



Registrar

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.nepa.org.pk, E-mail: registrar@nepa.org.pk

No. NEPRA/PAR-179/KE(IIL)-2018/3269-3271
February 26, 2019

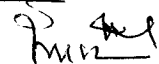
Subject: **APPROVAL OF POWER ACQUISITION REQUEST FILED BY K-ELECTRIC FOR PURCHASE OF UPTO 4 MW FROM INTERNATIONAL INDUSTRIES LIMITED (IIL) UNDER INTERIM POWER PROCUREMENT (PROCEDURES & STANDARDS) REGULATIONS 2005 [CASE # PAR-179/KE(IIL)-2018]**

Dear Sir,

Please find enclosed herewith the subject approval of the Authority (11 pages) in Case No. NEPRA/PAR-179/KE(IIL)-2018.

2. The approval of the Authority is being intimated to the Federal Government for the purpose of notification in the official gazette in accordance with the provisions of Section 31(7) of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).
3. The Order of the Authority's approval needs to be notified in the official Gazette.

Enclosure: As above


26 02 19
(Syed Safer Hussain)

Secretary
Ministry of Energy (Power Division)
'A' Block, Pak Secretariat
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)

Approval of

Power Acquisition Request filed by

K-Electric Limited (KE)

For Purchase of upto 4 MW from International Industries Limited (IIL)

under

Interim Power Procurement (Procedures & Standards) Regulations 2005

(No: NEPRA/PAR-179)

Islamabad

Commentator:

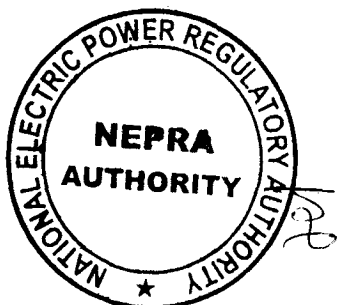
Sui Southern Gas Pipeline Company Limited

1. Introduction

- 1.1. International Industries Ltd. (IIL) is a public limited company located at Karachi. The company claims to be the Pakistan's largest manufacturer of steel, stainless steel and plastic pipes with annual manufacturing capacity of 750,000 tons. NEPRA has granted generation License No. SGC/60/2010 dated 30th July 2010 to International Industries Ltd (IIL) for its 4.38 MW (gross ISO) gas based power plant at Landhi Industrial Area, Karachi.
- 1.2. IIL owns a captive power plant with the installed capacity of 4.38 MW comprising 4 x 1.09 MW GE Jenbacher gas engine. This is a cogeneration facility where the waste heat from the generator produces 2.7 tons of steam per hour through use of a locally produced DDFC waste heat boiler and the hot water from the water jacket of engines is passed through an absorption chiller made in China, to give 380 tons of chilled water to fulfil factory cooling requirements. The Company has a Gas Supply Agreement with SSGC. On full supply of gas at 1.22 MMCFD at ISO conditions, the unit can generate up to 4 MW Gross. The power plant is currently dedicated for supply of power to the manufacturing facility and surplus power export to K-Electric.
- 1.3. K-Electric Limited (KE) and IIL entered into a Power Acquisition Contract on 18th April 2009 for sale and purchase of surplus power of up to 4 MW from IIL on take and pay basis for a period of five years. After the expiry of PAC in April 2014, First Addendum was executed on 26th May 2014 thereby extending the PAC for a period of 3 years with similar terms and conditions.
- 1.4. Upon expiry of First addendum in April 2017, a Second Addendum was signed on 18th April 2017 for further period of 3 years and a copy of the same was submitted to NEPRA vide KE's letter dated 30th May 2017. NEPRA, vide letter dated 15 September 2017 directed KE to file a Power Acquisition Request under the IPPR-2005 for approval of PPA as well as approval of the extension of the PPA.

2. Filing of PAR

- 2.1. K-Electric Limited (KE) vide letter No. SBD/AR/NEPRA-0209/2018-1304 dated 18th April 2018 (**PUC**) while referring to the NEPRA's letter dated 15th September 2017 submitted subject PAR for purchase of up to 4MW Power from IIL under Interim Power Procurement Regulations, 2005 (IPPR-2005).
- 2.2. In view of the power demand in the K-Electric network, availability of surplus power from IIL for supply to K-Electric, and cheaper cost of gas based generation, K-Electric hereby requests the NEPRA to approve K-Electric's Power Acquisition Request and determine a power sale and purchase tariff based on Take and Pay arrangement. This Power Acquisition Request is also in accordance with the requirement by NEPRA as noted in its letter Ref No. NEPRA/SA (T-1)/PAR- 100/15492 dated 15th September 2017. Once the determination is provided, K-Electric shall submit the Power



Acquisition Contract duly negotiated with IIL in accordance with NEPRA's determination for approval.

- 2.3. KE also submitted that IIL supplies surplus power to KE at a much cheaper rate compared with furnace oil generation and the fact that there is a demand in the system for such power, both IIL and KE have continued to sale and purchase surplus power with the understanding that any adjustments to the tariff payments, if required, shall be applied retrospectively in accordance with NEPRA's determination of this PAR.
- 2.4. The Authority admitted the subject PAR on 6th June 2018.

3. Salient features of the PAR

3.1. The salient features of the PAR are as under:

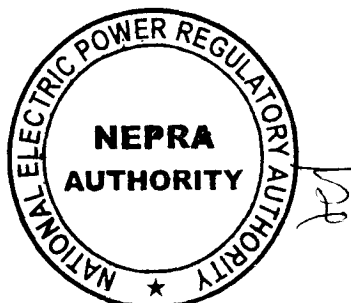
i. The proposed take and pay tariff is hereunder:

Sr.	Description	Tariff (PKR /kWh)
1	Fuel Cost component Excluding GID Cess	6.00 @ Rs. 600/MMBTU
2	Fuel Component Including GID Cess	8.00 @ Rs. 800/MMBTU
3	Variable O&M	1.678
4	Fixed O&M	0.62
5	Total (Excluding GID Cess)	8.30
6	Total (Including GID Cess)	10.30

ii. Key assumption for above tariff are as under:

- Gas price of PKR 600 per MMBTU (HHV basis) plus PKR 200 per MMBTU of Gas Infrastructure Development Cess (GIDC) has been assumed.
- Previous PAC was based on efficiency of 36.8% (HHV), IIL requested efficiency of 34.1% (HHV) in the proposed PAR. The fuel component shall be indexed to fuel price changes as notified by OGRA.
- As per previous contract PKR 0.106/unit escalation on Variable O&M will be allowed after completing of 12 qualifying months on every year. Going forward it is proposed that the variable O&M shall be indexed to Pakistan CPI on an annual basis.
- No indexation has been proposed on Fixed O&M.
- Net supply has been assumed 3.6 MW (surplus power).
- Plant availability has been assumed 92%.

3.2. IIL requested to continue with same terms and condition as per previous agreement along with revised fuel charges as per actual basis as IIL is only recovering its energy cost component without any profit margin.




3.3. GIDC is an additional cost of fuel procurement and will become pass-through if charged and collected by the fuel supplier upon directive from the Government of Pakistan and upon presentation of relevant documents and invoices to KE.

4. Issues framed

4.1. Following issues were framed for the hearing:

- i. Whether the Proposed HHV Heat Rates of 9997 BTU/kWh (efficiency 34.1%) are justified?
- ii. Whether the proposed Fixed O&M cost is reasonable and justified?
- iii. Whether the proposed Variable O&M Cost is reasonable and justified?
- iv. Whether the Proposed indexation of Variable O&M on the basis of Pakistan CPI is justified?
- v. Whether the proposed tariff control period of three years is justified?
- vi. Whether there is any negative impact of this power purchase on the existing tariff of K-Electric?

5. Notice of Hearing

5.1. The Authority decided to hold a hearing in the matter on 18th July 2018. Notice of Hearing along with issues framed were published in the newspaper on 4th July 2018 inviting comments from stakeholders. Individual Notices were also issued to various stakeholders on 5th July 2018.

5.2. KE vide its letter dated 13th July 2018 requested to reschedule the hearing after the 3rd week of July 2013 as per convenience owing to non-availability of IIL representatives. The Authority accepted the request of KE and adjourned the hearing.

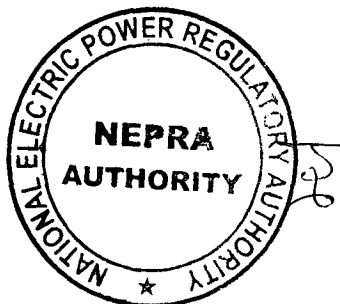
5.3. The hearing was rescheduled for 18th September 2018. Notice of hearing was issued in the newspapers. Individual notices were also sent to stakeholders on 3rd September 2018.

6. Comments/Interventions

6.1. In response to notice of hearing, comments were received from Sui Southern Gas Company Limited (SSGC).

6.2. SSGC vide its letter dated 10th September 2018 submitted the following comments in the matter;

- M/s International Industries Limited is existing Captive Power customer of SSGC with approved load of 1.220 MMCFD. At customer request SSGC has issued NOC vide letter ref; Sales/NOC-PG-573/2009 dated 3rd September 2009 to M/s.



International Industries Limited for sale of surplus power to KE from approved gas load of 1.220 MMCFD.

- The NOC was issued in accordance with directives vide GOP letter No. NG(I)-7(177),08 dated 8th April 2008 reproduced below;

“the condition for self-use in respect of gas allocation reserved for captive power has been revoked and the CPPs will be allowed to sell surplus generation to DISCOs or KESC. SSGC and SNGPL will issue NOCs to the respective CPPs.”

7. Hearing

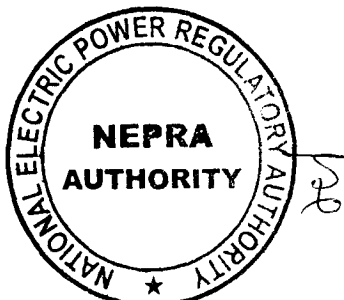
Hearing was held in NEPRA building Islamabad as per schedule and was participated by the representatives of IIL and KE.

8. CONSIDERATION OF THE VIEWS OF THE STAKEHOLDERS, ANALYSIS, FINDINGS AND DECISIONS ON IMPORTANT ISSUES

- 8.1. The issue wise discussion, submissions of the Petitioner and stakeholders, analysis, findings and decisions are provided in the succeeding paragraphs.

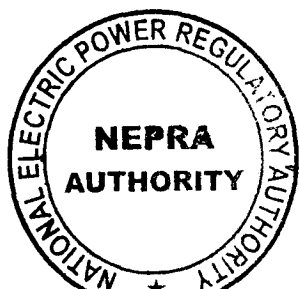
9. Whether the Proposed HHV Heat Rates of 9997 BTU/kWh (at 34.1% efficiency) are justified?

- 9.1. KE submitted that the plant efficiency used in the expired PAC for calculation of fuel cost component was 36.8%, however, IIL requested in the power sale proposal that the efficiency should be changed to 34.13%. KE requested NEPRA to consider any justification for this revision. KE further submitted that the FCC has been proposed to be indexed with change in actual gas price including GIDC where applicable.
- 9.2. IIL in justification of the proposed heat rates/efficiency submitted the summary of SSGC paid bills from 2005-06 to 2017-18, Certificate of approximate fuel cost of Gas Genset Model JGS320 by the equipment supplier and fuel charges calculation based on engine specification and gas tariff.
- 9.3. IIL requested to allow 10% of gross capacity i.e. 0.4 MW as auxiliary consumption and provided detailed list of auxiliaries for analysis. IIL submitted that usually OEM only gives requirement of auxiliaries to be operated and the calculation of loads is depending on the site condition, heads and other factors. While analyzing details of auxiliary consumption as provided by the company certain duplications like cooling tower fan motors, jacket water pumps and exhaust fans etc. have been noted. Furthermore, there are some components mentioned in the details of auxiliary consumption as provided by the company like boiler feed pumps and boiler softener pumps that are usually used in combined cycle based operation. Hence, keeping in



view the size of the generating units and comparing it with existing comparable captive power plants operating in the country, the Authority considers that the auxiliary consumption at 3.5% of gross capacity i.e. 0.14 MW as also mentioned in generation license of IIL is justified and approved instead of 0.4 MW as claimed by the company.

- 9.4. The installed gross capacity of four gas engines as enunciated in license of IIL is $4 \times 1.094 \text{ MW} = 4.38 \text{ MW}$ whereas while reviewing the OEM brochure and efficiency calculation of subject plant it is noted that the installed gross capacity of four gas engines namely JMS 320 GS-NI, is $4 \times 1.064 \text{ MW} = 4.23 \text{ MW}$. As per IIL, it is a typo error. IIL is directed to take necessary action for the correction in the generation license.
- 9.5. IIL requested to allow 34.13% gross HHV flat thermal efficiency at RSC for its power plant based on actual specific fuel consumption. The historical operational data from year 2005 till 2018 has also been provided by the company wherein gross HHV thermal efficiency varies in the range of 31% to 36%. The company in support of its claim also submitted that due to variable site conditions manufacturer allow tolerance of 5% according to DIN-ISO 3046 and DIN 6271 from the OEM brochure value therefore the requested value is on lower side. It may be noted that the earlier Power Acquisition Contract was based on 36.8% gross HHV flat thermal efficiency at RSC which was even greater than gross HHV thermal efficiency i.e. 36.11% at standard reference conditions as indicated by the OEM and as per company no additional impact for CHP/waste steam utilization had earlier been taken into account.
- 9.6. IIL has submitted the detailed calculation of thermal efficiency and also provided the letter of Orient Energy system showing degradation curve due to aging for Type 6 gas engines instead of IIL's Type 3 gas engines. However, the company on December 10, 2018 in response to NEPRA's email submitted degradation curve due to aging for Type 3 gas engines which states that "Based on GE/Innio's experience the efficiency degradation is between 0.8 and 1.3% points depends on operating condition/mode and maintenance performance".
- 9.7. It is observed while reviewing OEM brochure that the gross HHV thermal efficiency i.e. 36.11% at standard reference conditions is based on a new unit (immediately upon commissioning) and the effects of degradation during normal operation can be mitigated through regular service and maintenance work.
- 9.8. In order to assess thermal efficiency of the subject power plant, figures mentioned in OEM brochure, values in previous PAC, auxiliary consumption, degradation due to aging and utilization of steam for the cooling requirements have been examined in detail. Based on technical analysis and historical operational record of installed gas



engines, gross HHV flat thermal efficiency of 35.92% at RSC or net HHV flat thermal efficiency of 34.66% at RSC (adjusted for site conditions, auxiliary consumption and degradation due to aging) is considered realistic for the subject power plant and the same is being approved.

9.9. Based on the approved net HHV efficiency of 34.66% (flat) over the life of the agreement period, the net HHV heat rates works out 9844.60 BTUs/kWh. On the basis of Gas price of Rs. 600/MMBTU excluding GIDC, the fuel cost component shall be Rs. 5.9068/kWh which shall be subject to variation in gas price. In case GIDC is paid to the fuel supplier, the same shall be included in the price of gas and fuel cost component shall be revised accordingly.

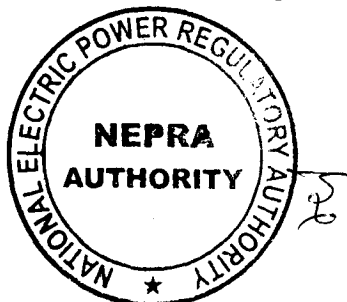
10. Whether the proposed Variable and Fixed O&M Cost is reasonable and justified?

10.1. According to KE, IIL proposed the latest invoiced O&M amount of Rs. 1.678/kWh for variable O&M and Rs. 0.62/kWh for fixed O&M subject to indexation with local CPI on variable O&M in line with the tariff determinations of other captive power plants. No indexation was proposed on fixed O&M.

10.2. IIL submitted the following breakup regarding justification of Fixed and Variable O&M cost:

Expense	Rs in '000	Cost per Unit Rs./kWh
Salaries, wages and benefits	31,534	0.98
Electric Duty	323	0.01
Water	7,173	0.22
Oil and filters	9,171	0.28
Plant maintenance cost	7,517	0.23
Insurance	225	0.01
Depreciation	12,858	0.40
Administrative cost	3,750	0.12
Working capital – financial charges	5,035	0.16
Financial charges on capital cost:		
Debt	11,041	0.34
Equity	14,558	0.45
Total	103,184	3.20

10.3. The requested O&M cost has been found on the higher side as compared to cost allowed to captive power plants of similar nature. The Authority allowed variable O&M cost of Rs. 0.66/kWh and fixed O&M cost of Rs. 0.4966/kWh on the basis of CPI of 216.3 for the month of April 2017 to captive power plants. In addition to the fixed




and variable O&M, ROE of Rs. 0.3871/kWh and insurance of Rs. Rs. 0.1067/kWh was also allowed to captive power plants. The total O&M cost component works out Rs. 1.6504/kWh and the same is approved in the instant case. Apart from variable O&M, other components were determined on plant operation of 9 months. In case of plant operation of 3 non gas months from December to February, only variable O&M along with fuel cost shall be paid in line with other captive power plants. The determined fixed and variable cost shall be subject to indexation on the basis of CPI (General) every two years in the month of April on the basis of CPI (General) of preceding month of March.

11. Whether the Proposed indexation of Variable O&M on the basis of Pakistan CPI is justified?

11.1. III. proposed to change the indexation mechanism to local CPI. The proposal is in line with the adjustment mechanism approved in case of other captive power plants and is being approved.

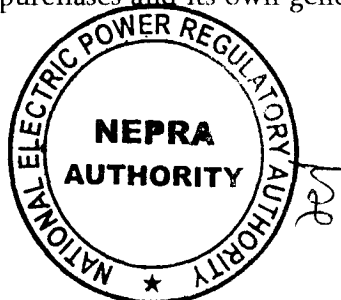
12. Whether the proposed tariff control period of three years is justified?

12.1. According to the PAR submitted by KE, the sale and purchase of surplus power shall be made on "take and pay" basis through bilateral agreement between the power producer and KE. KE intends to purchase power from III because of the prevalent demand and supply gap, which is expected to be filled in the next five years or more, by installation of new power projects. Hence it is safe to enter into an agreement for a three year period. Since the 'take and pay' clause stipulates that neither party shall be liable to the other for not selling nor purchasing electrical energy, it is a reasonable period to contract for. KE further submitted that while the agreement could be for three years, a clause could be added that if K-Electric requires additional power after three years and III has surplus to give to K-Electric, the agreement could be mutually extended for a further period at mutually agreed terms and conditions.

12.2. Keeping in view the demand-supply scenario of KE, the proposed period of three years seems reasonable and approved as such. In case of extension of PPA beyond three years, formal approval shall be sought from NEPRA.

13. Whether there is any negative impact of this power purchase on the existing tariff of K-Electric?

13.1. K-Electric has a portfolio of approximately 3000 MW in its fleet which include both power purchases and its own generation. Gas based power to the tune of 4 MW from



IIL will have negligible impact on KE's existing tariff, and will in fact be cheaper than furnace oil. In addition to having little to no effect on KE's tariff, this power will improve the supply situation for the consumers in Karachi.

13.2. Keeping in view the price of furnace oil and RLNG, the electricity generation on local gas is cheaper and shall not have any negative impact on the existing tariff of KE.

14. Summary of Tariff

14.1. The summary of tariff is as under:

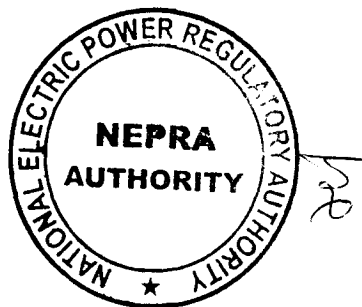
Description	Tariff Rs./kWh	Indexation/ Adjustment
Fuel Cost component	5.9068	Fuel Price
Total O&M Cost Component:	1.6504	
Variable O&M	0.6600	CPI (General)
Fixed O&M	0.4966	CPI (General)
ROE	0.3871	
Insurance	0.1067	
Total Tariff	7.5572	
Reference Values:		
Gas Price excluding GIDC	Rs. 600/MMBTU	
CPI (General) for the month of April 2018	220.25	

15. Order

15.1. The Authority hereby approves the following take and pay tariff for purchase of gas based surplus power by K-Electric Limited from International Industries Limited with effect from 18th April 2017:

Reference Tariff

Description	Rs./kWh
Fuel Cost Component	5.9068
Total O&M Cost Component:	1.6504
Variable O&M	0.6600
Fixed O&M	0.4966
ROE	0.3871
Insurance	0.1067
Total	7.5572




15.2. Tariff Adjustments / Indexations

The reference tariff is subject to following adjustments / indexations:

15.3. Adjustment on account of Gas Price Variation

In future the fuel cost component will be subject to gas price variation as notified by OGRA or any other body for captive power producers from time to time according to the following mechanism:

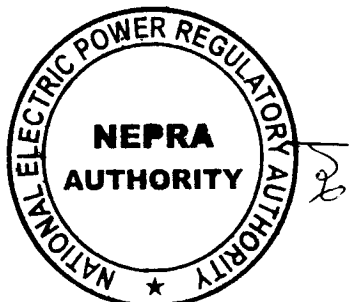
$FCC_{(Rev)}$	=	$FCC_{(Ref)} \times GP_{(Rev)} / GP_{(Ref)}$
Where:		
$FCC_{(Rev)}$	=	Revised Fuel Cost Component applicable for the billing cycle
$FCC_{(Ref)}$	=	Reference FCC on Gas is Rs. 5.9068/kWh.
$GP_{(Rev)}$	=	Revised Ex-GST HHV gas price applicable for the billing cycle as notified by OGRA for captive power plants
$GP_{(Ref)}$	=	Reference Ex-GST HHV Gas price is Rs. 600 /MMBTU

15.4. Adjustment on Account of Inflation

The O&M cost shall be subject to indexation every two years in the month of April on the basis of CPI (General) as published by Pakistan Bureau of Statistics for the preceding month of March as per the following mechanism:

$O\&M_{(Rev)}$	=	$O\&M_{(Ref)} \times CPI_{(Rev)} / CPI_{(Ref)}$
Where:		
$O\&M_{(Rev)}$	=	Revised Variable and Fixed O&M components of tariff
$O\&M_{(Ref)}$	=	Reference Variable and Fixed O&M components of tariff of Rs. 0.66/kWh and Rs. 0.4966/kWh respectively
$CPI_{(Rev)}$	=	Revised CPI (General) index as published by Pakistan Bureau of Statistics
$CPI_{(Ref)}$	=	Reference CPI (General) of 220.25 for April 2017

15.5. Fixed cost has been assessed on the basis of 9 month plant operation, in case of plant operating in three non-gas months; the power producer will be entitled only the fuel cost component and variable O&M.



15.6. In case Gas Infrastructure Development Cess (GIDC) is paid by the power producer to the fuel supplier, the same shall be allowed and the Fuel Cost Component shall be adjusted accordingly.

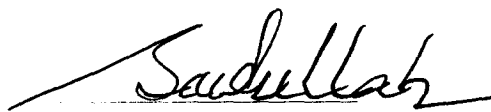
15.7. The term of the contract shall be three (3) years with effect from 18th April 2017.

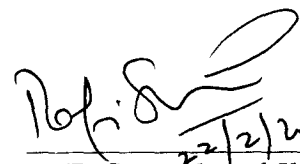
15.8. The Authority has decided to grant permission for procurement of power as per the above approved generation tariff. KE is directed to incorporate the same in the Power Acquisition Contract and submit the same in line with the Regulation 5(1) of the IPPR-2005.


16. Notification

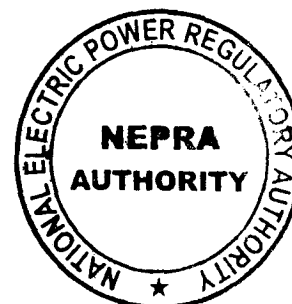
The above Order is to be notified in the official gazette in accordance with the provisions of Section 31(7) of the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997.

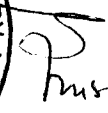
Authority


(Saif Ullah Chattha)
Member 13.2.2019


(Rafique Ahmed Shaikh)
Member 22/2/2019


(Rehmatullah Baloch)
Vice Chairman 22/2/2019




26 02 19