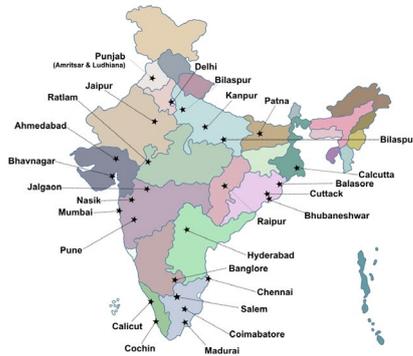


IN THIS ISSUE

RECYCLING CENTERS SPREAD THROUGHOUT THE COUNTRY



Page 01

Plastics Recycling in India



Page 05

Recycling of Multi-layer/ Laminated Plastics Waste



Page 07

Plastics Recycling & Recovery

A Presentation

Name of the ENVIS Centre



**INDIAN CENTRE
FOR PLASTICS IN
THE ENVIRONMENT**

Olympus House, 2nd Floor, 25, Raghunath
Dadaji Street, Fort, Mumbai - 400 001.

Tel.: +91 22 4002 2491, 2261 7137 / 7165

Fax: 2261 7168

E-mail: icpe@icpe.in, icpe@envis.nic.in

Web sites

www.icpeenvis.nic.in

www.icpe.in

...

1009, Vijaya Building, 10th Floor, 17
Barakhamba Road, New Delhi - 110 001.

Tel.: 011 4359 6329 • Telefax: 011 2332 6376

E-mail: icpedelhi@airtelmail.in

...

Area of Activity

**Capacity Enhancement Programme
on Management of Plastics, Polymer
Waste and Bio-Polymers, Impact of
Plastics on Eco-System**

Head of Institution

Mr. K. G. Ramanathan

President - GC



Other Office Bearers



Mr. S. K. Ray

Hon. Secretary /

Member - EC



Mr. P. P. Kharas

Hon. Treasurer /

Member - EC



Mr. Vijay Merchant

NGO - Project

Member - GC

ICPE-ENVIS Co-ordinator

Mr. T. K. Bandopadhyay
Sr. Technical Manager



Designed By

Mr. Sudheer Khurana
Sr. Programme Officer



Plastics Recycling - A Resource Management

Development of Synthetic Plastics began during the second half of Eighteenth Century, close to the time when industrialisation began in the Europe and slowly in rest of the world. By the middle of Nineteenth Century many major scientific discovery and inventions took place in the development of many types of plastics although the volume remained at a low sphere. However since around 1970's, the volume of production of plastics materials increased at a very fast rate and today the production at a level of around 250 Mn Tons is close to that of Steel on the basis of surface area covered.

Although plastics are employed in myriad applications where they actually conserve natural resources, there are some issues which have been surrounding the material ever since its growth rate increased. These issues mostly relate to the management of waste created by plastics products after its use, mostly in the packaging applications. The plastics waste management relates mainly to the waste generated by packaging – the single largest application sector in plastics. The cause is mainly littering habit and inadequate infrastructure for waste management activity and absence proper recycling facilities preferably close to the place of generation of waste. Over a period of last two to three decades, developed countries have been able to address this particular issue in an appropriate manner and resolve the same to a great extent. Countries like Japan, Australia, UK and many countries of the European Union have taken a comprehensive policy of dealing all types of packaging materials – plastics, paper, glass and metals, under a uniform Packaging Waste Management Law. Participation of manufacturers has been made an essential part of this waste management system. The result is evident. In many countries under the European Union have achieved the distinction of having nil or negligible area under landfill in their countries – all waste is being either recycled or its energy is being recovered or all food & biodegradable waste is composted.

Plastics Industry has been actively involved in framing the Government Policies and devising appropriate technologies based on the expertise and knowledge the members of Industry possesses. Close cooperation between the Industry and the Civic Authorities and wide scale awareness campaign among the general mass has contributed to the achievement of a successful waste management programme. These aspects are not yet fulfilled in the developing and most underdeveloped countries keeping the plastics waste issue still as a challenge.

This edition of ENVIS Eco-Echoes, deals with Plastics Recycling status in India.

7th ISFR 2013
7th International Symposium on
Feedstock Recycling of Polymeric Materials
23-26 October 2013 New Delhi - INDIA

Organised by:

-  Council of Scientific and Industrial Research (CSIR)
-  CSIR-Indian Institute of Petroleum Dehradun - India
-  Research Association for Feedstock Recycling of Plastics (FSRJ), Japan

Co-organised by:
Indian Centre for Plastics in the Environment (ICPE), Mumbai, India

Subscription Information:

ENVIS is sent free of cost to all those interested in the information on Plastics and Environment.

Readers are welcome to send their suggestions, contributions, articles, case studies, and new developments for publication in the Newsletter to the ICPE-ENVIS address.

Reproduction of material from this Newsletter is welcome, with prior permission. For more information on ENVIS and about the contents, please contact the editor.

Editor

Mr. T. K. Bandopadhyay

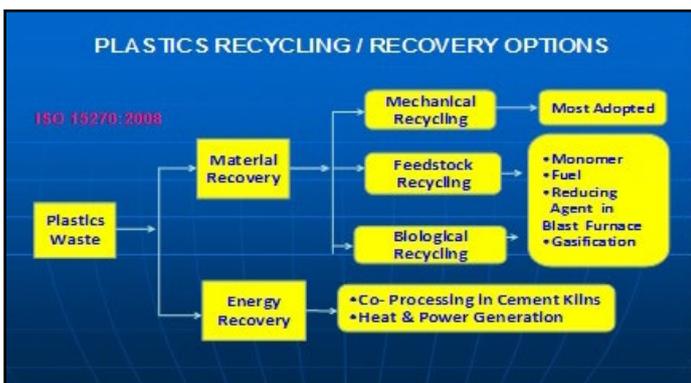
Plastics Recycling in India

India has made significant technological progress in the area of manufacturing of plastics products in almost all sectors of applications. However when it comes to the recycling of plastics, the performance is insignificant in a way that this activity is mostly accomplished in an unorganised sector without the application of modern day technology. This is mainly because of the reason that India has very cheap workforce which is involved in segregation and cleaning operation of the plastics waste in the Municipality Solid Waste (MSW) stream for mechanical recycling and there are smaller recycling plants operated by cheap but skilled workforce.

In the Rigid category, almost 100% waste is recycled in India whether it is from the packaging or from other sectors of application with the exception of Expanded Polystyrene (EPS) – which has a low recycling rate. In the Flexible category, collection rate of laminated/multilayered plastics, contaminated/mixed plastics waste from MSW stream is low and recycling of these waste has remained low. New technologies have been set up to recycle this category of plastics waste also.

As in the rest of the world, Mechanical Recycling has remained the most adopted methods of recycling in India too. Except PET bottle recycling, which is in the organised sector, most of other Mechanical Recycling activities in India are in the unorganised and small scale sector. While most of the Mechanical Recycling activities deal with homogeneous mixtures of same family of plastics waste, there has been some development in the area of recycling of commingled / mixed plastics through mechanical recycling process for manufacturing compressed boards / roof sheets and plastic 'lumbers'.

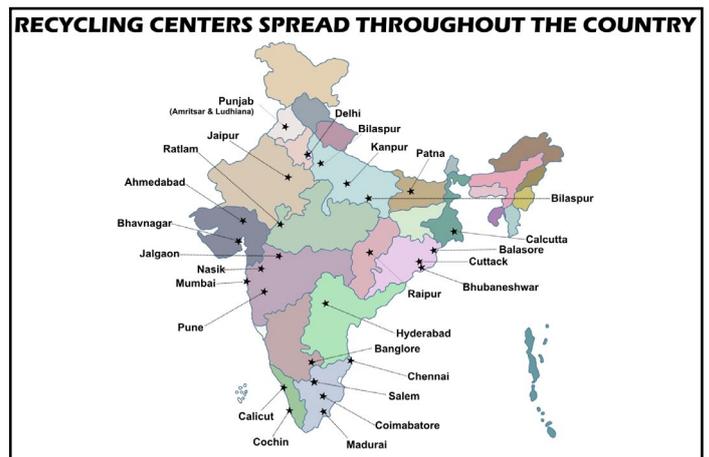
Among the non-conventional recycling technologies, some initiatives in the Feedstock Recycling and Energy Recovery have been taken in the country in the last few years. Manufacturing of Industrial Fuel from mixed plastics waste and Co-processing of mixed plastics waste in Cement Kilns have started in India, in a small way though. Use of waste plastics for Heat & Power generation and its use as Reducing Agent in the Blast Furnace and conversion to Monomer are not visible in India as on date.



In an innovative technology, use of plastics waste in the construction of asphalt road has been demonstrated in the country in the past decade. All types of mixed flexible plastics packaging waste, without elaborate cleaning, find use in this application.

Although Plastics recycling activities are popular near major urban cities, some specific clusters in different zones of the country have emerged. These are:

- Plastics Recycling Cluster - Dhoraji, Gujarat
- Daman
- Vapi in Gujarat
- Plastics Recycling Cluster MALEGAON (DYANA) and Sholapur in Maharashtra
- Dharavi and Bhandup area in Mumbai
- Plastics Recycling Cluster at Indore, Madhya Pradesh
- Plastics Recycling Cluster at Delhi, NCR



Out of around 8.0 Mn Tons of plastics produced in India (in 2012), 60% or 4.8 MTs are used for long term applications and hence do not require recycling on year to year basis. Out of the balance 40% or 3.2 MTs, which go for packaging applications, most of the rigids are recycled with the exception of EPS, which has a low recycling rate.

Quantum of PET recycling, which is carried out in the organised sector, is estimated to be around 400, 000 MTs out of total consumption of about 600,000 MTs, 100,000 MTs of which are considered to remain in circulation for reusing and the remaining 100,000 MTs remaining still to be collected from remote and other areas.

As per the last sample study published in 2008, the status of Plastics Recycling in India stood as stated below:

- Numbers of Organised Recycling Units: 3500
- Numbers of Unorganised Recycling Units: 4000
- Major Types of Plastics Recycled: PET, HDPE, PVC, LDPE/LLDPE, PP, PS & others like ABS, PMMA etc.
- Manpower directly involved in Plastics Recycling: around 6,00,000
- Manpower indirectly involved in Plastics Recycling: around 10,00,000
- Quantum of Plastics Recycled per annum: 36,00,000 Tons (3.6 Million Tons)

The total quantum of recycling comprised of plastics products which went for recycling including the ones from household, furniture etc applications. Considering the overall growth of the plastics industry and its increased usage pattern, the total recycling could very well be estimated at around 40,00,000 MTs in 2012.

Brief Analyses Of Different Types Of Plastics Recycling / Recovery Options

Plastics Recycling Options

- **Material Recycling**
 - » Mechanical Recycling
 - » Feedstock Recycling
- **Energy Recovery**

Mechanical Recycling

- This is most preferred and widely used recycling process.
- Cost effective.
- This process converts the waste in to products for same or new areas of application. For example a milk packaging film waste is converted in to barsati film (water proofing purpose). A broken bucket is remoulded in to a bucket or mug etc. An automotive battery is converted in to briefcase. A PET bottle waste is recycled in to fibre for further conversion in to a carpet or a T-shirt.
- » Recycled material is available at 50% – 60% cost of virgin material, at a lower property though.

Requirement:

Requirement for Mechanical recycling is Homogeneous input of same type of plastics waste. When different

types of plastics are mixed together, specific segregation technique is employed to accumulate similar groups of plastics materials separately. Cleaning is an important part of the process. The process flow chart is as follows:

Sequence of operations

The mechanical recycling option generally comprises the following sequence of unit operations, some of which may occur simultaneously, that are carried out as part of the recycle preparation and production process:

“Collection → Identification → Sorting → Grinding / Shredding with or without dust removing → Washing → Drying → Separating → Agglomerating → Extruding / Compounding → Palletizing”

In some cases where the sorting process is able to group same type of plastic waste together, the “separating process” after washing and drying may not be necessary.”
ISO 15270

PLASTICS ARE 100% RECYCLABLE

In fact, India recycles 60% of its plastics - almost three times more than rest of the world

	
■ Barsati films	■ Used milk pouches
	
	
■ Empty battery packs	■ Luggage
	
	
■ Niwar patti	■ Discarded plastic bags
	

MECHANICAL RECYCLING



Feedstock Recycling

As per ISO 15270, the definition of Feedstock Recycling is – “conversion to monomer or production of new raw materials by changing the chemical structure of plastics waste through cracking, gasification or depolymerization, excluding energy recovery and incineration.”

NOTE: Feedstock recycling and chemical recycling are synonyms.”

Conversion to:

- Monomer – about 30% recovery possible
- Fuel – close to 100% recovery claimed. 6 units of electricity can be generated from 1 litre fuel
- Reducing agent in blast furnace for production of iron – Up to 40% replacement of coke established. A 3 Mn Tons / PA plant can use 0.6 Mn Tons Waste Plastics PA.
- Gasification
- Liquification

Advantage:

» Complicated mixtures of waste can be used.

There is limited number of small plants in India which converts plastics waste in to fuel commercially. Present capacity is around 50 TPD, which is expected to go up to 500 TPD shortly.

Conversion to monomer is common in the case of PET Bottle waste recovery. The process is mostly carried out within the PET manufacturing plant.

Conversion to Reducing Agent for use in Blast Furnace, Gasification and Liquification are not known in India.

Conversion Of Plastic Waste To Fuel

Plants Working In India At Present
TOTAL PRODUCTION AROUND 50 MTD

Indian Centre for Plastics in the Environment

Energy Recovery

Cement kilns

- More than 50% fossil fuel (coal) can be replaced
- 170 cement kilns in India can use more than 1.8 Mn tons of plastic waste using a meager quantity of 30 MTs of Waste Plastics / day

Incineration

- Calorific value of Polyethylene is 45 MJ / Kg, similar to that of crude oil
- 15 MJ of net energy can be recovered from 1 kg Polyethylene waste which can be used as heat energy.

Mixed plastics waste, which is otherwise difficult for recycling through mechanical recycling process, can be used.

Co-processing of plastics waste in Cement Kilns has started in India. Incineration is mainly carried out to treat contaminated materials which include medical plastics waste. It is not used for power generation in India.

Meeting of the Scientific Advisory Committee (SAC) of ENVIS Scheme of MoEF from 23rd – 25th June, 2013

ENVIS Secretariat of MoEF had scheduled a Meeting during 24th & 25th June, 2013 to review the activities of all 39 Thematic Centres of ENVIS programme by the Scientific Advisory Committee of the Ministry. ENVIS Centres under State Government / Pollution Control Boards were not called.

Data base, Information collected and Knowledge Products developed by each Centre were reviewed. The review was conducted in consultation with the Subject Division of the Ministry and the Economic Advisor of the ENVIS Secretariat.

ICPE ENVIS Centre activities were presented as per the format prescribed by the ENVIS Secretariat. The Review Committee appreciated the quality of information put in by ICPE ENVIS Centre and was fully satisfied with its performance. On the suggestion of the Subject Division Members, the Economic Adviser advised ICPE ENVIS Centre to collect and disseminate information on the following three subjects under appropriate head: E-Waste (Plastics Components) ; Registered Plastics Recyclers in India and Multilayer Plastics.

The Committee was informed that:

- As 'E -waste' was not a part of ICPE ENVIS Centre's Mandate, information on this subject was not collated under ENVIS activity. Now onwards, as per the advice of the Committee, this would be included.
- List of Registered Plastics Recyclers is already available

in CPCB's website; hence ICPE ENVIS Centre did not duplicate the activity. However, the Committee insisted that the 'List' should be included in ICPE ENVIS Centre website also. Accordingly Registered Recyclers' list would be included in ICPE ENVIS Centre website.

- Regarding 'Multilayer Plastics', the Committee was informed that sufficient mention of the subject is available in the website along with the descriptive articles on – 'Construction of Road', 'Fuel from Plastics Waste', 'Co-processing of Plastics Waste in Cement Kilns' and 'Compressed Boards'. However, a specific description on this subject along with the issues and solutions would be included in the website separately.

The Economic Adviser was requested to increase the Grant amount to ICPE ENVIS Centre. It was brought to the notice of the Ministry that actual expenses incurred by the Centre was about 25% more than the sanctioned grant from the Ministry. She assured that ICPE's case would be considered and the entire expenditure amount as mentioned in the earlier Audited Expenditure Statement of ICPE ENVIS Centre would be recommended for Grant amount for the FY 2013 – 2014 itself.

(By the time of publication of this edition of the Newsletter, Sanction Order from the Ministry was received for the grant of the amount for the FY 2013 – 14, which is 30% more than that of last year. ICPE ENVIS Centre thanks ENVIS H. Q. for the quick action.)

International News

Philippines shows the way -Las Piñas finds Plastic answer to school chair shortage

In Las Piñas City, a recycling plant can do just that. Inaugurated by the Villar Foundation on Friday, a factory in Barangay Ilaya is now turning plastic wastes into armchairs which will soon be distributed among campuses in Metro Manila.

The foundation tapped the Davao-based Envirotech Waste Recycling Inc. for the technology. "We have a lot of plastic wastes here in Metro Manila. When disposed improperly, they could clog our drainage systems and eventually cause flooding, which in turn spreads diseases," said Senator-elect Cynthia Villar, who formally opened the facility along with her son, Las Piñas Rep. Mark Villar, and her husband, Sen. Manny Villar. "So we thought of processing these plastic wastes and coming up with something useful. That was, when I read about this technology in Davao," Villar said. Envirotech President Winchester Lemen said the recycling plant in Las Piñas is only the second of its kind nationwide. The first is Envirotech's plant which has been in operation since 2010.

A recycling plant would cost P5 million to P8 million to build, Lemen said. The Las Piñas plant can produce around 1,000 armchairs a month. About 24 kilos of mixed "soft plastics"—

such as those used as food wrappers—are needed to make a chair, which can be fashioned to look like wooden pieces and comes with replaceable parts. Contaminants found in the raw materials are removed in the process, Lemen said, noting that tests conducted on Envirotech armchairs had shown low levels of lead (42 parts per million) and no traces of mercury.



SENATOR-ELECT Cynthia Villar (left) inspects the machinery that can turn plastic wastes into school chairs at a newly opened recycling plant in Las Piñas City. NIÑO JESUS ORBETA

Recycling of Multi-layer/Laminated Plastics Waste

As per ongoing interaction process between ICPE and Central Pollution Control Board (CPCB) on safe environmental practices for plastics waste management and recycling (among other related matters), a visit was organised by ICPE for CPCB official for the inspection of special plastics recycling plants near Mumbai. The CPCB official was shown the manufacturing facilities of plastic chip boards made from multi-layer/ laminated plastics waste by Deluxe Recycling (India) Pvt. Ltd., Manor, near Mumbai.

The company manufactures the chip boards, which are used as alternative to wooden ply boards and are used in all applications, where wooden ply boards are used. Variety of plastics waste is used for manufacturing the chip boards, which include waste of:

- Tetra pack pouches of fruit juice and other liquid products
- Multi-layer plastic laminates used for packaging wafers, coffee, tea, etc.
- Lamitubes used for toothpaste packaging, etc.

Various applications of these chip boards include:

- Door panels
- Industrial pallets
- Hospital & school furniture
- Furniture and interiors for home & office, etc.

Typical properties of these chip boards, as claimed by the manufacturer, are given in the table.

CPCB official was satisfied with the manufacturing process of the facility.

As per industry report, there are 3 or 4 such recycling facilities in the country at present.



Features and Advantages of the Boards are:

- Easy to cut, normal wood working tools and machinery can be used.
- Will not rot, crack, warp or splinter and unlike wood there are no knots.
- Do not get affected by termite, borer, bacteria, etc.
- Resistant to mild chemicals, oil, gasoline, pathogens.
- Resistant to water and salt water.
- Not affected by exposure to most substances.
- Denser than wood and have high compression strength.
- Can be sawn, moulded, screwed like other wood products.
- Virtually maintenance-free, hence saves valuable cost.
- Do not expand under varying climatic conditions.
- Impervious to insects.
- Stain resistant.
- Aesthetically pleasing.
- Have long life.
- Cost effective.
- Recyclable.



CPCB official also visited a large capacity plastics recycling plant, Shakti Plastics Industries in Manor near Mumbai.

The unit recycles various kinds of plastics waste including polythene bags and moulded articles, polypropylene jumbo bags (woven sacks), nylon rods, ABS parts, polystyrene, SAN articles, etc. All the machines including grinding, agglomerators, extruders, granulators, etc., have been designed and manufactured indigenously. The appropriate heaters and temperature controllers ensure that the plastics materials are not overheated during extrusion operation. The well ventilated, spacious and airy shop floor ensures no untoward emission of undesired gaseous products.

CPCB official was satisfied with the clean operation of the large recycling unit.

Reproduced from Envis Volume 3 • Issue 1 • Jan.–Mar. 2005
As the Subject is relevant today also

Plastics Recycling & Recovery

A Presentation



PLASTICS RECYCLING & RECOVERY

Indian Centre for Plastics in the Environment
www.icpeenvs.nic.in/ / www.icpe.in

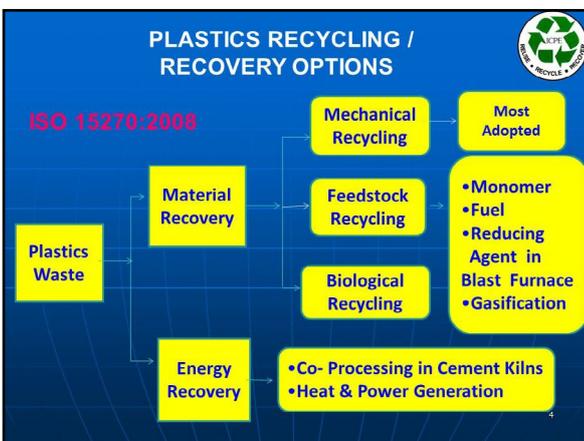
1



Major Applications of Plastics

- Agriculture
- Healthcare / Medical
- Education
- Pipes for Water, Gas and Sewerage
- Building & Construction – Flooring / Doors & Windows / Drainage Pipes, Water Storage Tanks, Construction Linings etc
- Cables
- Electricals & Electronics Equipments
- Thermal Insulation
- Automobile, Aviation & Railways
- **Packaging** **35 – 40%**
- Household
- Furniture
- Toys & Others

2




RECYCLING STATISTICS - INDIA

Traditionally Indians Opted for Recycling way back in the 60's as a Source of Earning. Today the Status is -

■ Numbers of Organised Recycling Units:	≈ 3500
■ Numbers of Unorganised Recycling Units:	≈ 4000
■ Manpower: Direct	≈ 0.6 Mn
Indirect	≈ 1 Mn
■ Plastics Recycled per annum	≈ 3.6 Mn MTs
■ Estimated Investment in Plant & M/c	≈ Rs. 1500 Mn

Source: CIPET Study for CPCB (Draft)

5



MECHANICAL RECYCLING –

CONVENTIONAL & MOST FOLLOWED PROCESS

REQUIREMENT

HOMOGENIOUS & CLEAN INPUT

6



PLASTICS WASTE FROM MSW STREAM / OTHER SOURCES ARE SEGREGATED, CLEANED, SHREDDED / GRINDED AND REMOULDED INTO USEFUL UTILITIES



7



FEEDSTOCK RECYCLING

CONVERSION TO BASIC MONOMER

- NOT YET DEVELOPED IN INDIA

8



CONVERSION TO FUEL



ALL TYPES OF MIXED PLASTICS WASTE CAN BE USED WITHOUT ELABORATE CLEANING

9

PRESENT STATUS:

- AVAILABILITY CONSTRAINT OF INPUT AT OPTIMUM COST
- SOME SMALL PLANTS ARE RUNNING IN SOME CITIES IN THE COUNTRY – HYDERABAD, ALATHUR (Nr CHENNAI), PUNE, VASAI (Nr MUMBAI)
- SOME CORPORATES HAVE SET UP SMALL PLANTS FOR SAFE DISPOSAL OF THEIR OWN PLASTICS / ELECTRICTRONICS WASTE - BANGALORE.
- TOTAL PRODUCTION AROUND 50 MTD AT PRESENT WITH PROSPECT OF BEING SCALED UP TO 500 MTD SHORTLY



10

APPROVALS

- FUEL SOLD AS FURNACE OIL IS RECOMMENDED FOR USE IN GENERATOR SETS / FARM TRACTORS / BOILERS



11

FEEDSTOCK RECYCLING

REDUCING AGENT IN BLAST FURNACE

- UP TO 40% REPLACEMENT OF COKE ESTABLISHED A 3 MN TPA PLANT CAN USE 0.6 MN TONS WASTE PLASTICS
- JAPAN IS THE WORLD LEADER IN UTILISING THIS TECHNOLOGY
- YET TO BE ESTABLISHED IN INDIA



12

ENERGY RECOVERY - CO-PROCESSING IN CEMENT KILN



- ALL TYPES OF MIXED PLASTICS WASTE CAN BE USED
- SEGREGATION AND CLEANING NOT REQUIRED



13

ENERGY RECOVERY

CO-PROCESSING IN CEMENT KILNS

- CLEANER EMISSIONS (COMPARED TO COAL)
- > 60 % REPLACEMENT OF COAL ESTABLISHED - (GERMANY)
- ≈ 5% REPLACEMENT TRIAL BY ACC & ICPE IN INDIA SUCCESSFUL
- AT 10% REPLACEMENT RATE - 170 CEMENT KILNS IN INDIA COULD DISPOSE OF THE ENTIRE PLASTICS WASTE GENERATED IN THE COUNTRY TODAY WITH ADDITIONAL BENEFIT OF REDUCTION IN THE USE OF FOSSIL FUEL – COAL

PROCESS IMPLEMENTED IN SOME STATES OF INDIA



14

PLASTICS WASTE IN ROAD CONSTRUCTION



ASPHALT PLANT OF BMC, WORLI, MUMBAI

Prof. V S AGHASE ROAD DADAR, MUMBAI



16

PLASTICS WASTE USED IN ROAD CONSTRUCTION

- PE / PP / PS / EPS : 10 – 15% Replacement of Bitumen Established with Proven Benefits
- Multilayered Plastics & EPS @ 15% of total Plastics Waste Have been Used

For 1 KM long and 7 feet wide Road, 1 MT of Plastics Waste is used with 9 MTs of Bitumen.

450, 000 KM Rural Road in India Can Use more than 0.5 Mn Tons of Plastics Waste



18

MECHANICAL RECYCLING OF MIXED PLASTICS

LUMBER AS WOOD SUSTITUTE



INDIAN MACHINERY MFRER OFFERING SMALLER & CHEAPER PLANT



19

Awareness Programme at Anjumaan Islaam School & College, Mumbai on 16th April, 2013

ICPE Mumbai office had organised a School Awareness programme at Anjumaan Islaam School & college, CST, Mumbai on 16th April, 2013. About 250 students of Class VIII and Class IX attended the programme. Three teachers also were present.

Shri Tushar Bandopadhyay of ICPE conducted the sessions with the assistance of Shri Sudheer Khurana and Smt Payal Das. The programme included screening of awareness films and deliberations through Power Point Presentation. Students interacted during the presentation on how they could

contribute in the waste management and clean-up activities. Shri Shabbir, Prof. of Anjumaan Islam College also explained the students about the importance of keeping the environment clean by adopting proper waste management practices.

The Principal of the school expressed her gratitude to ICPE Management for deputing its officers for organising the awareness programme for the students on the very important social issue. She expected that ICPE would offer its assistance in conducting such programme in the future also.



DATA SHEET

Suggested End Products Made of Recycled Plastics

List of Non-Critical Items which may be made of Recycled Plastics

1. Fiber fills for pillows/mattresses/sleeping bags
2. Carpets
3. Floor/door mats
4. Lube oil bottles
5. Box Strapping and other secondary packaging items
6. Drainage and Agricultural Pipes
7. Dust Bins/Pans
8. Trash/Garbage Bags
9. Refuse Containers
10. Wheel barrows used in SWM
11. Moulded Luggage - Briefcase
12. Non food containers for household and industrial chemicals such as bleach, detergent, oils (non-edible) etc.
13. Signs and Traffic barrier cones
14. Flower pots
15. Horticultural supplies – Planters, trays, nursery bags
16. Household Multi-utility Items not meant for food-contact applications
17. Storage Bags
18. Drip Irrigation pipes
19. Garden Pipes
20. Buckets/Mugs for wash-rooms
21. Jackets, T-shirts, Upholstery and apparels
22. Tool handles
23. Footwear
24. Mirror / Photo Frame
25. Soap Container
26. Garden furniture
27. Recreational Equipment
28. Structural Applications – Non-critical
29. Conduits for Cables
30. Floor Coverings
31. Stationery products: rulers, staplers, Video/CD boxes
32. Coat hangers
33. Photo frames
34. Office supplies – File folders, binder covers, presentation folders etc
35. Car mats
36. Tarpaulin
37. Barsati Films (waterproof wide width films)
38. Niwar Patti (weaved tapes)
39. Sutli (twisted thread)
40. Camping equipment
41. Clamshell packaging for Polaroid cameras
42. Automotive parts where appearance and strength are not important
43. Computer applications
44. Instrument Panel top-covers/retainers
45. Lawn/Garden Components
46. Roofing shingles
47. Plastic broom / scoop and the like.
48. Lumbers for making Benches, Pallets and Fence etc.

ICPE Recommendation to BIS

Products **NOT** to be made of Recycled Plastics

List of Critical Items which shall not be made by Recycled Plastics

1. Carry bags for direct contact with ready to eat foods
2. Containers for carrying/storing ready-to-eat food products
3. Water bottles
4. Cosmetics/Shampoo containers
5. Water storage containers
6. Soft drink and Mineral water bottles
7. Milk crates
8. Lunch boxes
9. Drinking straws
10. Crockery/Cutlery items
11. Edible Oil containers
12. Hair Oil containers
13. Electrical Insulation / Switches / Other Parts
14. Toothbrush Handles
15. Toys, which may be put inside mouth, and the like.



DO YOU KNOW?

SIX PET bottles can be recycled into ONE t-shirt

**WORLD'S ICE DEPOSITORY IS MELTING
DUE TO
GLOBAL WARMING
VANISHING GLACIERS GIVE AN ALARM
NOTE FOR
MOTHER EARTH.**



Melting of Himalayan Glaciers

**PLASTICS ARE AMONG THE HIGHEST
GREEN HOUSE GAS SAVERS
&
DECREASE THE IMPACT OF
GLOBAL WARMING**

**DON'T LITTER, USE PLASTICS RESPONSIBLY, KEEP
THE MOUNTAINS CLEAN**



Plastics, Metals, Paper ...
Can be recycled into useful products.

PLASTICS ARE 100% RECYCLABLE

