National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

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No. NEPRA/R/LAG-285/20470-75 October 14, 2019

Mr. Ahsan Zafar Syed,
Chief Executive Officer,
Engro Powergen Thar (Private) Limited,
16th Floor, The Harbor Front Building,
HC # 3, Marine Drive, Block-4,
Clifton, Karachi.

Subject: **Modification-I in Generation Licence No. IGSPL/49/2015**
Licence Application No. LAG-285
Engro Powergen Thar (Private) Limited (EPGTPL)

Reference: EPGTPL's LPM submitted vide letter dated May 06, 2019 (received on May 14, 2019)

It is intimated that the Authority has approved Modification in Generation Licence No. IGSPL/49/2015 dated March 18, 2015 in respect of Engro Powergen Thar (Private) Limited (EPGTPL), pursuant to Regulation 10(11) of the NEPRA Licensing (Application and Modification Procedure) Regulations 1999.

2. Enclosed please find herewith determination of the Authority in the matter of Licensee Proposed Modification in the Generation Licence of EPGTPL along with Modification-I in the Generation Licence No. IGSPL/49/2015 as approved by the Authority.

Encl: As above

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

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(Syed Safeer Hussain)

Copy to:

1. Secretary, Power Division, Ministry of Energy, A-Block, Pak Secretariat, Islamabad.
2. Managing Director, NTDC, 414-WAPDA House, Lahore.
3. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
4. Chief Executive Officer, Hyderabad Electric Supply Company Limited (HESCO), WAPDA Offices Complex, Hussainabad, Hyderabad
5. Director General, Environment Protection Department, Government of Sindh, Complex Plot No. ST-2/1, Korangi Industrial Area, Karachi.

National Electric Power Regulatory Authority
(NEPRA)

Determination of the Authority in the Matter of Licensee Proposed Modification in the Generation Licence of Engro Powergen Thar (Pvt.) Limited

October 14, 2019
Case No. LAG-285

(A). Background

(i). The Authority in terms of Section-15 (now Section-14B) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the "NEPRA Act") granted a generation licence (No. IGSPL/49/2015 dated March 18, 2015 to Engro Powergen Thar (Pvt.) Limited (EPGTPL) for its 660 MW indigenous Thar coal based generation facility/thermal power plant.

(ii). According to the above generation licence, the generation facility/thermal power plant consist of 2x330 MW steam turbine with Circulating Fluidized Bed Boiler with subcritical parameters. The generation facility is located at 5.0 KM from Thar Block-II, District Tharparkar, in the province of Sindh.

(B). Communication of Modification

(i). EPGTPL in accordance with Regulation-10(2) of the NEPRA Licensing (Application & Modification Procedure) Regulations, 1999 (the "Licensing Regulations"), communicated a Licensee Proposed Modification (LPM) in its existing generation licence on May 14, 2019.

(ii). In the text of the proposed modification, EPGTPL proposed to incorporate the ramping rate (MW/min), in its generation licence as given below:-

Unit load range % age	Cold Start (%MW/Min)	Warm Start (%MW/Min)	Hot Start (%MW/Min)
0—<25%	≤0.35	≤0.8	≤1.0
≥25%— ≤50%	≤0.35	≤0.8	≤1.0
>50— ≤100%	≤0.35	≤0.8	≤1.0

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR NEPRA

(iii). Further, in the text of the proposed modification, EPGTPL also proposed to incorporate the time required to synchronize to Grid, in its generation licence as given below:-

Length of Shutdown in hours	≤ 2	>2 ≤8	>8≤32	>32 ≤150	>150
Time required to synchronize to Grid (Min)	100	150	350	530	770

(iv). Regarding statement of the reasons in support of the modification, EPGTPL, inter alia, stated that the data/specification regarding ramping rate and the time required to synchronized to the grid provided at the time of filing of application for grant of generation licence, were tentative and indicative in nature. These specifications require modification in light of actual design and requirements of the power plant and instructions provided by the Original Equipment Manufacturer (OEM) to EPGTPL.

(v). About "statement of the impact on the tariff, quality of service and the performance by the Licensee of its obligations under the licence", EPGTPL has submitted that (a). the upfront tariff granted to EPGTPL will not be effected by the proposed modifications; (b). the modification is necessary to avoid any impediment in the quality of service and (c). the proposed modification will facilitate EPGTPL in fulfilling its obligations under the generation licence.

(C). Processing of LPM

(i). After completion of all the required information as stipulated under the Regulation 10(2) and 10(3) of the Licensing Regulations by EPGTPL, the Registrar published the communicated LPM on May 30, 2019 in one (01) English and one (01) Urdu newspaper to inform the general public, interested/affected parties, and different stakeholders about the said LPM as required under the Regulation-10(4) of the Licensing Regulations. The Registrar invited comments of the said stakeholders in favor or against the communicated LPM.

(ii). Apart from the above, separate letters were also sent to government ministries, their attached departments and representative organizations etc. on May 30, 2019. Through the said letters, the stakeholders were informed about the communicated LPM and publication of notice in the press. Further, the said entities were invited for submitting their views and comments in

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

the matter for assisting the Authority.

(D). Comments of Stakeholders

(i). In response to the above, this office has received comments from Central Power Purchasing Agency (Guarantee) Limited (CPPA-G) only. The salient points of the comments offered by CPPA-G are summarized in the following paragraphs:

(a). CPPA-G commented that review of the proposed modification reveals that EPGTPL intends to lower ramping rate for unit load range under cold and warm start between 50% to 100% i.e. 0.35%/min and 0.8%/min respectively than that has already been allowed by NEPRA for 2x660 MW coal fired power plant of Port Qasim Electric Power Company Limited (PQEPCL) i.e. ≤0.5%/m and >0.5≤1. Furthermore, time required to synchronize to grid for subject project seems to be on higher side for less than 2 hours and more than 150 length hours shut down than that has already been allowed in respect of 2x660MW coal fired power plant of Huaneng Shandong Rui Pakistan Energy (Pvt.) Limited (HSRPEPL). It is further highlighted that for lower ramping rate the unit requires more time to comply with the despatch instructions and consequently it increases the unit/complex startup cost due to increase in quantity of HSD/Coal fuel burned during the startup process. Moreover, EPGTPL has applied for calculating NTS from ignition of its boiler which should be taken from the notice by the system operator as per the prudent practice in all other IPPs of the country. Thus CPPA-G is of the view that EPGTPL being the smaller in complex size and capacity from PQEPCL and HSRPEPL should be allowed ramping rate and time required to synchronize to grid less than from the already commissioned coal fired power plants.

(ii). The Authority examined the above comments of CPPA-G and considered it appropriate to seek perspective of the licensee/EPGTPL on the observations of CPPA-G. On the comments of CPPA-G, the Licensee/EPGTPL submitted that comments offered by CPPA-G are of comparative nature (in comparison with Imported Coal fired Projects of different technology and using

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR

different fuel) without raising any objection on project specific technical data provided by EPGTPL under Technical Statement of the Reasons in Support of the Modification which clearly defines the requirements for this Project and its technical requirements.

(iii). Under Technical Statement of the Reasons in Support of the Modification, EPGTPL submitted that the modifications to the ramping rates and the time periods for synchronization to the grid are necessary because the specifications provided by the Company to NEPRA at the time of filing of the application for grant of its generation licence were tentative and indicative in nature. Accordingly, these specifications required modification in light of the actual design and requirements of the power plant and the data and instructions provided by the OEM to the Company. Consistent with NEPRA determination in the matter of similar IPPs modification application and Article 3.3 of the generation licence, the Company has applied for modification of its generation licence in light of the actual design of the power plant and the data provided and instructions received by the Company from the OEM. In addition to the above, modification to the ramping rates is necessary because:

(a). Boiler at EPGTPL is a CFB boiler utilizing Thar lignite coal. For CFB the normal ramp rate is 1 %. Boiler is burning high moisture lignite coal and requires some residence time to ensure proper burning. If the ramping rate is not followed, the circulation & even heating of the furnace cannot be ensured, a faster ramping may cause additional coal (at lower temperatures) into the furnace which may result in localized explosion, ash fusion and clinker formation in Boiler. Therefore, the modification to the ramping rate, has been proposed to ensure safe and efficient operation of the power plant;

(b). The ramping rate is also crucial to ensure proper heating of the Boiler/Steam tubes & piping, if the ramping rate is not observed, it may cause an adverse change in the airflow, distribution of coal, and difficulty in achieving thermal & chemical equilibrium for the CFB boiler, which may impact the boiler & steam piping etc. adversely. Under these circumstances, the boiler may overheat or leak. Furthermore, the operational life span of turbine may be

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

affected due to the excessive heat stress on the cylinder metal.

(c). The operation life span of steam turbine cylinder may be seriously impacted due to the excessive change rate of load and temperature. Furthermore, the ramping rate at various operation conditions shall be limited within the metal temperature increase rate range of cylinder. In view of above, the ramping rate of EPGTPL, shall be limited within 1%.

(iv). Regarding rationale for modification to the time required for synchronization to the grid EPGTPL submitted that said modification are based on the technical requirements of the technical specification of OEM and take into consideration the efficient and safe operation of the plant. In this regard, EPGTPL provided detailed calculation for grid synchronization for different lengths of shutdown:-

(a). More than 150 hours: Total 770 minutes, wherein 420 minutes are required for CFB boiler to set up temperature and pressure after the successful ignition; hot flushing time of 100 minutes in addition to Boiler Startup time to achieve the steam purity is required; 30 minutes are required for the pre-warming up of Turbine Cylinder (already included in Boiler Hot Flushing time), 220 minutes is required for steam turbine rush to 3000rpm after admission of steam(including 120 minutes at 1200rpm and 2000rpm cylinder warming) ; Then, 30 minutes is required for synchronize to grid. Therefore, total 770 minutes is required for unit start-up.

(b). More than 32 hours less than 150 hours: Total 530 minutes, wherein 420 minutes are required for CFB boiler to set up temperature and pressure after the successful ignition; hot flushing for 25 minutes is needed which will also include the pre-warming up of Turbine Cylinder; 55 minutes is required for steam turbine rush to 3000rpm after admission of steam (including 25 minutes at 3000rpm cylinder warming); Then, 30 minutes is required for synchronize to grid. Therefore, total 530 minutes is required for unit start-up.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

(c). More than 8 hours less than 32 hours: Total 350 minutes, wherein 260 minutes are required for CFB boiler to set up temperature and pressure after the successful ignition;40 minutes is required for steam turbine rush to 3000rpm .after admission of steam and 20 minutes at 3000rpm cylinder warming; Then, 30 minutes is required for synchronize to grid. Therefore, total 350 minutes is required for unit start-up.

(d). More than 2 hours less than 8 hours: Total 150 minutes, wherein 80 minutes are required for CFB boiler to set up temperature and pressure after the successful ignition;40 minutes is required for steam turbine rush to 3000rpm after admission of steam; then, 30 minutes is required for synchronize to grid. Therefore, total 150 minutes is required for unit start-up.

(e). Not more than 2 hours: Total 100 minutes, wherein 60 minutes are required for CFB boiler to set up temperature and pressure after the successful ignition;20 minutes is required for steam turbine rush to 3000rpm after admission of steam; Then, 20 minutes is required for synchronize to grid. Therefore, total 100 minutes is required for unit start-up.

(v). EPGTPL further submitted that its complex is a 2x330 MW CFB Boiler based power plant, which is a specially suited technology for high moisture Indigenous Coal of Thar Block-II. The low calorific value of Thar Coal & its non-homogeneity has been the reason for the selection of this particular technology, this technology is grossly different from the Prevailing Pulverized Coal (PC) boiler technology which has been used predominantly for Imported Sub-bituminous/Bituminous coals. Additionally the referred projects are using a super-critical steam turbine of 660 MW vs. a 330 MW sub-critical steam turbine at EPGTPL. Hence, such comparisons may not be practical owing to difference in the technology (like PC vs. CFB Boilers, Sub-critical vs. Super critical etc.) as well as difference in OEMs.

(vi). Regarding the requesting ramping rates, EPGTPL submitted that (a). since the boiler is burning a high moisture lignite coal (upto 50% moisture in Thar Coal) in a circulating bed of vs. PC boiler burning bituminous coal (moisture 15-

REGISTRAR

20% in imported Coal) in suspension firing tangentially. (b). For a CFB boiler with high amounts of circulating solids, keeping a ramp rate of upto 1% minimize the thermal stresses on the boiler pressure parts & refractory. It also maintains uniform heating of the furnace. At such rate, the coal introduction also minimizes the risk of localized instabilities leading to non-uniform temperatures & reduces the probability of ash clinker formation.

(vii). On the observations of CPPA-G for calculating the grid synchronization time the notice by the system operator, EPGTPL submitted that moving the starting point from the burner firing to the notice to synchronization from system operator will required additional time of 30 minutes to cover for the period between the Notice to Synchronization and the Burner firing for the Plant preparation & lineup of fuel & Air systems prior to ignition.

(viii). In view of the above, EPGTPL stressed that all the values (ramp-up rates and synchronization time) requested in the LPM are as per OEM recommendations therefore should be incorporated in the generation licence. In this regard, EPGTPL provided original certificates and relevant/supporting documents from OEM to support its point of view.

(ix). The Authority examined the above submissions/response of EPGTPL and decided to share the technical details submitted by EPGTPL regarding ramping rate and grid synchronization time with CPPA-G, requiring its clear consent in the matter. In response, CPPA-G through its letter dated September 04, 2019 inter alia submitted that the proposed modifications/claims of EPGTPL regarding ramping rate and grid resynchronization time are in accordance with the technical limits as recommended by the OEM.

(x). In view of the above, the Authority considered it appropriate to proceed further in the matter of LPM of EPGTPL as stipulated in the relevant Regulations and NEPRA Licensing (Generation) Rules 2000 (the "Generation Rules").

(E). Evaluation/Findings

(i). The Authority examined the entire case in detail considering the already granted generation licence & upfront tariff, the communicated LPM, comments of stakeholders, rejoinder of EPGTPL on comments and provisions of relevant rules and regulations in the matter.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR NEPRA

(ii). The Authority observes that in terms of Regulation-10(2) of the Licensing Regulations, a licensee may, at any time during the term of a licence, communicate to the Authority an LPM setting out (a). the text of the proposed modification; (b). a statement of the reasons in support of the modification; and (c). a statement of the impact on the tariff, quality of service and the performance by the licensee of its obligations under the licence.

(iii). Regarding criteria of modification in licence, the Authority observed that in terms of Regulation-10(5) of the Licensing Regulations, it is entitled to modify a licence in accordance with an authority proposed modification or LPM, subject to and in accordance with such further changes as the Authority may deem fit if, in the opinion of the Authority such modification (a). does not adversely affect the performance by the licensee of its obligations; (b). does not cause the Authority to act or acquiesce in any act or omission of the licensee in a manner contrary to the provisions of the NEPRA Act or the rules or regulations made pursuant to it; (c). is or is likely to be beneficial to the consumers; (d). is reasonably necessary for the licensee to effectively and efficiently perform its obligations under the licence; and (e).is reasonably necessary to ensure the continuous, safe and reliable supply of electric power to the consumers keeping in view the financial and technical viability of the licensee.

(iv). The main features of the application under consideration are that the Authority originally granted a generation licence (No. IGSPL/49/2015 dated March 18, 2015 to EPGTPL for its thermal generation facility/thermal power plant with an installed capacity of 660.00 MW based on 2x330 MW steam turbines with a subcritical boiler parameters. According to the generation licence, the generation facility is to be operated primarily on indigenous coal of Thar Coal field.

(v). According to the above mentioned generation licence, the parameters of ramping rate (0.5 to 1.0% or 1.65 to 3.3 MW/minute) and time required to synchronize to grid provided at the time of generation licence application and subsequently incorporated in the Schedule-I of the existing generation licence are indicative and are required to be confirmed after engineering design of the plant.

(vi). Accordingly, through the communicated LPM, EPGTPL proposed to include the following values of ramping rate in its generation licence:

Unit load range % age	Cold Start (%MW/Min)	Warm Start (%MW/Min)	Hot Start (%MW/Min)
0—<25%	≤0.35	≤0.8	≤1.0
≥25%— ≤50%	≤0.35	≤0.8	≤1.0
>50— ≤100%	≤0.35	≤0.8	≤1.0

(vii). Further, EPGTPL also proposed to modify the grid synchronizing time to grid according to the length of the shutdown time of the units/complex.

Length of Shutdown in hours	≤ 2	>2 ≤8	>8≤32	>32 ≤150	>150
Time required to synchronize to Grid (in Min)	100	150	350	530	770

(viii). In this regard, the Authority has observed that that the technical data provided by the applicant at the time of filing of generation licence application are mostly tentative and according to the feasibility study of the project. The ramping rate and time required for synchronization are design parameters and fixed at the design stage. The same are expected to refine at final stages of the project, according to the manufacturer provided data. Accordingly, finalization of the said parameters is considered as subject matter of PPA. Further, the PPA signed between CPPA-G and EPGTPL provides indicative values of ramping rates and grid synchronization time which are subject to change/update by the Company/EPGTPL within 365 days from the Effective Date.

(ix). The Authority has observed that the said issue has also been considered at the time of grant of the generation licences to different projects and accordingly a sub-article has been included in the generation licences. In Article 3.3 of the generation licence of EPGTPL, the licensee has been directed to provide the final arrangement, technical and financial specification and other specific details pertaining to its generation facility before its commercial operation date (COD) and EPGTPL has submitted the LPM for incorporation of the final parameters before its COD.

(x). Regarding the proposed changes, EPGTPL also submitted notarized translation of the start-up curves of steam turbine provided by the OEM of the steam turbine of the plant. Further, EPGTPL also provided a certificate from OEM of the boilers of the plant (i.e. General Electric-Alstom) stating that the start-up curves provided by EPGTPL are true copies of start-up curves of its boilers designed for

REGISTRAR

Thar Coal and supplied to EPGTPL. In this regard, the Authority observes that the proposed changes in the ramping rate and grid synchronization time are as per OEMs loading curves.

(xi). The Authority has observed that the issues of ramping rate grid synchronization time were also faced by the HSRPEPL and PQEPCL. In the said cases, the Authority considered the proposed changes and observed that the same are necessary for the safety and proper operation of the units. Accordingly, the Authority approved the change in the said parameters in generation licence of HSRPEPL and PQEPCL according to the data/recommendation provided by the equipment manufacturer.

(xii). Regarding impact of the communicated LPM on tariff, the Authority observes that EPGTPL unconditionally opted for the upfront tariff determined by the Authority for Thar Coal Projects and the Authority through determination No. NEPRA/TRF-301/EPTPL-2015/3272-3274 dated March 13, 2015, has granted up front tariff to EPGTPL for its 660 MW Thar Coal based project. Although the proposed changes will result in slight increase in the startup cost of the generation facility, however considering the envisaged base load operation of the plant, the impact on tariff is negligible. Therefore, the Authority is of the opinion that the communicated LPM of EPGTPL will not have any adverse impact on its existing up front tariff.

(xiii). In view of the above, the Authority considers that the LPM will not have any adverse effect on the performance of the Licensee of its obligations. Further, the LPM will not cause the Authority to act or acquiesce in any act or omission of the licensee in a manner contrary to the provisions of the NEPRA Act or the rules or regulations made thereunder. The LPM will be beneficial to the consumers in general as compared to other fuels as cheaper energy based on indigenous resource (Thar Coal) will be available to the power purchaser. The LPM is reasonably necessary for the licensee to effectively and efficiently perform its obligations under the licence. The LPM is necessary to ensure the continuous, safe and reliable supply of electric power to the consumers keeping in view the financial and technical viability of the Licensee.

REGISTRAR

(F). Approval of LPM

(i). In view of the above, the Authority is satisfied that the Licensee has complied with all the requirements of the Licensing Regulations pertaining to the modification. Therefore, the Authority in terms of Regulation-10(11) of the Licensing Regulations approves the communicated LPM without any changes.

(ii). Accordingly, the already granted Generation Licence (No. IGSPL/49/2015 dated March 18, 2015) is hereby modified. The changes made in the generation licence are attached as annexure to this determination. The approval of the LPM is subject to the provisions contained in the NEPRA Act, relevant rules framed there under, terms & conditions of the generation licence and other applicable documents.

Authority

Rafique Ahmed Shaikh
(Member)

Rehmatullah Baloch
(Member)

Saif Ullah Chattha
(Member)

(Did not Attend the meeting-Away)

Engr. Bahadur Shah
(Member/Vice Chairman)

(Did not Attend the meeting-Away)

Tauseef H. Farooqi
(Chairman)

REGISTRAR

National Electric Power Regulatory Authority (NEPRA)

Islamabad – Pakistan

GENERATION LICENCE

No. IGSPL/49/2015

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, as amended or replaced from time to time, the Authority hereby modifies the Generation Licence (No. IGSPL/49/2015 dated March 18, 2015) granted to Engro Powergen Thar (Private) Limited, to the extent of changes mentioned hereunder:

(a). Changes made in **Schedule-I** of the Generation Licence regarding ramping rate and time required to synchronize to grid attached are as **Annexure-A**.

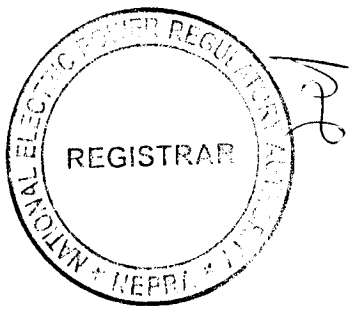
This **Modification-I** is given under my hand on this 14th **day** of **October Two Thousand & Nineteen**

14/10/19

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR NEPRA

Annexure-A



Modification-I
in the Generation Licence (No. IGSPL/49/2015, dated March 18, 2015) of Powergen Engro (Private) Limited

(A). Details of Generation Facility/Power Plant:

(a). At Para **F(v)** of **Schedule-I** of the generation licence, the detail relating to ramping rate of the generation facility/power plant has been incorporated as following:

Load Range (%age)	Cold Start (% MW/Min)	Warm Start (% MW/Min)	Hot Start (% MW/Min)
0—<25%	≤0.35	≤0.8	≤1.0
≥25%— ≤50%	≤0.35	≤0.8	≤1.0
>50— ≤100%	≤0.35	≤0.8	≤1.0

(b). At Para **F(vi)** of **Schedule-I** of the generation licence, the detail relating to time required to synchronize to grid has been incorporated as following:

Length of Shutdown (in Hours)	≤ 2	>2 ≤8	>8≤32	>32 ≤150	>150
Time required to synchronize to Grid (in Minutes)	100	150	350	530	770

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