



**TECHNICAL SPECIFICATION FOR
AGRO RESIDUE BASED BIO-MASS PALLETS
(NON- TORREFIED/ TORREFIED)**

FOR CO- FIRING IN COAL BASED THERMAL POWER PLANTS



**Government of India
Ministry of Power
CENTRAL ELECTRICITY AUTHORITY
NEW DELHI**

September, 2018



**TECHNICAL SPECIFICATION FOR
AGRO RESIDUE BASED BIO-MASS PALLETS
(NON- TORREFIED/ TORREFIED)
FOR CO- FIRING IN COAL BASED THERMAL POWER PLANTS**

**Government of India
Ministry of Power
CENTRAL ELECTRICITY AUTHORITY
NEW DELHI**

September, 2018



P. D. Siwal,
Member (Thermal)
Central Electricity Authority

P R E F A C E

In order to help in combating the air pollution due to burning of crop residue by farmers, the Ministry of Power, in November 2017, had brought out the policy for utilization of biomass for power generation through co-firing in coal fired thermal power plants. As per the policy, all coal based thermal power plants except those having ball and tube mill, of power generating utilities shall endeavor to use 5- 10 % blend of biomass pellets made, primarily, of agro- residue alongwith coal after assessing the technical feasibility viz. safety aspects etc. The policy requires CEA to develop the specification of the biomass pellets and to provide technical assistance/advice to utilities on how to use bio-mass pellets for blending with coal in coal based thermal power plants.

In line with above objective, CEA constituted a committee in December, 2017 with representation from various stake holders to develop the specification for biomass pellets and the guidelines for co- firing of the biomass pellets with coal in coal based thermal power plants.

The committee has so far held three meetings and it has finalized the technical specification of biomass pellets titled, "*Technical specification of agro residue based bio-mass pallets (non- torrefied/ torrefied) for co- firing in coal based thermal power plants*". The document reflects pooled experience and knowledge of participating engineers from CEA, utilities, power plant OEMs and pellet manufacturers. I hope that this specification shall serve a useful reference document for procurement of biomass pellets by the utilities for co- firing in their coal fired power plants.

Regarding co- firing of biomass pellets, it is to mention that M/s NTPC has earlier successfully carried out pilot studies for co- firing of biomass pellets (upto 10%) in their Dadri TPS and they are shortly to start commercial scale co- firing of agro residue based biomass pellets in this plant. The experience of NTPC at Dadri TPS will provide confidence to other utilities towards co- firing of biomass pellets in their power plants and thus help in addressing the greater issue of environmental pollution due to stubble burning.

I wish to express my appreciation to all the members of the Committee viz. CEA, MNRE, NAFED, NTPC, BHEL, L&T, PSPCL, APGENCO, Adani Power Ltd, Doosan Power, Abellon Clean Energy for sharing their experience and making valuable contribution in bringing out this specification.

New Delhi
September, 2018.

(P. D. SIWAL)



Contents

Sl. No.	Description	Page No.
1.0	General	1
2.0	Intent of specification	1
3.0	Scope of work	2
4.0	Quantity to be supplied & delivery schedule	2
5.0	Raw materials & pelletisation processes	2
5.1	Raw materials	2
5.2	Pelletisation and torrefaction processes	3
6.0	Technical parameters	4
7.0	Acceptance range of key technical parameters	5
8.0	Adjustments for variation in key technical parameters	6
8.1	Price adjustment for gross calorific value (GCV)	6
8.2	Quantity adjustment for moisture	6
8.3	Quantity adjustment for ash	7
8.4	Corrected weight of the consignment	7
8.5	Recovery on account of excess fines in consignment	7
9.0	Rejection level	8
10.0	Tests, standards and sampling	8
10.1	Testing standards/ methods	8
10.2	Sieve analysis	9
10.3	Sampling analysis at loading end (supplier's side)	9
10.4	Sampling analysis at receiving end (owner side)	9
11.0	Liquidated damages (LD) for deviation from delivery schedule	11
Appendix-1	Details to be furnished with each consignment during dispatch	12
Annexure- 1: CEA office order dated 27.12.2017: Constitution of the committee.		14
Annexure- 2: Cumulative list of participants of the committee meetings (three Nos.) held in CEA, N. Delhi on 2.2.2018, 2.4.2018 & 17.5.2018.		17: 17



TECHNICAL SPECIFICATION OF AGRO RESIDUE BASED BIO-MASS PALLETS (NON- TORREFIED/ TORREFIED) FOR CO- FIRING IN COAL BASED THERMAL POWER PLANTS

1.0 GENERAL

The burning of agro residue/ stubble in- situ by farmers after crop is harvested has been one of the reason for environmental pollution having adverse health impacts.

Co- firing of biomass alongwith coal in coal based thermal power plants to produce electricity is an efficient way of utilizing the agro residue and avoiding the environmental pollution, at the same time generating extra revenue to the farmers by sale of agro residue as raw material input to the pellets manufacturer. However, the raw agro residue cannot be directly utilized in thermal power plants as coal mill are not designed to pulverize the fibrous biomass and same needs to be densified and processed to form the pellets having pre- pulverised fine constituent particles. The densified biomass pellets/ torrefied pellets can be fed to the mills and easily crushed with coal for firing into the boiler.

Considering merits of using the agro residue based biomass pellets for power generation through co- firing alongwith coal in thermal power plants, Ministry of Power has brought out the policy for “Biomass utilization for power generation through co-firing in coal based power plants”. The policy has been uploaded on the CEA website. As per the policy all fluidised bed and pulverised coal units (coal based thermal power plants) except those having ball and tube mill, of power generation utilities, public or private, located in India, shall endeavour to use 5-10% blend of biomass pellets made, primarily, of agro residue along with coal after assessing the technical feasibility, viz. safety aspects etc.

In line with the policy, CEA has also issued an advisory to all the Thermal Power Generating Plants/Utilities to endeavor to use 5-10% blend of biomass pellets made, primarily, of agro residue along with coal after assessing the technical feasibility, viz. safety aspects etc. Further, as per policy, CEA is required to develop/issue the specification for the biomass pellets and provide technical assistance/advice to utilities on how to use bio-mass pellets for blending with coal in coal based thermal power plants.

2.0 INTENT OF SPECIFICATION

The intent of this specification is to cover the various relevant aspects and requirements of agro residue based biomass pellets (non- torrefied/ torrefied) to be supplied to a coal based thermal power plant for co- firing in the boilers alongwith coal.

The utilities are required to review the technical parameters indicated in this specification and make suitable modifications, if required, considering the broad characteristics of biomass pellets likely to be available for supply to their power plant.



3.0 SCOPE OF WORK

The scope of work of the bidder shall include manufacture, supply, loading, transport and delivery of non- torrefied/ torrefied biomass pellets at x.....MW coal based thermal power plant of M/s (Owner) located at

The bidder shall supply the pellets in loose form filled in the carriage vehicles (closed/ covered containers) and these shall be unloaded in the power plant at the area identified by the owner for this purpose.

The biomass pellets supplied shall primarily be made of agro residue and these shall adhere to the technical requirements indicated in this specification.

4.0 QUANTITY TO BE SUPPLIED & DELIVERY SCHEDULE

The quantity of biomass pellets to be supplied by the bidder shall be metric tonnes per day (tpd) on regular basis for a period of days/ months/ years. However, depending upon quantity to be supplied, the bidder can also supply the consignment of pellets at frequency of one consignment per more than one day, as per mutual agreement with the owner.

The supply of biomass pellets to the power plant shall begin from date The total quantity of biomass pellets to be supplied by the bidder during the contract period shall be about metric tonnes.

The consignment of biomass pellets shall be delivered at owner's thermal power plant, transported by trucks/dumpers.

If required by owner, as per reasons attributable to the power plant, the scheduled quantity of pellets to be supplied by the bidder to the power plant may change. In such case, the changed delivery schedule shall be sent by owner to the supplier, say three (3) day in advance at his official e-mail ID or by other means, indicating revised quantity of biomass pellets to be delivered (which may even be zero) and supplier shall dispatch the consignment accordingly.

5.0 RAW MATERIALS & PELLETISATION PROCESSES

5.1 Raw Materials

For manufacturing of non- torrefied/ torrefied biomass pellets, the raw materials to be used shall primarily be the surplus agro residue/ crop residue which remain unutilized after harvesting the crop and is otherwise being burnt by the farmers in the field. The type and availability of such surplus agro residue shall vary from region to region as per crop pattern and extent of farm residue being utilized for various purposes. For example, for north western region of the country, the agro residue/ farm residue likely to be available as surplus for making of pellets are paddy stubbles/ straw & husk, cotton stalks & husk, ground nut shell & stalks, maize stalks & cobs, sunflower stalks, gram stalks, castor stalks & shell and cumin seed stalks etc. (*owner to indicate available agro residues as applicable*).



Agro residue pellets can be manufactured using single or multiple agro/crop residues together. Any byproduct of wood work factory (such as wood, wood chips, saw dust, furniture waste etc.) shall not be used in manufacture of the biomass pellets.

Natural additives/ binder such as lignin, starch, animal dung etc. can be used for manufacturing pellets, if required, by the process.

The details of biomass components and natural additives/ binder (if any) likely to be used in manufacture of pellets alongwith their proportions shall be indicated by the bidder in his offer. Further, each consignment to be supplied shall indicate the actual material components & their proportions used in manufacture of biomass pellets.

Owner/ Procurer reserves the right to exclude any base material/ additive/ binder or modify their proportion, if any adverse impact of the base material/ additives/ binder is found on boiler in long run.

5.2 Pelletisation and Torrefaction Processes

5.2.1 Pelletisation

A typical description of pelletisation process for agro/ crop residue based biomass is indicated as below:

Biomass (agro/ crop residue) collected from fields / farmers shall be cleaned of soil etc. and shredded to get adequate size material. In case of high moisture content, the shredded material shall be dried to the extent of acceptable moisture level. The dried biomass shall be passed through a screening process to remove bigger size biomass material to be conveyed back to pre-shredding process. The screening system may have magnets also to remove metal particles.

The screened dried biomass shall be collected in the hopper placed above hammer mill through bucket elevator. Hammer mill/ grinder shall reduce the biomass to adequate particle size say to less than 2 mm. The biomass from the hammer mill/ grinder shall be pneumatically transferred to a cyclone filter to remove dust particles. The dust free biomass shall be conveyed to the screw feeder to transfer the feed into pellet mill consisting of perforated die of specified diameter holes. The pellets shall be cut to the required size by the cutter attached to the pellet mill. The densified hot biomass pellets, having temperature in the range 80- 100⁰C, shall be transferred to cooler via drag chain conveyor and shall be cooled by blower or sucking the cold air from the atmosphere. The cooled pellets shall then be transferred to vibrating Screen for removing the fines/ crumbled pellets to be sent back to the hopper above the pellet mill. The proper sized screened pellets shall be collected into storage hopper/ silo through bucket elevator for subsequent transportation to the power plant(s).

5.2.2 Torrefaction

A typical description of torrefaction process for agro/ crop residue based biomass is indicated as below:



Torrefaction refers to roasting, slow- and mild-pyrolysis, cooking and high-temperature drying of the biomass in a temperature regime between 200 and 300⁰C under an inert atmosphere. It induces depolymerization and devolatilization of hemicellulose. Major products of biomass torrefaction are solid torrefied biomass and volatiles with composition and yield of products depending on torrefaction temperature, holding time, and biomass physical & chemical properties. Torrefied biomass is brittle and hydrophobic with improved physical and chemical properties such as grindability, storage stability, energy density and has the potential to significantly reduce the cost of transportation, storage, and downstream processing.

Torrefaction process shall involve pre- drying the shredded biomass by heating upto about 100⁰C to evaporate physically bound water. Post- drying and intermediate heating shall be carried out between 100 and 200⁰C, removing chemically bound water as well as light organic fractions. Further heating will be carried out in the temperature range about 200 to 300⁰C with adequate holding time for decomposition & release of various volatile species with high oxygen contents. The remaining solid product called torrefied biomass shall mainly comprise of cellulose and lignin and characterized by increased brittleness, hydrophobicity, microbial degradation resistance, and energy density.

6.0 TECHNICAL PARAMETERS

The manufacturer/ supplier will guarantee the technical parameters of biomass pellets as given in the Table- 1 below:

Table: 1 Technical specification for biomass pellets (non- torrefied/ torrefied).

S.N.	Technical data	Unit	Guaranteed value range
1.	Base material	-	Agro residue/ crop residue
2.	Diameter	mm	Not more than 25 mm
3.	Length	mm	Not more than 50 mm
4.	Bulk density	kg/m ³	Not less than 600 kg/m ³
5.	Fines% (length <3 mm) (ARB*)	Weight %	fines ≤ 5%**
6.	Gross calorific value (ARB*)	kcal/kg	Non- torrefied pellets: 3500 ± 100 Torrefied pellets: 4500 ± 100
7.	Moisture (ARB*)	Weight %	Not more than 9%
8.	Ash (ARB*)	Weight %	Not more than 20%
9.	Hardgrove Grindability Index ^s (HGI)	-	50 or more



10.	Particle size distribution ^{\$\$} (After crushing and pulverizing in site lab pulverizer)	Weight %	Passing proportion from 2 mm mesh size sieve: ≥ 75% Passing proportion from 3 mm mesh size sieve: =100%
-----	---	----------	--

*ARB – As Received Basis

** Assessment of Fines shall be as per durability test of pellets.

\$ Applicable for torrefied pellets.

\$\$ Applicable for non- torrefied pellets.

The above indicated characteristic parameters of the pellets are intended to be adhered to and maintained by the manufacturer/ supplier. No price adjustment shall be done for the pellet supplies made as per above specification. The price adjustment shall be made for variation of key technical parameters from the specified values as described in subsequent clauses of this specification.

7.0 ACCEPTANCE RANGE OF KEY TECHNICAL PARAMETERS

In case consignment of biomass pellets does not meet the guaranteed parameters as given in Table- 1 above for GCV, moisture content, ash content and fines%, but are within the acceptable limit as given in Table 2 below, the consignment shall be accepted but with pro rata price/ quantity adjustment as described in subsequent clauses of this specification.

Table 2: Acceptance range of key technical parameters (on as received basis) with price/ quantity adjustment

S.N.	Technical data	Unit	Acceptance range with pro-rata price/ quantity adjustment
1	Gross calorific value	kcal/kg	Non- torrefied pellets: * GCV < 3400 & 3600 < GCV ≤ 4500 Torrefied pellets: ** GCV < 4400 & 4600 < GCV ≤ 5200
2	Moisture	Weight %	9% < Moisture ≤ 14%
3	Ash	Weight %	Ash > 20%
4	Fines% (Length < 3 mm)	Weight %	Fines > 5%



- * GCV shall not be less than 2800 kcal/ kg
- ** GCV shall not be less than 3600 kcal/kg

8.0 ADJUSTMENTS FOR VARIATION IN KEY TECHNICAL PARAMETERS

8.1 Price Adjustment for Gross Calorific Value (GCV)

8.1.1 If consignment of biomass pellets does not meet the guaranteed parameters for gross calorific value (ARB) but is within the acceptance range as given in Table- 2 above, the consignment shall be accepted with pro rata upward or downward price adjustment as calculated using following formula:

For non- torrefied pellets:

$$\text{Adjusted price} = \frac{[\text{Quoted price} \times \text{GCV (ARB)}]}{3500}$$

For torrefied pellets:

$$\text{Adjusted price} = \frac{[\text{Quoted price} \times \text{GCV (ARB)}]}{4500}$$

8.1.2 Upward price adjustment shall be done maximum up to 4500 kcal/kg GCV (ARB) for non- torrefied pellets and 5200 kcal/kg GCV (ARB) for torrefied pellets, beyond these values, upward price adjustment shall not be done even if supplier supplies pellets of higher GCV.

8.2 Quantity Adjustment for Moisture

8.2.1 If consignment of biomass pellets does not meet the guaranteed parameter for moisture (ARB) but is within the acceptance limit as given in Table- 2 above, the consignment shall be accepted but with pro rata quantity adjustment (weight correction) as calculated using following formula:

Weight correction factor on account of moisture (M) –

$$M = \frac{\{100 + X - \% \text{ Moisture(ARB)}\}}{100}$$

Where X is the moisture percentage as per specification = 9%.

- 8.2.2 Weight correction on account of moisture (ARB) shall be done only if it lies in range of $9 \% < \text{Moisture (ARB)} \leq 14\%$.
- 8.2.3 For moisture (ARB) less than or equal to 9%, no weight correction shall be done.
- 8.2.4 For moisture (ARB) more than 14%, the consignment of biomass pellets shall be rejected.



8.2.5 Further, final corrected weight on account of both moisture as well as ash shall be calculated as given in clause 8.4.

8.3 Quantity Adjustment for Ash

8.3.1 If consignment of biomass pellets does not meet the guaranteed parameters for ash content (ARB) but is within the acceptance limit as given in Table- 2 above, the consignment shall be accepted but with pro rata quantity adjustment (weight correction) as calculated using following formula:

Weight correction factor on account of ash (A) –

$$A = \frac{\{100 + Y - \% \text{ Ash content (ARB)}\}}{100}$$

Where Y is the Ash percentage as per specification= 20%.

8.3.2 Weight correction on account of ash content will be done only when ash content (ARB) of biomass pellets is more than 20%.

8.3.3 For ash content (ARB) less than or equal to 20%, no weight correction shall be done.

8.4 Corrected Weight of the Consignment

If W is the weight of consignment supplied, then final corrected weight on account of both moisture and ash corrections shall be calculated as below:

$$W_{corrected} = W \times M \times A$$

Where,

M= Weight correction factor on account of moisture (M)

A = Weight correction factor on account of ash (A)

The corrected weight ($W_{corrected}$) of the consignment and adjusted price for GCV of the biomass pellets as worked out above shall be considered for the payment to be made to the supplier.

8.5 Recovery on Account of Excess Fines in Consignment

8.5.1 Biomass dust, crushed/ broken/ damaged pellets of length less than 3 mm in consignment as received at owner's power plant shall be treated as fines and there shall be recovery on account of excess fines (ARB) if it is beyond 5%. The recovery on account of excess fines shall be worked out as per the following formula:

$$\text{Recovery} = \frac{1}{4} \times (\text{adjusted price of biomass pellets}) \times W_{corrected} \times \text{Excess weight \% of fines}$$

8.5.2 This amount shall be recovered from the payment of that consignment.



9.0 REJECTION LEVEL

9.1 The consignment of biomass pellets arrived at Utility shall initially be tested for following before unloading and shall be rejected in case any of the following parameters exceed the rejection level given in Table-3 below:

Table 3: Rejection Level

S. N.	Technical data	Unit	Rejection level
1.	Moisture (As Received Basis)	Weight %	More than 14%.
2.	HGI*	-	Less than 48.
3.	Particle size distribution** (After crushing and pulverizing in site lab pulverizer as per clause 10.4.3 below)	Weight %	Not meeting guaranteed value as specified in Table- 1 above.

* Applicable for torrefied pellets.

** Applicable for non- torrefied pellets.

9.2 The GCV of agro residue based biomass pellets supplied to the power plant shall not be less than 2800 kcal/kg in case of non- torrefied type pellets and 3600 kcal/kg in case of torrefied type pellets. If supplier is found to frequently supply the material of GCV less than the above values as found in test report of owner's lab or supplier is found to take deviations in other technical parameters like size, base material etc., warning letter shall be issued to supplier or contract may also be cancelled if supplier continues to do so even after issuing warning letter.

10. TESTS, STANDARDS AND SAMPLING

10.1 Testing Standards/ Methods

Biomass pellets sample shall be tested for various parameters in owner's power plant site lab as per following or equivalent standard given in the Table- 4 below:

Table- 4 : Testing and Standards

S.N.	Technical data	Testing Standard/ Method
1.	Dimensions/ Diameter & length	ISO 17829 or equivalent method may be referred.
2.	Fines% (ARB*)	ISO 18846 or equivalent method may be referred.
3.	Gross calorific value (ARB*)	IS 1350 or equivalent method may be referred.



4.	Moisture (ARB*)	IS 1350 or equivalent method may be referred (hand held moisture meter may also be used).
5.	Ash (ARB*)	IS 1350 or equivalent method may be referred.
6.	HGI [§]	ISO 5074 or equivalent method may be referred.
7.	Particle size distribution ^{§§}	Sieve analysis shall be done as per clause 10.2 below.

* ARB – As Received Basis

§ Applicable for torrefied pellets.

§§ Applicable for non- torrefied pellets.

10.2 Sieve Analysis

Sample of non- torrefied biomass pellets will be tested for particle size distribution after pulverizing 50 grams crushed pellets sample in a lab pulverizer for 1½ minutes or any fixed time period as found suitable by testing laboratory in-charge and measuring the passing proportion of the pulverized sample by sieving it through 2 mm and 3 mm mesh size sieve.

10.3 Sampling Analysis at Loading End (Supplier Side)

10.3.1 Each consignment should be accompanied by general details (such as name of company/firm/agency, address, date of dispatch, batch number, vehicle type and number, weight of consignment etc.) and technical details which shall contain the values of all parameters specified in Table-1 above in the format enclosed as Annexure-1.

10.3.2 The charges incurred on account of sampling analysis at loading end shall be borne by the supplier.

10.4 Sampling and Analysis at Receiving End (Owner Side)

10.4.1 10 kg or appropriate amount of sample shall be collected from each carriage vehicle/ consignment on random basis either prior to unloading or during unloading or after unloading or from conveyor belt or as per methodology mutually agreed between supplier(s) and the owner.

10.4.2 The authorized representative(s) of owner and supplier will jointly witness the process of sample collection and preparation of the laboratory samples. All representatives shall put their signature on the sample tags as evidence of the process of sampling. Testing process may also be witnessed by representative of supplier.

10.4.3 Before unloading, samples shall be tested for moisture and constituent particle size distribution (or HGI). If any of these values come out to be beyond the rejection level as given in Table- 3 above, the consignment shall be rejected and it shall be the supplier's responsibility to carry it back at his own cost.



10.4.4 The owner shall arrange for determination of fines part of pellets as per durability test at his plant site and fines proportion of biomass pellets shall be assessed and if fines percentage exceeds more than 5%, proportionate recovery shall be done for excess fines as per clause 8.5 above.

10.4.5 The collected sample shall be distributed in three parts as below:

Part-1:	For test and analysis in owner's power plant lab.
Part-2:	Shall be handed over to supplier/ supplier's representative.
Part-3:	Shall be the referee sample which will be sealed and the representatives from both sides shall put their signature on the sample tag. The sealed referee sample shall be kept in a safe box/ almirah at owner's plant site.

10.4.6 Part-1 sample shall be tested for GCV, moisture, ash content, fines and particle size distribution/ HGI etc. regularly which shall be used for quantity/ price adjustment, payment purpose and also to ascertain rejection parameters. Analysis report by supplier shall be treated as indicative only.

In case, supplier is supplying more than one carriage vehicle/ consignment in a day, a composite sample (Part-1, Part-2 and Part-3) for whole day may be prepared by mixing appropriate amount of samples collected from different carriage vehicles/ consignments which shall be used for quantity/ price adjustment and payment purpose. However, the rejection parameters shall be ascertained by testing samples only from individual carriage vehicle/ consignment.

10.4.7 Test report by the owner shall be sent to supplier after sample testing though e-mail. In case, supplier is not satisfied with the test results of owner which is being used for price and quantity adjustment, the sealed referee sample (Part 3) kept at owner's plant site in safe box/ almirah, shall be tested in a NABL accredited laboratory as notified by owner from time to time, expense of which shall be borne by supplier and shall be adjusted against payment of consignment. NABL accredited laboratory report of referee sample shall be final and binding on both the parties.

10.4.8 The referee sample be used only in case of conflict in quantity and price adjustment, whereas, in case of rejection of consignment due to moisture (ARB) and particle size distribution (or HGI), owner's plant lab test results shall be treated sufficient for rejection and no further third party test of referee sample shall be carried out.

10.4.9 In case supplier fails to provide its representative for witnessing the sampling process, owner's lab report shall be final. No third party test shall be carried out in such case.

10.4.10 Further, in case, owner fails to perform sampling of consignment due to any reason attributed to him, the test report of supplier sent with consignment shall be treated as final for payment.



10.4.11 No claim regarding quantity/ price adjustment shall be entertained after 15 days of owner's lab test report sent to supplier through e-mail by the owner.

11. LIQUIDATED DAMAGE (LD) FOR DEVIATION FROM DELIVERY SCHEDULE

11.1 The liquidated damage (LD) shall be applicable for short supply of biomass pellets in a given month against aggregate of daily/ agreed delivery schedule quantity in that month.

11.2 Liquidated Damage (LD) shall not be applicable for short supply up to 30% in a month against aggregate of daily delivery schedule in that month. However, for monthly short supply beyond 30%, liquidated damage (LD) shall be recovered from supplier @ 2% of price of the biomass pellets for shortfall quantity beyond 30%.

11.3 For facilitating the gradual ramping up of pellet manufacturing capacity, no liquidated damage (LD) shall be recovered from supplier for any short supply during initial 120 days from start date of delivery of biomass pellets.



Appendix- 1

Details to be furnished with each consignment during dispatch

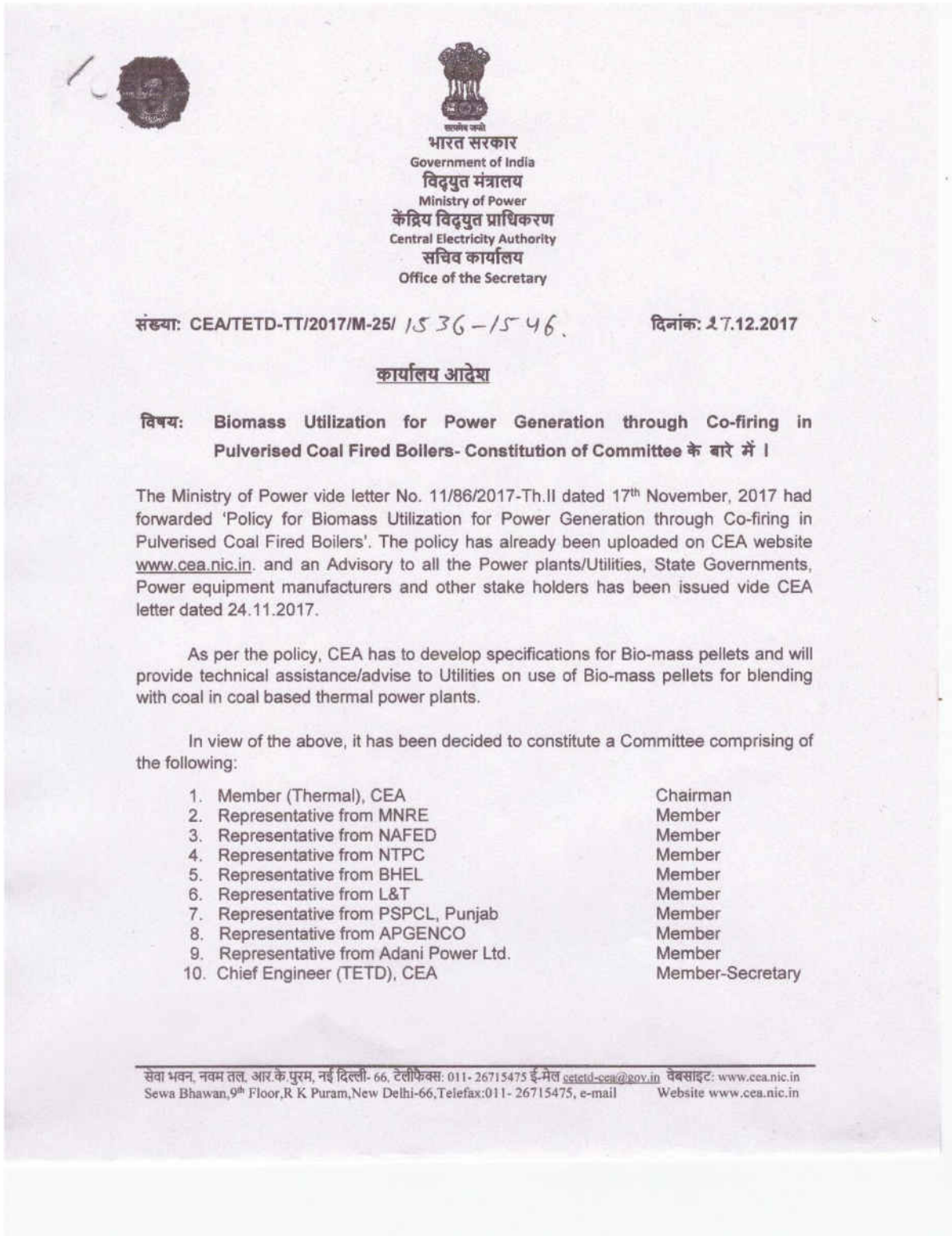
General Details				
Sl. No.	Description	Particulars		
1.	Name of company/ firm /agency		
2.	Address of manufacturing location		
3.	Type of biomass pellets	Non- torrefied/ Torrefied		
4.	Date of dispatch		
5.	Batch number		
6.	Carriage vehicle type/ number		
7.	Weight	Gross weight (kg)		
		Tare weight (kg)		
		Material weight (kg)		
8.	(Any other details as applicable)		
Technical Details				
S.N.	Technical data	Unit	Guaranteed Value	
1.	Base material(s) and their approximate % proportion	-	Name of base material(s)	approx. % proportion
2.	Details of binder/ additives	-	Name of additives/ binder	approx. % proportion
3.	Dimension	mm	(Fill Shape & Size of material)	
4.	Fines% (ARB*) (length< 3 mm)	Weight %		
5.	Gross Calorific Value (ARB*)	kcal/kg		
6.	Moisture (ARB*)	Weight %		



Technical specification of agro residue based bio-mass pellets (non- torrefied/ torrefied)
for co- firing in coal based thermal power plants

7.	Ash (ARB*)	Weight %	
8.	Hardgrove Grindability Index (HGI) (for torrefied pellets)	-	
9.	Particle size distribution (for non- torrefied pellets)	Weight %	Passing proportion from 2 mm mesh size sieve
			Passing proportion from 3 mm mesh size sieve
Name/ Designation:			
Signature:			
Date :			
Place:			

Annexure - 1



The Terms of Reference of the Committee shall be as follows:

- (i) To develop technical specification of the bio-mass pellets for Co-firing in Pulverized coal fired boilers.
- (ii) To develop guidelines for blending of Bio-mass pellets (5-10%) with coal in coal based thermal power plants.

The Committee may co-opt any other member, as deemed necessary.

The expenditure incurred on TA/DA etc. of the members of the Committee shall be borne by the respective organization.

The Committee shall finalize the specification and guidelines within six (6) months of issue of this Office Order.

प्रतिलिपि : सूची अनुसार ।

भवदीय
27/12/2017
(पी.सी.कुरील)
सचिव, के.वि.प्रा.



Technical specification of agro residue based bio-mass pallets (non- torrefied/ torrefied)
for co- firing in coal based thermal power plants

To,

with the request to nominate representative from your organization to the Committee along with their contact details:

1. Secretary, Ministry of New and Renewable Energy, Block-14, CGO Complex, Lodhi Road, New Delhi-110 003
Fax No. : 011- 24361298
2. Chairman, National Agricultural Cooperative Marketing Federation Of India Ltd. (NAFED), NAFED House, Siddhartha Enclave, Ashram Chowk, Ring Road, New Delhi – 110 014
Fax No. : 011- 26347348 / 26340261
3. Chairman & Managing Director, National Thermal Power Corp. Limited, NTPC Bhawan, Scope Complex, Institutional Area, Lodi Road, New Delhi- 110003
Fax No. : 011-24363050
4. Chairman & Managing Director, Bharat Heavy Electricals Ltd., BHEL House, Siri Fort, New Delhi – 110049
Fax No. : 011-26493021
5. General Manager, L&T MHPS Boilers Private Ltd., 12/4 Delhi Mathura Road, Near Sarai Khawaja Chowk, Faridabad – 121003 Haryana
Fax No. : 0129- 4291222
6. Chairman & Managing Director, Punjab State Power Corporation Limited, The Mall, Patiala -147 001 Punjab
7. Managing Director, Andhra Pradesh Power Generation Corporation Limited, Vidyut Soudha, Khairatabad, Hyderabad- 500 082 Andhra Pradesh
Fax No.: 040-23499101
8. Vice President, M/s Adani Power Limited, Achalraj, Opposite Mayor Bungalow, Law Garden, Ahemdabad – 380 006 (Gujarat)
Fax No.: 079- 25557177

प्रतिलिपी :

- (i) SA to Chairperson, CEA
- (ii) SA to Member (Thermal), CEA
- (iii) Joint Secretary, MoP

सेवा भवन, नकम तल, आर.के.पुरम, नई दिल्ली- 66, टेलीफ़ैक्स: 011- 26715475 ई-मेल secret-d-cea@gov.in वेबसाइट: www.cea.nic.in
Sewa Bhawan, 9th Floor, R K Puram, New Delhi-66, Telefax: 011- 26715475, e-mail Website www.cea.nic.in



Annexure - 2

**Cumulative list of participants of the committee meetings (three Nos.) held in CEA, N. Delhi on
2.2.2018, 2.4.2018 & 17.5.2018.**

1. CEA

- i) Shri P. D. Siwal, Member (Thermal)
- ii) Dr. L. D. Papney, Chief Engineer (TE&TD)
- iii) Shri H. R. Arora, Director (TE&TD)
- iv) Shri C.P. Jain, Director (TE&TD)
- v) Shri Sunit Kumar Gupta, Deputy Director (TE&TD)
- vi) Shri Pankaj Kumar Verma, Deputy Director (TE&TD)
- vii) Ms Nidhi Chauhan, Asstt. Director (TE&TD)

2. MNRE

Shri Vijay Bharati

3. NAFED

Shri Unnikrishna Kurup, General Manager

4. PSPCL

- i) Shri B. B. Pandhi, Chief Engineer
- ii) Shri Lakhwinder Singh, Deputy Chief Engineer
- iii) Shri Haraibal Singh, Executive Engineer

5. NTPC

- i) Shri Apurba Kumar Das, GGM, Dadri TPS
- ii) Shri Amit Kulshreshtha, GM, NTPC
- iii) Shri Rajeev Satyakam, GM, NTPC, NETRA
- iv) Shri Sanjay Karmakar, AGM, NTPC, NETRA
- v) Shri Ashwani Kr. Verma, Manager, NTPC
- vi) Shri Diwakar Kaushik, NTPC

6. BHEL

Shri P. Pari, AGM

7. L&T- MHPS

Shri K. Chinna Rao, Vice President

8. Adani Power Ltd.

- i) Shri Sameer Ganju, Associate Vice President
- ii) Shri Tanmay Vyas

9. Doosan Power Systems India Pvt. Ltd.

Shri Sanjeev Dhar, General Manager

10. Abellon Clean Energy, Pellet Manufacturer

Shri Pankaj Patel, Director (Technical)

11. Neway MSW Engineers Pvt. Ltd.

- i) Shri K. Iyyappan, Managing Director
- ii) Shri Satish Chikodi
