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STANDING COMMITTEE ON ENERGY

(2015-16)

SIXTEENTH LOK SABHA

MINISTRY OF NEW AND RENEWABLE ENERGY

POWER GENERATION FROM MUNICIPAL SOLID WASTE

TWENTIETH REPORT

सत्यमेव जयते

LOK SABHA SECRETARIAT
NEW DELHI

August, 2016/Sravana,1938 (Saka)

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Presented to Lok Sabha on 05.08.2016

Laid in Rajya Sabha on 05.08.2016

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CONTENTS

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INTRODUCTION

I, the Chairperson, Standing Committee on Energy, having been authorized by the Committee to present the Report on their behalf, present this Twentieth Report on 'Power Generation From Municipal Solid Waste' relating to the Ministry of New and Renewable Energy.

2. The Committee had a briefing on the subject by the representatives of the Ministry of New and Renewable Energy, Ministry Of Urban Development, Ministry Of Environment, Forest And Climate Change, New & Renewable Energy Development Corporation Of Andhra Pradesh Ltd. and some Private Producers on 6th November, 2015. The Committee, with a view to examining the subject in detail, had further briefing by the representatives of the Ministry of New and Renewable Energy, Ministry Of Urban Development, Govt. Of Andhra Pradesh and Govt. Of Punjab on 19th April, 2016, 27th April, 2016 and 8th July 2016. In order to gain first-hand experience of the working of a Waste to Energy Plant, the Hon'ble Chairperson, visited the Waste to Energy Plant at Okhla, Delhi on 19th October, 2015. The Committee wish to express their thanks to the representatives of the Ministry of New and Renewable Energy, Ministry Of Urban Development, Ministry Of Environment, Forest And Climate Change, State Govt. Of Andhra Pradesh and Punjab for appearing before the Committee and furnishing the desired information in connection with the issues relating to the subject.

3. The Report was considered and adopted by the Committee at their sitting held on

3rd August, 2016

4. The Committee place on record their appreciation of the valuable assistance rendered to them by the officials of the Lok Sabha Secretariat attached to the Committee.

5. For facility of reference and convenience, the observations and recommendations of the Committee have been printed in bold letters in Part-II of the Report.

NEW DELHI **DR. KIRIT SOMAIYA**

03 August, 2016 **Chairperson,**

Sravana 12, 1938 (Saka) **Standing Committee on Energy**

REPORT

PART-I

NARRATION ANALYSIS

I. INTRODUCTORY

The Municipal Solid Waste (MSW), as submitted by the Ministry of New and Renewable Energy (N and RM), is a heterogeneous mixture of paper, plastic, cloth, metal, glass, organic matter, construction and demolition debris, dust, etc., generated from households, commercial establishments, markets and road cleaning activities. The Committee were apprised by the M/o N&RM that India generates about 62 million tonnes of Municipal Solid Waste annually, out of which, 82% is being collected and the remaining 18% is littered; out of the total collected waste, only 28% is being treated and disposed.

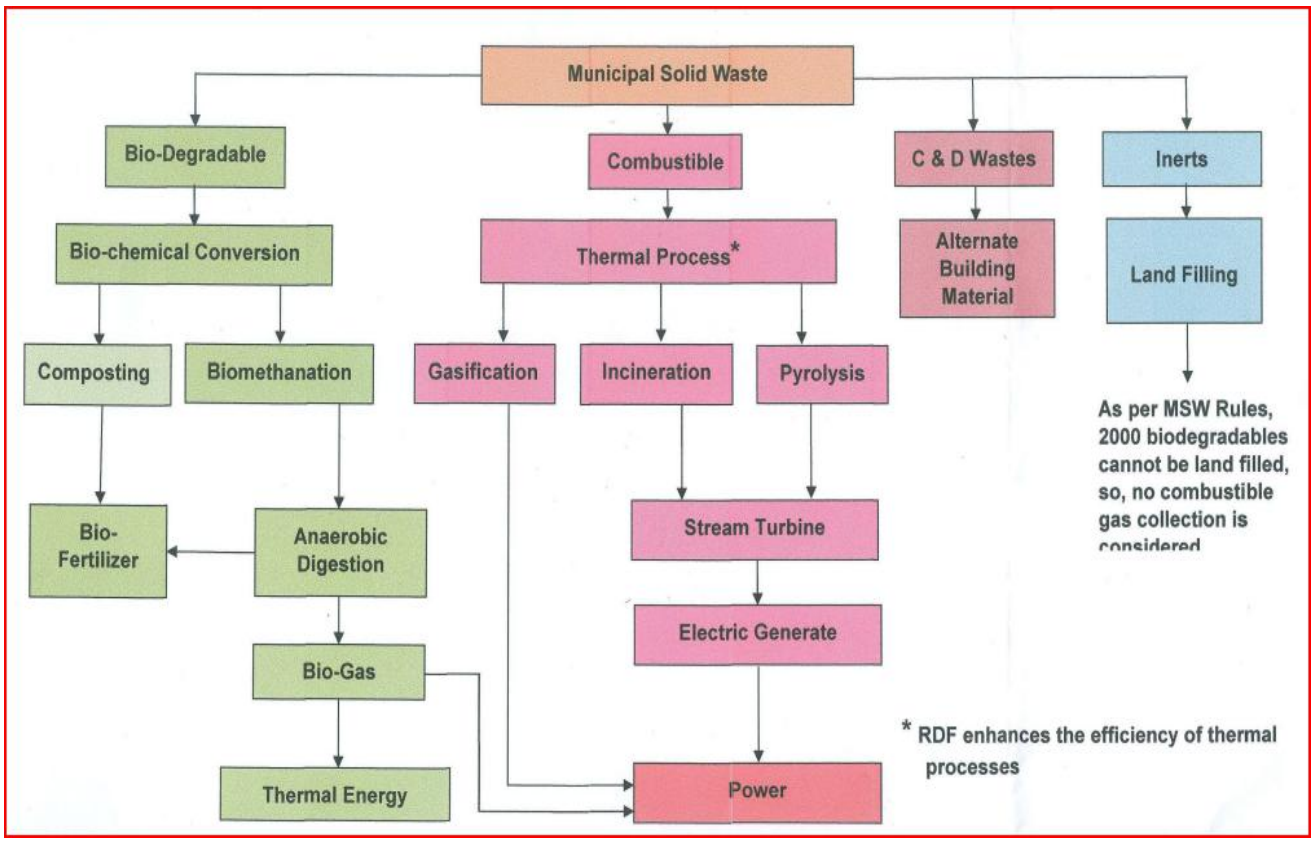
1.2 The Ministry submitted that if the current 62 million tonnes annual generation of MSW continues to be dumped without treatment, it will need 3,40,000 cubic meters of landfill space every day. Considering the projected waste generation of 165 million tonnes by 2031, the requirement of land for setting up landfill for 20 years (considering 10 meter high waste pile) could be as high as 66,000 hectares of precious land, which the country cannot afford to waste. Even to contain only untreated solid waste, 1,240 hectares of additional precious land every year would be required.

1.3 However, the Committee have observed that there is hardly a city in the country where Municipal Solid Waste is disposed off scientifically. Keeping in view that by 2031, the total generation of Municipal Solid Waste in the country would be 165 million tonnes - an increase of about 100 Million Tonnes in about 15 years, due to increasing industrialization, urbanization and changes in the pattern of life there is a urgent need to look into this subject and find out ways and methods to cope with this gargantuan garbage problem.

1.4 The Committee have been informed that in developed countries, environmental concerns rather than energy recovery is the prime motivator for waste-to-energy projects, which help in treating and disposing of wastes. However, the Committee fully conform to the view of the Ministry that in the Indian context, energy generation from MSW improves the viability of such waste management projects and that the major advantages for adopting technologies for recovery of energy from MSW are to reduce the quantity of waste

and net reduction in environmental pollution, besides generation of substantial quantity of energy.

waste to wealth landscape: abundant oppotunities*



* (as furnished by the Ministry of Urban Development)

II. MUNICIPAL SOLID WASTE : GENERATION, COMPOSITION AND POTENTIAL

2.1 According to the Ministry of New and Renewable Energy, in comparison to the levels of the developed world of 1 to 2.5 kg capita/day, average MSW generation in India is 450 gm/per capita/day. The MSW generation rate in the country is 200-300 gm/capita for small towns, 300-400 gm/capita for medium cities and 400-600 gm/capita for large cities.

2.2 The Committee were further informed that as per the latest report of Central Pollution Control Board (CPCB), published in February 2015, the total quantity of waste generation in the country is estimated at around 1.43 lakh metric tonnes per day. Out of which, 1.18 lakh metric tonnes (82%) is being collected and the remaining 18% is littered. Out of the total collected waste, only 0.33 lakh metric ton (28%) is being treated and disposed. City-wise MSW Generation is given at **Annexure I**. A table showing State-wise MSW Generation is as below:

State-wise waste generation, collection and treatment*****

S.No.	**States**	Quantity Generated (TPD)	Collected (TPD)	*Collected %*	Treated (TPD)	*Treated %*
1	Andaman & Nicobar	70	70	*100*	05	*7*
2	Andhra Pradesh & Telangana	11500	10656	*93*	9418	*82*
3	Arunachal Pradesh	110	82	*82*	74	*74*
4	Assam	650	350	*54*	100	*15*
5	Bihar	1670	NR	*NR*	NR	*NR*
6	Chandigarh	340	330	*97*	250	*74*
7	Chhattisgarh	1896	1704	*90*	168	*9*
8	Daman Diu, & Dadra	85	85	*85*	Nil	*0*
9	Delhi	8390	7000	*83*	4150	*49*
10	Goa	183	182	*99*	182	*99*
11	Gujarat	9227	9227	*100*	1354	*15*
12	Haryana	3490	3440	*99*	570	*16*
13	Himachal Pradesh	300	240	*80*	150	*50*
14	Jammu & Kashmir	1792	1322	*74*	320	*18*
15	Jharkhand	3570	3570	*100*	65	*2*
16	Karnataka	8784	7602	*87*	2000	*23*
17	Kerala	1576	776	*49*	470	*30*
18	Lakshadweep	21	-	*0*	-	*0*
19	Madhya Pradesh	5079	4298	*85*	802	*16*
20	Maharashtra	26,820	14900	*56*	4700	*18*

S.No.	States	Quantity Generated (TPD)	Collected (TPD)	*Collected %*	Treated (TPD)	*Treated %*
21	Manipur	176	125	*71*	-	*0*
22	Meghalaya	268	199	*74*	98	*37*
23	Mizoram	552	276	*50*	Nil	*0*
24	Nagaland	270	186	*69*	18	*7*
25	Orissa	2460	2107	*86*	30	*1*
26	Puducherry	495	495	*100*	Nil	*0*
27	Punjab	3900	3853	*99*	32	*1*
28	Rajasthan	5037	2491	*49*	490	*10*
29	Sikkim	49	49	*100*	0.3	*1*
30	Tamil Nadu	14532	14234	*98*	1607	*11*
31	Tripura	407	407	*100*	Nil	*0*
32	Uttar Pradesh	19180	19180	*100*	5197	*27*
33	Uttarakhand	1013	1013	*100*	Nil	*0*
34	West Bengal	8674	7196	*83*	1415	*16*
	Total	**1,43,449**	**1,17,644**	-	**32,871**	-

**Source: CPCB Report (06.02.2015)*

2.3 The Committee have observe that the waste that is treated is abysmally low. There is an urgent need to step up efforts so as to achieve 100% scientific processing and disposal of Municipal Solid Waste by 2019, as envisaged by the Government, under the Swachh Bharat Mission. Further, the figures given above pertain to urban areas only, whereas the Committee found that a large amount of waste is generated in rural areas also which has not been taken into account anywhere. There should be some facility to collect and treat solid waste at Panchayat level also as all the waste in rural areas is not suitable to be converted into organic manure.

MSW Composition

2.4 When asked by the Committee about the composition of MSW generated in the country, the Ministry gave the following reply:

> "As per the Task Force Report on Waste to Energy (WTE), the waste composition has changed rapidly during 1996-2011 and there is over 380% and 1650% increase in paper and plastic waste, respectively, which calls for serious effort to utilize compostable as well as burnable waste, adopting both compostable and waste to energy technologies. the proportion of high calorific value waste is increasing as shown in the table below.

Variation in MSW composition in India

Year	Composition (%)							
	Bio-degradable	Paper	Plastics / rubber	Metal	Glass	Rags	Others	Inerts
1996	42.21	3.63	0.60	0.49	0.60	Nil	Nil	45.13
2005	47.43	8.13	9.22	0.50	1.01	4.49	4.016	25.16
2011**	42.51	9.63	10.11	0.63	0.96			17.00
2011**	52.32	13.8	7.89	1.49	0.93	1.00		22.57

Sources : For 1996 results, NEERI 1996; for 2005 results, http://www.cpcb.nic.in

**** for North Eastern States as per a recent CPCB study conducted by NEERI

City-wise MSW composition in different cities of India, as per CPCB, is given in **Annexure-II**."

2.5 The Committee have observed that the waste that is generated in the country is a mixed waste comprising a large amount of inert material and a very high moisture level unlike in other countries. High level of moisture and inerts in the waste make it difficult to derive power from it. The Committee found that there is no proper public system of primary collection from the source of waste generation and municipal sanitation workers collect waste primarily through street sweeping, etc. Also, there is no practice of sorting of waste at source in a scientific way. Citizens should be encouraged to keep segregated bins for wet, dry and hazardous waste and stop littering on the streets. Segregation of waste should be made mandatory and if need be a penalty may be imposed for non-compliance.

Waste to Energy Potential in India

2.6 When the Committee enquired about the potential of energy which can be generated from this MSW, the Ministry stated that:

> "The solid waste generated from the cities/towns in India has present potential to generate power of approximately 500 MW, which can be enhanced to 1,075 MW by 2031 and further to 2,780 MW by 2050. The State-wise potential for power generation from MSW is given below":

State-wise potential for power generation from MSW

S. No.	State	Power Equivalent (MW)
1.	Andaman & Nicobar	1
2.	Andhra Pradesh	43
3.	Arunachal Pradesh	1
4.	Assam	2

5.	Bihar	6
6.	Chandigarh	1
7.	Chhattisgarh	7
8.	Daman Diu & Dadra	1
9.	Delhi NCT	28
10.	Goa	1
11.	Gujarat	31
12.	Haryana	13
13.	Himachal Pradesh	6
14.	Jammu & Kashmir	7
15.	Jharkhand	17
16.	Karnataka	35
17.	Kerala	6
18.	Madhya Pradesh	19
19.	Maharashtra	62
20.	Manipur	1
21.	Meghalaya	1
22.	Mizoram	2
23.	Nagaland	1
24.	Orissa	9
25.	Puducherry	2
26.	Punjab	15
27.	Rajasthan	19
28.	Sikkim	0
29.	Tamil Nadu	53
30.	Tripura	1
31.	Uttar Pradesh	72
32.	Uttarakhand	5
33.	West Bengal	32
	Total	**500**

III. TECHNOLOGY OPTIONS FOR POWER GENERATION FROM MUNICIPAL SOLID WASTE

3.1 When asked by the Committee about the technological options available in the country for the treatment and disposal of MSW, the Ministry stated as under:

> "Energy recovery in the form of electricity, heat and fuel from the waste is possible through different technologies. These processes are often grouped under "Waste to Energy" (WTE) technologies. Under the Indian context, following WTE technologies are suitable of-:
>
> i) Biomethanation for wet biodegradable wastes - Biomethanation is an anaerobic slurry-phase process that can be used to recover both nutrients and energy contained in biodegradable waste. Biogas can be used either as a source of thermal energy or to generate electricity by using gas engines and turbines.
>
> ii) Combustion of RDF – Segregation of dry high organic component of combustible wastes from mixed MSW to prepare fuel in the form of briquette/pellets/fluff and combustion of same to generate energy.
>
> iii) Mass burning of MSW - Complete combustion of MSW on as it is received basis (unprocessed MSW) to generate energy.
>
> iv) In addition to the above, two other technologies which are currently under R&D and piloting stage are of-:
>
> a) Gasification- Gasification is a process that converts organic or fossil based carbonaceous materials into carbon monoxide, hydrogen and carbon dioxide at elevated temperature in the presence of limited amount of oxygen.
>
> b) Pyrolysis- Pyrolysis uses heat to break down organic materials in the absence of oxygen, producing a mixture of combustible gases (primarily methane, complex hydro carbons, hydrogen, and carbon monoxide), liquids and solid residues."

3.2 A Chart showing Population based Waste Management Technology Options, as furnished by the Ministry, is given below:

Population based Waste Management Technology Options

Population range	Waste Gen.TPD	Composition	Technological options	Minimum requirements	Va lue added products	Approximate cost (excluding land cost)
Above 2 Million	>1100 TPD	Biodegradables 35 to 50 %	IWP comprising - BM +CC+ RDF W to E plant for power, based on: gasification , pyrolysis, incineration and mass burning. RDF to cement industry Plastic to fuel oil	Segregate wet wastes at source for BM and / or CC, dry wastes to be recycled or converted into RDF as feed stock for its own power plant / cement industry or any other power plant. Inerts to be land filled RDF must be burnt under controlled condition not below 850° C	75m^3 of bio gas or 100 KW of electricity per 1 TPD of segregated wet wastes + 60 kg manure in case of BM , 200 kg per TPD vermi castings / CC per TPD 20 % RDF + 15 % compost. 1 MW power per 100 TPD of MSW.	Rs 5-7 cr per 100 TPD of MSW composting + RDF Rs 15/20 lakh capital cost per 1 TPD for gas / electricity through Bio-methenation Rs 10 cr per MW power plant. Rs 20 lakh per 50kg capacity / shift catalytic conversion technology plastic waste to liquid fuel. Rs 16 crore per 10 tonne of plastic (pyrolysis technology)
Population range	**Waste Gen.TPD**	**Composition**	**Technological options**	**Minimum requirements**	**Va lue added products**	**Approximate cost (excluding land cost)**
1 lakh to 10 lakh	30 to 550 TPD	Biodegradables 40 to 55 %	IWP-BM, CC + RDF as feed stock to power plant / cement industry. Plastic to fuel oil	Segregate wet wastes at source for BM and / or CC, dry wastes to be recycled or converted into RDF as a feed stock for large power plant / cement industry and inerts to be landfilled	As above for BM + CC and RDF to be used as feed stock for power plants / cement industry likely output: (20 % RDF + 20 % Compost). 25 to 40 litres from 50kg plastic wastes	Cost for BM, CC and RDF as above Rs 20 lakh per 50kg capacity / shift catalytic conversion technology for plastic waste to liquid fuel. Rs 16 crore per 10 tonne of plastic (pyrolysis technology)
Population range	**Waste Gen.TPD**	**Composition**	**Technological options**	**Minimum requirements**	**Va lue added products**	**Approximate cost (excluding land cost)**
50,000 to 1 Lakh	10 to 30 TPD	Biodegradables 45 to 60 %	BM, VC or CC RDF	Segregate wet wastes at source for BM and / or VC / CC, dry wastes to be recycled or converted in to RDF as feedstock for power plants and landfill the inerts.	As above for BM +25 to 40 litres liquid fuel from 50kg plastic wastes	Rs 15/20 lakh capital cost per 1 TPD for gas / electricity through Bio-methenation Rs 7- 10lakh per TPD for VC/CC

3.3 The Committee have observed that for Biomethanation, wet biodegradable waste is required; for Combustion of RDF, dry high organic waste is required; for Gasification, organic or fossil based carbonaceous material is required; and for Pyrolysis, organic waste is required. Mass Burning of MSW is the only method which does not require any segregation of waste and uses mixed waste. However, this method of Mass Burning is detrimental to the environment, and should not be resorted to on a mass scale. Most of the above mentioned technologies require proper segregation of waste; however, there is lack of an efficient mechanism to segregate waste into biodegradable/dry/wet/ carbonaceous materials, etc. components.

3.4 In the view of the Committee, there should be efficient mechanism for segregation of waste at the source as it has become a herculean task all over the country. So, proper training should be provided to municipal workers for segregation of waste and awareness and sensitization programmes should be conducted for the same to bring in behavioural changes among the public. Also, there is a need to have a proper policy and cost effective technological support for W to E Sector as existing technologies do not seem to be compatible to local requirements.

IV STATUS OF WASTE TO ENERGY PROJECTS IN THE COUNTRY

4.1 When the Committee queried about the status of Waste to Energy Plants that are currently functioning in the country, the Ministry furnished the following information:

> "As per the direction of the Hon'ble Supreme Court, MNRE has taken up 5 pilot projects with an aggregate capacity of 57 MW under its programme on Energy Recovery from Urban, Industrial and Agricultural Waste Residue. Out of which, one plant at Okhla Delhi is operational and another one at Ghazipur, Delhi is under commissioning. The remaining 3 projects could not be completed due to paucity of funds/technical reasons. A brief summary status of all the projects is given below":

Status of 5 Pilot projects taken by MNRE

S. No.	Project promoters	Location	Capacity (MW)	Technology	Project cost (Rs. in crores)	Present status
1	M/s. Timarpur Okhla Waste Management Private Ltd. (TOWMCL) Jindal ITF Centre, 28 Shivaji Marg, New Delhi (Promoted by Jindal Urban Infrastructure Ltd.)	Old NDMC Compost plant, New Okhla tank, New Delhi	16	Combustion & Processing 1950 MT MSW per day	188.28	Commissioned in January 2012
2	M/s East Delhi Waste processing Company (P) Ltd., New Delhi (Promoted by DIAL, IL&FS Energy Dev. Co. Ltd. (IEDCL) and SELCO International Ltd.)	Gazipur, Delhi	12	Combustion	155.42	Project installation completed and is under trail run/ commissioning
3	M/s Srinivasa Gayatri Resource Recovery Limited No. 303, Shreshta Bhumi Complex, No. 87, K.R. Road, Next to Gayana Samaja, Bangalore	Village Mandur, Bangalore	8	Combustion	70.33	Project could not be completed due to paucity of funds, **sanction cancelled**
4	M/s. RDF Power Projects Ltd.401, Galada Towers, Adjacent Lane to Pantaloons, Begumpet, Hyderabad	Chinnaravul-apally Village, Bibinagar Madal in Nalgonda District, A.P.	11	Combustion	114.11	Project could not be completed due to paucity of funds
5	M/s. Rochem Separation Systems (India) Pvt. Ltd., 101, HDIL Towers, AnantKanekar Marg, Bandra (E), Mumbai.	Hadapsar, Pune	10	Gasification	90.00	Installed Ist phase of 2.6 MW and is not operational due to technical reasons. The Committee visited the plant. No generation of electricity and project is complete failure.

4.2 As per MoUD, there are 7 functional plants of 92.4 MW capacity, 4 non-functional plants of 40.6 MW capacity, 31 under construction plants of 241.8 MW capacity and 21 plants under tendering stage of 163.5 MW Capacity. Total power generation capacity of all WTE plants in India is 538.3 MW. The list of these plants, as furnished by the Ministry, is given below:

S. No.	Name of city/town	Waste intake (MT/day)	Power generation (MW)
1.	Okhla, Delhi	2000	16
2.	Pune, Maharashtra	700	10 (current generation 0.5 MW)
3.	Solapur, Maharashtra	400	3
4.	Rebladevpally (V), Sultanabad (M), Karimnagar, Telangana	1100	12 (15 days in a month – 9MW)
5.	Ghazipur, Delhi	---	16
6.	Jabalpur, Madhya Pradesh	---	11.4
7.	Narela-Bawana, Delhi	---	24
Sub-Total			**92.4**

Non-operational Plants

S. No.	Name of city/town	Waste intake (MT/day)	Power generation (MW)
1.	Kanpur, UP	1500	15
2.	Elikkta (V), Mahabubnagar Dist., A.P.	200MT (RDF based)	6.6
3.	Vijayawada	225	6.0
4.	Rajahmundry, Andhra Pradesh	1074	13
Sub-Total			**40.6**

Under Construction W2E Plants

S. No	State	Name of city/town	Proposed capacity (MWe)
1.	Andhra Pradesh	Vishakhapatnam	15
2.	Andhra Pradesh	Vijayawada	12
3.	Andhra Pradesh	Tirupati	5
4.	Andhra Pradesh	Kadapa	5
5.	Andhra Pradesh	Nellore	4
6.	Andhra Pradesh	Anantpur	4
7.	Andhra Pradesh	Kurnool	1
8.	Andhra Pradesh	Vizianagaram	4
9.	Andhra Pradesh	Tadepalligudem	5
10.	Andhra Pradesh	Guntur	15
11.	Bihar	Patna	12
12.	Gujarat	Surat	11.5
13.	Gujarat	Rajkot	4
14.	Himachal Pradesh	Shimla	1.7
15.	Jharkhand	Ranchi	11
16.	Karnataka	Bengaluru	8
17.	Karnataka	Bangalore, Karnataka	12
18.	Kerala	Kochi	10
19.	Madhya Pradesh	Indore	8
20.	Maharashtra	Pune	7
21.	Maharashtra	Thane	10
22.	Maharashtra	Nagpur	11.5
23.	Manipur	Imphal	1
24.	New Delhi	Kidwai Nagar	1.6
25.	Odisha	Bhubaneswar & Cuttack	11.5
26.	Punjab	Ludhiana	8
27.	Punjab	Bathinda	8
28.	Tamil Nadu	Coimbatore	8
29.	Telangana	Greater Hyderabad Municipal Corporation	11
30.	Uttar Pradesh	Allahabad	6
31.	Uttar Pradesh	Agra	10
		Total	**241.8**

W2E Plants under tendering

S. No	State	Name of city/town	Proposed capacity (MWe)
1	Andhra Pradesh	Guntur	15
2	Assam	Guwahati	5
3	Chhattisgarh	Durg-Bhilai	5
4	Chhattisgarh	Raipur	5
5	Gujarat	Ahmedabad	15
6	Haryana	Karnal	3.5
7	Haryana	Sonepat	5
8	Haryana	Bandhmadi	10
9	J&K	Srinagar	6.5
10	Jharkhand	Dhanbad	12
11	Madhya Pradesh	Bhopal	9.5
12	Madhya Pradesh	Gwalior	6
13	Madhya Pradesh	Rewa	5
14	Madhya Pradesh	Ujjain	3.5
15	Rajasthan	Jaipur	15
16	Rajasthan	Kota	5
17	Rajasthan	Jodhpur	6
18	Uttar Pradesh	Rampur	3
19	Uttar Pradesh	Jhansi	3
20	Uttar Pradesh	Gorakhpur	3
21	West Bengal	Kolkata	22.5
		Total	**163.5**

Grand Total of Power Generation Capacity (Functional (A) + Non-Functional (B) + Under Construction & others (C) = 538.3 MW")

4.3 The Committee have observed that except the Okhla and Ghazipur Plants, all the remaining Waste to Energy Plants, including the Pune Plant, have completely failed to take off. The Committee visited the Okhla and Pune Waste to Energy Plants for first-hand knowledge of working of such plants and found that while the working of the Okhla Plant (Delhi) was satisfactory, the Pune Plant was a complete failure. The model of Okhla Plant (Delhi) may be replicated in other cities for safe disposal of MSW generation of Power.

4.4 When queried by the Committee about the problems that are hampering the proper implementation of Waste to Energy Projects, the Ministry stated the reasons as under:

a) On the supply side, the irregular and inadequate quantity of Waste and the failures in delivery thereof to the WtE plants;
b) The non-payment of agreed fees and

c) The non-marketability of waste processed products, including power generated."

When further asked by the Committee about the steps that may have been taken by the Government to overcome these problems, the Ministry stated that:

a) Cities are incentivized for regular supply of garbage as indicated by plant load factor;

b) The amended Central Electricity Act makes it mandatory to purchase power from WtE plants by State DISCOMS.

c) Under the Swachh Bharat Mission(SBM), 20% of MSW Management Project Cost is available as grant/VGF to the States/ULBs as Central Assistance, subject to a maximum of Rs. 240 per capita.

d) MoUD is encouraging the States/ULBs to take up MSW Management projects as per the financial assistance mentioned above. Motivation is through Swachh Survey & Ranking of Cities being conducted every year. The best practices happening in cities are being showcased by exposure visits for promoting them and capacity building.

4.5 When asked by the Committee about the level of private sector participation in the sector of Waste to Energy and if the Government is satisfied with its response and performance, the Ministry stated as under:

> "So far, the private sector has participated in a limited manner with only a few agencies active in the sector. As private sector has come in as PPP partner, the performance of the project becomes a joint/united effort. The PPP arrangements need not be seen as single-responsibility contracts but treated as real partnerships between the local Govt. and the private sector."

When the Committee further queried about the measures which may help increase private sector participation and performance in this sector, the Ministry came up with the following reply:

> "Private Sector participation can be increased by various measures such as
> a) additional financial grants/VGF;
> b) assured supply of municipal waste;
> c) marketability of waste recovered products; and
> d) tax exemptions/rebates/holidays for equipment and machinery, etc."

4.6 The Committee have observed that most of the Waste to Energy Plants have been set up in the country under private sector driven PPP mode and most of these plants have failed to function properly. In the view of the Committee, Public Sector must come forward and set up at least two demonstration Waste to Energy Plants which would give a message that the Government is committed to the cause of scientific management of Municipal Solid

Waste in general and adoption of the methods of Waste to Energy in particular and it believes that such a project is viable and can be run efficiently and that all the risks associated with such projects are not transferred to the private partners .

4.7 When asked by the Committee about the environmental implications of Waste to Energy Plants, the Ministry stated as under:

> "The environmental implications of Waste to Energy Plants are the emissions only. However, with the availability of emission control technologies, the problem can be mitigated. The process itself has to achieve a high temperature burn at more than 800^{o} C to prevent formation of dioxins. Above all, the WtE plants should be seen as pollution management practice to mitigate crude dumping or landfilling of waste through green technology."

4.8 The Committee have observed that the process of generating power from waste is carried out at a high temperature of more than 800^{o} C thereby preventing formation of dioxins and WtE plants are said to be seen as pollution management practice to mitigate crude dumping or landfilling of waste. However, the Committee has noted that the locals generally complain of pungent odour coming out of Waste to Energy Plant. So, it should be taken care of by the agency concerned and it should be ensured that all the Waste to Energy Plants in the country adhere to the environmental norms and defaulters should be penalised.

V. ROLE OF MUNICIPAL AUTHORITIES IN SOLID WASTE MANAGEMENT

5.1 The Committee were apprised by the Ministry that the Constitution of India identifies MSW as a State subject. The 74th Amendment to the Constitution which was enacted in 1993 identifies solid waste management as the function that need to be transferred by the State Government to the Urban Local Bodies (ULBs). However, the transfer of functions is in transition. Historically, in addition to the ULBs, solid waste management has also been discharged by State agencies which may cater to the demands of the entire State or of a particular city. Thus, the responsibility for planning, design, implementation, operation and maintenance of solid waste management rests with the ULBs concerned agencies and State Governments.

5.2 As per the Task Force Report on WTE published by NITI Aayog (erstwhile Planning Commission) in May 2014, it has been estimated that the Urban Local Bodies (ULBs) spend about 60-70% of total expenditure on street sweeping, 20-30% on transportation, and less than 5% on final disposal of waste, which shows that hardly any attention is given to scientific disposal of waste. The waste collection efficiency in India ranges between 70% and 90% in major Metro cities, whereas in several smaller cities it is below 50%.

5.3 When the Committee queried about the role of Municipal Authorities in the field of Waste to Energy, the Ministry furnished the following information:

"Role of municipal Authorities in Waste to Energy Plants is given below:

Duties and responsibilities of local authorities and village Panchayats of census towns and urban agglomerations:-

(a) prepare a solid waste management plan as per State policy

(b) prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorized agency;

(c) facilitate construction and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation or through any agency such as

i) bio-Methanation, microbial composting, vermi-composting, anaerobic digestion or any other appropriate processing for bio-stabilization of biodegradable wastes;

ii) waste to energy processes, including refused derived fuel for combustible fraction of waste or supply as feedstock to solid waste based power plants or cement kilns;

(d) make adequate provision of funds for capital investments as well as operation and maintenance of solid waste management services in the annual budget ;

(e) make an application in Form-I for grant of authorization for setting up waste processing, treatment or disposal facility, if the volume of waste is exceeding five metric tonnes per day from the State Pollution Control Board or the Pollution Control Committee, as the case may be;

(f) submit application for renewal of authorization at least sixty days before the expiry of the validity of authorization."

5.4 The Committee were informed that there are multiple entities involved in collection, transportation, processing and disposal of MSW like Ragpickers, *Kabadiwalas*, Sanitation workers of Municipal Authorities, private contractors who have their own sweeping staff, waste collectors and vehicles to transport the waste from collection points to disposal sites, plant operators, etc. The Committee found that the Urban Local Bodies (ULBs) should adopt an integrated mechanism for collection, transportation and disposal of MSW. It should be the responsibility of the ULBs to supply required quality and quantity of MSW to Waste to Energy Plants failing which a penalty may be imposed on them. Ragpickers and *Kabadiwalas* may be integrated with the formal system by the State Governments and ULBs in order to maximise the collection efficiency.

VI. GOVT. OF INDIA'S INITIATIVES FOR PROMOTION OF POWER GENERATION FROM MUNICIPAL SOLID WASTE

6.1 The Committee were informed by the Ministry that, at the Central level, various Ministries, i.e. Ministry of Urban Development, Ministry of Environment, Forest and Climate Change and Ministry of New and Renewable Energy, etc. are involved in handling Municipal Solid Waste, viz. its collection, transportation, treatment and safe disposal. On being asked by the Committee about the role of the respective Ministries/Agencies in Solid Waste Management and Generation of Power from Solid Waste, the Ministry furnished the following information:

> "Handling of the Subject at Central Level as per Government of India (Allocation of Business) Rules, 1961
>
> At Central level, following three Ministries are involved in handling the subject of Municipal Solid Waste in respect of its collection, transportation, treatment and safe disposal -:
>
> a) Ministry of Urban Development (MoUD)
>
> MoUD is the nodal Ministry for formulation of policies, strategies and guidelines and assists the States by providing financial assistance for development of water supply and sanitation including municipal solid waste management infrastructure in the cities and towns.
>
> b) Ministry of Environment, Forest and Climate Change (MoEF& CC)
>
> MoEF& CC is involved in framing the rules for management and handling of Municipal Solid Waste under the – i) Environment (Protection) Act; ii) Water (Prevention and Control of Pollution) Act; iii) Air (Prevention and Control of Pollution) Act; and iv) Central Pollution Control Board
>
> c) Ministry of New and Renewable Energy (MNRE)
>
> MSW being renewable in nature, MNRE Supports MSW based power generation projects."

6.2 The Committee have observed that there is a need for coordinated efforts to be made to solve this problem of garbage and to make Waste to Energy Projects successful and viable. A Monitoring Committee, consisting of representatives from all the Central Ministries concerned like the Ministry of New and Renewable Energy, Ministry Of Urban Development, Ministry of Environment, Forest and Climate Change, etc., along with the representatives of the State Governments and Urban Local Bodies, should be established to

coordinate the efforts at each level and suggest suitable methods and technologies to be adopted, on case to case basis, to make Waste to Energy Plants a success. This Monitoring Committee may also have technical experts, financial analysts, representatives from private sector, etc.

6.3 The Committee were apprised about the following Waste to Wealth Interventions by the Government:

"Waste to Energy:

- Central Electricity Regulatory Commission (CERC) on 07.10.2015 has notified Generic tariff for Waste-to-Energy of Rs 7.90 per unit of power for RDF (Refuse Derived Fuel). States have initiated process for determining the tariff.Ministry of Power has revised the Tariff Policy 2006 vide resolution dated 28.01.2016, under the Indian Electricity Act, 2003, making it mandatory for State DISCOMS to purchase power from Waste-to-Energy plants.

Waste to Compose

- M/o Chemicals & Fertilizers has notified on 10.02.2016, the policy on promotion of City Compost, thereby providing Market Development Assistance of Rs. 1,500 per Metric Tonne to scale up production and consumption of compost.
- M/o Chemicals & Fertilizers has tagged compost manufacturing plants with fertilizer distribution companies in all States (purchase price of Rs. 2,500 per MT established)"

6.4 The Committee have observed that the Central Electricity Regulatory Commission (CERC) has notified Generic tariff for Waste-to-Energy of Rs 7.90 per unit of power for RDF (Refuse Derived Fuel). The Committee noted that fixing of tariff by the CERC is not the right solution and the tariff should be decided through competitive bidding as this act of tariff determination by the CERC may encourage inefficiency and non-transparency. Therefore, in view of the Committee, open competitive bids should be invited as is the case in Andhra Pradesh and Punjab.

6.5 The Committee also noted that it has been made mandatory for State DISCOMS to purchase power from Waste-to-Energy plants at this tariff of Rs 7.90 and this increased cost of electricity would ultimately be borne by the common consumers. The Committee is of the view that waste disposal is the responsibility of the State Governments and the ULBs; so the cost should be borne by them and not the common consumer. To make Waste to Energy Plants viable, the principle of "Polluters Pay, along with common but differentiated responsibility" should be adopted, i.e. the increased cost should not be borne by all customers equally instead of the one who produce more solid waste (such as Restaurants,

Hotels, Marriage Halls, other commercial establishments, etc.) should be made to pay more through a tax/cess/fine.

6.6 It has also been noted by the Committee that common people are made to pay twice for the disposal of same garbage, as in, people pay to the local bodies for collection of garbage from their home and again a high rate of electricity has been imposed on them to compensate the producer of electricity from waste. This is a kind of double taxation for the same service. This practice of ensuring 15% to 20% profit to the producer of electricity from waste and taxing common people twice for the same should be avoided.

6.7 When asked by the Committee about the efforts of the Government in the field of Waste to Energy, the Ministry furnished the following information:

> "Manual on Municipal Solid Waste Management
> Ministry of Urban Development (MOUD) and Central Public Health & Environmental Engineering Organization (CPHEEO) in collaboration with GIZ have prepared a revised manual for Municipal Solid Waste Management (MSWM).
>
> The Ministry of Urban Development (MoUD), Government of India had developed a Guidance Manual for MSW for all Urban Local Bodies which is based on learnings from 14 years' experience gained in India, post the notification of MSW management and Handling Rules in 2000. This revised manual on MSWM is designed to support decision makers at State and Urban Local Body levels, technical staff experts and academia involved in the proper management and implementation of all MSWM related activities. The manual reflects upon recent technological, managerial, financial and policy level developments.

Report of the Task Force on Waste to Energy

The NITI Aayog (erstwhile Planning Commission)has published "Report of the Task Force on Waste to Energy (W to E)" in May, 2014 which described the appropriate approaches, systems and technological options for waste to energy plant, including integration of *kabadiwala* and rag pickers, common regional sanitary landfills, centralized & decentralized processing of waste, selection of appropriate technologies for waste processing, and public-private partnership, etc. A copy of the same is available at MoUD portal:

Regulatory Framework

The existing as well as new regulatory framework to promote waste to energy in the country is as follows –

i) MSW Management and Handling Rules, 2015

Ministry of Environment, Forest and Climate Change (MoEF& CC) under the Environment (Protection) Act, 1986 has notified Municipal Solid Wastes (Management and Handling) Rules, 2000. These rules are being modified and the objections or suggestions have been invited on the proposals contained in the draft. According to the draft rules, the ULBhas to adhere the following compliance in the matter of processing and disposal of solid wastes at the facility to be setup by ULB on their own or through an agency or an operator of a facility:-

a) biodegradable wastes shall be processed by bio-methanation, composting, vermi composting, anaerobic digestion or any other appropriate biological processing for stabilisation of wastes.

b) segregated recyclable material to be provided to the recycling industry through waste pickers or any other agency engaged or authorised by the ULB for the purpose;

c) residual combustible wastes shall be utilized for supplying as a feedstock for preparing refuse derived fuel (RDF) or for generating energy or power from the waste by adopting proven waste to energy technologies for which emission standards as well as standards for dioxins and furans have been prescribed by the Central Pollution Control Board;

ii) Tariff Policy – Power from WTE plants

In compliance with Section (3) of the Electricity Act, 2003, Ministry of Power (MoP) has notified revised tariff policy on 28th January 2016 which includes the following :-

a) State Distribution Licensee shall procure power from all the Waste-to-Energy plants in the State, depending upon the resources available, at the tariff determined by the Appropriate Commission on cost plus basis.

b) The thermal power plant(s) including the existing plants located within 50 km radius of sewage treatment plant of municipality/local bodies / similar organization shall in the order of their closeness to the sewage treatment plant, mandatorily use treated sewage water produced by

these bodies and the associated cost on this account be allowed as a pass through in the tariff. Such thermal plants will also ensure back-up source of water to meet their requirement in the event of shortage of supply by the sewage treatment plant. The associated cost on this account shall be factored into the fixed cost so as not to disturb the merit order of such thermal plant. The shutdown of the sewage treatment plant will be taken in consultation with the developer of the power plant.

According to the draft Tariff Policy, *State Distribution Licensee shall procure power from all the Waste-to-Energy plants in the State, depending upon the resources available, at the tariff determined by the appropriate Commission on cost plus basis.*

iii) Generic Tariff for WTE Projects for FY 2015-16

The Central Electricity Regulatory Commission (CERC) vide notification dated 07th October 2015 and 31st March 2015 have notified norms for determination of Generic Tariff for MSW, RDF and Biogas based WTE projects along with Generic Tariff for FY 2015-16.

Technology	**Variable Cost (Rs./kWh)**	**Levelised Fixed Cost (Rs./kWh)**	**Applicable Tariff (Rs./kWh)**	**Benefit of Accelerated Depreciation (if availed) (Rs./kWh)**	**Net Levelised Tariff(Rs./kWh)**
MSW	0.00	7.04	7.04	0.54	6.50
RDF based MSW	3.56	4.34	7.90	0.31	7.59
Biogas	3.57	4.29	7.86	0.26	7.60

iv) Ministry of Road Transport and Highways Notification

Ministry of Road Transport and Highways, vide Notification dated 16th June 2015 has amended the Central Motor Vehicles Rules, 1989 and included the provisions for usage of biogas, in the form of bio-CNG, in motor vehicles as mentioned below:-

a) Provided that bio-compressed natural gas (bio-CNG) shall be permitted for motor vehicles as an alternate composition of the compressed natural gas (CNG);

b) Provided further that the mass emission standards applicable to compressed natural gas (CNG) vehicles under these rules shall be applicable to respective vehicles when they use bio-compressed natural gas (bio-GNG);

c) Provided also that the bio-compressed natural gas (bio-CNG) composition meets the fuel specification for bio-compressed natural gas (bio-CNG) as per IS 16087 and meets the requirement of Siloxanes max 0.1 ppm (calculated as Si).

v) Indian Standard on Biogas (Bio-methane)

This standard (IS 16087-2013) prescribes the requirement and the methods of sampling and test for the biogas (Biomethane) applications in stationary engines, automotive and thermal applications and supply through piped network. Requirements for Biogas (Biomethane) for automotive application and piped network as per standard is as under-

S.No.	Characteristic	Requirements	Method of Test Ref. to
i)	CH_4 Percent, *Min*	90	IS 15130 (Part 3)
ii)	Moisture, mg/m^3 *Max*	16	IS 15641 (Part 2)
iii)	H.S. mg/m^3 *Max*	30.3	ISO 6326-3
iv)	$CO_2+N_2+O_2$ Percent, *Max (v/v)*	10	IS 15130(part 3)
iv)	CO_2 percent, Max (v/v) (when intended for filling in cylinders)	4	IS 15130 (Part 3)
v)	O_2 percent, Max (v/v)	0.5	IS 15130(Part 3)

Programmes for Promotion of Waste to Energy

Currently the following programmes for support and promotion of Waste to Energy generation in India are underway:-

a) SBM (Urban) Component IV: Solid Waste Management

Ministry of Urban Development (MoUD) has launched Swacch Bharat Mission (SBM) on 2nd October 2014 with the target to make the country clean by 2nd October 2019. The mission will cover all 4041 statutory towns/cities as per 2011 census. One of the admissible components under SBM is Solid Waste Management including Waste to Energy with Central support up to 20% of the project cost in the form of Viability Gap Funding (VGF)/Grant. All feasible waste processing methods are eligible under Solid Waste Management. Key highlights of the mission related to WtE are given at **Annexure III**.

b) MNRE - Programme on Energy from Urban, Industrial & Agricultural Wastes/ Residues during 12th Plan Period

As per judgement of the Hon'ble Supreme Court on 15th May 2007, Ministry of New and Renewable Energy (MNRE) is implementing a Programme on Energy Recovery from Municipal Solid Waste (MSW) for setting up of five pilot projects from MSW in accordance with the guidelines given by the Hon'ble Supreme Court in the order dated 15th May, 2007.

A Central financial assistance of Rs. 2.0 crore per MW subject to a maximum of Rs. 10.0 crore per project is provided for projects on power generation from MSW. In addition to this, the plant & machinery, equipment, instruments, etc. used for initial setting up of power projects are also eligible for concessional custom duty exemption and Central excise duty exemptions. A copy of the scheme is given at **Annexure IV**."

6.8 Although the respective Ministries have been implementing different programmes, rules and regulatory framework for support and promotion of Waste to Energy in India, but desired results have not been achieved so far. In the view of the Committee, scientific treatment and disposal of municipal solid waste should be made compulsory under the Swachh Bharat Mission. Also, 100% collection and treatment of the solid waste should be made a binding criterion for short listing of cities under the Smart City Project and every city should be encouraged to come out with their respective proposal for the same in a time bound manner.

VII CLUSTER MODEL OF THE STATE GOVERNMENT OF ANDHRA PRADESH

7.1 The Committee were apprised that the State Government of Andhra Pradesh is keen to ensure that Andhra Pradesh emerges as a model State in the country in conceptualizing scientific and efficient municipal waste management project(s). Given this backdrop, the State Govt. invited bids for 10 clusters from the developer for setting up Waste to Energy (WtE) plants on a tariff based competitive bidding process. Out of the 10 clusters, contract work has been awarded for 3 clusters – Visakhapatnam, Guntur and Tirupati to M/s. JITF Urban Infrastructure Ltd., New Delhi, at quoted tariff of around Rs. 6.20. The tender for the remaining 7 clusters have been cancelled and fresh bids have been called in February 2016.

7.2 It was also submitted before the Committee that the Project Developers shall be required to set up a Waste to Energy (WtE) Plant on a PPP mode in that Cluster and shall be selected through a tariff based competitive bidding process. A single bidder shall be selected for setting up the WtE project for each Cluster. In the Waste to Energy project that is being carried out in Andhra Pradesh, a total of 53 ULBs having a waste potential of 4471 Tonnes per day (TPD) are involved. An expected capacity of 45 MW is to be commissioned under this project. A list of Clusters in Andhra Pradesh, as furnished by the Ministry is given below:

Cluster No.	Participating ULBs	MSW Potential of the ULB as per FY 2015-16	Total MSW generation of Cluster as per FY 2015-16	Approximate Distance from the Plant Location in the Cluster (km)	Proposed WtE Plant location
Cluster 1	Visakhapatnam	941.5	942	50	Survey No. 213, Gidijala Village, Anandapuram Mandal
Cluster 2	Vizianagaram	109	203	8.9	Vizianagaram - land in Gunupoorupeta
	Srikakulam	71		57.2	
	Amudalavalasa	11		67	
	Nellimarla	11		10	
Cluster 3	Tadepalligudem	80	342	-	Tadepalligudem: Land not finalized
	Bhimavaram	56		33	
	Tanuku	37		21	
	Palakollu	32		54	
	Narsapuram	32		68	
	Eluru	85		53	
	Nidadavolu	20		26	

Cluster No.	Participating ULBs	MSW Potential of the ULB as per FY 2015-16	Total MSW generation of Cluster as per FY 2015-16	Approximate Distance from the Plant Location in the Cluster (km)	Proposed WtE Plant location
Cluster 4	Guntur	320	1202	2.6	Guntur - Naidupeta, Chilakaluripet Road
	Vijayawada	525		37	
	Tenali	68		29	
	Chilakaluripeta	62		41	
	Sattenapalli	45		34	
	Mangalagiri	52		26	
	Narsaraopeta	65		47	
	Ponnur	35		32	
	Tadepalle	30		33	
Cluster 5	Machilipatnam	82.5	196	6	in Rudravaram village, 6 kms from Machilipatnam
	Gudivada	55		42	
	Repalle	25		42	
	Pedana	16		11	
	Vuyyuru	18		42	
Cluster 6	Tirupati	190	374	10	Tirupati - Ramapuram
	Chittoor	65		73	
	Srikalahasti	58		46	
	Nagari	27		47	
	Venkatgiri	16		63	
	Puttur	18		32.3	
Cluster 7	Nellore	200	296	12.8	Nellore - Donthali - 12.8 kms from Nellore Municipal Corporation
	Kavali	43		75	
	Gudur	38		36	
	Atmakur	15		65	
Cluster 8	Kurnool	140	316	15	Kurnool: Gargeyapuram&Nuthan Pally
	Dhone	32		63	
	Guduru	8		42	
	Yemmiganur	52		83	
	Nandyal	63		71	
	Nandikotkur	21		16	
Cluster 9	Ananthapur	110	283	-	Ananthapur - Survey No. 298, Alamuru Village, 7 kms from Anantapuram. land near Tagarakunta
	Dharmavaram	65		41	
	Guntakal	59		82	

Cluster No.	Participating ULBs	MSW Potential of the ULB as per FY 2015-16	Total MSW generation of Cluster as per FY 2015-16	Approximate Distance from the Plant Location in the Cluster (km)	Proposed WtE Plant location
	Tadipatri	44		57	Road
	Pamidi	1.25		33	
	Gooty	4		52	
Cluster 10	Kadapa	156	317	17	Kolumulapalle
	Rayachoty	38		35	
	Proddatur	75		68	
	Rajampet	30		67	
	Badvel	18.36		70	

7.3 Details regarding the cluster model of Andhra Pradesh, furnished by the Ministry, are as under:

a) Bid Process Coordinator: New & Renewable Energy Development Corporation of Andhra Pradesh Ltd. (NREDCAP)

b) Scope of the Project: Project Developers shall be required to set up a Waste to Energy (WtE) Plant on a PPP mode in that Cluster and shall be selected through a tariff based competitive bidding process. A single bidder shall be selected for setting up the WtE project for each Cluster. Bidders are free to bid for more than one Cluster and separate bids are required to be submitted for each Cluster.

c) Selection of Bidders: Selection of Bidders shall be done through a tariff based competitive bidding. The qualification of the Bidders shall be evaluated based on the developer/operator experience, waste handling experience and the PPP experience of the Bidder. The Bidder must have the minimum net worth to qualify. The Technical Proposal submitted only by the Qualified Bidders shall be opened. The strength of the Technical Proposal shall be evaluated based on the technologies proposed, environmental compliance, land requirement and other relevant aspects. Evaluation of the Financial Proposal shall only be made for those Qualified Bidders who have cleared the Technical Proposal as well. The Financial Proposal for each Cluster shall be evaluated separately. To evaluate the Financial Proposal, Bid Evaluation Criteria would be the least Quoted Tariff.

For every cluster, the Bidder with the lowest Bid Evaluation Criteria will be selected as the successful Bidder. If the Bid Evaluation Criteria for multiple Bidders is the same, then the Bidder with the higher Net Worth will be selected.

d) Details about the WtE Project: The WtE Project is proposed to be developed on a Design, Build, Finance, Operate and Transfer (DBFOT) basis for converting waste to energy at the identified site within each of the Cluster(s). The site shall be provided by the State Government/ ULBs to the selected Developer.

- ULBs shall deliver waste to the Developer at the identified project site/location at their own cost through a Concession Agreement for a period of 25 years.
- APDISCOMs shall be responsible for power evacuation from the switchyard of the WtE Plant and procurement of power generated from the project through a PPA for a period of 25 years in accordance with regulations applicable and any amendments/ revision thereto till date.
- No Tipping Fee shall be paid to the Developer.
- Scientific landfilling of the rejects from the WtE Plant along with the development of the scientific landfill shall be carried out by the Developer at its own cost.

e) Responsibilities of all the Stakeholders:

i) <u>Responsibilities of the all the Participating ULBs (including the Lead ULB)</u>:

- Deliver Assured Quantity of MSW to the Project Site at their own cost, conforming to the commitments made to the National Green Tribunal and adhere to operational standards for operation and maintenance of the transportation system

ii) <u>Responsibilities of the Lead ULB</u>:

- Provide land along with necessary clearances and support infrastructure for setting up WtE Project.
- Support the Developer to obtain other clearances (including other facilities like water and power) for the WtE plant from relevant authorities.

- Assist the Developer to submit pre-feasibility report along with supporting applications to the SEIAA to obtain EIA and EC Approval post award of the Project.
- Endeavour that the building plans for the Project Facilities at Site are duly and expeditiously approved by the concerned authorities under the relevant Acts / building by-laws / other relevant by-laws or regulations.
- Appoint an Independent Engineer within 4 (four) months from signing of the Concession Agreement to monitor the progress of commissioning of WtE project.
- However, in the coming years as the quantum of MSW generated increases, provision for addition of more capacity shall be provided. This shall be based on mutually agreed terms between the Developer, the Participating ULBs and the DISCOM.

iii) Responsibilities of the WtE Developer:

- Process MSW into energy in line with all applicable legislations including but not limited to the MSW Rules 2000.
- Ensure that no more than 25% of the MSW received at the Processing Facility is disposed of in the Landfill.
- Ensure development of the Scientific Landfill along with the transportation of the rejects from the Project Site to the dump yard for Scientific Landfilling at its own cost.
- Ensure sharing of incentive with the ULBs equivalent to 20% of the operational tariff for the units generated in excess of 85%.
- Maintain availability of the plant subject to availability of the MSW from the ULBs.

iv) Responsibilities of the APDISCOMs:

- Procure power and pay the WtE Developer as per the payment schedule at the applicable tariff for the year in accordance with regulations applicable and any amendments/ revision thereto till date.
- Undertake construction of necessary power evacuation facilities up to the identified project site at APDISCOM's own cost.

f) Payment Security:

- APDISCOMs shall provide to the Developer, an unconditional, revolving and irrevocable Letter of Credit (LC) equivalent to 1 month payment which shall have a term of 12 months and renewed annually. All costs relating to opening, maintenance of the Letter of Credit shall be borne by APDISCOMs.
- For any payment made by the APDISCOMs beyond the due date of payment, the APDISCOMs shall pay simple interest at prevailing base Prime Lending Rate of State Bank of India. However, the APDISCOMs are entitled to receive a rebate of 2% on the total billed amount if paid before the due date of payment.

g) Compensation & Revenue sharing between Lead ULB and the WtE Developer:

- The Developer shall be compensated by the Lead ULB for the shortfall in the MSW delivered by the all the ULBs in the Cluster and the Lead ULB shall be entitled to receive financial incentives from the Concessionaire if the amount of MSW delivered to the Project site, cumulative from all the Participating ULBs in the Cluster enables the WtE Plant to generate power in excess of 85% PLF.
- The Concessionaire shall compute incentive with the Lead ULB equivalent to 20% of the Payable Tariff applied on every unit generated in excess of 85% PLF.
- The settlement of compensation and revenue sharing would be done at the end of each Financial Year. It is the responsibility of the Lead ULB to recover the compensation from all the Participating ULBs and distribute the incentive to all the Participating ULBs in proportion to the shortfall in the MSW quantity delivered by each of the Participating ULBs.

h) Escalation of Tariff: Say T_1be the Payable Tariff in INR/kWh for the first Financial Year. Escalation of Payable Tariff shall be calculated as follows:

- 60% of the Payable Tariff for the first Financial Year shall be reduced at a rate of 2% every Financial Year for the term of the PPA
- 40% of the Payable Tariff for the first Financial Year shall be escalated annually as follows" :

Financial Year	Payable indexed fixed tariff (T_{Fi}) in INR/kWh	Payable indexed variable tariff (T_{Vi}) in INR/kWh	Payable Tariff ($T_{Fi} + T_{Vi}$) in INR/kWh
1	$T_{F1} = T_1 * 0.6$	$T_{V1} = T_1 * 0.4$	$T_1 = T_{F1} + T_{V1}$
2	$T_{F2} = T_{F1} * (1-(2\% * D/365))$	$T_{V2} = [T_{V1} *[1+ ((WPI_1 - WPI_0) /WPI_0) * D/365)]$	$T_2 = T_{F2} + T_{V2}$
i = 3 to 25	$T_{Fi} = T_{Fi-1} * (1-2\%)$	$T_{Vi}=[T_{Vi-1}*[1+((WPI_{i-1}-WPI_{i-2})/WPI_{i-2})]$	$T_i = T_{Fi}+ T_{Vi}$

(Where, T_i is the Payable Tariff for the 1st Financial Year. D is the number of days in the period beginning on the Commercial Operation Date and ending at 12.00 midnight on the following March 3. **WPI_i shall mean the Wholesale Price Index (WPI) for all commodities for the Financial Year 1**, where 0<=i<=25 and revision shall be done annually on the start of each Financial Year to reflect the variation in WPI.)

7.4 Given below are diagrams showing Operating Model Framework and Illustration of the Payment Terms , as furnished by the Ministry:

Operating Model Framework

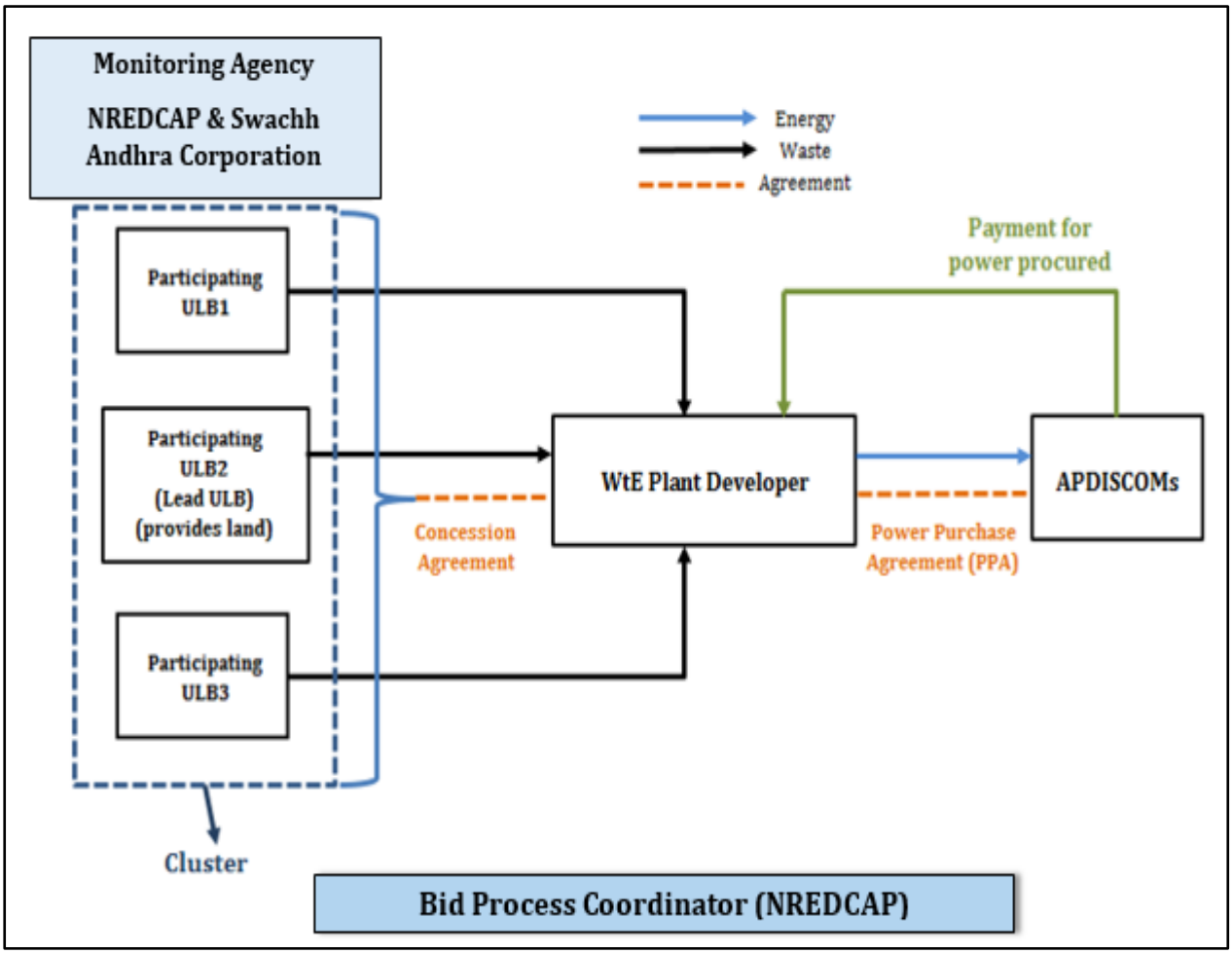
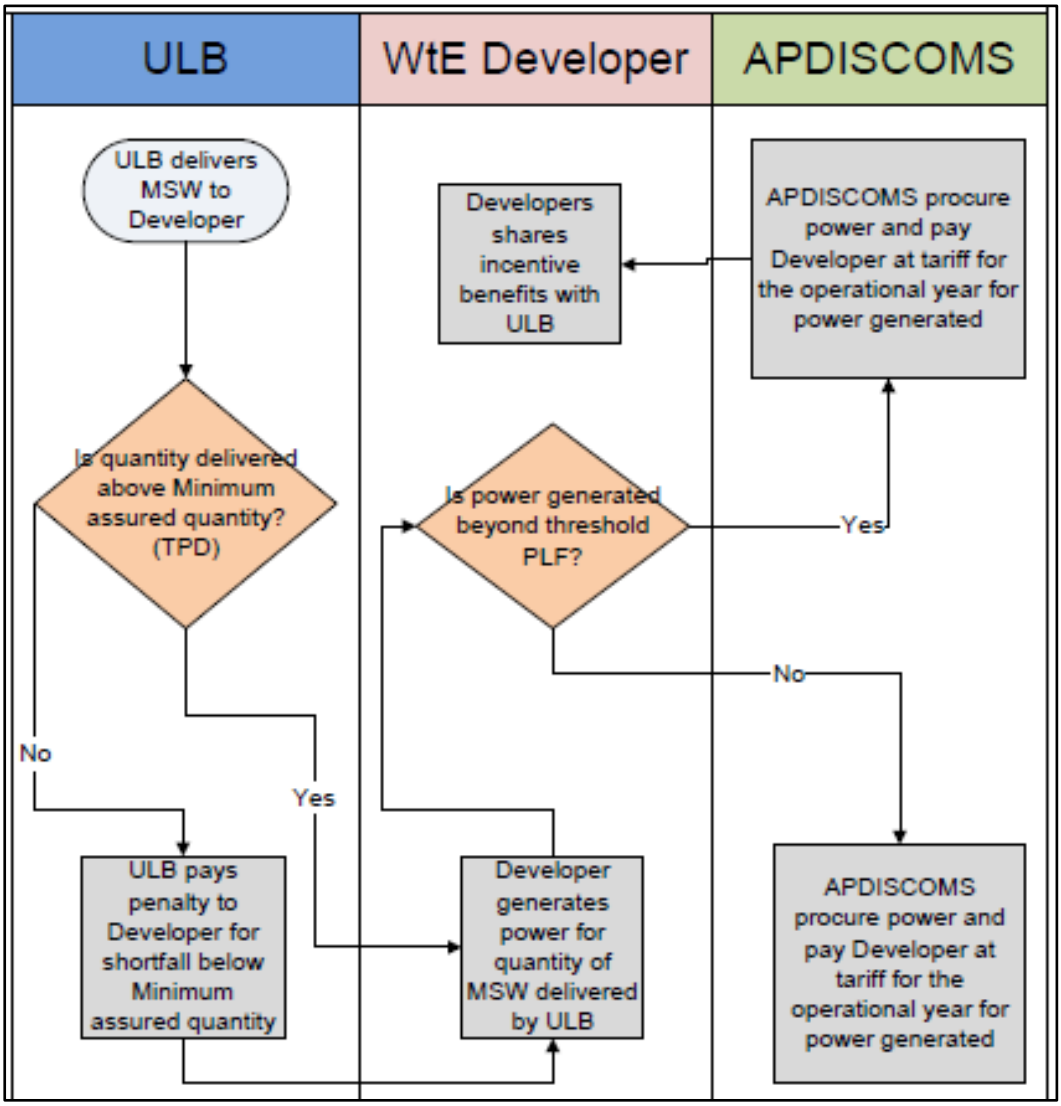


Illustration of the Payment Terms



7.5 The Committee have observed that in the State of Andhra Pradesh, Project Developers are required to set up a Waste to Energy Plant on a PPP mode on a Design, Build, Finance, Operate and Transfer (DBFOT) basis and are selected through a tariff based competitive bidding process. Also, ULBs are responsible to deliver waste to the Developer at the identified project site/location at their own cost without paying any Tipping Fee to the Developer and APDISCOMs are responsible for procurement of power generated from the project. There is also a provision of scientific landfilling of the rejects from the WtE Plant and development of the scientific landfill by the Developer at its own cost, etc.

7.6 The Committee appreciate the efforts of the State Government of Andhra Pradesh in this regard. In view of the Committee, the Andhra Model may serve as an example to other States to come forward and adopt innovative methods for scientific disposal and treatment of Municipal Solid Waste. So, there is a need to showcase the few success stories that the country have in the field of Waste to Energy so as to spread awareness and encourage States to come up with innovative methods suitable to their local conditions.

VIII. GLOBAL STATUS OF WASTE TO ENERGY

8.1 When the Committee desired to know about the international experience in the field of Waste to Energy, the Ministry furnished the following information:

"As reported in the Task Force Report on WtE, there are 2,200 WtE plants in the world. They have a disposal capacity of about 255 million tons of waste per year. By 2017, another 180 plants with a capacity of 52 million tons will be added. Modern WTE technologies have been commercially deployed, especially in Europe, Japan, Australia, China and the USA. In US there are 86 WTE Plants - about 12 % of waste is combusted for energy recovery – mostly 'mass burn'. Number of plants built from 2008-11 the world over is shown in the following figure. No new plants have been built in the US since 1995."

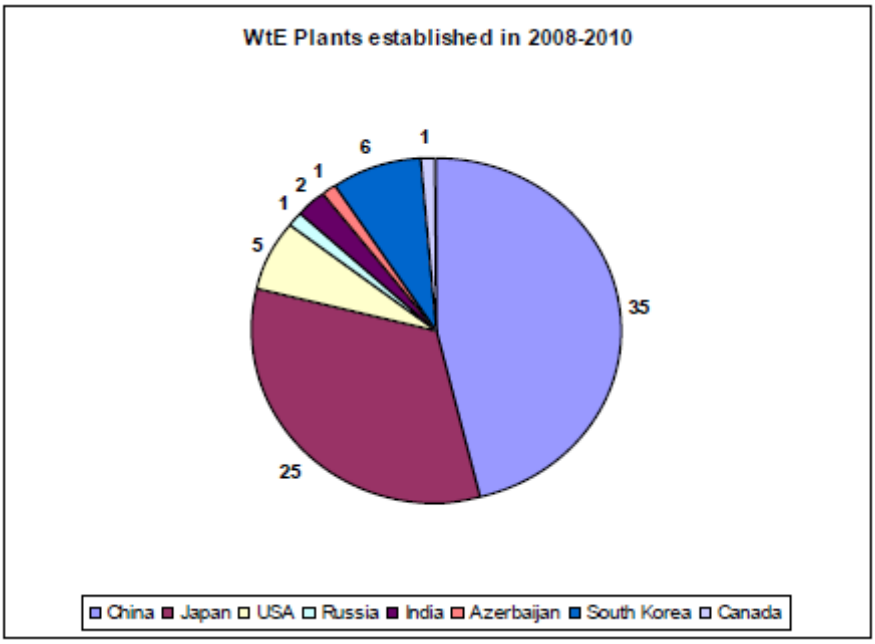


Figure: WTE Plants established during 2008-2011

Source: Report of the Task Force on Waste to Energy (Volume I), Planning Commission, 2014

8.2 On being asked by the Committee about some of the international experiences that can be suitably adapted in the Indian context, the Ministry furnished the following information:

"**European Union:** The total number of waste-to-energy plants in the 18 European countries is 455 compared to 86 in the United States. The data has been compiled by ISWA in 2013 and collected in 2011 and 2012. In some countries very large waste-to-energy plants are common. The European Union's strategy is to become a

'recycling' society, seeking to avoid waste as far as possible and to reuse waste generated as a resource. The EU has set a cap on the amount of recyclable and compostable waste that can be sent for energy recovery via incineration. It also seeks an end to waste to landfill. In the EU, the WTE Plant is considered a 'recovery' option only when it gainfully uses both electricity & heat generated.

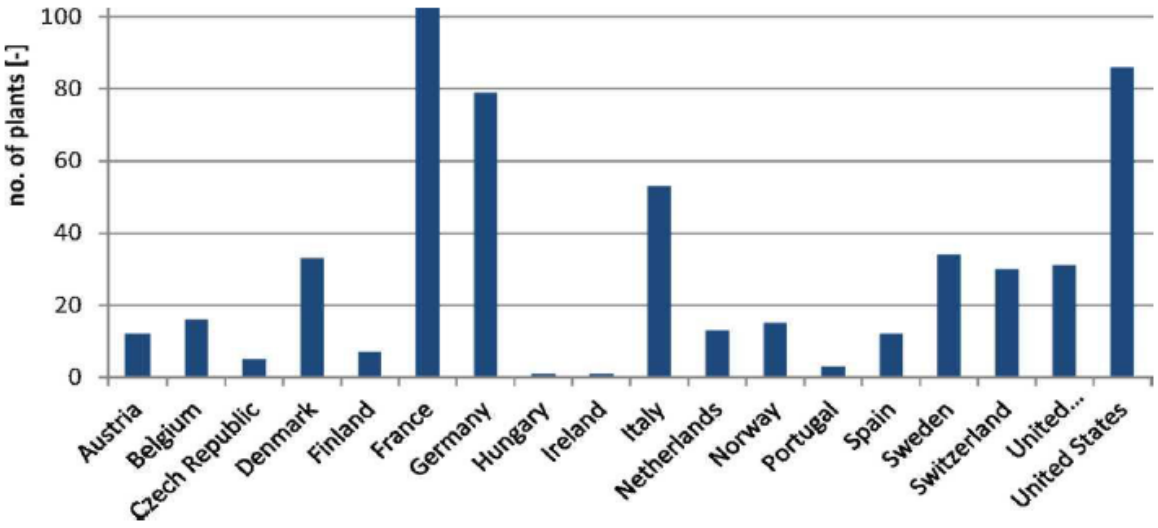


Figure: WTE plants in US and European Union

Source: Report of the Task Force on Waste to Energy (Volume I), Planning Commission, 2014

Japan : In Japan, Incineration has been the primary disposal route for waste due to lack of space for landfills - 74% of all waste produced in Japan is incinerated with just 2% sent to landfill. The households are required to sort waste into at least eight fractions – to increase recycling. The modern WTE plants are incentivized to recover energy (as well as recycling ash). It has 304 W2E plants (1,673 MW) using the MSW gasification technology. About 84% MSW is processed in grate combustion plants.

Australia: In Australia, the biomass based components of MSW are considered to be 'eligible' renewable energy. As per Renewable Energy Target (RET), 20% of Australia's electricity supply will be sourced from renewable sources by 2020.

China: China is the world's largest MSW generating country with MSW growing at 9% annually in China, the cities are under great pressure to deliver effective waste management solutions. Incineration, as a mainstream MSW treatment method, has received prime attention due to its advantage of energy recovery and volume reduction. China already has more than 200 WTE plants established with about 189,000 MT/day capacity, covering about 25% of MSW generated in the country. A central target calls for 50% of MSW to be treated by WTE incineration by the year 2020. Currently, the average calorific value of MSW in China equals 5000 kJ/kg. The

reasons for the low calorific value are the high moisture and high proportion of kitchen waste and in China almost all MSW incineration plants are designed to produce only electricity as a by-product.

China uses two types of MSW incineration technologies - Stoker and Fluidized Bed. The Circulating Fluidized Bed (CFB) technology is based on the co-firing of MSW with Coal (Maximum 20%) in CFB incinerator. The small and mid-sized cities appear to prefer CFB incinerators to combust their non-sorted MSW with high moisture content and low calorific values – CFBs account for half of China's MSW treatment capacity.

However, China has immense environmental challenges. The standards are quite lax compared to the EU standards. The challenge for future is monitoring of BOT incineration plants, ensure compliance, reduce air emissions, especially dioxins and heavy metals. In fact, only a few WTE plants dispose incinerator ash scientifically – they dump or sell the ash privately.

The Chinese Government is encouraging support from the private sector for establishing and operating WTE plants on BOT basis. The following incentives are extended:

a) Tipping Fees

b) Beneficial electricity generated prices: WTE plants receives a feed-in tariff, which means higher price for renewable energy. Recently, Beijing announced a fixed subsidized price for power purchased from WTE plants, which is about double that from coal-powered plants.

c) Tax Incentives: WTE plants are exempted from corporate income tax for the first 5 years of operation and are eligible for the immediate refund of value-added tax.

<u>Some of China's Municipal WtE Projects</u>:

- Yixing WTE Phase I, 25-year BOT
  - June 2007
  - 500 tonnes/day serving 1 million population
  - 65,985 m2 of land leased
  - $39 million investment
  - Equipment is domestically-made
  - Expanded to 800 tons/day in 2012
- Suzhou WTE Phase I, II, III, BOT
  - July 2006/June 2009/January 2013
  - 3,550 tonnes/day serving 13 million population

        - The largest municipal WTE in China
    - Jiangyin WTE Phase I and II, BOT
        - May 2008/ March 2011
        - 1,200 tonnes/day serving 2 million population
        - >4.5 Mj/Kg ave., <50% water content and <20% ash
        - A synergetic refuse and WWTP sludge incineration plant
    - Changzhou WTE, BOT
        - November 2008
        - 800 tonnes/day, serving 1.6 million population
        - It is located within the city
    - Zhenjiang WTE Phase I and II
        - BOT
        - August 2011/May 2015
        - 1,400 tonnes/day serving 3 million population
        - Deploys self-developed grate furnace and automatic control systems
        - Developed under the UN Clean Development Mechanism (CDM)
    - Jinan Waste-to-energy Project
        - BOT
        - October 2011
        - 2,000 tonnes/day serving 6 million population

Hong Kong: Environmental Protection Department (EPD) manages MSW management facilities for Collection, Transportation, Treating and Disposal. Hong Kong Government is under process of procuring a Design, Build, Operate (DBO) contract for 3000 TPD (covers 50% MSW generated) integrated Waste Management Facility in Shek Kwu Chau, with WTE using Moving Grate incineration Technology along with a mechanical sorting & recycling plant (200 TPD). The estimated capital cost for Phase 1 is USD 2.35 Billion.

Best Plant in the World - AEB's Amsterdam WTE plant has the best credentials in the world. Every day, 600 trucks and a number of freight trains deliver 4,400 tonnes of waste to the plant. Only the waste that is not suitable for 'reuse' or 'recycling' is incinerated. It produces electricity with a net energy efficiency of 30.6% - the highest in the world. The excess heat generated during combustion is used to provide district heating and hot water. The Incinerator ash is recycled to convert into useful products. Out of every 1,000 kg of waste, only 0.5 kg of residual waste remains for which there is no use. This is land filled.

Overall International Perspective

The situation prevailing in various countries indicate that concerted efforts are being made to minimize waste generation and maximize recycling of waste. Incineration or mass burning is in vogue in counties where availability of land is scarce. However in US , as per USEPA data of 2013, only 86 W to E plants in 24 States with a capacity of 97000 TPD generating 2790 MWH are currently operational. Of the MSW generated, only 7% is incinerated, 24 % is recycled and the remaining 69 % is landfilled. From 1995 to 2005, strict emission norms, especially for dioxins and furans, prevented more plants to be set up. Thrust is on recycling, reuse and recovery."

8.3 When asked by the Committee as to what may be adopted from international practices so as to improve the operation and viability of W to E Plants in India, the Ministry furnished the following information:

"Lessons for India

a) Cities with population above 2 million and cities generating more than 300 TPD or more of combustible fraction of MSW are suitable for setting up W to E power projects.

b) Concept of 5Rs should be actively promoted like in the European Union.

c) Tipping Fees should be introduced.

d) Beneficial electricity generated prices.

e) W to E plants be given a feed-in tariff, which means higher price for renewable energy.

f) Tax Incentives: W to E plants be exempted from corporate income tax for the first 5 years of operation and eligible for immediate refund of value-added tax.

g) A target of setting up 215 W to E plants by 2031 be formalized and generate 1075 MW of power.

h) A target be set for effective utilization and recycling of C&D waste."

8.4 In the view of the Committee, the learnings from other countries which have been running Waste to Energy Plants successfully, should be suitably adapted in the Indian context to make Waste to Energy Projects in the country viable, efficient and safe for the environment.

Part – II

Observations/ Recommendations of the Committee

Municipal Solid Waste: Generation, Composition and Potential

1. The Committee note that out of the total quantity of Municipal Solid Waste (MSW) generated in the country, i.e., 1.43 lakh metric tons per day, only 0.33 lakh metric tons is being treated and disposed. As per the data furnished by the Ministry, some of the States like Bihar, Chhattisgarh, Jharkhand, Orissa, Punjab, Uttarakhand, etc., have performed very poorly in terms of treatment of waste. The quantum of waste that these States treats is abysmally low. There is an urgent need to step up efforts so as to achieve 100% scientific processing and disposal of Municipal Solid Waste by 2019, as envisaged by the Government, under the Swachh Bharat Mission. The Committee also note that the figures regarding waste generation, collection and treatment, given by the Ministry pertain to urban areas only, whereas the Committee find that a large amount of waste is generated in rural areas which has not been taken into account anywhere. There should be some facility to collect and treat solid waste at Panchayat level also, as all the waste in rural areas is not suitable to be converted into organic manure. **Therefore, the Committee recommend that:**

(i) **All the Urban Local Bodies should be encouraged to prepare an Action Plan, in a time bound manner, for establishing Waste treatment facilities, employing technology according to their local needs in their respective areas so as to achieve 100% collection and treatment of MSW all over the country.**

(ii) **Waste generated in the villages should be taken into account and a proper mechanism for the collection and treatment of the same should be initiated at the Panchayat level also.**

2. The Committee note that the waste that is generated in the country is mixed waste, comprising a large amount of inert material and a very high moisture level unlike in other countries. The high level of moisture and inerts in the waste make it difficult to derive power from it. The Committee find that there is no proper system of collection from the source of waste generation and municipal sanitation workers collect waste primarily through street sweeping, etc. Also, there is no practice of sorting of waste at source in a scientific way. In the view of the Committee, an efficient mechanism for segregation of waste at the source itself should be put in place. T**he Committee, therefore, recommend that:**

(i) Citizens should be encouraged to keep segregated bins for wet, dry and hazardous waste and to stop littering on the streets.

(ii) Segregation of waste should be made mandatory in all Government Offices, households, Commercial Establishments, etc. and if need be a penalty may be imposed for non-compliance.

(iii) Proper training should be provided to municipal workers on segregation of waste for efficient utilization of resources.

(iv) Awareness and sensitization programmes should be conducted on the best practices in the field of waste handling to bring in behavioural changes among the public.

Technology options for power generation from Municipal Solid Waste

3. The Committee observe that for Biomethanation, wet biodegradable waste is required; for Combustion of RDF, dry high organic waste is required; for Gasification, organic or fossil based carbonaceous material is required; and for Pyrolysis, organic waste is required. Mass Burning of MSW is the only method which does not require any segregation of waste and uses mixed waste. However, this method of Mass Burning is

detrimental to the environment, and as much should not be resorted to on a mass scale. Most of these technologies require proper segregation of waste; however, there is lack of an efficient mechanism to segregate waste into biodegradable/dry/wet/ carbonaceous materials, etc. components. Also, these technologies have not yielded the desired results for reasons. **The Committee, therefore recommend that:**

(i) The Government should provide proper policy and technological support for the W to E Sector as the existing technologies do not appear to be compatible to local requirements.

(ii) Efficient, financially affordable and environmentally suitable technological methods should be adopted to recover energy from the waste without compromising on the viability of Waste to Energy Plants, and ensuring better public health.

(iii) Mass burning of municipal waste should be discouraged and prohibited as it is detrimental to environment and also a major source of health hazards.

Status of Waste to Energy Projects in the country

4. The Committee note that except the Okhla and Ghazipur Plants, all the remaining Waste to Energy Plants, including the Pune Plant, have completely failed to take off. The Committee visited the Okhla and Pune Waste to Energy Plants for gaining a first-hand knowledge of the working of such plants and found that while the working of the Okhla Plant (Delhi) was satisfactory, the Pune Plant was a complete failure. The Committee note that most of the Waste to Energy Plants have been set up in the country under private sector driven PPP mode and many of these plants have failed to function properly. The Committee feel that the Public Sector must come forward and set up at least two

demonstration Waste to Energy Plants which would give a message that the Government is committed to the cause of scientific management of Municipal Solid Waste in general, and adoption of the methods of Waste to Energy in particular, and it believes that such a project is viable and can be run efficiently.

Therefore, the Committee recommend that:

(i) The model of Okhla Plant (Delhi) may be replicated in other cities for safe disposal of MSW generation of Power.

(ii) The Government/PSUs should set up at least two demonstration Waste to Energy Plants with latest technology to give a message that the Government is committed to the cause of scientific management of Municipal Solid Waste.

5. The Committee note that the process of generating power from waste is carried out at a high temperature of more than 800^{o} C, thereby preventing formation of dioxins, and WtE plants are said to be seen as a pollution management practice to mitigate crude dumping or landfilling of waste. However, the Committee observe that the locals generally complain of pungent odour coming out of Waste to Energy Plants. That being so, it should be taken care of by the agency concerned and it should be ensured that all the Waste to Energy Plants adhere to environmental norms and defaulters should be penalized.

Therefore, the Committee recommend that:

(i) Appropriate technology must be used in all the Waste processing facilities to mitigate the problem of pungent odour.

(ii) A regulating mechanism must be evolved to ensure that all the Waste to Energy Plants in the country adhere to the environmental norms and defaulters be penalized.

Role of Municipal Authorities in Solid Waste anagement

6. The Committee note that the problems plaguing the waste to energy sector vary from irregular and inadequate quantity of supply to non-payment of agreed fee and non-marketability of waste processed projects, including power. The remedial measures, as informed by the Government, do not seem to be efficacious enough to redress the problem. Several, steps have been initiated under Swatch Bharat Mission for MSW management by way of grant to project cost, Viability Gap Funding (VGF) to States in Urban Local Bodies (ULB) etc., in incentivisation of cities for regular supply of garbage, etc. However, these steps have not succeeded to the desired extent in motivating the sector to come up in a desired manner. **The Committee, therefore, recommend that-**

(i) The entire process of waste to energy needs a revisit with a view to making it efficient, effective and delivery prone.

(ii) The grant/funding to States and Urban Local Bodies (ULB) be made more attractive.

(iii) Other motivational measures should be taken in a time bound and targeted manner to encourage direct involvement and participation of the people.

7. The Committee note that the participation of the private sector in the waste to energy programme has not come up to the expectation. The Committee has been apprised that so far the private sector has participated only in a limited manner, with few agencies active in the sector. They are there in the PPP mode, wherein the performance of the project becomes a joint/united effort. The PPP arrangements are not single responsibility contract, but based on the participation between local Government and the private sector. Consequently, the interests of the private sector may not be as encouraging due to several factors. To encourage participation of the private sector in a wholehearted manner,

various incentives can be offered and all the anticipated obstacles must be removed. **The Committee, therefore, recommend that that-**

(i) Adequate ways and means should be allotted to ensure the wholehearted participation of private sector in MSW management.

(ii) Tax exemptions/rebates/holidays for equipment and machinery etc. should be considered to encourage private participation the sector.

8. The Committee note that the five Pilot Projects were launched by (MNRE) Ministry of New and Renewable Energy with an aggregate capacity of 57 MW. However, out of these five Pilot Projects, only the one at Okhla of 16 MW is in a functional state. The Committee are dismayed to note that two projects could not be completed due to paucity of funds and the plant at Pune is not functional due to technical reasons. The Committee also note that Public Interest Litigation has been filed against the Okhla Waste Management Plant. These are serious issues and, if not resolved, lead to demotivation in the sector and may jeopardize the future activities with regard to waste to energy. The non-commissioning of plants on the ground of paucity of funds is not at all acceptable to the Committee. If issues of such public importance are dealt with in such manner, then the future of the waste to energy sector and its success can only be a point of debate and discussion. The technical glitch at the Pune Plant is not insurmountable but the way it has been dealt with speaks volumes of the lack of adequate effort from the Government side. **The Committee, therefore, recommend that-**

(i) There should be no paucity of funds with regard to Pilot Projects undertaken by the Ministry of New and Renewable Energy.

(ii) Technical reasons for non-operation of a Plant is a commonplace excuse and it cannot be allowed to hamper the operations of the project. This should be resolved in a time bound manner.

(iii) The issues of Public Interest Litigation should be addressed holistically as these may hurt the other projects as well. Hence, effective pre-emptive measures should be taken in this regard before the appropriate bodies to dispel any misgivings regarding the functioning of the plant and its adverse environmental impact in and around it.

9. The Committee note that MSW Management is a State Subject and as per the 74th Amendment to the Constitution, solid waste management as a function needs to be transferred by the State Government to Urban Local Bodies. However, the transfer of this function is yet to take place. In addition to ULBs, solid waste management has also been discharged by State agencies. Thus, the responsibility for planning, designing, implementation, operation and maintenance of the municipal solid waste rest with the State Government agencies and ULB concerned. The Committee find that management of municipal solid waste is not efficient and scientific by the agencies concerned and it is done by street sweeping, incurring most of the expenditure amounting to 70% of the earnings of the local bodies. This also hampers the process of waste collection at source to its final disposal at the energy plants. **The Committee, therefore, recommend that:-**

(i) The process of garbage collection should be upgraded by the ULBs and State agencies concerned and be made more scientific and efficient.

(ii). A proper estimation should be made by the ULBs concerned regarding the approximate quantity of municipal waste generated everyday so as to ensure its supply to the waste energy plant in a definite manner.

10. The Committee note that there are multiple entities involved in collection, transportation, processing and disposal of MSW like Ragpickers, *Kabadiwalas*, Sanitation workers of Municipal Authorities, private contractors who have their own sweeping staff, waste collectors and vehicles to transport the waste from collection points to disposal sites, plant operators, etc. The Committee are of the view that the Urban Local Bodies should

adopt a coordinated mechanism for collection, transportation and disposal of MSW. It should be the responsibility of the ULBs to supply the required quality and quantity of MSW to Waste to Energy Plants, failing which a penalty may be imposed on them. Ragpickers and *Kabadiwalas* may be brought into the formal system by the State Governments and ULBs in so that the collection efficiency can be maximised. **Therefore, the Committee recommend that:**

(i) ULBs should supply required quality and quantity of MSW at the doorstep of the 'Waste to Energy' Plant failing which a penalty may be imposed on them.

(ii) Ragpickers and *Kabadiwalas* should be integrated with the formal system by the State Governments and ULBs in order to maximise the collection efficiency.

(iii) ULBs should make efforts to involve civil society/NGOs/Resident Welfare Associations in management of waste and spreading awareness among the masses.

Govt. of India's Initiatives for promotion of power generation from Municipal Solid Waste

11. The Committee observe that at the Central level, various Ministries, i.e. the Ministry of Urban Development, Ministry of Environment, Forest and Climate Change and Ministry of New and Renewable Energy, etc. are involved in handling Municipal Solid Waste, viz. its collection, transportation, treatment and safe disposal. There is a need for coordinated efforts to be made to solve the problem of garbage and to make Waste to Energy projects successful and viable. A Monitoring Committee, consisting of representatives from all the Central Ministries concerned, along with the representatives of the State Governments and Urban Local Bodies, should be set up to coordinate the efforts at each level and suggest suitable methods and technologies to be adopted, to make the Waste to Energy Plants viable. **Therefore, the Committee recommend that:**

(i) Coordinated efforts need to be made to solve the problem of garbage and to make the Waste to Energy Projects successful and viable.

(ii) A Monitoring Committee, consisting of representatives from all the Central Ministries like the Ministry of New and Renewable Energy, Ministry Of Urban Development, Ministry of Environment, Forest and Climate Change, etc., along with the representatives of the State Governments and Urban Local Bodies, should be put in place to coordinate the efforts at each level and suggest suitable methods and technologies to be adopted, on a case to case basis, to make the Waste to Energy Plants a success.

(iii) Monitoring Committee may also have technical experts, financial analysts, representatives from private sector, etc.

12. The Committee note that the Central Electricity Regulatory Commission (CERC) has notified Generic tariff for Waste-to-Energy of Rs 7.90 per unit of power for Refuse Derived Fuel (RDF). The Committee are of the view that fixing of tariff by the CERC be treated as indicative/supportive. The right solution will be that the tariff should be decided through competitive bidding. Open competitive bids should be invited has been done by Andhra Pradesh and Punjab. **Therefore, the Committee recommend that:**

(i) The practice of tariff determination by the CERC must be reviewed. If need be, the Electricity Act may be amended for the same.

(ii) Tariff of electricity generated from all the Waste to Energy Plants should be decided through the process of competitive bidding.

(iii) The initiative of the Government of Rajasthan regarding Waste to Energy Plant to arrive at tariff for Waste to Energy is a welcome step. The pricing of Waste to Energy Power is unique as the difference between the tariff set by CERC and tariff arrived at through competitive bidding should be given to State DISCOMS as royalty.

13. The Committee note that it has been made mandatory for State DISCOMS to purchase power from the Waste-to-Energy plants at the tariff of Rs 7.90 and this increased cost of electricity would ultimately be borne by the common consumers. The Committee is of the view that waste disposal is the responsibility of the State Governments and the ULBs; as such, the cost should be borne by them and not by the common consumer. The Committee also note that common people are made to pay twice for the disposal of the same garbage; they pay to the local bodies for collection of garbage from their home and again a high rate of electricity has been imposed on them to compensate the producer of electricity from waste. This practice of ensuring 15% to 20% profit to the producer of electricity from waste and taxing common people twice for the same should be avoided. Therefore, to make the Waste to Energy Plants viable, **the Committee recommend that:**

(i) The big polluters such as restaurants, hotels, marriage halls and other commercial establishments should be asked to develop scientific methods of segregation of waste and its disposal, failing which, they should be made to pay more through tax/cess/fine.

(ii) Some alternate mechanism should be adopted so that common people are not compelled to pay twice for the collection and disposal of garbage.

14. The Committee note that although the respective Ministries have been implementing a number of Rules, Policies, Promotion Programmes, etc. for support and promotion of Waste to Energy in India, like Manual on Municipal Solid Waste Management; MSW Management and Handling Rules, 2015; Tariff Policy; Ministry of Road, Transport and Highways Notification; Indian Standard on Bio-Gas; custom duty and excise duty exemption, etc., but the desired results have not been achieved so far. **Therefore, the Committee recommend that:**

(i) All the Rules, Policies, Programmes relating to the Waste to Energy Sector should be monitored regularly in an integrated manner for their proper and efficient implementation so as to support and promote 'Waste to Energy' in India.

(ii) Scientific treatment and disposal of municipal solid waste should be made compulsory under the Swachh Bharat Mission.

(iii) 100% collection and treatment of solid waste should be made a binding criterion for short listing of cities under the Smart City Project and every city should be encouraged to come out with their own proposal for the same in a time bound manner.

Cluster model of the State Government of Andhra Pradesh

15. The Committee have observed that in the State of Andhra Pradesh, Project Developers are required to set up a Waste to Energy Plant on a PPP mode on a Design, Build, Finance, Operate and Transfer (DBFOT) basis and are selected through a tariff based competitive bidding process. The ULBs are responsible to deliver waste to the Developer at the identified project site/location at their own cost without paying any Tipping Fee to the Developer and the APDISCOMs are responsible for procurement of power generated from the project. There is also a provision of scientific landfilling of the rejects from the WtE Plant and development of the scientific landfill by the Developer at its own cost. The Committee appreciate the efforts of the State Government of Andhra Pradesh and are of the view that the Andhra Model may serve as an example to other States to come forward and adopt innovative methods for scientific disposal and treatment of Municipal Solid Waste. That being the case, there is a need to showcase the few success stories that the country have achieved in the field of Waste to Energy so as to spread awareness and encourage also

States to come up with innovative methods, appropriate to their native conditions. **Therefore, the Committee recommend that:**

(i) The Committee laud the efforts of the Govt. of Andhra Pradesh for their initiative in the MSW management and taking a lead in the country in Waste to Energy Sector.

(ii) States should be encouraged to come forward and adopt innovative methods for scientific disposal and treatment of Municipal Solid Waste.

(iii) The success stories in the field of Waste to Energy should be showcased so as to spread awareness and encourage more States to come up with innovative methods which suit their local condition the best.

Global status of Waste to Energy

16. The Committee note that there are about 2200 Waste to Energy Plants in the world with a disposal capacity of about 255 million tonnes of waste per year. Modern Technologies have been deployed, especially in Europe, Japan, Australia, China and USA. The Committee understand that the European Union's strategy is to become a recycling society, seeking to avoid waste as far as possible and to reuse waste generated as a resource. The Committee also note that the situation prevailing in various countries indicates that concerted efforts are being made to minimize waste generation and maximize recycling of waste. Incineration or mass burning is in vogue in counties where availability of land is scarce. However in USA, as per USEPA data of 2013 only 86 W to E plants are currently operational in 24 States with a capacity of 97000 TPD generating 2790 MWH. Of the MSW generated only 7% is incinerated, 24 % is recycled and the remaining 69 % is landfilled. From 1995 to 2005, strict emission norms, especially for dioxins and furans prevented more plants to be set up, full thrust on recycling, reuse and recovery. **In view of the above, the Committee recommend that best practice from other countries which have been running Waste to Energy Plants successfully should be suitably studied**

and where possible adapted to the Indian conditions to make Waste to Energy Projects in the country viable, efficient and safe for the environment.

***

NEW DELHI
03 AUGUST,2016
SRAVANA 12,1938

DR. KIRIT SOMAIYA
Chairperson
Standing Committee On Energy

ANNEXURE I

Municipal Solid Waste Generation in Metro Cities / State Capitals*

S. No.	City	MSW (tpd)
1.	Agartala	102
2.	Agra	520
3.	Ahmedabad	2,300
4.	Aizwal	107
5.	Allahabad	350
6.	Amritsar	550
7.	Asansol	210
8.	Bangalore	3,700
9.	Bhopal	350
10.	Bhubaneswar	400
11.	Chandigarh	264
12.	Chennai	4,500
13.	Coimbatore	700
14.	Daman	25
15.	Dehradun	220
16.	Delhi	6,800
17.	Dhanbad	150
18.	Faridabad	700
19.	Gandhinagar	97
20.	Gangtok	26
21.	Guwahati	204
22.	Hyderabad	4,200
23.	Imphal	120
24.	Indore	720
25.	Itanagar	102
26.	Jabalpur	400
27.	Jaipur	310
28.	Jammu	300
29.	Jamshedpur	28
30.	Kanpur	1,600
31.	Kavaratti	2
32.	Kochi	150
33.	Kohima	45
34.	Kolkata	3,670
35.	Lucknow	1,200
36.	Ludhiana	850
37.	Madurai	450
38.	Meerut	52
39.	Mumbai	6,500
40.	Nagpur	650
41.	Nashik	350
42.	Panjim	25
43.	Patna	220
44.	Pondicherry	250
45.	Port Blair	45
46.	Pune	1,300
47.	Raipur	224
48.	Rajkot	230
49.	Ranchi	140
50.	Shillong	97
51.	Shimla	50
52.	Silvassa	35
53.	Srinagar	550
54.	Surat	1,200
55.	Thiruvananthapuram	250
56.	Vadodara	600
57.	Varanasi	450
58.	Vijayawada	600
59.	Vishakhapatnam	334
	Total MSW	50,592

* Municipal Solid Waste Study conducted by CPCB through:

a) EPTRI (1999-2000)
b) NEERI-Nagpur (2004-2005)
c) CIPET during 2010-11

Cities Generating MSW In Between 100-500 TPD (Indicative)

S.No	City	MSW (tpd)
1.	Vishakhapatanam	334
2.	Patna	220
3.	Vadodara	600
4.	Hubli-Dharwar	300
5.	Kochi	150
6.	Thiruvanathpuram	360
7.	Indore	720
8.	Bhubaneshwar	400
9.	Ludhiana	850
10.	Coimbatore	700
11.	Madurai	450
12.	Allahabad	350
13.	Varanasi	450
14.	Guntur	180
15.	Elluru	100
16.	Kakinada	100
17.	Kurnool	110
18.	Nellore	130
19.	Nizamabad	110
20.	Rajamundhry	160
21.	Vijayawada	600
22.	Warangal	250
23.	Guwahati	204
24.	Dhanbad	150
25.	Jamshedpur	28
26.	Ranchi	140
27.	Bhavnagar	150
28.	Jamnagar	170
29.	Rajkot	230
30.	Faridabad	700
31.	Belgaum	110
32.	Mysore	180
33.	Kannur	180
34.	Kozhikode	130
35.	Durg	170
36.	Gwalior	210

S.No	City	MSW (tpd)
37.	Jabalpur	400
38.	Raipur	224
39.	Ujjain	150
40.	Ahmadnagar	100
41.	Akola	100
42.	Amravati	100
43.	Aurangabad	220
44.	Jalgaon	230
45.	Kolhapur	130
46.	Latur	130
47.	Malegaon	110
48.	Nasik	350
49.	Solapur	180
50.	Cuttack	120
51.	Rourkela	130
52.	Amritsar	550
53.	Jalandhar	180
54.	Ajmer	210
55.	Bikaner	110
56.	Jodhpur	260
57.	Kota	200
58.	Trichy	240
59.	Tirunelveli	135
60.	Aligarh	150
61.	Bareily	200
62.	Ghaziabad	130
63.	Gorakhpur	170
64.	Meerut	52
65.	Moradabad	130
66.	Saharanpur	120
67.	Durgapur	140
68.	Chandigarh	264
69.	Salem	100
70.	Dehradun	25

Cities Generating MSW In Between 50-100 TPD (Indicative)

S.No	City	MSW (tpd)
1.	Anantpur	55
2.	Khammam	85
3.	Tirupati	85
4.	Arrah	50
5.	Bhagalpur	70
6.	Bihar Sharif	60
7.	Bokaro(Steel)	80
8.	Gaya	75
9.	Muzaffarpur	50
10.	Panipat	60
11.	Rohtak	65
12.	Bellary	80
13.	Davengere	70
14.	Gulbarga	80
15.	Mangalore	70
16.	Thirussur	65
17.	Murwara(Katni)	60
18.	Ratlam	60
19.	Sagar	50
20.	Chandrapur	50
21.	Dhule	65
22.	Ichalkaranji	85
23.	Nanded	80
24.	Prabhani	50
25.	Sangli	85
26.	Bhivandi	90
27.	Berhampur	50
28.	Patiala	70
29.	Alwar	55
30.	Beawar	55
31.	Bharatpur	50

S.No	City	MSW (tpd)
32.	Bhilwara	55
33.	Ganganagar	55
34.	Pali	60
35.	Sikar	50
36.	Tonk	50
37.	Udaipur	60
38.	Dindugul	60
39.	Nagarcoil	60
40.	Thanjavur	60
41.	Tuticorin	60
42.	Firozabad	60
43.	Jhansi	90
44.	Mathura	70
45.	Muzaffarnagar	70
46.	Rampur	60
47.	Shahjahanpur	65
48.	Asansol	60
49.	Bardhaman	70
50.	Kharagpur	50
51.	Medinipur	90
52.	Ondal	60
53.	Pondicherry	80
54.	Jammu	90
55.	Srinagar	70
56.	Shimla	90
57.	Shillong	90
58.	Aizwal	50
59.	Tirupur	60
60.	Imphal	70

ANNEXURE II

City wise MSW composition in different cities of India

S. NO	Name of City	Population (As per 2001 census)	Area (Sq. km)	Waste Quantity (TPD)	Waste Generation Rate (kg/c/day)	Compostable (%)	Recyclables (%)	C/N Ratio	HCV* (Kcal/Kg)	Moisture (%)
Cities having population less than 1 lakh										
1	Kavaratti	10,119	4	3	0.30	46.01	27.20	18.04	2242	25
2	Gangtok	29,354	15	13	0.44	46.52	16.48	25.61	1234	44
3	Itanagar	35,022	22	12	0.34	52.02	20.57	17.68	3414	50
4	Daman	35,770	7	15	0.42	29.60	22.02	22.34	2588	53
5	Silvassa	50,463	17	16	0.32	71.67	13.97	35.24	1281	42
6	Panjim	59,066	69	32	0.54	61.75	17.44	23.77	2211	47
7	Kohima	77,030	30	13	0.17	57.48	22.67	30.87	2844	65
8	Port Blair	99,984	18	76	0.76	48.25	27.66	35.58	1474	63
Cities having population between 1-5 lakhs										
9	Shillong	1,32,867	10	45	0.34	62.54	17.27	28.86	2736	63
10	Simla	1,42,555	20	39	0.27	43.02	36.64	23.76	2572	60
11	Agartala	1,89,998	63	77	0.40	58.57	13.68	30.02	2427	60

12	Gandhinagar	1,95,985	57	44	0.22	34.30	13.20	36.05	698	24
13	Dhanbad	1,99,258	24	77	0.39	46.93	16.16	18.22	591	50
14	Pondicherry	2,20,865	19	130	0.59	49.96	24.29	36.86	1846	54
15	Imphal	2,21,492	34	43	0.19	60.00	18.51	22.34	3766	40
16	Aizwal	2,28,280	117	57	0.25	54.24	20.97	27.45	3766	43
17	Jammu	3,69,959	102	215	0.58	51.51	21.08	26.79	1782	40
18	Dehradun	4,26,674	67	131	0.31	51.37	19.58	25.90	2445	60
19	Asansol	4,75,439	127	207	0.44	50.33	14.21	14.08	1156	54
Cities having population between 5-10 lakhs										
20	Kochi	5,95,575	98	400	0.67	57.34	19.36	18.22	591	50
21	Raipur	6,05,747	56	184	0.30	51.40	16.31	23.50	1273	29
22	Bhubanesvar	6,48,032	135	234	0.36	49.81	12.69	20.57	742	59
23	Tiruvanantapuram	7,44,983	142	171	0.23	72.96	14.36	35.19	2378	60
24	Chandigarh	8,08,515	114	326	0.40	57.18	10.91	20.52	1408	64
25	Guwahati	8,09,895	218	166	0.20	53.69	23.28	17.71	1519	61
26	Ranchi	8,47,093	224	208	0.25	51.49	9.86	20.23	1060	49
27	Vijaywada	8,51,282	58	374	0.44	59.43	17.40	33.90	1910	46
28	Srinagar	8,98,440	341	428	0.48	61.77	17.76	22.46	1264	61

29	Madurai	9,28,869	52	275	0.30	55.32	17.25	32.69	1813	46
30	Coimbatore	9,30,882	107	530	0.57	50.06	15.52	45.83	2391	54
31	Jabalpur	9,32,484	134	216	0.23	48.07	16.61	28.22	2051	35
32	Amritsar	9,66,862	77	438	0.45	65.02	13.94	30.69	1836	61
33	Rajkot	9,67,476	105	207	0.21	41.50	11.20	52.56	687	17
34	Allahabad	9,75,393	71	509	0.52	35.49	19.22	19.00	1180	18
35	Visakhapattanam	9,82,904	110	584	0.59	45.96	24.20	41.70	1602	53
Cities having population between 10-20 lakhs										
36	Faridabad	10,55,938	216	448	0.42	42.06	23.31	18.58	1319	34
37	Meerut	10,68,772	142	490	0.46	54.54	10.96	19.24	1089	32
38	Nashik	10,77,236	269	200	0.19	39.52	25.11	37.20	2762	62
39	Varanasi	10,91,918	80	425	0.39	45.18	17.23	19.40	804	44
40	Jamshedpur	11,04,713	64	338	0.31	43.36	15.69	19.69	1009	48
41	Agra	12,75,135	140	654	0.51	46.38	15.79	21.56	520	28
42	Vadodara	13,06,227	240	357	0.27	47.43	14.50	40.34	1781	25
43	Patna	13,66,444	107	511	0.37	51.96	12.57	18.62	819	36
44	Ludhiana	13,98,467	159	735	0.53	49.80	19.32	52.17	2559	65
45	Bhopal	14,37,354	286	574	0.40	52.44	22.33	21.58	1421	43
46	Indore	14,74,968	130	557	0.38	48.97	12.57	29.30	1437	31
Cities having population greater than 20 lakhs										
47	Nagpur	20,52,066	218	504	0.25	47.41	15.53	26.37	2632	41
48	Lucknow	21,85,927	310	475	0.22	47.41	15.53	21.41	1557	60

49	Jaipur	23,22,575	518	904	0.39	45.50	12.10	43.29	834	21
50	Surat	24,33,835	112	1000	0.41	56.87	11.21	42.16	990	51
51	Pune	25,38,473	244	1175	0.46	62.44	16.66	35.54	2531	63
52	Kanpur	25,51,337	267	1100	0.43	47.52	11.93	27.64	1571	46
53	Ahmedabad	35,20,085	191	1302	0.37	40.81	11.65	29.64	1180	32
54	Hyderabad	38,43,585	169	2187	0.57	54.20	21.60	25.90	1969	46
55	Banglore	43,01,326	226	1669	0.39	51.84	22.43	35.12	2386	55
56	Chennai	43,43,645	174	3036	0.62	51.34	16.34	29.25	2594	47
57	Kolkata	45,72,876	187	2653	0.58	50.56	11.48	31.81	1201	46
58	Delhi	1,03,06,452	1483	5922	0.57	54.42	15.52	34.87	1802	49
59	Greater Mumbai	1,19,78,450	437	5320	0.45	62.44	16.66	39.04	1786	54

* HCV on dry weight basis

Annexure –III

Key highlights of Swatch Bharat Mission related to Waste to Energy

100% Cost reimbursement for preparing the DPR shall be done by GoI as per unit cost and norms set up by NARC.

In order to promote projects of waste to energy, it is clarified that the central government Grant / VGF may also be used for such projects, either upfront or as generation based incentive for power generated for a given period of time.

The State High Powered Committee (HPC) will authorize institutes of national repute for appraisal of DPRs for the technical and economic appraisal of DPRs for projects recommended by ULBs. No appraisal will be done by MoUD. The cost of DPR appraisal by these institutes shall be an admissible component under administrative costs, subject to norms as approved by MoUD.

The performance and quality of appraisal by these identified and authorized institutes will be evaluated and monitored by HPEC as well as NARC and corrective actions taken wherever necessary.

The implementation of SWM projects will be as per directions of State Level High Power Committee.

Central government incentive for the SWM projects will be in the form of a maximum of 20% Grant / VGF for each project. The remaining funds have to be generated as indicated in para 2.6 above.

While considering projects under MSWM it will be ensured that there is no duplication in terms of funding under any other scheme or programme.

SWM projects will be sanctioned by the State level HPC which shall include a representative of the MoUD. In the entire project approval and procurement process, all provisions and procedures as prescribed by respective State Governments must be followed in their entirety. The entire approval procedure for MSW projects except for release of Central funds will end at the State Level.

States will contribute a minimum of 25% funds for SWM projects to match 75% Central Share.(10% in the case of North East States and special category states).

Funding pattern and financial process

Subsequent installments shall be released based on utilization certificates of previous grants, physical and financial progress and other indicators as approved and desired by the National Advisory & Review Committee (NARC).

State level

Empanel reputed Institutes like IITs, NIT's, State Technical Universities etc. for appraisal of DPRs.

Annexure IV

Details of MNRE Scheme on Energy Recovery from MSW

MNRE - Programme on Energy from Urban, Industrial and Agricultural Wastes/ Residues

1. Objectives of the Scheme:

(i) To promote setting up of projects for recovery of energy from urban, industrial and agricultural wastes; and

(ii) To create conducive conditions and environment, with fiscal and financial regime, to develop, demonstrate and disseminate utilization of wastes and residues for recovery of energy.

2. Estimated Potential: 4000 MW

3. Scope and Eligibility Criteria:

(i) Setting up of five pilot projects based on Municipal Solid Waste.

(ii) Biogas production from Industrial waste.

(iii) Power generation or production of bio-CNG from biogas produced from sewage and industrial wastes or from Urban and Agricultural wastes through biomethanation.

(iv) Power generation from solid industrial waste.

(v) Promotional activities.

(vi) R&D, Resources assessment, technology Up gradation and performance evaluation, etc.

(vii) Installation of biomass co-generation projects (excluding bagasse co-generation) in industry for meeting the requirement of captive power and thermal energy with at least 50% of power for captive use, and an option for the surplus power to be exported to the grid.

Criteria based on type of wastes

(i) Projects based on any bio-waste from urban, agricultural, industrial/agro–industrial sector (excluding bagasse).

(ii) Projects for co-generation /power generation and production of bio-CNG from biogas.

(iii) Mixing of other wastes of renewable nature, including rice husk, bagasse, sewage, cow-dung, other biomass and industrial effluents (excluding distillery effluents) will be permissible.

(iv) Biogas generation projects based on distillery effluents and projects based on wastes from fossil fuels and waste heat (flue gases) shall not be supported.

(v) Municipal Solid Waste based projects selected through transparent competitive procedure would only be eligible for central financial assistance.

(vi) In MSW to Power projects, any waste of renewable nature or biomass can be mixed to the extent of 25% based on gross Calorific Value. Use of a maximum of 25% conventional fuels would be allowed in Biomass Co-generation (Non-Bagasse) projects based on agricultural wastes and residues other than bagasse.

Criteria based on technologies

(i) Projects based on waste-to-energy conversion technologies, namely, biomethanation, combustion, gasification, pyrolysis or a combination there of.

(ii) Projects for generation of power from biogas will be based either on 100% biogas engines or steam turbines with a minimum steam pressure of 42 bars.

(iii) MSW based projects need to be developed in accordance with the decision of Hon'ble Supreme Court given during the hearing on May 15, 2007 and the recommendations of the Expert Committee referred there in.

(iv) The projects based on biomethanation of MSW should be taken up only on segregated/ uniform Waste unless it is demonstrated that in Indian conditions, the waste segregation plant/ process can separate waste suitable for Biomethanation.

(v) Bio-CNG to be produced will have to meet the BIS specifications as per ISI 6087: 2013.

Criteria based on capacity

There will be no minimum / maximum limit on capacity of projects supported under this programme, however, cattle dung based power generation projects of up to 250 kW capacity will not be considered under this programme.

4. Subsidy/Grant/Incentive provided under the Scheme:

Central Financial Assistance (CFA) for projects of different categories is given in the form of capital subsidy to the promoters and in the form of Grants-in-Aid for other activities, as given below:

S.No.	Wastes/ Processes/ Technologies	Capital Subsidy
1	Power generation from Municipal Solid Waste	Rs. 2.00 crore/ MW (Max. Rs.10 crore/ project)
2	Power generation from biogas at Sewage Treatment Plant or through biomethanation of Urban and Agricultural Waste/ residues including cattle dung or production of bio-CNG	Rs. 2.00 crore/MW or bio-CNG from 12000 m^3 biogas/day (Max. Rs. 5 crore/project)
3	Biogas generation from Urban, Industrial	Rs. 0.50 crore/ MWeq. (12000 m^3 biogas /day with maximum

S.No.	Wastes/ Processes/ Technologies	Capital Subsidy
	and Agricultural Wastes/residues	of Rs. 5 crore/ project)
4	Power Generation from Biogas (engine / gas turbine route) and production of bio-CNG for filling into gas cylinders	Rs. 1.00 crore/MW Or bio-CNG from 12000 m^3 biogas (Max. Rs.5 crore/project)
5	Power Generation from Biogas, Solid Industrial, Agricultural Waste/residues excluding bagasse through Boiler+ Steam Turbine Configuration	Rs. 0.20 crore/MW (Max. Rs. 1 crore/project)

The capital subsidy will be considered subject to the following:

(i) The amount of capital subsidy would be calculated on the basis of installed capacity.

(ii) Total capital subsidy would be limited to Rs.5.00 crore per project for Industrial Waste; however, it will be limited to Rs.1.00 crore per project in case of projects for power generation through boiler turbine configuration in standalone mode or through co- generation.

(iii) Subsidy amount will be restricted to 20% of the project cost in Urban, Agricultural Waste/ residues and Industrial Waste while financial assistance will be limited to 40% for STP.

(iv) In case of Special Category States (NE region, Sikkim, J&K, Himachal Pradesh and Uttarakhand), the capital subsidy would be 20% higher than that for other States. This provision will also be applicable two items (ii &iii) above.

(v) CFA to Biomass co-generation projects would be limited to a maximum of Rs. 1.0 crore/project, irrespective of the installed capacity of the project.

(vi) Financial assistance would be provided for organizing training courses, business meets, seminars/ workshops and publicity/ awareness on case-to-case basis, subject to a maximum of Rs. 3.0 lakhs per event/activity.

(vii) Financial support would be provided for R&D projects, including studies on resources assessment, technology Upgradation, performance evaluation etc. to institutions/ industries. This will be governed by the procedures /guidelines issued by MNRE.

Release of Central Financial Assistance

(i) The entire capital subsidy amount is released to the beneficiary's loan account in the lending financial institution/ banks for the purpose of offsetting the loan amount only after successful commissioning of project as per DPR norms and receipt of copies of statutory clearances and requisite project related information/ documents. The condition of successful commissioning of the project would, *inter-alia*, imply operation of the project for three months, including continuous

operation for at least 72 hours at minimum of 80% of rated capacity, for MSW based projects; this would be 60% of rated capacity.

(ii) In case the project is set up by the developers through their own resources, the CFA would be released directly to the developer after successful commissioning of the project.

5. Implementation Arrangements:

The scheme will be implemented by State Nodal Agencies, Urban Local Bodies/ Municipal Corporations, private and public sector enterprises and organizations, as well as NGOs including through Energy Service Companies (ESCOs). For projects to be implemented without debt financing/ loans, the proposals will be directly submitted to the Ministry for financial support. In cases where debt financing/ loans from domestic FIs/ Banks is involved, the proposals for financial support will be submitted by the promoters to the Ministry through Banks/ FI along with all the statutory clearances. The projects will be taken up by Urban Local Bodies and other Government organizations in Public Private Partnership mode. Financial Assistance for MSW based projects will be provided for projects selected through a transparent competitive procedure. State Nodal Agencies would be provided an incentive/ service charge @ Rs.1% of the subsidy restricted to Rs.5.00 lakh per project, in order to facilitate development of projects and their monitoring during implementation/ post commissioning. Service charges for Biomass co- generation (Non-bagasse) projects would be @ Rs.1 lakh/MW restricted to Rs. 5 lakh/project.

6. 12th Plan Envisaged Outlay: 175 Crore.

7. Provisions for Monitoring and Evaluation:

(i) The State Nodal Agencies concerned will closely monitor the execution of the projects and provide guidance for their timely completion. They would also submit periodic progress reports to MNRE.

(ii) MNRE may also monitor the progress of implementation of the projects as well as their performance through a Monitoring Committee consisting of representatives from MNRE, financial institution (s)/ banks, Technical Institutions and State Nodal Agencies.

8. Special Provisions, if any under the Scheme:

The aforesaid programme is subject to change(s) and modification(s) as may be decided by the MNRE, Govt. of India from time to time, and subject to availability of funds. The Ministry shall in no way be liable for expenditure incurred by promoters for pre-project preparation or other activities, merely on the basis of these circular and / or related announcements by the Ministry. In case of any ambiguity on interpretation of any provisions of the scheme, the decision of the Ministry shall be final and binding.

Expected Outcome of the Scheme: Capacity of 650 MW is to be added during 12th PlanPeriod.

Annexure - V

MINUTES OF THE SIXTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2015-16) HELD ON 6th NOVEMBER, 2015, IN COMMITTEE ROOM 'D', PARLIAMENT HOUSE ANNEXE, NEW DELHI

The Committee met from 1500 hrs to 1700 hrs

PRESENT

LOK SABHA

Dr. Kirit Somaiya - Chairperson

2. Shri Ashwani Kumar Chaubey
3. Shri Harish Dwivedi
4. Shri Saumitra Khan
5. Shri Bhagat Singh Koshyari
6. Shri Jagdambika Pal
7. Shri Ravindra Kumar Pandey
8. Smt. Krishna Raj
9. Shri M.B. Rajesh

RAJYA SABHA

10. Shri Oscar Fernandes
11. Shri Javed Ali Khan
12. Shri Ananda Bhaskar Rapolu
13. Dr. Anil Kumar Sahani
14. Smt. Viplove Thakur

SECRETARIAT

1. Shri K. Vijayakrishnan - Additional Secretary
2. Smt. L. N. Haokip - Under Secretary

Witnesses

MINISTRY OF NEW & RENEWABLE ENERGY

1.	Shri J.C. Sharma	Economic Adviser
2.	Dr. V.K. Jain	Scientist – F
3.	Dr. N.P. Singh	Sr. Consultant

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

4.	Shri Bhshwanath Sinha	Joint Secretary
5.	Shri Vinod Babu	Senior Scientist, Central Pollution Control Board

MINISTRY OF URBAN DEVELOPMENT

6.	Shri Praveen Prakash	Joint Secretary
7.	Smt. Shubha Thakur	Joint Secretary
8.	Shri V.K. Chaurasia	Joint Advisor

DEPARTMENT OF LEGAL AFFAIRS

9.	Shri Ramayan Yadav	JS & LA
10.	Shri Mahesh Tyagi	Deputy Legal Adviser

MINISTRY OF POWER

11.	Shri Tapan Kumar Barai	Member, Thermal, CEA
12.	Shri Sandesh Sharma	Chief Engineer, CEA

NITI AAYOG

13.	Dr. Ashok Kumar Jain	Energy Adviser

MUNICIPAL CORPORATION OF BRIHANMUMBAI

14.	Mr. Rajendra Vale	Dy. Municipal Commissioner

NEW & RENEWABLE ENERGY DEVELOPMENT CORPORATION OF ANDHRA PRADESH LTD.

15.	Mr. M. Kamalakar Babu	VC & MD

PRIVATE PRODUCERS

16.	Mr. Rakesh Agarwal	MD, Timarpur, Okhla Waste Management
17.	Mr. Harshad Joshi	Business Head, Essel Group, Mumbai
18.	Mr. P. Subramani	Director, Enken Engineers Pvt. Ltd., Chennai

2. At the outset, the Chairperson welcomed the Members of the Committee and the representatives of the Ministry of New and Renewable Energy; Ministry of Urban Development; Ministry of Environment, Forest and Climate Change; Ministry of Law; Ministry of Power; NITI Aayog; Municipal Corporation of Greater Mumbai; Department of Energy (Government of Andhra Pradesh) and some Private Producers, to the sitting of the Committee. Hon'ble Chairperson informed that the sitting of the Committee has been called to discuss the 'Generation of Power from Solid Waste'. As such, the Committee would like to understand the status, scenario, challenges before the sector and the potential, along with suggestions as to how to give momentum to it.

3. After the introduction of the witnesses, Sr. Consultant, MNRE, briefed the Committee about the subject and informed that, at the Central level, various Ministries, i.e. Ministry of Urban Development, Ministry of Environment, Forest and Climate Change and Ministry of New and Renewable Energy, are involved in handling Municipal Solid Waste, viz. its collection, transportation, treatment and safe disposal.

4. The Energy Adviser, NITI Aayog, informed the Committee that at the initiative of the Hon'ble Prime Minister, a sub-group of ten Chief Ministers has been formed to promote the Swachh Bharat Abhiyan; after consultation with various stakeholders, a report has been submitted to the Hon'ble Prime Minister on 14th October, 2015. This report also includes solid waste management as one of the subjects.

5. Thereafter, power point presentations were made before the Committee by some private players, informing about various technologies employed in their respective

plants for the generation of energy from solid waste and the roadblocks in the smooth functioning of the 'Waste to Energy' plants.

The Presentation inter-alia dwelt upon the following four models:

(i) Waste to Energy Plant at Okhla, Delhi by M/S Jindal Urban Infra.

(ii) Essel Jabalpur MSW Pvt. Ltd. by Essel Infra, Mumbai.

(iii) Waste to Energy Plant at Lucknow by M/S Enkem Engineers, Chennai.

(iv) Cluster Model of Govt. of Andhra Pradesh by NREDCAP, Hyderabad.

6. The following important points were discussed during the sitting:

(i) Inviting competitive bidding instead of Tariff fixation by CERC.

(ii) Clarity in policies and regulations.

(iii) Encouraging higher participation of private sector.

(iv) Need to expedite the process of Environment Clearance.

(v) Encouraging people to separate waste at the household level.

(vi) Need to focus on rural solid waste which is increasing day by day.

(vii) Mandatory segregation of urban waste, as power generation from mixed waste poses several environmental problems.

(viii) Non-availability of land for setting up of 'Waste to Energy' plant.

7. Thereafter, the members sought clarifications on various issues relating to the subject and the representatives responded to the same. The Committee directed the representatives of various Ministries to furnish written replies to those queries which could not be readily responded to by them.

8. The Committee noted that the safe disposal of waste is the responsibility of the State or the Municipality; so, that its cost has to be borne by them and not by the consumer of electricity. The Committee were keen to know why the Lucknow Plant had to be shut down within one year of its commissioning and whether this experience has been taken into account for future as this is a matter of grave concern that at one place,

a new plant is opening while at other, an existing plant is shutting down due to various reasons. The Committee also felt that there is a need for discussion among various stakeholders regarding the collection, transportation, treatment and safe disposal of municipal waste. The Ministries concerned should give support to this sector in terms of tax exemption; however, it must not encourage inefficiency on the part of the operators.

9. Hon'ble Chairperson referred to the relevance and necessity of environmental permission for 'Waste to Energy' plants, and also about the methodology for collection of solid waste and its disposal, including generation of electricity from such waste. He desired the Representatives of all the Ministries concerned, to furnish before the Committee, a detailed note regarding their respective roles in the sector of Energy generation from Solid Waste.

10. The verbatim proceedings of the sitting of the Committee were kept on record.

The Committee then adjourned.

Annexure - VI

MINUTES OF THE NINETEENTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2015-16) HELD ON APRIL 19th, 2016, IN COMMITTEE ROOM '62', PARLIAMENT HOUSE, NEW DELHI

The Committee met from 1500 hrs to 1630 hrs

PRESENT

LOK SABHA

Dr. Kirit Somaiya - Chairperson

2. Shri Ashwani Kumar Chaubey
3. Shri Harish Dwivedi
4. Dr. Arun Kumar
5. Shri Jagdambika Pal
6. Smt. Krishna Raj
7. Shri M.B. Rajesh
8. Shri Bhanu Pratap Singh Verma

RAJYA SABHA

9. Shri V.P. Singh Badnore
10. Shri Oscar Fernandes
11. Shri Javed Ali Khan
12. Dr. K.P. Ramalingam
13. Shri Ananda Bhaskar Rapolu
14. Dr. Anil Kumar Sahani

SECRETARIAT

1. Shri K. Vijayakrishnan - Additional Secretary
2. Shri N.K. Pandey - Director

List of Witnesses

MINISTRY OF NEW & RENEWABLE ENERGY

1.	Shri Santosh D. Vaidya	Jt. Secretary
2.	Shri J.B. Mohapatra	JS&FA
3.	Dr. V.K. Jain	Adviser
4.	Shri Dilip Nigam	Adviser
5.	Shri B.K. Bhatt	Adviser
6.	Shri G.L. Meena	Adviser
7.	Dr. N.P. Singh	Sr. Consultant
8.	Dr. Ashwani Kumar	MD, SECI
9.	Shri S.K. Bhargava	Director, IREDA

2. At the outset, the Chairperson welcomed the Members of the Committee and the representatives of the Ministry of New and Renewable Energy to the sitting of the Committee and informed that the sitting of the Committee had been called to discuss the subject, 'Power Generation from Solid Waste'. Also, the Hon'ble Chairperson apprised them of the agenda and focus area for the discussion and the provisions of Directions 55(1) and 58 of the Directions by the Speaker.

3. During the discussion, the Joint Secretary, MNRE, made a power-point presentation on the subject, "Power Generation from Municipal Solid Waste (MSW)" which, *inter-alia,* covered Composition of Waste, Potential of Power Generation from MSW, Diffused Handling of Subject: Waste to Energy (WTE), MNRE Programme on Energy from Urban, Industrial and Agricultural Wastes/ Residues, Status of 5 Pilot WTE Projects of MNRE, Issues Hampering Progress in WTE, Dr. Kasturirangan Task Force Report on WTE, Regulatory Framework for WTE Projects, Ecosystem for WTE & Compost Plants, etc.

4. The Committee, *inter-alia,* deliberated upon the following points with the representatives of the Ministry of New and Renewable Energy:

(i) Increasing the amount of subsidy provided by MNRE for Waste to Energy Plants from the existing Rs. 2 crore/MW (Max. Rs. 10 crore/project).

(ii) Encouraging the setting up of Waste to Energy Plants through reasonable financial and technological support.

(iii) Learning from International Best Practices in the field of 'Waste to Energy'.

(iv) Encouraging people to separate waste at the household level.

(v) Non-availability of land for setting up of 'Waste to Energy' plants.

(vi) Some Municipalities have inflated their data regarding generation of waste. So, such data furnished by the Municipalities should be cross-checked by the Ministry.

5. Thereafter, the Members sought clarifications on various issues relating to the subject and the representatives responded to the same. The Committee directed the representatives of the MNRE to furnish written replies to those queries which could not be readily responded to by them. The Members desired that the 'Dr. Kasturirangan Task Force Report on Waste to Energy' may be circulated to the Members for their reference.

6. Hon'ble Chairperson desired the representatives of the MNRE to furnish before the Committee, a detailed note regarding the following:

a) City-wise data regarding quantity of MSW generated, treated, power generation potential, annual compost potential, etc.

b) Details of successfully running 'Waste to Energy' Plants in other countries like Singapore, HongKong, Japan, etc.

c) Guidelines regarding 'Waste to Energy' in the context of the proposed 100 Smart Cities.

d) Data regarding Biomass generation during the last 3 Years.

e) Details regarding the Competitive Bidding Process in Andhra Pradesh and Punjab with respect to MSW and Waste to Energy.

7. The verbatim proceedings of the sitting of the Committee were kept for record.

The Committee then adjourned.

Annexure - VII

MINUTES OF THE TWENTIETH SITTING OF THE STANDING COMMITTEE ON ENERGY (2015-16) HELD ON 27 APRIL, 2016, IN COMMITTEE ROOM 'B', PARLIAMENT HOUSE ANNEXE, NEW DELHI

The Committee met from 1600 hrs to 1700 hrs

PRESENT

LOK SABHA

Dr. Kirit Somaiya - Chairperson

2. Shri Harish Dwivedi
3. Shri Bhagat Singh Koshyari
4. Dr. Pritam Gopinath Munde
5. Smt. Krishna Raj
6. Shri Vinayak Bhaurao Raut
7. Shri Gutha Sukender Reddy
8. Shri Devendra Singh alias Bhole Singh
9. Shri Malyadri Sriram

RAJYA SABHA

10. Shri V.P. Singh Badnore
11. Shri Oscar Fernandes
12. Shri Pyarimohan Mohapatra
13. Dr. K.P. Ramalingam
14. Shri Ananda Bhaskar Rapolu

SECRETARIAT

1. Shri K. Vijayakrishnan - Additional Secretary
2. Shri N.K. Pandey - Director
3. Smt. L. Nemjalhing Haokip - Under Secretary

List of Witnesses

MINISTRY OF NEW & RENEWABLE ENERGY

1.	Ms Varsha Joshi	Joint Secretary
2.	Dr. J.C. Sharma	Economic Adviser
3.	Dr. V.K. Jain	Adviser
4.	Shri N.P. Singh	Senior Consultant
5.	Shri Girish Kumar	Director

MINISTRY OF URBAN DEVELOPMENT

6.	Shri Praveen Prakash	Joint Secretary and Mission Director, Swachh Bharat Mission

GOVT. OF ANDHRA PRADESH

7.	D. Muralidaar Reddy	Mission Director, Swachh Andhra Corporation

GOVT. OF PUNJAB

8.	R.S. Sahota	Project Director, Solid Waste Management Division

2. * * * * * * * * * * * *

3. * * * * * * * * * * * *

4. Thereafter, the Chairperson welcomed the representatives of the Ministry of New and Renewable Energy, Ministry of Urban Development, Government of Andhra Pradesh and Government of Punjab to the sitting of the Committee and informed that the sitting of the Committee had been called to discuss the subject, 'Power Generation from Solid Waste'. Also, the Hon'ble Chairperson apprised them of the agenda and focus area for the discussion and the provisions of Directions 55(1) and 58 of the Directions by the Speaker.

5. During the discussion, the Joint Secretary, MoUD, made a power-point presentation on the subject "Swachh Bharat Mission - Focus on Waste to Wealth"

which, *inter-alia,* covered India's Solid Municipal Waste Scenario, Waste to Wealth Potential in India by 2020, Technology Alternative for MSW, Waste to Wealth Interventions, International Best Practices, etc. The representatives of the Governments of Andhra Pradesh and Punjab also made power point presentations on the subjects, "Waste to Energy Projects in Andhra Pradesh" and "Punjab Municipal Solid Waste Management Projects" which, *inter-alia,* elaborated on Approach and Methodology, Waste to Energy Projects Awarded and Operating Model of the Waste to Energy Projects in the two States.

6. Thereafter, the members sought clarifications on various issues relating to the subject and the representatives responded to the same. The Committee directed the representatives of the Ministry of Urban Development to furnish written replies to those queries which could not be readily responded to by them.

7. The Committee decided to undertake an on-the-spot study visit during the month of May-June, 2016 to Srinagar or Hyderabad for two days, to have detail examination of the subjects selected by the Committee. The Committee also wished to seek necessary permission regarding this study visit, from the Hon'ble Speaker.

8. The Committee also decided to take up a new subject 'Pricing of Imported Coal-It's impact on Power Tariff, CERC/APTEL Orders and findings of DRI' for detailed examination during the year 2015-16.

9. The verbatim proceedings of the sitting of the Committee were kept for record.

The Committee then adjourned.

ANNEXURE-VIII

MINUTES OF THE TWENTY SIXTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2015-16) HELD ON JULY 08, 2016, IN COMMITTEE ROOM '62', PARLIAMENT HOUSE, NEW DELHI

The Committee met from 1100 hrs to 1230 hrs

PRESENT

LOK SABHA

Dr. Kirit Somaiya - Chairperson

2. Shri M. Chandrakasi
3. Shri Harish Dwivedi
4. Shri Bhagat Singh Koshyari
5. Dr. Arun Kumar
6. Shri R.P. Marutharajaa
7. Shri Ravindra Kumar Pandey
8. Shri M.B. Rajesh
9. Shri Vinayak Bhaurao Raut
10. Shri Devendra Singh alias Bhole Singh
11. Shri Bhanu Pratap Singh Verma

RAJYA SABHA

12. Shri Javed Ali Khan
13. Shri Ananda Bhaskar Rapolu
14. Dr. Anil Kumar Sahani
15. Smt. Viplove Thakur

SECRETARIAT

1. Shri S.C. Chaudhary - Joint Secretary
2. Smt. L. Nemjalhing Haokip - Under Secretary

List of Witnesses

MINISTRY OF NEW & RENEWABLE ENERGY

1.	Smt Varsha Joshi	Joint Secretary
2.	Dr. V.K. Jain	Adviser

MINISTRY OF URBAN DEVELOPMENT

3.	Shri Praveen Prakash	Joint Secretary and Mission Director, Swachh Bharat Mission

2. At the outset, the Chairperson welcomed the Members of the Committee and the representatives of the Ministry of New and Renewable Energy and the Ministry of Urban Development to the sitting of the Committee and informed that the sitting of the Committee had been called to discuss the subject, 'Power Generation from Solid Waste'. Also, the Hon'ble Chairperson apprised them of the agenda and focus area for the discussion and the provisions of Directions 55(1) and 58 of the Directions by the Speaker.

3. During the discussion, the Joint Secretary, MoUD, submitted before the Committee that the Waste to Energy Plant at Jabalpur, Madhya Pradesh of 11.2 MW capacity has been commissioned in May,2016 and a waste to Energy Plant at Bawana, Delhi of 24MW capacity is under testing phase.

4. The Committee, *inter-alia,* deliberated upon the following points with the representatives of the Ministry of Urban Development and the Ministry of New and Renewable Energy:

(i) Need for the Government to set up at least two demonstration Waste to Energy Plants to show its commitment to the cause of W to E.

(ii) Need to have proper policy and cost effective technological support for W to E Sector.

(iii) Need for W to E Plants to adhere to environmental norms.

(iv) Need to encourage segregation of waste at the source of generation itself.

(v) Need to showcase success stories in the field of W to E to spread awareness about its benefit.

(vi) Need to have better coordination among Ministries/State Agencies/ULBs associated with W to E Sector.

(vii) Need to adopt the mechanism of competitive bidding for determination of tariff instead of resorting to tariff fixation by the CERC.

(viii) Need to make 100% scientific disposal and treatment of solid waste compulsory under Swatch Bharat Mission and Smart City Project.

(ix) Need to take into account waste that is generated in villages which is also a mixed waste and cannot efficiently be utilized in making of organic manure.

5. Thereafter, the Members sought clarifications on various issues relating to the subject and the representatives responded to the same. The Committee directed the representatives of the MNRE and the MoUD to furnish written replies to those queries which could not be readily responded to by them.

6. The verbatim proceedings of the sitting of the Committee were kept for record.

The Committee then adjourned.

ANNEXURE-IX

MINUTES OF THE TWENTY-SEVENTH SITTING OF THE STANDING COMMITTEE ON ENERGY (2015-16) HELD ON 3rd AUGUST, 2016 IN COMMITTEE ROOM '62', PARLIAMENT HOUSE , NEW DELHI

The Committee met from 1500 hrs. to 1600 hrs.

PRESENT

LOK SABHA

Dr. Kirit Somaiya - Chairperson

1. Shri M. Chandrakasi
2. Shri Ashwini Kumar Choubey
3. Shri Harish Dwivedi
4. Shri Bhagat Singh Koshyari
5. Dr. Arun Kumar
6. Dr. (Smt) Pritam Gopinath Munde
7. Shri Jagdambika Pal
8. Shri Ravindra Kumar Pandey
9. Shri Vinayak Bhaurao Raut
10. Shri Devendra Singh alias Bhole Singh
11. Shri Bhanu Pratap Singh Verma

RAJYA SABHA

12. Shri Ranvijay Singh Judev
13. Shri Javed Ali Khan
14. Shri Ananda Bhaskar Rapolu
15. Dr. Vinay P. Sahasrabuddhe
16. Shrimati Viplove Thakur

SECRETARIAT

1.Shri Sukhi Chand Chaudhary	Joint Secretary
2.Shri N.K.Pandey	Director
3.Smt. L.Nemjalhing Haokip	Under Secretary

2. At the outset, the Chairman welcomed the Members and apprised them of the agenda for the sitting. The Committee then took up for consideration the following draft Reports:-

i) 20th Report on 'Power Generation from Solid Waste'.

ii) 21st Report on 'Action Taken by the Government on the recommendations contained in the 13th Report (16th Lok Sabha) on 'Development and status of Small Hydro Sector'

3. After discussing the contents of the Reports in detail, the Committee adopted the aforementioned draft Reports without any changes. The Committee also authorized the Chairperson to finalize the above-mentioned Reports and present the same to both the Houses of Parliament in the current Session.

The Committee then adjourned.