



# **Uttar Pradesh Electricity Regulatory Commission**

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Dated: January 24, 2024

## **Public Notice**

An approach paper has been prepared by the Commission **on Methodology for Co-Firing of Biomass Pallets and its cost recovery**. The Commission hereby invites written suggestions/objections/ comments from various stakeholders, which may be sent to the Secretary, Uttar Pradesh Electricity Regulatory Commission, Vidyut Niyamak Bhawan, Vibhuti Khand, Gomti Nagar, Lucknow - 226010 through post and email on [secretary@uperc.org](mailto:secretary@uperc.org) and [manoj@uperc.org](mailto:manoj@uperc.org) **on or before 14.02.2024**.

  
(Secretary)

Encl.:

1. Approach Paper

**Uttar Pradesh Electricity Regulatory Commission**

APPROACH PAPER ON

METHODOLOGY FOR CO-FIRING OF BIOMASS PELLETS AND RECOVERY OF ITS COSTS IN THE FIXED AND VARIABLE CHARGES / ECR IN BIOMASS CO-FIRED THERMAL POWER PLANTS.

**January 2024**

# 1. Introduction

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## **Background**

- 1.1 On 17.11.2017, the Ministry of Power ("**MoP**"), Government of India issued an office memorandum titled as "*Policy for Bio-mass Utilisation for Power Generation through Co-firing in Pulverised Coal Fired Boilers*" ("**Bio-mass Policy**") introducing the concept of blending of coal with bio-mass pellets and advised all the power plants/utilities, public or private located in India, **excluding coal units having ball and tube mill** to endeavor to use 5-10 % blend of bio-mass pellets made primarily of agro residue along with coal **after assessing the technical feasibility viz. safety aspects etc.**
- 1.2 Central Electricity Authority ("**CEA**") vide its letter dated 24.11.2017 bearing ref. no. CEA/TETD-TT/2017/M-25/1137-1251 informed all stakeholders to endeavor use 5-10% blend of bio-mass pellets made, primarily, of agro residue along with coal **after assessing the technical feasibility, viz. safety aspects etc.**
- 1.3 CEA issued '**Technical Specification for Agro Residue Based Biomass pellets (Non- Torrefied/ Torrefied) for Co- Firing in Coal Based Thermal Power Plants**' dated 15.09.2018 covering various relevant aspects and requirements of agro residue-based bio-mass pellets (non- torrefied/ torrefied) to be supplied to a coal based thermal power plant for co-firing in the boilers along with coal, including the palletization and torrefaction process and other technical aspects viz; the associated technology, acceptance range of key technical parameters, adjustment for variation in key technical factors etc.
- 1.4 The Uttar Pradesh Electricity Regulatory Commission (hereinafter referred to as 'the Commission') has recognized the use of Biomass *as fuel* in biomass co-fired Coal based Thermal Power Plants UPERC (Terms and Conditions for determination of Generation Tariff) Regulations, 2019 {2019/343-A Lucknow} notified on 11<sup>th</sup> September 2019. The relevant excerpts are being reproduced below:

*Regulation 3 "Definitions"*

(35) **Landed Fuel Cost'** means the total cost of coal (including Biomass in case of cofiring), lignite or the gas delivered at the unloading point pf the generating station

*and shall include the base price or input price. Washery charges, wherever, applicable, transportation cost (overseas or inland or both) and handling cost, charges for third party sampling and applicable statutory charges;'*

- 1.5 Subsequently, the Ministry of Law and Justice, Government of India vide Notification No. CG-DL-E-13082021-228982 dated 13.08.2021 notified the **Commission for Air Quality Management in National Capital Region and Adjoining Areas Act, 2021 ("CAQM Act")** for better co-ordination, research, identification, and resolution of problems surrounding the air quality index in the NCR and adjoining areas.
- 1.6 The AQM Commission, in view of, compelling need to control air pollution from burning of paddy straw, **on 17.09.2021, issued Direction No. 42, directing coal based thermal power plants situated in a radius of 300 km of Delhi** to: (i) initiate immediate steps to co-fire bio-mass based pellets, Torrefied Pellets/Briquettes (with focus on paddy straw) with coal (up to 5-10%) in the power plants through a continuous and uninterrupted supply chain; and (ii) take all necessary steps to ensure that co-firing of bio-mass pellets in thermal power plants begins without any delay. **The said Direction No. 42 contained a list of thermal power plants situated within 300 km radius of Delhi NCR for which co-firing of bio-mass pellets with coal was mandatory.**
- 1.7 MoP vide its letter bearing no. NBM/MD/21-22/03 **dated 23.09.2021 issued a model Standard Operating Procedure for bio-mass pellets cofiring** in PF Boilers ("**Model SOP**"), whereby various parameters in handling, storage and blending of pellets have been explained, **for thermal power producers to prepare site specific standard operating procedure.**
- 1.8 MoP vide its office memorandum dated 28.09.2021 bearing no. 11/86/2017-Th. II (Part-V), decided that **Central Pollution Control Board and the AQM Commission would impose penalties for those plants that do not comply with the mandate to compulsorily use bio-mass pellets in thermal power plants.** For plants located within a 300 KM area from the NCR, penalty was stipulated to be higher as compared to rest of the country.

- 1.9 Ministry of New and Renewable Energy ("the MNRE"), Government of India issued clarification, vide reference dated 26.9.2019, that the power generated from co-firing of Biomass in Coal based Thermal Power Plants is Renewable Energy (RE) and is eligible for meeting non-solar Renewable Purchase Obligation (RPO).
- 1.10 In furtherance to policy dated 17.11.17, advising all coal based TPPs to use biomass for power generation after assessing technical feasibility except those having bowl & tube mill, the Ministry of Power, on 08.10.2021 has issued a revised policy, *to further promote use of biomass pellets in coal based thermal power plants*, with modifications specifying percentage use and type of bio-mass pellets to be used for different combinations viz, bowl mills, bowl & race mills and ball & tube mills.
- 1.11 CEA has issued Guidelines/procedure for examining the request of the power plants for seeking exemption/relaxation from bio-mass co-firing on 04.02.2022.
- 1.12 Clarification dated 07.04.2022 has been issued by MOP regarding clarification of applicability of Revised Biomass Policy to Fluidized Bed Boilers.
- 1.13 Ministry of Power, Government of India also issued Revised Model Contract for use of Biomass in thermal Power Plants (TPPs), vide letter No. 11/86/2017- Th-II Part (II) dated 06<sup>th</sup> January 2023.
- 1.14 Addendum dated 03.05.2023 to Revised Policy for Biomass Utilization dated 08.10.2021 regarding use of material for Bio-Pellets.
- 1.15 Modification dated 16.06.2023 of Revised Bio-mass policy dated 08.10.2021.
- 1.16 CAQM advisory dated 30.08.2023 regarding benchmark prices of non-terrified bio-mass pellets.
- 1.17 Price Benchmarking of Biomass Pellets for co-firing in Thermal Power Plants for Northern Region (excluding NCR)- dated 08.11.2023.

**2. Salient features of "Policy for Biomass Utilization for Power Generation through Co-firing in Coal Based Power Plants" issued by MoP on 08.10.2021 along with addendum/modifications are as follows:**

2.1 Relevant extracts from the Biomass Policy are as below:

"3. .... The modifications in the above Policy are under:

- (i) All coal based thermal power plants of power generation utilities with bowl mill, shall on annual basis mandatorily use 5 per cent blend of biomass pellets made, primarily, of agro residue along with coal with effect from one year of the date of issue of this guideline. The obligation shall increase to 7 percent with effect from two years after the date of issue of this order and thereafter.
- (ii) All coal based thermal power plants generation utilities with ball & race mill, shall on annual basis mandatorily use 5% blend of biomass pellets (torrefied only) made, primarily, of agro residue along with coal. This is to be complied with within one year starting from this order. Two years from the date of issue of this order and thereafter the obligation will increase to 7 percent.
- (iii) All coal based thermal power plants of power generation utilities with ball & tube mills, shall on annual basis mandatorily use 5 % blend of torrefied biomass pellets with volatile content below 22% primarily made of agro residue along with coal. This is to be complied within one year.
- (iv) Generating Utilities having certain units under Reserve Shutdown or not being dispatched due to MOD (Merit Order Despatch) consideration would ensure to increase the percentage of co-firing up to 10 % in their other operating units/ plants (5% in plants having ball and tube mills).
- (v) Any power plants seeking exemption / relaxation from co-firing may be considered on case-to-case basis, based on recommendations of CEA. A committee headed by Chief Engineer (TE&D), CEA, including representatives from NTPC, BHEL, CPRI, Ministry of Agriculture and Mission Directorate shall examine the request of power plants for their exemption/ relaxation from mandatory co-firing of biomass, as mentioned at para (i) to (iv) above.
- (vi) The policy of co-firing of biomass would be in force for 25 years or till the useful life of the thermal power plant whichever is earlier. The minimum percentage of biomass for co-firing will be reviewed from time to time.

(vii) The minimum contract period for procurement of biomass pellets by generating utilities shall be for 7 years so as to avoid delays in awarding contracts by generating companies every year and also to build up long terms supply chain. There may be provision of firm price of biomass pellets for the first year of the contract and yearly rate variation from second year onwards where rates can vary as per terms and conditions of the contract. In order to enable its implementation, model RfP and contract shall be issued by MOP by 15.11.2021 for adhering to by all generating utilities. However, the ongoing process of contracting for biomass co-firing by generating utilities shall not be affected till issue of Model Contract.

(viii) Provisions related to tariff determination and scheduling shall be as given below:

- a) For projects set up under Section 62 of the Electricity Act 2003, the increase in cost due to co-firing of biomass pellets shall be pass through in Energy Charge Rate (ECR).
- b) For projects set up under Section 63 of the Electricity Act 2003, the increase in ECR due to biomass co-firing can be claimed under Change in Law provisions.
- c) Such additional impact on ECR shall not be considered in deciding Merit Order Despatch (MOD) of the power plant.
- d) Obligated Entities such as Discoms can meet their Renewable Purchase Obligations (RPO) by buying such generation of co-firing.”

2.2 Relevant Extracts from addendum dated 03.05.2023 are as follows:

“4. Biomass pellets used for co-firing in TPPs can be made from the following:

- (i) ‘agro-residue’ [as mentioned in para 3(i), 3(ii) and 3(iii) above] i.e., the leftover portion of the agriculture produce such as stubble/straw/stalk/husk which are surplus and not being used as animal fodder. This includes agro-residue obtained from crops like Paddy, Soya, Arhar, Gwar, Cotton, Gram, Jawar, Bajra, Moong, Mustard, Sesame, Til, Maize, Sunflower, Jute, Coffee, etc. as well as groundnut shell, coconut shell, castor seed shell etc.

- (ii) In addition, pellets made from following agro product/crop waste can also be used for co-firing in TPPs:
- a. bamboo and its by-products (e.g. bamboo chips, cuttings, bamboo dust etc.
  - b. horticulture waste such as dry leaves and trimmings obtained from maintenance & pruning of trees and plants.
  - c. Other biomass such as pinecone, needle, elephant grass, sarkanda etc.

2.3 Relevant Extracts from addendum dated 16.06.2023 are as follows:

"Existing clause no.3-(i), (ii), (iii) to be replaced by following clauses:

- 3(i) All coal based thermal power plants of power generation utilities with bowl mills, shall on annual basis mandatorily use minimum 5% blend of biomass pellets made, primarily, of agro residue along with coal w.e.f. FY 2024-25. The obligation shall increase to 7% w.e.f. from FY 2025-26.
- 3(ii) All coal based thermal power plants of power generation utilities with ball & race mills, shall on annual basis mandatorily use 5% blend of biomass pellets (torrefied only) made, primarily, of agro residue along with coal w.e.f. FY 2024-25. The obligation shall increase to 7% w.e.f. FY 2025-26.
- 3(iii) All coal based thermal power plants of power generation utilities with ball & tube mills, shall on annual basis mandatorily use 5% blend torrefied biomass pellets with volatile content below 22%, primarily made of agro residue along with coal w.e.f. FY 2024-25.

**Addition of para 5, after para 4 of ibid policy, as under:**

A committee shall be constituted under the leadership of CEA with members from MNRE, MoAFW, MoPNG, Forum of Regulators, SAMARTH, State Govt., Power Utilities etc. for price benchmarking of biomass pellets considering the business viability, impact on electricity tariff and efficient & faster pellet procurement by power utilities.

The price benchmarking would be carried out region-wise for a period of 5 years with



provision for periodic escalation. The benchmark price will not include the transportation cost from pellet manufacturing unit to the TPPs. **TPPs shall determine the transportation cost from pellets manufacturing units to TPPs in a fair and transparent manner. The procurement of benchmark priced pellets shall be carried out on a first come, first serve basis.** If TPPs are unable to procure biomass pellets at the benchmark price, they have the option to go for a short-term tender. However, it is important for TPPs to ensure that the price discovered in the short-term tender is determined in a fair and transparent manner. The price discovered should also be comparable to the benchmarked prices. The recommendation of price benchmarking committee will be effective from 1.1.2024. Meanwhile, the power utilities shall go for short term tenders for meeting the immediate requirement of biomass pellets for their TPPs.

**Addition of para 6, after 5 of ibid policy, as under**

It has been observed that the availability of torrefied biomass pellets is much lower in market. Therefore, those power plants which can use non-torrefied pellets should utilize the same only. **Hence, TPPs having bowl mill will issue tenders for non-torrefied biomass pellets only, while TPPs having either ball & race mill or ball & tube mill will issue tenders for torrefied biomass pellets.** This practice will continue till further notification on this issue.

**3.0 Applicability of the Methodology**

- 3.1 The methodology is applicable to State Sector Thermal Generating Stations under section 62 or section 63 of the Electricity Act, 2003 since the Commission regulates tariff of the State Sector Generating Stations for sale or purchase of electricity under Section 86(1)(a) and 86(1)(b) of the Act.
- 3.2 For Thermal Generating Stations, under section 62 of EA'03, under commercial operation as on date of MOP notification dated 08.10.2021 for Biomass Utilization for Power Generation through Co-firing in Coal Based Power Plants issued by MoP on 08.10.2021, the said notification would constitute a Change in law.
- 3.3 For Thermal Generating Stations, under section 63 of EA'03, under commercial operation as on date of MOP notification dated 08.10.2021 for

Biomass Utilization for Power Generation through Co-firing in Coal Based Power Plants issued by MoP on 08.10.2021, the said notification would constitute a Change in law subject to applicable provisions of the PPA.

### **3.4 Landed cost of Biomass Fuel**

Where biomass fuel is used for blending with coal, the landed cost of biomass fuel shall be worked out based on the delivered cost of biomass at the unloading point of the generating station, inclusive of taxes and duties as applicable. The energy charge rate of the blended fuel shall be worked out considering consumption of biomass based on blending ratio as specified by Authority or actual consumption of biomass, whichever is lower.

*3.4.1 Energy generated from biomass shall be worked out based on the actual consumption of biomass and coal rather than on normative operational parameters of Station Heat Rate and Auxiliary Power Consumption.*

*3.4.2 Principle of proportion shall be the basis to work out the energy generated from biomass. The energy output is estimated in proportion to the heat input from biomass out of total heat input from biomass and coal.*

*3.4.3 Heat input shall be worked out based on consumption and quality (GCV) of the coal and biomass.*

*3.4.4 Consumption of coal and biomass shall be worked out based on opening balance, receipt and closing balance of coal and biomass.*

### **3.5 Methodology for estimation of electricity generated from biomass in biomass co- fired coal based Thermal Power Plants, including captive and co-generation power plants co-firing biomass.**

The methodology specified hereunder shall be followed by State Sector Thermal Generating Stations for estimating electricity generated from Biomass in biomass co-firing Coal based Thermal Power Plants and captive / co-generation power plants using co-firing biomass.

#### **Step-1:**

1. The electricity generated from Biomass shall be estimated at Generator Terminal on monthly basis in accordance with the following formulae:

$$Eb(G) = [(Q_b \times G_b) / ((Q_c \times G_c) + (Q_b \times G_b))] \times E(GT)$$

Where,

$E_b(G)$  =Electrical energy generated by biomass at Generator terminal during the month (kWh);

$Q_b$ =Quantity of biomass consumed during the month (kg)

$G_b$ =Weighted average Gross Calorific Value (GCV) of biomass consumed during month (kCal/kg)

$E(GT)$  =Gross electrical energy generated at Generator Terminal during the month (kWh)

$Q_c$ =Quantity of coal burnt during the month (kg)

$G_c$  = Weighted average GCV of coal burnt during the month (kCal/kg)

2. The product ( $Q_b \times G_b$ ) represents heat (in Kcal) input through biomass during the month and shall be estimated on monthly basis by applying following formulae:

$$Q_b \times G_b \text{ (kCal)} = \{\text{opening balance of biomass (kg) X weighted average GCV of opening balance of biomass (kCal/kg)}\} + \{\text{quantity of bio- mass received during the month (kg) X weighted average GCV of biomass received during the month (kcal/kg)}\} - \{\text{closing stock of bio-mass (kg) X weighted average GCV of the closing balance of bio-mass (kCal/kg)}\}.$$

3. The product ( $Q_c \times G_c$ ) represents heat (in Kcal) input through coal during the month (kcal) and shall be estimated on monthly basis by applying the following formulae:

$$Q_c \times G_c \text{ (kCal)} = \{\text{opening balance of coal (kg)X weighed average GCV of opening balance of coal (kCal/kg)}\} + \{\text{quantity of coal received during the month (kg) X weighted average GCV of}$$

**coal received during the month (kCal/kg)} – {closing stock of coal (kg) X weighted average GCV of the closing balance of coal (kCal/kg)}**

**Step-2:**

1. The ex-bus electrical energy generated by using biomass shall be estimated on monthly basis by applying following formulae:

$$\mathbf{Eb\ (ex-bus)\ =\ Eb(G)\{1-[(E(GT)-ESO)/E(GT)]\}}$$

Where,

Eb (ex-bus) = Electrical energy generated by bio-mass ex-bus during the month (kWh).

Eb(G) = Electrical energy generated by biomass at Generator terminal during the month arrived at Step-1(kWh)

E(GT) = Total electrical energy generated at generator terminal during the month (kWh)

ESO = Total Energy Sent Out (ex-bus) during the month (kWh)

**3.6 The generating company shall provide the various information to the beneficiaries and publish them in the manner given below:**

- a. The generating company shall maintain separate fuel accounts for coal and bio- mass, with opening balance, fuel received during the month and closing balance in kg. The generating company shall also maintain separate GCV (in kCal/kg) accounts for coal and biomass, with weighted average GCV of the opening balance, weighted average GCV of the fuel received during the month and weighted average GCV of the closing balance at the end of the month.
- b. The monthly fuel and GCV accounts shall be made available to authorized representative(s) of the beneficiaries and RLDC/SLDC on demand. Any authorized representative of beneficiaries shall be allowed to witness the GCV testing of Bio- mass.
- c. Generating company shall keep beneficiaries informed about the co-firing of Bio- mass with coal. Authorized representatives of the beneficiaries

shall be allowed inspection during the period when biomass is being co-fired.

- d. The monthly accounts of fuel and GCV, duly signed by the authorized official of the generating company shall be published on its website along with the bills towards purchase of coal and Biomass.
- e. The generating company shall publish the quantum of Biomass fired and the energy generated from Biomass based on the formulae specified above on its website.

- 3.7 For Compliance to Bio -mass Policy dated 08.10.2021, in terms of *mandatorily use of 5 per cent blend of biomass pellets along with coal with effect from one year of the date of issue of this guideline*, Coal based thermal power plants, as a prerequisite, are required to assess useful economic life of plant, technical feasibility with any additional capital / operation expenditure required, if any, and technical constraints for enabling co-firing while ensuring safety aspects.
- 3.8 Coal based thermal power plants, as a prerequisite, are also required to assess procurement of Agro residue-based Bio-mass pellets in line with technical specification issued by CEA, sourcing, and supply chain constraints against Model Contract document issued by MoP, frame site specific standard operating procedure (SOP) in line with standard SOP issued by MoP etc. The responsibility of procuring pellets in terms of the MOP directives issued from time to time shall be the responsibility of the Power Plants.
- 3.9 Subsequent to the assessment of above aspects, the plant can approach CEA as per *Guidelines/procedure prescribed for examining the request of the power plants for seeking exemption/relaxation from bio-mass co-firing*, in case of exemption/ relaxation required.
- 3.10 Generating Power Plants shall consult the OEM regarding technical feasibility and impact on operation parameters before undertaking the technical feasibility study in terms of Bio-mass Policy as stated above. The report of OEM and technical feasibility study shall be shared with the beneficiary for

their comments and arriving at consensus. The cost of the study shall be borne by the beneficiary (ies).

- 3.11 Generating Stations shall estimate the capex viz., Biomass pellet handling & Feeding system, construction of storage facilities, any retrofitting or modifications in existing equipment or system for enabling co-firing of Biomass, etc.
- 3.12 For Thermal Generating Stations, under section 62 of EA'03, under commercial operation as on date of MOP notification dated 08.10.2021 for Biomass Utilization for Power Generation through Co-firing in Coal Based Power Plants issued by MoP on 08.10.2021, the capex would be treated as additional capitalization, subject to prudence check by the Commission at the time of True-up of the relevant control period.
- 3.13 For Thermal Generating Stations, under section 63 of EA'03, under commercial operation as on date of MOP notification dated 08.10.2021 for Biomass Utilization for Power Generation through Co-firing in Coal Based Power Plants issued by MoP on 08.10.2021, the capex, subject to applicable provisions of the PPA, may be allowed as one time reimbursement or annuity stream over a period as determined by the Commission.

This Approach paper is being issued for comments by the stakeholders within twenty-one days.

By Order of the Commission

Secretary, UPERC

Place: Lucknow

Dated: 01/2024