republic of Pakistan

2nd Floor, OPF Building, G-5/2, Islamabad

Ph: 9206500, 9207200, Fax: 9210215

E-mail: registrar@nepra.org.pk

Registrar

No. NEPRA/R/LAG-82/1454-56

February 23, 2012

Mr. Inam ur Rahman
Chief Executive Officer
Tenaga Generasi Limited
Dawood Centre, M.T. Khan Road,
Karachi-75530
Phone: 021-35686001-16

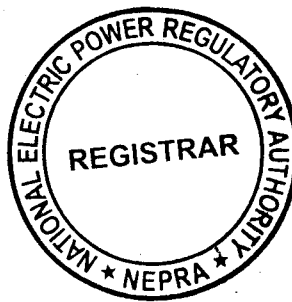
Subject: **Modification in Generation Licence No. WPGL/04/2006, dated 18.12.2006, Tenaga Generasi Limited (TGL).**

Reference: *Your letter No. nil, dated October 27, 2011.*

It is intimated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. WPGL/04/2006 in respect of Tenaga Generasi Limited pursuant to Regulation 10(11) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999.

2. Enclosed please find herewith Modification-I in the Generation Licence No. WPGL/04/2006, as approved by the Authority. Further, the determination of the Authority in the matter is also attached.

Encl:/As above



(Syed Safeer Hussain)

Copy to:

1. Chief Executive Officer, Hyderabad Electric Supply Company (HESCO), WAPDA Water Wing Complex, Hussainabad, Hyderabad
2. Director General, Pakistan Environmental Protection Agency, House No. 311, Main Margalla Road, F-11/3, Islamabad.

National Electric Power Regulatory Authority (NEPRA)

Islamabad – Pakistan

MODIFICATION
GENERATION LICENCE
WPGL/04/2006

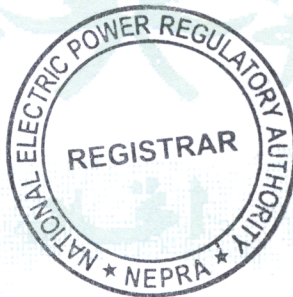
In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-26 of the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997, the Authority hereby modifies the Generation Licence granted to Tenaga Generasi Limited (No. WPGL/04/2006 dated December 18, 2006 and expiring on September 29, 2028), to the extent of changes mentioned as here under:-

- (i). The Installed Capacity mentioned on the Face Sheet may be read as 49.50 MW instead of 50.00MW;
- (ii). Changes in Schedule-I attached as Modified Schedule-I; and
- (iii). Changes in Schedule-II attached as Modified Schedule-II.

This **Modification-I** is given under my hand this 23rd day of **February**
Two Thousand & Twelve

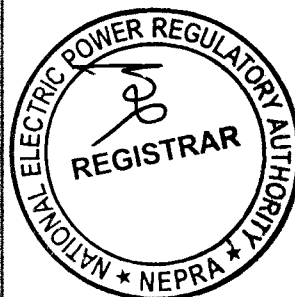


Registrar

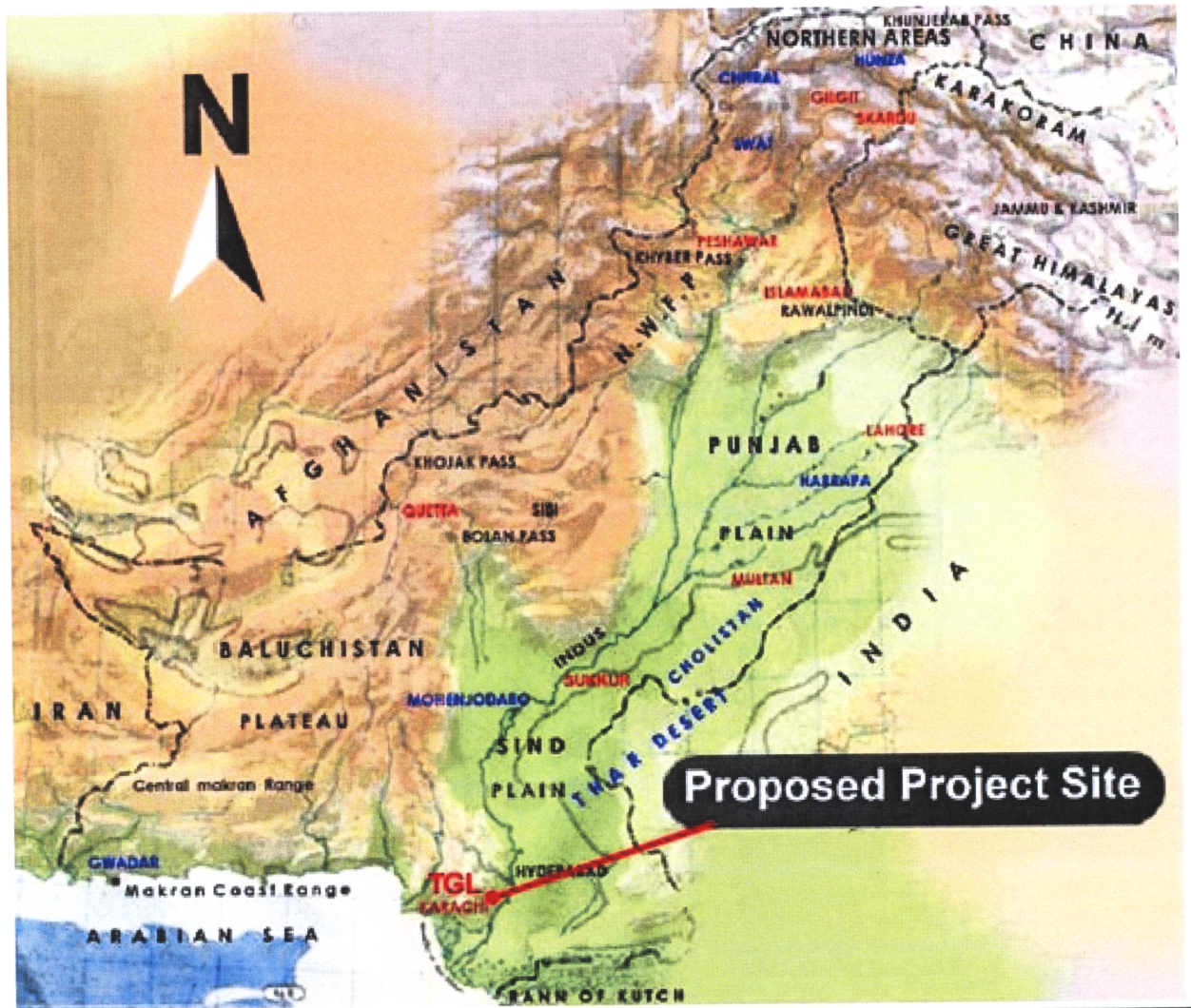


SCHEDULE-I
Modified

The Location, Size, Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facilities of the Licensee are described in this Schedule.



Site Location
of Generation Facility/Wind Farm of
Tenaga Generasi Limited
(TGL)

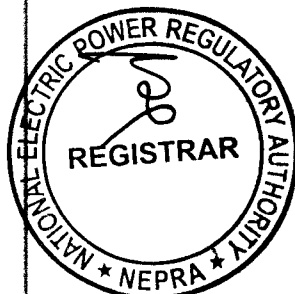


Site Access
of Generation Facility/Wind Farm of
TGL

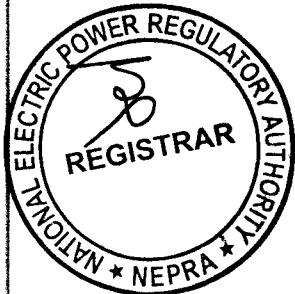
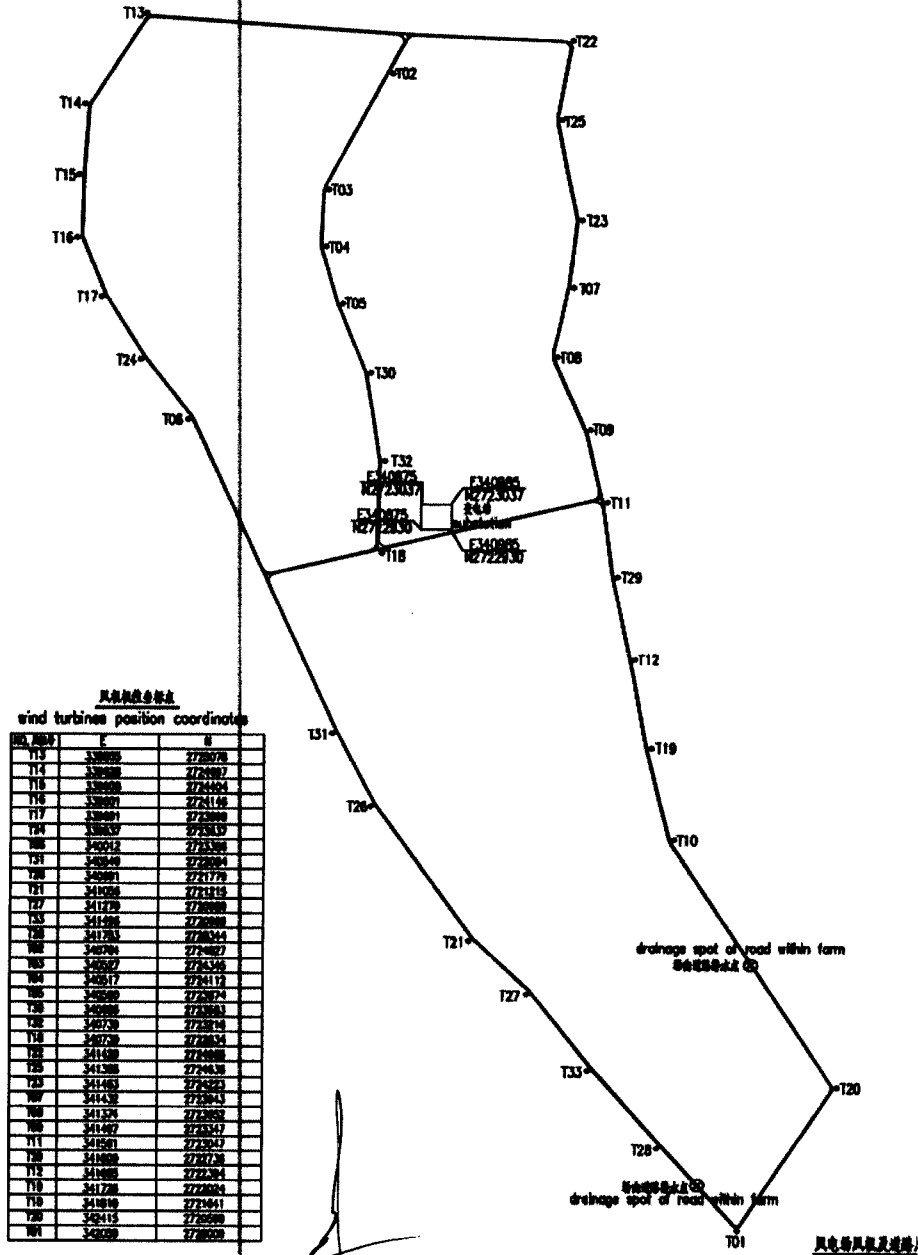


Land Coordinates
of Generation Facility/Wind Farm of
TGL

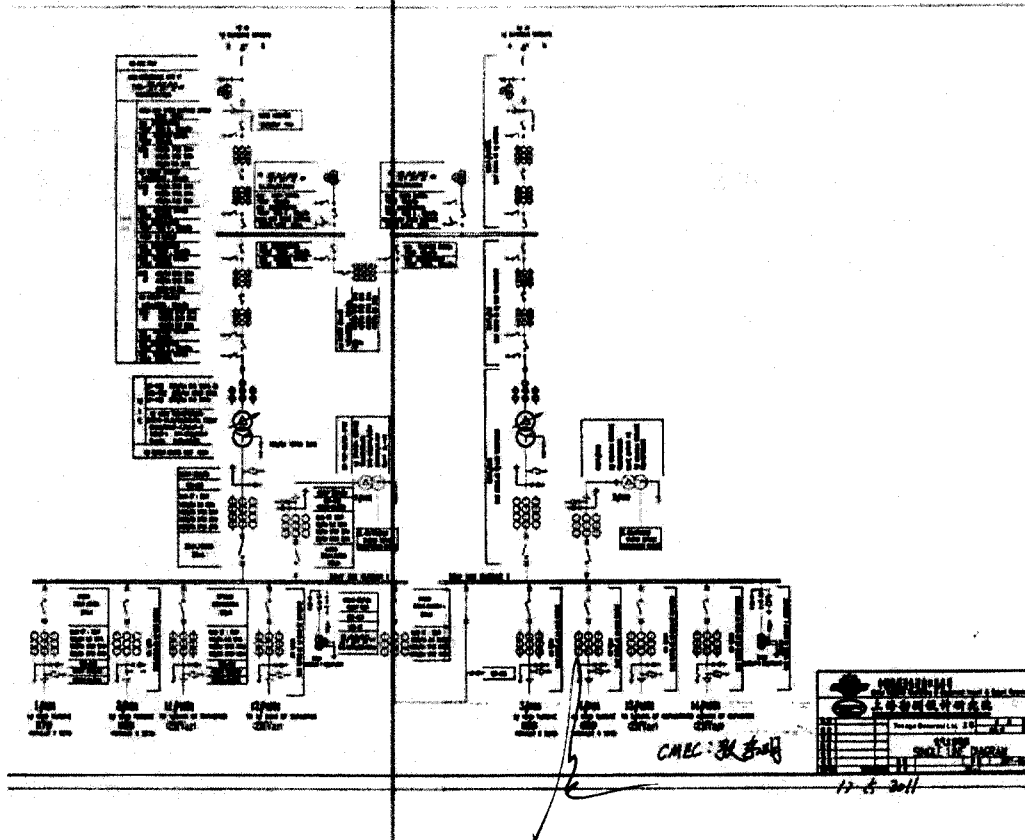
Coordinates		
Sr. No.	Longitude	Latitude
1	67° 24' 50.70"	24° 36' 20.24"
2	67° 24' 50.34"	24° 36' 36.09"
3	67° 24' 25.71"	24° 37' 11.04"
4	67° 24' 20.45"	24° 37' 45.12"
5	67° 24' 58.63"	24° 37' 56.71"
6	67° 26' 02.28"	24° 37' 52.70"
7	67° 26' 11.59"	24° 37' 18.45"
8	67° 26' 38.23"	24° 35' 17.71"
9	67° 26' 18.93"	24° 35' 58.09"
10	67° 26' 44.22"	24° 37' 00.66"
11	67° 28' 02.64"	24° 37' 00.66"
12	67° 28' 09.95"	24° 35' 06.35"
13	67° 26' 57.40"	24° 35' 06.35"
14	67° 26' 55.80"	24° 35' 47.52"
15	67° 26' 42.78"	24° 35' 47.52"
16	67° 25' 20.52"	24° 36' 14.62"
17	67° 25' 39.58"	24° 35' 46.47"
18	67° 26' 31.59"	24° 34' 49.05"
19	67° 29' 33.90"	24° 34' 45.40"
20	67° 29' 08.80"	24° 35' 32.50"
21	67° 28' 24.48"	24° 35' 06.14"
22	67° 28' 24.69"	24° 33' 53.11"



Micro-Sitting of Generation Facility/Wind Farm of TGL

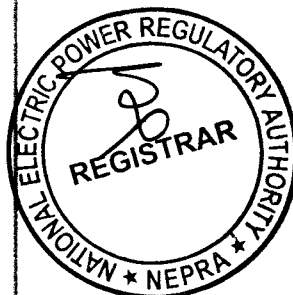
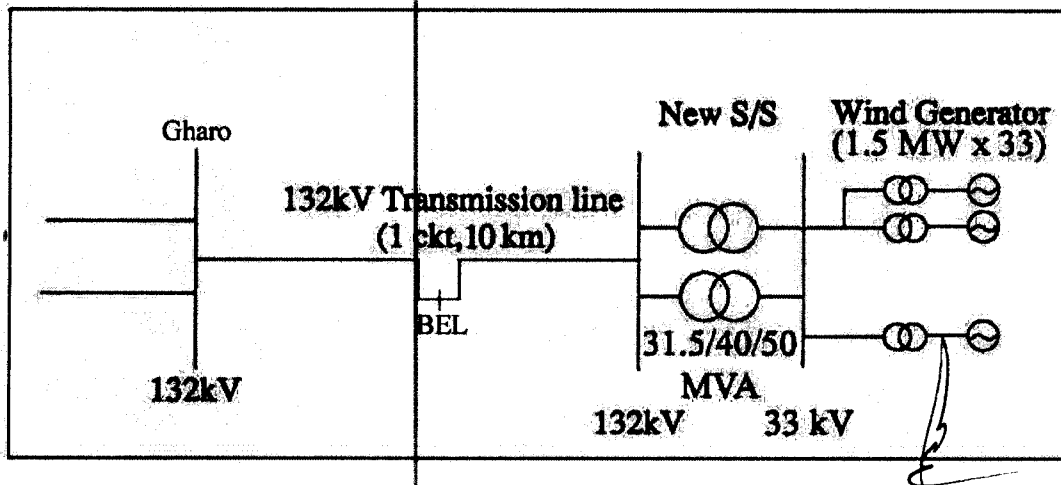


Single Line Diagram
of Electrical System of the of
Generation Facility/Wind Farm of
TGL

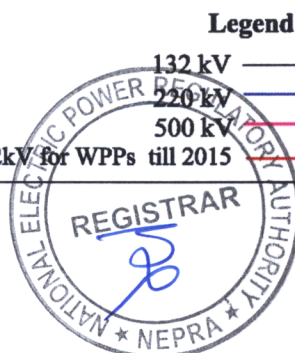
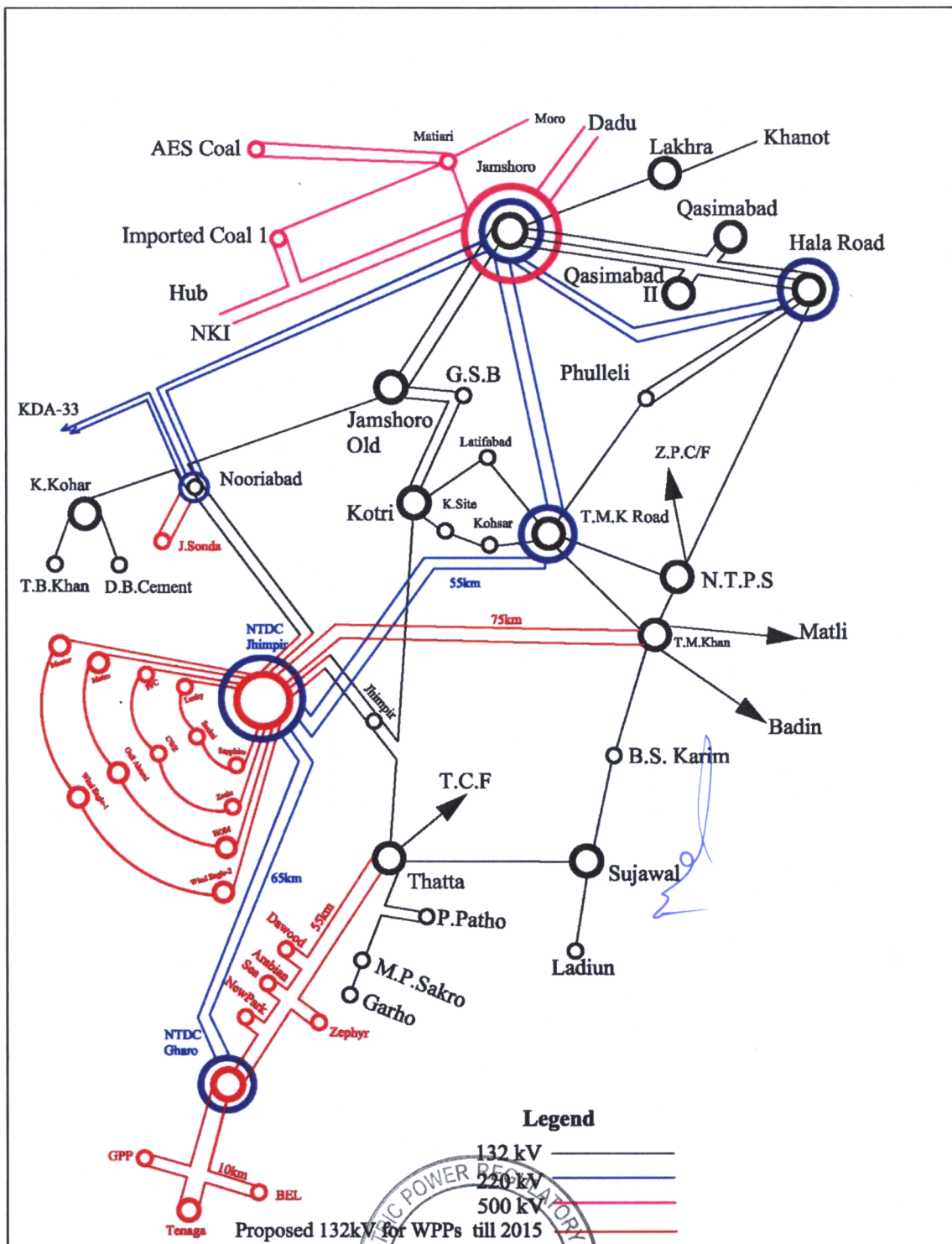


Interconnection/Dispersal Arrangement
for Dispersal of Power from the Generation
Facility/Wind Farm of
TGL

The power generated by the Licensee from its Wind Farm shall be dispersed to the Load Center of HESCO by constructing a new 132 kV D/C Transmission Line (measuring about 10 km in length) by making an In-Out arrangement and connecting the other nearby Wind Farms of Green Power (Private) Limited [now Foundation Wind Energy-II (Private) Limited] and Beacon Energy Limited (now Foundation Wind Energy-I Limited) and connecting the Wind Farms to 220/132kV Grid Station of Gharo.



Schematic Diagram for Interconnection/Transmission Arrangement for Dispersal of Power from TGL



Generation Facility/Wind Farm Details*

(A). General Information

(i).	Name of Applicant/Company	Tenaga Generasi Limited
(ii).	Registered/Business Office	3 rd Floor, Dawood Centre, M.T Khan Road, Karachi
(iii).	Plant Location	Deh Khuttikun, Taluka Mirpur Sakro, District Thatta Sindh.
(iv).	Type of Generation Facility	Wind Power

(B). Wind Farm Capacity & Configuration

(i).	Wind Turbine type, Make & Model	GE 1.5 xle 1.5 MW
(ii).	Installed Capacity of Wind Farm (MW)	49.5 MW
(iii).	Number of Wind Turbine Units/Size of each Unit (KW)	33 x 1.5 MW

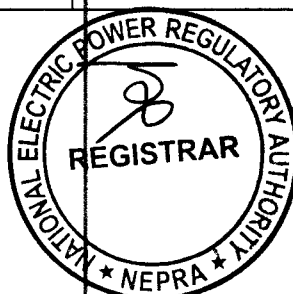
(C). Wind Turbine Details

a. <u>Rotor</u>		
(i).	Number of blades	3
(ii).	Rated Rotor speed	9-18
(iii).	Rotor diameter	82.5 m
(iv).	Swept area	5346 m ²
(v).	Power regulation	Active Single Blade Adjustment
(vi).	Rated Power at	11.5 m/s

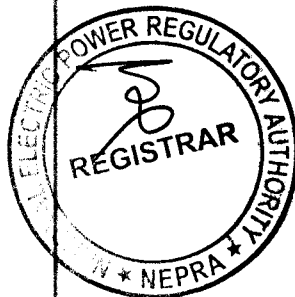
* As provided by the Licensee



(v).	Cut-in wind speed	3.5 m/s
(vi).	Cut-out wind speed	20 m/s
(vii).	Survival wind speed	52.5 m/s at 10 minutes average (at 80 m hub height)
(viii).	Pitch regulation	Individual electromotive pitch
b. <u>Blades</u>		
(i).	Blade length	40.3 m
(ii).	Material	Glass reinforced plastic
(iii).	Weight	6200 kg Per Blades
c. <u>Gearbox</u>		
(i).	Type	3 stage 1 planetary 2 spur gear stages
(ii).	Gear ratio	1: 107.1
(iii).	Weight	-
(iv).	Oil quantity	300 liter
(v).	Main shaft bearing	Self-aligning roller bearing
d. <u>Generator</u>		
(i).	Power	1,500 kW (adjustable)
(ii).	Voltage	690 V
(iii).	Type	Double-fed asynchronous generator, air-cooled
(iv).	Speed	1000 - 2000 rpm
(v).	Enclosure class	IP 54
(vi).	Coupling	Multiple steel disc, electrically insulated
(vii).	Efficiency	Efficiency 95 % at full load, (electrical system overall)
(viii).	Weight	-
(ix).	Power factor	0.95 leading to 0.95 lagging.



e. <u>Yaw System</u>		
(i).	Yaw bearing	Gear motor
(ii).	Brake	10 Disk brake with hydraulic brake calipers
(iii).	Yaw drive	Asynchronous motor
(iv).	Speed	0.75 °/s
f. <u>Control System</u>		
(i).	Type	Remote field controller/PLC GE Power converter system
(ii).	Grid connection	Via IGBT converter
(iii).	Scope of monitoring	Remote monitoring of more than 300 different parameters, e.g. temperature sensors, hydraulic sensors, pitch parameters, vibration, speed, generator torque, wind speed and direction etc.
(iv).	Recording	Production data, event list, long and short-term trends
g. <u>Brake</u>		
(i).	Design	Three independent systems, fail safe (individual pitch)
(ii).	Operational brake	Electromechanical
(iii).	Secondary brake	Actively actuated Disc brake
h. <u>Tower</u>		
(i).	Type	cylindrical tubular steel tower
(ii).	Hub heights	Tubular tower 80 m



(D). Other Details

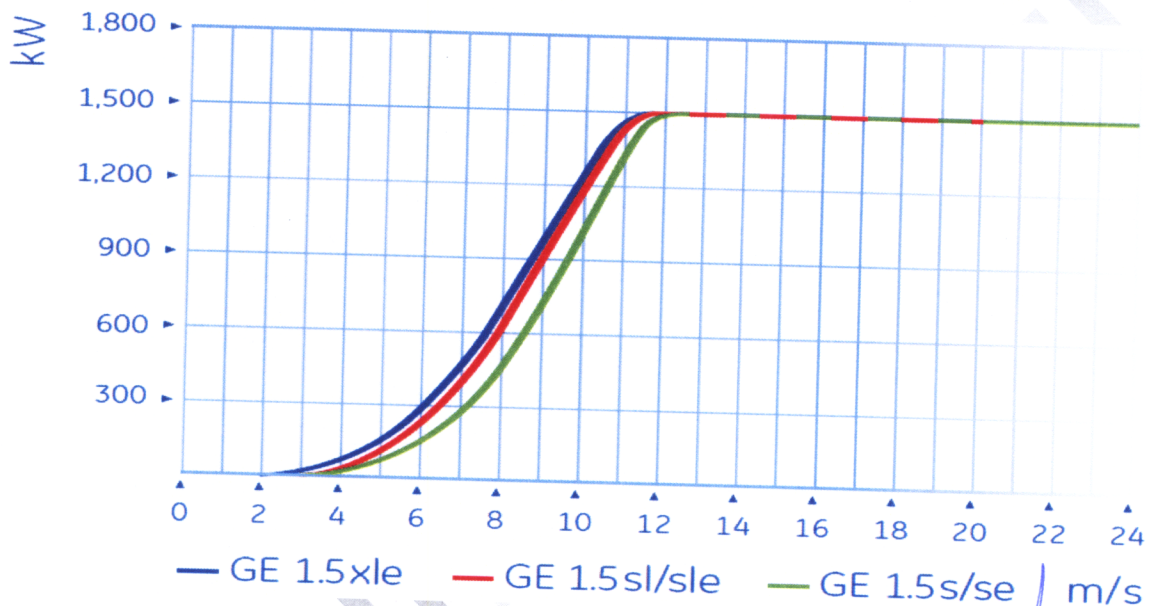
(i).	Project Commissioning date (Anticipated)	March 31, 2014
(ii).	Expected Life of the Project from Commercial Operation date (COD)	20 Years

Modification



Power Curve[†] With Graphic And Calculated Power Tables GE- 1.5xle 1.5 MW

Power Curve With Graphic GE- 1.5 xle 1.5 MW



[†] The power curve for the individual Wind Turbine provided by the manufacturer and as mentioned in this Generation Licence shall form the basis in determining the cumulative Power Curve of Wind Farm/Complex.



Calculated Power Curve GE 1.5xle - 50 Hz and 60 Hz

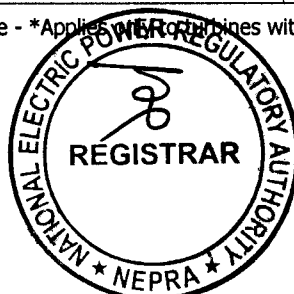
Standard Atmospheric Conditions (Air Density of 1.225 kg/m³)

Rotor Diameter: 82.5 m

(Cut-out wind speed based on 10 minutes average)

Wind Speed at HH [m/s]	Electrical Power [kW]			Cp.e normal turbulence intensities
	Low turbulence intensities TI < 10%	Normal turbulence intensities 10 % < TI < 15 %	High turbulence intensities 15% < TI < 20 %	
3.0	0	0	0	0.000
3.5	13	14	19	0.102
4.0	55	57	62	0.272
4.5	107	109	115	0.365
5.0	167	170	177	0.414
5.5	235	239	249	0.438
6.0	315	320	333	0.452
6.5	408	414	431	0.461
7.0	517	525	547	0.468
7.5	641	650	675	0.471
8.0	781	792	817	0.472
8.5	936	947	967	0.471
9.0	1098	1100	1096	0.461
9.5	1250	1239	1219	0.441
10.0	1380	1362	1330	0.416
10.5	1463	1443	1407	0.381
11.0	1497	1483	1451	0.340
11.5	1500	1495	1469	0.300
12.0	1500	1500	1485	0.265
12.5	1500	1500	1495	0.235
13.0	1500	1500	1500	0.209
13.5	1500	1500	1500	0.186
14.0	1500	1500	1500	0.167
14.5	1500	1500	1500	0.150
15.0	1500	1500	1500	0.136
15.5	1500	1500	1500	0.123
16.0	1500	1500	1500	0.112
16.5	1500	1500	1500	0.102
17.0	1500	1500	1500	0.093
17.5	1500	1500	1500	0.085
18.0	1500	1500	1500	0.079
18.5	1500	1500	1500	0.072
19.0	1500	1500	1500	0.067
19.5	1500	1500	1500	0.062
20.0	1500	1500	1500	0.057
20.5*	1500	1500	1500	0.053
21.0 *	1500	1500	1500	0.049
21.5 *	1500	1500	1500	0.046
22.0 *	1500	1500	1500	0.043
22.5*	1500	1500	1500	0.040
23.0 *	1500	1500	1500	0.038
23.5*	1500	1500	1500	0.035
24.0*	1500	1500	1500	0.033
24.5 *	1500	1500	1500	0.031
25.0 *	1500	1500	1500	0.029

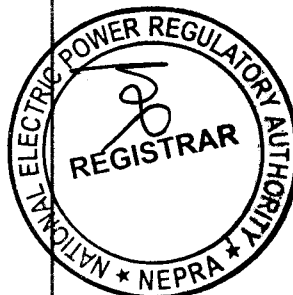
Table 1: Calculated power curve for the GE 1.5xle - *Applies to turbines with windEXTEND enabled



					Air Density [kg/m ³]						
	1.020	1.040	1.060	1.080	1.100	1.120	1.140	1.160	1.180	1.200	Standard Atmospheric Conditions 1.225
Wind Speed at HH [m/s]					Electrical Power [kW]						
3.0	0	0	0	0	0	0	0	0	0	0	0
3.5	6	7	8	8	9	10	11	12	12	13	14
4.0	41	43	44	46	47	49	50	52	54	55	57
4.5	85	87	89	92	94	96	99	101	103	106	109
5.0	135	138	142	145	149	152	155	159	162	165	170
5.5	193	198	202	206	211	215	220	224	228	233	239
6.0	260	266	272	278	284	289	295	301	307	313	320
6.5	339	347	354	361	369	376	383	391	398	405	414
7.0	432	441	450	460	469	478	487	496	505	514	525
7.5	537	548	559	570	581	592	603	614	625	636	650
8.0	656	670	683	696	710	723	736	749	762	775	792
8.5	789	805	820	836	852	867	882	898	913	928	947
9.0	929	947	964	982	999	1015	1032	1048	1064	1080	1100
9.5	1067	1085	1103	1121	1138	1155	1172	1188	1204	1220	1239
10.0	1200	1218	1236	1253	1270	1286	1302	1318	1332	1346	1362
10.5	1317	1333	1349	1364	1378	1391	1403	1414	1424	1433	1443
11.0	1404	1415	1426	1436	1445	1453	1461	1467	1473	1478	1483
11.5	1455	1462	1467	1473	1477	1481	1484	1487	1490	1492	1495
12.0	1483	1486	1489	1492	1494	1496	1498	1500	1500	1500	1500
12.5	1497	1499	1500	1500	1500	1500	1500	1500	1500	1500	1500
13.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
13.5	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
14.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
14.5	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
15.0-20.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
20.5 - 25.0*	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500

Table 2: Calculated power curve for the GE 1.5xle for normal turbulence intensities

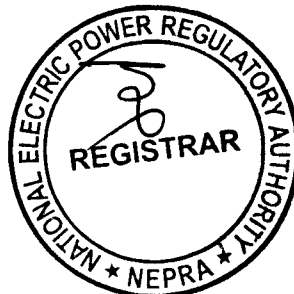
*Applies only to turbines with windEXTEND enabled



					Air Density [kg/m ³]						
	1.020	1.040	1.060	1.080	1.100	1.120	1.140	1.160	1.180	1.200	Standard Atmospheric Conditions 1.225
Wind Speed at HH [m/s]					Electrical Power [kW]						
3.0	0	0	0	0	0	0	0	0	0	0	0
3.5	5	5	6	7	8	9	9	10	11	12	13
4.0	40	41	43	44	46	47	49	50	52	53	55
4.5	83	85	87	90	92	94	97	99	101	104	107
5.0	133	136	139	143	146	149	153	156	159	163	167
5.5	190	194	199	203	208	212	216	221	225	230	235
6.0	256	262	268	273	279	285	291	296	302	308	315
6.5	334	341	349	356	363	370	377	385	392	399	408
7.0	425	434	443	452	461	470	479	488	497	506	517
7.5	529	540	551	562	573	583	594	605	616	627	641
8.0	647	660	673	686	699	712	726	739	752	765	781
8.5	779	795	810	826	841	856	872	887	902	917	936
9.0	922	940	957	975	993	1010	1028	1045	1062	1078	1098
9.5	1067	1086	1105	1124	1142	1160	1177	1195	1212	1229	1250
10.0	1209	1228	1247	1265	1283	1300	1316	1332	1347	1362	1380
10.5	1333	1350	1367	1382	1397	1410	1423	1434	1444	1453	1463
11.0	1424	1436	1447	1456	1465	1472	1479	1484	1489	1493	1497
11.5	1473	1479	1484	1488	1492	1495	1498	1500	1500	1500	1500
12.0	1496	1499	1500	1500	1500	1500	1500	1500	1500	1500	1500
12.5	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
13.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
13.5	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
14.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
14.5	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
15.0 - 20.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
20.5 - 25.0*	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500

Table 3: Calculated power curve for the GE 1.5xle for low turbulence intensities

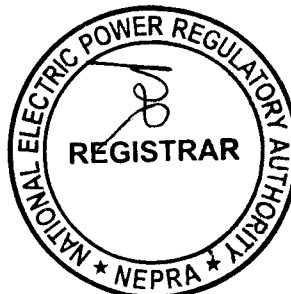
*Applies only to turbines with windEXTEND enabled



	Air Density [kg/m ³]										
	1.020	1.040	1.060	1.080	1.100	1.120	1.140	1.160	1.180	1.200	Standard Atmospheric Conditions 1.225
Wind Speed at HH [m/s]	Electrical Power [kW]										
3.0	0	0	0	0	0	0	0	0	0	0	0
3.5	9	10	11	12	13	14	15	16	17	17	19
4.0	46	47	49	51	52	54	55	57	59	60	62
4.5	90	92	95	97	100	102	105	107	110	112	115
5.0	142	145	149	152	156	159	163	166	169	173	177
5.5	201	206	211	215	220	224	229	234	238	243	249
6.0	271	277	283	289	295	301	307	313	319	325	333
6.5	353	361	368	376	384	391	399	406	414	421	431
7.0	450	460	469	478	488	497	507	516	525	535	547
7.5	558	569	581	592	604	615	626	638	649	661	675
8.0	680	694	707	721	734	748	761	774	788	801	817
8.5	812	828	843	859	874	889	904	919	934	949	967
9.0	941	958	974	990	1005	1020	1035	1049	1064	1078	1096
9.5	1063	1080	1096	1112	1128	1143	1159	1173	1188	1202	1219
10.0	1183	1199	1215	1231	1246	1261	1275	1289	1302	1315	1330
10.5	1287	1303	1317	1331	1344	1356	1367	1377	1387	1396	1407
11.0	1366	1377	1387	1397	1406	1414	1422	1429	1436	1443	1451
11.5	1416	1424	1431	1437	1443	1448	1453	1457	1461	1465	1469
12.0	1451	1456	1461	1465	1469	1472	1475	1477	1480	1482	1485
12.5	1473	1476	1479	1482	1484	1486	1488	1490	1491	1493	1495
13.0	1486	1489	1490	1492	1493	1494	1496	1497	1498	1499	1500
13.5	1495	1496	1497	1498	1499	1500	1500	1500	1500	1500	1500
14.0	1499	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
14.5	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
15.0 - 20.0	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
20.5 - 25.0*	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500

Table 4: Calculated power curve for the GE 1.5xle for high turbulence intensities

*Applies only to turbines with windEXTEND enabled



Thrust Coefficients GE 1.5xle - 50 Hz & 60 Hz

Rotor diameter: 82.5 m

Wind Speed at Hub Height [m/s]	Thrust Coefficient []
3	1.29
4	1.03
5	0.85
6	0.77
7	0.76
8	0.76
9	0.74
10	0.65
11	0.52
12	0.39
13	0.29
14	0.23
15	0.19
16	0.15
17	0.13
18	0.11
19	0.09
20	0.08
21*	0.07
22*	0.06
23*	0.05
24*	0.05
25*	0.04

Standard Atmospheric Conditions according to ISO 2533.

* Applies only to turbines with windEXTEND enabled



SCHEDULE-II
Modified

The Total Installed/Gross ISO Capacity (MW), Total Annual Full Load Hours, Average Wind Turbine Generator (WTG) Availability, Total Gross Generation of the Generation Facility/Wind Farm (in GWh), Array & Miscellaneous Losses (GWh), Availability Losses (GWh), Balance of Plant Losses (GWh) and Annual Energy Generation (GWh) of the Generation Facility /Wind Farm of Licensee is given in this Schedule.



SCHEDULE-II*

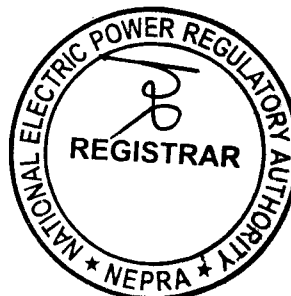
1.	Total Installed Gross ISO Capacity of the Generation Facility/Wind Farm (MW)	49.5
2.	Total Annual Full Load Hrs	2970
3.	Average Wind Turbine Generator (WTG) Availability	95.90%
4.	Total Gross Generation of the Generation Facility/Wind Farm (in GWh)	176.9981
5.	Array & Miscellaneous Losses GWh	18.9388
6.	Availability Losses GWh	6.4804
7.	Balance of Plant Losses GWh	4.5474
8.	Annual Energy Generation (20 year equivalent Net AEP) GWh	147.0315
9.	Net Capacity Factor	33.91%

Note

All the above figures are indicative as provided by the Licensee. The Net energy available to NTDC[†] for dispatch will be determined through procedures contained in the Energy Purchase Agreement.

*As provided by Licensee

† National Transmission and Dispatch Company Limited



National Electric Power Regulatory Authority
(NEPRA)

Determination of the Authority
In the Matter of Licensee Proposed Modification of
Tenaga Generasi Limited

February 20, 2012
Application No. LAG-82

(A). Background

(i). NEPRA granted a Generation Licence (No.WPGL/04/2006, dated December 18, 2006) to Tenaga Generasi Limited (TGL) for its 50.00 MW Wind Farm (WF) located at Khuttikun, Taluka Mirpur Sakro, District Thatta, in the Province of Sindh.

(ii). The original sponsors of the project [i.e. Arash Ventures Group of Companies (AVG), an established Malaysian Business Group] envisaged installing twenty (20 x 2.5 MW) Clipper Liberty C93 Wind Turbine Generators (WTGs).

(iii). Despite hectic efforts of the sponsors, the project could not be implemented. Later on, the original sponsors (i.e. AVG) sold their 100% shareholding to Dawood Lawrencepur Limited (DLPL). The Authority in its Regulatory Meeting (RM-08-076), dated March 24, 2008 acknowledged and allowed the change in share holding of TGL.

(iv). After the acquisition of the project, the new sponsors carried out the due diligence of the project and decided to implement the project with some other WTG manufacturer/supplier, requiring modification in the already granted Generation Licence.

(B). Communication of Licensee Proposed Modification

(i). TGL in accordance with Regulation-10 of the National Electric Power Regulatory Authority Licensing Application & Modification



Procedure) Regulations, 1999 (the Regulations), communicated a Licensee Proposed Modification (LPM) in its existing Generation Licence on October 28, 2011.

(ii). TGL in the "Text of the proposed Modification" & "Reason in Support of Modification" statements informed that the granted Generation License contained details of the site for the Project originally allocated by the Alternative Energy Development Board (AEDB). However, AEDB later changed the site of the project and the same has been finalized recently. The change of site of the project requires modification. Further, the earlier granted Generation Licence was based on Clipper manufactured WTGs. However, with an aim of achieving highest standards in technology for its Project, the sponsors carried out a thorough due diligence process and have decided to implement the project with WTGs of General Electric (G.E.), requiring a modification.

(iii). Regarding the "Impact on Tariff", TGL submitted that a separate tariff petition would be filed for determining the exact impact on tariff due to proposed change in WTG. About "Quality of Service (QoS)" and "Performance", TGL confirmed that the proposed change in technology would not have any impact on quality of service, performance by the licensee of its obligations under the licence as the selected EPC Contractor [i.e. China Machinery Engineering Corporation (CMEC)] and the WTG supplier [i.e. G.E.] are world renowned and have vast experience of setting up wind farms all over the world. TGL stressed that in fact the changes in WTGs will not only improve the QoS but also improve its performance in fulfillment of its obligations under the existing Generation Licence.

(C). Processing of LPM

(i). After completion of all the required information as stipulated under the Regulation 10 (2) and 10 (3) of the Regulations by TGL, the Registrar accepted the communicated LPM as required under the Regulation 10 (4) of the Regulations and published a notice about the communicated LPM in one English and one Urdu daily newspaper on



November 26, 2011, seeking comments from general public/other stakeholders in favor or against the proposed LPM.

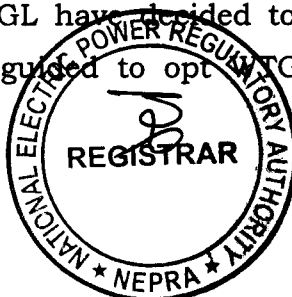
(ii). Apart from the notice in the press, separate notices were also sent to experts, government ministries and representative organizations etc. inviting their views and comments.

(D). Comments of Stakeholders

(i). In response to the above published notice of LPM in the press and subsequent correspondences made with other stakeholders, NEPRA received comments from three (03) stakeholders. These included Engineering Development Board, Government of Pakistan (EDB), Central Power Purchasing Agency (CPPA) of National Transmission & Despatch Company Limited (NTDC) and Securities & Exchange Commission of Pakistan (SECP).

(ii). The salient points of the comments offered by the above mentioned stakeholders are summarized in the following paragraphs: -

- (a). EDB in its observation did not express any concern about the proposed amendment communicated by TGL;
- (b). CPPA communicated that there is need to encourage and introduce IEC Type Class IV WTGs in the Country. These types of WTGs have full conversion characteristics that enhance the plant factor to 100%. In case of low wind or no wind, the remaining output or the entire MW output of the WTG can be delivered in MVARs by the full converter. Reactive power thus supplied will be close to the load centers in HESCO network relieving the utility of huge transportation losses. IEC type Class-IV WTGs not only support the network (frequency and voltage control) but would also supply the much needed reactive power. As the sponsors of TGL have decided to change the WTG now, they may be guided to opt WTG of IEC Type Class IV



instead of Type-III or Type-II. CPPA would like to highlight that TGL needs to ensure that their proposed plant complies with the provisions of the Grid Code as amended in April 2010;

- (c). SECP in its views stated that TGL was registered as a public limited company under the Companies Ordinance 1984 as required under the NEPRA Act. It also confirmed that the Memorandum of Association did include power generation as its business objectives. SECP did not convey any adverse comments about the corporate behavior of the company;

(iii). The perspective of TGL on the aforesaid position of CPPA, was sought. TGL in its rejoinder stated that the selected turbine, GE 1.5xle, is the state of the art machine and employs a Power Converter to interface the rotor of the doubly-fed induction generator to the grid. The machine offers the capability of quickly regulating the voltage on a continuous basis for a power system that corresponds to a selection of under excited/over excited power factor. The Low Voltage Ride-through capability enables the wind turbine to operate during and after transmission system faults resulting in a severe voltage dip at the wind farm. The Grid Interconnection Study, conducted by Power Planners International and approved by NTDC, clearly indicates that the selected turbine, GE 1.5xle, is fully compliant with all the Grid Code requirements. The IEC Type Class IV machines are currently not being offered by the WTG vendors for the Pakistan market.

(iv). The response of TGL was found reasonable considering the fact that all the wind projects currently being implemented in the country were using IEC type Class-III WTGs. Further, AEDB had already approved the Feasibility Study of the project based on the proposed WTG technology. Further, asking the sponsors will mean doing things again from ab-initio which will not serve any purpose as TGL has already signed a non reopen able contract with CMEC for supply of type-III WTGs for which CPPA had also agreed. CPPA also did not mention about deploying Type-IV WTGs during the Public Hearing in relation to the tariff petition filed by TGL.



(v). In view of the above, the observations of CPPA for asking the sponsors for selecting Type-IV WTGs were not considered relevant and it was found appropriate to process the communicated LPM without holding any Public Hearing etc.

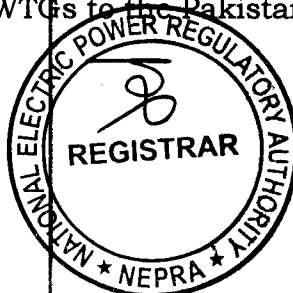
(E). Approval of LPM

(i). The Economic Growth of any Country is directly linked with the availability of reliable, secure and cheaper supply of electricity. The existing energy mix of the country is heavily skewed towards costlier thermal power plants, mainly operating on imported furnace oil.

(ii). The continuously increasing trend in fuel prices is not only causing severe pressure on the precious foreign exchange reserves of the country but is also resulting in higher consumer end prices. In view of this, the Authority considers it imperative that all the indigenous resources including Renewable Energy (RE), should be explored and their development is encouraged for achieving sustainable development.

(iii). In consideration of the above, the Authority had earlier granted a Generation Licence (No. WPGL/04/2006, dated December 18, 2006) to TGL for an installed capacity of 50.00 MW, to be implemented with Clipper Liberty C93 WTGs. However, the project could not be implemented as sponsors could not finalize the deal of supply of the WTGs with Clipper. After the acquisition of the project by DLPL, the new sponsors have now decided to implement the project with G.E. WTG (i.e. 1.5 MW x1e) for which a firm, non reopen-able Engineering, Procurement and Construction (EPC) contract has already been signed with CMEC. Further, AEDB which had issued the Letter of Intent (LoI) for the project has also given its consent to implement the project with the proposed WTG of G.E.

(iv). The Authority considers the implementation of the project with G.E. machines/WTGs very important as this will bring one of the leading manufacturers of the WTGs to the Pakistani market.



(v). In view of the above, the Authority considers that the request of TGL to implement the project with WTGs of G.E. (1.5 xle) is worth considering. Accordingly, the Authority hereby approves the communicated LPM in the Generation Licence of TGL. The already granted Generation Licence (No. WPGL/04/2006, dated December 18, 2006) is hereby modified. The Face Sheet indicating the required changes in the Generation Licence alongwith the Modified Schedule-I & II of the Generation Licence are attached as Annexure to this determination. The grant of such a Licensee Proposed Modification would be subject to the provisions contained in the NEPRA Act and relevant rules framed there under.

Authority

Shaukat Ali Kundi
Member

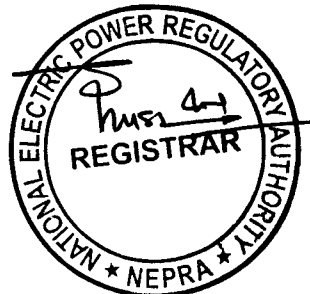
Shaukat Ali Kundi
22.02.2012

Ghiasuddin Ahmed
Member/Vice Chairman

Ghiasuddin Ahmed
22/2

Khalid Saeed
Chairman

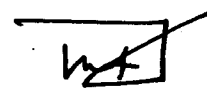
Khalid Saeed
23/2/12



46. Tenaga Generasi Limited (TGL) communicated a Licensee Proposed Modification (LPM) to the Authority In accordance with Regulation 10 of the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 (the Regulations).

47. The processing of the communicated LPM has been completed as stipulated in the Regulations. Accordingly a Draft Case Officer's Report (DCOR) has been prepared. The complete case file is being forwarded to you for your views as directed by the Authority in its Regulatory Meeting (RM-11-402), dated August 18, 2011.

48. In the light of the said directions of the Authority, please review the same and give your comments, if any within forty eight (48) hours for incorporating the same in the final COR to be submitted for the consideration of the Authority.



(Engr. Imtiaz Hussain Baloch)
Dy. Director (Licensing)
December 26, 2011

Legal Advisor (Mr. Irfan Munawar Gill)

NEPRA
Licensing Division
363
26-12-11

Legal Advisor
Issue No. 0513
Date 27-12-11

-12-
49. The required legal opinion is being
submitted for further action.

Irfan Gill
Irfan Munawar Gill
Legal Advisor (KIP)

~~Dy. Director (Licensing)~~

50. Please refer Para 46-49/N, the final Case Officer's Report in the matter of LPM of TGL duly incorporating the views/comments of Legal Advisor (Mr. Gill) is submitted for your kind perusal/approval.

51. It is proposed that the case file may be sent to Director (coordination) for convening a meeting of the Authority to deliberate/discuss and finalize the case.

(Engr. Imtiaz Hussain Baloch)
Dy. Director (Licensing)
December 29, 2010

Member (Licensing)

52. Para 51 is approved PL -

✓ Dir (Co-ord)

✓ DD (Licensing) 53. On 9/1/12 pl.

Int

Jan 4, 2012

↓
30/12

Gamm
3/1/12

Director (Co-Coord)
D. 39
L. 04-1-12

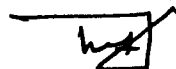
NEPRA
Licensing Division
Copy No. 368
29-12-11

54. Please refer Para 50-53/N, the Authority in its Regulatory Meeting (RM-12-018), dated January 09, 2012 considered the Licensee proposed Modification (LPM) filed by TGL.

★ F/A


55. The Authority approved the LPM without any changes. Licensing Division has now received the Minutes of the above mentioned Meeting. In the light of these minutes, the drafts of LPM in Generation Licence and determination of the Authority have been prepared.

56. The said drafts alongwith the complete case file are being forwarded to you for your views/vetting before submitting the same for the initial/signature of the Authority.


(Engr. Imtiaz Hussain Baloch)
Dy. Director (Licensing)
February 14, 2012

Legal Advisor (Mr. Gill)

The draft LPM determination is in accordance with the decision of Authority passed in RM 12-018. I have reviewed the draft and have made couple of minor changes. Please look into attached draft.


16/2/2012

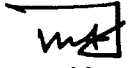
58. DD (Licensing)

on P/15

RA
Licensing Division
436
14/2/2012

Legal Advisor (KIP)
Rec No. 730-Sub-499
Date: 15-02-12
16-02-12

58. Please refer Para 54-57/N, the modifications made to the already granted Generation Licence of TGL and Determination of the Authority in the matter, duly vetted by Legal Advisor (KIP) are submitted for initial/signature of the Authority.


(Engr. Imtiaz Hussain Baloch)
Dy. Director (Licensing)
February 20, 2012

Member (L)
Dy. No. 242
Date 20-2-12

VC/Member Consumer Affairs
Diary No. 627
Date 22-2-2012

Licensing Division
Diary No. 445
Date 20-2-12

CHAIRMAN
Dy. No. 580
Date 23-2-12

Member (Licensing)
59. *Pl discuss -*
Deputy Director (Lic)

Discussed with:
DD(Lic) - Determination
over signed -
21/02
22/02

Member (Tariff & CA)/Vice Chairman

Chairman

23/12
22/2

Registrar

Pl check &
put-up for
signature

23/2/12

TA After doing the needful, original Licence, determination and covering letter in duplicate is hereby submitted for signature, Pl.

REGISTRAR

Signd. H. Issued

23/2/12

AD(R)/TA

Letters have been issued vide LAG-82/1454-56
dtd. 23-02-2012
DDu (Licensing)
23/2/12

Registrar 14/8
Dy. No.
Dated 23-02-12