



Registrar

**National Electric Power Regulatory Authority**  
**Islamic Republic of Pakistan**

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No. NEPRA/UGTMSWPP-2018/539-541

January 15 2018

Subject: **Determination of the Authority in the Matter of Upfront Generation Tariff for  
Municipal Solid Waste Power Projects**

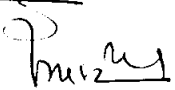
Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along Annex-I, II & III (25 pages).

2. The Determination 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, 1997.

3. The Order of the Authority along with Annex-I, II & III is to be notified in the official Gazette.

Enclosure: As above

  
15 01 18

( Syed Safer Hussain )

Secretary  
Ministry of Energy  
'A' Block, Pak Secretariat  
Islamabad

CC:

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



Determination of the Authority  
in the matter of  
Upfront Generation Tariff  
for  
Municipal Solid Waste Power Projects

Dated 15<sup>th</sup> January, 2018

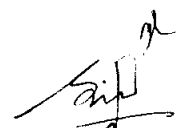
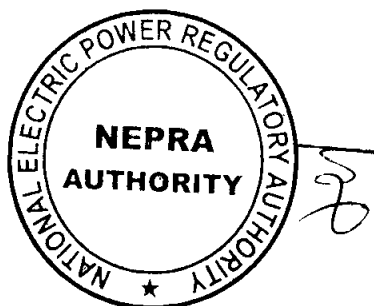
**Interveners:**

- Anwar Kamal Law Associates
- Whistle Blower

**Commentators:**

- Alternative Energy Development Board (AEDB)
- Hyderabad Electric Supply Company (HESCO)
- Central Power Purchasing Agency (CPPA-G)
- Ministry of Petroleum & Natural Resources
- Pakistan Environmental Protection Agency, Ministry of Climate Change
- Punjab Power Development Board (PPDB)
- Waste Busters

- 1 The National Electric Power Regulatory Authority (hereinafter referred to as the "Authority") has been established under section 3 of the 'Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997' (hereinafter referred to as the "Act") and its responsibilities under the Act include, inter alia, determination of tariff, rates, charges and other terms and conditions for supply of electric power services by generation, transmission and distribution companies. In performing its functions under the Act, the Authority has to protect, as far as practicable, the interests of consumers and companies providing electric power services in accordance with the guidelines, not inconsistent with the provisions of the Act laid down by the Federal Government.
- 2 One of the most daunting issues facing the world is the mounting waste problem which impairs public health, pollutes environment and threaten to drown some poor countries in toxicity. In Pakistan roughly 20 million tons of solid waste is generated annually, with annual growth rate of about 2.4 percent. All major cities i.e. Islamabad, Lahore, Karachi and Peshawar, are facing enormous challenges in tackling the problem of urban waste. This availability of the municipal solid waste creates potential of electricity generation which will not only provide electricity to the national grid but will also help in cleaning the environment. Presently Capital Development Authority (CDA) Islamabad, Punjab Power Development Board (PPDB) is pursuing for development of the Solid Waste to Energy Power Project. The addition of Municipal Solid Waste to electricity projects (MSWE) will not only resolve or minimize the issue of garbage which is affecting the environment but will also provide electricity to the national grid
- 3 Keeping in view the above, the Authority in exercise of its powers under the Section 7 of the Act read with rule 3 (1) of the National Electric Power Regulatory Authority (Tariff Standards and Procedure) Rules, 1998 (hereinafter referred to as the "tariff rules") and regulation 3 of the National Electric Power Regulatory Authority Upfront Tariff (Approval & Procedure) Regulations, 2011 (hereinafter referred to as the "upfront tariff regulations") decided to initiate proceedings for determination of new upfront tariff for generation of electricity from Municipal Solid Waste Power Projects (hereinafter referred to as the "upfront tariff"). Accordingly a draft upfront tariff proposal was developed on the basis of information available with the Authority.
4. Proceedings
- 4.1 The advertisement in this regard was published on 25<sup>th</sup> February 2017 & 5<sup>th</sup> March 2017 for information / views / comments of the stakeholders. In response two intervention requests from Anwar Kamal Law Associates and Whistle Blower were received. Notice of hearing was published on 5<sup>th</sup> April 2017. Hearing in the matter was held on 25<sup>th</sup> April 2017 which was attended by representatives of Central Power Purchasing Agency (CPPA-G), Alternative Energy Development Board (AEDB), Punjab Power Development Board (PPDB), Lahore Waste Management Company and other stakeholders. As a matter of reference the proposed generation tariff for Refuse Derived Fuel (RDF) power projects and assumptions were as under:





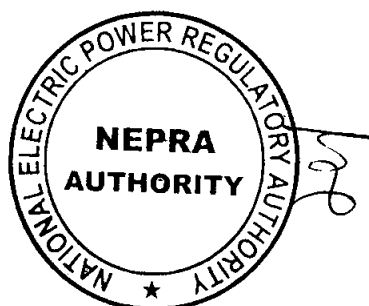
Tariff Components	Rs./kWh						WACC
	1-10	11-30	Levelized	1-15	16-30	Levelized	Levelized
FCC	3.5294	3.5294	3.5294	3.5294	3.5294	3.5294	3.5294
Variable O&M – foreign	0.2526	0.2526	0.2526	0.2526	0.2526	0.2526	0.2526
Variable O&M – Local	0.1684	0.1684	0.1684	0.1684	0.1684	0.1684	0.1684
Fixed O&M – Local	0.2807	0.2807	0.2807	0.2807	0.2807	0.2807	0.2807
Insurance	0.1754	0.1754	0.1754	0.1754	0.1754	0.1754	0.1754
Working Capital	0.0230	0.0230	0.0230	0.0230	0.0230	0.0230	0.0230
ROE / WACC	0.9665	0.9665	0.9665	0.9665	0.9665	0.9665	1.8424
Debt Servicing/Depreciation	2.7666		1.8033	2.2311		1.8001	0.7871
<b>Total</b>	<b>8.1627</b>	<b>5.3961</b>	<b>7.1994</b>	<b>7.6271</b>	<b>5.3961</b>	<b>7.1962</b>	<b>7.0592</b>

4.2 For MSW technology generation tariff was as under:

Tariff Components	Rs./kWh						WACC
	1-10	11-30	Levelized	1-15	16-30	Levelized	Levelized
FCC	1.7647	1.7647	1.7647	1.7647	1.7647	1.7647	1.7647
Variable O&M – foreign	0.3400	0.3400	0.3400	0.3400	0.3400	0.3400	0.3400
Variable O&M – Local	0.2267	0.2267	0.2267	0.2267	0.2267	0.2267	0.2267
Fixed O&M – Local	0.3778	0.3778	0.3778	0.3778	0.3778	0.3778	0.3778
Insurance	0.2361	0.2361	0.2361	0.2361	0.2361	0.2361	0.2361
Working Capital	0.0461	0.0461	0.0461	0.0461	0.0461	0.0461	0.0461
ROE / WACC	1.2635	1.2635	1.2635	1.2635	1.2635	1.2635	2.4280
Debt Servicing / Depreciation	3.6169	-	2.3576	2.9168	-	2.3534	1.0291
<b>Total</b>	<b>7.8717</b>	<b>4.2548</b>	<b>6.6123</b>	<b>7.1716</b>	<b>4.2548</b>	<b>6.6082</b>	<b>6.4483</b>

4.3 The generation tariff assumptions were as under:

- i. The project cost has been assumed as US\$ 1.3 million per MW for RDF power projects and US\$ 1.7 million per MW for MSW power projects.
- ii. The annual plant factor has been assumed as 75%.
- iii. Insurance has been assumed as 1% of EPC cost.
- iv. The debt equity structure of 75:25.
- v. IRR of 15%.
- vi. KIBOR of 6.53%. Spread over KIBOR as 3%
- vii. Exchange rate parity of PKR 105/US\$.
- viii. Debt repayment period of 10 years, 15 years and WACC (11.24%) for 30 years.
- ix. Efficiency of 29.24% (flat)
- x. Calorific Value of 9918.597 btu/kg for solid waste to energy power projects.
- xi. Fuel price of Rs. 1,500/ton for MSW power plants and Rs. 3,000/ton for RDF technology including freight.



5. Intervention Requests

In response to the advertisement, two intervention requests have been received:

- i. Anwar Kamal Law Associates (AKLA)
- ii. Whistle Blower

6. AKLA Concerns

7. The concerns of the AKLA are as under:

- Under which law NEPRA has developed the NEPRA Upfront Tariff (Approval and Procedure) Regulations – 2011?
- The Upfront determination is mismatched with the least cost generation plan.
- In Upfront tariff there is no provision of stakeholder participation.
- A large number of comparatively cheaper, conventional coal and gas (RLNG) based power plants are in the pipeline and a large number of these power plants will be commissioned by the end of the year 2018.
- Efficiencies of the new technology are very low and due to non-availability of the fuel the power plants may not be able to achieve the desired plant factor.
- The proposed new technology would probably be on must run power plants and will supply electricity irrespective of Economic Merit Order.
- Due to available generation capacity and by operating these power plants the capacity component will be paid for the idle capacity.
- Why low efficiency, low plant factor and costlier power plant if the efficient plants are available in the market.
- What is the purpose to determine the proposed Upfront Tariff.
- Whether any agency carried out any study about the availability of fuel, regions-wise for the proposed technology
- Due to higher electricity cost in Pakistan the industries especially the exports goods manufacturing industries are losing their global market share.
- Non-use of already commissioned and readily available Japan, Saba, SEPCOL, Reshma and Gulf Power (700 MW) are the obvious examples of mismanagement.
- The generation addition in future will create surplus power situation and the consumer will pay capacity charges.

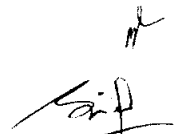
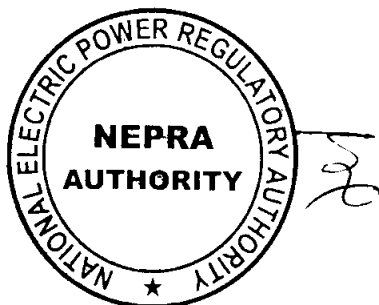
8. Whistle Blower

The Whistle Blower has the same comments as of the AKLA.

9. Commentators

9.1 Following comments have been received from commentators:

- Energy Department, Government of Sindh Directorate of Alternative Energy
- Lahore Waste Management Company (LWMC) / PPDB



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- Energy Department Government of KPK.
- Hyderabad Electric Supply Company.
- Central Power Purchasing Agency (CPPA-G).
- Alternative Energy Development Board.

10. EPA Govt. of Khyber Pakhtunkhwa

10.1 EPA Govt. of Khyber Pakhtunkhwa submitted the following comments:

- Initial Environmental examination and Environmental Impact Assessment report be submitted for review and Environmental approval.

11. Energy Department, Government of Sindh Directorate of Alternative Energy

- The utilization of Alternative Energy technologies other than Wind and Solar is in the priority agenda of the Government to resolve the persisting energy crises.
- Availability of upfront tariff for Solid Waste to Energy power project will save the time period and attract the investments.
- The proposal of Upfront Tariff for Solid Waste to Energy Power Project is supported with the request of early determination.

12. Hyderabad Electric Supply Company (HESCO)

- HESCO appreciate and support NEPRA initiative.
- Fixed cost component for RDF should be same as of MSW.
- ROE/WACC for solid waste power plants needs to be reviewed on the basis of project life.
- IRR also divided equally into 30 years of the project life.

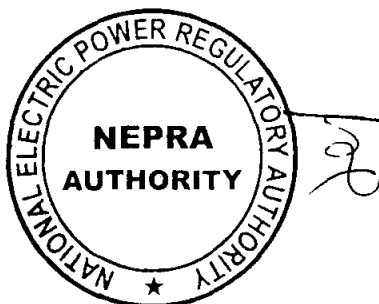
13. Lahore Waste Management Company (LWMC) / PPDB

- The project cost is on lower side vis-à-vis the quotes received from Chinese firm hired for conducting the feasibility Study for development of Solid Waste to Energy Power Project.
- The efficiency internationally is in the range of 20-25% vis-à-vis proposed in the publication.
- The moisture content in the garbage is much higher due to which the Calorific Value is on lower side as against the proposed figure.
- The IRR of 15% for the renewable project which will not only produce electricity but will protect the environment is on lower side.

14. Waste Busters (Commentator)

14.1 The waste busters vide letter dated 3<sup>rd</sup> November 2017 provided the following information:

Head	Particulars	Units	Waste Busters
Operational Parameters	Capacity	MW	10
	Plant Load Factor 1 <sup>st</sup> year	%	75%
	Plant Load Factor 2 <sup>nd</sup> Year	%	55%
	Auxiliary Consumption	%	18%
Project Cost	Useful Life	Year	25






	Tariff Period	Year	25
	Capital Cost	US\$	30
Sources of Fund – Equity	Equity Amount (MM)	US\$	7.5
	Return on Equity for 1 <sup>st</sup> 10 years	%	15%
	Return on Equity for 11 <sup>th</sup> Year onwards	%	18%
Depreciation	Discount Rate	%	10%
	Depreciation Rate for first 12 years	%	8%
	Depreciation from 13 <sup>th</sup> years onwards	%	5%
		%	10%
O&M	O&M expenses	%	15% of O&M
	Maintenance spares Receivables	Days	60 days
	Fuel stock	Days	60 days
	Interest on Working Capital	%	15%
Fuel Related	Municipal Solid Waste	%	100%
	GCV of MSW	Kcal/kg	1700 kCal/kg
	Price of MSW	US\$/Ton	US\$ 10/MT
Tariff	Levellized tariff for 25 years	US Cents/kWh	0.14/kWh

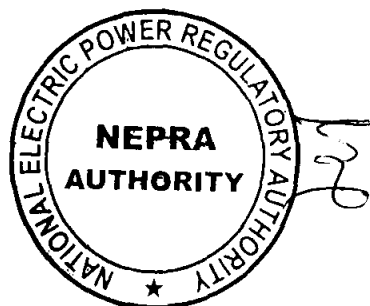
14.2 The waste busters further submitted that the Authority may give due consideration to the following factors while determining the tariff:

- No dumping / tipping fee is to be received (which is common in many other jurisdiction)
- Various project development costs, duties on imported equipment, financial and other professionals fees are not reflected in the cost parameters / financial modelling;
- The commercial terms of the off-take contract (s) are yet to be negotiated and may lead to increased costs;
- The capital cost of waste to energy project typically ranges from US\$ 2.5 M/MW to US\$ 3.0 million per MW which is twice the cost of the power generated by gas fired solar and other feed stock system run power plants.
- Higher auxiliary expenses / consumption (such as stricter emission control norms, MSW feeding / recovery system and ash extraction system) consume 16% or more of gross power generated by the project to run the auxiliaries.
- The efficiency range is usually 26% to 30% for a WtE power plant as compared to other type of renewable and hydro carbon power plants.
- The true benefit of collecting and managing MSW (with a direct positive environmental and social impact) and then converting MSW to energy.

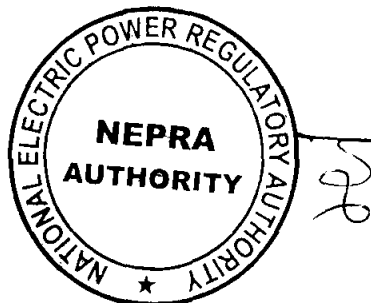
15. Central Power Purchasing Agency (CPPA-G)

15.1 CPPA-G submitted that energy planning premised on pragmatic and balanced view of following imperatives will assist in achieving long term objectives of energy landscape of the country, consistent with the short-term solutions.

- Energy Access and security



- Environmental Sustainability
  - Economic Growth and development
- 15.2 It is added that renewable sources of generation not only accelerate the stride on account of aforesaid imperatives but are the intrinsic tool to cope with the commitment in the international energy landscape.
- 15.2.1 **Policy, Regulatory and Legal Framework:**
- o CPPA-G submitted that the power procurement by the Power Purchaser, keeping in view the current / planned commitments with prospective translation into positive differential of generation and demand gap, should not be evacuated in Must Run fashion which in turn calls for an amendment in above policy. This will prevent swelling of fixed cost component of the end-consumer's tariff.
  - o The amount of energy procured from the renewables (technology specific) to be inducted into National Grid, pursuant to the demand projections for each year, should be determined as percentage of the total generation to be added in the each year and the same percentage needs to be assured by the Distribution Companies in their submission of Power Acquisition Program to the Authority for approval.
  - o Draft Energy Purchase Agreement needs to be framed to depict Non Must Run regime as proposed above.
  - o Section 32 of NEPRA Act entails development of prescribed procedures and standards for Authority's prior approval of Power Acquisition Program for Distribution Companies.
- **Determination of Uniform Feed in Tariff:**
- o CPPA-G suggested that the cost plus tariff on case to case basis without Upfront tariff and without front loading be announced.
16. **Pakistan Environmental Protection Agency, Ministry of Climate Change**
- 16.1 Ministry of Climate Change submitted that all potential power projects including those based on solid waste or biomass for consideration of generation license by NEPRA may be subjected to comply with the mandatory requirement of seeking environmental approval from respective environmental protection agency as per their territorial jurisdiction and in accordance with the provisions of the relevant environmental protection acts and rules / regulation made thereunder.
17. **Ministry of Petroleum & Natural Resources**
- 17.1 The Ministry of Petroleum and Natural Resources supported the usage of Municipal waste for electricity generation and stated that this will not only reduce reliance on gas generation but also bridge the gap between demand and supply.
18. **Issues**
- 18.1 Considering the comments / input of the stakeholders and information / data available with the Authority, following issues were framed for consideration and deliberations of the Authority:
- Whether the proposed project cost for Municipal Waste and Refuse Derived Fuel is justified?





- Whether the Debt: Equity ratio of 75:25 is reasonable?
  - Whether the proposed O&M is reasonable?
  - Whether the 15% IRR is justified?
  - Whether the 1% insurance is reasonable?
  - Whether the proposed efficiency of 29.24% justified?
  - What should be pricing mechanism for solid waste management?
  - Whether the annual plant factor is justified
  - Whether the concerns of the Intervener are reasonable and justified?
- 18.2 The above issues were published in the notice of hearing dated 5<sup>th</sup> April 2017 for discussion / deliberations during the hearing dated 25<sup>th</sup> April 2017.

19. Issue-Wise discussion and Recommendations

19.1 Based on the submissions of the Interveners and commentators, the issue-wise discussion is as under:

20. Whether the proposed project cost for Municipal Waste and Refuse Derived Fuel is justified?

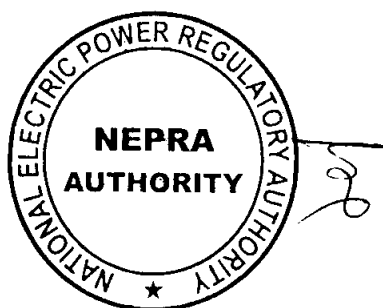
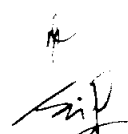
20.1 NEPRA in its proposal assumed the following project costs:

- For Refuse Derived Fuel: US\$ 1.3 million per MW
- Fuel Municipal Waste: US\$ 1.7 million per MW

20.2 The officials from Punjab Power Development Board (PPDB), Lahore Waste Management Company (LWMC) and the Project Company MCCT-ENFI Consortium participated in the hearing and submitted that presently the project company is undertaking the detailed feasibility study for development of approximately 40 MW Waste to Energy Power Project at Lahore. In the hearing, the Authority advised LWMC and Project Company to provide the CAPEX and related efficiencies of already established Waste to Energy (WtE) power projects in China by the Project Company.

20.3 In response to the directions of the Authority, PPDB stated that the project cost is on lower side. The PPDB also submitted that the tariff does not address waste to energy option like, landfill gas, biogas extraction, gasification and pyrolysis only. According to PPDB the incineration or combustion of MSW and RDF is considered. The PPDB also submitted that the project cost in case of biogas and gasification will be extremely low. PPDB submitted the following comparison:

Countries	Purchase Price (USD/kWh)	Period	Comments
Japan	0.22	20 years	Depending on the ratio of feed
Germany	0.19-0.22	20 years	Price of new facility decrease by 2% every year.
Netherland	0.14	(Before 15 years)	Over 500 kW



Austria	0.135-0.2	15 years	If fuel is waste price will decrease by 20-40% depends on MSW
China	0.09-0.12		Including incentive
Indonesia	0.12		1050 IDR/kWh
Malaysia	0.14		0.42 MYR/kWh

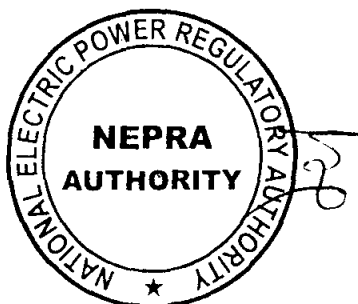
20.4 PPDB also submitted the following project cost of the different Chinese MSW power plants:

Project Name	Capacity* (MW)	CAPEX (Mill US\$)	CAPEX (Mill US\$/MW)
Guangzhou Likeng	40	140.1	3.5
Guangzhou Panyu	40	147.8	3.7
Shandong Jinan	40	129.0	3.2
Tianjin Binhai	40	155.9	3.9
Hebei Julu	40	137.7	3.4
Wuxi Xidong	40	142.1	3.6
Shandong Qingdao	40	175.4	4.4
Nanjing Tonging	40	146.4	3.7
Xi'an Gaolin	40	192	4.8

20.5 According to the PPDB the claimed cost of the Lahore Xingzhong Renewable Energy Co. (Pvt.) Limited (SPV Company of project main sponsor MCCT-ENFI (LOI holder)), for the Lahore Waste Power plant is US\$ 5.79 million per MW with levelized tariff of US Cents 17.5/kWh which was subsequently revised to US\$ 4.75 million per MW with levelized tariff of US Cents 14/kWh. The letter communicated stated as under:

Tariff (US\$ Cents /kWh)	Tipping Fee (US\$/t)
10	14.28
11	11.01
12	7.74

20.6 The Authority considered the submissions of interveners and commentators. The Authority also compared the project cost of the MSW power plants in neighboring countries, Turkey and in Europe. The Authority noted that the selection of the technology and emission control standards are the major drivers of the project cost. Since fuel is mix therefore the pre-operative equipment, boiler, emission control equipment, leachate treatment plant etc. are used to generate electricity from the MSW power plant. In addition to the aforesaid pre-processing equipment, feasibility study, imported technology requires in-depth studies due to which the pre-operative expenses increases. According to the information / data available with the Authority, power projects cost of incineration power projects ranges between US\$ 2.5 million to US\$ 6 million depending upon the size of the power plant, technology, emission control standards, characteristics of the solid waste etc.



- 20.7 The Authority considers that the main purpose of the MSW power plant is environment cleaning therefore the organic composition of the waste, the design and emission control system has to be built in a way to cater for the emission hazards. There are two functions in the solid waste power plant (i) waste collection, dumping and (ii) disposal of the waste. The Authority considers that in accordance with the provision of law, the cost to the extent of electricity generation can be passed on to the end-consumers. Accordingly prudent project cost is required to be assessed for the incineration based power projects.
- 20.8 The Authority observed that the per unit tariff in Turkey for MSW power plant is US Cents 13/kWh. In our neighboring country recently announced tariff is US Cents 11/kWh for 11.5MW MSW power plant. In order to arrive at just and informed decision, the Authority also sent NEPRA team to visit the MSW power plant in Beijing China. The Authority considered the information provided with respect to the MSW Beijing Power Plant whose project cost was around US\$ 4 million per MW. The per unit electricity tariff was US Cents 10/kWh.
- 20.9 Keeping in view the above, the Authority considers that the project cost of US\$ 3.5 million per MW is reasonable assessment for the MSW power plants. Accordingly the Authority has decided to allow the same. The breakup of project cost is as under:

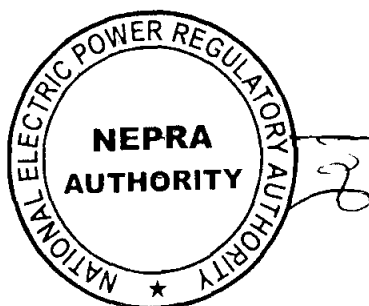
Description	US\$ in M
EPC	2.4815
Non-EPC	0.6049
Custom Duties & Cess (5.95%)	0.1476
Financing Fees & IDC	0.2660
Total Project Cost	3.5000

21. Whether the Debt: Equity ratio of 75:25 is reasonable?

- 21.1 In the instant case debt:equity ratio of 75:25 was proposed which was recommended by the different stakeholders. The Authority considers that the MSW power projects are at nascent stage therefore needs to be treated in same manner as in case of Independent Power Producers. Accordingly the tariff has been calculated on basis of debt:equity ratio of 75:25.

22. KIBOR Spread

- 22.1 The Upfront Tariff for MSW Power Projects proposal was based on KIBOR plus 3% Spread. Accordingly the tariff was calculated on the same basis.
- 22.2 The Authority noted that State Bank of Pakistan ("SBP") in June, 2016 had approved financing scheme for renewable power projects. SBP is providing loan at a flat rate of 6% for a debt servicing term of ten years. Under that scheme, financing shall be available to the prospective sponsors desirous of setting up of renewable energy power projects with a capacity ranging from more than 1 MW to 50 MW, who have completed prescribed requirements of Alternative Energy Development Board (AEDB) and other relevant Government Departments / Authority (Federal or Provincial), in compliance with the prevalent Renewable Energy Policy of the



Government of Pakistan. The Municipal Solid Waste power projects are under the GOP RE policy 2006. Accordingly, the reference tariff has been approved on the same basis. This upfront tariff shall be approved /adjusted for the projects on commercial financing terms only after the option of financing under SBP scheme is exhausted which shall be substantiated with submission of relevant documentary evidences at the time of application for this upfront tariff. The commercial financing for local debt after exercising the SBP scheme shall be KIBOR + 3% and in case of foreign financing LIBOR + 4.5%. The savings in the spread, if any, shall be shared between power purchaser and power producer in the ratio of 60:40.

23. **Construction Period**

23.1 The construction period for the MSW power plant was proposed as 24 months. The ENFI Company / PPDB requested for 30 months construction period.

23.2 The Authority considers that the 24 month construction period for thermal power plant is reasonable time period. At present, most of the power plants are installed in given time period for construction. Accordingly the Authority has decided to allow 24 months of the construction period from the date of issuance of the decision for the specific project. The applicability period for opting of this tariff shall be one year from the date of notification in the official gazette from the GOP.

24. **Minimum Size of the Power Plant**

24.1 The project size depends on the fuel (waste) availability near the project location. Mostly above 15 MW power projects are established for electricity generation. The Authority considers that the size of the plant has to be selected by the project sponsors.

24.2 The Authority considers that as a matter of equity and justice all provinces shall be given equal opportunity to establish the MSW power plant in their respective area. Accordingly 50 MW for each province has been fixed as maximum capacity in order to avail the instant upfront tariff. For Federal territory i.e. Islamabad, 50 MW is the maximum capacity. Accordingly overall 250 MW capacity is the maximum cap for establishment of the MSW power plants in the country for this Upfront Tariff.

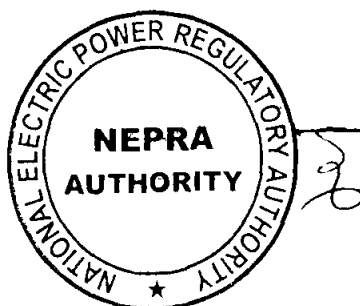
25. **Whether the proposed O&M is reasonable?**

25.1 The Authority in case of Solid Waste assumed the O&M cost @ 4% of the EPC cost. Accordingly following O&M was advertised:

Description	Rs./kWh Levelized
Variable O&M – foreign	0.2526
Variable O&M – Local	0.1684
Fixed O&M – Local	0.2807
<b>Total</b>	<b>0.7007</b>

25.2 For MSW technology following O&M was published for input of the stakeholders:

Description	Rs./kWh Levelized
Variable O&M - foreign	0.3400
Variable O&M - Local	0.2267





Fixed O&M - Local	0.3778
<b>Total</b>	<b>0.9445</b>

25.3 Globally around 4-6% of the EPC cost is allowed at O&M cost. PPDB communicated the letter from the Lahore Xingzhong Renewable Energy Co. (Pvt.) Limited (SPV Company of project main sponsor MCCT-ENFI (LOI holder)), which stated that the O&M cost is around 6.15%. The Authority noted that in the neighboring countries the O&M cost is allowed as 5-6% of the capital cost. Due to the mix fuel the repair and maintenance and other associated issues, the O&M cost of the MSW power plant is higher as compared to the thermal power plants. The Authority has therefore decided to allow 5% of the EPC cost as O&M cost in the instant case. Accordingly the O&M cost on per kWh hours has been assessed as under:

Description	Rs./kWh Levelized
Variable O&M - foreign	0.2100
Variable O&M - Local	0.3149
Fixed O&M - Local	1.2248
<b>Total</b>	<b>1.7496</b>

26. Whether the 15% IRR is justified?

26.1 The Authority had proposed IRR of 15%. This IRR was in line with the return allowed in case of Wind Upfront Tariff.

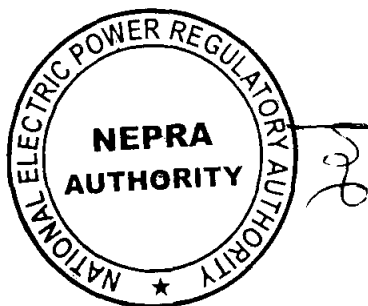
26.2 PPDB stated that the IRR needs to be reviewed keeping in view the huge investment required in the field of Solid Waste Management Projects. According to the Company the investor needs higher return. The representatives of ENFI (Chinese firm) also submitted that the IRR offered is on lower side.

26.3 The Authority in the case of Renewable Power Projects allowed 17% IRR which has been reviewed in case of Wind Upfront Tariff to 15% IRR. The MSW Power Plants will not only provide electricity to the national grid but will also contribute in protecting the environment. In view thereof the Authority has decided to allow 16% IRR in the instant case.

27. Whether the 1% insurance is reasonable?

27.1 Currently 1% of EPC is allowed by the Authority as cost for insurance during construction and operations. The essence of insurance cost is that in the event of a disaster, the insurance coverage should exist to cover for replacement of the damaged machinery/ equipment. Insurance cost typically covers events such as earthquake, flooding, technology specific risk, cyber security, terrorism, marine, delay in construction and location specific risks.

27.2 The Authority keeping in view the actual benchmarks available in different projects considers 1% of EPC cost as insurance cost is reasonable. Accordingly the same has been approved on account of insurance component for the project construction and operational period.



28. Whether the proposed efficiency of 29.24% justified?

28.1 In the proposed Upfront Tariff efficiency was mentioned as 29.24% for the life of the project. The tariff was accordingly calculated on the same efficiency.

28.2 In response PPDB representative stated that the efficiency is on the higher side. According to PPDB if they are in the process of finalizing the Solid Waste to Energy Power Project for which Chinese firm has been hired. The Chinese Firm has carried out the feasibility study and the process is on advance stage. The Chinese Company representative Mr. Yidan Li has also commented on the efficiency matter. According to the representative of Chinese firm, the efficiency assumed by NEPRA is higher since the efficiency of the Solid Waste Power Projects ranges between 20-22%. He further stated that the solid waste is not consistent fuel which has higher calorific value therefore this has major impact on the efficiency of the machine. The representative of Chinese firm further added that the Medium Temperature Boilers are used instead of higher pressure boiler. Following information in this regard has been provided:

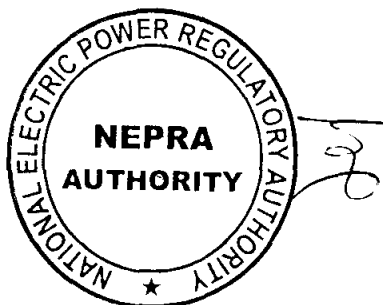
Project Name	Waste Supply (Capacity)	Efficiency	Owner's website
Guangzhou Panyu Waste-to-Energy Power Plant	2000t/d(40MW)	22.30%	<a href="http://www.grantop.net/">http://www.grantop.net/</a>
Hebei Julu Waste-to-Energy Power Plant	2000t/d(40MW)	20.60%	<a href="http://www.soundgroup.com/">http://www.soundgroup.com/</a>
Wuxi Xidong Waste-to-Energy Power Plant	2000t/d(40MW)	21.90%	<a href="http://www.enfi.com.cn/class/view?id=10090">http://www.enfi.com.cn/class/view?id=10090</a>
Nanjing Tongjing Waste-to-Energy waste incineration Power Plant	2000t/d(40MW)	21.30%	<a href="http://www.ebchinaintl.com/sc/global/home.php">http://www.ebchinaintl.com/sc/global/home.php</a>

28.3 AEDB in its comments stated that efficiency proposed by NEPRA may kindly be revised on ground reality and keeping in view the different technologies.

28.4 The issue of efficiency has been discussed in the pricing mechanism of the MSW in the next issue.

29. What should be pricing mechanism for solid waste management?

29.1 The NEPRA in its proposal assumed Rs. 1,500 per ton for MSW and Rs. 3,000 per ton for RDF. Accordingly the fuel cost component was calculated based on the aforesaid assumptions.



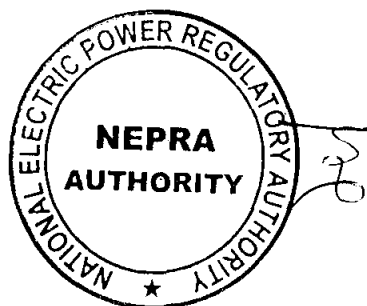



- 29.2 Lahore Waste Management Company representative Mr. Nusrat Gill stated that around 7,000 ton per day waste is generated in Lahore. According to the representative of LWMC around 1000 ton per day municipal waste is provided to the DG Khan cement. The representative of LWMC further stated that currently the Turkish firm is responsible for collection, transportation into a centralized dumping station Lakhodair landfill site with a price of around US\$ 26/ton.
- 29.3 Collection, transportation and dumping of the waste is the responsibility of the waste management companies which are provided funds through their respective municipal corporations. The dumped garbage is not only creating environmental hazards but also polluting the environment affecting the inland water and occupying the precious land. Usually the power plants are established near the dumping area of the garbage thus the dumped garbage is utilized for the electricity generation. Since garbage is free therefore no fuel price is allowed in the incineration based power projects. Rather for disposing of the garbage, in some cases power producer is paid tipping fee by the waste management companies. The issue of tipping fee is dependent upon the negotiations between the power producers and waste management company. In case tipping fee is paid, the same is additional revenue for the power projects.
- 29.4 In our neighboring country, no fuel price is allowed for MSW power plants. The waste management company is already paid per ton amount from the relevant municipal corporations. The waste is therefore dumped by the relevant waste management companies which is used for electricity generation. In view thereof the Authority considers that the fuel cost component cannot be allowed in absence of any fuel price. Instead of fuel payment, additional revenue is earned due to tipping fee. Accordingly no fuel cost component has been assumed. Since there is no fuel price therefore efficiency and Calorific Value of the machine are not relevant.

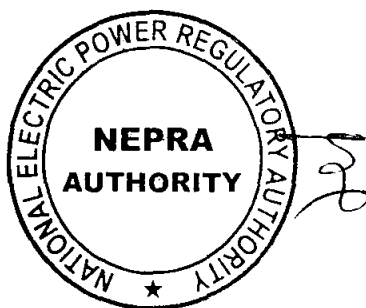
30. Whether the annual plant factor is justified?

- 30.1 The annual plant availability factor of 75% was proposed in the publication. Accordingly the generation tariff was calculated based on the aforesaid plant factor. PPDB provided following information proposed by the Lahore Xingzhong Renewable Energy Co. (Pvt.) Limited (SPV Company of project main sponsor MCCT-ENFI (LOI holder)), with respect to plant factor:

Energy Yr	GWh	PF
1	169.3	
2	182.3	
3	195.3	
4	208.3	
5	221.3	
6-25	234.5	
Average	226.6	



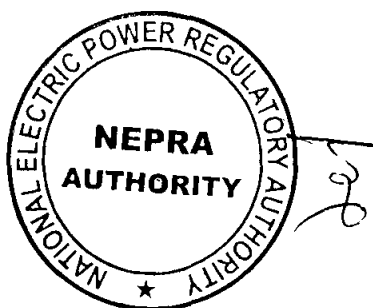
- 30.2 According to the Cost and Performance characteristics of New Generating Technologies, Annual Energy Outlook 2016, the capacity factor for WtE plants is 70-90%. In our neighboring country plant factor for Solid Waste Power Project is assumed as 60% during stabilization, 65% during first year after stabilization and 75% from 2<sup>nd</sup> year onward. In China the plant availability factor was around 90% however the plant factor was around 75%-80%.
- 30.3 The availability factor of the power plant is entirely depending upon the organic composition of the fuel which is mix in case of garbage. Keeping in view the mix fuel, the Authority has decided to allow 65% plant availability factor for first year, 70% plant availability factor for 2<sup>nd</sup> year and from 3<sup>rd</sup> year onward 75% plant availability factor shall be maintained. The tariff has been calculated on the basis of take or pay mechanism however the availability factor has been fixed as explained above.
31. Auxiliary Consumption
- 31.1 NEPRA developed a proposal for determination of upfront tariff for solid waste based power plants which is based on 12% auxiliary consumption.
- 31.2 In case of regional benchmarks, the auxiliary consumption is allowed from 12% to 16%. The PPDB communicated the request of the ENFI (Chinese firm) which stated that due to the pre-processing and emission control system, the auxiliary consumption is 16%. The waste buster stated that the auxiliary consumption may be allowed at 18%.
- 31.3 The Authority considers that the auxiliary consumption in the solid waste power plant is higher as compared to the thermal power plants. Accordingly 15% auxiliary consumption being reasonable assessment is allowed in the instant case.
32. Tariff Control Period
- 32.1 The tariff control period in the matter was proposed as 30 years. In neighboring country there is 20 years operational period of the plant.
- 32.2 As per information provided by the Punjab Power Development Board (PPDB) the ENFI (Chinese firm) who have conducted the feasibility study for 40 MW power plant in the Lahore has suggested 25 years operational period.
- 32.3 Keeping in view the above, the Authority has decided to allow tariff control period of 25 years from Commercial Operations Date (COD).
33. **Whether the concerns of the Intervener are reasonable and justified?**
- 33.1 **Response to AKLA Queries**
- 33.1.1 In accordance with the provision of Section 47 and sub-clause (a) of the Sub-Section 7 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 the Upfront Tariff Regulations have been framed. Energy is fundamental input to economic activity, and thus to human welfare and progress. The importance of electricity in the





development of the economy of any country is beyond any doubt. 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 reasons, the Authority is of the considered opinion that for sustainable development all indigenous resources of power generation must be developed on priority basis in the public and private sector, including Coal, Hydel, Wind, Solar and RE.

- 33.1.2 The concerns of the AKLA with respect to least cost generation plan are valid. The Authority is cognizant of the least cost generation plan and the while determining generation tariff all these factors are kept in mind. The environmental issues are hampering the country for which such kind of power plants are required. The existing demand supply gap also requires induction of new generation plant and especially the renewable power projects for enhancement of the energy security.
- 33.1.3 The existing energy mix of the country is heavily skewed towards the thermal power plants, mainly operating on imported fuel. The import of fuel for electric power generation not only creates a pressure on the precious foreign exchange reserves of the country but is also an environmental concern. Therefore, in order to achieve sustainable development it is imperative that indigenous RE resources are given priority for power generation and their development is encouraged. The renewable projects will help in diversifying the energy portfolio of the country. Further, the project will not only enhance the energy security of the country by reducing the dependence on imported oil but will also help in protecting environment by disposing off the MSW.
- 33.1.4 Upfront tariff are always determined in accordance with the relevant provisions of law and through consultative process wherein input of all stakeholders is solicited.
- 33.1.5 So far as under-utilization of the existing plants is concerned, demand phenomenon needs to be understood. Demand is not constant; rather it changes round the clock from peak to minimum. During the period of less demand, generation has to be curtailed. Non utilization of plants during the minimum demand time doesn't mean that plants are underutilized as all the plants cannot be operated when there is not enough demand. The MSW power projects will further strengthen the economy and economic welfare of the farmers of this country.
- 33.1.6 Further, wherever the underutilization have come to the notice of the Authority, the appropriate legal proceedings are initiated and even recently the Authority has initiated the legal proceedings in this regard.
- 33.1.7 As regards the CPPA-G concerns, the policy framework is the prerogative of GOP therefore the query of the CPPA-G in this regard is not relevant in the instant case.



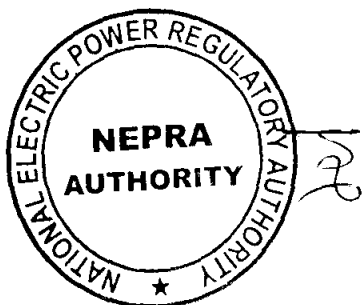
**34. ORDER**

34.1 The Authority hereby determines and approves the following upfront tariff for Municipal Solid Waste Power Projects (MSWPP) for delivery of electricity to the power purchaser:

Tariff Components	MSW Incineration Power projects			Indexation
	1-10	11-30	Levelized	
Rs./kW/hr				
Variable O&M-Foreign	0.2100	0.2100	0.2100	US GPI & PKR / USD
Variable O&M – Local	0.3149	0.3149	0.3149	CPI General
Fixed O&M – Local	1.2248	1.2248	1.2248	CPI General
Insurance	0.3499	0.3499	0.3499	PKR / USD
ROE /ROEDC	2.2272	2.2272	2.2272	PKR/USD
Debt Servicing	4.9494	-	3.3504	LIBOR / KIBOR & PKR/USD (If applicable)
<b>Total Tariff Rs./kW/hr</b>	<b>9.2762</b>	<b>4.3268</b>	<b>7.6772</b>	
<b>Levelized Tariff – Rs/kWh</b>	<b>12.6469</b>	<b>5.7691</b>	<b>10.5073</b>	
<b>Levelized Tariff US Cents/kWh</b>	<b>12.0447</b>	<b>5.4943</b>	<b>10.0070</b>	

- i. The above tariff is applicable for 25 years from COD.
- ii. The above tariff is applicable for MSW power projects.
- iii. Dispatch criterion will be energy charge.
- iv. The reference component wise Upfront Tariff table is attached herewith as Annex-I
- v. The reference Debt Service schedule is attached herewith as Annex-II.
- vi. This upfront tariff has been worked out on the basis of the interest rate of 6% being offered under SBP scheme. In case of commercial local financing, the tariff shall be computed using applicable KIBOR plus a premium of 300 basis points. In case of commercial foreign financing, the tariff shall be computed using applicable LIBOR plus a premium of 450 basis points. In case negotiated rates/spread is less than the said limits, the savings shall be shared by the power purchaser and the power producer in the ratio of 60:40 respectively. The power producer shall submit relevant authentic documentary evidence to the Authority, for the aforesaid adjustment within 15 days of COD of the relevant company. In case the premium on LIBOR/KIBOR is higher than that mentioned above, no adjustment on the basis of actual higher premium will be allowed.
- vii. The 50% of the approved total project cost has been assumed in foreign currency (USD) which shall be adjusted with respect to PKR/US\$ exchange rate variation to be worked out on quarterly basis as per the assumed schedule of debt and equity injections spread over 24 months of project construction period as given hereunder.

1st QTR	2nd QTR	3rd QTR	4th QTR	5th QTR	6th QTR	7th QTR	8th QTR	Total 24 months
10%	20%	20%	15%	15%	10%	5%	5%	100%






34.2 The PKR/US\$ exchange rate variation will be average of the quarter. The interest during construction shall be adjusted at the time of COD on account of actual project financing mix and variation in quarterly LIBOR/KIBOR (where applicable) over the approved reference rates. The interest during construction shall be reassessed for the allowed construction period of twenty four months, starting from the date of financial close/construction period, on the same computation basis as already adopted, by applying 3 months KIBOR/LIBOR of last day of the preceding quarter (plus allowed spread thereon), on the basis of phasing for debt injection considered in the computation of upfront tariff.

34.3 Pass through items

34.3.1 If the company is obligated to pay any tax on its income from generation of electricity, or any duties and/or taxes, not being of refundable nature, are imposed on the company up to the commencement of its commercial operations for import of its plant, machinery and equipment, the exact amount paid by the company on these accounts shall be reimbursed by the power purchaser on production of original receipts. This payment should be considered as a pass-through payment spread over a twelve months period. Furthermore, in such a scenario, the company shall also submit to the power purchaser details of any tax savings and the power purchaser shall deduct the amount of these savings from its payment to the company on account of taxation.

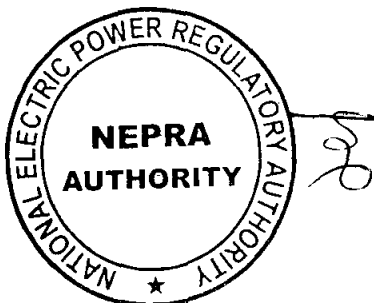
34.3.2 The adjustment for duties and/ or taxes will be restricted only to the extent of duties and/or taxes directly imposed on the company. No adjustment for duties and/or taxes imposed on third parties such as contractors, suppliers, consultants, etc. excluding adjustment for taxes imposed on dividend as stated below, will be allowed. Withholding tax on dividends will not be allowed as a pass through item.

34.4 Adjustments & Indexations

34.4.1 Following indexation shall be applicable to the reference tariff after one-time adjustment:

- a) Fixed O&M: The fixed O&M component will be adjusted on account of local Inflation. Quarterly adjustments for inflation will be made on 1<sup>st</sup> July, 1<sup>st</sup> October, 1<sup>st</sup> January & 1<sup>st</sup> April respectively on the basis of the latest available information with respect to Pakistan CPI (General). The formula of indexation will be as under:

$F. O\&M_{(REV)}$	=	$F. O\&M_{(REF)} * CPI_{(REV)} / CPI_{(REF)}$
Where:		
$F. O\&M_{(REV)}$	=	The revised Fixed O&M component of tariff
$F. O\&M_{(REF)}$	=	The reference Fixed O&M component of tariff
$CPI_{(REV)}$	=	The applicable revised CPI (General)



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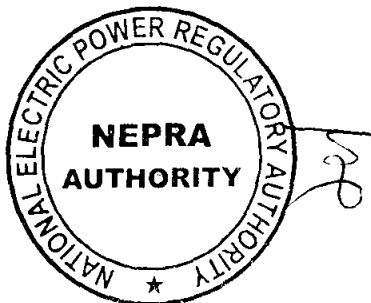
CPI <sub>(REF)</sub>	=	The reference CPI (General) of 216.61 for the month of August, 2017
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- b) Variable O&M-Local: The local variable O&M component will be adjusted on account of local Inflation. Quarterly adjustments for inflation will be made on 1st July, 1st October, 1st January & 1st April respectively on the basis of the latest available information with respect to Pakistan CPI (general). The formula of indexation will be as under:

L V. O&M <sub>(REV)</sub>	=	L V. O&M <sub>(REF)</sub> * CPI <sub>(REV)</sub> / CPI <sub>(REF)</sub>
Where:		
L V. O&M <sub>(REV)</sub>	=	The revised local variable O&M component of tariff
L V. O&M <sub>(REF)</sub>	=	The reference local variable O&M component of tariff
CPI <sub>(REV)</sub>	=	The applicable revised CPI (General)
CPI <sub>(REF)</sub>	=	The reference CPI (General) of 216.61 for the month of August 2017

- c) Variable O&M-Foreign: The foreign variable O&M component will be adjusted on account of variation in Rupee/Dollar exchange rate and US CPI. Quarterly adjustments for inflation and exchange rate variation will be made on 1st July, 1st October, 1st January & 1st April respectively on the basis of the latest available information with respect to US CPI (notified by US bureau of labor statistics) and revised TT&OD Selling rate of US Dollar (notified by the National Bank of Pakistan). The formula of indexation will be as under:

F V. O&M <sub>(REV)</sub>	=	F V. O&M <sub>(REF)</sub> * US CPI <sub>(REV)</sub> / US CPI <sub>(REF)</sub> * ER <sub>(REV)</sub> /ER <sub>(REF)</sub>
Where:		
F V. O&M <sub>(REV)</sub>	=	The revised foreign variable O&M component of tariff
F V. O&M <sub>(REF)</sub>	=	The revised foreign variable O&M component of tariff
US CPI <sub>(REV)</sub>	=	The revised US CPI (All Urban Consumers)
US CPI <sub>(REF)</sub>	=	The reference US CPI (All Urban Consumers) of 245.519 for the month of August, 2017
ER <sub>(REV)</sub>	=	The revised TT & OD selling rate of US dollar
ER <sub>(REF)</sub>	=	The reference TT & OD selling rate of RS. 105/USD



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- d) Adjustment of debt servicing component: This fixed charge component after one-time adjustment will remain unchanged throughout the tariff control period except for the adjustment due to variation in LIBOR/KIBOR in case of commercial financing. The debt servicing component of tariff will be adjusted accordingly on a quarterly basis.
- e) Return on Equity: Return on equity (ROE) as well as Return on Equity during Construction (ROEDC) component of tariff shall be adjusted for variation in PKR/US\$ exchange rate according to the following formula:

$ROE_{(Rev)}$	=	$ROE_{(Ref)} * ER_{(Rev)} / ER_{(Ref)}$
Where;		
$ROE_{(Rev)}$	=	Revised ROE Component of Tariff
$ROE_{(Ref)}$	=	Reference ROE Component of Tariff
$ER_{(Rev)}$	=	The revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
$ER_{(Ref)}$	=	The reference TT & OD selling rate of Rs. 105/USD

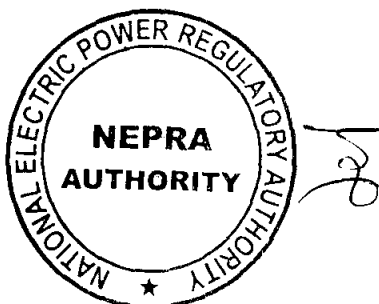
- f) Insurance during Operation: The actual insurance cost for the minimum cover required under contractual obligations with the Power Purchaser, not exceeding 1% of the EPC cost, will be treated as pass through. Insurance component of reference tariff shall be adjusted annually as per actual upon production of authentic documentary evidence according to the following formula;

AIC	=	$Ins_{(Ref)} / P_{(Ref)} * P_{(Act)}$
Where		
AIC	=	Adjusted insurance component of tariff
$Ins_{(Ref)}$	=	Reference insurance component of tariff
$P_{(Ref)}$	=	Reference premium @ 1% of EPC Cost at Rs. 105
$P_{(Act)}$	=	Actual premium or 1% of the EPC Cost converted into Pak Rupees on exchange rate prevailing on the 1st day of the insurance coverage period whichever is lower

#### 34.5 Terms and condition of Upfront Tariff

34.5.1 The proposed terms and conditions are as under:

- i. Upfront tariff will be applicable for all new power projects using Municipal Solid Waste.
- ii. Following are eligible for Upfront tariff:





- a. Companies recommended by the AEDB / relevant agencies for the grant of Upfront tariff.
- b. Companies which certify that all the plant and machinery to be installed will be new and international standards in the form attached as Annex-.III.
- iii. The option for accepting Upfront tariff by power projects will be applicable for one year from the date of notification in the official gazette by the GOP.
- iv. The Upfront Tariff will be applicable and become effective after Commercial Operation Date (COD).
- v. The decision to opt for upfront tariff once exercised will be irrevocable.
- vi. The project sponsors will be required to achieve COD within 24 months from date of approval of Upfront tariff by the Authority. No extension will be allowed.
- vii. The sponsors interested in availing Upfront tariff will submit unconditional formal application to NEPRA for approval by the Authority in accordance with the NEPRA Upfront Tariff (Approval and Procedure) Regulations 2011.
- viii. The mode of transaction will be on take or pay basis. No allowance / adjustment shall be given other than NEPRA allowed tariff.
- ix. The projects opting this tariff shall secure debt under the concessionary financing scheme of State Bank of Pakistan. This tariff shall be allowed on the approved terms of commercial financing only after availing the option of financing under SBP scheme.
- x. Power Producers shall have the option to offer energy to the respective Distribution Company (DISCO) at 11 KV or 132 KV, or to the CPPAG at 132 KV, provided that the cost of interconnection, grid station upgrades etc for power evacuation shall be incurred by the respective DISCO/CPPAG.
- xi. In the Upfront Tariff no adjustment for certified emission reductions has been accounted for. However, upon actual realization of carbon credits, the same shall be distributed between the power purchaser and the power producer.
- xii. Pre-COD sale of electricity to the power purchaser, if any, will be allowed subject to the terms and conditions of PPA, at the applicable tariff excluding principal repayment of debt component and interest component.
- xiii. The adjustment/indexation of upfront tariff will be made on the basis of benchmarks assumed by the Authority for Upfront Tariff in accordance with the indexation mechanism stipulated hereinabove. No project specific adjustments shall be taken into account.
- xiv. The PPA executed shall be consistent with all applicable documents including Generation License and NEPRA's Tariff determination for the power producer. Any provisions of PPA/

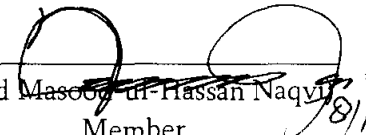


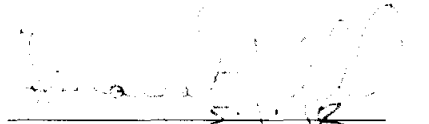



PPA which is inconsistent with NEPRA's Tariff Determination shall be void to that extent and its financial impact shall not be passed on to the end consumer.


- xv. The terms and conditions specified herein form an integral part of this tariff.
35. The above order of the Authority, along with attached annexures (I to III), are recommended for notification by the Federal Government, in the Official Gazette, in accordance with Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

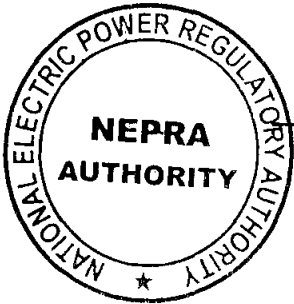
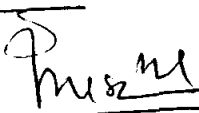
AUTHORITY

  
(Syed Masood-ul-Hassan Naqvi)  
Member

  
(Himayat Ullah Khan)  
Member

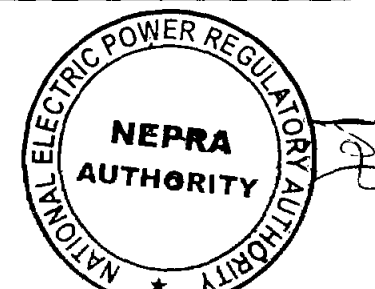
  
(Saif Ullah Chatterji)  
Vice Chairman 8.1.2018

  
(Briq (R) Tariq Saddozai)  
Chairman

  
  
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**Reference Upfront Tariff for Municipal Solid Waste Power Projects**

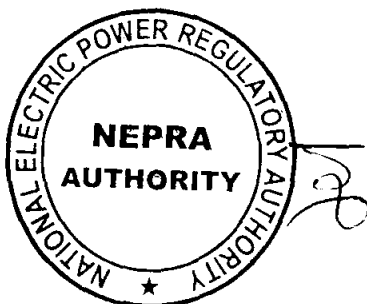
Year	Variable O&M Local	Variable O&M Foreign	Fixed O&M Local	Insurance	Return on Equity	Loan Repayment	Interest Charges	Total Tariff @ availability factor	
	Rs./kW/hr								Rs./kWh
1	0.3149	0.2100	1.2248	0.3499	2.2272	2.7904	2.1590	14.2711	13.5915
2	0.3149	0.2100	1.2248	0.3499	2.2272	2.9617	1.9878	13.2517	12.6207
3	0.3149	0.2100	1.2248	0.3499	2.2272	3.1434	1.8060	12.3683	11.7793
4	0.3149	0.2100	1.2248	0.3499	2.2272	3.3363	1.6131	12.3683	11.7793
5	0.3149	0.2100	1.2248	0.3499	2.2272	3.5410	1.4084	12.3683	11.7793
6	0.3149	0.2100	1.2248	0.3499	2.2272	3.7583	1.1911	12.3683	11.7793
7	0.3149	0.2100	1.2248	0.3499	2.2272	3.9889	0.9605	12.3683	11.7793
8	0.3149	0.2100	1.2248	0.3499	2.2272	4.2337	0.7157	12.3683	11.7793
9	0.3149	0.2100	1.2248	0.3499	2.2272	4.4935	0.4559	12.3683	11.7793
10	0.3149	0.2100	1.2248	0.3499	2.2272	4.7692	0.1802	12.3683	11.7793
11	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
12	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
13	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
14	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
15	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
16	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
17	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
18	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
19	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
20	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
21	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
22	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
23	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
24	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
25	0.3149	0.2100	1.2248	0.3499	2.2272			5.7691	5.4943
<b>Levelized Tariff</b>	<b>0.3149</b>	<b>0.2100</b>	<b>1.2248</b>	<b>0.3499</b>	<b>2.2272</b>	<b>2.3919</b>	<b>0.9585</b>	<b>10.5073</b>	<b>10.0070</b>





**Reference Upfront Tariff for Municipal Solid Waste Power Projects  
Debt Servicing Schedule**

Period	Local Debt					Annual Principal Repayment Rs./kW/hr	Annual Interest Rs./kW/hr	Annual Debt Service Rs./kW/hr
	Principal Million Rupees	Repayment Million Rupees	Mark-Up Million Rupees	Balance Million Rupees	Debt Service Million Rupees			
1	275.6254	5.0790	4.1344	270.5464	9.2134	0.6821	0.5552	1.2374
	270.5464	5.1552	4.0582	265.3913	9.2134	0.6923	0.5450	1.2374
	265.3913	5.2325	3.9809	260.1588	9.2134	0.7027	0.5346	1.2374
	260.1588	5.3110	3.9024	254.8478	9.2134	0.7133	0.5241	1.2374
1	275.6254	20.7776	16.0758	254.8478	36.8534	2.7904	2.1590	4.9494
2	254.8478	5.3906	3.8227	249.4572	9.2134	0.7240	0.5134	1.2374
	249.4572	5.4715	3.7419	243.9857	9.2134	0.7348	0.5025	1.2374
	243.9857	5.5536	3.6598	238.4321	9.2134	0.7458	0.4915	1.2374
	238.4321	5.6369	3.5765	232.7952	9.2134	0.7570	0.4803	1.2374
2	254.8478	22.0526	14.8008	232.7952	36.8534	2.9617	1.9878	4.9494
3	232.7952	5.7214	3.4919	227.0738	9.2134	0.7684	0.4690	1.2374
	227.0738	5.8073	3.4061	221.2665	9.2134	0.7799	0.4574	1.2374
	221.2665	5.8944	3.3190	215.3722	9.2134	0.7916	0.4457	1.2374
	215.3722	5.9828	3.2306	209.3894	9.2134	0.8035	0.4339	1.2374
3	232.7952	23.4058	13.4476	209.3894	36.8534	3.1434	1.8060	4.9494
4	209.3894	6.0725	3.1408	203.3169	9.2134	0.8155	0.4218	1.2374
	203.3169	6.1636	3.0498	197.1533	9.2134	0.8278	0.4096	1.2374
	197.1533	6.2561	2.9573	190.8972	9.2134	0.8402	0.3972	1.2374
	190.8972	6.3499	2.8635	184.5473	9.2134	0.8528	0.3846	1.2374
4	209.3894	24.8421	12.0114	184.5473	36.8534	3.3363	1.6131	4.9494
5	184.5473	6.4451	2.7682	178.1022	9.2134	0.8656	0.3718	1.2374
	178.1022	6.5418	2.6715	171.5603	9.2134	0.8786	0.3588	1.2374
	171.5603	6.6400	2.5734	164.9204	9.2134	0.8917	0.3456	1.2374
	164.9204	6.7396	2.4738	158.1808	9.2134	0.9051	0.3322	1.2374
5	184.5473	26.3665	10.4870	158.1808	36.8534	3.5410	1.4084	4.9494
6	158.1808	6.8406	2.3727	151.3402	9.2134	0.9187	0.3187	1.2374
	151.3402	6.9433	2.2701	144.3969	9.2134	0.9325	0.3049	1.2374
	144.3969	7.0474	2.1660	137.3495	9.2134	0.9465	0.2909	1.2374
	137.3495	7.1531	2.0602	130.1964	9.2134	0.9607	0.2767	1.2374
6	158.1808	27.9844	8.8690	130.1964	36.8534	3.7583	1.1911	4.9494
7	130.1964	7.2604	1.9529	122.9360	9.2134	0.9751	0.2623	1.2374
	122.9360	7.3693	1.8440	115.5667	9.2134	0.9897	0.2477	1.2374
	115.5667	7.4799	1.7335	108.0868	9.2134	1.0045	0.2328	1.2374
	108.0868	7.5921	1.6213	100.4948	9.2134	1.0196	0.2177	1.2374
7	130.1964	29.7016	7.1518	100.4948	36.8534	3.9889	0.9605	4.9494
8	100.4948	7.7059	1.5074	92.7888	9.2134	1.0349	0.2024	1.2374
	92.7888	7.8215	1.3918	84.9673	9.2134	1.0504	0.1869	1.2374
	84.9673	7.9388	1.2745	77.0284	9.2134	1.0662	0.1712	1.2374
	77.0284	8.0579	1.1554	68.9705	9.2134	1.0822	0.1552	1.2374
8	100.4948	31.5242	5.3292	68.9705	36.8534	4.2337	0.7157	4.9494
9	68.9705	8.1788	1.0346	60.7917	9.2134	1.0984	0.1389	1.2374
	60.7917	8.3015	0.9119	52.4902	9.2134	1.1149	0.1225	1.2374
	52.4902	8.4260	0.7874	44.0642	9.2134	1.1316	0.1057	1.2374
	44.0642	8.5524	0.6610	35.5118	9.2134	1.1486	0.0888	1.2374
9	68.9705	33.4587	3.3948	35.5118	36.8534	4.4935	0.4559	4.9494
10	35.5118	8.6807	0.5327	26.8311	9.2134	1.1658	0.0715	1.2374
	26.8311	8.8109	0.4025	18.0203	9.2134	1.1833	0.0541	1.2374
	18.0203	8.9431	0.2703	9.0772	9.2134	1.2011	0.0363	1.2374
	9.0772	9.0772	0.1362	0.0000	9.2134	1.2191	0.0183	1.2374
10	35.5118	35.5118	1.3416	-	36.8534	4.7692	0.1802	4.9494



Date: \_\_\_\_\_

The Registrar,  
National Electric Power Regulatory Authority,  
Islamabad

**Subject:- Certification in respect of application for approval of tariff for Municipal Solid Waste Power Projects**

I, [NAME, DESIGNATION], being the duly Authorized representative of [NAME OF APPLICANT COMPANY] by virtue of [BOARD RESOLUTION/POWER OF ATTORNEY DATED ], hereby confirm that for our project of [CAPACITY OF THE PROJECT] MW installed capacity to be located at [ADDRESS OF THE PROJECT SITE]:

2. All the plant and machinery to be installed will be brand new and of international standards.

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Company Stamp

