

Minutes of Meeting

Expert Committee to prepare “Standards/Norms for Refuse Derived Fuel (RDF) from Municipal Solid Waste for its utilization in Cement Kilns, Waste to Energy Plants and similar other installations.

The 2nd meeting of ‘Expert Committee to prepare “Standards/Norms for Refuse Derived Fuel (RDF) from Municipal Solid Waste for its utilization in Cement Kilns, Waste to Energy Plants and similar other installations’ was held on 19.12.2017 at 10.00 AM in Hotel Shangri-La, New Delhi under the Chairmanship of **Dr.N. B. Mazumdar**. The list of participants is at **Annexure-I**.

At the outset, **Sh. V. K. Chaurasia, Member Secretary** welcomed the members and briefed the participants on the key agenda of RDF standardisation. The key discussion points of the 1st Committee meeting was read out and minutes of the meeting were confirmed by the members. He informed the Committee that the expert members **Sh. Gautom Reddy, Sh. S. Vinod Babu, Sh. P.K. Khandelwal** and **Dr. Channiwala Salim Abbasbhai** have sought leave of absence.

Dr. N. B. Mazumdar, Chairman in his key note address highlighted the existing regulations and need of standards for RDF. He further mentioned that challenges in preparing/processing RDF from municipal solid waste is not just limited to segregating combustible waste fraction but also in drying, shredding and transportation requirements. Chairman invited all expert members to present their views and give concrete suggestions for formulation of RDF standards.

Ms. Kamna Swami, GIZ presented the key findings of GIS based mapping exercise undertaken by GIZ along with TERI. In the map, all cement plants and MSW processing facilities (compost and waste to energy plants) within 100, 200 and 300kms radius and estimated potential of MSW based RDF in cluster approach are shown. To make the mapping exercise more useful, **Ms Aparna Sharma**, Secretary General, Cement Manufacturing Association (CMA) suggested that further information from their 48 members in cement industry can be provided on potential use of RDF, investment needed along with suggestions on RDF standards. CMA team requested

for a data form to be developed for circulation to the cement companies. It was agreed to jointly develop the data form to collect relevant data.

In another presentation given by GIZ team, the existing standards defined in CPHEEO manual and operationalization of standards as per draft guidelines for pre-processing and co-processing of hazardous and other wastes in cement plants as per Hazardous and Other Wastes in Cement Plants (M&TBM) Rules 2016 by CPCB, Ministry of Environment, Forest and Climate Change was deliberated upon. She also presented the American Society for Testing and Materials (ASTM) classification of various RDF grades. It was suggested that the ASTM classification is based on solid, liquid and gaseous forms, but for Indian scenario, the grading of RDF as per end user requirements (cement plant) is more practical. For discussion, three grades of RDF namely RDF-1 as Raw RDF (Segregated combustible baled fractions), RDF -2 as Local RDF (Primary Shredded) and RDF-3 as Fine Grade (Ready to use) were presented. The grading is largely done based on sizing and calorific value.

Thereafter Chairman requested **Cement Industry** representatives to give their perspective and the key points of discussion are summarized as below:

- a) **Dr K V Reddy**, CMA, Environmental Task Force mentioned that instead of one quality of RDF, 2-3 grades of RDF need to be defined for practical purposes. He mentioned that 60% of cement production is done in 8 clusters as shown in map and therefore, assessment of RDF utilization potential in these zones will be useful.
- b) **Mr Bimal Modi**, Ultra Tech Cement, clarified that every cement plant may not be ready with requisite infrastructure and such capacity needs to be augmented in due course of time. He further mentioned that the quality of RDF will also determine the quantum of RDF that can be utilized by each plant. Also, in some cases the limestone quality is already marginal and sets a limiting factor for utilization of RDF at large scale. Therefore, depending on local conditions, the potential of RDF utilization varies across plants and plant clusters.
- c) **Mr Ulhas Parlikar**, Geocycle, stated that with efficient source segregation practices, the high chlorine content can be addressed to some extent.

Although, with appropriate processes, chlorine problem can be tackled this would involve significant cost.

- d) **Mr Sanjay Jain**, Dalmia cement, mentioned about the successful global practices of use of RDF and mentioned that due to high moisture, ash and chlorine content in Indian condition, the use of RDF is limited. He further mentioned about the complexity of odour issue.
- e) **Mr R B M Tripathy**, J&K cement pointed out that the economic value of MSW based RDF is not sufficient to make it a sustainable business model.

On the above discussion, Chairman suggested to do the matching exercise of readiness of cement plants in terms of existing infrastructure and capacities for usage of RDF. He also suggested to look into the details of how the cost of transportation of coal by cement plants is viable and if same can be applicable for RDF.

Thereafter Chairman requested **Waste Management Industry** representatives to give their perspective. The key points of subsequent discussion are summarized below:

- a) **Mr Kapil Gupta**, IL&FS Environment, stated that it is important to define RDF whether it is commodity, product or fuel. On this Chairman clarified that in SWM Rules 2016, RDF is defined as a product which is prepared by following certain processes. Mr Gupta stated that each cement plant has specific requirements of RDF and therefore it is important to have 2-3 grades of RDF. He also said that RDF is a processed product not a manufactured product therefore, there is limitation in meeting stringent parameters of low moisture, high calorific value and low chlorine content by waste processing companies.
- b) **Mr Arvind Singh**, Waste Management Association, presented key facts that there are about 238 MSW Processing plants across the country which varies from 10 TPD to 4000 TPD capacity. It is not viable for smaller plants (which are maximum in number) to invest in setting up the RDF plants on their own and like Geocycle model, cement plants should come up with processing plants at plant level or at cluster level.
- c) **Mr K S Rao**, Hitachi Zosen, stated that financial closure of waste management projects is still challenging and therefore, setting up of RDF Plants in public private partnership model needs to be looked into cautiously as cost of RDF

preparation is high. He mentioned that in waste to energy plants (mass burn) even 1100 K/cal/kg can be utilised although optimum energy recovery is at 1600 k/ cal. The moisture and ash content up to 30% can be taken care of. Based on their company experience, the Chairman requested a small note on NCV and GCV comparison from Mr. Sreenivas Rao.

- d) A presentation was made by **Mr. Raghavendra Rao** on Polycrack technology of Heterogeneous Catalytic Conversion of waste at low temperature. This technology accepts even mixed & unsegregated waste and is seen as a workable solution for the small compost plant producing small quantities of crude RDF containing combustible material, throughout the country.

Thereafter, **Mr. Sanjit Rodrigues**, MD, Goa Waste Management Corporation shared the perspective of **urban local bodies** (ULBs). He suggested that the mapping should be shared with ULBs so that they know where plants are located. Depending on the readiness of cement plants, short, medium and long term action plans can be prepared. He reiterated that the RDF is processed not manufactured product and therefore it is not practical to put ideal requirements for meeting low moisture, low chlorine etc from ULBs. He felt that with implementation of source segregation and available solutions, odour problem can be addressed. Based on his experience, he also shared that municipalities should commit RDF supply considering the fact that the material is of light weight and voluminous. He suggested to have 3 grades of RDF which can be termed as 'gold', 'silver' and 'bronze' quality. Keeping in view the experiences and capacities of majority of ULBs, he said that baling of segregated combustible fraction can be easily handled by them, but shredding can be challenging. Therefore he suggested that technological innovation and automation is required at the end of cement plants and appropriate blending they can make this material usable as per their specific plant requirements.

The participants discussed the various possible grades of RDF and segregated combustible fraction standards. The same are presented in **Annexure-II**.

The participants also discussed that as per SWM Rules 2016, the combustible non-recyclable waste having calorific value of 1500 K/cal/kg or more shall not be disposed of on landfills and shall only be utilized for generating energy either through refuse

derived fuel or by giving away as feed stock for preparing refuse derived fuel. For cement plants, MSW derived RDF with minimum calorific value of 2500 K/cal/Kg was suggested by the representatives of the cement manufacturing industry.

Mr V K Jindal, Joint Secretary (SBM), said that to meet the SBM goal, utilisation of RDF by cement plants on regular basis will play an important role as waste to energy plants can't be set up everywhere and his Ministry will support with all policy level interventions. He suggested that the committee should come up with action plan on this.

Dr Ashish Chaturvedi, GIZ, suggested to start with defining the grades and standards of RDF. Keeping in view the complexities due to heterogeneous waste, regional and seasonal variations and readiness of cement plants, a national prescriptive solution may not be useful. He suggested to develop models in consultation with ULBs, waste management companies and cement plants.

Summing up the discussions **Dr. N. B. Mazumdar**, **Chairman** of the committee mentioned the following issues to be examined before the next meeting:

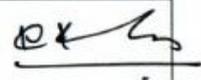
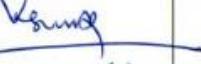
1. The members of the committee should seriously examine the need to have multiple standards for various RDF categories and the likely specifications thereof.
2. CMA suggested that most of the cement plant operator/manufactures do not have pre-processing facilities and it is important to get their views on the subject and therefore it was necessary to involve them. A proforma for collecting relevant information be circulated to these units through the CMA. This proforma should be developed at the earliest in consultation with CMA.
3. Members from both PSUs - SAIL and NTPC have shared inability of potential use of RDF in these industries at present. Therefore standardisation of RDF for these industries is not required for now.
4. The chairman urged the cement industry and the waste management industry to work together to evolve proper strategy and system for control of odour when unrefined RDF need to be stored in cement plant premises.

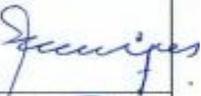
5. In view of the fact that RDF prepared from MSW should not be used in a facility where complete emission control is not in place, only cement industry remains a viable candidate. Under the circumstances it would be desirable to encourage alternative technologies which can tackle the problem of disposal of RDF produced by compost plants as a by-product. Conversion of RDF into liquid fuel could provide a viable alternative provided its commercial application is possible.
6. Finally the members were urged to complete the task given to the committee within the given timeframe.

At the end, **Shri V. K. Chaurasia**, Adviser (PHE), Ministry of Housing & Urban Affairs thanked the expert members for their rich contributions. The next date of the meeting shall be informed to members.

The meeting ended with vote of thanks to Chair.

List of Attendees

S. No.	Name & Designation	Organization with Addresses	Email Id	Mobile No.	Signature
1.	KAPIL GUPTA Vice President	IL & FS Environment New Delhi	ILFSINDIA KAPIL.GUPTA@ ILFS .COM	9810335388	
2.	Anind Singh Vice President	IL & FS Environment New Delhi	singh.anind@ ilfsindia.com	8800933993	
3.	Anirudh Dani E.A. to Business Head	J. K. Cement Limited	anirudh.dani@ JKCement.Com	9717002938	
4.	R.B.M. TRIPATHI UNIT HEAD.	J.K.CEMENT Muddapur (Karnataka)	rbmotsipathie JKCement.Com	9108517800	
5.	K. Srinivasa Rao	HITACHI ZOSEN INDIA.	Sreenivasa Rao K @h2-india.com	9849204241 8501009992	
6.	Uthas Parlikar	Geocycle India, Acc Ltd	uthas.parlikar@ acclimited.com	9967581975	
7.	SADHAN KUMAR GOSH	JABALPUR UNIVERSITY	SADHANKGOSH@ @GMAIL.COM	98300 44464	

S. No.	Name & Designation	Organization with Addresses	Email Id	Mobile No.	Signature
8.	SUNIL SINGAL DGM (EMD)	Steel Auth. of Ind. Utd, EMD 16 th floor, SCOPE Minar Laxmi Nagar, N-Delhi-92	emdsail1@gmail.com	9868897408 9968605725	
9.	J. B. Ramnidek Z. Advisor	MOHUA, Namar Bharat New Delhi	jbkarndel@gmail.com jbkarndel@nic.in	9013369078	
10.	SANJIT RODRIGUES M.D. GOA WASTE MANAGEMENT CORP.	GOA WASTE MANAGE- MENT CORPORATION, SALGAD, BARDEZ-GOA	sanjitrodrigues @gmail.com	9822123738	
11.	Dr. N.B. MAZUMDAR	B-40, PAARIJAT APTS. 28/4 DWARKA, NEW DELHI	NBMAZUMDAR@ GMAIL.COM	9891580717	
12.	V.K. Chaurasia Advisor	MOHUA	VK.chaurasia @nic.in	9819225905	
13.	Ashish Chaturvedi Director, Climate	GIZ	ashish.Chaturvedi @giz.de	9810538400	
14.	Aparna Dutt Sharma Secretary General	CMA	aparnadutt.sharma @cmindia.org	9810978216	
15.	Dr. S.K. Handlov Advisor (Tech)	CMA	sh.khandlov@ cmindia.org	9958998069	
16.	Dr. K.V. Reddy	Ultratech	kvijender.reddy @dityebivls.com	8424048990	
17.	BHAVNA SETIA RANJAN HEAD, PUBLIC AFFAIRS	CMA	bhavna.ranjana@ cmindia.org	9810400069	

S. No.	Name & Designation	Organization with Addresses	Email Id	Mobile No.	Signature
18.	Col KJS Sandhu (Retd)	Jaypee Green Tech Fuel Processing Plant Chandigarh	kjs.sandhu@ jalmdia.co.in	9872229777	
19.	SANJAY JAIN	Dalmia Cement H.O, New Delhi.	jain.sanjay@ dalmiabha-sat.com	9313333448	
20.	BIMAL MODI	Ultratech Cement Ltd. Mumbai 40001	bimal.modi@ adityabirla.com	9702098150	
21.	Rajeev Goswami	Shree Cement Ltd Bawana	goswami@shreecement Ltd.co	9251037459	
22.	T. Raghavendra Rao	Sustainable Technologies & Environmental Project	raotr@hotmail.com	9821153197	
23.	VIBHOR SOOD	Technical Expert (GIZ)	vibhor.sood@giz.de	8130483431	
24.	Kamna Swami	Technical Advisor. (GIZ)	Kamna.swami @giz.de		
25.	B. Srinivas	UGO President Prism Cement	b.srinivas@prism cement.co.in	915844 65444	
26.	Manoj Shrivastava	Associate VP Prism Cement.	manojshrivastava@ prismcement.com	9911539554	
27.	RAJIV SATYAKAM	AGM, NTPC LTD	rsatyakam@ntpc.co.in	9650993201	

Annexure-II

Draft Standards of Refuse Derived Fuel (RDF) derived from Municipal Solid Waste evolved after Preliminary Discussions in the 2nd Expert Committee Meeting

SINo	Parameters	Segregated Combustible Fraction	RDF Grade III	RDF Grade II	RDF Grade I
1	Size – 2D and 3D in mm	75 mm maximum any dimension	50 mm maximum any dimension	30 mm maximum any dimension	25 mm maximum any dimension
2	Ash – % maximum permissible	<20 %	<20 %	<15 %	<10 %
3	Moisture – % maximum permissible	< 25 %	< 20%	<15 %	<10%
4	Chlorine – % maximum permissible	< 1.0 %	< 1.0 %	< 0.7	< 0.5
5	Sulfur – % maximum permissible	<1.5 %	<1.5 %	<1.5 %	<1.5 %
6	NCV – in Kcal/kg	> 2500 kCal/kg net	> 3000 kCal/kg net	> 4000 kCal/kg net	> 4500 kCal/kg net
7	Any other parameter?	RDF Odour to be controlled.	RDF Odour to be controlled.	RDF Odour to be controlled.	RDF Odour to be controlled.
8	Preference for use – in line-calciner or separate-line calciner?		No preference	No preference	No preference
9	Feeding arrangement – any comments or suggestions?		Cost can be covered by the project. RDF manufacturing CAPEX and Capex in Cement plant to be included in calculations.	Cost can be covered by the project. RDF manufacturing CAPEX and Capex in Cement plant to be included in calculations.	Cost can be covered by the project. RDF manufacturing CAPEX and Capex in Cement plant to be included in calculations.
10	Would the cement company like to install its own refinement/waste processing facility to achieve standards or would prefer ULBs to do this?		Open	Open	Open

Note: Some specific cement plants having constraints of ash absorption, moisture tolerance, chlorine and sulphur limits, may need lower limits.