华能山东如意（巴基斯坦）能源有限公司

Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited

BEFORE
THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

APPLICATION FOR MODIFICATION OF GENERATION LICENSE

PURSUANT TO RULE 10 (2) NEPRA (APPLICATION AND MODIFICATION PROCEDURE) REGULATIONS, 1999
READ WITH THE PROVISIONS OF
THE REGULATION FOR GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER ACT (XL OF) 1997 & THE RULES AND REGULATIONS MADE THEREUNDER

ON BEHALF OF

HUANENG SHANDONG RUYI (PAKISTAN) ENERGY (PRIVATE) LIMITED

IN RELATION TO THE GENERATION LICENSE GRANTED BY NATIONAL ELECTRIC POWER REGULATORY AUTHORITY DATED 10 JUNE 2015.

DATED: 16th AUGUST 2017

HUANENG SHANDONG RUYI (PAKISTAN) ENERGY (PRIVATE) LIMITED
ADDRESS : HOUSE NO. 105, STREET 10, BLOCK H, PHASE 5, DEFENCE HOUSING AUTHORITY, LAHORE, PAKISTAN
EMAIL : huanengruyi_energy@163.com
PHONE # : (92)300-0805896; (92)310-7878539
FAX # : (9242)35714340

华能山东如意（巴基斯坦）能源有限公司

Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited

16th August 2017

To,
THE REGISTRAR
NEPRA
Government of Pakistan
Islamabad

SUBJECT: LICENSE PROPOSED MODIFICATION TO THE GENERATION LICENSE

Dear Sir,

We, Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited (the **"Company"**), hereby submit our application for the modification of our Generation License bearing reference No. IGSPL/60/2015 dated 10 June 2015 (the **"Generation License"**).

Pursuant to Section 10 (2) of the National Electric Power Regulatory Authority (Application and Modification Procedure) Regulations, 1999 (the **"1999 Regulations"**), a licensee may at any time during the term of their Generation License communicate to National Electric Power Regulatory Authority (**"NEPRA"**) the proposed modification, which in the present case is to expire on 30 December 2047.

Pursuant to Section 10 (3) of the 1999 Regulations, in case of a licensee proposed modification, the licensee shall pay at fee calculated in accordance with the provision of Schedule II of the 1999 Regulations, which in the present case amounts to a sum of Pakistani Rupees Seven Million and Fifty Thousand Four Hundred and Eighty only (PKR 750,480/-). A copy of the bank draft for the said fee has been attached to the application.

Please acknowledge the same.

Best Regards,

Song Taiji
Chief Executive Officer (C.E.O.)

HUANENG SHANDONG RUYI (PAKISTAN) ENERGY (PRIVATE) LIMITED BOARD RESOLUTION[2]

华能山东如意（巴基斯坦）能源有限公司
Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited

EXTRACT OF THE MINUTES OF THE MEETING OF THE BOARD OF DIRECTORS OF HUANENG SHANDONG RUYI (PAKISTAN) ENERGY (PRIVATE) LIMITED HELD AT 10:00 AM AT ISLAMABAD ON 01 AUGUST 2017

BOARD RESOLUTIONS:

The following resolutions were discussed in detail by the Board and approved unanimously:

"**RESOLVED THAT** Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited, a company incorporated under the laws of Pakistan with its registered office located at House No. 105, Street 10, Block H, Phase 5, Defence Housing Authority, Lahore, Pakistan (the "**Company**") be and is hereby authorised to submit an application for the modification to the Generation Licence issued by National Electric Power Regulatory Authority in respect of its 2 x 660 MW coal power generation project located at Qadirabad, Sahiwal, Punjab (the "**Project**") and in relation thereto, enter into and execute all required documents, make all filings and pay all applicable fees, in each case, of any nature whatsoever, as required".

"**FURTHER RESOLVED THAT** in respect of submitting an application to the National Electric Power Regulatory Authority for the modification to the Generation Licence, **MR. SONG TAIJI AS C.E.O, MR. ATIF AKTHAR AS MANAGER COMMERCIALS** be and are hereby singly and jointly empowered and authorized for and on behalf of the Company to:

(i) review, execute, submit, and deliver the modification to the Generation License application and any related documentation required by National Electric Power Regulatory Authority for the modification to the Generation Licence, including any contracts, affidavits, statements, documents, powers of attorney, letters, forms, applications, deeds, guarantees, undertakings, approvals, memoranda, amendments, letters, communications, notices, certificates, requests, statements and any other instruments of any nature whatsoever;

(ii) represent the Company in all negotiations, representations, presentations, hearings, conferences and/or meetings of any nature whatsoever with any entity (including, but in no manner limited to National Electric Power Regulatory Authority, any private parties, companies, partnerships, individuals, governmental and/or semi-governmental authorities and agencies, ministries, boards, departments, regulatory authorities and/or any other entity of any nature whatsoever);

(iii) sign and execute the necessary documentation, pay the necessary fees, appear before the National Electric Power Regulatory Authority as needed, and do all acts necessary for completion and processing of the modification to the Generation License application;

(iv) appoint or nominate any one or more officers of the Company or any other person or persons, singly or jointly, in their discretion to make communicate with, make presentations to and attend the National Electric Power Regulatory Authority hearings; and

(vi) do all such acts, matters and things as may be necessary for carrying out the purposes aforesaid and giving full effect to the above resolutions/resolution".

"**AND FURTHER RESOLVED THAT MR. SONG TAIJI**, AS C.E.O **AND MR. ATIF AKTHAR AS MANAGER COMMERCIALS** be and is hereby authorized to delegate all or any of the above powers in respect of the foregoing to any other officials of the Company as deemed appropriate."

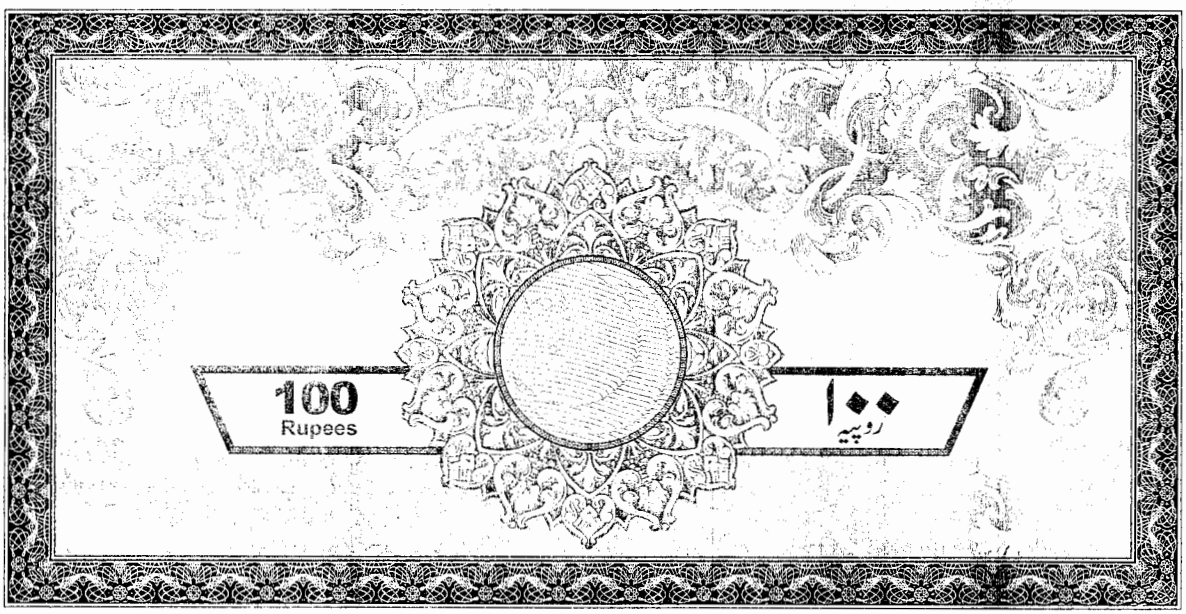
SIGNATURE

.....

MR. SONG TIAJI
CHIEF EXECUTIVE OFFICER
HUANENG SHANDONG RUYI (PAKISTAN) ENERGY (PRIVATE) LIMITED

AFFIDAVIT[3]

275226



BEFORE

THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

AFFIDAVIT

AFFIDAVITofSONG HAJI,CEO and authorized representative ofHuaneng Shandong Ruyi (Pakistan) Energy (Private) Limited, with its registered office located atHouse No. 105, Street 10, Block H, Phase 5, Defence Housing Authority, Lahore, Pakistan.

I, the above-named Deponent, do hereby solemnly affirm and declare that:-

1. I am the C.E.O of Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited, House No. 105, Street 10, Block H, Phase 5, Defence Housing Authority.

2. The contents of the accompanying modification to the Generation License, by the full strength of the Authority under Rule 10(2) of the National Electric Power Regulatory Authority Licensing (Application and Modification Procedure) Regulations, 1999, including all supporting documents are true and correct to the best of my knowledge and belief, and nothing material or relevant thereto has been concealed or withheld therefrom.

3. I also affirm that all further documentation and information to be provided by me in connection with the aforesaid modification to the Generation License shall be true and correct to the best of my knowledge and belief.

.....

DEPONENT

VERIFICATION

It is hereby verified on solemn affirmation at ISLAMABADon 11August2017, that the contents of the above Affidavit are true and correct to the best of my knowledge and belief, and that nothing material or relevant thereto has been concealed or withheld therefrom.

.....

DEPONENT

ATTESTED
S. Nasir Hussain Zaidi
NOTARY PUBLIC
ISLAMABAD
AUG 2017

TABLE OF CONTENTS

1. DETAILS OF THE PETITIONER

1.1 NAME AND ADDRESS

Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited

ADDRESS	: House No. 105, Street 10, Block H, Phase 5, Defence Housing Authority, Lahore, Pakistan
EMAIL	: huanengruyi_energy@163.com
PHONE #	: (92)300-0805896; (92)310-7878539
FAX #	: (9242)35714340

1.2 AUTHORIZED REPRESENTATIVE

NAME:	SONG TIAJI
DESIGNATION:	C.E.O

1.3 PROJECT DETAILS

Huaneng Shandong Ruyi (Pakistan) Energy (Private) Limited (the **"Company"**), a private limited company incorporated under the laws of Pakistan, is establishing a Coal based Power Project at Qadirabad, District Sahiwal, Punjab with a capacity of 2 x 660 MW (the **"Project"**).

Pursuant to Section 15 of the Regulation for Generation, Transmission and Distribution of Electric Power Act, 1997, NEPRA granted the Company Generation License No. IGSPL/60/2015 on 10 June 2015 for the Project.

2. DETAILS OF THE PROPOSED MODIFICATION

2.1 DETAILS OF THE PROPOSED MODIFICATION

Pursuant to Section 10 (2) of the 1999 Regulations, the Company seeks to apply for the following modifications to plant requirements in the Generation License:

i. Ramping rate (MW/min) to be modified to:

Unit load range % age	Cold Start (%MW/Min)	Warm Start (%MW/Min)	Hot Start (%MW/Min)
0~<25%	0.2	0.6	1
25~ 50%	0.3	0.8	1

50~ 100%	0.3	0.3	0.8

ii. Time required to Synchronize to Grid (Hrs.) to be modified to:

Time required to synchronize to Grid (Min)	Cold start	Warm start	Hot start	Very hot start
	600	480	150	90

3. RATIONALE FOR THE PROPOSED MODIFICATION

3.1 China-Pakistan Economic Corridor (**"CPEC"**) being the government of Pakistan's (**"GOP"**) top priority has meant significant pressure on CPEC's early harvest projects to be completed at a rapid pace. The Project being an early harvest project faced similar pressure and the push to meet the exacting pace resulted in an oversight by the Company. This oversight caused erroneous performance data for the ramping rate and the consequent incorrect time required to synchronize to grid being approved in the Generation License.

3.2 It is humbly submitted that the ramping rate and consequent incorrect time required to synchronize to grid be modified according to the proposed modification submitted in paragraph 2.1 of this application.

3.3 Further to this application, please find attached herewith the following in support of the modification:

i. *The Chinese Standard supporting proposed modification of License* as **Annex 1**;
ii. *The Steam Turbine Ramping Rate Certificated by Shanghai Electric* as **Annex 2**; and
iii. comparative data on the ramping rate submitted by other coal fired power projects as **Annex 3** (*Data Submitted by other Coal Fired Power Plants approved by NEPRA*).

3.4 Additionally, notwithstanding the rationale in paragraph 3.1, The company could have got a higher ramping rate using Check coal with low calorific value of 4300 kCal/kg. However, NEPRA in its decision regarding the "Suo Moto Review Proceedings in the Fuel Price Adjustment Mechanism Determined in Upfront Coal Tariff" dated 23 September 2016, fixed a minimum calorific value of 5500 Kcal/kg for coal to be used by power plants. The Company's present combustion system cannot support the ramping rate in the Generation License using coal of calorific value of 5500 Kcal/kg. Thus, it is humbly submitted that the proposed modification be accepted. (Find attached herewith as **Annex 4** (*Determination dated 23 September 2016*)).

3.5 As mentioned in the aforesaid clause 3.4, the Combustion Characteristic of Huaneng Shandong Ruyi Sahiwal 2*660MW Coal-fired Power Project have slight change due to the change of Check coal. (Find attached herewith as **Annex 5**)

4. IMPACT OF THE PROPOSED MODIFICATION ON THE TARIFF, QUALITY OF SERVICE, AND PERFORMANCE OF THE LICENSEE OF ITS OBLIGATIONS UNDER THE LICENSE

4.1 IMPACT OF THE PROPOSED MODIFICATION ON THE TARIFF

The Company has opted for upfront coal tariff for 2 x 660 MW Coal Power Plant issued by NEPRA. Since the upfront tariff is a fixed tariff, the proposed modification to the Company's Generation License will have no impact on the tariff.

4.2 IMPACT OF THE PROPOSED MODIFICATION ON THE QUALITY OF SERVICE

The Company hereby certifies that the Upfront Tariff and the obligations enunciated in the Generation License are fully acceptable to the Company and that the proposed modification will not impact the quality of service.

4.3 IMPACT OF THE PROPOSED MODIFICATION ON THE PERFORMANCE OF THE LICENSEE OF ITS OBLIGATIONS UNDER THE LICENSE

The proposed modification would facilitate the Company in fulfilling its obligations under the Generation License.

5. PRAYER

In view of the above, it is hereby most respectfully requested that NEPRA may kindly be pleased to:

(i) accept the proposed modification to the Generation License for the development of the Project; and

(ii) treat the Company's request for modification to the Generation License on a non-discriminatory basis.

FOR AND ON BEHALF OF
HUANENG SHANDONG RUYI (PAKISTAN) ENERGY (PRIVATE) LIMITED

Song Taiji
Chief Executive Officer (C.E.O.)

ANNEX 1

THE CHINESE STANDARD FOR SUPPORTING PROPOSED MODIFICATION OF LICENSE

1. THE FOREWORD OF THE STANDARD (CHINESE VERSION)

华中电监市场价财〔2011〕200号

关于印发《华中区域并网发电厂辅助服务管理实施细则》和《华中区域发电厂并网运行管理实施细则》的通知

河南、湖南、四川电监办，华中电网公司，河南、湖北、湖南、江西、四川省电力公司，重庆市电力公司，各有关发电企业：

《华中区域并网发电厂辅助服务管理实施细则(试行)》及《华中区域发电厂并网运行管理实施细则(试行)》(以下简称《两个细则》)经过一年多的试行，初步规范了华中区域电力调度行为，提高了发电企业运行管理水平和参与辅助服务的积极性，在保证电力系统安全稳定运行方面发挥了显著作用。华中电监局在总结前期试运行经验，广泛听取各电力企业意见的基

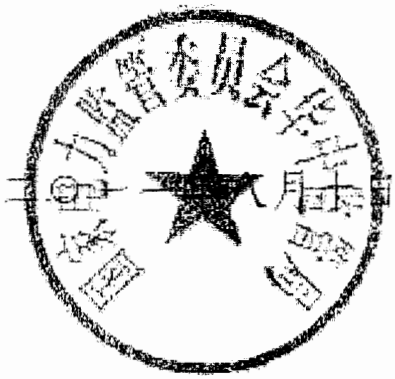
础上，组织修订相关条款，形成《华中区域并网发电厂辅助服务管理实施细则》和《华中区域发电厂并网运行管理实施细则》，现予以印发，请遵照执行。

修订后的《两个细则》于2011年9月1日起正式实施，请各电网企业在8月30日前完成技术支持系统的修改及调试工作。

《两个细则》实施工作过程中遇到问题请及时向华中电监局市场与价财监管处反馈。联系人：董小寒 027-88717615。

附件：1.《华中区域并网发电厂辅助服务管理实施细则》

2.《华中区域发电厂并网运行管理实施细则》



2. THE FOREWORD OF THE AFOREMENTIONED CHINESE STANDARD (ENGLISH VERSION)

HZDJSCJC [2011] No.200

Circular on Issuing *Implementation Rules for Auxiliary Service Management of Grid-connected Power Plants in Central China* and *Implementation Rules for Management of Grid-connected Operation of Power Plants in Central China*

Henan Electric Power Regulation Office, Hunan Electric Power Regulation Office, Sichuan Electric Power Regulation Office, Central Power Grid Company, Henan Electric Power Company, Hubei Electric Power Company, Hunan Electric Power Company, Jiangxi Electric Power Company, Sichuan Electric Power Company, Chongqing Electric Power Company, and all related power plants:

The Implementation Rules for Auxiliary Service Management of Grid-connected Power Plant in Central China (Trial) and Implementation Rules for Management of Grid-connected Operation of Power Plants in Central China (Trial), after one year's trial operation, have regulated preliminarily the electric power dispatch in Central China, increased the operation management level of power plants and their enthusiasm in providing auxiliary services, playing an important role in guaranteeing operation safety and stability of electric power system. Based on the trial operation experience in the past year and by referring to the suggestions and advice provided by the related power plants, Central China Electric Power Regulation Bureau has organized to revise the terms in these two implementation rules and finalized the Implementation Rules for Auxiliary Service Management of Grid-connected Power Plant in Central China and Implementation Rules for Management of Grid-connected Operation of Power Plants in Central China (collectively the "**Revised Rules**"). The Revised Rules are hereby issued to all of you to be complied with.

The Revised Rules will come into force on September 1, 2011, all related power plants and companies are required to complete modification and commissioning of technical support systems before August 30.

For any problem found during implementation of the Revised Rules, please give feedback to the Market and Price Regulation Office. Contact: Dong Xiaohan; Tel: 027-88717615.

Annex 1: Implementation Rules for Auxiliary Service Management of Grid-connected Power Plant in Central China; and

Annex 2: Implementation Rules for Management of Grid-connected Operation of Power Plants in Central China.

Keyword: power generation, grid –connected management, rules, circular

Copy to: Market Regulation Department of National Electric Power Regulation Commission

Office of Central China Electric Power Regulation Bureau Issued on August 10, 2011

3. THE COMPLIANCE CLAUSE (CHINESE VERSION)

2、具备 AGC 功能的机组，应按调度指令要求投入 AGC，无法投入 AGC 功能或 AGC 调节性能不满足表 2、表 3 中任一项基本要求，每日按 5 万千瓦时记为考核电量。每月由电力调度机构对所有机组 AGC 控制单元的调节性能进行测试，测试结果及时在“三公”调度网站上公布，并报电力监管机构备案。

表 2　火电机组 AGC 调节性能要求

额定容量	调节范围下限（额定容量的百分数）	调节范围上限（额定容量的百分数）	调节速度（每分钟额定容量的百分数）	调节精度
100MW（含）－200MW	75％	100％	2.0％/Min	±3％
200MW（含）－300MW	66％	100％	2.0％/Min（直吹式制粉系统机组为 1％/Min）	±3％
300MW（含）－600MW	60％	100％	2.0％/Min（直吹式制粉系统机组为 1％/Min）	±3％
600MW 及以上	55％	100％	2.0％/Min（直吹式制粉系统机组为 1％/Min）	±3％

表 3　水电机组 AGC 调节性能要求

调节形式	调节范围下限（额定容量的百分数）	调节范围上限（额定容量的百分数）	调节速度（每分钟额定容量的百分数）	调节精度
全厂方式	机组最低振动区上限	100％	最大机组的 30％/Min	±3％
单机方式	最低振动区上限	100％	60％/Min	±3％

4. **THE TRANSLATION OF THE AFOREMENTIONED CLAUSE (ENGLISH VERSION)**

For units with AGC, AGC should be put into operation as required by the dispatch instructions. If AGC cannot be put into operation or the regulation performance of AGC fails to meet the basic requirement in Table 2 or Table 3, penalty is imposed according to relevant regulations. The electric power despatch organization tests the regulating performance of AGC control units of all units each month, publishes the test results on the open, fair, and just despatch website, and reports to the electric power regulation authority for filing.

Table 2 Requirements for Regulation Performance of AGC of Thermal Power Units

Rated Capacity	Lower Limit of Regulating Range (percentage in rated capacity)	Upper limit of Regulating Range (percentage in rated capacity)	Regulating Speed (percentage in rated capacity per minute	Regulating Accuracy
100MW (inclusive) ~ 200MW	75%	100%	2.0%/Min	±3%
200MW (inclusive) ~ 300MW	66%	100%	2.0%/Min (1%/Min for unit with direct-fired pulverizing system)	±3%
300MW (inclusive)~ 600MW	60%	100%	2.0%/Min (1%/Min for unit with direct-fired pulverizing system)	±3%
600MW and above	55%	100%	2.0%/Min (1%/Min for unit with direct-fired pulverizing system)	±3%

Table 3 Requirements for AGC Regulating Performance of Hydraulic Power Units

Regulating Type	Lower Limit of Regulating Range (percentage in rated capacity)	Upper limit of Regulating Range (percentage in rated capacity)	Regulating Speed (percentage in rated capacity per each minute	Regulating Accuracy
For whole power plant	Upper limit of minimum vibration zone of unit	100%	80% of the maximum unit/Min	±3%
For single unit	Upper limit of minimum vibration zone	100%	60%/Min	±3%

According to the Table 2 Requirements for Regulation Performance of AGC of Thermal Power Units, all the units will be controlled by AGC. In order to reduce unstable factors and damage possibilities for both grid and generation units, all the units should comply with the limit speed. The designing aim of AGC is to automate the generation process and to create safer conditions for facility work.

In accordance with the requirement of the Standard, the regulating speed of direct-fired pulverizing system coal power plants is less than or equal to 1%.

华中电监市场价财〔2011〕200号

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河南、湖南、四川电监办，华中电网公司，河南、湖北、湖南、江西、四川省电力公司，重庆市电力公司，各有关发电企业：

《华中区域并网发电厂辅助服务管理实施细则(试行)》及《华中区域发电厂并网运行管理实施细则(试行)》(以下简称《两个细则》)经过一年多的试行，初步规范了华中区域电力调度行为，提高了发电企业运行管理水平和参与辅助服务的积极性，在保证电力系统安全稳定运行方面发挥了显著作用。华中电监局在总结前期试运行经验，广泛听取各电力企业意见的基

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二〇一一年八月十日

主题词：发电　并网管理　细则　通知

抄送：国家电监会市场监管部。

国家电监会华中监管局办公室　　2011年8月10日印发

华中区域并网发电厂辅助服务管理实施细则

第一章 总 则

第一条 为保障华中电力系统安全、优质、经济运行，规范辅助服务管理，根据《并网发电厂辅助服务管理暂行办法》（电监市场[2006]43号）和国家有关法律法规，制定本细则。

第二条 本细则所称辅助服务是指为维护电力系统的安全稳定运行，保证电能质量，除正常电能生产、输送、使用外，由发电厂提供的服务，包括：一次调频、自动发电控制、调峰、无功调节、备用和黑启动服务等。

第三条 本细则适用于华中区域网、省（市）电力调度机构及其直调的并网发电厂。其中，电网公司所属电厂参与辅助服务，不参与结算。

第四条 网、省（市）电力调度机构在电力监管机构授权下负责实施直调电厂（含并网自备发电厂）的辅助服务统计、考核和补偿等日常工作。

省电监办负责监管所在省电网辅助服务工作，华中电监局负责监管区域电网及其他省（市）电网辅助服务工作。

第二章 定义与分类

第五条 并网发电厂提供的辅助服务分为基本辅助服务和有偿辅助服务。

第六条 基本辅助服务是指为了保障电力系统安全稳定运行、保证电能质量，发电机组必须提供的辅助服务。包括一次调频、基本调峰、基本无功调节等。

（一）一次调频是指当电力系统频率偏离目标时，发电机组通过调速系统的自动反应，调整有功出力减少频率偏差所提供的服务。

（二）基本调峰是指发电机组在规定的最小技术出力到额定容量范围内，为了跟踪负荷的峰谷变化而有计划的、按照一定调节速度进行的发电机组出力调整所提供的服务。

常规燃煤机组和热电联产机组在非供热期的基本调峰标准为其额定容量的 50%，燃气机组基本调峰标准为其额定容量的100%，水电机组、综合利用机组以及在供热期间的热电联产机组按实际能力提供基本调峰。

（三）基本无功调节是指发电机组在一定的功率因数范围内（其中火电一般为 0.85-1.0，水电一般为 0.9-1.0）向电力系统注入或在0.97-1.0的功率因数范围内从系统吸收无功功率所提供的服务。

第七条 有偿辅助服务是指并网发电厂在基本辅助服务之外所提供的辅助服务，包括自动发电控制（AGC）、有偿调峰、旋转备用、有偿无功调节、黑启动等。

（一）自动发电控制是指发电机组在规定的出力调整范围内，跟踪电力调度指令，按照一定调节速率实时调整发电出力，以满

足电力系统频率、跟踪负荷曲线及联络线功率控制要求的服务。

（二）有偿调峰是指发电机组超过基本调峰范围进行深度调峰，以及机组按照调度指令要求在24小时内完成启停机（炉）进行调峰所提供的服务。

（三）旋转备用是指为了保证可靠供电，电力调度机构指定的并网发电机组在高峰时段内通过预留一定的发电容量所提供的服务。

（四）有偿无功调节是指发电机组在进相功率因数低于0.97的情况下向电力系统吸收无功功率或迟相功率因数低于额定值（火电一般为0.85，水电一般为0.9）的情况下向电力系统注入无功功率所提供的无功服务。

第八条 黑启动是指电力系统大面积停电后，在无外界电源支持情况下，由具备自启动能力的发电机组所提供的恢复系统供电的服务。

第三章 提供与调用

第九条 并网发电厂有义务提供辅助服务，且履行以下职责：

（一）提供基础技术参数以确定各类辅助服务的能力，定期提供有资质单位出具的辅助服务能力测试报告；

（二）负责厂内设备运行与维护，确保具备提供符合规定标准要求的辅助服务的能力；

（三）根据电力调度指令要求提供辅助服务；

（四）执行辅助服务考核和补偿；

（五）配合完成参数校核工作。

第十条 辅助服务遵循“按需调用”的原则，电力调度机构根据电网运行需要和发电机组性能，合理调度发电机组承担辅助服务。

第十一条 电力调度机构调用并网发电厂辅助服务时，应履行以下职责：

（一）根据电网情况、安全导则、调度规程，遵循“按需调度”和“三公”原则，组织、安排调度管辖范围内并网发电厂的辅助服务；

（二）根据相关技术标准和管理办法对辅助服务补偿、考核情况进行记录和统计；

（三）定期公布辅助服务调用、考核及补偿详细情况；

（四）及时答复发电企业的问询；

（五）定期对辅助服务的有关情况进行统计分析并报送电力监管机构；

（六）按电力监管机构的要求报送其它相关情况。

第四章 考核与补偿

第十二条 对基本辅助服务不进行补偿，当并网发电厂因自身原因造成基本辅助服务达不到规定标准需接受考核。对有偿辅助服务进行补偿，当并网发电厂因自身原因造成辅助服务不能被调用或达不到指定要求时，需接受考核。具体考核办法见《华中区域发电厂并网运行管理实施细则》。

第十三条 自动发电控制（AGC）服务补偿：

1、自动发电控制按照单元（单机或全厂）跟踪负荷变化及区域控制偏差（ACE）的贡献量进行补偿。

2、单元AGC补偿费用（元）=AGC贡献量（MWh）×50元/MWh。

3、对满足调节性能要求的AGC调节过程进行补偿，调节过程的贡献量由被调用AGC控制单元的实际发电有功出力变化量△P与完成本次调节过程的时间△T计算得出，贡献量M=△P*T0*T0/△T，取T0=300秒。

4、AGC响应时间和调节精度不满足《华中区域发电厂并网运行管理实施细则》规定标准要求的不予以补偿。

第十四条 有偿调峰服务补偿：

1、有偿调峰服务按机组计量。

2、有偿调峰补偿费用（元）=运行调峰深度贡献电量（MWh）×100元/MWh+启停调峰补偿费用（元）。

3、运行调峰深度贡献电量为在调峰时实际发电出力曲线低于基本调峰规定最小出力的积分电量。

4、火电启停调峰按下列标准补偿：单机容量在10万千瓦及以下的燃煤机组启停调峰一次，按机组容量补偿0.5万元/万千瓦。单机容量在10万千瓦以上的燃煤机组启停调峰一次，按机组容量补偿1万元/万千瓦。燃气机组启停调峰一次，按机组容量补偿500元/万千瓦。

5、由于机组自身原因造成出力低于基本调峰规定最小出力

或机组停运的不在补偿范围。

第十五条 旋转备用补偿：

1、旋转备用补偿费用（元）=旋转备用贡献量（MWh）×20 元/MWh

2、旋转备用贡献量为电力调度机构指定的备用容量（以实际备用容量的权重计算指定备用容量）和提供备用时间的乘积，其中提供备用时间仅限定于高峰时段。

第十六条 有偿无功服务补偿：

1、有偿无功服务按机组计量。

2、有偿无功补偿费用（元）=提供有偿无功电量（MVarh）×50 元/MVarh。

3、有偿无功电量是根据电力调度指令要求、机组比进相功率因数 0.97 多从电力系统吸收的无功电量和比迟相额定功率因数（火电一般为 0.85，水电一般为 0.9）多向电力系统注入的无功电量。

4、水电机组在低负荷调相运行工况下提供有偿无功服务，其补偿费用（元）$=Y_{调相} \times P_N \times t_{调相}$，其中，$P_N$为发电机组容量（单位为 MW），$t_{调相}$为机组调相运行时间（单位为小时），$Y_{调相}$为调相运行补偿标准取 20 元/MWh。

第十七条 电力调度机构应根据系统运行需要确定黑启动机组，并与黑启动机组所在发电公司签订黑启动服务合同，合同中应明确机组黑启动技术性能指标。对提供黑启动机组的改造新增投资成本、运行维护成本、黑启动测试成本和人员培训成本等给

予补偿。水电机组按2万元/月，其他机组按10万元/月补偿。

第十八条 对于地区外来电（包括跨区域和跨省、市），视为购电省（市）的并网发电厂，原则上参加基本调峰和有偿调峰。

第五章 计量与结算

第十九条 并网机组必须接受电力调度能量管理系统（EMS）监视和控制，提供的辅助服务技术参数须经有资质试验单位校验确认。

第二十条 辅助服务统计数据包括电能量计量采集装置数据、电力调度自动化系统记录的发电负荷指令和省（市）间联络线交换功率指令、实际有功（无功）出力，日发电计划曲线（含修改）、省（市）间联络线交换功率曲线、电网频率、电压曲线等。

第二十一条 辅助服务补偿费用在各省（市）电网企业单独记帐，实行专项管理。发电厂所有考核费用全部用于补偿提供有偿辅助服务的电厂。以省（市）为单位实行收支平衡，辅助服务补偿费用不足部分按各电厂实际上网电量比例分摊，富余部分按考核电量等比例返还。

第二十二条 根据各电厂上月并网运行应考核费用、全厂机组辅助服务应补偿费用及应分摊费用，计算出各电厂上月最终应获得或应支出的费用，由网、省（市）电网企业根据结算关系，与发电企业月度电费一并结清。

当月无上网电量的自备电厂发生的考核费用由省（市）电网企业代其垫付，在其有上网电量后，电网企业从其电费中补

扣代垫的资金及利息。

第六章　监督与管理

第二十三条　电力监管机构负责组织或委托有资质试验单位，审核并网发电机组性能参数和辅助服务能力。

第二十四条　每月20日前，网、省（市）电力调度机构将上月直调机组辅助服务调用、统计、考核和补偿情况在“三公”调度门户网站上披露。

第二十五条　并网发电厂对统计结果有疑问，可以向相应电力调度机构提出复核，电力调度机构在接到问询的2个工作日内应予以答复。

第二十六条　每月25日前，电网企业和电力调度机构将辅助服务调用、统计、考核和补偿情况明细清单报送电力监管机构，经电力监管机构审批后，结果生效。

第二十七条　每月28日前，电力监管机构在门户网站上发布上月电厂辅助服务考核和补偿结果。

第二十八条　并网发电厂对辅助服务调用、统计和考核等情况有疑问，经与电力调度机构协商后仍有争议的，可以向电力监管机构提出申诉，由电力监管机构依法协调或裁决。

第七章　附　则

第二十九条　本细则由华中电监局负责解释。

第三十条　本细则自2011年9月1日起施行。

华中区域发电厂并网运行管理实施细则

第一章 总 则

第一条 为保障华中电力系统安全、优质、经济运行，维护电力企业的合法权益，根据《发电厂并网运行管理规定》（电监市场[2006]42号），结合华中电力系统的实际情况，制定本细则。

第二条 本细则适用于华中区域网、省（市）电力调度机构直调电厂（含并网自备发电厂，以下简称并网发电厂）。其中，进入商业化运营机组参加运行考核，电网公司所属电厂参与考核，不参与结算。

地（市）、县（市）电力调度机构直调电厂的并网运行管理可参照执行。

第三条 发电厂并网运行管理应遵循电力系统客观规律和建立社会主义市场经济体制的要求，贯彻“安全第一、预防为主、综合治理”的方针，实行“统一调度、分级管理”，坚持“公开、公平、公正”的原则。

第四条 网、省（市）电力调度机构在电力监管机构授权下按照调度管辖范围具体实施并网发电厂的运行考核工作。

省电监办负责对所在省电网的并网发电厂运行考核工作实施监管，华中电监局负责监管区域电网和其他省（市）电网的并网发电厂运行考核工作。

第二章　运行管理

（一）安全管理

第五条　电力调度机构应按其调度管辖范围负责电力系统运行的组织、指挥、指导和协调。电网企业、并网发电厂、电力用户有义务共同维护电力系统安全稳定运行。

第六条　并网发电厂应严格遵守国家法律法规、国家标准、电力行业标准及电力系统调度规程。

第七条　并网发电厂涉及电网安全稳定运行的继电保护和安全自动装置、通信设备、自动化设备、励磁系统及电力系统稳定器（PSS）装置、调速系统、高压侧或升压站电气设备等运行和检修安全管理制度、操作票和工作票制度等，应符合有关安全管理的规定，否则不允许机组并网运行。

第八条　电力调度机构针对电力系统运行中存在的安全问题，应及时制定反事故措施，报电力监管机构审备；并网发电厂应落实电力调度机构制定的反事故措施，对并网发电厂一、二次设备中存在影响电力系统安全运行的问题，并网发电厂应与电力调度机构共同制定相应整改计划，并确保计划按期完成。对于未按期完成整改的并网发电厂，每逾期一天，按 2 万千瓦时记为考核电量，并由电力监管机构责令改正并给予通报批评。

第九条　电力调度机构应制定防止电网大面积停电事故预

案，合理设置黑启动电源，制定黑启动方案并报电力监管机构备案，还应针对电网方式变化和特点组织电网联合反事故演习和实施必要的黑启动试验。并网发电厂要按照所在电网防止大面积停电事故预案的统一部署，积极配合落实事故处理预案；要制定可靠完善的保厂用电措施、全厂停电事故处理预案和内部黑启动方案，报电力调度机构和电力监管机构备案；并根据电力调度机构的要求参加电网联合反事故演习。对于未按期制定事故处理预案的并网发电厂，每逾期一天，按 2 万千瓦时记为考核电量，月累计考核电量不超过并网发电厂全厂当月上网电量的 1%，并由电力监管机构给予通报批评；对于无故不参加电网联合反事故演习的并网发电厂，由电力调度机构给予通报批评。

电力调度机构确定为黑启动的发电厂，因电厂原因不能提供黑启动时（不含计划检修），电厂应及时向电力调度机构汇报，无法提供黑启动服务期间，按每小时 0.1 万千瓦时记为考核电量，最大考核费用不超过该厂年度黑启动辅助服务补偿费用。

电力调度机构检查发现电厂不具备黑启动能力，而电厂隐瞒不报的，当月不予以补偿，并按每小时 0.2 万千瓦时记为考核电量，最大考核费用不超过该厂年度黑启动辅助服务补偿费用。

电力监管机构委托电力调度机构对提供黑启动的并网发电机组每年做一次黑启动测试试验。指定提供黑启动的机组在被调用时（含测试试验），无法达到合同约定的技术标准，当

月不予以补偿，并按前六个月收取的辅助服务补偿费用的两倍予以考核。

第十条 电力生产事故管理和调查工作应按照《电力生产事故调查暂行规定》(国家电监会4号主席令)的有关规定执行。

并网发电厂发生事故后，由电力监管机构组织事故调查和分析，并网发电厂应积极配合，并提供所需的故障录波数据、事故时运行状态和有关数据资料。并网发电厂拒绝配合的，由电力监管机构给予通报批评，拒不改正的或者提供虚假材料、隐瞒事实的，按全厂容量（机组之间通过母线和联变实现电气连接为一个电厂）×1小时记为考核电量。

第十一条 发电厂并网安全性评价工作按照《华中区域发电机组并网安全性评价实施细则》规定执行。

（二）调度管理

第十二条 并网发电厂应在机组并网前，与电网企业签订并网调度协议，不得无协议并网运行。并网调度协议由并网发电厂和电网企业根据平等互利、协商一致和确保电力系统安全运行的原则，参照国家电监会和国家工商总局印发的《并网调度协议（示范文本）》签订，协议签订后应在10个工作日内在电力监管机构备案。双方达不成协议的，由电力监管机构协调或裁决。

第十三条 电力调度机构、电网企业和并网发电厂应按照《电力企业信息报送规定》(国家电监会13号令）及《电力企

业信息披露规定》（国家电监会 14 号令）的要求及时报送和披露调度运行信息。

第十四条 并网发电厂应严格服从电力调度机构的指挥，迅速、准确执行调度指令，不得以任何借口拒绝或者拖延执行。接受调度指令的并网发电厂值班人员认为执行调度指令将危及人身、设备或系统安全的，应立即向发布调度指令的电力调度机构值班调度人员报告并说明理由，由电力调度机构值班调度人员决定该指令的执行或者撤销。对于无故延缓执行调度指令、违背和拒不执行调度指令的并网发电厂，由电力监管机构给予通报批评，并每次按 100 万千瓦时记为考核电量。根据实际损失情况，追究单位和有关人员的法律和经济责任。

第十五条 火电机组允许强迫停运次数、允许等效非计划停运时间如下表：

表 1 火电机组非计划停运的允许次数、时间

额定容量	允许强迫停运次数（次/年）	允许等效非计划停运时间（小时/年）
200MW 以下	2	144
200MW（含）~300MW	2	168
300MW（含）~600MW	2	180
600MW 及以上	2	220

水电机组非计划停运次数和时间以全厂为单位进行统计和考核，允许强迫停运次数为 0.5 台次/年、允许等效非计划停运时间为 30 小时/台。

电力调度机构对并网发电厂非计划停运实施如下考核：

1、非电厂原因导致的非计划停运和经电力调度机构同意的并网发电厂消缺时段免于考核。但消缺工期超出调度机构批准的计划工期时，超出计划时间仍计入非计划停运时间。

2、机组发生非计划停运时，并网发电厂应立即向电力调度机构报告，电力调度机构核查清楚原因后，纳入非计划停运考核；

3、机组未在调度规定的时间内完成并网的，导致偏离发电计划曲线，按照曲线偏差考核。机组无法开出的，电力调度机构核查清楚原因后，纳入非计划停运考核；

4、非计划停运次数按年度考核，以允许强迫停运次数为基数，每超过允许次数1次，按机组容量×1小时记为考核电量；

5、非计划停运时间按年度考核，非计划停运考核电量=机组额定容量×[等效非计划停运时间-允许等效非计划停运时间]（小时），等效非计划停运时间最高不超过允许等效非计划停运时间的1.1倍。

第十六条 并网发电厂应严格执行电力调度机构下达的日发电计划曲线（含修正），电力调度机构修改发电调度计划曲线应提前30分钟通知并网发电厂（紧急情况除外）。

电力调度机构对日发电计划偏差实施如下考核：

1、电网频率正常，实际出力偏离机组额定容量±2%及以上，记偏差部分电量为考核电量；

2、当频率在49.90赫兹以下时，低于有功计划曲线而少发

电量按 2 倍记为考核电量；当频率在 50.10 赫兹以上时，超过有功计划曲线而多发电量按 2 倍记为考核电量；

3、机组没有按照调度指令时间停运，将其后过程中发生的曲线偏差电量记为考核电量。

下列情况免于考核：

1、调度机构调整负荷曲线后， 火电 30 分钟（水电 15 分钟）内免除发电计划曲线考核；

2、火电机组开停机过程中出力不足额定容量的 50%，水电厂全厂出力计划低于最大单机最低振动区上限；

3、AGC 投入运行期间出现的偏差（严格跟踪负荷曲线模式除外）；

4、机组发生非计划停运导致偏离发电计划曲线时，已经纳入非计划停运考核后，不再进行曲线偏差考核；

5、当出现系统事故，机组按照调度指令紧急调整出力时。

第十七条 并网发电厂单机 100MW 及以上火电机组和单机容量 40MW 及以上非贯流式水电机组（经调度机构认可不需参与 AGC 调整的机组除外）应具有 AGC 功能。并网发电机组 AGC 的投运率和调节精度、调节范围、响应速度等应满足要求。加装 AGC 设备的并网发电厂应保证其正常运行，不得擅自退出并网机组的 AGC 功能。

对并网发电机组提供 AGC 服务的考核内容，包括：AGC 的可用率、调节容量、调节速率、调节精度等。

1、AGC 的月投运率必须达到 90％以上。每低于 1 个百分点（含不足一个百分点），每台次记考核电量 5 万千瓦时。经调度机构同意退出的时间段，不纳入考核范围。

2、具备 AGC 功能的机组，应按调度指令要求投入 AGC，无法投入 AGC 功能或 AGC 调节性能不满足表 2、表 3 中任一项基本要求，每日按 5 万千瓦时记为考核电量。每月由电力调度机构对所有机组 AGC 控制单元的调节性能进行测试，测试结果及时在“三公”调度网站上公布，并报电力监管机构备案。

表 2　火电机组 AGC 调节性能要求

额定容量	调节范围下限（额定容量的百分数）	调节范围上限（额定容量的百分数）	调节速度（每分钟额定容量的百分数）	调节精度
100MW（含）～200MW	75％	100％	2.0%/Min	±3%
200MW（含）～300MW	66％	100％	2.0%/Min（直吹式制粉系统机组为 1%/Min）	±3%
300MW（含）～600MW	60％	100％	2.0%/Min（直吹式制粉系统机组为 1%/Min）	±3%
600MW 及以上	55％	100％	2.0%/Min（直吹式制粉系统机组为 1%/Min）	±3%

表 3　水电机组 AGC 调节性能要求

调节形式	调节范围下限（额定容量的百分数）	调节范围上限（额定容量的百分数）	调节速度（每分钟额定容量的百分数）	调节精度
全厂方式	机组最低振动区上限	100％	最大机组的 80％/Min	±3%
单机方式	最低振动区上限	100％	60％/Min	±3%

3、在电网出现异常或由于安全约束限制电厂出力，导致机组AGC功能达不到投入条件时，不考核该机组AGC服务。

4、对于非传统类型机组（如循环硫化床机组、灯泡贯流式机组）的AGC 性能考核指标，以具备技术检验资质的单位出具的AGC 调节实验报告数据为准。

5、具备全厂AGC控制模式的调度机构和电厂应按全厂AGC方式运行、考核。

第十八条 并网发电机组必须具备一次调频功能，否则不允许并网运行。并网发电机组一次调频的人工死区、调速系统的速度变化率和一次调频投入的最大调整负荷限幅、调速系统的迟缓率、响应速度等应满足《华中电网发电机组一次调频技术管理规定（试行）》（华中电监市场〔2006〕32 号）的技术要求。并网运行机组应投入一次调频功能，不得擅自退出机组的一次调频功能。

对并网发电机组一次调频的考核内容，包括：一次调频投运率；机组一次调频人工死区；机组调速系统的速度变动率；调速系统的迟缓率；机组一次调频负荷调节幅度；机组一次调频响应行为。

1、并网运行机组一次调频月投运率应达到100%（经调度同意退出期间，不纳入考核）。每低于1个百分点（含不足一个百分点）每台次记考核电量5万千瓦时。

机组一次调频月投运率（%）=一次调频月投运时间（小时）×100%/机组月并网运行时间（小时）

2、机组一次调频的人工死区

（1）电液型汽轮机调节控制系统的火电机组一次调频的人工死区控制在±0.033Hz（±2r/min）内；

（2）机械液压调节控制系统的火电机组一次调频的人工死区控制在±0.10Hz（±6r/min）内；

（3）直流锅炉机组一次调频的人工死区控制在±0.033Hz（±2r/min）内；

（4）水电机组一次调频的人工死区控制在±0.05Hz内。

3、机组调速系统的速度变动率（或水电机组的永态转差率）

（1）火电机组速度变动率为4%～5%；

（2）水电机组的永态转差率不大于4%。

4、一次调频的最大调整负荷限幅

（1）水电机组一次调频的负荷变化限制幅度为额定负荷的±10%；

（2）额定负荷500MW及以上的火电机组，一次调频的负荷调整限幅为机组额定负荷的±6%；

（3）额定负荷210～490MW的火电机组，一次调频的负荷调整限幅为机组额定负荷的±8%；

（4）额定负荷100～200MW的火电机组，一次调频的负荷调整限幅为机组额定负荷的±10%；

（5）额定负荷100MW以下的火电机组，一次调频的负荷调整限幅为机组额定负荷的±8%。

5、调速系统的迟缓率（或水电调速器的转速死区）

（1）电液调节控制系统的火电机组，其调速系统的迟缓率小于0.06%；

（2）机械、液压调节控制系统的火电机组，其调速系统的迟缓率小于0.1%；

（3）水电机组调速器的转速死区小于0.04%。

6、响应行为

机组一次调频的响应行为包括一次调频的负荷响应滞后时间、一次调频的最大负荷调整幅度。

（1）所有火电机组、额定水头在50米及以上的水电机组，其一次调频的负荷响应滞后时间，应小于4秒；额定水头在50米以下的水电机组，其一次调频的负荷响应滞后时间，应小于10秒；

（2）所有机组一次调频的负荷调整幅度应在15秒内（直流锅炉、循环硫化床锅炉要求25秒内达到）达到理论计算的一次调频的最大负荷调整幅度的90%；

（3）在电网频率变化超过机组一次调频死区时开始的45秒内，机组实际出力与响应目标偏差的平均值应在理论计算的调整幅度的±5%内。

7、以上2-6项中任一项不满足要求，每项次记考核电量2万千瓦时。

第十九条 并网发电厂应严格执行电力调度机构的励磁系

统及电力系统稳定器（PSS）、调速系统、继电保护、安全自动装置、自动化设备和通信设备等的有关系统参数管理规定。并网发电厂应按电力调度机构的要求书面提供设备（装置）参数，并对所提供设备（装置）参数的完整性和正确性负责。设备（装置）参数整定值应按照电力调度机构下达的整定通知单执行或满足电力调度机构的要求。并网发电厂改变设备（装置）状态和参数，应经电力调度机构同意。

第二十条 电力调度机构应根据电网结构和并网发电厂的电气技术条件，按照安全、经济的原则，安排并网发电厂参与电力系统调峰、调频、调压和备用。并网发电厂应按照电力调度机构调度值班人员的指令执行。并网发电厂参与辅助服务的情况由电力调度机构记录，按月度报送电力监管机构备案，并向所有并网发电厂披露。

第二十一条 并网发电厂发电机组的自动励磁调节装置的低励限制、强励功能应正常投运。并网发电厂不得擅自退出发电机组的自动励磁调节装置或低励限制、强励功能。并网发电厂应在电力调度机构的指挥下，按规定进行发电机组进相试验，在发电机允许条件下，进相深度应满足电网运行的需要。

并网发电厂应具备AVC功能（经调度机构认可不需参与AVC调整的机组除外）并提供基本无功调节服务。基本无功调节是指发电机组在一定的功率因数范围内（其中火电为0.85-1.0，水电为 0.9-1.0）向电力系统注入或在一定的功率因数范围内

（即 0.97-1.0）从电力系统吸收无功功率所提供的服务。

电力调度机构按其调度管辖范围对并网发电厂进行如下考核：

1、因电厂自身原因，达不到基本无功调节服务标准要求的，每日按 1 万千瓦时记为考核电量；

2、电力调度机构根据调度规程下达并网发电厂母线电压曲线，并对电厂母线电压合格率进行考核。

月度母线电压合格率应不小于 99.9%，每降低 0.1 个百分点，记考核电量 2 万千瓦时。

月度母线电压合格率（%）=1-机组并网运行时月度母线电压不合格时间（小时）/机组月并网运行时间（小时）×100%

电厂 AVC 月投运率必须达到 90%以上。每低于 1 个百分点（含不足一个百分点），记考核电量 2 万千瓦时。经调度机构同意退出的时间段，不纳入考核范围。

3、机组无功出力或进相深度达到规定的技术要求后，电压仍不合格，免于考核；

4、机组励磁系统性能包括进相能力达不到第三十五条规定的要求，期间电压曲线考核加倍；

5、全厂停电期间，免于考核。

第二十二条 并网发电厂应参与电力系统调峰，基本调峰能力必须达到机组技术参数要求的指标。

常规燃煤机组和在非供热期的热电联产机组的基本调峰能力为其额定容量的 50%，燃气机组基本调峰能力为其额定容量

的 100%，水电机组、综合利用机组以及在供热期的热电联产机组按实际能力提供基本调峰。

积极开展节能发电调度，充分利用水能资源，尽可能减少弃水。

对并网发电厂进行如下考核：

1、在调度指令要求机组提供基本调峰服务，但机组无法满足基本技术要求时，每台次按缺额容量×调度要求调峰时间（小时）×2 记为考核电量。

2、并网机组自行占用备用容量的，按照缺额容量×占用时间（小时）×2 记为考核电量。

（三）检修管理

第二十三条 并网发电厂应按《发电企业设备检修导则》（DL/T838-2002）、电力系统调度规程的相关规定，向电力调度机构提出年度、月度及日常检修申请，并按照电力调度机构下达的年度、月度、日常检修计划严格执行。并网发电厂应按照电力调度机构批准的检修工期按时完成检修任务。

第二十四条 电力调度机构应统筹安排并网发电厂发电机组及其外送输变电设备的检修，尽可能安排发电厂外送输变电设备与发电机组检修同时进行。

第二十五条 并网发电厂涉网的继电保护及安全自动装置、自动化及通信等二次设备的检修管理应按照电力调度机构的调度规程和有关规定执行。电力调度机构对并网发电厂一次

和二次设备的检修在检修工期和停电范围等方面应统筹安排、统一考虑。电力调度机构管辖范围内的二次设备检修应与并网发电厂一次设备的检修相配合。

第二十六条 并网发电厂变更检修计划，包括无法按时开工、延长检修工期、增加检修工作项目等，应按照电力系统调度规程和有关规定执行。电力调度机构视电网运行情况和其它并网发电厂的检修计划统筹安排，若无法安排变更检修计划，应及时通知并网发电厂，并说明原因。

第二十七条 电力调度机构根据电网运行情况变更并网发电厂检修计划，包括发电厂检修计划无法按期开工、中止检修工作等，电力调度机构应提前与并网发电厂协商。对推迟计划检修期间，发生发电厂的设备故障或影响本细则规定的指标完成时，不对该机组进行考核处理；由于推迟计划检修引起的发电设备故障（非电厂责任）而需增加计划检修项目、工期时，电力调度机构应批准其延长计划检修工期，并保证该机组计划检修工期增加不影响年度电量完成。

第二十八条 并网发电厂检修工作由于电厂自身原因出现以下情况之一，每次按5万千瓦时记为考核电量。

1、未按调度规程规定报送年、月、日检修计划；

2、计划检修工作不能按期完工，但未办理延期手续；

3、设备检修期间，办理延期申请超过一次；

4、擅自增加（或减少）工作内容而未办理申请手续的；

5、计划检修工作临时调整。

（四）技术指导和管理

第二十九条 并网发电厂涉及电网安全稳定运行的继电保护和安全自动装置、通信设备、自动化设备、励磁系统及 PSS 装置、调速系统、直流系统、高压侧或升压站电气设备等应纳入电力系统统一规划、设计、建设和运行管理，其技术性能和参数应达到国家及行业有关规定和安全性评价要求，其技术规范应满足接入电网的要求。

第三十条 并网发电厂涉及电网安全稳定运行的继电保护和安全自动装置、通信设备、自动化设备、水电厂水库调度自动化系统设备、励磁系统及 PSS 装置、调速系统和一次调频系统、直流系统、高压侧或升压站电气设备以及涉及机网协调的相关设备和参数的管理应按电力调度机构的有关规定执行，其选择、配置和涉网定值等应满足电网安全稳定运行的要求，并经电力调度机构审核。

第三十一条 电力调度机构按其管辖范围对并网发电厂继电保护和安全自动装置，包括发电机组涉及机网协调的保护开展技术指导和管理工作。

1、并网发电厂涉及电网安全稳定运行的继电保护和安全自动装置，包括发电机组涉及机网协调的保护设计选型应符合电力调度机构有关规程规定，与系统有关的继电保护和安全自动装置的配置、选型应征得电力调度机构的同意，并报电力调

度机构备案。

2、并网发电厂涉及电网安全稳定运行的继电保护和安全自动装置，包括发电机组涉及机网协调的保护的运行管理、定值管理、检验管理、装置管理应按照电力调度机构的有关规定执行。

3、并网发电厂应严格执行国家及有关部门颁布的继电保护及安全自动装置反事故措施。

4、并网发电厂应按国家标准、行业标准和有关规定开展继电保护专业技术监督工作，在工程的初设审查、设备选型、设计、安装、调试、运行维护阶段，均必须实施继电保护技术监督，对发现的重大问题及时报电力调度机构并进行整改。

5、为提高电力系统的安全性，并网发电厂应配合电网企业及时改造、更换到年限的继电保护及安全自动装置。设备更新改造应相互配合，确保双方设备协调一致。

6、并网发电厂应按继电保护技术监督规定定期向电力调度机构报告本单位继电保护技术监督总结的情况。

7、并网发电厂应按照《电力系统继电保护及安全自动装置评价规程》以及电力调度机构的有关要求，对所管辖的继电保护和安全自动装置的动作及投运情况进行认真分析并形成月报表，并报送电力调度机构。

8、并网发电厂应完成电力系统故障信息管理系统（含机组及系统故障录波）建设，满足所在电网的接口规约和数据传输模式，按照电力调度机构的规定、标准要求配置，并应通过通

信网络无障碍地接入电力调度机构的故障信息系统。

电力调度机构按其调度管辖范围对并网发电厂进行如下考核：

1、并网发电厂涉网继电保护和安全自动装置误动、拒动，每次按 5 万千瓦时记为考核电量；造成电网事故的，每次按全厂当时运行容量 × 0.5 小时记为考核电量。

2、并网发电厂涉网继电保护和安全自动装置未按规定投运（经调度同意退出期间除外）的，每次按2万千瓦时记考核电量；超出调度机构要求的整改期限，每天按2万千瓦时记考核电量；导致电网事故扩大或造成电网继电保护和安全自动装置越级动作，每次按全厂当时运行容量 × 1小时记为考核电量。

3、并网发电厂继电保护和安全自动装置动作后，电厂不能在 2 小时内向电力调度机构报告并提供完整的保护动作报告和故障录波数据而影响电网事故处理的，每次按 2 万千瓦时记为考核电量。

4、并网发电厂在 24 小时内，未消除涉网继电保护和安全自动装置设备异常或缺陷，每次按 2 万千瓦时记为考核电量。

5、并网发电厂不能按规定时间要求报送电厂继电保护和安全自动装置运行分析月报，每次按 2 万千瓦时记为考核电量。

6、对以下管理要求未能达标者，每项按 2 万千瓦时记为考核电量：

（1）对所属继电保护及安全自动装置进行调试并定期进行校验、维护，使其满足原定的装置技术要求，符合整定要求，

并保存完整的调试报告和记录。

（2）与电网运行有关的继电保护及安全自动装置必须与电网继电保护及安全自动装置相匹配。

（3）并网电厂内的继电保护和安全自动装置，必须与系统保护相匹配。在系统状态改变时，应按电力调度机构的要求按时修改所辖保护的定值及运行状态。

7、以下要求未能达标者，每项按2万千瓦时记为考核电量：

（1）继电保护主保护月投运率≥99.5%。继电保护主保护月投运率计算公式为：

$$RMD=(TMD/SMD)\times 100\%$$

式中：RMD为主保护月投运率；

TMD为主保护装置该月处于运行状态的时间；

SMD为主保护装置该月应运行时间。

（2）安全自动装置月投运率≥99%。安全自动装置月投运率计算公式为：

$$RSS=(TSS/SSS)\times 100\%$$

式中：RSS为安全自动装置月投运率；

TSS为安全自动装置该月处于运行状态时间；

SSS为安全自动装置该月应运行时间。

（3）故障录波月完好率≥98%。故障录波月完好率计算公式为：

$$RSR=(NSR/NRE)\times 100\%$$

式中：RSR 为故障录波月完好率；

NSR 为该月故障录波完好次数；

NRE 为该月故障录波应评价次数。

8、由于并网电厂继电保护、安全自动装置异常，造成涉网一次设备被迫停运，每次按 5 万千瓦时记为考核电量。

第三十二条 电力调度机构按其管辖范围对并网发电厂通信设备开展技术指导和管理工作。

1、并网发电厂通信设备的配置及运行应满足电力调度机构的有关规程和规定。

2、并网发电厂至电力调度机构应具备两个及以上独立的通信传输通道。设在并网发电厂的通信设备应配置独立的通信专用电源系统，当交流电源中断时，为保证通信设备可靠供电，通信专用蓄电池组的供电能力不少于 8 小时。并网发电厂的通信设备（含通信电源系统）应具备完善的通信监测系统和必需的声响告警装置，监控信号应接入到电厂综合监控系统或有人值班处。

3、电力调度机构应督促并网发电厂按期完成调度管辖范围内通信设备的缺陷处理及重大问题整改。

4、因并网发电厂原因造成通信事故时，应按电力调度机构的通信设备事故处理预案进行处理和抢修。事故处理完成后，并网发电厂应及时提交事故处理报告。

5、因并网发电厂通信责任造成电网继电保护、安全自动装

置、自动化通道和调度电话中断时，电力调度机构应按通信设备事故处理预案进行处理，并网发电厂应在电力调度机构指挥下尽快恢复正常。

6、因并网发电厂通信设备异常造成电网安全稳定性和可靠性降低时，并网发电厂应在电力调度机构的指挥下尽快恢复通信设备正常。

电力调度机构按其调度管辖范围对并网发电厂进行如下考核：

1、并网发电厂通信设备和调度电话运行指标应达到电力调度国家级企业等级标准：微波设备月运行率、载波设备月运行率、光纤设备月运行率、调度程控交换机和调度电话月运行率不低于99.95%，调度电话月可通率不低于100%，每降低1个百分点（含不到1个百分点），按2万千瓦时记为考核电量。

通信电路（微波、载波、光纤、交换机设备）运行率＝{1－Σ[中断路数（路）×电路故障时间（min）]/[实用路数（路）×全月日历时间（min）]}×100%。

调度电话月可通率＝{1－Σ[中断路数（路）×电路故障时间（min）]/[实用路数（路）×全月日历时间（min）]}×100%。

2、并网发电厂通信设备故障引起线路主保护单套运行时间超过24小时，或引起安全自动装置非计划停用时间超过120小时，每次按2万千瓦时记为考核电量。并网发电厂通信设备故障引起继电保护或安全自动装置误动、拒动，造成电网事故，

或造成电网事故处理时间延长、事故范围扩大，每次按全厂当时运行容量×0.5小时记为考核电量。

3、并网发电厂通信电路非计划停运（不可抗力除外），造成远跳及过电压保护、远方切机（切负荷）装置由双通道改为单通道，时间超过24小时，每次按2万千瓦时记为考核电量。

4、并网发电厂通信出现下列情形的（不可抗力除外），每次按2万千瓦时记为考核电量。

（1）影响电网调度和发供电设备运行操作的；

（2）造成继电保护和安全装置误动、拒动但未造成电网事故或未影响电网事故处理的；

（3）引起调度自动化或调度电话业务中断时间4小时以上的；

（4）造成电网与并网发电厂通信电路全部中断时；

（5）并网发电厂与电力调度机构直接关联的通信光缆连续故障时间超过24小时的；

（6）并网发电厂内通信电源全部中断的；

（7）并网发电厂内录音设备失灵，影响电网事故分析的。

5、并网发电厂至电力调度机构不具备两个及以上独立的通信传输通道要求的，必须在调度机构下达整改通知期限内完成整改，逾期未完成的按2万千瓦时/月记考核电量。

第三十三条 电力调度机构按其管辖范围对并网发电厂自动化设备开展技术指导和管理工作。

1、并网发电厂自动化设备的设计、选型应符合电力调度机

构有关规程规定，采用成熟可靠的产品，并报电力调度机构备案。其接口和传输规约必须满足自动化主站系统的要求。

2、并网发电厂应满足《电力二次系统安全防护总体方案》及《发电厂二次系统安全防护方案》（电监安全[2006]34号）的要求，确保并网发电厂二次系统的安全。

3、并网发电厂自动化设备的运行应遵循电力系统调度规程和自动化系统运行管理规程等规程、规定的要求。并网发电厂自动化设备应能及时、准确、可靠的反映并网发电厂的运行状态和运行工况。

4、并网发电厂的自动化设备至调度主站应具备独立的两路不同路由的通信通道或一路专线一路调度数据网通道。电厂端接入的远动信息应满足调度机构对接入信息的要求。并网发电厂自动化设备原则上应采用两路完全独立的供电电源。并网发电厂自动化设备必须是通过具有国家级检测资质的质检机构检验合格或电力监管机构认可的测试机构测试合格的产品。并网发电厂应在发电机组出口及网厂计量关口点安装关口电能表和关口电能计量装置，关口电能计量信息应接入相关电网关口电能计量系统。

5、并网发电厂自动化设备事故或故障时，应按有关运行管理规程进行处理和抢修。事故处理完成后，并网发电厂应及时提交事故处理报告。

6、并网发电厂应配合相关电网企业的技术改造计划，按要

求进行自动化设备的改造，电力调度机构应督促并网发电厂按期完成调度管辖范围内有关电厂自动化设备的整改工作。

7、并网发电厂机组监控系统或 DCS 系统应及时、可靠地执行电力调度机构自动化主站下发 AGC/AVC 指令，同时应具有可靠的技术措施，对接收的 AGC/AVC 指令进行安全校核，拒绝执行超出机组或电厂规定范围等异常指令。

电力调度机构按其调度管辖范围对并网发电厂进行如下考核：

1、并网发电厂应向电力调度机构准确、实时传送必要的远动信息。对远动量传输不完整的，限期整改。未按要求进行整改的，每数据每日按 0.5 万千瓦时记为考核电量。

2、并网发电厂处于安全区Ⅰ、Ⅱ的业务系统的安全防护应满足国家有关规定和电力调度机构的具体要求。如电力调度机构检查发现并网发电厂不满足要求或擅自改变网络结构，每次按 2 万千瓦时记为考核电量；如由于并网发电厂原因造成电力调度机构业务系统被病毒或黑客攻击、网络异常，每次按全厂当时运行容量 × 0.5 小时记为考核电量；如造成电网事故，每次按全厂当时运行容量 × 1 小时记为考核电量。

3、并网发电厂未经调度许可，擅自退出或检修电力调度机构管辖的自动化设备的，每次按 5 万千瓦时记为考核电量。

4、并网发电厂远程终端装置、计算机监控系统的考核：

（1）事故时遥信误动、拒动，每次按 2 万千瓦时记为考核

电量；

（2）遥测月合格率、遥信月合格率低于99%时，每降低1个百分点（含不到1个百分点）按2万千瓦时记为考核电量。

5、调度数据网络厂站端可用率应达到99%以上，每降低1个百分点（含不到1个百分点）按1万千瓦时记为考核电量。

第三十四条 并网发电厂涉网设备的参数管理包括励磁系统及调速系统的传递函数及各环节实际参数，发电机、变压器、升压站电气设备等设备实际参数以及涉网技术设备（AGC、AVC等）是否满足接入电网安全稳定运行要求。并网发电厂应按电力调度机构有关设备参数管理的规定执行。并网发电厂还应定期委托有资质的试验单位对涉网设备进行参数实测，并及时将试验报告及技术资料报送电力调度机构备案。

第三十五条 电力调度机构按其管辖范围对并网发电厂励磁系统和PSS装置开展技术指导和管理工作。

1、并网发电厂的励磁系统和PSS装置的各项技术性能参数应达到《大型汽轮发电机交流励磁系统技术条件》（DL/T843-2003）、《大型汽轮机自并励静止励磁系统技术条件》（DL/T650-1998）等国家和行业有关标准的要求，并满足电网安全稳定运行的要求。并网发电厂的励磁系统和PSS装置应由并网发电厂委托有资质的试验单位进行试验，并报电力调度机构审备，由电力调度机构下达涉网定值。电力调度机构有权督促并网发电厂进行试验。

2、并网发电厂单机100MW及以上火电机组和单机50MW水电机组原则上应配置PSS装置，并网发电厂其他机组应根据电网稳定运行的需要配置PSS装置。

3、新机组并网前，发电厂应向电力调度机构提供机组励磁系统型号、传递函数模型及相关设计参数，在机组满负荷试运行前，应进行励磁系统参数实测，实测结果在试验完成后一个月内报送电力调度机构。

4、单机容量200MW及以上发电机组应具备进相运行能力，在额定有功出力时，功率因数可达到超前0.95以上；50MW及以上水轮发电机和100MW及以上汽轮发电机励磁系统标称响应不低于2单位/秒；快速可控硅强行励磁上升时间不大于0.08秒；自并励励磁系统的延迟时间不大于0.03秒；自动励磁调节系统应保证机端调压精度优于1%；励磁系统年强迫停运率不大于0.5%；水电机组PSS在机组有功出力从零到满载的范围内，PSS应能可靠投入，并不出现反调现象。

电力调度机构按其调度管辖范围对并网发电厂进行如下考核：

1、按要求应配置而未配置PSS装置的机组，每月按该机组容量×1小时记为考核电量。

2、发电机组正常运行时自动励磁调节装置和PSS月投运率应达到100%。每降低1个百分点（含不足1个百分点）按该机组容量×1小时记为考核电量。

3、火电机组强励倍数不小于1.8倍，水电机组强励倍数不小于2.0倍，达不到要求的，每月按该机组容量×1小时记为考核电量。

第三十六条 电力调度机构按其管辖范围对并网发电厂调速系统开展技术指导和管理工作。

1、并网发电厂的发电机组调速系统的各项技术性能参数应达到《汽轮机电液调节系统性能验收导则》(DL/T824-2002)、《水轮机电液调节系统及装置基本技术规程》(DL/T563-1995)等国家和行业有关标准的要求，并满足电网安全稳定运行的要求。并网发电厂的调速系统应由并网发电厂委托有资质的试验单位进行试验，实测结果在试验完成后一个月内报电力调度机构备案。电力调度机构有权督促并网发电厂进行试验。

2、并网发电厂在商业化运行前应与EMS系统联调试验，满足电网对机组的调整要求。

第三十七条 电力调度机构按其管辖范围对并网发电厂高压侧或升压站电气设备开展技术指导和管理工作。

1、并网发电厂高压侧或升压站电气设备应根据《电力设备预防性试验规程》(DL/T596-1996)的要求按周期进行预防性试验，及时消除设备的缺陷和安全隐患，确保设备的遮断容量等性能达到电力行业规程要求。若不能达到要求，由电力监管机构要求限期整改。

2、并网发电厂高压侧或升压站电气设备外绝缘爬距应与所

在地区污秽等级相适应，不满足污秽等级要求的应予以调整，受条件限制不能调整的应采取其它的防污闪补救措施。

3、并网发电厂高压侧或升压站电气设备的接地装置应根据地区短路容量的变化，校核其（包括设备接地引下线）热稳定容量。对于升压站中的不接地、经消弧线圈接地、经低阻或高阻接地的系统，必须按异点两相接地校核接地装置的热稳定容量。

4、并网发电厂升压站主变中性点接地方式应按照电力调度机构的调度命令执行。

电力调度机构按其调度管辖范围对并网发电厂进行如下考核：

1、并网发电厂高压侧或升压站电气设备发生事故，每次按全厂当时运行容量×0.5小时记为考核电量。

2、并网发电厂高压侧或升压站电气设备主设备可用率不小于99%，预试完成率为100%，影响设备正常运行的重大缺陷的消缺率为100%。不能完成由电力调度机构给予通报批评。

第三十八条 电力调度机构按其管辖范围对并网水电厂水库调度开展技术指导和管理工作。

1、并网水电厂的水库调度运行管理应满足国家和行业有关规定和电力调度机构的调度规程有关规定的要求，向电力调度机构及时报告对电厂发电能力及安全运行造成重大影响的突发情况；定期报送丰水期、平水期、枯水期气象水文趋势预报、年度运行方式等。每迟报或漏报一项，按1万千瓦时记为考核

电量。电力调度机构按照调度管辖范围负责水库调度运行管理和考核工作。

2、电力调度机构及并网水电厂应做好水调自动化系统的建设及运行管理工作，制定水调自动化系统管理规定，保证系统稳定、可靠运行，并按《全国电力二次系统安全防护总体方案》的要求做好安全防护工作。电力调度机构及水电厂应加强水调自动化系统维护，并网发电厂应按规定向电力调度机构水调自动化系统自动传送水库运行相关信息，保证管理范围内通信通道的畅通，保证上传信息的准时、合格，否则每次按 2 万千瓦时记为考核电量。

3、电力调度机构应合理利用水力资源，充分发挥水库的综合效益和水电厂在电网运行中的调峰、调频和事故备用等作用，并负责开展水库群优化调度工作等。并网水电厂发生重大水库调度事件后，应及时汇报电力调度机构，并按电力调度机构事故处理预案进行处理。事故处理完成后，并网发电厂应及时提交事故处理报告。

第三章　考核实施

第三十九条　发电厂并网运行考核的基本原则：全网统一评价标准；每月按照调度管辖范围分别对发电厂进行考核；同一事件适用于不同条款的考核取考核电量最大的一款；考核电量和考核费用分省（市）单独记帐。

第四十条　发电厂应考核费用和省（市）发电厂考核总费

用的计算公式为：

$$X_i = Q_i \times P_i$$

$$X = \sum_{i=1}^{N} X_i$$

其中，

P_i：当月本发电厂平均上网结算电价；

Q_i：考核电量；

X_i：发电厂应考核费用；

X：省（市）发电厂考核总费用；

N：省（市）参加考核电厂个数；

发电厂并网运行管理考核费用全部作为辅助服务补偿资金来源之一。具体管理办法见《华中区域并网发电厂辅助服务管理实施细则》。

第四十一条 网、省（市）电力调度机构负责实施其直调电厂的日常统计和考核工作。

第四十二条 电力调度机构于每月20日在“三公”调度门户网站上披露所有机组上月并网运行管理统计和考核结果。其中与机组辅助服务有关的一次调频、AGC、调峰、备用和黑启动等，按照《华中区域并网发电厂辅助服务管理实施细则》的要求进行披露。

发电企业对统计结果有疑问，可以向相应电力调度机构提出复核。电力调度机构经核查后，在接到问询的2个工作日内

予以答复。

每月25日，电力调度机构将机组并网运行管理统计和考核结果报电力监管机构审批。

每月28日，经电力监管机构审批后，并网发电厂运行考核结果生效，并在电力监管机构门户网站上发布。

第四章　监　管

第四十三条　并网发电厂的考核电量、考核费用及其使用情况，由电力监管机构监管。

第四十四条　发电厂对机组并网运行考核统计结果有疑问，经与电力调度机构协商后仍有争议，可以向电力监管机构提出申诉，由监管机构依法协调或裁决。

第四十五条　建立并网调度协议和购售电合同备案制度，并网调度协议和购售电合同备案按照《华中区域〈购售电合同〉和〈并网调度协议〉备案管理及检查暂行办法》（华中电监市场〔2006〕125号）执行。

第四十六条　建立电力“三公”调度情况书面报告制度，“三公”调度交易情况报告按照电监会《电力“三公”调度交易和厂网电费结算情况报告内容及格式》（办市场〔2007〕179号）和《华中区域电力公开、公平、公正调度情况报告管理暂行办法》（华中电监市场〔2006〕124号）执行。

第四十七条　建立厂网联席会议制度，通报有关情况，研究解决发电厂并网运行管理中的重大问题。厂网联席会议按照

《华中区域厂网联席会议制度（试行）》（华中电监市场〔2006〕33号）执行。

第四十八条 电力监管机构组织电力企业统一建设发电厂并网运行考核技术支持系统。电力调度机构、并网发电厂按要求分别配套建设。运行考核技术支持系统建成后，由电力调度机构统一管理，电力调度机构和发电厂按照管辖范围负责相关设备的运行和维护。

第五章 附 则

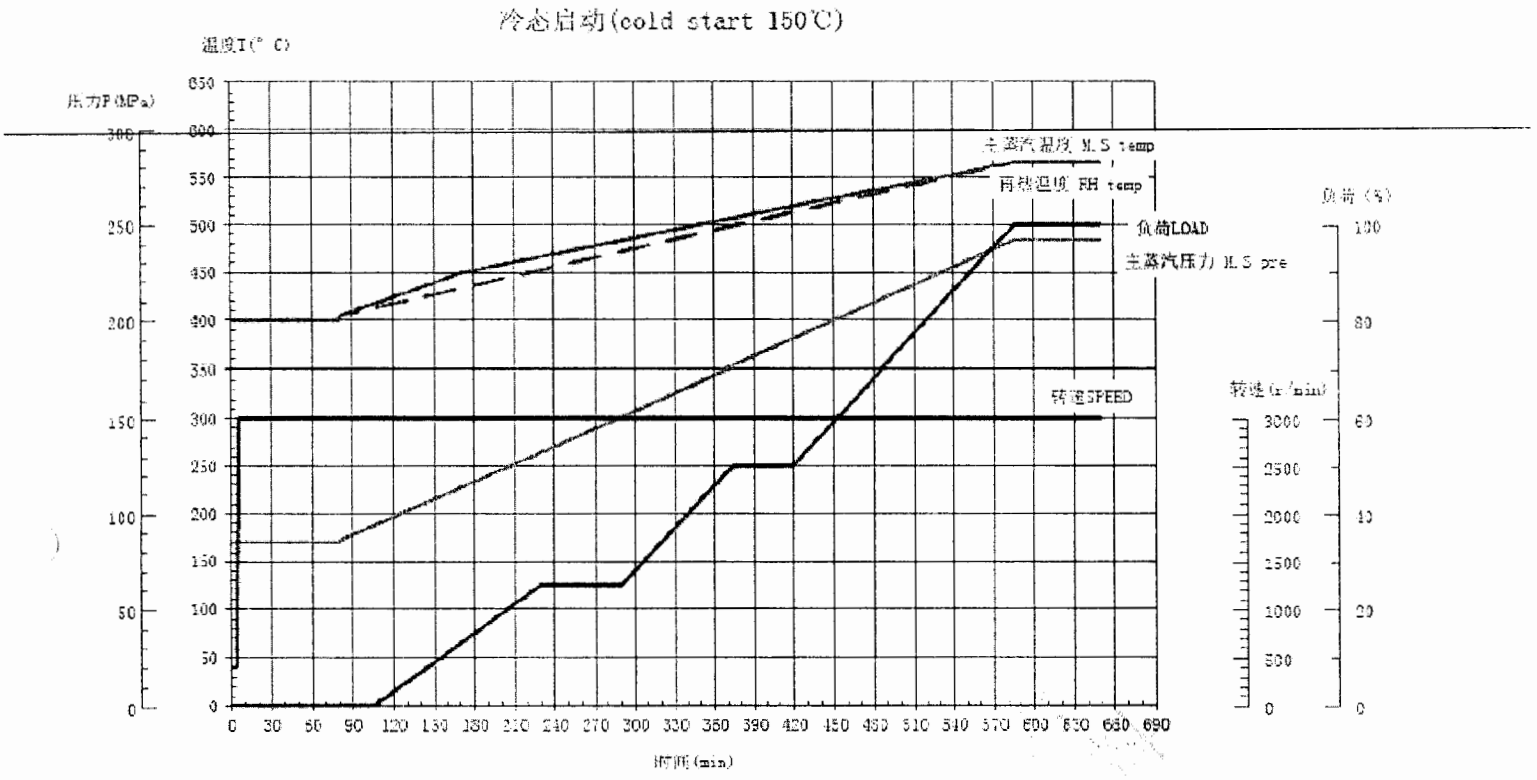
第四十九条 本细则由华中电监局负责解释。

第五十条 本细则自2011年9月1日起实施，各省（市）现有的发电厂并网运行考核有关办法和规定同时废止。

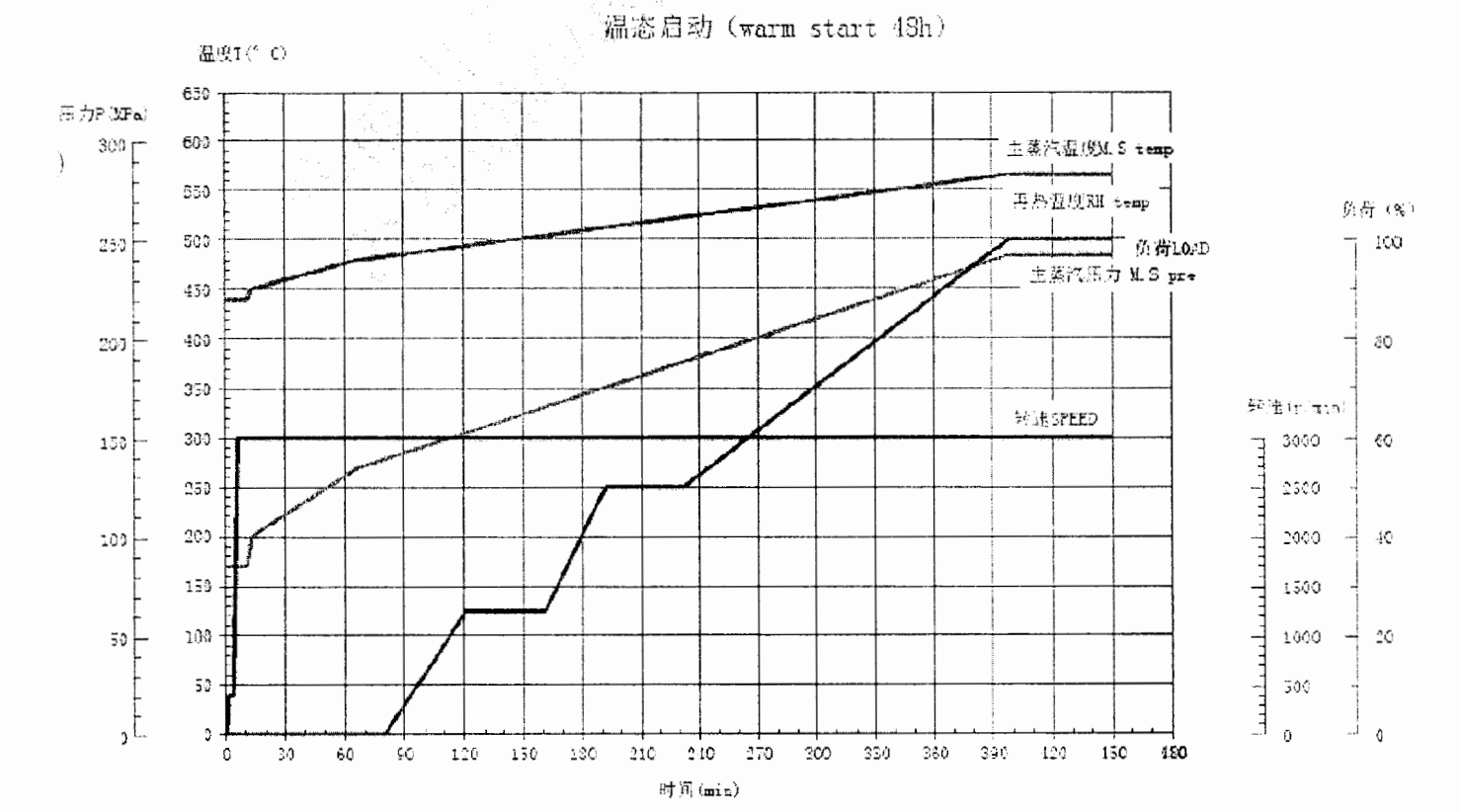
ANNEX 2

THE STEAM TURBINE RAMPING RATE CERTIFICATED BY SHANGHAI ELECTRIC

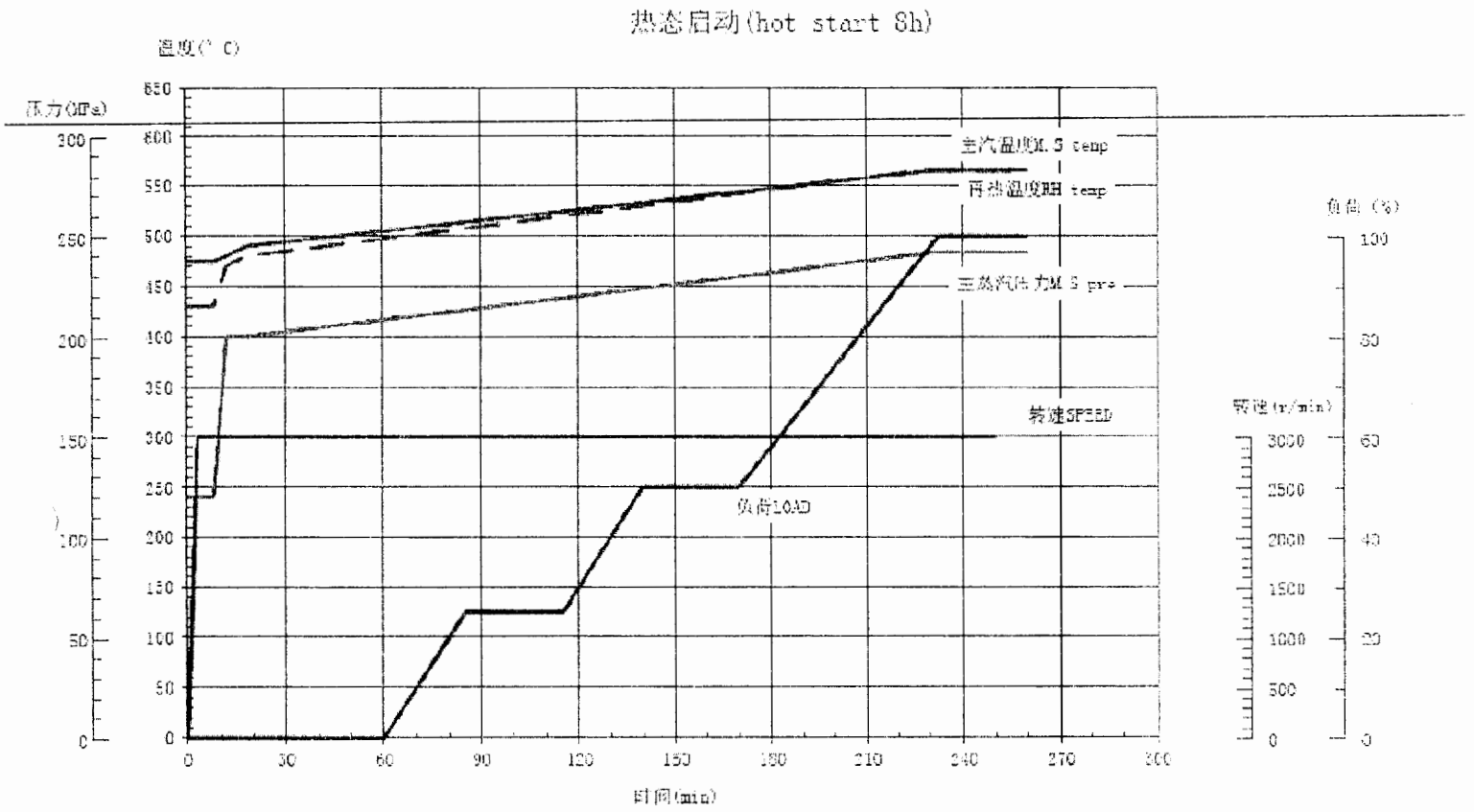
1. COLD START



2. WARM START



3. HOT START


热态启动(hot start 8h)
温度(° C)
压力(MPa)
主汽温度M.S temp
再热温度RH temp
主蒸汽压力M.S pre
转速SPEED
负荷LOAD
负荷（%）
转速(r/min)
时间(min)

Annex 3

DATA SUBMITTED BY OTHER COAL FIRED POWER PLANTS APPROVED BY NERPA

1. THALNOVA POWER THAR (PVT.) LIMITED (TNPTPLI)

	Tanks/Open Yard	87,500 Ton	87,500 Ton	Approx. 600M²
(vii).	Gross Storage	Primary Fuel	Alternative Fuel	Start-Up Fuel
		Approx. 175,000 Ton	Approx. 175,000 Ton	1200 M²

(D). Emission Values

		Primary Fuel	Alternative Fuel	Start-Up Fuel
(i).	SO_x (mg/Nm³)	<850	<850	<850
(ii)	NO_x (mg/Nm³)	<510	<510	<510
(iii)	Particulate Matter (mg/Nm³)	<100	<100	-

(E). Cooling System

(i).	Cooling Water Source/Cycle	Water from Left Bank Outfall Drainage-LBOD (Primary Source) and ground/well water pumped out of the mining area/other area (Backup Source)/Close cycle cooling system

(F). Plant Characteristics

(i).	Generation Voltage	21KV
(ii).	Frequency	50Hz
(iii)	Power Factor	0.8 to 0.85 (lagging) /0.95(leading)
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes
(v)	Ramping Rate (MW/min)	0.5-1% rated load (3.3-5.6MW/Minute depending upon nature of start up and regular operational conditions.
(vi)	Time required to Synchronize to Grid (Hrs.)	3-12 Hrs depending upon the nature of startup

According to the Generation license of TNPTPLI, the ramping rate for steam turbine is between 0.5%-1%.

2. JAMSHORO POWER COMPANY LIMITED

(A). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	880 MW			
(ii).	Type of Technology	Thermal Power Plant			
(iii).	Number of Units/ Size (MW)	Unit-1	Unit-2	Unit-3	Unit-4
		250 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine
(iv).	Unit Make & Model	Unit-1	Unit-2	Unit-3	Unit-4
		Mitsui, Japan	CMEC, China	CMEC, China	CMEC, China
(v).	Commercial Operation date (of each Unit)	Unit-1	Unit-2	Unit-3	Unit-4
		Jan. 27, 1990	Dec.03, 1989	June 27, 1990	Jan. 21, 1991
(vi).	Expected Useful Life of the Generation Facility/Plant-i from Commercial Operation Date (of each Unit)	Unit-1	Unit-2	Unit-3	Unit-4
		37 Years	38 Years	37 Years	36 Years
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation Licence	Unit-1	Unit-2	Unit-3	Unit-4
		25 Years	25 Years	25 Years	25 Years

(E). Plant Characteristics

		Unit-1	Unit-2	Unit-3	Unit-4
(i).	Generation Voltage	16.5	15.75	15.75	15.75
(ii).	Frequency	50	50	50	50
(iii).	Power Factor	0.85 Lag	0.85 Lag	0.85 Lag	0.85 Lag
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	No	No	No	No
(v).	Ramping Rate (MW/min)	2.0	1.0	1.0	1.0
(vi).	Time required to Synchronize to Grid (Hrs.)	12	6	6	6

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

According to the Generation license of Jamshoro Power Company Limited, the ramping rate for steam turbine is less than 1%.

For TNPTPLI and the aforementioned Jamshoro Power Company Limited, the average ramping rate for the steam power plants is close to 1%.

3. CHINA POWER HUB GENERATION COMPANY (PRIVATE) LIMITED (CPHGCPL) (NO. IGSPU68/2016)

(F). Plant Characteristics

(i).	Generation Voltage	22 KV (Transmission Voltage 500 kV)
(ii).	Frequency	50Hz
(iii).	Power Factor	0.8 (lagging) /0.92(leading)
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes
(v).	Ramping Rate (MW/min)	To be provided later
(vi).	Time required to Synchronize to Grid (Hrs.)	To be provided later

4. THAR COAL BLOCK-I POWER GENERATION COMPANY (PVT.) LIMITED (TCHPGCPL) (NO. IGSPL/74/2017)

(v).	Ramping Rate (MW/min)	0.5-1%rated load (3.3-6.6MW/Minute). This figure is indicative and will be confirmed after engineering design of the plant
(vi).	Time required to Synchronize to Grid (Hrs.)	5 minutes. This figure is indicative and will be confirmed after engineering design of the plant

In the cases of CPHGCPL and the aforementioned TCHPGCPL, their respective generation license indicates that the ramping rate and the time required to synchronize to grid will be provided later i.e. it is difficult to ascertain at the time of applying for the generation license the exact performance date for the ramping rate and the consequent time required to synchronize to grid.

National Electric Power Regulatory Authority
Islamic Republic of Pakistan

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

Registrar

No. NEPRA/R/DL/LAG-361/ 687-94 February 01, 2017

Mr. Mustafa Bilwani,
Chief Executive Officer,
ThalNova Power Thar (Pvt.) Limited,
Ground Floor, G&T Tower # 18,
Beaumont Road, Civil Lines-10,
Karachi.

Subject: **Generation Licence No. IGSPL/75/2017**
Licence Application No. LAG-361
ThalNova Power Thar (Pvt.) Limited (TNPTPL)

Reference: Your application vide letter No. TN/01/0012/08-2016, dated August 10, 2016, received on August 11, 2016.

Enclosed please find herewith Generation Licence No. IGSPL/75/2017 granted by National Electric Power Regulatory Authority (NEPRA) to ThalNova Power Thar (Pvt.) Limited (TNPTPL), for its 330.00 MW Indigenous/Thar Coal based Thermal Generation facility located near Islamkot, Thar Coal Block-II, District Tharparker, in the province of Sindh, pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997). Further, the determination of the Authority in the subject matter is also attached.

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: Generation Licence (IGSPL/75/2017)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

01.02.17
(Syed Safeer Hussain)

Copy to:

1. Secretary, Ministry of Water and Power, A-Block, Pak Secretariat, Islamabad.
2. The Secretary, Energy Department, Government of Sindh, 3rd Floor, State Life Building No. 03, Opp: CM Secretariat, Karachi
3. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore.
4. Managing Director, Private Power and Infrastructure Board (PPIB), Ground & Second Floors, Plot No. 10, Mauve Area, Sector G-8/1, Islamabad.
5. Chief Executive Officer, Central Power Purchasing Agency Guarantee Limited (CPPAG), 6th Floor, Shaheed-e-Millat Secretariat, Jinnah Avenue, Blue Area, Islamabad.
6. Director General, Environment and Alternative Energy Department, Government of Sindh, Plot No ST/2/1, Sector 23, Korangi Industrial Area, Karachi.
7. Chief Secretary, Government of Sindh, Sindh Secretariat, Karachi.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Generation Licence Application of Thalnova Power Thar (Private) Limited

January 24, 2017
Case No. LAG-361

(A). Background

(i). The electric power sector of the country is experiencing a supply-demand gap. In order to bridge the said deficit, all efforts are being made to set up generation facilities using cheaper resources. The efforts include projects by the federal as well as provincial governments.

(ii). The Government of Pakistan (GoP) has set up Private Power and Infrastructure Board (PPIB) as a one window facilitator for the entrepreneurs interested in setting up new generation facilities. In order to meet the electricity/energy needs of the country and to improve the energy mix, the GoP has decided to install generation facilities/thermal power plants mainly operating on indigenous coal. In order to implement the said initiative, PPIB has issued Letter of Intent (LoI) to various local and foreign investors/groups.

(iii). Thal Limited, Novatex Limited and Descon Engineering Limited (collectively the Sponsors) submitted a proposal to Private Power & Infrastructure Board (PPIB) for setting up a 330.00 MW Thar coal based power project at Thar Block-II, District Tharparker, in the Province of Sindh. PPIB found the proposal financially and technically viable and issued a notice to proceed on May 13, 2016 to the sponsors. In order to implement the project, the sponsors incorporated a special purpose vehicle in the name of Thalnova Power Thar (Private) Limited (TNPTPL). PPIB also issued LoI to TNPTPL on August 02, 2016 for setting up a 330.00 MW project.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(B). Filing of Generation Licence Application

(i). In accordance with Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the NEPRA Act), TNPTPL submitted an application on August 11, 2016 requesting for the grant of generation licence.

(ii). The Registrar examined the submitted application to confirm its compliance with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 (the Licensing Regulations). The Registrar found the application in compliance with the Licensing Regulations and submitted the matter before the Authority for admission of the application for grant of generation licence or otherwise.

(iii). The Authority found the form and content of the application in substantial compliance with Regulation-3 of the Licensing Regulations. Accordingly, the Authority admitted the application for consideration of the grant of the generation licence as stipulated in Regulation-7 of the Licensing Regulations. The Authority approved the advertisement containing (a). the prospectus; (b). a notice to the general public regarding admission of the application of TNPTPL, for the purpose of inviting the general public to submit their comments in the matter as stipulated in Regulation-8 of the Licensing Regulations. The Authority also approved the list of the persons to submit their comments or otherwise to assist the Authority in the matter.

(iv). Accordingly, the advertisement was published in one Urdu and one English national newspaper on September 23, 2016. Apart from the above, separate letters were also sent to government ministries, their attached departments, representative organizations and individual experts on September 26, 2016. The said stakeholders were requested to submit their views/comments for the assistance of the Authority.

(v). Meanwhile, TNPTPL informed that in the notice of admission the total cost of the project was mentioned as US$ 408.245 million whereas in terms of

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

NEPRA determined tariff the cost of the project is US$ 498.30 millions. In view of the said, TNPTPL requested that the project cost may be corrected and considered as US$ 498.30 million. The Authority acceded to the request of TNPTPL. Accordingly, an addendum to the notice of admission was published in the press on October 10, 2016 seeking afresh comments of stakeholders.

(C). Comments of Stakeholders

(i). In reply to the above, comments were received from three (03) stakeholders including Energy Department Govt. of Sindh, PPIB and Ministry of Petroleum & Natural Resources. The salient points of the comments offered by the above stakeholder are summarized in the following paragraphs: -

(a). Energy Department, Govt. of Sindh submitted that TNPTPL intends to install sub-critical circulating fluidized bed boiler with emission control through Electrostatic Precipitator (ESP) 99.9%. Energy Department, Govt. of Sindh supported the grant of generation licence to TNPTPL stating that the project is solely based on indigenous coal that will help in saving of foreign exchange, will ensure energy security of the country and will generate direct and indirect job opportunities in the region;

(b). Ministry of Petroleum & Natural Resources commented that TNPTPL intends to install coal fired thermal power plant and as such, no gas is required for utilization. Therefore, Ministry of Petroleum and Natural Resources has no objection for the grant of generation licence;

(c). PPIB in its comments supported the initiative of TNPTPL for investment in the power sector of Pakistan and construction of 330.00MW coal power plant.

(ii). The above comments of the stakeholders were examined and generally found in support of the grant of generation licence to the TNPTPL. In view of the above, it was considered appropriate to process the application of the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

TNPTPL for the consideration of the grant of generation licence as stipulated in the Licensing Regulations and NEPRA Licensing (Generation) Rules, 2000 (the Generation Rules).

(D). Analysis of the Authority

(i). The Authority has examined the generation licence application of TNPTPL along with information provided with the generation licence application including feasibility study of the project, environment impact assessment study, interconnection and dispersal arrangement studies, relevant rules & regulations and the provisions of the Policy for Power Generation Projects 2015.

(ii). The applicant company (i.e. TNPTPL) is a private limited company (having Universal Incorporation No. 0099023, dated April 18, 2016) under Section 32 of the Companies Ordinance, 1984. The registered/business office of the company is Ground Floor, G&T Tower, #18 Beaumont Road, Civil Lines-10, Karachi. The memorandum of association of the company, inter alia, includes generation of electric power and its supply thereof. According to the submitted memorandum of association of the company, the total number of shares is one thousand and six (1006) of Rs. 10 each. Out of which 500 shares are owned Thal Power (Pvt.) Limited, 500 shares are with Nova Thar Powergen (Pvt.) Limited whereas, the balance six (06) shares are owned by six (06) individuals.

(iii). The project is located at Thar Coal Block-II, District Thar in the Province of Sindh. The proposed 330MW generation facility/thermal power plant will be consisting of a 1 x 330MW subcritical unit having Circulating Fluidized Bed (CFB) Boiler technology and sub-critical steam parameters (i.e. main steam 175 bar and 541 °C, single reheat steam 36 bar and 541°C). The CFB technology is particularly adept at burning low-grade, high-ash coals and co-firing with other low-grade waste materials.

(iv). For operation of the plant, lignite coal will be supplied from the adjacent mine through trucks, which is most feasible and economical option. The trucks will unload the lignite coal at the unloading station which has a capacity of

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

1000t/h and is sufficient for 330 MW unit. There is also an option of conveyer belt from mine to plant but that can be used later in the regular stage and trucks will be used as a backup option.

(v). The selected main parameters of the steam turbine and boiler of the project (i.e. main steam 175 bar and 541°C) are at the higher end of the subcritical class and produce higher efficiency. The high efficiency of the selected system and the low cost of coal fuel will generate the low cost power and make an economically feasible solution to relieve power shortages in Pakistan. The efficiency of the proposed generation facility/thermal power plant will be more than 37%.

(vi). The Authority has observed that the operation of the proposed coal power plant will generate major waste in the form of ash, waste water and gaseous emission. In this regard, TNPTPL has ensured to adopt adequate measures to cover all these issues. The ash will be stored temporarily on site until it is transported to mine area for final disposal where it will be used as a backfill in the spent mine pit. The dumped ash will be compacted, mixed with sand and given leaching protection. The waste water from the plant will be treated and stored for recycling in the process stream, suppressing coal and ash dust and for landscaping. A sewage treatment plant will treat sewage from the housing complex and construction camp. Waste water from the sewage plant will be discharged or recycled in appropriate processing stream. Non-recycled waste water from the project will be disposed through a 50 cusec drainage and waste water effluent channel being prepared by the Govt. of Sindh. Main gaseous emissions from the plant include sulfur dioxide (SO_2) and nitrogen oxide (NO_x) along with particulate matters emission. For treatment of flue gas, the steam generator is equipped with dry Electrostatic Precipitator (ESP) with efficiency greater than 99.9% and desulfurization efficiency of greater than 90% which is achieved by injection of limestone in the CFB boiler. For NO_x control, low NO_x burner will be used. Further, proper arrangement will be made for disposal of ashes/combustion and FGD residues. Depending upon the emissions limits imposed on the plant, direct injection of limestone into the bed is often sufficient to meet SO_2 removal

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

requirements, without the additional desulfurization equipment found on pulverized coal power plants. The emission control system will make the technology environmentally friendly. In this regard, TNPTPL has carried out Environmental and Social Impact Assessment (ESIA) study to ensure compliance with the relevant environment standards and Environmental Protection Agency, Govt. of Sindh (EPA, Sindh) has issued NOC in the matter.

(vii). Regarding system studies of the project, the Authority has observed that TNPTPL has submitted interconnection study of the project, which has been carried out by Planning Department of Power Planners International. According to the said study, the electric power generated by the proposed generation facility of TNPTPL will be evacuated by looping in-out 500 kV circuit between Engro Coal Fired Power Plant and Matiari Converter Station. In this regard, NTDC through its letter dated December 12, 2016 has accorded its approval for the interconnection studies. Further, CPPA-G through its letter dated April 13, 2016 has provided its consent for procuring power from the generation facility of TNPTPL.

(viii). Regarding land of the project, the Authority has observed that Sindh Engro Coal Mining Company has confirmed that it has initially allocated 110 Acres of land to TNPTPL, near Islamkot, Thar Block-II, District Tharparker, in the Province of Sindh. The land has been allocated for establishment of indigenous coal based thermal power plant and coal yard etc.

(ix). The Authority has observed that the least cost option criteria as envisaged in Rule-3(5) of the Generation Rules, includes several factors i.e. (a). sustainable development or optimum utilization of the renewable or non-renewable energy resources proposed for generation of electric power; (b). the availability of indigenous fuel and other resources; (c). the comparative costs of the construction, operation and maintenance of the proposed generation facility against the preferences indicated by the Authority; (d). the costs and rights-of-way considerations related to the provision of transmission and interconnection facilities; (e). the constraints on the transmission system likely to result from the proposed generation facility and the costs of the transmission system expansion

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

required to remove such constraints; (f). the short-term and the long-term forecasts for additional capacity requirements; (g). the tariffs resulting or likely to result from the construction or operation of the proposed generation facility; and (h). the optimum utilization of various sites in the context of both the short-term and the long-term requirements of the electric power industry as a whole. The Authority considers that the proposed plant of TNPTPL will be helpful for sustainable development as it will be utilizing indigenous coal (cheaper fuel) of Thar block-II, which will result in less per unit cost of electricity to CPPA-G. The plant will be connected to the proposed 500kV system of NTDC which is at a distance of 5-km from it, for which right of way and space at terminal substation would be available. In this regard, NTDC has accorded its approval for the interconnection arrangement, CPPA-G has provided its consent for procuring power from TNPTPL and EPA, Sindh has issued NOC for the project. Further, TNPTPL has unconditionally accepted the upfront coal tariff. In view of the said, the Authority is of the considered opinion that project of TNPTPL fulfills the least cost option criteria as envisaged in the Rule-3(5) of the Generation Rules.

(x). In view of the above, the Authority is of the considered opinion that TNPTPL qualifies for the grant of generation licence in terms of NEPRA Act, the Generation Rules and the Licensing Regulations.

(E). Grant of Generation Licence

(i). Sustainable and affordable electric power is a key and lifeline for the socio-economic development of any country. In fact, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. The electricity consumption per capita has a strong correlation to the Social Development Indices (Human Development Index-HDI, life expectancy at birth, infant mortality rate, and maternal mortality) and Economic Indices (such as GDP per capita etc.).

(ii). Increasing electricity consumption per capita can directly stimulate faster economic growth and indirectly achieve enhanced social development. In

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

short, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. In view of the said, the Authority is of the considered opinion that for sustainable development, all types of electric power generation resources including coal, hydel, wind, solar and other renewable energy resources must be tapped and developed on priority basis both in public and private sectors.

(iii). The current energy mix of the country is skewed towards the costlier thermal generation facilities/power plants operating on furnace oil. The import of relatively expensive furnace oil results in depletion of the precious foreign exchange reserves of the country affecting the macro and micro stability of the country. In view of the said, an increase in the consumer end tariff is experienced which not only results in higher inflation but it also affects the competitiveness of the local industry with its foreign peers. In order to address the said issues, the Authority considers it imperative that efforts must be made to change the energy mix towards cheaper fuels. With the depleting natural gas reserves in the country and relatively longer lead time for the construction of hydro electric power projects, the coal power plants are considered to be the best option in the short and medium term planning. Therefore, to reduce the demand-supply gap and to achieve sustainable development, it is vital that coal projects are given priority for power generation and their development is encouraged. In view of the said, the Council of Common Interests (CCI) approved the Power Policy 2015 which envisages rationalizing the energy mix and reducing the demand-supply gap through imported and indigenous coal based power generation. In consideration of the said, the Authority is of the view that the proposed project of TNPTPL is consistent with the provisions of Power Policy 2015.

(iv). The term of a generation licence under the Rule-5 of the Generation Rules is to be commensurate with the maximum expected useful life of the units comprised in a generating facility. Further, as per the International benchmarks available, the useful life of a steam turbine is normally taken as thirty (30) years from its Commercial Operation Date (COD). TNPTPL has confirmed that based on the up-front tariff determined by the Authority for Thar coal projects, it will be negotiating a Power Purchase Agreement (PPA) with CPPA-G for a period of

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Thirty (30) years. In view of the said, the Authority hereby fixes the term of the proposed generation licence of TNPTPL as thirty (30) years from COD of the project.

(v). Regarding tariff that the company will charge from the Power Purchaser/CPPA-G, it is clarified that under Section-7(3)(a) of the NEPRA Act, determination of tariff, rate and charges etc. is the sole prerogative of the Authority. In this regard, the Authority through its determination No. NEPRA/TRF-367/TPTPL-2016/14217-14219 dated October 18, 2016 has granted an up-front tariff to TNPTPL for its project. The Authority directs TNPTPL to follow the terms and conditions of the granted up-front tariff in letter and spirit and charge the power purchaser only such tariff which has been determined, approved or specified by the Authority.

(vi). Regarding compliance with the environmental standards, the Authority directs TNPTPL to ensure that the project will comply with the environmental standards during the term of the generation licence. In view of the said, the Authority has included a separate article (i.e. Artcle-10) in the generation licence along with other terms and conditions that the licensee will comply with relevant environmental standards. Further, the Authority directs TNPTPL to submit a report on a bi-annual basis, confirming that operation of its generation facility/thermal power plant is compliant with required environmental standards as prescribed by the concerned environmental protection agency.

(vii). Regarding land of the project, it is clarified that Sindh Engro Coal Mining Company has allocated 110 Acres of land to TNPTPL, near Islamkot, Thar Block-II, District Tharparker, in the Province of Sindh as mentioned in the Schedule-I of the generation licence. In this regard, the Authority directs TNPTPL that the aforementioned land shown in schedule-I shall be exclusively used for the proposed coal power plant and TNPTPL cannot carry out any other activity on this land except with prior approval of the Authority.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

In view of the above, the Authority hereby approves the grant of generation licence to TNPTPL on the terms and conditions set out in the generation licence annexed to this determination. The grant of generation licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed there under and the other applicable documents.

Authority:

Maj. (R) Haroon Rashid
(Member)

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member/Vice Chairman)

Tariq Saddozai
(Chairman)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

31.02.17

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. IGSPL/75/2017

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants Generation Licence to:

THALNOVA POWER THAR (PRIVATE) LIMITED

Incorporated Under Section-32
of the Companies Ordinance, 1984 (XL VII of 1984) Having Corporate Universal Identification No.0099023, Dated April 18, 2016

for its Indigenous/Thar Coal Based Thermal Generation Facility Located near Islamkot, Thar Coal Block-II, District Tharparker, in the Province of Sindh

(Installed Capacity: 330.00 MW Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand on 01st day of ~~January~~ February Two Thousand & Seventeen and expires on 30th day of December Two Thousand & Forty Nine.

01.02.17

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-1
Definitions

1.1 In this Licence

(a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";

(b). "Applicable Documents" mean the Act, the NEPRA rules and regulations, any documents or instruments issued or determinations made by the Authority under any of the foregoing or pursuant to the exercise of its powers under the Act, the grid code, the applicable distribution code, if any, or the documents or instruments made by the licensee pursuant to its generation licence, in each case of a binding nature applicable to the licensee or, where applicable, to its affiliates and to which the licensee or any of its affiliates may be subject;

(c). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";

(d). "Bus Bar" means a system of conductors in the generation facility of the Licensee on which the electric power of all the generators is collected for supplying to the Power Purchaser;

(e). "Commercial Operations Date (COD)" means the Day immediately following the date on which the generation facility of the Licensee is Commissioned;

(f). "CPPA-G" means "the Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(g). "Grid Code" means the grid code prepared by NTDC and approved by the Authority, as it may be revised from time to time by NTDC with any necessary approval by the Authority;

(h). "IEC" means International Electrotechnical Commission or any other entity created for the like purpose and its successors or permitted assigns;

(i). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;

(j). "Interconnection Point" the physical point or points where the generation facility and the Grid System are to be connected;

(k). "Law" means the Act, relevant rules and regulations made there under and all the Applicable Documents;

(l). "Licensee" means "**Thalnova Power Thar (Private) Limited**" and its successors or permitted assigns;

(m). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;

(n). "Power Purchase Agreement" means the power purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric energy generated by the generation facility, as may be amended by the parties thereto from time to time;

(o). "Power Purchaser" means the CPPA-G purchasing power on behalf of XW-DISCOs from the Licensee, pursuant to Power Purchase Agreement;

(p). "Regulations" mean "the National Electric Power Regulatory

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time";

(q). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";

(r). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or rules and regulations issued under the Act.

Article-2
Applicability of Law

This Licence is issued subject to the provisions of the Applicable Law, as amended from time to time.

Article-3
Generation Facilities

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the generation facility of the Licensee are set out in Schedule-I of this Licence.

3.2 The net capacity of the generation facility of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility before its COD.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-4
Term of Licence

4.1 The Licence is granted for a term of thirty (30) years from the COD of the generation facility.

4.2 Unless suspended or revoked earlier the Licensee may apply for renewal of this licence ninety (90) days prior to the expiry of the above term as stipulated in the Regulations.

Article-5
Licence fee

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

Article-6
Tariff

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority.

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.

7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-8
Maintenance of Records

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

Article-9
Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended from time to time.

Article-10
Compliance with Environmental Standards

10.1 The Licensee at all times shall comply with the environmental standards as may be prescribed by the relevant competent authority as amended from time to time.

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility is in line with environmental standards as prescribed by the relevant competent authority.

Article-11
Power off take Point and Voltage

The Licensee shall deliver power to the Power Purchaser at the outgoing Bus Bar of its grid station. The up-gradation (step up) of generation voltage up to the required voltage level for Interconnection Point will be the responsibility of the Licensee.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-12
Provision of Information

12.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

12.2 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

Article-13
Design & Manufacturing Standards

All the components of the generation facility/power plant shall be designed, manufactured and tested according to the latest IEC, IEEE or any other equivalent standards. All plant and equipment shall be unused and brand new.

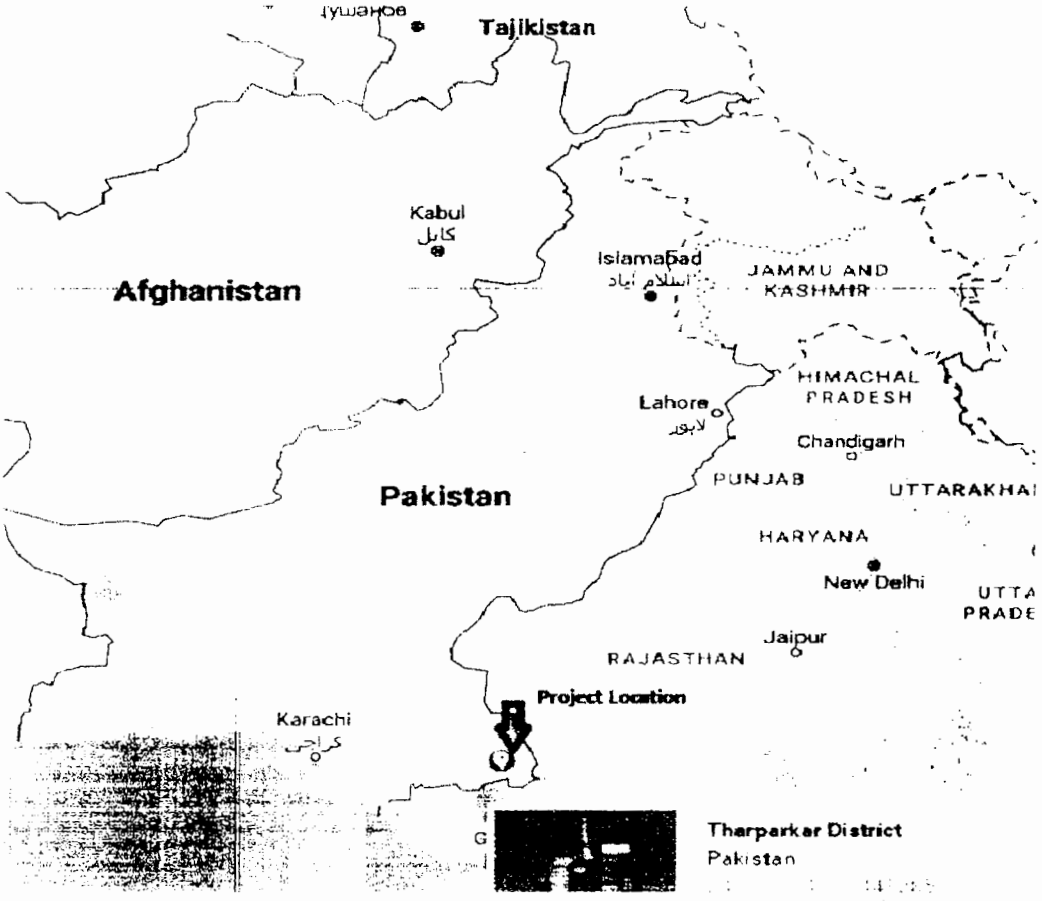
NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

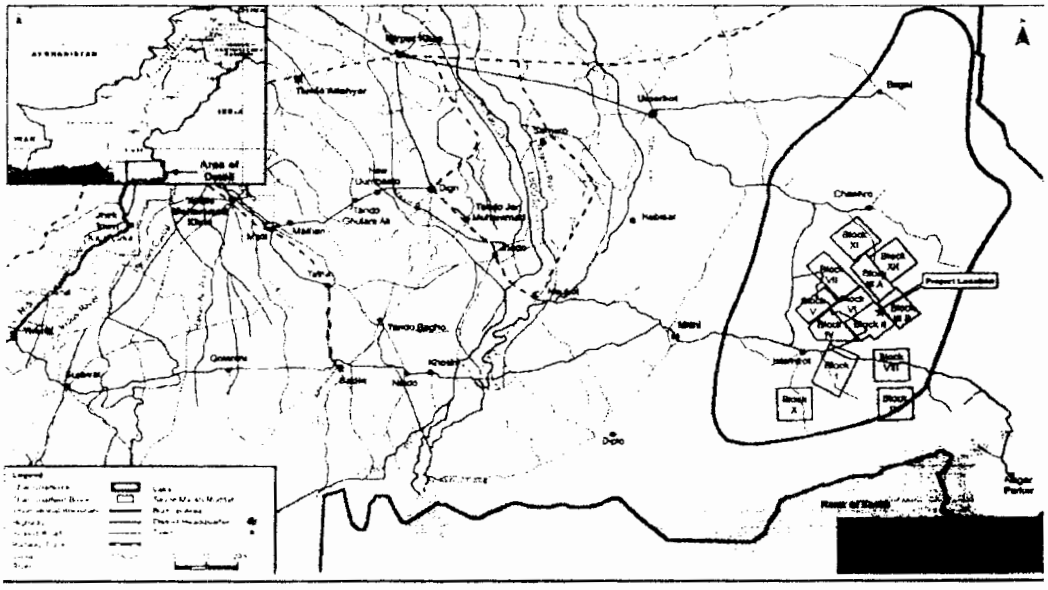
SCHEDULE-I

The Location, Size (i.e. Capacity in MW), 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

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

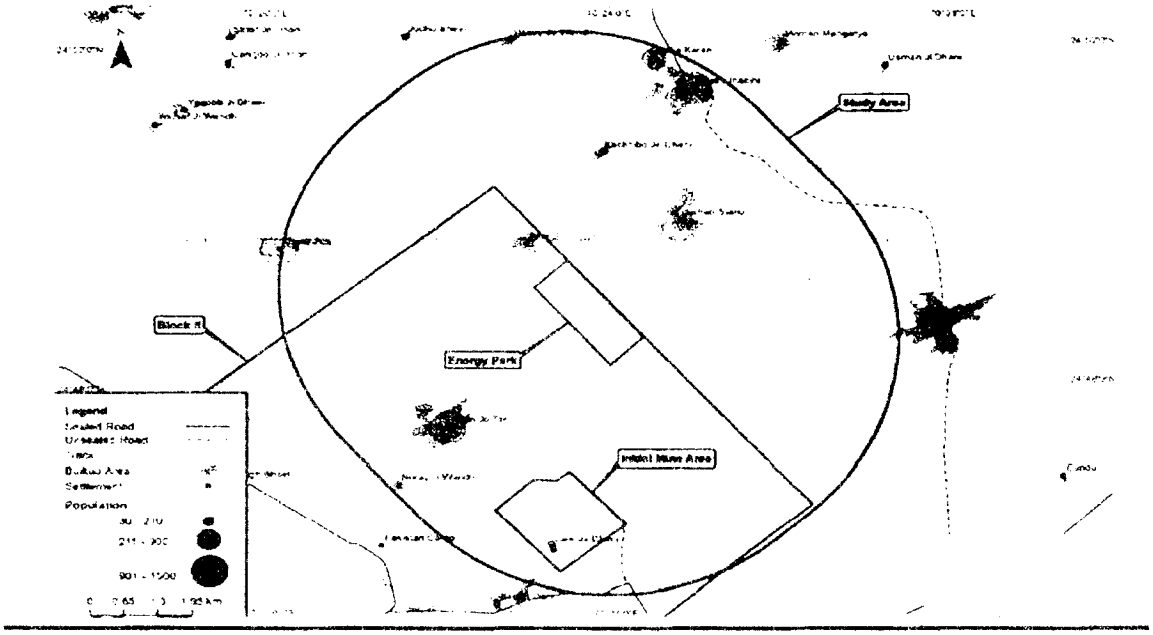
Location
of the Generation Facility/Thermal Power Plant





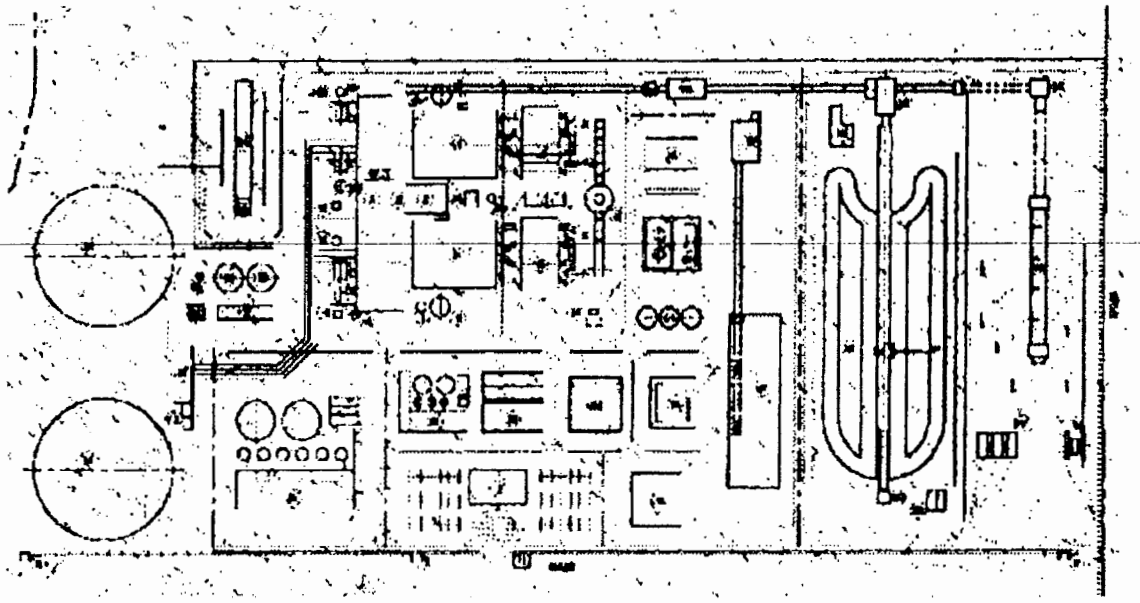
NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Location
of the Generation Facility/Thermal Power Plant



NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Layout and
Land Coordinates of the Generation Facility/Thermal Power Plant



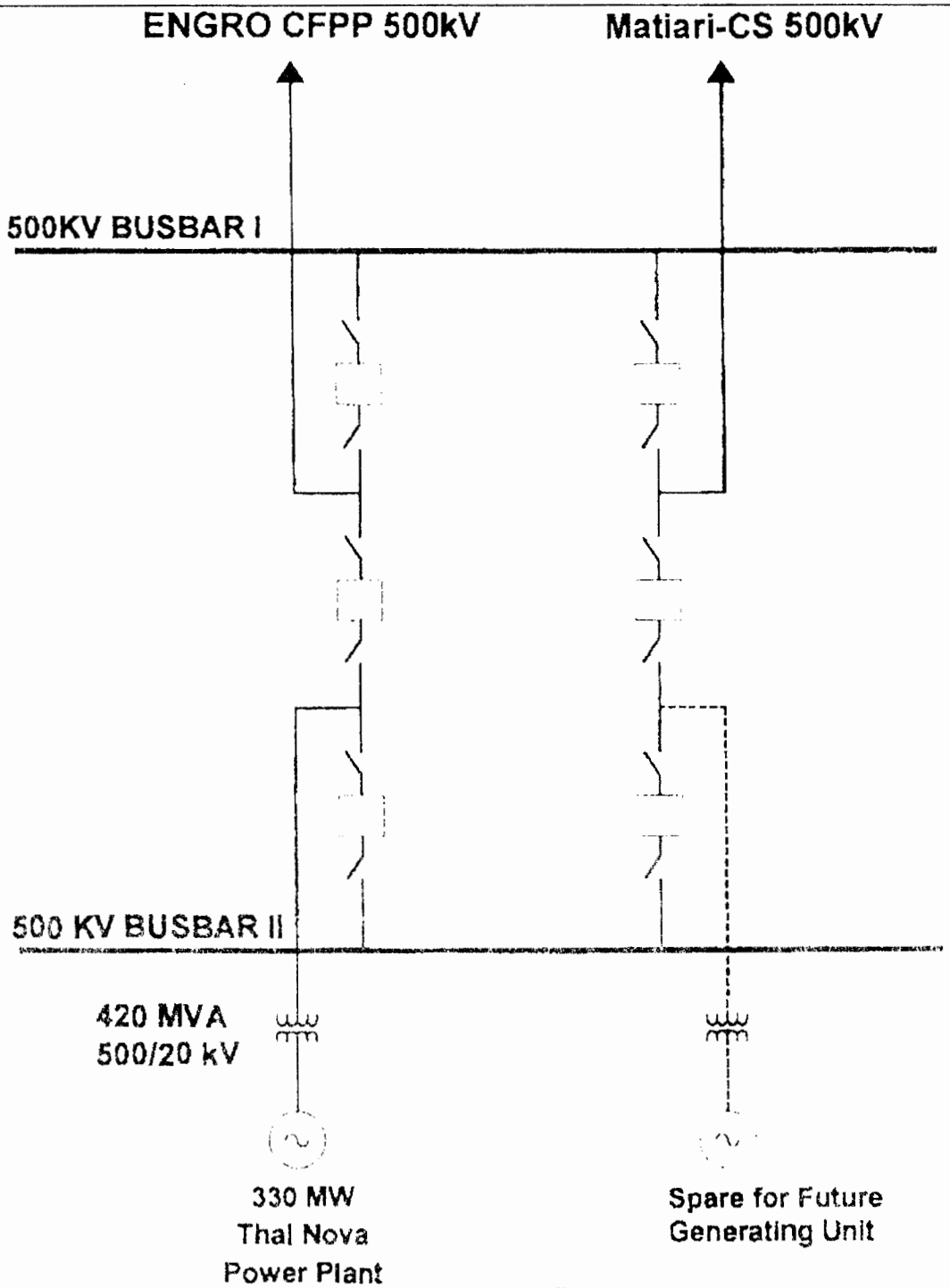
Project Land: 110 Acres

Land Coordinates (NE)

Boundary	Latitude (N)	Longitude
Boundary-A	24°48'42.57"	70°23
Boundary-B	24°49'3.16"	70°23
Boundary-C	24°49'14.51"	70°23
Boundary-D	24°48'54.05"	70°23'10

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Single Line Diagram
of the Generation Facility/Thermal Power Plant



NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Interconnection Facilities/ Transmission Arrangements for Dispersal of Power from the Generation Facility/ Thermal Power Plant

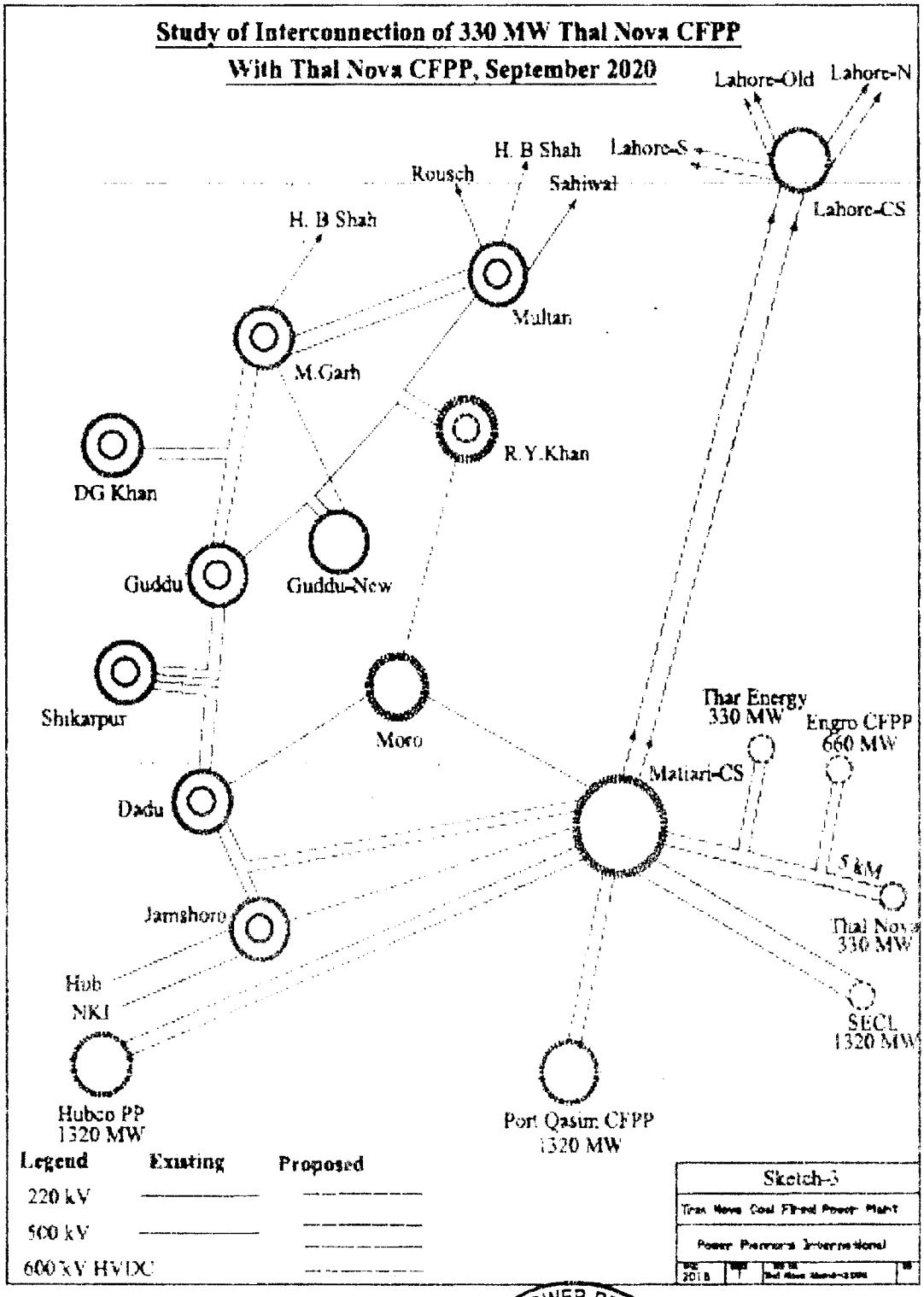
The electric power from the Coal based generation facility of Thalnova Power Thar (Private) Limited (TNPTPL) will be dispersed to the National Grid.

(2). The interconnection facilities /transmission arrangement for supplying to National Grid from the above mentioned generation facility shall be at 500 kV level. The Interconnection/Dispersal Arrangement will be consisting of looping in-out arrangement of 500 kV circuit between Engro Coal Fired Power Plant and Matiari Converter Station.

(3). Any change in the above mentioned interconnection facilities /transmission arrangement for dispersal of electric power as agreed by the Licensee and the Power Purchaser shall be communicated to the Authority in due course of time.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Schematic Diagram of Interconnection Arrangement for Dispersal of Power from the Generation Facility/ Thermal Power Plant



Details
Of the Generation Facility/
Thermal Power Plant

(A). General Information

(i).	Name of Company/Licensee	Thalnova Power Thar (Private) Limited
(ii).	Registered /Business Office	Ground Floor, G&T Tower, #18 Beaumont Road, Civil Lines-10, Karachi.
(iii).	Location of the Generation Facility	near Islamkot, Thar Coal Block-II, District Tharparker, in the Province of Sindh
(iv).	Type of Generation Facility	Mine Mouth Lignite fired power generation

(B). Plant Configuration

(i).	Installed Capacity/ Plant Size of the Generation Facility	330.00 MW	
(ii).	Type of Technology	Sub-critical parameters with Circulating Fluidized Bed Boiler (CFB) Technology	
(iii).	Number of Units/Size (MW)	1 x 330.00 MW	
(iv).	Unit Make/Model/Type & Year of Manufacture etc.	Boiler	CFB Boiler with Sub-critical Steam Parameters of GE-Alstom or Equivalent
		Steam turbine	GE-Alstom or Equivalent
		Generator	GE-Alstom or Equivalent
(v).	COD of the Generation Facility (Expected)	December 31, 2019	
(vi).	Expected Useful Life of the Generation Facility from COD	30 years	

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(C). Fuel/Raw Material Details

(i).	Primary Fuel	Thar Block-II Lignite		
(ii).	Alternative Fuel	Imported Coal (Indonesian/Equivalent)		
(iii).	Start-Up Fuel	High Speed Diesel		
(iv).	Fuel Source f	Primary Fuel	Alternative Fuel	Start-Up
		Lignite Coal from Thar Block-II	To be imported from Indonesia or equivalent	Indigenous/ Imported
(v).	Fuel Supplier	Primary Fuel	Alternative Fuel	Start-Up
		The main fuel source is indigenous, produced from Thar Block-II lignite mine, owned &operated by Sindh Engro Coal Mining Company (SECMC)	To be imported from Indonesia or equivalent	PSO/ Equivalent
(vi).	Supply Arrangement	Primary Fuel	Alternative Fuel	Start-Up Fuel
		Via Trucks/ Conveyer Belt from Thar Block-II Mine to Generation Facility	Via trucks from Karachi Port	Via Trucks to Generation Facility
(vii).	No. of Storage Bunkers/Tanks/ Open Yard	Primary Fuel	Alternative Fuel	Start-Up Fuel
		Open stockyards	Open stockyard	Two Oil tanks
	Storage Capacity of each Bunkers/	Primary Fuel	Alternative Fuel	Start-Up Fuel

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

	Tanks/Open Yard	87,500 Ton	87,500 Ton	Approx. 600M^3
(viii).	Gross Storage	Primary Fuel	Alternative Fuel	Start-Up Fuel
		Approx. 175,000 Ton	Approx. 175,000 Ton	1200 M^3

(D). Emission Values

		Primary Fuel	Alternative Fuel	Start-Up Fuel
(i).	SO_x (mg/Nm^3)	<850	<850	<850
(ii).	NO_x (mg/Nm^3)	<510	<510	<510
(iii).	Particulate Matter (mg/Nm^3)	<100	<100	-

(E). Cooling System

(i).	Cooling Water Source/Cycle	Water from Left Bank Outfall Drainage-LBOD (Primary Source) and ground/well water pumped out of the mining area/other area (Backup Source)/Close cycle cooling system

(F). Plant Characteristics

(i).	Generation Voltage	21KV
(ii).	Frequency	50Hz
(iii).	Power Factor	0.8 to 0.85 (lagging) /0.95(leading)
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes
(v).	Ramping Rate (MW/min)	0.5-1% rated load (3.3-6.6MW/Minute depending upon nature of start up and regular operational conditions.
(vi).	Time required to Synchronize to Grid (Hrs.)	3-12 Hrs depending upon the nature of startup

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

SCHEDULE-II

The Installed/ISO Capacity (MW), De-Rated Capacity at Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity At Mean Site Conditions (MW) of the Generation Facilities of Licensee are given in this Schedule

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

SCHEDULE-II

(1).	Total Gross Installed Capacity of the Generation Facility	330.00 MW
(2).	De-rated Capacity of Generation Facility at Reference Site Conditions	330.00 MW
(3).	Auxiliary Consumption of the Generation Facility	29.70 MW
(4).	Total Installed Net Capacity of Generation Facility at Reference Site Conditions	300.3 MW

Note

All the above figures are indicative as provided by the Licensee. The net capacity available to power purchaser for dispatch will be determined through procedure(s) contained in the power purchase agreement or any other applicable document(s).

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Ataturk Avenue (East) G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600021
Web: www.nepra.org.pk, E-mail: info@nepra.org.pk

No. NEPRA/R/LAG-02/ 9463-9469

August 11, 2014

Chief Executive Officer
Jamshoro Power Company Limited
Mohra Jabal Dadu Road,
Jamshoro - Sindh

Subject: **Modification-II in Generation Licence No. GL/01/2002 — Jamshoro Power Company Limited**

Reference: Your office letter No. CEO/JPCL/TD/1190 dated January 22, 2014.

It is intimated that the Authority has approved "Licensee Proposed Modification" in Generation Licence No. GL/01/2002 (issued on July 01, 2002) in respect of Jamshoro Power Company Limited (JPCL) pursuant to Regulation 10(11) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999.

2. Enclosed please find herewith determination of Authority in the matter of Licensee Proposed Modification in the Generation Licence of JPCL along with Modification-II in the Generation Licence No. GL/01/2002, as approved by the Authority.

Encl:/As above

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REGISTRAR
NEPRA

(Syed Safeer Hussain)

Copy to:

1. Secretary, Ministry of Water and Power, Government of Pakistan, Islamabad
2. Secretary, Ministry of Finance, Government of Pakistan, Islamabad
3. Secretary, Privatization Commission, Government of Pakistan, Islamabad
4. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
5. Chief Operating Officer, CPPA, 107-WAPDA House, Lahore
6. Director General, Pakistan Environmental Protection Agency, Plot No. 41, Street No. 6, H-8/2, Islamabad.

National Electric Power Regulatory Authority (NEPRA)

Determination of Authority in the Matter of Licensee Proposed Modification of Jamshoro Power Company Limited

August 06, 2014
Case No. LAG-02

(A). Background

(i). The Authority had granted a Generation Licence (No. GL/01/2002, dated July 01, 2002 to Jamshoro Power Company Limited (JPCL/GENCO-I) for a cumulative Installed Capacity of 1054.00 MW for its two distinctly located Generation Facilities at Thermal Power Station, Jamshoro (TPS Jamshoro) and Gas Turbine Power Station, Kotri (GTPS Kotri) in the Province of Sindh.

(ii). TPS Jamshoro of JPCL has an installed capacity of 880.00 MW, consisting of four (04) conventional Steam Turbines (1 x 250.00 MW + 3 x 210.00 MW), installed between 1989 and 1991. Whereas, GTPS Kotri of JPCL had an Installed Capacity of 174.00 MW, consisting of six (06) Gas Turbines and One (01) Steam Turbine.

(iii). Later on, the Authority through its decision No. NEPRA/R/LAG-02/3885-91, April 16, 2014, excluded two units of GTPS Kotri (i.e. Unit No. 1 & 2 each of 15.00 MW) from the Generation Licence of JPCL which had completed their useful lives (set up during the period from 1969-70) and were of very lower efficiency,

(B). Communication of LPM

(i). JPCL, through its correspondence of January 22, 2014 communicated an LPM in terms of Regulation 10 of NEPRA Licensing (Application & Modification Procedure) Regulations, 1999 (the Regulations) for

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR NEPRA

de-commissioning of the Unit No.1 & 2 of GTPS Kotri and installation of 2 x 660 MW Units at TPS Jamshoro. In view of its earlier decision whereby the Authority had already excluded Unit No. 1 & 2 of GTPS Kotri from the Generation Licence of JPCL, the Authority decided to restrict the scope of the communicated LPM of JPCL for addition of two New Coal Units only.

(ii). JPCL in the "Text of the Proposed Modification" submitted that it plans installation of 2 x 600 MW (Net) Supercritical Coal Fired Units using a Blend of Imported Sub-Bituminous Coal and Domestic Lignite at its TPS Jamshoro Complex. Regarding the "Reason in Support of Modification", JPCL informed that Coal offers a promising option to diversify the existing Energy Mix and to provide affordable power to the electric power consumers. In view of the said, the Government of Pakistan (GoP) aims to increase the share of Coal based generation to 15% of the Total Installed Capacity of the Country in 10 years. Accordingly, 2 x 600 MW (Net) Coal based Supercritical Units are planned to be installed with the Financial Support of the Asian Development Bank (ADB), to decrease the existing Electric Power Shortfall in the Country.

(iii). About the Statement of the "Impact on the Tariff", JPCL submitted that it would file a separate Tariff Petition for its proposed 2 x 600 MW (Net) Coal Fired Power Project. Regarding the Statement of the Impact on the Quality of Service (QoS), JPCL clarified that the addition of New Coal Units would provide 8,935 GWh per Annum to the National Gird. With the Installation of the said Units, the share of electric power generation through Furnace Oil would be decreased to 31% whereas, the share of Clean Coal electric power in the Generation Mix would be increased to 5%. The proposed addition of the Coal Units would result in 50% decrease in the Energy Purchase Price for TPS Jamshoro from its current level.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(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 JPCL, the Registrar accepted the LPM for further processing as stipulated in the Regulations. The Authority considered the matter in its Regulatory Meeting (RM-14-091), held on February 20, 2014 and accepted the LPM for further processing.

(ii). The Registrar published the communicated LPM on March 27, 2014 in one English and one Urdu daily Newspapers, seeking comments of general public and other stakeholders. Apart from the notice in the press, separate notices were also sent to Individual Experts, Government Ministries/Department and representative organization etc. inviting their views and comments in the matter.

(D). Comments of Stakeholders

(i). In response to the above, the Authority received comments from five (05) stakeholders. These included Central Power Purchasing Agency (CPPA) of National Transmission & Despatch Company Limited (NTDC), Pakistan Mineral Development Corporation (Pvt.) Limited (PMDCPL), Punjab Mineral Development Corporation (PbMDC) Ministry of Petroleum & Natural Resources (MoP&NR) and Ministry of Water & Power (MoW&P). The salient points of the comments offered by the above mentioned stakeholder are summarized in the following paragraphs: -

(a). CPPA in its comments expressed its no objection for acceptance of the communicated LPM of JPCL, subject to fulfillment of requirements as laid down in the NEPRA Licensing (Generation) Rules-2000 (the Rules) as amended from time to time;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(b). PMDCPL stated that Coal is the most abundant fuel in the country with largest indigenous deposits. Coal fired power generation stations are proven contributor to global warming, pollution fraction of carbon dioxide emissions. Its naturally occurring radioactive isotopes release into the environment leads to radioactive contamination which leads to respiratory diseases. PMDCPL is currently producing about 2,000,000 metric tones coal per annum from its coal mining projects. It is capable to extract over 5,000,000 metric tons in a year. Currently PMDCPL is supplying coal to the cement factories from Sorrange and Degari coal mines and greatly interested to step ahead;

(c). PbMDC remarked that its comments in the particular case may be treated as Nil;

(d). MoP&NR commented that JPCL intends installing 2 x 660 MW Coal fired Power Plants/Units. MoP&NR has no objections/comments as no gas issue is involved;

(e). MoW&P in its comments supported the communicated LPM stating that the country is facing chronic Power shortages which hampers economic growth. The growing dependence on expensive imported furnace oil for Power Generation has added to the difficulties in meeting the demand and has led to widespread load shedding and power interruption to industrial and commercial activities resulting in less productivity and public dissatisfaction. The country has an urgent requirement to generate additional Power to feed into the national grid. In this scenario Coal offers a promising option to provide affordable power and diversify the energy mix. The GoP aims to increase the share of coal-base generation in next 10 years. In this regard a 2 X 660 MW Coal fired Power Project is going to installed at TPS

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

Jamshoro in near future, which will be helpful in decreasing the existing power shortfall and will increase the generation capacity. These new 2 X660 MW coal fired Power Project also offer an optimum solution in lowering the generation cost.

(ii). The above observations of PMDCPL were forwarded to JPCL for review/comments/rejoinder. JPCL submitted that ADB is funding the project which has imposed strict conditions on environment compliance. JPCL confirmed that the project would comply with the required environmental standards.

(iii). In view of the supportive comments of the stakeholders, the suitable rejoinder of JPCL and considering the fact that EPA, Sindh had already issued an NoC for the Project, the Authority considered it appropriate to process the communicated LPM as stipulated in the Regulations and the Rules.

(E). Approval of LPM

(i). The importance of electricity/electric power in the development of the economy of any country is of imperative nature. The Economic Growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. Without the availability of Electric Power, the life in today's Modern Society is unimaginable. It is the electricity that lights houses, buildings, streets, provides domestic and industrial heat, and powers most equipment used in homes, offices and machinery in factories. Improving access to electricity worldwide is critical to alleviating poverty.

(ii). In view of the above, the Authority is of the considered opinion that for sustainable development all indigenous power generation resources including Coal, Hydel, Wind, Solar and other Renewable Energy (RE) resources must be developed on priority basis to meet the future electric

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

power demand of the country. Out of the various electric power generation resources available, Coal plays a vital role in electricity generation worldwide. Coal-fired power plants contribute about 40% of global electricity. In some countries, coal fuels even a higher percentage of electricity. These include South Africa (93%), Poland (87%), China (79%), Australia (78%), Kazakhstan (75%), India (68%), Israel (58%), Czech Rep (51%), Morocco (51%), Greece (54%), USA (45%) and Germany (41%).

(iii). In contrary to the above, the contribution of Coal in the power generation in Pakistan is only 0.07% only. The existing energy mix of the country is heavily skewed towards the costlier thermal power plants, mainly operating on imported furnace oil. The continuously increasing trend in fuel prices is a constant source of pressure on the foreign reserves of the country. Therefore, in order to achieve sustainable development it is imperative that the existing fuel mix of the country changed towards low cost fuel and for that purpose Coal (imported/indigenous) is considered the only viable option in this regard. In view of the said, it is considered imperative that Coal power projects are accorded priority and their development is encouraged.

(iv). The Authority contemplates that the initiative of JPCL for setting up 2 x 660 MW Coal fired Power Plant at TPS, Jamshoro is very vital and needs to be encouraged. This will not only help in overcoming the severe shortage of electricity in the country but will also trigger Industrial growth thereby helping in raising the GDP of the country which is on the decline due to shortage of electricity.

(v). The proposed generation facility of JPCL, is a Conventional Steam Turbine Power Plant with Supercritical Boilers using Coal as fuel. JPCL has confirmed that Supercritical Technology is very mature with many units installed and operational Worldwide for many years. JPCL has also confirmed that the track record for such Units is very good thus justifying the proposed technology. JPCL has clarified that the selected main parameters of the Steam Turbine and Boiler of the proposed Generation Facility (593°C and 24.1MPa) are at the high end of the supercritical class and will result in high thermal

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

efficiency and will cause less emission per unit of electricity generated. Further, JPCL has confirmed that a modem emission control system will make the technology environmentally friendly. Also Air emission control equipment, including an electrostatic precipitator (ESP) and a Flue Gas Desulfurization (FGD) system will be installed to lower Green House Gases (GHG) emissions. A selective catalytic reduction system (SCR) will also be installed to ensure that NO_x emission complies with national and global standards. Plant design will incorporate provisions for CO_2 capture (i.e. carbon capture ready). Waste water will be treated and utilized in-plant, with a small quantity of effluent discharged after further treatment to meet environmental standards. Conventional solid wastes will be disposed at the ash pond, while hazardous waste will be collected and treated in-plant. Periodic monitoring of groundwater will be done to prevent water contamination. Efforts will be made to maximize use of fly ash and gypsum to reduce waste disposal. Water will be constantly sprayed in the coal yard to reduce coal dust. Sound attenuation material will be applied on machinery generating high noise levels. Pollution monitoring system inside and around the station will be set up to constantly monitor the environmental conditions. JPCL has obtained necessary NoC from Environmental Protection Agency, Govt. of Sindh (EPA, Sindh) for its Coal Power Plants/Units. The Authority has considered the submission and has made JPCL obligatory to comply with the required rules and regulation on environment in terms of Article 10 of its existing Generation Licence. Further, the Authority directs JPCL to submit a quarterly report on environment confirming that the operation of its different generation facilities including the forthcoming Coal Power Plants/Units are compliant with required Environmental Standards of the EPA, Sindh.

(vi). The term of a Generation Licence under the Rules is to be commensurate with the maximum expected Useful Life of the units comprised in a Generating Facility. The Authority at the time of the grant of original Generation Licence (No. GL/01/2002, dated July 01, 2002) to JPCL had set its term to nineteen (19) years from the date of its issuance i.e. upto June 30, 2021, based on the remaining useful life of the latest installed Unit. With the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

proposed installation of the new 2 x 660 MW Steam Turbine, the term of the Generation Licence may be re-fixed based. JPCL has informed that one of its New Coal Unit will be commissioned on December 31, 2018 whereas the other Unit will achieve Commercial Operation by December 31, 2019. JPCL has estimated the Useful life of each Unit to be thirty (30) years from the Date of its Operation. The Authority has considered the submissions of JPCL pertaining to the useful life of the Coal Units and is satisfied that the said information about Useful Life is consistent with the Industry Standards. In view of the said, the Authority hereby re-fixes the Term of the Generation Licence for a period of further thirty (30) years from the expected commercial operation date of the latest Coal Unit (i.e. upto the Year 2049)

(vii). Regarding the Tariff, it is hereby clarified that under Section 7(3)(a) of the NEPRA Act, the determining of tariff, rate and charges etc. is the sole responsibility of the Authority. In the particular case, JPCL has not filed a Tariff Petition so far. The Authority directs JPCL to file a Tariff Petition for its 2 x 660 MW Coal Fired Power Plants/Units. Pending, the filing of the tariff petition and its processing, the Authority directs JPCL to charge only such tariff which has been determined, approved or specified by the Authority in terms of Rule-6 of the Rules.

(viii). In view of the above, the Authority hereby approves the LPM, in the Generation Licence of JPCL pertaining to the said Coal Fired Power Plant/Units thereby increasing the total Installed Capacity of JPCL to 2344.00 MW from existing 1024.00 MW. In consideration of the said, the already granted Generation Licence (No. GL/01/2002, dated July 01, 2002) in the name of JPCL is hereby modified. The Face Sheet indicating the required changes alongwith Revised/Modified Articles and Schedule-I & II of the Generation Licence are attached as Annexure to this determination. The approval of LPM will be subject to the provisions contained in the NEPRA Act, relevant rules and regulations framed there under.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

Authority

Maj. (R) Haroon Rashid
Member

Khawaja Muhammad Naeem
Member

Habibullah Khilji
Member/Vice Chairman

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REGISTRAR
NEPRA

National Electric Power Regulatory Authority (NEPRA)

Islamabad – Pakistan

GENERATION LICENCE

GL/01/2002

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 Jamshoro Power Company Limited/GENCO-I (issued on July 01, 2002 and subsequent modification of April 16, 2014 and expiring on June 30, 2021), to the extent of changes mentioned as here under:-

(i). Changes in Articles of the Generation Licence are attached as **Annexure-A**;

(ii). Changes in **Schedule-I** are attached as Revised/Modified Schedule-I; and

(iii). Changes in **Schedule-II** are attached as Revised/Modified Schedule-II.

This **Modification-II** is given under my hand on this 11th of **August Two Thousand & Fourteen**

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY * NEPRA *

Annexure-A

Modification-I
in Generation Licence of Jamshoro Power Company Limited (No. GL/01/2002, dated July 01, 2002)

(A). Face Sheet

(i). On the Face Sheet (i.e. the first page of the Generation Licence), in the last line the phrase "expires on 30th day of June, Two Thousand & Twenty One" is replaced by the phrase "expires on 30th day of December, Two Thousand & Forty Nine."

(B). Article-4

(i). The Article 4 titled "Term" is modified as "The Term of the Generation Licence is re-fixed for a period of thirty (30) years from the expected date of commissioning/operation of the latest coal unit (i.e. Unit No. 6) of the Licensee."

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

SCHEDULE-I
(Revised/Modified)
Modification-II

The Location, Size (i.e. Capacity in MW), 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.

General Information About the Licensee/ Jamshoro Power Company Limited

(i).	Name of Licensee/ Company	Jamshoro Power Company Limited		
(ii).	Registered /Business Office	Thermal Power Station (TPS), Mohro Jabal, Dadu Road, Jamshoro, Sindh.		
(iii).	Plant Locations	Plant-I	Plant-II	Plant-III
		TPS Jamshoro (Unit No. 1, 2, 3 & 4)	TPS Jamshoro (Unit No. 5 & 6)	Gas Turbine Power Station, (GTPS), Kotri.
(iv).	Type of Generation Facility	Plant-I	Plant-II	Plant-III
		Thermal Power Plant	Thermal Power Plant	Thermal Power Plant

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Detail
of Generation Facility of Plant-I/
TPS Jamshoro
(Unit No. 1, 2, 3 & 4)

(A). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	880 MW			
(ii).	Type of Technology	Thermal Power Plant			
(iii).	Number of Units/ Size (MW)	Unit-1	Unit-2	Unit-3	Unit-4
		250 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine	210 MW Steam Turbine
(iv).	Unit Make & Model	Unit-1	Unit-2	Unit-3	Unit-4
		Mitsui, Japan	CMEC, China	CMEC, China	CMEC, China
(v).	Commercial Operation date (of each Unit)	Unit-1	Unit-2	Unit-3	Unit-4
		Jan. 27, 1990	Dec.03, 1989	June 27, 1990	Jan. 21, 1991
(vi).	Expected Useful Life of the Generation Facility/Plant-I from Commercial Operation Date (of each Unit)	Unit-1	Unit-2	Unit-3	Unit-4
		37 Years	38 Years	37 Years	36 Years
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation Licence	Unit-1	Unit-2	Unit-3	Unit-4
		25 Years	25 Years	25 Years	25 Years

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(viii).	Remaining useful life of the Generation Facility at the time of this Modification dated April 16, 2014	Unit-1	Unit-2	Unit-3	Unit-4
		14 Years	14 Years	14 Years	15 Years
(ix).	Remaining useful life of the Generation Facility at the time of this Modification dated August 11, 2014	Unit-1	Unit-2	Unit-3	Unit-4
		14 Years	14 Years	14 Years	15 Years

(B). Fuel Details

(i).	Primary Fuel	Unit-1	Unit-2	Unit-3	Unit-4
		Furnace Oil			
(ii).	Alternative Fuel	Unit-1	Unit-2	Unit-3	Unit-4
		Furnace Oil	Natural Gas		
(iii).	Start-Up Fuel	Unit-1	Unit-2	Unit-3	Unit-4
		High Speed Diesel (HSD)			
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Imported/Indigenous			
(v).	Fuel Supplier for each of the above	Primary Fuel	Alternative Fuel		
		PSO/SHELL	SSGC		
(vi).	Supply Arrangement for each of the above	Primary Fuel	Alternative Fuel		
		Tank/Lorries and Railway Wagons	Gas Pipelines		

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(vii).	No of Storage Tanks	Primary Fuel	Alternative Fuel
		4	N/A
(viii).	Storage Capacity of each Tank	Primary Fuel	Alternative Fuel
		27000 K Liters	N/A
(ix).	Gross Storage	Primary Fuel	Alternative Fuel
		108000 K Liters	N/A

(C). Emission Values

		Furnace Oil	Natural Gas
(i).	SO_x (mg/Nm^3)	1550 to 1650	-
(ii).	NO_x (mg/Nm^3)	300 to 400	90 to 130
(iii).	CO_2 %	10.8 % to 14.0%	2.5 % to 2.7%

(D). Cooling System

(i).	Cooling Water Source/Cycle	River Water (Open Cycle)

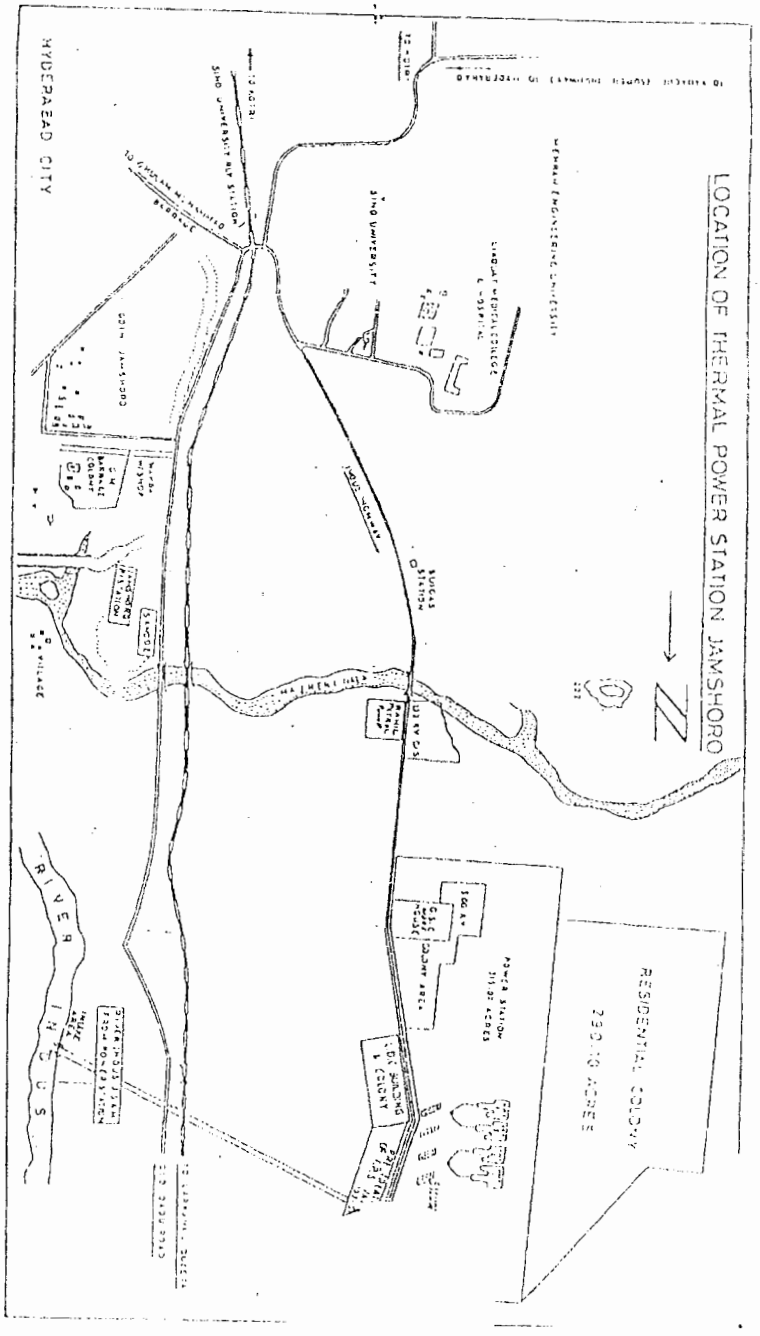
(E). Plant Characteristics

		Unit-1	Unit-2	Unit-3	Unit-4
(i).	Generation Voltage	16.5	15.75	15.75	15.75
(ii).	Frequency	50	50	50	50
(iii).	Power Factor	0.85 Lag	0.85 Lag	0.85 Lag	0.85 Lag
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	No	No	No	No
(v).	Ramping Rate (MW/min)	2.0	1.0	1.0	1.0
(vi).	Time required to Synchronize to Grid (Hrs.)	12	6	6	6

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

(F). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	TPS Jamshoro is connected with 500KV/220KV/132KV Grid Station Jamshoro through 220 KV & 132 KV Power Cables which is situated at a distance approximately 1.5 Km.



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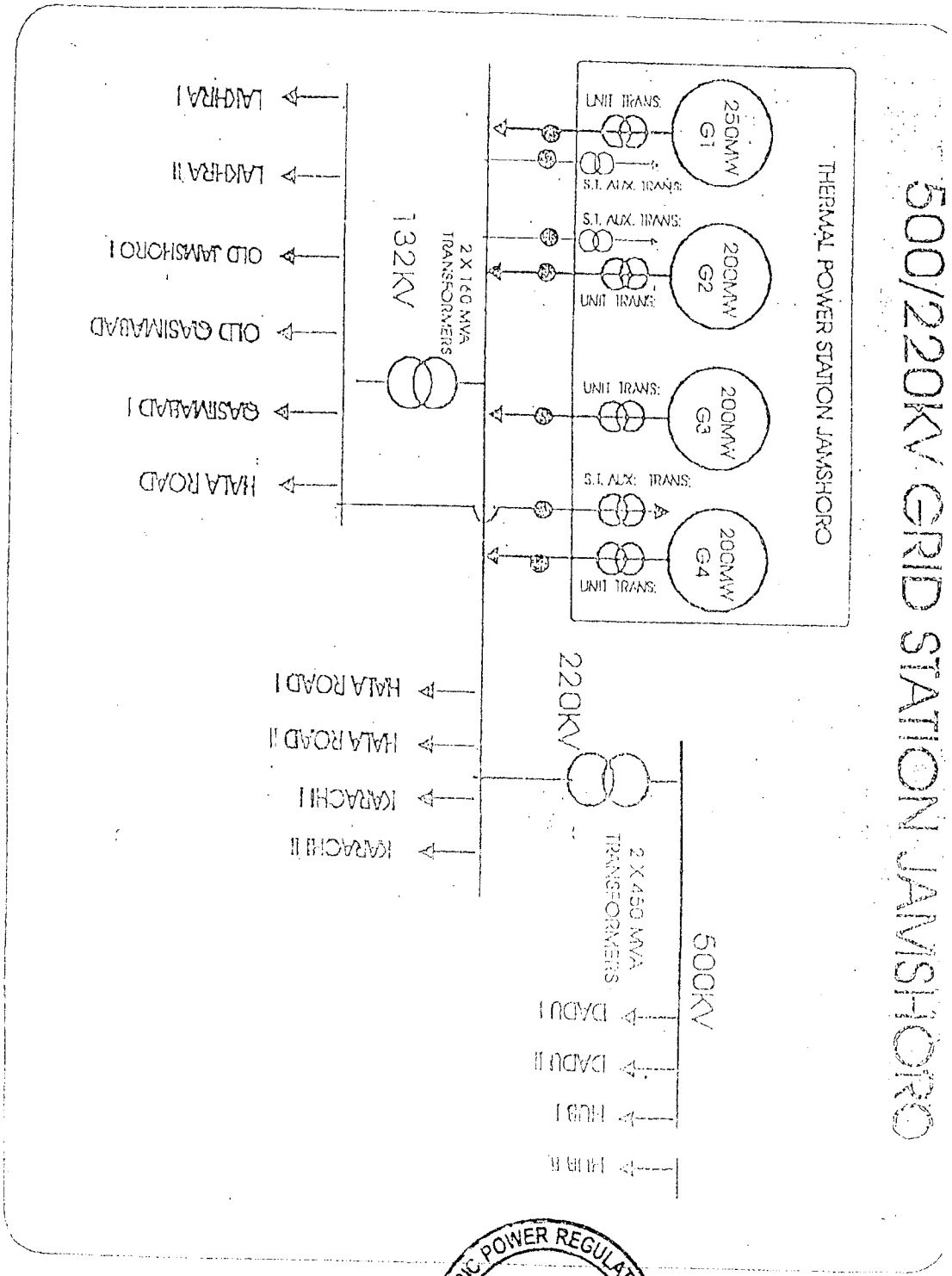
REGISTRAR
NEPRA



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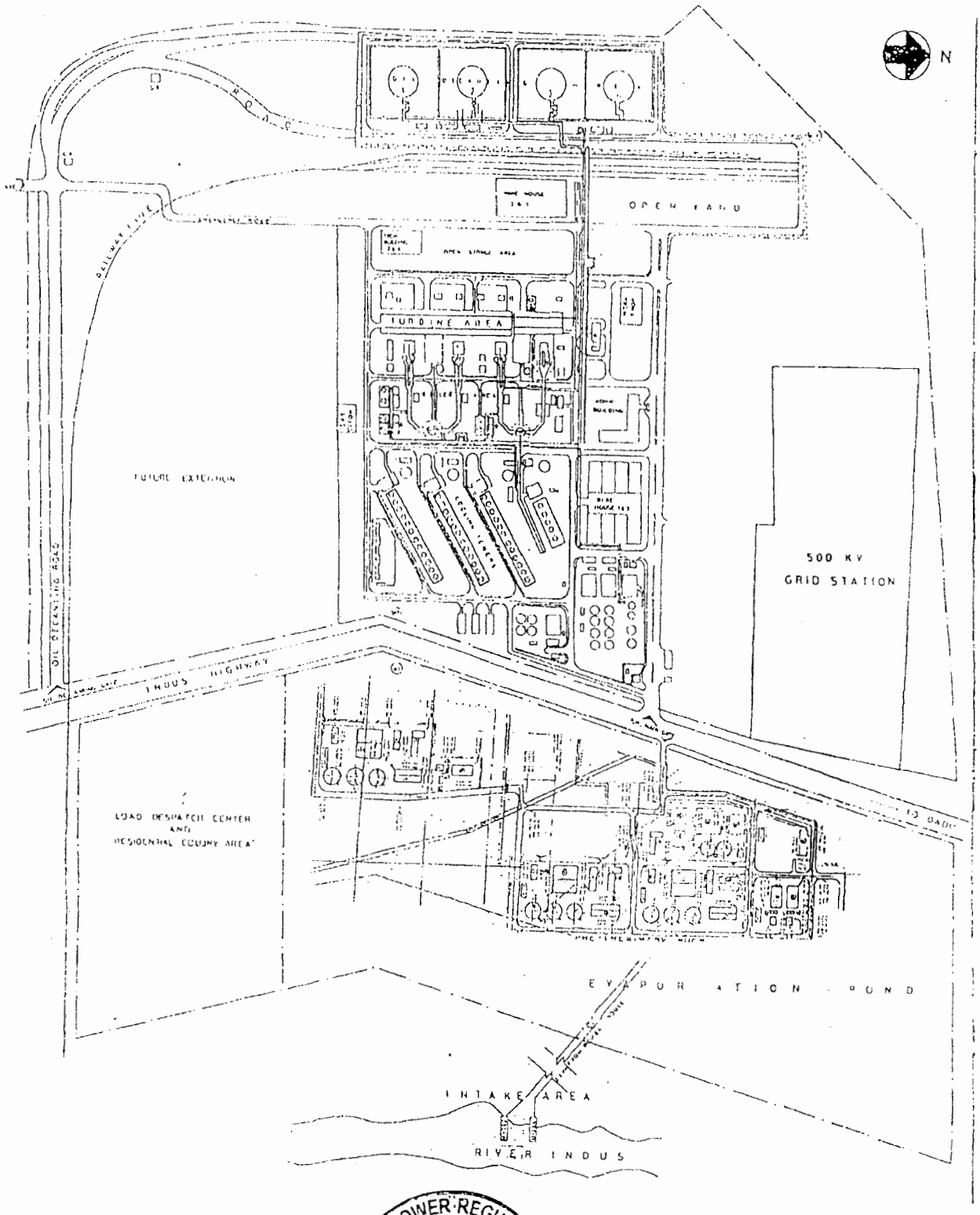
REGISTRAR
NEPRA



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REGISTRAR
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Detail
of Generation Facility of Plant-II/
TPS Jamshoro
(Unit No. 5 & 6)

(A). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	1320 MW	
(ii).	Type of Technology	Thermal Power Plant	
(iii).	Number of Units/Size (MW)	Unit-5	Unit-6
		660MW Steam Turbine	660 MW Steam Turbine
(iv).	Unit Make & Model	Unit-5	Unit-6
		Siemens/Harbin China/Ansaldo or Equivalent	Siemens/Harbin China/Ansaldo or Equivalent
(v).	Commercial Operation date (of each Unit)	Unit-5	Unit-6
		December 31, 2018	December 31, 2019
(vi).	Expected Useful Life of the Generation Facility/Plant-II from Commercial Operation Date (COD) of each Unit	Unit-5	Unit-6
		30 Years	30 Years
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation License	Unit-5	Unit-6
		Not Installed at that time	Not Installed at that time

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

(viii).	Remaining useful life of the Generation Facility/Plant-II at the time of this Modification dated April 16, 2014	Unit-5	Unit-6
		Not Installed at that time	Not Installed at that time
(ix).	Remaining useful life of the Generation Facility/Plant-II at the time of this Modification dated August 11, 2014	Unit-5	Unit-6
		30 Years from COD	30 Years From COD

(B). Fuel Details

(i).	Primary Fuel	Unit-5	Unit-6
		Imported/Local Coal	Imported/Local Coal
(ii).	Alternative Fuel	Unit-5	Unit-6
		Nil	Nil
(iii).	Start-Up Fuel	Unit-5	Unit-6
		HSD	HSD
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Imported/Indigenous	
(v).	Fuel Supplier for each of the above	Primary Fuel	Start-Up Fuel
		Imported/Local Coal will be supplied through Long Term Contract (Name of the Supplier will be Indicated after signing of Coal Supply Agreement)	PSO/SHELL

(vi).	Supply Arrangement for each of the above	Primary Fuel	Start-Up Fuel
		Tank/Lorries and Railway Wagons	Tank/Lorries and Railway Wagons
(vii).	No of Storage Bunkers/Tanks/ Open Yard	Primary Fuel	Start-Up Fuel
		To be communicated later	To be communicated later
(viii).	Storage Capacity of each Bunkers/Tanks/ Open Yard	Primary Fuel	Start-Up Fuel
		To be communicated later /40 Acres	To be communicated later
(ix).	Gross Storage	Primary Fuel	Start-Up Fuel
		To be communicated later	To be communicated later

(C). Emission Values

		Primary Fuel	Start-Up Fuel
(i).	SO_x (mg/Nm^3)	As per guidelines of ADB & NEQs	As per guidelines of ADB & NEQs
(ii).	NO_x (mg/Nm^3)	-do-	-do-
(iii).	CO_2 %	-do-	-do-

(D). Cooling System

(i).	Cooling Water Source/Cycle	River Water (Open Cycle)/Tube wells at site.

(E). Plant Characteristics

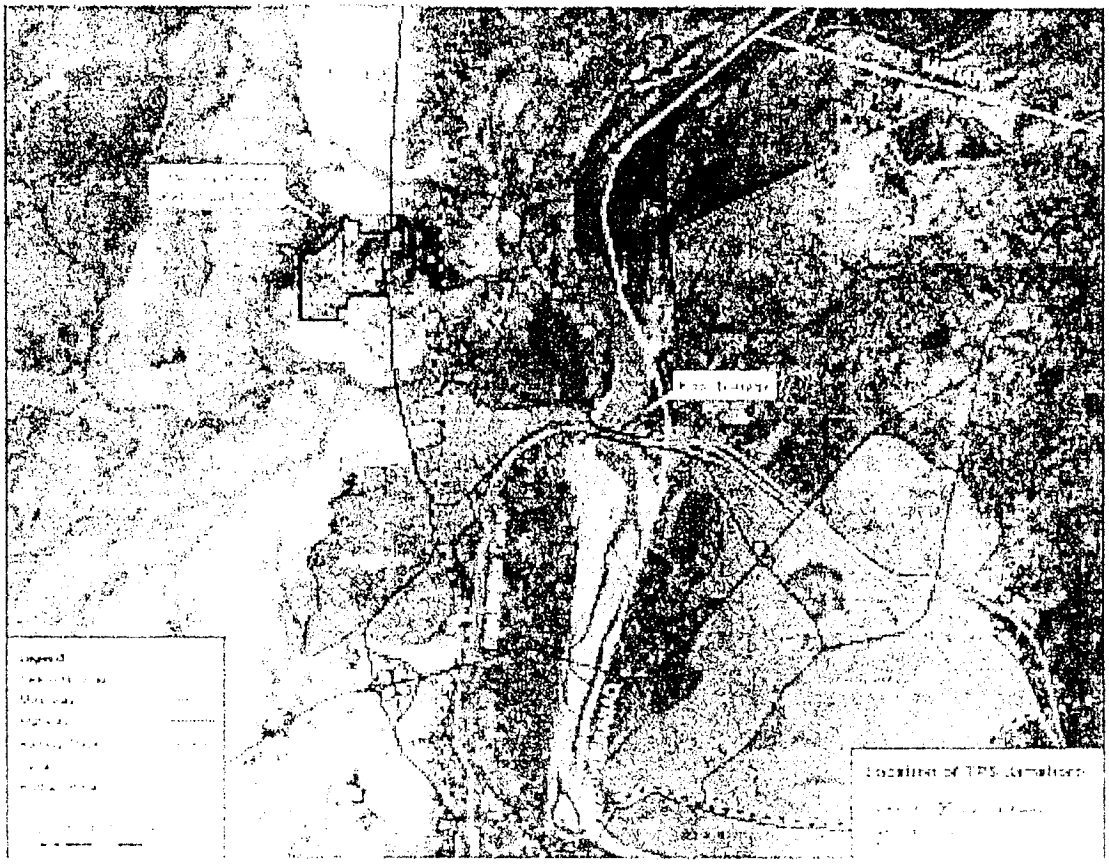
		Unit-I	Unit-II
(i).	Generation Voltage	24 KV	24 KV
(ii).	Frequency	50	50
(iii).	Power Factor	0.85 Lag	0.85 Lag

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes	Yes
(v).	Ramping Rate (MW/min)	To be provided Later	To be provided Later
(vi).	Time required to Synchronize to Grid (Hrs.)	-Do-	-Do-

(F). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	The Interconnection/Transmission Facilities for Plant-II of TPS Jamshoro for evacuation of power will be consisting of the following:-:- (i). New 500 kV switching station at Moro. (ii). 500 kV Jamshoro-Moro (S/C) transmission line (with Series Compensation) measuring about 200 km on quad bundled AASC Greeley Conductor; (iii). 500 kV Moro-Dadu S/C transmission line 55 km on quad bundled AASC Greeley conductor; (iv). 500 kV Moro-R.Y.Khan S/C transmission line 355 km on quad bundled AASC Greeley conductor; and (v). Extension at Jamshoro, Dadu and R.Y. Khan 500 kV substations.



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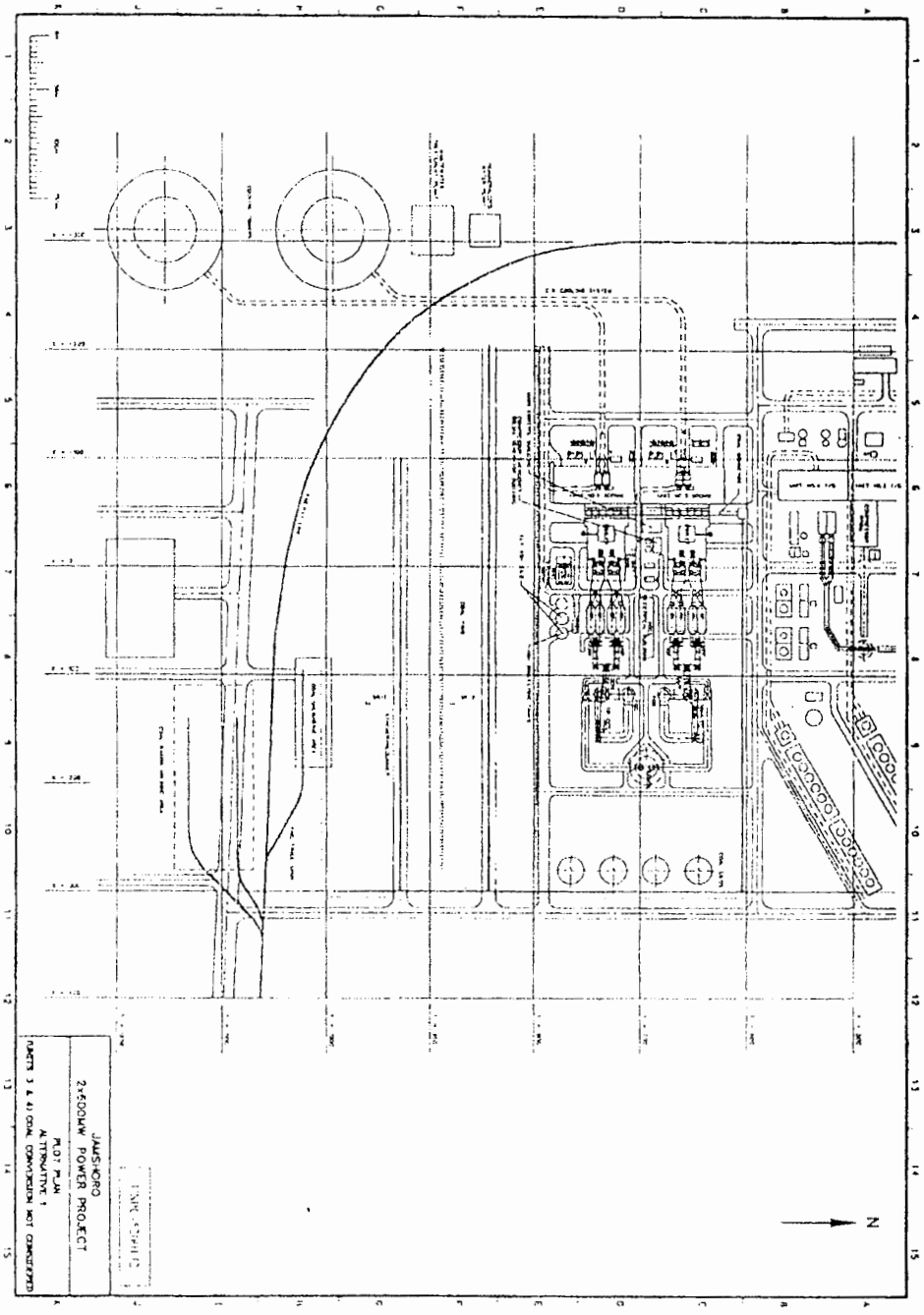
PLANT LAYOUT OF JAMSHORO 2X660 MW (GROSS) COAL FIRED PROJECT



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REGISTRAR
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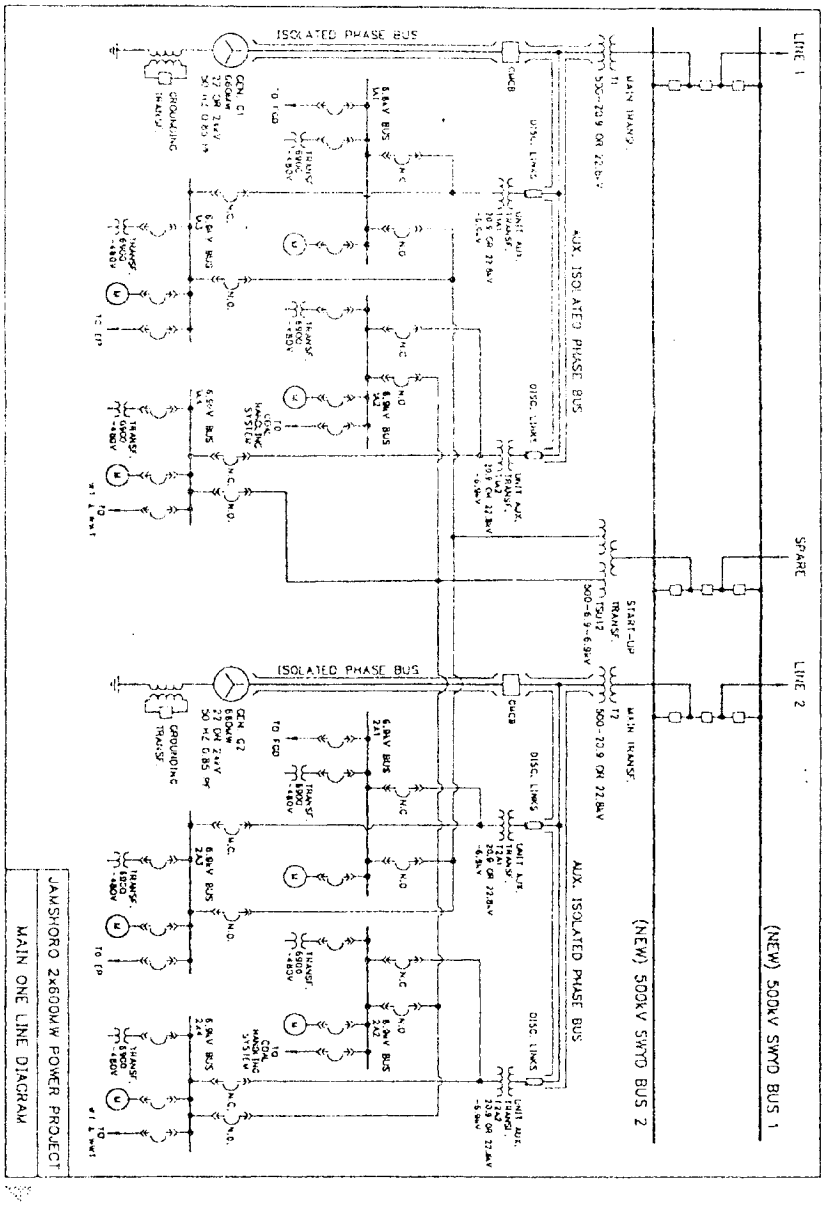


Detail of Generation Facility of Plant-III/ GTPS, Kotri

(A). Plant Configuration

(i).	Plant Size Installed Capacity (Gross ISO)	144 MW				
(ii).	Type of Technology	Thermal Power Plant/Combined Cycle Power Plant				
(iii).	Number of Units/Size (MW)	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		25 MW Gas Turbine	25 MW Gas Turbine	25 MW Gas Turbine	25 MW Gas Turbine	44 MW Steam Turbine
(iv).	Unit Make & Model	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		Thom B.V. Holland	Thom B.V. Holland	Hitachi Japan	Hitachi Japan	HPEEC China & Cockrill Mech: Indus Belgium
(v).	Commercial Operation date (of each Unit)	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		May 1979	May 1979	April 1981	May 1981	October 1994
(vi).	Expected Useful Life of the Facility from Commercial Operation Date (of each Unit)	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		36 Years	36 Years	38 Years	36 Years	32 Years
(vii).	Expected Useful Life of the Facility (Each Unit) at the time of Grant of Original Generation Licence	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		13 Years	13 Years	15 Years	15 Years	24 Years

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

(viii).	Remaining useful life of the Generation Facility at the time of Modification-I dated April 16, 2014	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		2 Years	2 Years	4 Years	4 Years	13 Years
(viii).	Remaining useful life of the Generation Facility at the time of this Modification-II dated August 11, 2014	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		2 Years	2 Years	4 Years	4 Years	13 Years

(B). Fuel Details

(i).	Primary Fuel	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		Natural Gas				
(ii).	Alternative Fuel	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		HSD				
(iii).	Start-Up Fuel	Unit-3	Unit-4	Unit-5	Unit-6	Unit-7
		Nil				
(iv).	Fuel Source for each of the above (i.e. Imported/ Indigenous)	Primary Fuel		Alternative Fuel		
		Indigenous		Indigenous/Imported		
(v).	Fuel Supplier for each of the above	Primary Fuel		Alternative Fuel		
		SSGC		PSO/SHELL		
(vi).	Supply Arrangement for each of the above	Primary Fuel		Alternative Fuel		
		Gas Pipelines		Tank/Lorries and Railway Wagons		

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(vii).	No of Storage Tanks	Primary Fuel	Alternative Fuel
		N/A	4
(viii).	Storage Capacity of each Tank	Primary Fuel	Alternative Fuel
		N/A	2,000,000 Liter
(ix).	Gross Storage	Primary Fuel	Alternative Fuel
		N/A	8,000,000 Liter

(C). Emission/Effluents Values

		Natural Gas
(i).	SO_x (mg/Nm^3)	-
(ii).	NO_x (mg/Nm^3)	90 to 130
(iii).	CO_2 %	2.5 % to 2.7 %

(D). Cooling System

(i).	Cooling Water Source/Cycle	Canal Water/Open Cycle

(E). Plant Characteristics

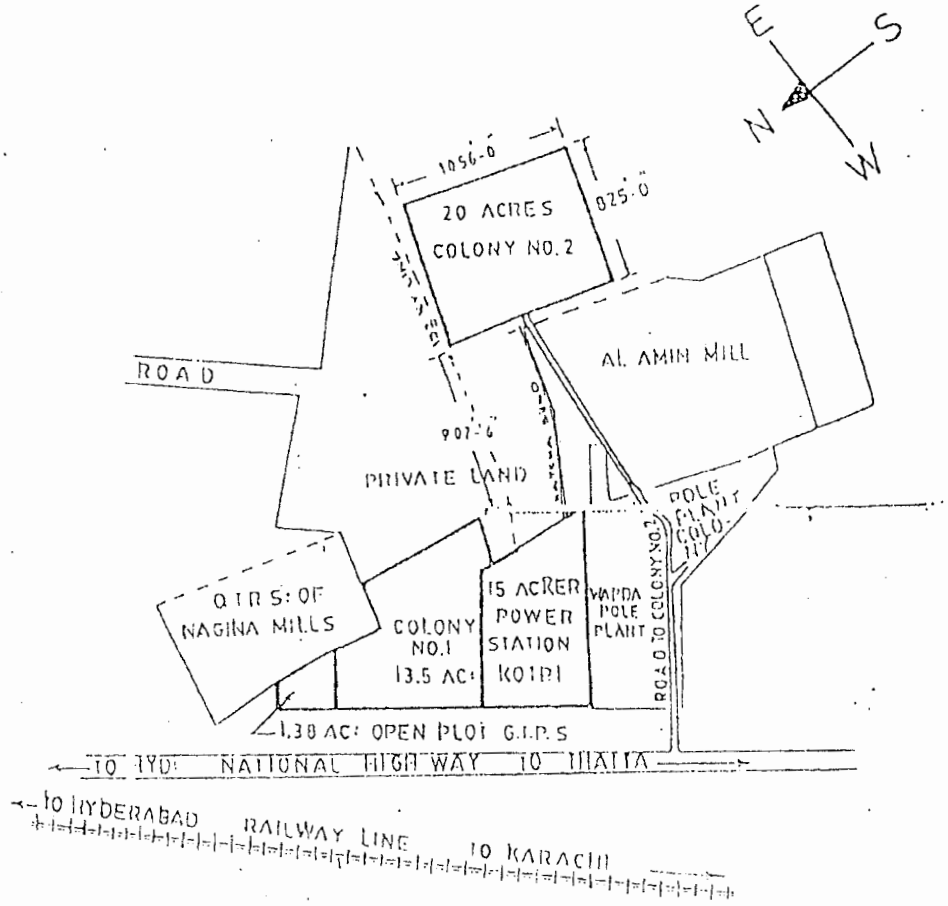
		Unit-3	SSGC	Unit-5	Unit-6	Unit-7
(i).	Generation Voltage	11.0	11.0	11.0	11.0	11.0
(ii).	Frequency	50	50	50	50	50
(iii).	Power Factor	0.80	0.80	0.80	0.80	0.80
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	No	No	No	No	No
(v).	Ramping Rate MW/Min	2.0	2.0	2.0	2.0	1.0

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

(vi).	Time required to Synchronize with Grid (Minutes)	20	20	20	20	20

(F). Interconnection Arrangement

(i).	Interconnection & Transmission Arrangement	The Gas Turbine Power Station, Kotri has its 132KV Grid Station in the Premises of Power Plant.



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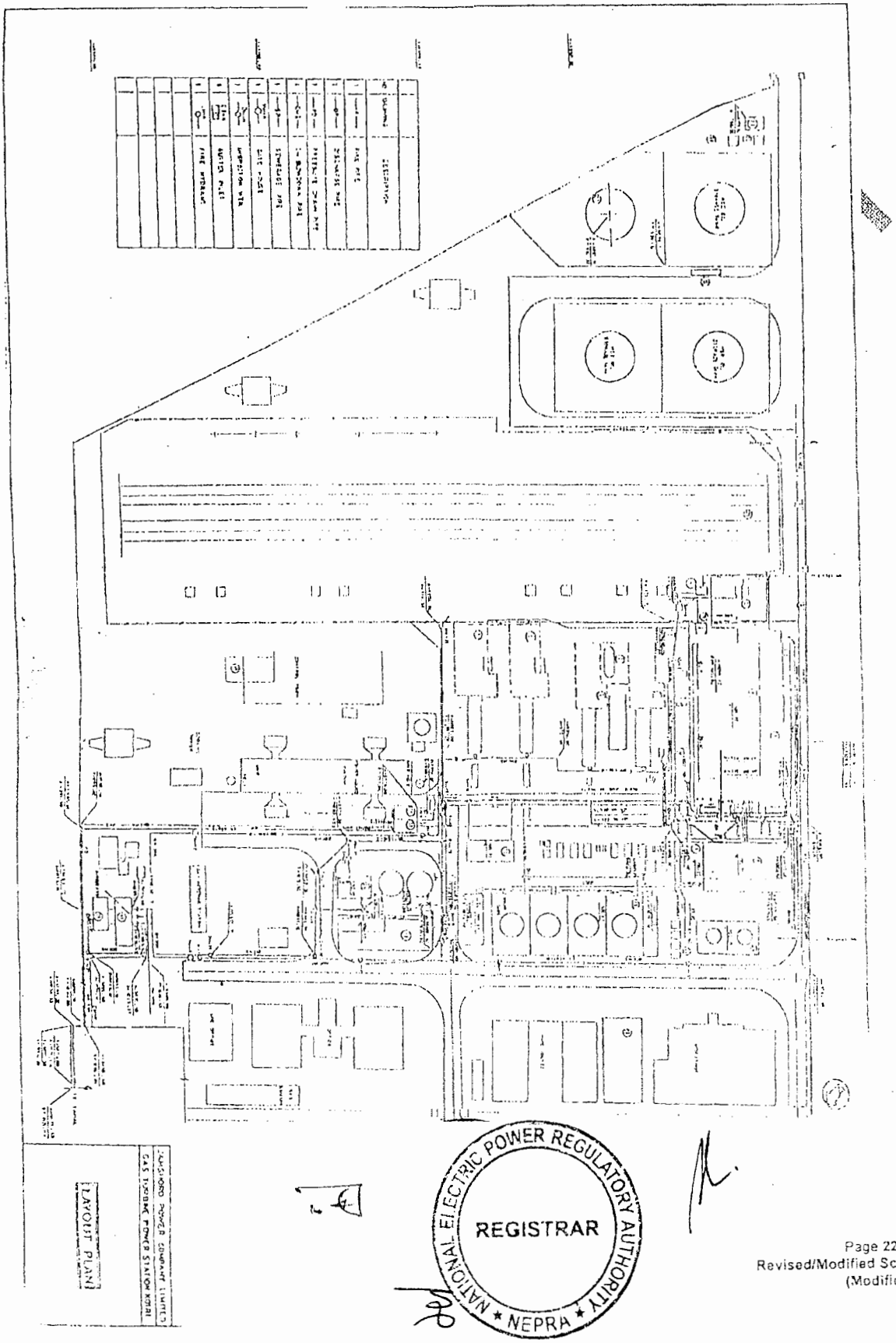
REGISTRAR
NEPRA



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REGISTRAR
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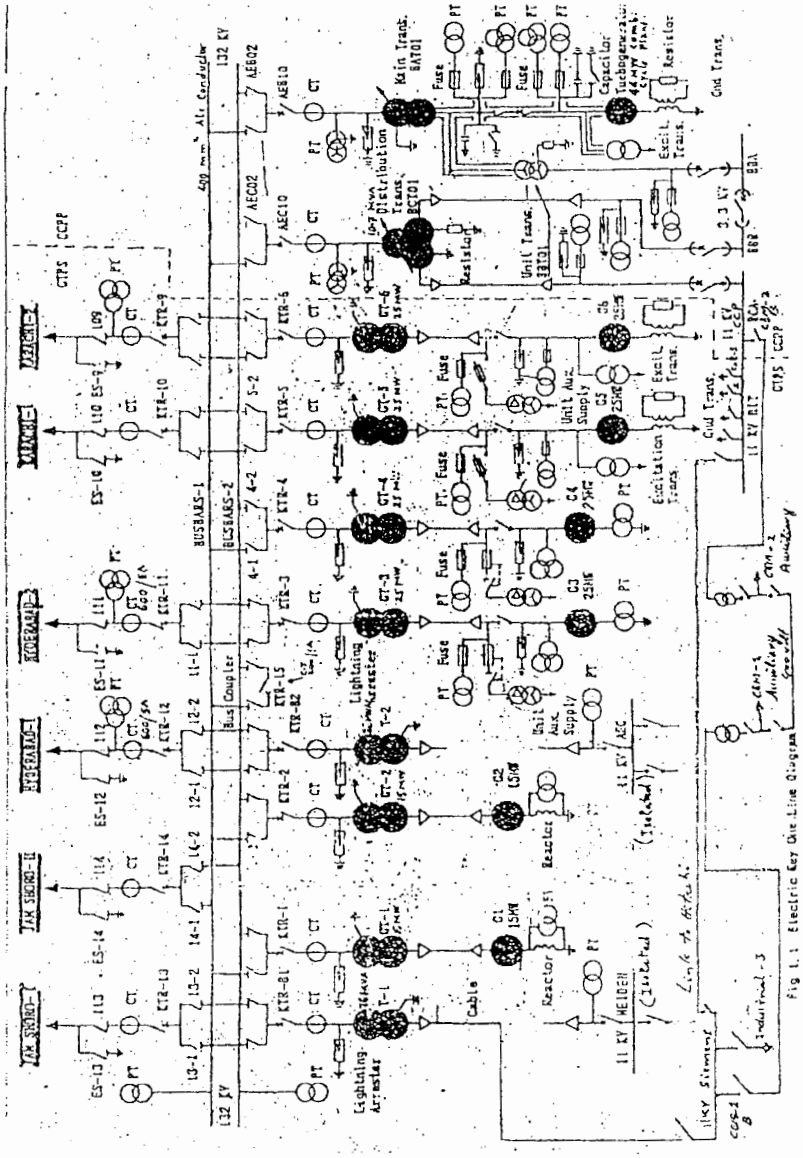

Fig 1.1 Electric Key One Line Diagram

SCHEDULE-II
(Revised/Modified)
Modification-II

The Installed/ISO Capacity (MW), De-Rated Capacity At Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity (MW) of the Generation Facilities of Licensee is given in this Schedule

SCHEDULE-II

Power Station	Unit Detail	Installed Capacity (MW)	De-Rated Capacity (MW)		Net Capacity (MW)	
TPS Jamshoro (Plant-I)	Unit-1	250	Unit-1	200	Unit-1	182.00
	Unit-2	210	Unit-2	170	Unit-2	154.70
	Unit-3	210	Unit-3	170	Unit-3	154.70
	Unit-4	210	Unit-4	170	Unit-4	154.70
	Sub-Total-I	**880**		**710**		**646.1**
TPS Jamshoro (Plant-II)	Unit-5	660	Unit-5	660	Unit-5	600
	Unit-6	660	Unit-6	660	Unit-6	600
	Sub-Total-II	**1320**		**1320**		**1200**
GTPS Kotri	Unit-3	25	Unit-3	22	Unit-3	21.91
	Unit-4	25	Unit-4	22	Unit-4	21.91
	Unit-5	25	Unit-5	22	Unit-5	21.91
	Unit-6	25	Unit-6	22	Unit-6	21.91
	Unit-7	44	Unit-7	44	Unit-7	40.82
	Sub-Total-II	**144**		**132**		**128.46**
	Grand Total	**2344**		**2162**		**1974.56**

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph:+92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/DL/LAG-314/ /2377-82 September 08, 2016

Mr. Khalid Mansoor
Chief Executive Officer,
China Power Hub Generation Company (Private) Limited,
11th Floor, Ocean Tower, Block - 9, Main Clifton Road,
Karachi.

Subject: **Generation Licence No. IGSPL/68/2016**
Licence Application No. LAG-314
China Power Hub Generation Company (Private) Limited (CPHGCPL)

Reference: Your application vide letter No. Nil, dated 31st July, 2015, received on 18th August, 2015.

Enclosed please find herewith Generation Licence No. IGSPL/68/2016 granted by National Electric Power Regulatory Authority (NEPRA) to China Power Hub Generation Company (Private) Limited (CPHGCPL), pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997). Further, the determination of the Authority in the subject matter is also attached.

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: Generation Licence (IGSPL/68/2016)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

8/9/16

(Syed Safeer Hussain)

Copy to:

1. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
2. Chief Operating Officer, CPPA-G, 107-WAPDA House, Lahore
3. Managing Director, Private Power and Infrastructure Board (PPIB), 50-Nazimuddin Road, Sector F-7/4, Islamabad.
4. Director General, Environment Protection Department, Government of Punjab, Zarghoon Road, Quetta.
5. Chief Executive Officer, Quetta Electric Supply Company Limited, 22-A, Zarghoon Road, Quetta.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Application of China Power Hub Generation Company (Pvt.) Limited for the Grant of Generation Licence

September 02, 2016
Case No. LAG-314

(A). Background

(i). The electric power sector of the country is experiencing a supply-demand gap. In order to bridge the said deficit and improve the energy mix, Government of Pakistan (GoP) has decided to install generation facilities/thermal power plants based on indigenous as well as imported coal. All efforts are being made to set up generation facilities using cheaper resources. The efforts include projects by the federal as well as provincial governments.

(ii). In order to implement the said initiative, GoP has set up Private Power Infrastructure Board (PPIB) as a one window facilitator for the entrepreneurs interested in setting up new generation facilities. PPIB has issued Letter of Intent (LoI) to various local and foreign investors/groups. PPIB also issued LoI in the name of the Hub Power Company Limited on June 29, 2015 for setting up a 2 x 660.00 MW imported coal based power project at Hub, Mouza Kund, Tehsil Gadani, District Lasbella, in the Province of Balochistan. The proposed project is a joint venture of the Hub Power Company Limited, a public limited company under the laws of Islamic Republic of Pakistan) and China Power International Holding Limited-CPIHL, a company incorporated under the laws of People's Republic of China)

(B). Filing of Generation Licence Application

(i). In accordance with section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the NEPRA Act) read with NEPRA Licensing (Application and Modification, Procedure) Regulations, 1999 (the Licensing Regulations), the Hub Power Company Limited submitted an

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

application on August 18, 2015 requesting for the grant of generation licence. At the time of submission of application the Hub Power Company Limited clarified that a special purpose vehicle to implement the project is still under incorporation and once it is established, the generation licence will be novated/assigned to the special purpose vehicle.

(ii). The Authority considered the matter in its Regulatory Meeting (RM-15-683), held on September 29, 2015 and found the form and content of the application in substantial compliance with Regulation-3 of the Licensing Regulations. Accordingly, the Authority admitted the application for consideration of the grant of the generation licence as stipulated in Regulation-7 of the Licensing Regulations. The Authority approved the advertisement containing (a). the prospectus; (b). a notice to the general public about the admission of the application of the Hub Power Company Limited, to invite the general public for submitting their comments in the matter as stipulated in Regulation-8 of the Licensing Regulations. The Authority also approved the list of the persons for providing their comments or otherwise to assist the Authority in the consideration of the above mentioned application of the Hub Power Company Limited. Accordingly, the advertisement was published in one Urdu and one English national newspaper on October 02 & 04, 2015 respectively.

(iii). Apart from the above, separate letters were also sent to government ministries, their attached departments, representative organizations and individual experts etc. on October 06, 2015. The said stakeholders were directed to submit their views/comments for the assistance of the Authority.

(iv). Meanwhile, the sponsors of the project informed that in order to implement the project, special purpose vehicle has been incorporated in the name of China Power Hub Generation Company (Pvt.) Limited (CPHGCPL). The Authority considered the matter in its Regulatory Meeting (RM-16-11), held on January 14, 2016 and directed to publish a new advertisement in terms of Regulation-8 of the Licensing Regulations. Accordingly an addendum to the earlier notice of admission was published in press on February 02, 2016. In this regard, notices were also sent to the relevant stakeholders on February 08, 2016.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

(C). Comments of Stakeholders

(i). The Authority received comments from eleven (11) stakeholders including Board of Investment, Ministry of Petroleum and Natural Resources, Directorate General of Mines & Minerals, Govt. of Balochistan, Punjab Mineral Development Corporation, PPIB, National Transmission and Despatch Company Limited (NTDC), Central Power Purchasing Agency (Guarantee) Limited (CPPA-G), Ministry of Ports and Shipping, Port Qasim Authority, Anwar Kamal Law Associates, and Energy Department, Govt. of Sindh.

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

(a). Board of Investment submitted that energy sector is the priority sector of the government to cater the short fall in the country. Uninterrupted and affordable supply of energy is the backbone for industrial growth as well as attracting foreign direct investment in the country. In view thereof, Board of Investment supports the grant of generation licence subject to the tariff being consumer friendly and competitive with neighboring countries;

(b). Ministry of Petroleum and Natural Resources commented that the company intends to install super critical coal fired thermal power plant and as such, no gas is required for utilization. Therefore, Ministry of Petroleum and Natural Resources has no objection for the grant of generation licence;

(c). Directorate General of Mines & Minerals, Govt. of Balochistan appreciated the establishment of 1320.00 MW thermal power plant at Hub and proposed that coal resources of the province may be used in these power plants to promote the coal industry of Balochistan;

(d). Punjab Mineral Development Corporation in its comments expressed no objection to the grant of generation licence;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

(e). PPIB in its comment supported the issuance of generation licence and stated that it has issued LoI to the project company and the project is well on track to achieve commercial operation in 2018. PPIB further apprised that the project is included as 'actively promoted projects' in China Pakistan Economic Corridor (CPEC) framework;

(f). NTDC commented that a 500 KV double circuit transmission line from the Hub Power Company Limited to Matiari has been proposed for interconnection of the project with national grid and PC-I has been sent to planning commission for approval of the competent authority. Further, grid interconnection study Report-1(Load Flow) for evacuation of power from the project has been sent to the sponsors. Grid interconnection study Report-2 (Short circuit and system stability study) will be sent later after receipt of some parameters of the power plant. NTDC further clarified that generally the interconnection scheme is proposed initially on the basis of Report-1 for evacuation of power to national grid and it remains the same after Report-2 in which the plant interconnection scheme is finalized. However, in some cases final interconnection scheme in Report-2 may be modified with respect to the proposals in Report-1;

(g). CPPA-G commented that generation licence may be granted for development of the project. However, while approving the tariff the cost of land may be adjusted as the new coal fired plant is being developed on the existing site of 1200 MW RFO based power plant of the Hub Power Company Limited as the cost of land was already included in the Hub Power Company Limited 's RFO based plant;

(h). Ministry of Ports and Shipping communicated no objection to the grant of generation licence to the applicant. Ministry of Ports and Shipping further submitted that it does not guarantee provision of coal for the plant which will be the respon[illegible] of the developer

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

itself. However in case of import of coal the concerned port authorities can facilitate handling at port;

(i). Port Qasim Authority submitted that in view of the shortage of energy in the country, the project is supported;

(j). Anwar Kamal Law Associates provided detailed comments and opposed the grant of generation licence to the applicant on "take or pay" basis. Anwar Kamal Law Associates in its comments made serious reservation regarding performance of the Authority stating that the regulator has failed to remove the inefficiencies of the power sector. Further, Anwar Kamal Law Associates has highlighted different issues including issues of energy mix, poor performance of generation & distribution companies, high price of electricity, increased load shedding, long term power purchase agreements on take or pay basis, installation of imported coal based power plants in mid-country, coal transportation and logistics issues, surplus capacity, under utilization of power plants, induction of new plants on take or pay basis, economic merit order and market rules developed by NEPRA etc.

(k). Energy Department, Govt. of Sindh submitted that the establishment of the 1320.00 MW thermal power plant may be considered as per government policy guidelines. The guidelines of environmental protection agency should strictly be followed and new technology should be used to reduce the risk of emission of CO2. Energy Department, Govt. of Sindh further added that detail/specification of machinery/technology of combustion should be furnished for detail technical comments.

(iii). The Authority examined above comments of stakeholders and observed that some of the stakeholders (i.e. Directorate General of Mines & Minerals, Govt. of Balochistan, CPPA-G and Anwar Kamal Law Associates had raised certain objections to the grant of generation licence to CPHGCPL. Therefore, it was considered appropriate seeking perspective of the applicant on

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

the comments/observations of Directorate General of Mines & Minerals, Govt. of Balochistan, CPPA-G and Anwar Kamal Law Associates.

(iv). On the observation of Directorate General of Mines & Minerals, Govt. of Balochistan that coal resources of the Balochistan may be used in the power plant, the CPHGCPL submitted that it has positively considered the proposal of utilizing coal resources of Balochistan and has started examining technical possibilities of utilizing reasonable percentage of local coal in the coal blend subject to the approval of the Authority.

(v). Regarding the observations of CPPA-G that while approving the tariff the cost of land may be adjusted as the new coal fired plant is being developed on the existing site of the Hub Power Company Limited, CPHGCPL has submitted that land acquired by it and the land transferred by the Hub Power Company Limited must be addressed separately. The project shall be developed by China Power Hub Generation Company- a joint venture between the Hub Power Company Limited and CPIHL. The applicant/CPHGCPL is an independent legal entity that shall acquire the land, and shall develop the project pursuant to upfront tariff-2014 and under the said upfront tariff, CAPEX (which includes cost of land) is fixed and is not an item for true-up. The Authority has not adjusted the land price for any coal based projects under the upfront tariff regime irrespective of the fact if they are being developed on some port authority's discounted leased land located at coast or highly exorbitant fertile agriculture land in mid country. Limited true up is allowed in upfront tariff for certain projects on the basis of unforeseen or special costs. Cost of land has never been the basis of seeking an "adjustment" in the upfront tariff. Therefore, to the extent of the CPHGCPL, any reference of adjustment for the 'paid land' is irrelevant.

(vi). As regards transfer of land by the Hub Power Company Limited to the CPHGCPL, it is worth noting that the Hub Power Company Limited project is a Built Own Operate (BOO) IPP. As such, the Hub Power Company Limited is the ultimate owner of the land until a situation arises where the project is terminated before the expiry of 'Term' and the assets be transferred to GoP after settlement of agreed compensation amounts. For settling a HUBCO-termination scenario and the transfer of assets to GoP (including the land transferred to the CPHGCPL), we have initiated a process of dialogue with the concerned agency i.e. CPIB. Had the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

Hub Power Company Limited project been a BOOT (Built, Own, Operate and Transfer) IPP only then, the concerns of CPPA-G could have any basis for arguing adjustment of 'paid land', It is very important to note here that even with transferring of some piece of land to the applicant/CPHGCPL, the Hub Power Company Limited would continue providing the contracted capacity to the power purchaser for which it has been paid in past, and will be paid in future through the capacity purchase price.

(vii). In its rejoinder to the observations of Anwar Kamal Law Associates, the applicant/CPHGCPL has submitted that the comments are related to GoP Policies and working of NEPRA and nothing directly pertains to the grant of generation licence. Further, the issue of "take or pay" relates to tariff rather than generation licence.

(viii). The Authority considered the rejoinder and the other submissions of CPHGCPL and found the same plausible. Accordingly, the Authority considered it appropriate to process the application of CPHGCPL for the consideration of the grant of Generation Licence as stipulated in the Licensing Regulations and NEPRA Licensing (Generation) Rules, 2000 ("the Generation Rules").

(D). Grant of Generation Licence

(i). Sustainable and affordable electric power is a key and lifeline for the socio-economic development of any country. In fact, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. The electricity consumption per capita has a strong correlation to the Social Development Indices (Human Development Index-HDI, life expectancy at birth, infant mortality rate, and maternal mortality) and Economic Indices (such as GDP per capita etc.).

(ii). Increasing electricity consumption per capita can directly stimulate faster economic growth and indirectly achieve enhanced social development. In short, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. In view of the said, the Authority is of the considered opinion that for sustainable development, all types of electric power generation resources including coal, hydel, wind, solar and other

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

Renewable Energy (RE) resources must be tapped and developed on priority basis both in Public and Private Sectors.

(iii). The current energy mix of the country is skewed towards the costlier thermal generation facilities/power plants operating on Furnace Oil. The Import of relatively expensive furnace oil results in depletion of the precious foreign exchange reserves of the country affecting the macro and micro stability of the country. In view of the said, an increase in the consumer end tariff is experienced which not only results in higher inflation but it also affects the competitiveness of the local Industry with its foreign peers. In order to address the said issues, the Authority considers it imperative that efforts must be made to change the energy mix towards cheaper fuels. With the depleting natural gas reserves in the country and relatively longer lead time for the construction of hydro electric power projects, the coal power plants are considered to be the best option in the short and medium term planning. Therefore, to reduce the demand-supply gap and to achieve sustainable development, it is vital that coal projects are given priority for power generation and their development is encouraged. In view of the said, the Council of Common Interests (CCI) approved the Power Policy 2015 which envisages rationalizing the energy mix and reducing the demand-supply gap through imported and indigenous coal based power generation. In consideration of the said, the Authority is of the view that the proposed project of CPHGCPL is consistent with the provisions of Power Policy 2015.

(iv). The Authority has examined the details submitted by CPHGCPL about the proposed generation facility/power plant with reference to its location, the type of technology being deployed, interconnection arrangements for dispersal of electric power and other relevant details.

(v). The power plant is to be located at about 20 KM from the center of Hub city, Mouza Kund, Tehsil Gadani, District Lasbella, in the Province of Balochistan. The Authority has observed that the proposed project is joint venture of the Hub Power Company Limited and China Power International Holding Limited. In this regard CPHGCPL has submitted it is a separate legal entity and that land acquired by it and the land transferred by the Hub Power Company Limited must be addressed separately. Regarding transfer of land by the Hub Power Company Limited to the project, CPHGCPL has submitted that the Hub

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

Power Company Limited project is a Built Own Operate (BOO) IPP. As such, the Hub Power Company Limited is the ultimate owner of the land until a situation arises where the project is terminated before the expiry of 'Term' and the assets be transferred to GoP after settlement of agreed compensation amounts. For settling a HUBCO-termination scenario and the transfer of assets to GoP (including the land transferred to the CPHGCPL, we have initiated a process of dialogue with the concerned agency i.e. PPIB. Regarding land of the of the project, the Authority has observed that CPHGCPL has been allocated about 333 acres land in Hub city, Mouza Kund, Tehsil Gadani, District Lasbella, in the Province of Balochistan as shown in schedule-I of the licence. In this regard, the Authority directs CPHGCPL that the aforementioned land shall be exclusively used for the proposed coal power project and CPHGCPL cannot carry out any other generation activity on this land except with prior approval of the Authority.

(vi). Regarding the issue of adjustment of cost of land of the project in the tariff, the Authority has observed that upfront tariff for coal dated June 26, 2014 is based on generic capital expenditure (CAPEX). Neither individual CAPEX line items, including cost of land have been identified nor any adjustment provided on actual basis, other than those adjustments that have been specifically identified in the tariff determination. In principle, upfront tariff is a package deal. Companies opting for upfront tariff have to commercially evaluate the approved numbers keeping in view its available resources, strength and weaknesses. Therefore, individual CAPEX item such as land cost cannot be adjusted on case to case basis.

(vii). The Authority has observed that the proposed generation facility will be consisting of 2 x 660MW super-critical units each with one boiler, steam turbine and generator. The boiler will be fueled by imported coal with the capability to burn local coal of the same quality in future. Design coal for this project will be South African RB-3 and check coal will be blend of 50% Indonesian NAR4700 and 50% South African RB-3. Proposed coal supplier would be Mercuria and Uniper. The coal will be transported through marine shipment. The Authority considers that the supercritical technology is very mature with many units in operation worldwide for many years with good track records.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(viii). Regarding technical parameters, CPHGCPL has confirmed that the selected main parameters of the steam turbine and boiler of the project (571°C and 25.40MPa) are at the high end of the supercritical class and produce high thermal efficiency that results in less emission per unit of electricity generated. Guaranteed efficiency of boiler is about 93.3% (low heating value). The modern emission control system will make the technology environmentally friendly. The high efficiency of the selected system and the low cost of coal fuel will generate the lowest cost power and make an economically feasible solution to relieve power shortages in Pakistan. The gross efficiency of the proposed generation facility/thermal power plant will be more than 41% (i.e. 42.11%) whereas the net efficiency of same will be greater than 38.00%. The Authority considers that the higher efficiency of the proposed generation facility and the low cost of fuel (i.e. imported coal) will provide an economically feasible solution to relieve power shortages in the country.

(ix). NTDC has confirmed about carrying out the load flow studies pertaining to the dispersal of electric power from the proposed generation facility. In this regard, on the basis of load flow study results, it has been confirmed that the electric power from the Imported Coal based generation facility of CPHGCPL can be dispersed to the National Grid in a reliable manner during normal and N-1 contingency conditions without any transmission constraints. In this regard, the Authority has observed that Report-2 (short circuit and system stability study) has not been provided. In view of the said, the Authority directs CPHGCPL to submit the remaining parts of the grid interconnection study (i.e. short circuit and transient & stability study) duly approved by NTDC within 08 weeks of grant of generation licence.

(x). The term of a Generation Licence under the Rule-5 (1) of the Generation Rules, is to be commensurate with the maximum expected useful life of the units comprised in a generating facility. As explained above, the proposed generation facility of CPHGCPL will be consisting of two (02) steam turbine units of 660.00 MW each. According to the International benchmarks available, the useful life of a steam turbine is normally taken at least thirty (30) years from its Commercial Operation Date (COD). Further, CPHGCPL has also confirmed that it will be negotiating a Power Purchase Agreement (PPA) with the Power Purchaser having a term of thirty (30) years. In view of the said, the Authority hereby sets the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

term of the proposed Generation Licence of CPHGCPL to be thirty (30) years from its COD.

(xi). Regarding the tariff of generation company (i.e. CPHGCPL), the Authority through its determination No. NEPRA/TRF-342/CPHGCL-2016/2043-2045, dated February 12, 2016 has granted CPHGCPL an up-front tariff for its project. The Authority directs CPHGCPL to follow the terms and conditions of the granted up-front tariff in letter and spirit and charge the power purchaser only such tariff which has been determined, approved or specified by the Authority.

(xii). As explained above, the proposed generation facility for which generation licence has been sought is based on imported coal. The coal based generation facility may be harmful to environment because of emission of green house gases and production of ash and other effluents. In this regard, CPHGCPL confirmed that proposed generation facility will have air emission control equipment, including an electrostatic precipitator and a flue gas desulfurization system to lower green house gases emissions. Effluents from the plant will be treated and monitored for compliance with National Environmental Quality Standards (NEQS) before being discharged into the sea. All other industrial effluents such as those from the boiler makeup water treatment system, oily waste and sanitary waste will be treated to comply with NEQS and re-used as far as possible. Water will also be used to mix with ash to form ash-slurry and for washing coal. Here too water will be retreated and re-used. In this regard, CPHGCPL has also provided a copy of the necessary NOC issued by Environmental Protection Agency, Govt. of Balochistan confirming that NEQS will be followed. Apart from the above, the Authority directs CPHGCPL to ensure that the generation facility conforms to the environment standards during the term of the generation licence. In view of the said, the Authority has included a separate article along with other terms and conditions that the Licensee will comply with relevant environmental standards. Further, the Authority directs CPHGCPL to submit a report on a bi-annual basis, confirming that operation of its proposed generation facility is compliant with required Environmental Standards as prescribed by Environmental Protection Agency, Govt. of Balochistan.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

In view of the above, the Authority hereby approves the grant of generation licence to CPHGCPL on the terms and conditions set out in the generation licence annexed to this determination. The grant of generation licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed there under and the other applicable documents.

Authority

Maj. (R) Haroon Rashid
(Member)

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member/Vice Chairman)

Brig. (R) Tariq Saddozai
(Chairman)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

8-9-16

National Electric Power Regulatory Authority (NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. IGSPL/68/2016

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants a Generation Licence to:

CHINA POWER HUB GENERATION COMPANY (PVT.) LIMITED

Incorporated under the Companies Ordinance, 1984
Under Corporate Universal Identification No. 0095052
Dated September 03, 2015

for its Imported Coal based Thermal Generation Facility
Located at Hub, Mouza Kund, Tehsil Gadani, District Lasbella,
in the Province of Balochistan

(Installed Capacity: 1320.00 MW Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand on 8th day of September Two Thousand & Sixteen and expires on 30th day of August Two Thousand & Forty Eight.

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-1
Definitions

1.1 In this Licence

(a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";

(b). "Applicable Documents" have the same meaning as defined in the Rules;

(c). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";

(d). "Bus Bar" means a system of conductors in the generation facility of the Licensee on which the electric power of all the generators is collected for supplying to the Power Purchaser;

(e). "Commercial Operations Date (COD)" means the Day immediately following the date on which the generation facility of the Licensee is Commissioned;

(f). "CPPA-G" means "the Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;

(g). "Grid Code" means the grid code prepared by NTDC and approved by the Authority, as it may be revised from time to time by NTDC with any necessary approval by the Authority;

(h). "Grid System" means the transmission facilities owned by the Power Purchaser, other than the Interconnection Facilities of the Licensee through which the net electric power output will be

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

received and distributed by the Power Purchaser;

(i). "IEC" means International Electrotechnical Commission or any other entity created for the like purpose and its successors or permitted assigns;

(j). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;

(k). "Interconnection Point" the physical point or points where the generation facility and the Grid System are to be connected;

(l). "Law" means the Act, relevant rules and regulations made there under and all the Applicable Documents;

(m). "Licensee" means "**China Power Hub Generation Company (Pvt.) Limited**" and its successors or permitted assigns;

(n). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;

(o). "Power Purchase Agreement" means the power purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric energy generated by the generation facility, as may be amended by the parties thereto from time to time;

(p). "Power Purchaser" means the CPPA-G purchasing power on behalf of XW-DISCOs from the Licensee, pursuant to Power Purchase Agreement;

(q). "Regulations" mean "the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time";

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

(r). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";

(s). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or Rules and regulations issued under the Act.

Article-2
Applicability of Law

This Licence is issued subject to the provisions of the Law, as amended from time to time.

Article-3
Generation Facilities

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the generation facility of the Licensee are set out in Schedule-I of this Licence.

3.2 The net capacity of the generation facility of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility before its COD.

Article-4
Term of Licence

4.1 The Licence is granted for a term of thirty (30) years from the COD of the generation facility.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

4.2 Unless suspended or revoked earlier the Licensee may apply for renewal of this licence ninety (90) days prior to the expiry of the above term as stipulated in the Regulations.

Article-5
Licence fee

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

Article-6
Tariff

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority.

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.

7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-8
Maintenance of Records

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

Article-9
Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended from time to time.

Article-10
Compliance with Environmental Standards

10.1 The Licensee at all times shall comply with the environmental standards as may be prescribed by the relevant competent authority as amended from time to time.

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility is in line with environmental standards as prescribed by the relevant competent authority.

Article-11
Power off take Point and Voltage

The Licensee shall deliver power to the Power Purchaser at the outgoing Bus Bar of its grid station. The up-gradation (step up) of generation voltage up to the required voltage level for Interconnection Point will be the responsibility of the Licensee.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-12
Provision of Information

12.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

12.2 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

Article-13
Design & Manufacturing Standards

All the components of the generation facility/power plant shall be designed, manufactured and tested according to the latest IEC, IEEE or any other equivalent standards. All plant and equipment shall be unused and brand new.

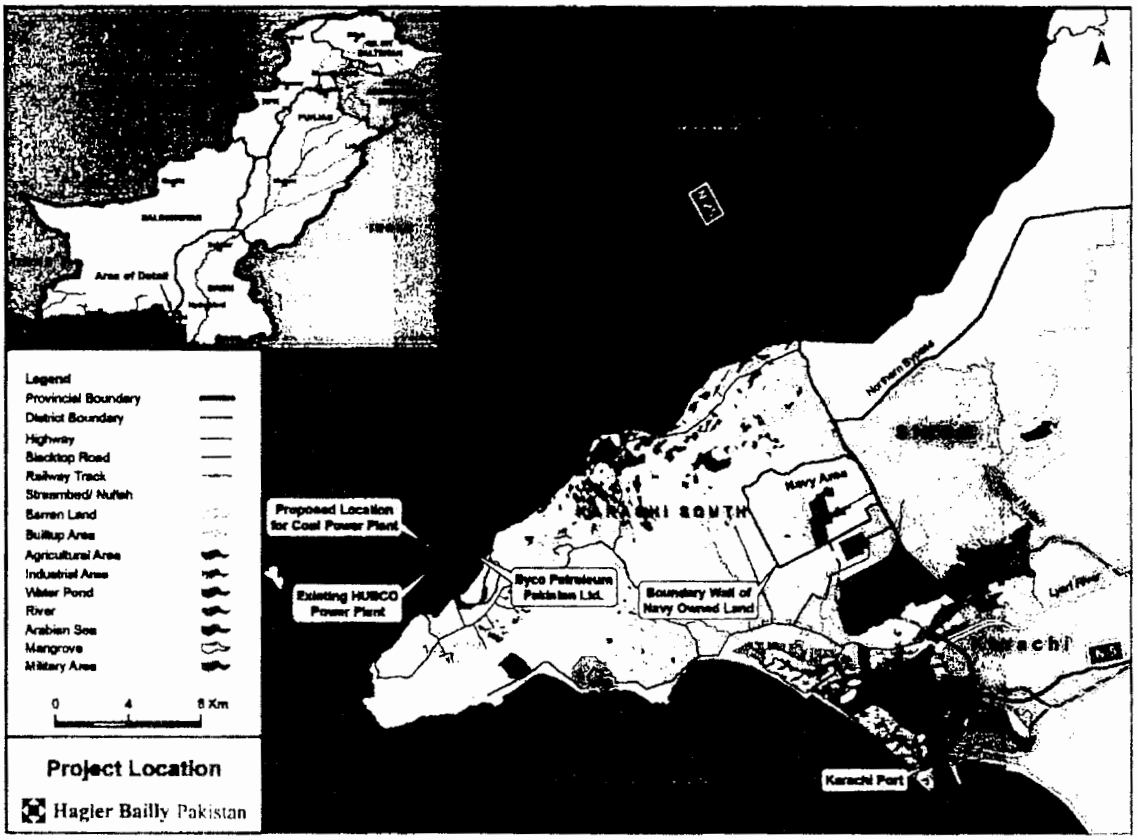
NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

SCHEDULE-I

The Location, Size (i.e. Capacity in MW), 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

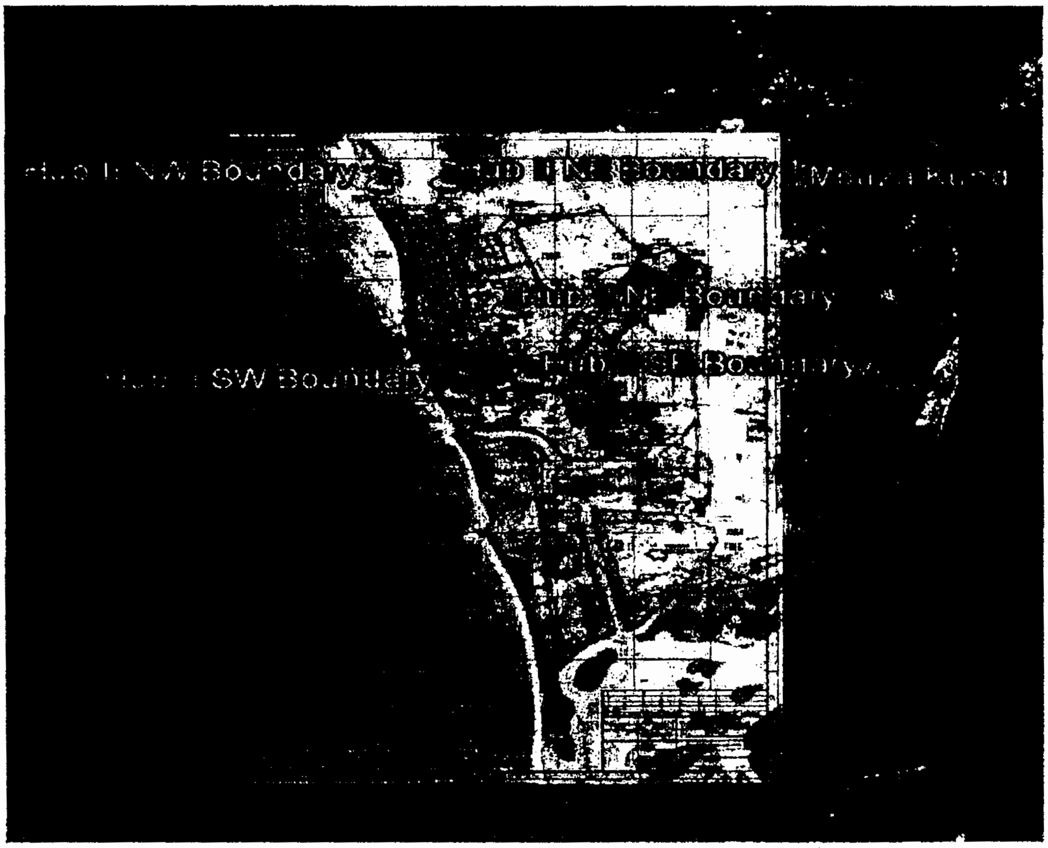
NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Site Location of the Generation Facility/Thermal Power Plant of China Power Hub Generation Company (Pvt.) Limited (CPHGCPL)



NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

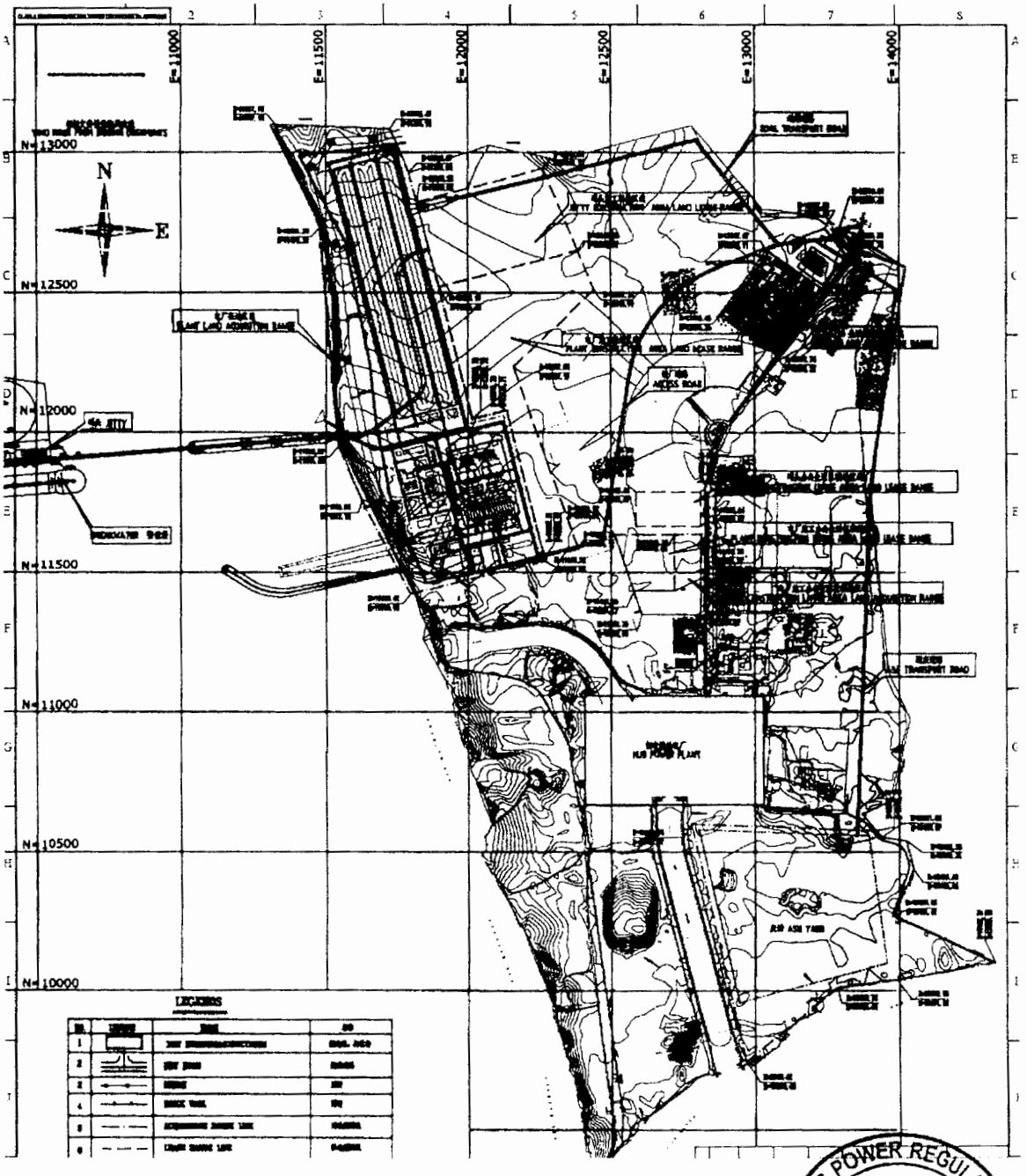
Land Coordinates of the Generation Facility/Thermal Power Plant of CPHGCPL



Land Coordinates

[illegible]	24°5[illegible]	66°[illegible]
[illegible]	24°5[illegible]	66°4[illegible]
[illegible]	24°55'1.25"N	66°4[illegible]
[illegible]	24°54'40.30"N	66°41[illegible]
South-West Boundary	24°54'41.45"N	66°41'[illegible]

Lay Out
of the Generation Facility/Thermal Power Plant of CPHGCPL



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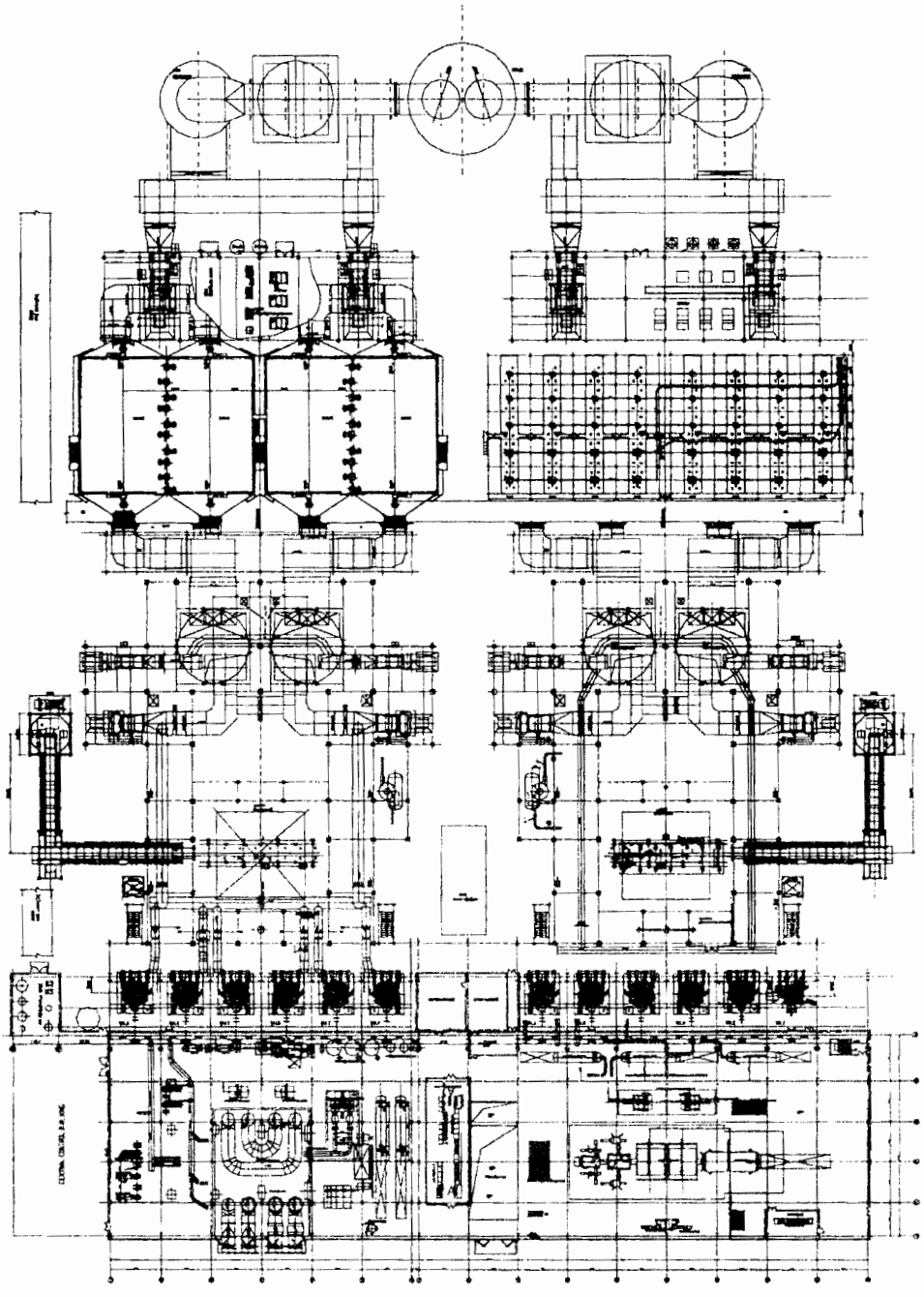
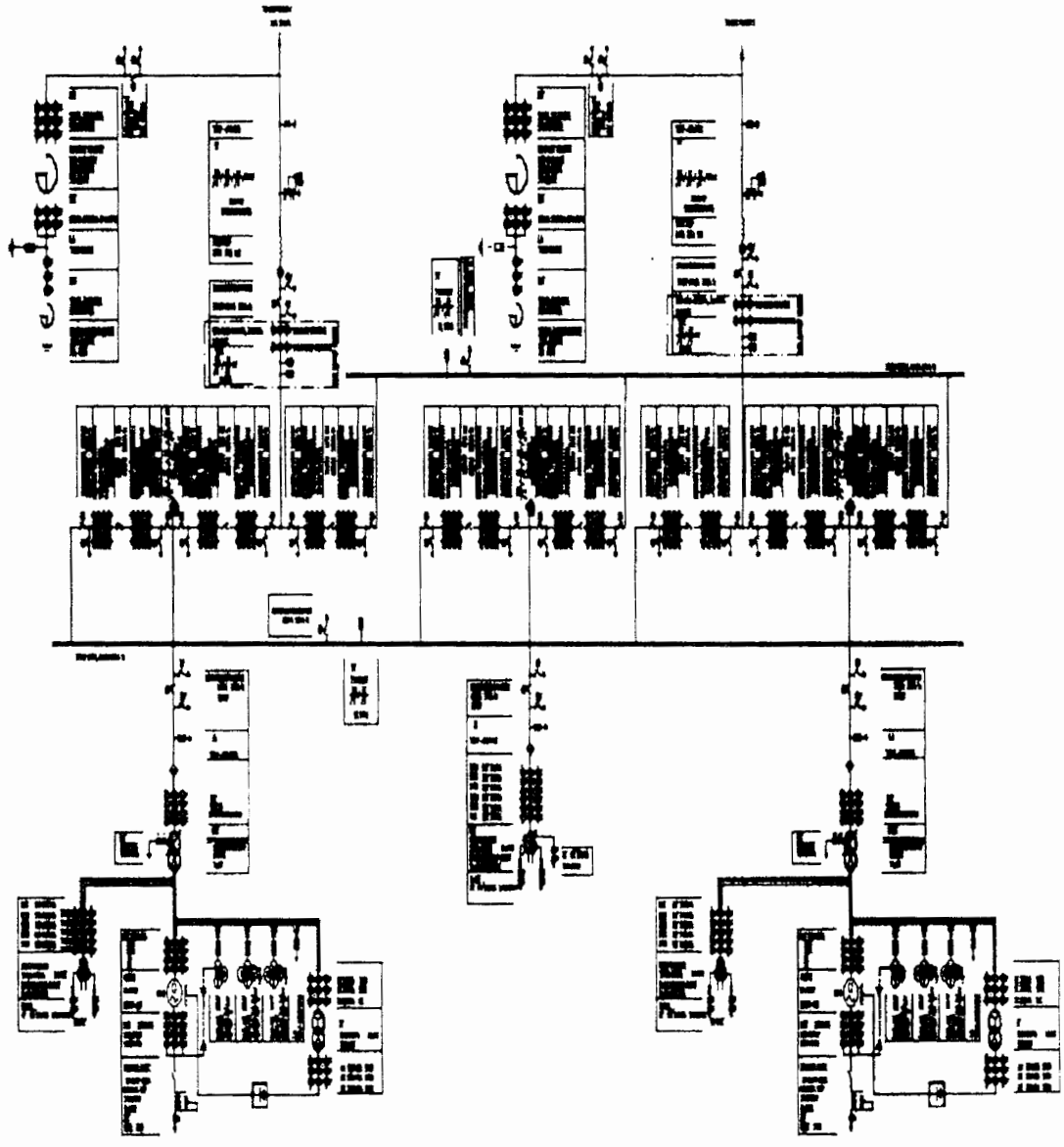
REGISTRAR
NEPRA



NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Single Line Diagram (Electrical) of the Generation Facility/Thermal Power Plant of CPHGCPL



NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Interconnection Facilities/ Transmission Arrangements for Dispersal of Power from the Generation Facility/ Thermal Power Plant of CPHGCPL

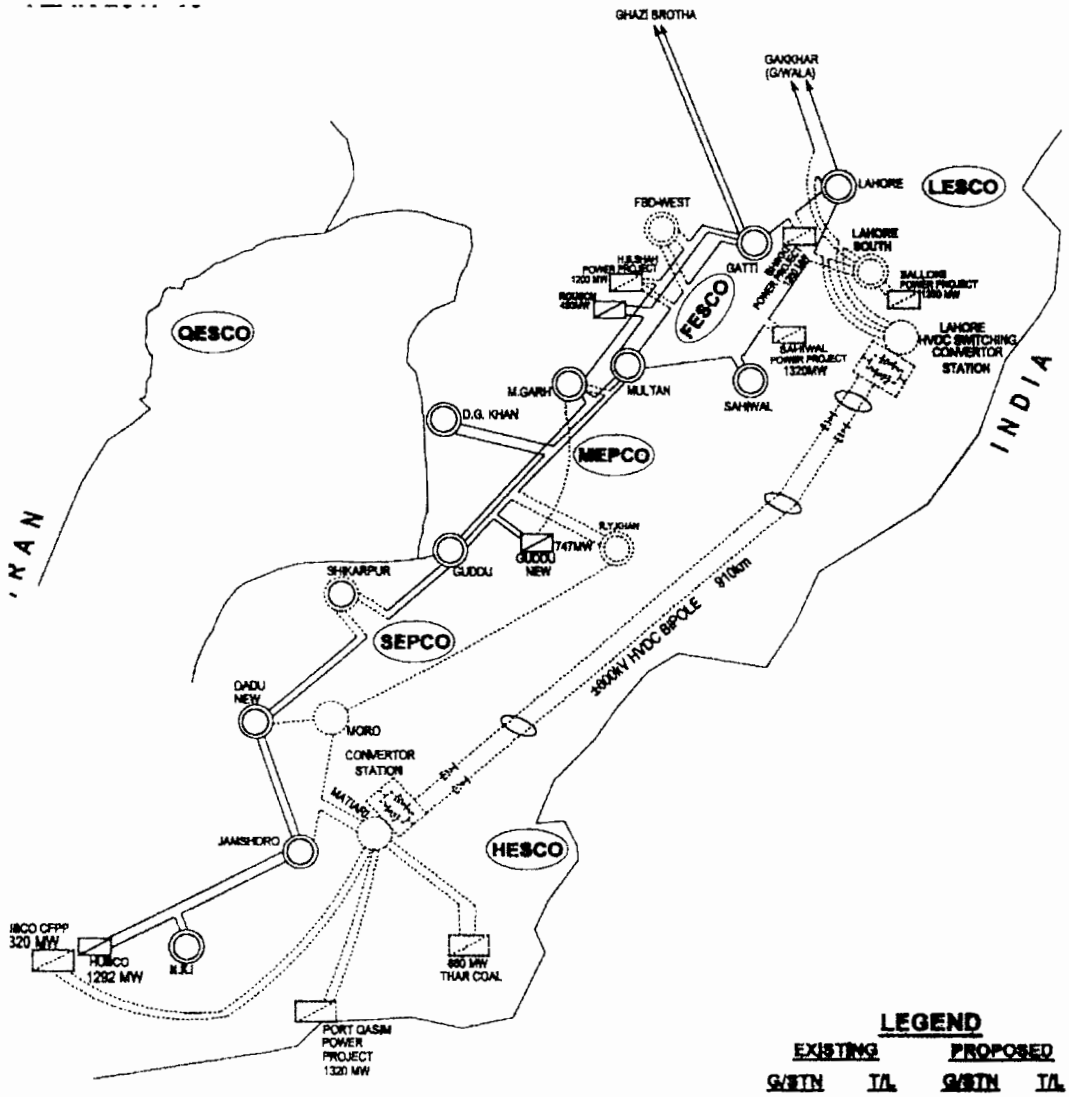
The electric power from the imported coal based generation facility/thermal power plant of CPHGCPL will be dispersed to the national grid.

(2). The interconnection facilities/transmission arrangements for supplying to national grid from the above mentioned generation facility shall be at 500 KV level. The dispersal/interconnection arrangement for supplying to national grid will be by constructing a 500 KV double circuit transmission line from HUBCO to Matiari, connecting the generation facility/thermal power plant with 500 KV Matiari Grid Station.

(3). Any change in the above mentioned interconnection facilities/transmission arrangements for dispersal of electric power as agreed by the Licensee and the power purchaser shall be communicated to the Authority in due course of time.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Schematic Diagram of Interconnection Arrangement for Dispersal of Power from the Generation Facility/ Thermal Power Plant of CPHGCPL



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REGISTRAR
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Details of Generation Facility/ Power Plant

(A). General Information

(i).	Name of Company/Licensee	China Power Hub Generation Company (Pvt.) Limited
(ii).	Registered /Business Office	10th Floor, Ocean Tower, Block-9, Main Clifton Road, Karachi
(iii).	Location of the Generation Facility	Hub, Mouza Kund, Tehsil Gadani, District Lasbella, in the Province of Balochistan
(iv).	Type of Generation Facility	Coal Fired Thermal Power Plant

(B). Plant Configuration

(i).	Installed Capacity/ Plant Size of the Generation Facility	1320.00 MW	
(ii).	Type of Technology	Pulverized Coal Thermal Power Generation Facility with Super Critical Boiler and Steam Turbine	
(iii).	Number of Units/Size (MW)	2 x 660.00 MW	
(iv).	Unit Make/Model/Type & Year of Manufacture Etc.	Boiler	Boiler , with supercritical steam parameters, ALSTOM make, Model: 2031.7/25.52-1
		Steam turbine	Super critical, single-reheat, four cylinder Steam Turbine, ALSTOM make, Model: DKY4-4ND37
(v).	COD of the Generation Facility (Expected)	August 31, 2018	
(vi).	Expected Useful Life of the Generation Facility from COD	30 years	

(C). Fuel/Raw Material Details

(i).	Primary Fuel	Imported Coal
(ii).	Start-Up Fuel	Light Fuel Oil (LFO) or High Speed Diesel (HSD)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(iii).	Fuel Source for each of the above	Primary Fuel	Start-Up
		Lignite/Sub-Bituminous Coal from Indonesia, South Africa etc.	Indigenous/Imported
(iv).	Fuel Supplier for each of the above	Primary Fuel	Start-Up
		Mercuria and Uniper	PSO/Shell etc.
(v).	Supply Arrangement for each of the above	Primary Fuel	Start-Up Fuel
		Through Ships/Vessel/Barge, Jetty and Trucks etc.	Through Oil Tankers
(vi).	No. of Storage Bunkers/Tanks/ Open Yard	Primary Fuel	Start-Up Fuel
		Two (02) coal yards	Two (02) tanks
(vii).	Storage Capacity of each Bunkers/ Tanks/Open Yard	Primary Fuel	Start-Up Fuel
		Approx. 70.6×10^4 Tons	$360m^3$
(viii).	Gross Storage	Primary Fuel	Start-Up Fuel
		Approx. 141.2×10^4 Tons	$720m^3$

(D). Emission Values

		Primary Fuel	Start-Up Fuel
(i).	SO_x (mg/Nm^3)	<200	<200
(ii).	NO_x (mg/Nm^3)	<398	-
(iii).	Particulate Matter (mg/Nm^3)	<40	-

(E). Cooling System

(i).	Cooling Water Source/Cycle	Open Channel Once-through from Arabian Sea

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(F). Plant Characteristics

(i).	Generation Voltage	22 KV (Transmission Voltage 500 kV)
(ii).	Frequency	50Hz
(iii).	Power Factor	0.8 (lagging) /0.92(leading)
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes
(v).	Ramping Rate (MW/min)	To be provided later
(vi).	Time required to Synchronize to Grid (Hrs.)	To be provided later

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

SCHEDULE-II

The Installed/ISO Capacity (MW), De-Rated Capacity At Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity At Mean Site Conditions (MW) of the Generation Facilities of Licensee are given in this Schedule

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

SCHEDULE-II

(1).	Total Gross Installed Capacity of the Generation Facility	1320.00 MW
(2).	De-rated Capacity of Generation Facility at Reference Site Conditions	1320.00 MW
(3).	Auxiliary Consumption of the Generation Facility	105.60 MW
(4).	Total Installed Net Capacity of Generation Facility at Reference Site Conditions	1214.40 MW

Note

All the above figures are indicative as provided by the Licensee. The net capacity available to power purchaser for dispatch will be determined through procedure(s) contained in the power purchase agreement or any other applicable document(s).

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

National Electric Power Regulatory Authority

Islamic Republic of Pakistan

Registrar

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

No. NEPRA/R/DL/LAG-338/ 249-57 January 05, 2017

Mr. MengDonghai,
Chief Executive Officer,
Thar Coal Block-1 Power Generation Company (Pvt.) Limited,
House No. 20/1, 21st Street, Khayaban-e-Tanzeem, Phase V,
DHA, Karachi.

Subject: **Generation Licence No. IGSPL/74/2017**
Licence Application No. LAG-338
<u>Thar Coal Block-1 Power Generation Company (Pvt.) Limited (TCBPGCPL)</u>

Reference: Your application vide letter No. Nil, dated March 08, 2016, received on March 11, 2016.

Enclosed please find herewith Generation Licence No. IGSPL/74/2017 granted by National Electric Power Regulatory Authority (NEPRA) to Thar Coal Block-1 Power Generation Company (Pvt.) Limited, for its 1320.00 MW Indigenous/Thar Coal based Thermal Generation facility located at Thar Coal Block-1, District Thar, in the province of Sindh, pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997). Further, the determination of the Authority in the subject matter is also attached.

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: <u>Generation Licence (IGSPL/74/2017)</u>

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05.01.17
(Syed Safeer Hussain)

Copy to:

1. Secretary, Ministry of Water and Power, A-Block, Pak Secretariat, Islamabad.
2. Chief Executive Officer, Hyderabad Electric Supply Company Limited (HESCO), Old State Bank Building, G.O.R Colony, Hyderabad.
3. Chief Executive Officer, Sukkur Electric Supply Company (SEPCO), Old Thermal Power Station, Sukkur.
4. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore.
5. Managing Director, Private Power and Infrastructure Board (PPIB), Ground & Second Floors, Plot No. 10, Mauve Area, Sector G-8/1, Islamabad.
6. Chief Executive Officer, Central Power Purchasing Agency Guarantee Limited (CPPAG), 6th Floor, Shaheed-e-Millat Secretariat, Jinnah Avenue, Blue Area, Islamabad.
7. Director General, Environment and Alternative Energy Department, Government of Sindh, Plot No ST-2/1, [illegible] Industrial Area, Karachi.
8. Chief Secretary, Government of [illegible] Secretariat, Karachi.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Application of Thar Coal Block-1 Power Generation Company (Private) Limited for the Grant of Generation Licence

December 29, 2016
Case No. LAG-338

(A). Background

(i). The electric power sector of the country is experiencing a supply-demand gap. In order to bridge the said deficit and improve the energy mix, Government of Pakistan has decided to install generation facilities/thermal power plants based on indigenous as well as imported coal. All efforts are being made to set up generation facilities using cheaper resources. The efforts include projects by the federal as well as provincial governments.

(ii). In order to implement the abovementioned initiative, Government of Pakistan has set up Private Power Infrastructure Board (PPIB) as a one window facilitator for the entrepreneurs interested in setting up new generation facilities. PPIB has issued Letter of Intent (LoI) to various local and foreign investors/groups. PPIB also issued LOI to Shanghai Electric Group Company Limited (SEGCL) for setting up an approximately 1320 MW supercritical indigenous coal fired generation facility/thermal power plant at Thar Coal Block-1, District Thar in the Province of Sindh.

(iii). In order to implement the project, the sponsors of the project incorporated a Special Purpose Vehicle (SPV) in the name of Thar Coal Block-1 Power Generation Company (Private) Limited (TCBPGCPL)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(B). Filing of Generation Licence Application

(i). In accordance with Section-15 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ("the NEPRA Act"), TCBPGCPL submitted an application on March 11, 2016 requesting for the grant of generation licence.

(ii). The Registrar examined the application to confirm its compliance with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 ("the Licensing Regulations"). The Registrar found the same non-compliant with the Licensing Regulations and directed TCBPGCPL for providing the missing information/documents etc. TCBPGCPL submitted the required information/documentation on April 07, 2016. Accordingly, the Registrar submitted the case to the Authority for consideration regarding admission of the application or otherwise. The Authority considered the matter in its Regulatory Meeting (RM 16-313), held on May 11, 2016 and found the form and content of the application in substantial compliance with Regulation-3 of the Licensing Regulations. Accordingly, the Authority admitted the application for the grant of the generation licence as stipulated in Regulation-7 of the Licensing Regulations. The Authority approved the advertisement containing (a). the prospectus; (b). a notice to the general public about the admission of the application of TCBPGCPL, to invite the general public to submit their comments in the matter as stipulated in Regulation-8 of the Licensing Regulations. The Authority also approved the list of relevant stakeholders to provide their comments in the matter for assistance of the Authority.

(iii). Accordingly, the advertisement was published in one Urdu ("daily Jang") and one English ("the DAWN") newspapers on May 17-18, 2016, respectively. Apart from the above, separate letters were also sent to government ministries, their attached departments, representative organizations and individual experts etc. on May 19, 2016. The said stakeholders were directed to submit their views/comments for the assistance of the Authority.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(C). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from three (03) stakeholders, which included Ministry of Petroleum and Natural Resources, Board of Investment and Ministry of Water & Power. A summary of the comments provided by the above stakeholders is as under:-

(a). Ministry of Petroleum and Natural Resources expressed its no objection for the proposed coal power project as it will not require any allocation of natural gas;

(b). Board of Investment in its comments stated that energy sector is priority of the Government of Pakistan to cater the short fall in the country. Being an investment promoting and facilitating agency, Board of Investment has also been making efforts to attract investment in the said sector. Board of Investment understands that affordable and smooth supply of energy is the backbone for industrial growth as well as attracting Foreign Direct Investment in the country. In view of the said, proposal of TCBPGCPL for grant of generation license is supported subject to consumer friendly/competitive tariff and completion of all codal/technical formalities under rules & regulations;

(c). Ministry of Water & Power submitted that this project is critical part of generation development in Pakistam and on fast track basis for implementation and the Ministry supports the proposal. Further, Ministry of Water & Power stated that the Authority may process the application as per provisions of the NEPRA Act and GOP guidelines. Ministry of Water & Power stressed that Thar coal resources are critical for future energy security of the country.

(ii). The above comments of the stakeholders were examined and the same were found supportive for the grant of generation licence to TCBPGCPL.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

Accordingly, the Authority considered it appropriate to process the application of TCBPGCPL for the consideration of the grant of generation licence as stipulated in the Regulations and NEPRA Licensing (Generation) Rules, 2000 ("the Generation Rules").

(D). Analysis of the Authority

(i). The Authority has examined the generation licence application of TCBPGCPL along with information provided with the generation licence application including feasibility study of the project, environment impact assessment study, interconnection and dispersal arrangement studies and relevant rules & regulations.

(ii). The applicant company (i.e. TCBPGCPL) is a private limited company (having Corporate Universal Identification No. 0097511, dated January 28, 2016) under Section-32 of the Companies Ordinance, 1984 (XLVII of 1984). The Registered Office of the company is located at House No. 20/1, 21st Street, Khayaban-e-Tanzeem, Phase V, D.H.A, Karachi. The Memorandum of Association of the company, the objects of the company, *interalia*, include electricity generation and its supply thereof. According to the submitted Memorandum of Association of the company, its 99.9997% shares of the company are held by Shanghai Electric Investment (Dubai) Limited, whereas the remaining 0.0003% shares are held by the three individuals namely Meng Donghai, Sha Yunfeng and Song Guohui in equal proportions.

(iii). The Project is located at Thar Coal Block-1, District Thar in the Province of Sindh. The proposed generation facility/thermal power plant will be consisting of 2 x 660MW supercritical units having supercritical variable pressure operation coal fired tower type boiler with single furnace, extraction condensing steam turbine and inner-cooled generator. The boiler will be fueled by indigenous lignite of Thar Block-1. Supercritical technology is very mature with many units in commercial operation for many years with good records. The selected main parameters of the steam turbine and boiler of the project (600°C and 270 bar) are at the high end of the supercritical class and produce high

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

thermal efficiency that results in less emission per unit of electricity generated. The modern emission control system will make the technology environmentally friendly. The high efficiency of the selected system and the low cost of coal fuel will generate the lowest cost power and make an economically feasible solution to relieve power shortages in Pakistan. The gross efficiency of the proposed generation facility/thermal power plant will be 42.39% whereas the Net Efficiency of the same will be 39%.

(iv). Regarding system studies of the project, the Authority has observed that TCBPGCPL has submitted Load Flow and Short Circuit Studies of the project, which has been carried out by Planning Department of NTDC. According the submitted system studies, the electric power generated by the proposed generation facility of TCBPGCPL will be dispersed to the National Grid at 500 KV Voltage Level. The Interconnection/Dispersal Arrangement will be consisting of a 500 kV Double Circuit transmission line, approximately 15 km long, on Quad-bundled Greeley Conductor for making In/Out of already planned Engro CFPP Matiari Single Circuit at the switchyard of 2x660 MW thermal power plant of TCBPGCPL; Further, TCBPGCPL has also submitted consent from Central Power Purchasing Agency (Guarantee) Limited (CCP-G), wherein CPPA-G has confirmed that it will purchase power generated by the 2x660 MW project of TCBPGCPL.

(v). The proposed power plant of TCBPGCPL is based on indigenous coal. The coal based generation facilities may be harmful to environment because of emission of greenhouse gases and production of ash and other effluents. In this regard, the sponsors have confirmed that the proposed generation facility will comply with the environmental standards of the country. Further, TCBPGCPL has carried out an Environmental Impact Assessment study and has also provided a copy of the No Objection Certificate (NOC) issued by Environmental Protection Agency, Government of Sindh.

(vi). Regarding land of the project, the Authority has observed that office of the District Collector, Tharparkar Government of the Sindh has allotted about 621 acres of land to TCBPGCPL in Makaan Bhave jo tar and Varval, Deh

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

Khuiyo Ghulam Shah, Taluka Islamakot, District Tharparkar. The said land has been allocated for establishment of indigenous coal based thermal power plant and its ash yard.

(vii). The Authority is of the considered opinion that project of TCBPGCPL fulfills the least cost option criteria as envisaged in the Rule-3(5) of the Generation Rules including (a). sustainable development or optimum utilization of the renewable or non-renewable energy resources proposed for generation of electric power; (b). the availability of indigenous fuel and other resources; (c). the comparative costs of the construction, operation and maintenance of the proposed generation facility against the preferences indicated by the Authority as the project has accepted the upfront tariff determined by the Authority for coal power projects; (d). the costs and rights-of-way considerations related to the provision of transmission and interconnection facilities; (e). the constraints on the transmission system likely to result from the proposed generation facility and the costs of the transmission system expansion required to remove such constraints; (f). the short-term and the long-term forecasts for additional capacity requirements; (g). the tariffs resulting or likely to result from the construction or operation of the proposed generation facility; and (h). the optimum utilization of various sites in the context of both the short-term and the long-term requirements of the electric power industry as a whole

(E). Grant of Generation Licence

(i). Sustainable and affordable electric power is a key and lifeline for the socio-economic development of any country. In fact, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. The electricity consumption per capita has a strong correlation to the Social Development Indices (Human Development Index-HDI, life expectancy at birth, infant mortality rate, and maternal mortality) and Economic Indices (such as GDP per capita etc.).

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(ii). Increasing electricity consumption per capita can directly stimulate faster economic growth and indirectly achieve enhanced social development. In short, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of electricity. In view of the said, the Authority is of the considered opinion that for sustainable development, all types of electric power generation resources including coal, hydel, wind, solar and other Renewable Energy (RE) resources must be tapped and developed on priority basis both in Public and Private Sectors.

(iii). The current energy mix of the country is skewed towards the costlier thermal generation facilities/power plants operating on Furnace Oil. The Import of relatively expensive furnace oil results in depletion of the precious foreign exchange reserves of the country affecting the macro and micro stability of the country. In view of the said, an increase in the consumer end tariff is experienced which not only results in higher inflation but it also affects the competitiveness of the local Industry with its foreign peers. In order to address the said issues, the Authority considers it imperative that efforts must be made to change the energy mix towards cheaper fuels. With the depleting natural gas reserves in the country and relatively longer lead time for the construction of hydro electric power projects, the coal power plants are considered to be the best option in the short and medium term planning. Therefore, to reduce the demand-supply gap and to achieve sustainable development, it is vital that coal projects are given priority for power generation and their development is encouraged. In view of the said, the Council of Common Interests (CCI) approved the Power Policy 2015 which envisages rationalizing the energy mix and reducing the demand-supply gap through imported and indigenous coal based power generation. In consideration of the said, the Authority is of the view that the proposed project of TCBPGCPL is consistent with the provisions of Power Policy 2015.

(iv). The Authority has observed that a part of the system studies of the project namely System Stability & Reliability Study has not been submitted. In this regard, the Authority directs TCBPGCPL to submit the same within two (02) months of the grant of the generation licence.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(v). The term of a Generation Licence under the Rule-5 (1) of the Generation Rules, is to be commensurate with the maximum expected useful life of the units comprised in a generating facility. As explained above, the proposed generation facility of TCBPGCPL will be consisting of two (02) steam turbine units of 660.00 MW each. According to the International benchmarks available, the useful life of a steam turbine is normally taken at least thirty (30) years from its Commercial Operation Date (COD). Further, TCBPGCPL has also confirmed that it will be negotiating a Power Purchase Agreement (PPA) with the Power Purchaser having a term of thirty (30) years. In view of the said, the Authority hereby fixes the term of the proposed Generation Licence of TCBPGCPL as thirty (30) years from COD of the project.

(vi). Regarding Tariff that the company will charge from the Power Purchaser, it is clarified that under Section-7(3)(a) of the NEPRA Act, determination of tariff, rate and charges etc. is the sole prerogative of the Authority. In this regard, the Authority through its determination No. NEPRA/TRF-360/TCB-1-2016/8694-8696 dated June 10, 2016 has granted an up-front tariff to TCBPGCPL for its project. The Authority directs TCBPGCPL to follow the terms and conditions of the granted up-front tariff in letter and spirit and charge the power purchaser only such tariff which has been determined, approved or specified by the Authority in terms of Rule-6 of the Generation Rules.

(vii). Regarding compliance with the environmental standards, the Authority directs TCBPGCPL to ensure that the project will comply with the environmental standards during the term of the generation licence. In view of the said, the Authority has included a separate article (i.e. Artcle-10) in the generation licence along with other terms and conditions that the licensee will comply with relevant environmental standards. Further, the Authority directs TCBPGCPL to submit a report on a bi-annual basis, confirming that operation of its generation facility/thermal power plant is compliant with required environmental standards as prescribed by the concerned environmental protection agency.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(viii). Regarding land of the project as mentioned in the Schedule-I of the generation licence, the Authority directs TCBPGCPL that the same shall be exclusively used by TCBPGCPL for the proposed coal power plant and TCBPGCPL cannot carry out any other generation activity on this land except with prior approval of the Authority.

(ix). In view of the above, the Authority hereby approves the grant of generation licence to TCBPGCPL on the terms and conditions set out in the generation licence annexed to this determination. The grant of generation licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed there under and the other applicable documents.

Authority:

Maj. (R) Haroon Rashid
(Member)

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member/Vice Chairman)

Tariq Saddozai
(Chairman)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

05.01.17

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. IGSPL/74/2017

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants Generation Licence to:

THAR COAL BLOCK-1 POWER GENERATION COMPANY (PRIVATE) LIMITED

Incorporated Under Section-32
of the Companies Ordinance, 1984 (XL VII of 1984) Having Corporate
Universal Identification No. 0097511, Dated January 28, 2016

for its Indigenous/Thar Coal Based Thermal Generation Facility Located at Thar Coal Block-1, District Thar, in the Province of Sindh

(Installed Capacity: 1320.00 MW Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand on 05th day of January Two Thousand & Seventeen and expires on 30th day of December Two Thousand & Fifty.

05.01.17

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-1
Definitions

1.1 In this Licence

(a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";

(b). "Applicable Documents" have the same meaning as defined in the Rules;

(c). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";

(d). "Bus Bar" means a system of conductors in the generation facility of the Licensee on which the electric power of all the generators is collected for supplying to the Power Purchaser;

(e). "Commercial Operations Date (COD)" means the Day immediately following the date on which the generation facility of the Licensee is Commissioned;

(f). "CPPA-G" means "the Central Power Purchasing Agency (Guarantee) Limited" or any other entity created for the like purpose;

(g). "Grid Code" means the grid code prepared by NTDC and approved by the Authority, as it may be revised from time to time by NTDC with any necessary approval by the Authority;

(h). "Grid System" means the transmission facilities owned by the Power Purchaser, other than the Interconnection Facilities of the Licensee through which the net electric power output will be received and distributed by the Power Purchaser;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(i). "IEC" means International Electrotechnical Commission or any other entity created for the like purpose and its successors or permitted assigns;

(j). "IEEE" means the Institute of Electrical and Electronics Engineers and its successors or permitted assigns;

(k). "Interconnection Point" the physical point or points where the generation facility and the Grid System are to be connected;

(l). "Law" means the Act, relevant rules and regulations made there under and all the Applicable Documents;

(m). "Licensee" means "**THAR COAL BLOCK-1 POWER GENERATION COMPANY (PRIVATE) LIMITED**" and its successors or permitted assigns;

(n). "NTDC" means National Transmission and Despatch Company Limited and its successors or permitted assigns;

(o). "Power Purchase Agreement" means the power purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric energy generated by the generation facility, as may be amended by the parties thereto from time to time;

(p). "Power Purchaser" means the CPPA-G purchasing power on behalf of XW-DISCOs from the Licensee, pursuant to Power Purchase Agreement;

(q). "Regulations" mean "the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time";

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(r). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000";

(s). "XW DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or Rules and regulations issued under the Act.

Article-2
Applicability of Law

This Licence is issued subject to the provisions of the Law, as amended from time to time.

Article-3
Generation Facilities

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the generation facility of the Licensee are set out in Schedule-I of this Licence.

3.2 The net capacity of the generation facility of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility before its COD.

Article-4
Term of Licence

4.1 The Licence is granted for a term of thirty (30) years from the COD of the generation facility.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

4.2 Unless suspended or revoked earlier the Licensee may apply for renewal of this licence ninety (90) days prior to the expiry of the above term as stipulated in the Regulations.

Article-5
Licence fee

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

Article-6
Tariff

The Licensee shall charge only such tariff which has been determined, approved or specified by the Authority.

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.

7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

Article-8
Maintenance of Records

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

Article-9
Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended from time to time.

Article-10
Compliance with Environmental Standards

10.1 The Licensee at all times shall comply with the environmental standards as may be prescribed by the relevant competent authority as amended from time to time.

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility is in line with environmental standards as prescribed by the relevant competent authority.

Article-11
Power off take Point and Voltage

The Licensee shall deliver power to the Power Purchaser at the outgoing Bus Bar of its grid station. The up-gradation (step up) of generation voltage up to the required voltage level for Interconnection Point will be the responsibility of the Licensee.

Article-12
Provision of Information

12.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

12.2 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

Article-13
Design & Manufacturing Standards

All the components of the generation facility/power plant shall be designed, manufactured and tested according to the latest IEC, IEEE or any other equivalent standards. All plant and equipment shall be unused and brand new.

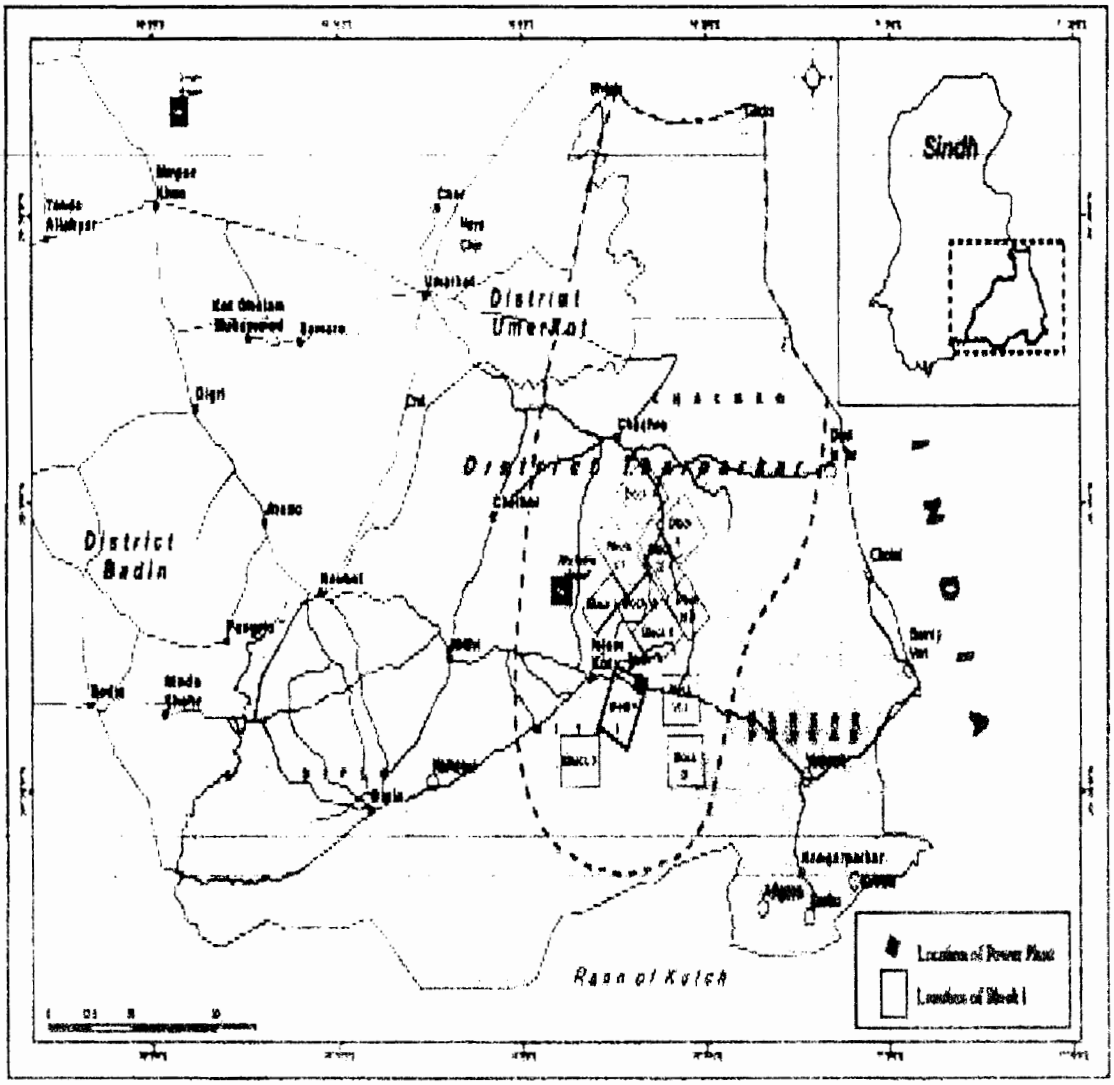
NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

SCHEDULE-I

The Location, Size (i.e. Capacity in MW), 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

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Location
of the Generation Facility/Thermal Power Plant



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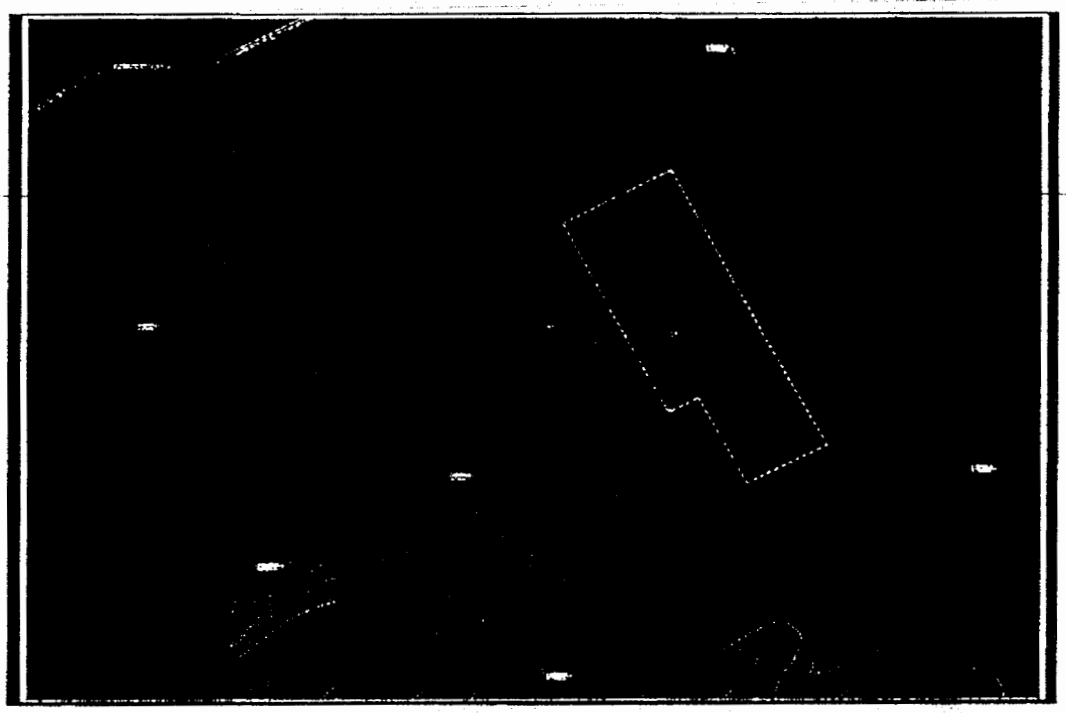
REGISTRAR
NEPRA

Land
of the Generation Facility/Thermal Power Plant



Land Coordinates (NE)

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REGISTRAR
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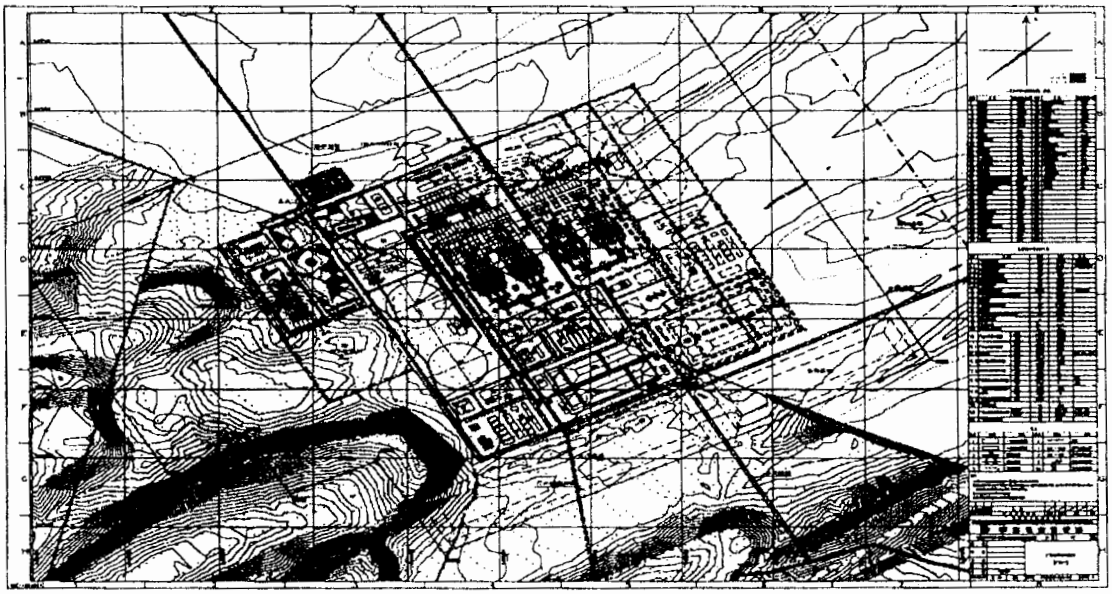
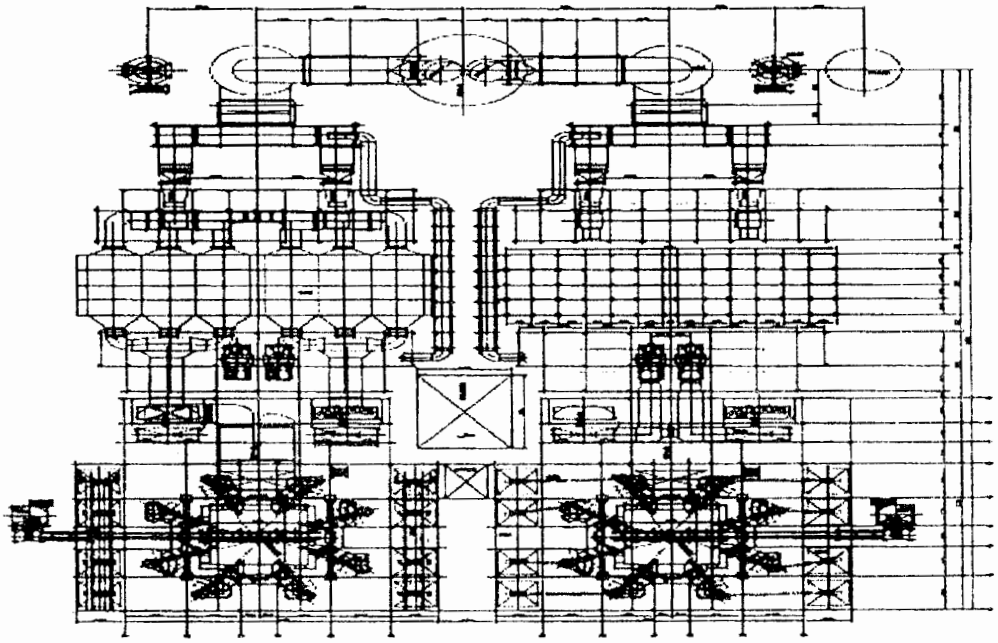
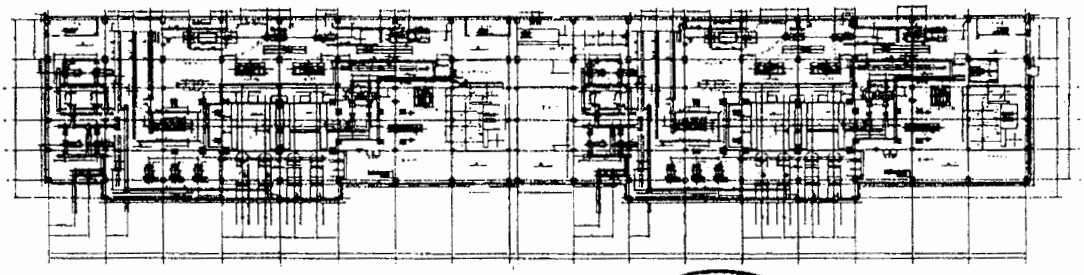
Layout
of the Generation Facility/Thermal Power Plant







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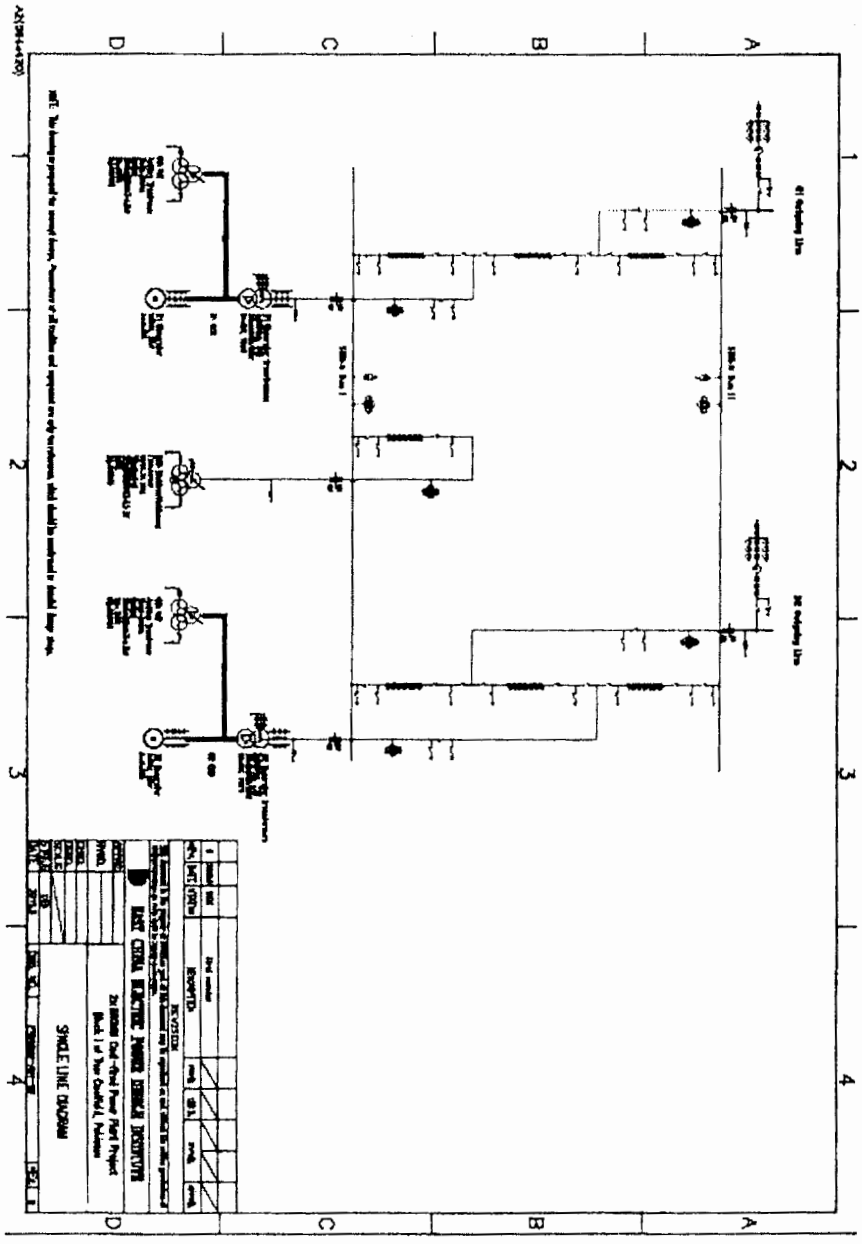
Single Line Diagram
of the Generation Facility/Thermal Power Plant



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REGISTRAR
NEPRA

Interconnection Facilities/ Transmission Arrangements for Dispersal of Power from the Generation Facility/ Thermal Power Plant

The electric power from the Coal based generation facility of Thar Coal Block-1 Power Generation Company (Private) Limited (TCBPGCPL) will be dispersed to the National Grid.

(2). The Interconnection Facilities (IF)/Transmission Arrangement (TA) for supplying to National Grid from the above mentioned generation facility shall be at 500 kV level. The Interconnection/Dispersal Arrangement will be consisting of a 500 kV Double Circuit transmission line, approximately 15 km long, on Quad-bundled Greeley Conductor for making In/Out of already planned Engro coal fired thermal power plant-Matiari Single Circuit at the switchyard of 2x660 MW thermal power plant of TCBPGCPL.

(3). Any change in the above mentioned IF A for dispersal of electric power as agreed by the Licensee and the Power Purchaser shall be communicated t the Authority in due course of time.

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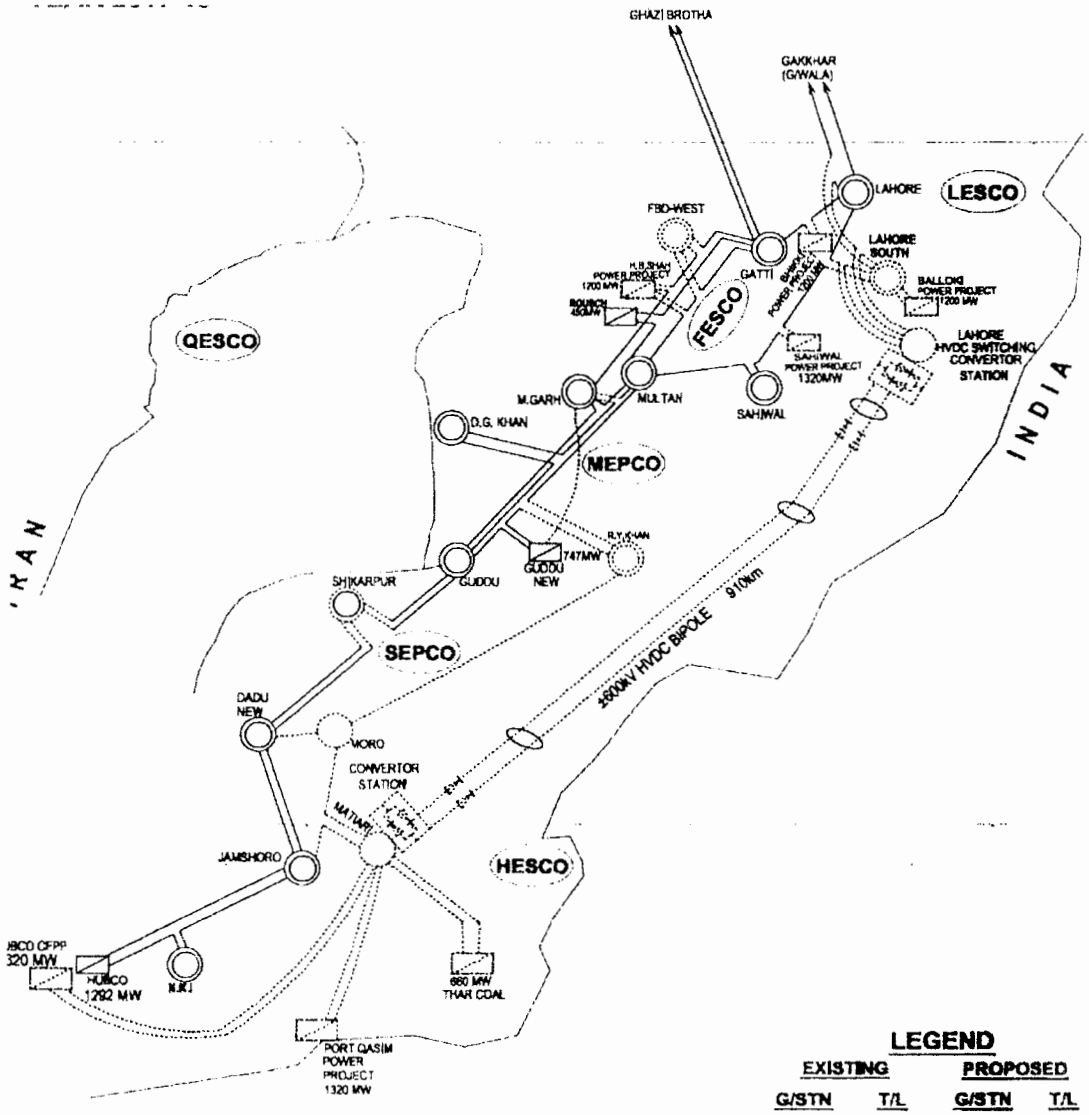
REGISTRAR
NEPRA

Schematic Diagram of Interconnection Arrangement for Dispersal of Power from the Generation Facility/ Thermal Power Plant



LEGEND

	EXISTING		PROPOSED	
	G/STN	T/L	G/STN	T/L
500kV	○	——	○	——
220kV	○	——	○	——
±500kV HVDC				
±600kV HVDC				
500kV HYDEL P/STN	▭		▭	
500kV THERMAL P/STN	▨		▨	

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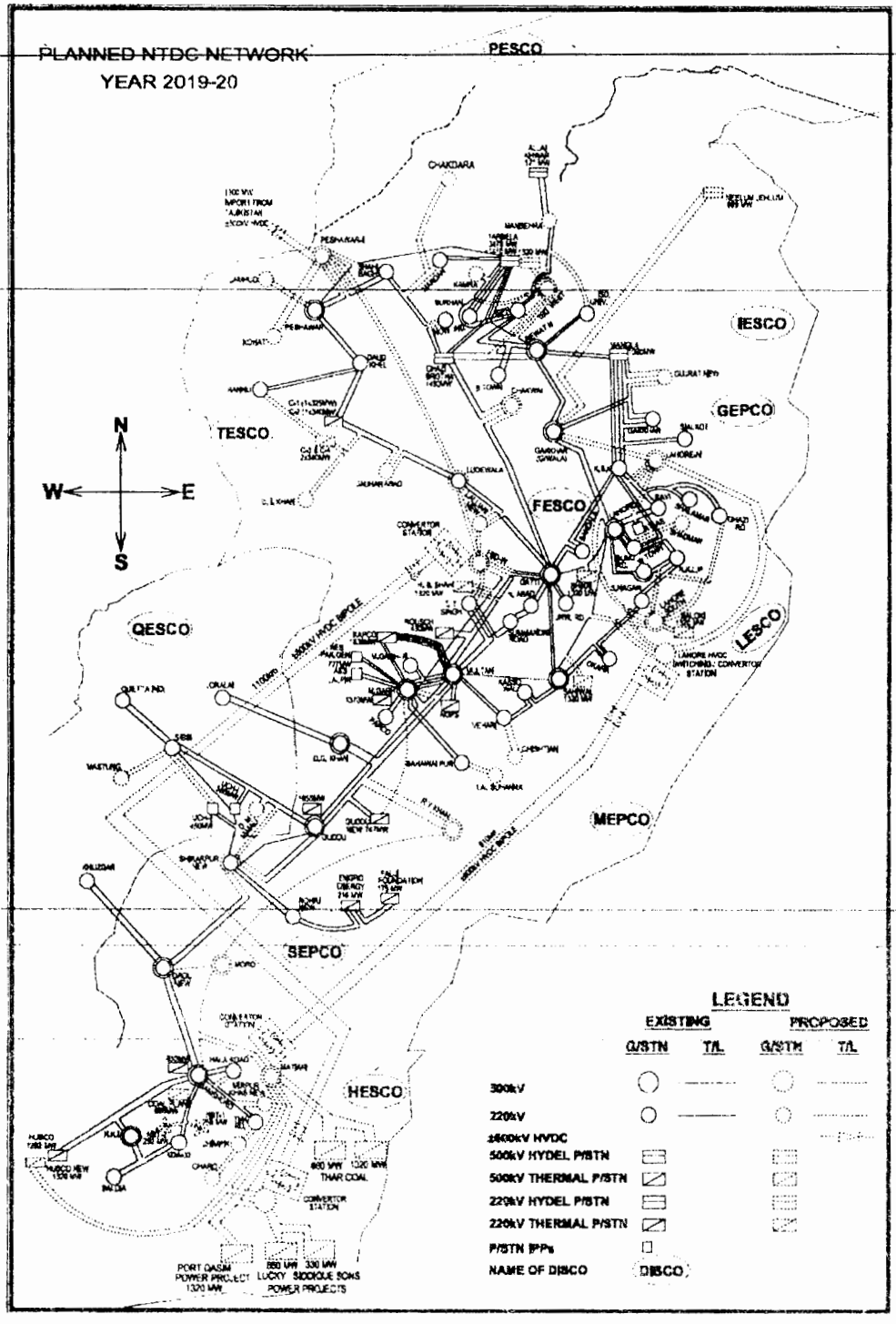

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REGISTRAR
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Details
Of the Generation Facility/
Thermal Power Plant

(A). General Information

(i).	Name of Company/Licensee	Thar Coal Block-1 Power Generation Company (Private) Limited
(ii).	Registered /Business Office	10th Floor, Ocean Tower, Block-9, Main Clifton Road, Karachi
(iii).	Location of the Generation Facility	Thar Coal Block-I, Tehsil Mithi, District Tharparkar, Sindh Province
(iv).	Type of Generation Facility	Mine Mouth Lignite fired power generation

(B). Plant Configuration

(i).	Installed Capacity/ Plant Size of the Generation Facility	1320.00 MW	
(ii).	Type of Technology	High parameter supercritical tower-type boiler	
(iii).	Number of Units/Size (MW)	2 x 660.00 MW	
(iv).	Unit Make/Model/Type & Year of Manufacture Etc.	Boiler	High parameter supercritical variable pressure operation coal fired concurrent boiler, tower-type boiler with single furnace, once reheat and balanced draft
		Steam turbine	High parameter supercritical, once-reheat, tandem, four-casing, four-flow condensing steam turbine. (660 MW, 27 MPa, 600°C,) STP Make & Model: N660-27/600/600
		Generator	660 MW, an inner-cooled generator with rotor and stator core cooled by hydrogen and stator winding cooled by water. SGP Make & Model: QFSN-660-2

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(v).	COD of the Generation Facility (Expected)	December 31, 2020
(vi).	Expected Useful Life of the Generation Facility from COD	30 years

(C). Fuel/Raw Material Details

(i).	Primary Fuel	Thar Block-I Lignite	
(ii).	Start-Up Fuel	Light Fuel Oil (LFO)	
(iii).	Fuel Source for each of the above	Primary Fuel	Start-Up
		Lignite/Sub-Bituminous Coal from Thar Block-I	Indigenous/Imported
(iv).	Fuel Supplier for each of the above	Primary Fuel	Start-Up
		The main fuel source is indigenous, produced from Thar Block-I lignite mine, owned & operated by Sino Sindh Resources (Private) Limited (SSRL)	Indigenous
(v).	Supply Arrangement for each of the above	Primary Fuel	Start-Up Fuel
		8753613 Ton (Max) per annum via belt conveyer from Thar Block-I Mine	1742 t per annum
(vi).	No. of Storage Bunkers/Tanks/ Open Yard	Primary Fuel	Start-Up Fuel
		One Open stockyard (two parts)	Two Oil tanks
(vii).	Storage Capacity of each Bunkers/	Primary Fuel	Start-Up Fuel

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
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	Tanks/Open Yard	30 days	1000 M^2
(viii).	Gross Storage	Primary Fuel	Start-Up Fuel
		Approx. 658680 Ton	2000 M^2

(D). Emission Values

		Primary Fuel	Start-Up Fuel
(i).	SO_x (mg/Nm^3)	<400	<400
(ii).	NO_x (mg/Nm^3)	<500	<500
(iii).	Particulate Matter ($mg/Nm^{3)}$	<100	-

(E). Cooling System

(i).	Cooling Water Source/Cycle	Nara river water from Government of Sindh scheme (primary source) and well water from mine (backup source)/Cycle: Close cycle cooling system, but the air cooling system might be considered if required

(F). Plant Characteristics

(i).	Generation Voltage	22KV
(ii).	Frequency	50Hz
(iii).	Power Factor	0.85 (lagging) /0.95(leading)
(iv).	Automatic Generation Control (AGC) (MW control is the general practice)	Yes

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(v).	Ramping Rate (MW/min)	0.5-1%rated load (3.3-6.6MW/Minute). This figure is indicative and will be confirmed after engineering design of the plant
(vi).	Time required to Synchronize to Grid (Hrs.)	5 minutes. This figure is indicative and will be confirmed after engineering design of the plant

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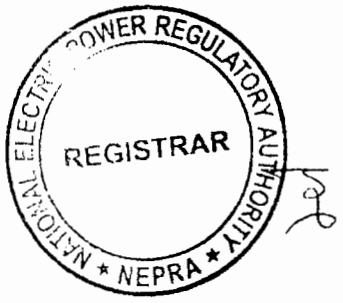
SCHEDULE-II

The Installed/ISO Capacity (MW), De-Rated Capacity at Mean Site Conditions (MW), Auxiliary Consumption (MW) and the Net Capacity At Mean Site Conditions (MW) of the Generation Facilities of Licensee are given in this Schedule



SCHEDULE-II

(1).	Total Gross Installed Capacity of the Generation Facility	1320.00 MW
(2).	De-rated Capacity of Generation Facility at Reference Site Conditions	1320.00 MW
(3).	Auxiliary Consumption of the Generation Facility	105.60 MW
(4).	Total Installed Net Capacity of Generation Facility at Reference Site Conditions	1214.40 MW

Note

All the above figures are indicative as provided by the Licensee. The net capacity available to power purchaser for dispatch will be determined through procedure(s) contained in the power purchase agreement or any other applicable document(s).

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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ANNEX 4

DECISION REGARDING SUO MOTO REVIEW UPFRONT COAL TARIFF

National Electric Power Regulatory Authority
Islamic Republic of Pakistan

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad
Ph: +92-51-9206500, Fax: +92-51-2600026
Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

Registrar

No. NEPRA/TRF-UTC/2013/13032-13034
September 23, 2016

Subject: **Decision of the Authority regarding Suo Moto Review Proceedings in the Fuel Price Adjustment Mechanism Determined in Upfront Coal Tariff**

Dear Sir,

Please find enclosed herewith the subject Decision of the Authority (25 Pages) regarding Suo Moto Review Proceedings in the Fuel Price Adjustment Mechanism Determined in Upfront Coal Tariff.

2. The subject Decision is being intimated to the Federal Government for the purpose of notification in the Official Gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

Enclosure: As above

23.09.16

(Syed Safeer Hussain)

Secretary
Ministry of Water & Power,
'A' Block, Pak Secretariats
Islamabad

CC: 1. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad.
2. Secretary, Ministry of Finance, 'Q' Block, Pak Secretariat, Islamabad.

National Electric Power Regulatory Authority

(NEPRA)

****

Decision of the Authority

Regarding *suo moto* Review Proceedings in the Fuel Price Adjustment Mechanism Determined in Upfront Coal Tariff

September 23, 2016

Commentators:

i. Argus Media Limited
ii. China Power Hub Generation Company Limited (CPHGCL)
iii. Norez Abdullah
iv. Anglo American Marketing Limited (AAML)
v. Port Qasim Electric Power Company Limited (PQEPCL)
vi. Global Coal (gC)
vii. NISHAT Chunian Group
viii. SIDDIQSONS Energy Limited
ix. Lucky Electric Power Company
x. Kot Addu Power Company Limited (KAPCO)

Background

1. The Authority approved coal price adjustment mechanism (hereafter "the mechanism") in the determination of coal upfront tariff dated June 26, 2014 (hereinafter referred to as "the Determination"). The mechanism as illustrated in para xxv page 33 of the Determination is reproduced below: -

"

$$FCC = \left| \left(CP_{(RB)} + Ft_{(M)} + MI + OC \pm Premium/Discount \right) \times \frac{HR}{HV_{(RB)}} \times \frac{Q_{(RB)}}{Q_{(T)}} \right| \times FC_{(Exch)} + \left| \left(CP_{(NCA)} + Ft_{(M)} + MI + OC \pm Premium/Discount \right) \times \frac{HR}{HV_{(NCA)}} \times \frac{Q_{(NCA)}}{Q_{(T)}} \right| \times FC_{(Exch)} + \left| \left(CP_{(NCI)} + Ft_{(M)} + MI + OC \pm Premium/Discount \right) \times \frac{HR}{HV_{(NCI)}} \times \frac{Q_{(NCI)}}{Q_{(T)}} \right| \times FC_{(Exch)} + \left| CP_{(Local)} \times \frac{HR}{HV_{(Local)}} \times \frac{Q_{(Local)}}{Q_{(T)}} \right| + Ft_{(Inland)}$$

Where;

CP(RB)	=	Actual Weighted Average Richard Bay (South Africa) coal prices on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in the Globalcoal
HV(RB)	=	Actual Weighted Average Heating Value of the coal imported from South Africa
CP(NCA)	=	Actual Average Newcastle (Australia) coal prices on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in the Globalcoal
HV(NCA)	=	Actual Weighted Average Heating Value of coal imported from Australia
CP(NCI)	=	Actual Average Newcastle (Indonesia) coal prices on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in the Globalcoal

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

HV(NCI) = Actual Weighted Average Heating Value of coal imported from Indonesia

CP(Local) Actual Coal price of local coal expressed in US$/M.Ton calculated according to the following formula;

$$CP_{(Local)} = \left(\frac{HV_{(Local)}}{\left(\frac{Q_{(RB)}}{Q_{(T)}} \times HV_{(RB)}\right)+\left(\frac{Q_{(NCA)}}{Q_{(T)}} \times HV_{(NCA)}\right)+\left(\frac{Q_{(NCI)}}{Q_{(T)}} \times HV_{(NCI)}\right)}\right) \times \left(\left(\frac{Q_{(RB)}}{Q_{(T)}} \times CP_{(RB)}\right)+\left(\frac{Q_{(NCA)}}{Q_{(T)}} \times CP_{(NCA)}\right)+\left(\frac{Q_{(NCI)}}{Q_{(T)}} \times CP_{(NCI)}\right)\right)$$

HV(Local)	=	Heating Value of Local Coal
Ft(M)	=	Actual Weighted Average Contracted Marine Freight per ton from South Africa, Australia and Indonesia
Q(RB)	=	Actual quantity of coal (Tons) purchased from South Africa during the month immediately preceding the invoice month
Q(NCA)	=	Actual quantity of coal (Tons) purchased from Australia during the month immediately preceding the invoice month
Q(NCI)	=	Actual quantity of coal (Tons) purchased from Indonesia during the month immediately preceding the invoice month
Q(Local)	=	Actual Quantity of local coal purchased during the month immediately preceding the invoice month
QT	=	Total quantity of coal purchased during the month immediately preceding the invoice month
Ft(Inl)	=	Actual Inland Freight expressed in Rs./M.Ton
OC	=	Other cost Include Bunker Fuel, Port Charges, Insurance & common Jetty facility in $/Ton
FC(Exch)	=	PKR/$ exchange rate average for the month

Imported Coal (sub-bituminous)		
South Africa (6,600 Kcal/Kg)	26,190.91 BTU/Kg	
Australia (6,000 Kcal/Kg)	23,809.92 BTU/Kg	
Indonesia (6,500 Kcal/Kg)	25,794.08 BTU/Kg	
Weighted Average Calorific Values		
Imported Coal	25,555.98 BTU/Kg	
Local Coal (sub-bituminous)	22,046.00 BTUs/Kg	
Richard Bay (South Africa)-FOB	40%	US$93.40/M.Ton

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Newcastle -Australia-FOB	20%	US$89.00/M.Ton
Newcastle -Indonesia-FOB	40%	US$87.55/M.Ton
Weighted average FoB		**US$ 90.18**
Marine Freight		US$20.00/M.Ton
Marine Insurance		0.10% of FOB price
Other Costs		10% of FOB price
Weighted Average CIF Price		**US$119.60/M.Ton"**

Argus Media Proposal

2. In May 2015, Mr. Zulkarnain Noor (Vice President – Sales & Business Development) & Mr. Mohammed Ali (Regional Account Manager) of Argus Media, ("Argus") which is an independent media organization whose activities include publication of price assessments for physical energy and related commodities, approached NEPRA to seek certain clarifications on the mechanism. Argus subsequently offered their services to independently review the mechanism and submit their review in writing. The Company submitted a proposal on August 06, 2015. Relevant portion of the proposal are reproduced hereunder:

"Argus Proposes that the ICI 3 be Used as the Indonesian Price Reference instead of Average Newcastle (Indonesia) by globalCoal

- The ICI index series is the most widely accepted price reference for Indonesian coal. The ICI is a weekly spot price index for Indonesian steam coal. It has been accepted in pricing applications since its launch in June 2006.
- The ICI provides indicative prices for the five most referenced grades of Indonesian coal. The ICI is the driver for official Indonesian HBA (known as Indonesia Coal Price Reference, ICPR).
- ICI was launched to specifically capture the growing impact of Indonesian coal internationally, the critical requirement for an Indonesian coal price index that is assessed directly, independently, and transparently.
- ICI has drawn strong attention and support from the Indonesian government and the Indonesian Coal Mining Association (ICMA) as well as from the market. Companies in more than 30 different countries currently subscribe to the ICI indices.
- ICI pricing is used across many sectors. It is used as a basis for trading and contract evaluation in international trade to Southeast Asia, and Northeast Asia, both on a spot and term reference. It is used in the Indonesian domestic market to establish the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

buying price for PLN Persero, the state power generation company. ICI is used to calculate the Domestic Market Obligation (DMO) for Indonesian coal producers.

- The ICI is used by the government Directorate of Mines and Minerals in annual production asset planning. Furthermore, it is the driving component of monthly HBA (ICPR) for Indonesia tax and royalty calculations. The HBA is a basket comprising ICI 1 for 6500 kcal/kg GAR thermal coal, another Indonesian price reference and two Australian price references. However, coal exporters typically use the ICI to track and anticipate changes in the monthly HBA.

- ICI is used by the governor of Kalimantan to assess taxation and mining royalties, and beyond this sphere, companies use the ICI in various financial applications such as project valuation and feasibility, audit and internal reporting.

B) Australian Reference Coal Price to Determine the Upfront Electricity Tariff

Choice of the Australian Price Reference

- The Argus Media endorses NEPRA's inclusion of Australian coal in its ***reference coal price formula*** for imports into Pakistan. Whilst Australia is a dominant coal producer in the Asia-Pacific region, large volumes of Australian coal might not be purchased by Pakistan's power plant complex going forward given the thermal coal industry's market structure and the specifications of coal required by the power plant complex in Pakistan. However, the price formation of the sea-borne thermal coal market is impacted by decisions made by Australian coal producers and hence its inclusion makes for a more robust *reference coal price formula*. For example, price negotiations between Japanese and Australian producers on term pricing sets a price anchor for the spot markets.

- Care ought to be taken when selecting the calorific value of the Australian coal used in the *reference coal price formula*. One reason for this is on account of the issue of normalization of prices and the error that this can result when calculating the price of coal with a calorific value that is different from the price benchmark used in the normalization. The second reason is the robustness of the underlying price index used and its volatility, which will be discussed below.

Argus Proposes that the API 5 be Used as the Australian Price Reference

- As discussed earlier, the market's expectation is that the calorific value of coal that will be purchased by the Pakistani power plants will err towards the subbituminous variety. Even the higher calorific value coal that will be used for blending with the low rank material will be closer to the 5,500kcal/kg NAR range. Hence, in order to reduce

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

the errors that emerges due to the normalization of prices. Argus proposes that API 5 be used as the Australian reference price in NEPRA's *reference coal price formula.*

- The volatility of the underlying benchmark coal price is important when making a choice as to its inclusion in a price formula. NEPRA as a regulator seeks to maximize the welfare of the country's inhabitants, which would in this case require that firms are incentivized to build and operate coal-fired power plants in the country. It helps firms to invest when they are not exposed to excessive risk when they do so.

- A measure of price risk is volatility of prices. This dataset consists of 1,154 price points dating from December 2008 and June 2013, that were chosen at random. The API6 price series (in red) shows lesser volatility than its globalCoal counterpart as evidenced by the fewer spikes and troughs in the time series data.

3. The most appropriate and relevant price reference would be one which both reflects most closely the typical grades and quality of coal that would be imported into Pakistan, and which has already won widespread acceptance in the international coal market.

4. The index which most accurately meets these requirements, in terms of robustness and minimizing the errors due to price normalization, is the API 5 index for 5,500 kcal/kg NAR thermal coal.

5. Argus thus recommended the following indices for fuel price adjustment formula:

    - For Indonesia: Indonesian Coal Index (ICI 3) — 5,000kcal/kg GAR

    - For South Africa: Argus/McCloskey's Coal Price Index (API 4) — 6,000kcal/kg NAR

    - For Australia: Argus/McCloskey's Coal Price Index (API 5) — 5,500kcal/kg NAR"

Proceedings

6. In order to further deliberate on the issues and ArgusMedia proposal, the Authority accordingly decided to initiate a *suo moto* proceedings to review the fuel price adjustment mechanism provided in the Upfront Coal Tariff Determination dated June 26, 2014 in exercise of powers under section 7 (2) (g) of NEPRA Act, read with regulation 3(1) of NEPRA (Review Procedure) Regulation, 2009 and stakeholders were informed through advertisement dated January 9, 2016. Individual notices were also sent to relevant stakeholders on January 14, 2016. The Authority also decided to conduct a hearing in the matter which was held on February 18, 2016

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

7. Consequently, Summary of Argus recommendation was advertised in the national dailies and Argus proposal was uploaded on the NEPRA's website for public comment. In light of the advertisement and the notices sent, NEPRA received a number of valuable comments. These comments are summarized below:

China Power Hub Generation Company Limited (CPHGCL)

- CPHGCL stated that it is against the usage of notional basket rate for calculation of benchmark coal price.
- CPHGCL proposed that indices should be relevant, transparent & liquid
- For coal imported from Australia, NEWC (globalCoal) index should be used instead of the one proposed by Argus media.
- CPHGCL stated that as per their discussion with the traders, miner and consultant, ICI-3 proposed by the Argus for Indonesia coal is not considered a widely acceptable index. According to CPHGCL, IPP should be given the option to use both NEWC and ICI index for coal coming from Indonesia. {CPHGC later retracted this suggestion}
- According to CPHGCL, freight calculation is a complex matter. It should be indexed on a long term contract with international acceptable benchmark listed on the London based Baltic exchange. Since the major cost of Marine freight is the consumption of Bunker Fuel and hence linkage to bunker oil prices will have to be made. (CPHGCL subsequently submitted a detailed paper on freight calculation which will be discussed in detail under the issue related to freight computation).
- Other cost as currently allowed at 10% of FoB price is not a correct estimation as per CPHGCL, the FoB price of coal are subject to demand and supply of the commodity, port charges, Stevedoring, discharge port sampling other cost are fixed in nature.
- CPHGCL also stated that; Letter of credit cost related to import coal should be allowed as there is no provision for allowance of such cost in the current mechanism.

Norez Abdullah

Mr. Norez Abdullah stated that;

- The selection of coal CV should be regulated at the time of award of generation License.
- Authority should encourage the remote distanced plant to select a relatively higher CV of coal than those located at the south. This would help avoid potential price hike due to excessive demand and cannibalism of supply over long term demand

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

- There should be a minimum limit of CV for coal destined for up country as high CV coal will help reduce the transportation cost (this point was raised in the hearing). For this purpose the Authority should engage third party market analyst for Authority's guidance.

Anglo American Marketing Limited (AAML)

AMML commented that;

- To have at least two coal suppliers to reduce supply risk.
- Indices should be transparent, liquid and have reasonable longevity.
- ICI-3 for Indonesia coal is opposed as according to AAML, these are reported regularly, but not traded and result in discrepancies between the value of indices and actual transaction price.
- The only credible indices are API4 and NEWC.
- Philippines use NEWC to price Indonesia coal with a discount.
- Freight should be based on BSI, with allowance for bunker fuel adjustment.

Port Qasim Electric Power Company Limited (PQEPCL)

PQEPCL submitted that;

- The Argus media proposal is endorsed for using ICI-3 index for Indonesia coal.
- Marine freight, marine insurance, other cost and premium/discount are not directly linked to the reference heating value of the coal and should be determined separately
- PQEPCL proposed a premium of 6%

Global Coal (gC)

- gC proposed a basket rate and stated that, it is likely that Australian coal may not be largely consumed in Pakistan; however, supply and demand of this market has a significant impact on global trade flows and pricing levels. Therefore, gC's NEWC index should be used for pricing coal coming from Australia.

NISHAT Chunian Group

Nishat Chunian Commented that;

- As per Argus, Index is updated once in a week, please identify the exact date for which the index will be used, whether it will be L/C opening date, contract signing date, shipping date, average of few dates or any other.
- What if we purchase coal having a calorific value different from the proposal, for example the proposal for Indonesian coal is ICI 3 which corresponds to 5000 GAR,

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

what will be the procedure if we use coal having a calorific value different than reference coal.

- What if the power producer is unable to buy the coal at a price calculated by the index, as the index is based on historical prices and the purchase is concluded on current prices. The differential could either be upwards or downwards.
- What if the quality of coal received is different from the committed quality.
- Coal indexation as provided in the upfront tariff includes Premium and Discount, what exactly does it mean.
- What will be the mechanism for determining the Marine Freight and Inland Freight, what kind of documentation will be required.
- Is there any limit on Marine Insurance?
- What will be included in the other Cost, we believe that all the costs incidental; to bring the coal at site will be included therein, further will there be any limit on it and what kind of documentation will be required.
- What alternate indexes could be used and what if the proposed index is withdrawn.
- What will be the relevant exchange rate?
- Upfront tariff requires that for each shipment third party verification will be conducted by surveyors at loading and discharge port and the certification will in turns be verified by CPPA.
- Upfront tariff also requires Power Producer to furnish a prescribed coal usage and procurement statement duly verified and certified by the CPPA along with a monthly bill. This will not only delay the invoicing process, but also will make it practically impossible hence need to be revisited.

SIDDIQSONS Energy Limited

SEL commented that:

- The index for coal FOB price should be the same as of origin. For example, in case of Indonesian coal, the index should be of Indonesian coal.
- A premium on US $/mmBTU basis should be allowed on the FOB coal price if the IPP is purchasing the coal of CV equal to or higher than the CV of the index coal.
- A discount on US $ / mmBTU basis should be applied on FOB coal price if the IPP is purchasing the coal of CV lower than the CV of index coal.
- With the passage of time, the high CV coals will not be available for long term supply while the boiler design is done for the long term. Considering this, coal with CVs around 4600 GAR should be allowed. Our coal, however, is of 5000 GAR.
- The other components of coal price should also be fixed in a transparent manner in line with our proposal and letter dated January 18, 2016.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

LUCKY ELECTRIC:

Lucky Electric observed that;

- ~~API 4 Index to be used for South African coal.~~
- Since South African coal is traded on NAR basis, therefore, no adjustment for moisture or ash is required as the pricing is based on NET basis.
- For Indonesian coal which is traded on GAR basis, the formula for adjustment of ash and moisture be clearly defined. Please specify the index to be taken for Indonesian and Australian coal.
- The index of coal source country should apply instead of average index for South African, Indonesian and Australian.
- Premium of up to 6% be allowed on top of the index.
- Mechanism for determination of sea freight, port handling, and inland transportation needs to be clearly defined to avoid ambiguity at later stage.

KAPCO

KAPCO stated that;

- API 4 or API 2 for South African coal and globalCoal NEWC index for Australian and Indonesian coal may be allowed.
- Currently, most of the traders are reluctant to offer large quantities on long term basis. NEPRA to allow more than one supplier to cover the supply side risk.
- Most of the traders consider 5 years as long term agreement which will be renewed for next five years depending on the availability of same specification coal.
- PIBTL is asking US$ 9 per ton which is not based on any facts but they have adopted this number from NEPRA's upfront tariff KPT charges are less than US$ 4 per ton. It is requested that NEPRA shall take up matter with PQA and finalize the port charges so that terminal agreement can be initiated with PIBTL.
- NEPRA has allowed 2% losses during coal transportation. The probability of coal losses is higher during inland coal transportation as Pakistan Railways will use open hopper trucks. Therefore fine coal particles will fly away from top and also some losses from side gates due to improper sealing. KAPCO requested that additional allowance may be allowed to upcountry projects due to these losses.
- Upcountry plants must use coal of 5300 kcal/kg NAR. However, projects near ports shall also justify the use of low Btu coal on the basis of US$/Net Btu.
- NEPRA to instruct Power Purchaser to agree minimum 70% Take or Pay with IPP.
- NEPRA to also allow 70 to 80% coal procurement through long term agreement and remaining through Spot Market.
- Pakistan Railways (PR) transportation tariff is based on fixed and variable. Fixed

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

tariff will be charged on committed quantity and variable tariff will be based on actual quantity delivered. By increasing the ToP will reduce the risk of higher cost of fixed charges. It is requested that the actual fixed transportation charges shall be considered as pass through.

- If ToP is increased and Spot purchase is allowed then IPP will agree the committed quantity with PR 10% higher than ToP and take the risk of transportation by trucks if PR refuses to accommodate additional tonnage.

8. The Authority noted that the delivered coal price, which normally referred in the industry as coal CIF price, comprises several components but for simplicity and ease of comprehension, delivered coal price can be divided into four (4) components as indicated below:

   i. Freight on Board (FoB)

   ii. Marine Freight

   iii. Insurance

   iv. Other Costs such as, Port charges, Terminal charges etc.

   Accordingly;

   Coal price, Cost Insurance freight (CIF) = FoB price + marine freight + Insurance + Other cost

9. During the proceedings, the Authority observed that the price adjustment mechanism to be proposed should not only be simple and transparent but also acceptable to coal based IPPs. In this regard numerous issues came up during the proceedings. Therefore, after considering the submitted comments and detailed discussion with relevant stakeholders, the following issues were framed which are discussed hereunder:

   I. How to fix indices for pricing FoB coal imported from different regions?
   II. How to benchmark freight rates and subsequent adjustments?
   III. How to ascertain Other Cost?
   IV. Whether or not to have a basket benchmark price for coal adjustment to be determined by giving a reasonable weightage to coal exporting countries like South Africa, Australia and Indonesia?
   V. Whether or not to set minimum quality (CV) of coal to be transported up country?

How to fix indices for pricing FoB coal imported from different regions?

10. The Argus media proposed the following index in its recommendation:

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

- For Indonesia: Indonesian Coal Index (ICI 3) -- 5,000kcal/kg Gross As Received (GAR)
- For South Africa :Argus/McCloskey's Coal Price Index (API 4) -- 6,000kcal/kg Net As Received (NAR)
- For Australia: Argus/McCloskey's Coal Price Index (API 5) — 5,500kcal/kg NAR

11. According to Argus, API indices, which are produced in conjunction with McCloskey, price coal at key import/exporting locations in northwest Europe, South Africa, Australia, South China, Colombia and India. The ICI index, that Argus produces jointly with PT Coalindo Energy price coal, exported from Indonesia and is heavily referenced by buyers and sellers of Indonesian material.

12. It was considered that prior to fixing an index, there are few things which need to be looked into, major and most important among which is transparency in price assessment, frequency of usage by major player and liquidity. It was noted that the Indonesian government includes Argus media published indices in its assessment of royalty since 2006. Argus informed that the Indonesian government will soon increase the weight of ICI index used for royalty assessment from current 25% to 50%. Similarly, it was also brought to the attention of the Authority that India's CERC also uses ICI3 and API4 in the coal price formula.

13. The information submitted by Argus indicates that the ICI has been published since 2006 as a joint report with Coalindo Energy which is based in Jakarta, Indonesia. In case of ICI indices, both independent assessments of Argus and Coalindo are averaged out equally, thus minimizing the price manipulation and volatility. Further SEL has based its draft CSA on ICI-3 and similarly PQEPCL has also proposed ICI-3 in the draft CSA. During subsequent communication it was also noted that there was an overwhelming support for using ICI-3 for pricing Indonesian coal. Therefore, in view of the above, the Authority decided to use ICI-3 as an index for coal import from Indonesia.

14. For the South African Coal (FoB Richard Bay, 6000 kcal/kg), Argus/Mcloskey API4 index is the dominant reference index. The Authority observed that API4 is also used by local cement manufacturer for its coal import from South Africa. It was understood that API4 is the leading price index for coal today with huge acceptance in both physical and derivatives trades. This is again a basket index of two different prices, i.e. Argus and Mcloskey. Because of wide scale acceptability of this index, the Authority therefore decided to use API4 as a benchmark index for coal imports from South Africa.

15. For Australian Coal, in addition to API 5 proposed by Argus, GlobalCoal or "gC" —which is also in the similar line of business as Argus Media is— proposed NEWC (Newcastle). According to gC, the NEWC Index was introduced in 2002, in response to a demand for an

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

independently established, transparent and reliable reference price for spot FOB Newcastle (NEWC) thermal coal. The unique index methodology was developed in collaboration with the industry and as a result, the NEWC Index has since established itself as *the* price benchmark for the Asia- Pacific thermal coal market. According to gC, in 2015, the derivative market in the NEWC index was estimated at 462 million tonnes, exceeding that of API4 (South African coal).

16. The Authority observed that the index proposed by Argus for Australia i.e. API5 may not be of acceptable liquidity level and the commentators did not support using API5 instead, they preferred gC's NEWC for Australian coal. Therefore, for Australian coal, the Authority decided to give the option to IPPs to choose either NEWC or API5 or both indices.

17. Some of the commentators like AAML during the discussion requested that IPPS should be free to choose one index from one region/country and apply to price coal from another. However, Argus and other stakeholder opposed it. The Authority assessed the merit of this suggestion is of the view that such flexibility in price assessment may lead to price distortion as the dynamics of NEWC pricing which reflects the market and the laws of Australia may not be relevant for instance, to price the coal of Indonesia or other export hubs. From regulator's point of the view this price distortion due to wrong application of base index should be discouraged. Therefore, it is decided not to consider this option of pricing one region of coal on the basis of an index derived from another region.

18. Some commentators requested that coal from Colombia should also be considered for Pakistan. The Authority was informed that Colombia coal – which is superior to Indonesian coal in terms of CV and perhaps better than South African coal, with low production cost —is facing a market downturn. The reason is that the Colombian coal traders have heavily relied on Europe for its export and the demand for coal in Europe is receding due to many reasons, major among them is the environmental impact of coal and lack of financing for new coal plants. Hence, the Colombia coal traders are currently exploring new market and some are willing to offer discounts in order to make sure their coal mines are running.

19. While Colombia coal might have its own advantage, the Authority, however is aware that Colombia is very far from Pakistan and from coal import point of view, it doesn't naturally fit for Pakistan. However, considering the low marine freight these days and the possibilities that Colombia coal traders may offer competitive price for its coal, the Authority reckons that there is potential for Pakistan to take advantage of the situation in Colombia. The Authority therefore decided that IPP should also be allowed to import coal

from Colombia, as long as the delivered price to any of the Pakistan Port in terms of US$/MMbtu is comparable to South Africa coal or Indonesia whichever is lower at that time. An IPP proposing Colombian coal should suggest an appropriate index that is relevant, transparent and liquid.

Summary Decision

- For Indonesia: Indonesian Coal Index (ICI 3) — 5,000kcal/kg GAR
- For South Africa :Argus/McCloskey's Coal Price Index (API 4) — 6,000kcal/kg NAR
- For Australia: Argus/McCloskey's Coal Price Index (API 5) — 5,500kcal/kg NAR or NEWC (6000 kCal/kg NAR) or both

How to benchmark freight rates and subsequent adjustments

20. In the Determination, the freight rate was to be adjusted at actual. It was felt that a mechanism needs to be developed that brings some level of transparency and minimize room for gaming or manipulation of freight price. During discussion, it came to the notice of the Authority that there isn't an established coal import route from places like Indonesia and Australia to Pakistan. Only a few million tons of coal is imported from South Africa, mainly for the consumption of local cement industry. The issue of freight calculation is further complicated due to the fact that it varies from vessel to vessel, for instance capsize vessel with a typical weight of over 150,000 DWT will have different freight and will take more time to reach the destination as compared to a smaller Panamax which is 65,000 DWT vessels.

21. In this regard, SEL and CPHGC submitted a freight calculation formula. SEL submitted the following:

Freight rate US$ /MT = BF + TCA + BAF + PCA + PIR+ PPBD + DVC

Where,
BF = Base Freight
TCA = TC Average Factor
BAF = Bunker Adjustment Factor
PCA = Port Cost Adjustment
PIR = Piracy Cost Adjustment
PPBD = Pre/Post Berthing Delays Charge at Discharge Port
DVC = Deviation charges

22. In accordance with the above mechanism, SEL proposed freight rates that worked out to be US$14 per ton. While justifying the component wise break up of freight, SEL informed that out of US$ 14/ton freight, US$ 4.7 /t related to base freight for which no justification was provided by its coal supplier to SEL. SEL however, informed that this formula is based

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

on firmed coal supply agreement which means that this is the only acceptable formula for coal transport to Pakistan.

23. CPHGC also shared a freight formula which is relatively more transparent with clear break up of each and every major component of freight, all linked with some international benchmark/index.

Freight = ((Delivery Days x Time Charter Rate) + (Bunker Consumed x Bunker Price x Bunker Adjustment) + Port Charges & Other Costs) / Cargo Quantity

Where;

Delivery days travel days in addition to loading, unloading days
Time Charter rates Applicable Baltic Time Charter (TC) rates
Bunker Price applicable Platts Bunker Price
Port charges and insurances etc. cannot be provided for each shipment as they are determined by independent port and insurance entities

24. Time Charter rates are linked with reputable index such as Baltic Dry Index based on the type of vessel. Fuel charges are derived though inputs such as fuel consumed times bunker price published by Platts. There is also bunker adjustment factor to accommodate the fuel prices to cater for price volatility and other fuelling charges

25. The Authority observed that the CPHGC's formula is more detailed and avoid the issue of base freight which was proposed by SEL. The Authority, however noted that port charges and insurance are separately covered under Other cost and Insurance cost respectively. Therefore, there is no need to include these costs in the freight calculation. In view of the above, the formula is, therefore, being allowed for marine freight calculation:

Freight = ((Delivery Days x Time Charter Rate) + (Bunker Consumed x Bunker Price x Bunker Adjustment) / Cargo Quantity

Where;

Delivery days is the vessel travel days in addition to loading unloading days
Time Charter rates are the relevant vessel rate indicated in the Baltic Time Charter (TC) rates
Bunker Price is the price indicated in the Platts Bunker Price
Bunker Adjustment is to be mutually agreed between the parties of the CSA reflective of the market.

How to benchmark Insurance

26. The Authority allowed marine insurance of 0.1% of FoB price. SEL in the instant case proposed Insurance of 0.2% of the price delivered to the power plant (DAP). The Authority was informed that the L/C opening bank will require to insure the delivered cargo of coal that already has a freight component. The Authority considers that the inclusion of freight in the calculation of insurance cost is a reasonable suggestion however, it was decided to allow insurance upto 0.1% of the CFR coal price instead of the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

proposed 0.2% of DAP. The insurance cost shall be adjusted to the maximum of 0.1% of Cost and freight of coal or actual whichever is lower. For this purpose, IPP will have to provide all the relevant documents in support of this while requesting a fuel cost adjustment.

How to ascertain Other Cost?

27. In the Determination, other cost was allowed at 10% of FoB which was a provisional number subject to adjustment at actual. Other cost is a sum of all the ancillary cost associated with transport of coal. It mainly includes Ports charges, terminal charges, L/C charges and jetty cost (if any). The Authority observed that these are mostly on a tonnage basis. Due to lack of information concerning other cost, the Authority therefore, decided to allow Other Cost at actual based on the submission of authentic documentary evidence. The Authority however, may review the actual cost under this head, after a year of large coal imports to the country and fix a benchmark if required.

Whether or not to have a basket benchmark price for coal adjustment to be determined by giving a reasonable weightage to coal exporting countries like South Africa, Australia Indonesia?

28. While assessing reference fuel cost component of coal, the Authority priced the coal based on the following reference weightage:

    - Indonesia 40%
    - South Africa 40%
    - Australia 20%

29. In the fuel price formula, this was subject to change as per actual. Argus while reviewing our formula proposed that there should be some sort of weightage while fixing benchmarking fuel price. Similarly, gC also agreed with prescribing weightages for computing coal price and stated that such basket benchmark coal prices is also practiced by regulator in India and Indonesia.

30. The Authority observed that if the coal price is fixed as per any fixed benchmark weightages, then, even if an IPP procure 100% Indonesian coal, its coal price will be determined based on price prevalent at that time at each of the above three regions in a given percentage let say Indonesia 40%, South Africa 40% and Australia 20%. In the opinion of the Authority this will increase the risk of IPP as the benchmark price may be more or less than the actual price paid for the shipment by an IPP. Further, it will also

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

necessitate to set benchmark freight which itself is a complex exercise, and also premiums and other cost and thus will lead to fix a benchmark CIF price which will have no bearing with the actual price of coal. Prescribing fixed weightages will complicate the exercise of monthly fuel cost adjustment. Also, Pakistan has no experience handling such large quantities of coal that is destined in the coming 5-6 years to be used for power generation. The Authority is aware that IPPs lack experience and local infrastructure is yet to be established and Pakistan is not like India and Indonesia, where a robust domestic and export market is already established and wherein such mechanism can be easily applied. In view thereof, it is considered that the market is not ripe to fix benchmark prices based on assumed basket. This may be reconsidered after 5 years or earlier when actual coal import data is available which could prompt revision in the pricing mechanism.

Whether or not to set minimum quality (CV) of coal destined to be transported up country?

31. The commentators namely, Mr. Norez Abdullah and KAPCO have proposed that NEPRA should fix a minimum quality of coal that is to be transported upcountry for the power plants like Sahiwal power project and other Coal conversion projects, Lalpir Pakgen etc. The reason they are concerned is inland coal transportation is on per ton basis and power plant will need specific amount of Btus or heat to produce a certain fixed number of units. Hence, annual coal quantity will depend entirely on the quality of coal procured. This means that more quantity of coal with low quality/heating value will be required to be transported to make sure the plant received the same Btus. This will increase the inland local transportation cost for power plant to be established in the upcountry. The Authority was informed that, with the CV of 6200 Kcal/kg, a typical power plant with a capacity of 660 × 2 MW will approx. need 3.07 million tons per annum (mtpa). Whereas, if coal with low CV of 4600 kCal/kg is supplied to the power plant, its requirement will jump to 4.34 mtpa which is 1.27 mtpa more. The extra 1.27 mtpa means the transportation bill will increase by approx. Rs 8 billion. In the opinion of the Authority setting a minimum CV of coal is a reasonable proposition and in the consumer's interest.

32. The Authority is also aware that before fixing minimum CV of coal, there are some key factors that need to be looked into, for example a) whether good quality of coal is available in the market to ensure long term supply for the entire project life of the power plant b) whether a power plant current design needs to be changed to accommodate the revised CV. Both these factors are important. During the proceedings, with ArgusMedia suggested that that 5500 Kcal/kg (NAR) should be the minimum quality of coal that should be allowed to use for up country power plants as such quality of coal is

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

abundantly available and that there is always the option for coal suppliers to mix two different qualities of coal together to maintain the approved minimum CV i.e. 5500 NAR. With regards to changing design, some of the IPPs have informed that their boilers are designed for a range of CV and ±1500 kcal/kg can be accommodated in the power plants. Therefore, setting a minimum CV will not lead to boiler design change.

33. In view of the above, it has been decided to set a minimum CV of 5500 Kcal/kg (NAR) on noncoastal power plants.

Whether Premium over coal price should be allowed

34. On this issue the SEL and CPHGCL, commentators informed that under the long-term coal supply contract, a supplier provides a certain quantity commitment to the buyer. In order to fulfill the obligation, the supplier line up all their resources well before the actual delivery of coal, this takes place years before the actual shipment. The Authority was also informed that, the level of premium depends on the strength of the buyer. For instance, a company which is already buying a good quantity of coal from the same supplier backed by strong finances may negotiate a coal supply agreement with a minimum or no premium. The issue of premium doesn't arise if coal is purchased through spot market. But an IPP can't buy all of its required coal from spot market because spot purchases carry the risk of limited supply. The Authority is aware that there is no benchmark available in the international market wherein, one can analyze, compare and fix a max premium ceiling for the upcoming coal import. The SEL, Lucky Energy and PQEPC have proposed a premium of 6%. In the opinion of the Authority coal is abundantly available in an import market whose demand is dwindling. Therefore, although COD of the plant will be achieved in 2-4 years, it is expected that the current condition will prevail. In view of the above, the Authority decided to not to allow the premium over and above the benchmark index price.

35. In view of the above discussion, the following coal pricing mechanism is, therefore, being allowed:

Fuel Cost Component (South African Coal)

$$FCC = \left[\left(CP_{(RB)} + Ft_{(M)} + MI + OC - Discount \right) \times \frac{HR}{HV_{(RB)}} \right] \times FC_{(Exch)}$$

CP(RB) = Actual Weighted Average Richard Bay (South Africa) Coal Prices (CP) in US$/kg on the basis of Opening Inventory of coal and purchases of coal till the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

month immediately preceding the invoice month indicated in Argus/McCloskey's Coal Price Index (API 4) 6000 kCal/kg NAR

HV(RB)	=	Actual Weighted Average Heating Value (HV) (LHV) in Btu/kg of the coal imported from South Africa
HR	=	Heat Rate in Btu/kWh
$Ft_{(M)}$	=	Actual marine freight computed on the basis of approved mechanism in US$/kg
OC	=	Other Charges to include all port and terminal charges etc. in US$/kg
MI	=	Marine Insurance in US$/kg
$FC_{(Exch)}$	=	Average PKR to US$ exchange rate for the month

Fuel Cost Component (Australian Coal)

$$FCC = \left[\left(CP_{(NCA)} + Ft_{(M)} + MI + OC - Discount \right) \times \frac{HR}{HV_{(NCA)}} \right] \times FC_{(Exch)}$$

CP(NCA)	=	Actual Average Newcastle (Australia) coal prices (CP) in US$/kg on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in Argus/McCloskey's Coal Price Index (API 5) or GlobalCoal NEWC (6000 Kcal/kg NAR)
HV(RB)	=	Actual Weighted Average Heating Value (HV) (LHV) in Btu/kg of the coal imported from Australia
HR	=	Heat Rate in Btu/kWh
$Ft_{(M)}$	=	Actual marine freight computed on the basis of approved mechanism in US$/kg
OC	=	Other Charges to include all port and terminal charges etc. in US$/kg
MI	=	Marine Insurance in US$/kg
$FC_{(Exch)}$	=	Average PKR to US$ exchange rate for the month

Fuel Cost Component (Indonesian Coal)

$$FCC = \left[\left(CP_{(Indo)} + Ft_{(M)} + MI + OC - Discount \right) \times \frac{HR}{HV_{(Indo)}} \right] \times FC_{(Exch)}$$

CP(Indo)	=	Actual Average Indonesia coal prices (CP) in US$/kg on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in the Indonesian Coal Index (ICI 3) 5,000kcal/kg GAR

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

HV(Indo)	=	Actual Weighted Average Heating Value (HV) (LHV) in Btu/kg of the coal imported from Indonesia
HR	=	Heat Rate in Btu/kWh
$Ft_{(M)}$	=	Actual marine freight computed on the basis of approved mechanism in US$/kg
OC	=	Other Charges to include all port and terminal charges etc. in US$/kg
MI	=	Marine Insurance in US$/kg
$FC_{(Exch)}$	=	Average PKR to US$ exchange rate for the month

Fuel Cost Component (Local Coal)

$$FCC = \frac{(CP_{(Local)} + Ft_{(Inland)}) \times HR}{HV_{(Local)}}$$

Where;

HR	=	Heat Rate in Btu/kWh
Ft(Inland)	=	Inland Freight expressed in Rs/kg
HR	=	Heat Rate in Btu/kWh
HV(local)	=	Heating Value (LHV) in Btu/kg
CP (Local)	=	Local coal price in Rs/kg determined by relevant/competent agency

Terms and Conditions:

- Marine Insurance will be allowed at 0.1% of the CFR price or actual whichever is lower. For this purpose IPP shall submit all the relevant documents, including insurance invoice, etc.
- Other Charges shall include port/terminal charges, L/C charges, common jetty cost if any etc. This shall be adjusted on actual based on the submission of authentic documentary evidence.
- Coal losses shall be calculated at a maximum of 2% on delivered coal price of imported coal and 1% of local coal.
- IPP will have the option to procure coal in any combination of the above loading regions, i.e. South Africa, Australia and Indonesia. In this regard fuel cost component shall be adjusted based on actual weightage.
- For the coal destined for upcountry, IPP shall ensure a minimum calorific value of coal of 5500 kCal/kg (NAR). For fuel price adjustment purpose, Argus's ICI-2 (which is already benchmark for a coal CV of 5500kCal/kg NAR) or equivalent index shall be used, provided that the index is transparent and liquid.
- IPP shall justify the choice of coal to the satisfaction of the Authority

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

- IPP will have the option to procure coal in any combination of the above loading regions, i.e. South Africa, Australia and Indonesia. In this regard fuel cost component shall be adjusted based on actual weightage.
- For the coal destined for upcountry, IPP shall ensure a minimum calorific value of coal of 5500 kCal/kg (NAR). For fuel price adjustment purpose, Argus's ICI-2 (which is already benchmark for a coal CV of 5500kCal/kg NAR) or equivalent index shall be used, provided that the index is transparent and liquid.
- IPP shall justify the choice of coal to the satisfaction of the Authority
- The pricing mechanism shall be reviewed after three years when the actual coal price, quality, quantity, source, etc., data is available. It can be reviewed earlier if it is noted that current mechanism leads to a coal price that is unrealistic and detrimental to both the interest of consumers and the project sponsors.
- Bill of lading will be used as date of coal procurement.
- In case Thar coal is utilized for non-mine mouth power plant in full or in part, the price of Thar coal shall be determined by the Thar Coal Energy Board/Relevant Agency and fuel price will be determined based on the weightage average actual percentage of coal i.e. Thar and imported coal.
- The Federal Government is actively promoting imported coal based power plants to address the demand/supply gap and also to have a base load generation option. These plants are expected to achieve COD in the next 2-3 years. Without a clear pricing mechanism, the operation of these upcoming power plants could be jeopardized. It is felt that the Federal Government may take the initiative to establish an imported coal pricing agency for the purpose of prescribing a coal pricing mechanism based on the international best practices. Therefore, in the absence of imported coal pricing mechanism, and till such time a coal pricing mechanism is put in place, this adjustment mechanism as approved in this decision shall be used.

ORDER

1. In exercise of Power under section 7(2) (g) of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 read with regulation 3(1) of NEPRA (Review Procedure) Regulations, 2009 the Authority has decided to review its decision regarding reconsideration Request filed by GoP in the matter of Upfront coal Tariff for Coal Power Projects dated June 24, 2016, hereinafter referred to as "the Decision" to the extent of the following:

2. Para 56, subsection xxv page 33 of the Decision may be replaced with the following

"Fuel Cost
During the tariff period the fuel cost shall be calculated according to the following

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

formula on monthly basis:

Fuel Cost Component (South African Coal)

$$FCC = \left(\left(\left(CP_{(RB)} + Ft_{(M)} + MI + OC - Discount \right) \times \frac{HR}{HV_{(RB)}} \right) \times FC_{(Exch)} \right)$$

CP(RB)	=	Actual Weighted Average Richard Bay (South Africa) Coal Prices (CP) in US$/kg on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in Argus/McCloskey's Coal Price Index (API 4) 6000 kCal/kg NAR
HV(RB)	=	Actual Weighted Average Heating Value (HV) (LHV) in Btu/kg of the coal imported from South Africa
HR	=	Heat Rate in Btu/kWh
$Ft_{(M)}$	=	Actual marine freight computed on the basis of approved mechanism in US$/kg
OC	=	Other Charges to include all port and terminal charges etc. in US$/kg
MI	=	Marine Insurance in US$/kg
$FC_{(Exch)}$	=	Average PKR to US$ exchange rate for the month

Fuel Cost Component (Australian Coal)

$$FCC = \left(\left(\left(CP_{(NCA)} + Ft_{(M)} + MI + OC - Discount \right) \times \frac{HR}{HV_{(NCA)}} \right) \times FC_{(Exch)} \right)$$

CP(NCA)	=	Actual Average Newcastle (Australia) coal prices (CP) in US$/kg on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in Argus/McCloskey's Coal Price Index (API 5) or GlobalCoal NEWC (6000 Kcal/kg NAR)
HV(RB)	=	Actual Weighted Average Heating Value (HV) (LHV) in Btu/kg of the coal imported from Australia
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$Ft_{(M)}$	=	Actual marine freight computed on the basis of approved mechanism in US$/kg
OC	=	Other Charges to include all port and terminal charges etc. in US$/kg
MI	=	Marine Insurance in US$/kg
$FC_{(Exch)}$	=	Average PKR to US$ exchange rate for the month

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

Fuel Cost Component (Indonesian Coal)

$$FCC = \left(\left(\left(CP_{(Indo)} + Ft_{(M)} + MI + OC - Discount \right) \times \frac{HR}{HV_{(Indo)}} \right) \times FC_{(Exch)} \right)$$

CP(Indo)	=	Actual Average Indonesia coal prices (CP) in US$/kg on the basis of Opening Inventory of coal and purchases of coal till the month immediately preceding the invoice month indicated in the Indonesian Coal Index (ICI 3) 5,000kcal/kg GAR
HV(Indo)	=	Actual Weighted Average Heating Value (HV) (LHV) in Btu/kg of the coal imported from Indonesia
HR	=	Heat Rate in Btu/kWh
$Ft_{(M)}$	=	Actual marine freight computed on the basis of approved mechanism in US$/kg
OC	=	Other Charges to include all port and terminal charges etc. in US$/kg
MI	=	Marine Insurance in US$/kg
$FC_{(Exch)}$	=	Average PKR to US$ exchange rate for the month

Fuel Cost Component (Local Coal)

$$FCC = \frac{(CP_{(Local)} + Ft_{(Inland)}) \times HR}{HV_{(Local)}}$$

Where;

HR	=	Heat Rate in Btu/kWh
Ft(Inland)	=	Inland Freight expressed in Rs/kg
HR	=	Heat Rate in Btu/kWh
HV(local)	=	Heating Value (LHV) in Btu/kg
CP (Local)	=	Local coal price in Rs/kg determined by relevant/competent agency

Terms and Conditions:

- Marine Insurance will be allowed at 0.1% of the CFR price or actual whichever is lower. For this purpose IPP shall submit all the relevant documents, including insurance invoice, etc.
- Other Charges shall include port/terminal charges, L/C charges, common jetty cost if any etc. This shall be adjusted on actual based on the submission of authentic documentary evidence.
- Coal losses shall be calculated at a maximum of 2% on delivered coal price

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

- IPP will have the option to procure coal in any combination of the above loading regions, i.e. South Africa, Australia and Indonesia. In this regard fuel cost component shall be adjusted based on actual weightage.
- For the coal destined for upcountry, IPP shall ensure a minimum calorific value of coal of 5500 kCal/kg (NAR). For fuel price adjustment purpose, Argus's ICI-2 (which is already benchmark for a coal CV of 5500kCal/kg NAR) or equivalent index shall be used, provided that the index is transparent and liquid.
- IPP shall justify the choice of coal to the satisfaction of the Authority
- The pricing mechanism shall be reviewed after three years when the actual coal price, quality, quantity, source, etc., data is available. It can be reviewed earlier if it is noted that current mechanism leads to a coal price that is unrealistic and detrimental to both the interest of consumers and the project sponsors.
- Bill of lading will be used as date of coal procurement.
- In case Thar coal is utilized for non-mine mouth power plant in full or in part, the price of Thar coal shall be determined by the Thar Coal Energy Board/Relevant Agency and fuel price will be determined based on the weightage average actual percentage of coal i.e. Thar and imported coal.
- The Federal Government is actively promoting imported coal based power plants to address the demand/supply gap and also to have a base load generation option. These plants are expected to achieve COD in the next 2-3 years. Without a clear pricing mechanism, the operation of these upcoming power plants could be jeopardized. It is felt that the Federal Government may take the initiative to establish an imported coal pricing agency for the purpose of prescribing a coal pricing mechanism based on the international best practices. Therefore, in the absence of imported coal pricing mechanism, and till such time a coal pricing mechanism is put in place, this adjustment mechanism as approved in this decision shall be used.

3. Para 56 subsection III page 34 of the determination, "Central Power Purchasing Agency (CPPA)" may be replaced with "Central Power Purchasing Agency (CPPA) itself or through internationally recognized reputable third party firm"."

4. Para 56 subsection xx (d) may be deleted.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA
AUTHORITY

The Authority, in exercise of the powers conferred on it under Section 7(3) (a) read with Section 31 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, Tariff Standards and Procedure Rules, 1998 and all other powers enabling it in this behalf, and after taking into consideration all the submissions made by the parties, issues raised, evidence/ record produced during hearings, and all other relevant material, hereby issues this decision.

AUTHORITY

(Maj. (R) Haroon Rashid)
Member

(Syed Masood-ul-Hasan Naqvi)
Member

20.9.16

(Himayat Ullah Khan)
Member/Vice Chairman

(Brig. (R) Tariq Saddozai)
Chairman

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
NEPRA AUTHORITY

23.09.16

ANNEX 5

THE COMBUSTION CHARACTERISTIC OF HUANENG SHANDONG RUYI SAHIWAL 2*660MW COAL-FIRED POWER PROJECT

1. The reason for choosing the direct-blowing combustion system

There are basically two arrangements for coal handing and feeding: direct-fired or bin storage.

With the direct-fired arrangement, the coal is broken into manageable sizes and stored in a bunker. The raw coal is then fed to a pulverizer, which crushes the coal to the appropriate size for feeding into the boiler. The pulverizer is swept with hot air, which aids in removing moisture from the coal. The direct-fired There is less resistance when the coal powder conveying in pipeline, and small power consumption. The direct-fired system can Guaranteed control accuracy to protect the life of the metal. Majority of modern coal fired boilers are equipped with direct-fired system

The principle of bin storage pulverizer system is the same with direct-fired system. But there are some disadvantages for example, more space occupied, more investment used, more power used, huge noise produced, and lots of coal powder were stored in the bin storage which is easy to deflagration and so on.

Also, the project is expected to operate as a base load unit but the design will include provisions to allow the units to operate at lower loads, which needs the unit(s) maintain load stability and keep the unit(s) run continuously. So, the direct-blowing combustion is the best choice.

2. The current situation Huaneng Shandong Ruyi Sahiwal 2*660MW Coal-fired Power Project

I. The change in fuel.

According to section 3.2 in the feasibility study report For Huaneng Shandong Ruyi Sahiwal 2*660MW Coal-fired Power Project approved by Shandong Electric Power Engineering Consulting Institute Corp, Ltd., Indonesia coal and South African coal are used for Sahiwal Power Project, and the heat value of designed check coal should be 4300Kcal/kg. However according to the file NEPRA/TRF-UTC/2013/13032-13034 issued by NEPRA on September 23, 2016, the coal used for inland power project must have a heat value of 5500 Kcal/kg above to reduce transportation cost and the burden of consumers. As such, South African coal with the heat value of 5500-5800 Kcal/kg has always been used since the project was put into operation. Considering the project location, it takes at least 65 days for transportation and storage of the import coal for the project, 20 days for transportation from South African to rail loading point at Qasim port and 45 days for storage in coal yard. Such long-time transportation and storage leads to significant moisture loss of the coal. To prevent explosion of pulverizing system caused by over-temperature, it is required to fill water again for the fuel system to increase coal moisture to ensure the outlet temperature of mill keeps normal. It leads to low efficiency and serious blocking of the mill and imposes serious impact on the boiler efficiency, hence reducing the load change rate of the unit.

II. Impact of coal quality change on boiler combustion characteristics

Great difference between the heat value of South African coal (5500Kcal/kg above) and that of designed check coal leads to change of combustion characteristics of the boiler. When the load is increased or decreased fast, the heat load on the section of boiler becomes high and coking is caused on the heating surface, leading to over-temperature on partial heating surface. For example, during the process of fast loading, wall temperature of platen superheater tends to be overlimit and the tubes of heating surface are subject to overheating. Long-time fast loading operation may cause to damage or even rupture of the tubes of heating surface. During the process of fast loading decrease, due to temperature drop on the heating surface

and under the effects of combustion regulation and air volume disturbance, coke dropping occurs, and the combustion deteriorates. The risk of outfire may occur under low load conditions. Therefore, it is requested the load change rate be changed based on optimization data provided by manufacturer.

Moreover, the Project in Sahiwal power plant are equipped with direct-fired system. There are 6 mills which crushes the coal to the appropriate size for feeding into the boiler. These 6 mills must be started one by one from initial load to full load and each mill needs some time to start up which will further decrease the ramping rate.