ICPE
INDIAN CENTRE FOR PLASTICS IN THE ENVIRONMENT

Envis Eco-Echoes

Management of Plastics, Polymer wastes and Bio-polymers and Impact of Plastics on the Eco-system

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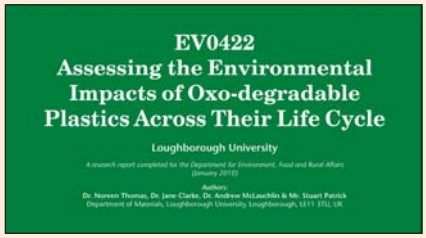

Envis Eco-Echoes

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

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Editorial

Use of Plastics Waste in the construction of Asphalt Road is finding growing popularity in different parts of India. Specific reports of some cases in West Bengal and Kerala have been published. Also published in this edition are the details of the mixing procedure of plastics waste with aggregates and bitumen in 'Batch Process' so that the same can be replicated by the road engineers and the contractors for their use. Details of the 'Continuous Process' would be carried in the following edition.

Synthetic polymers have become very versatile and useful material for the modern world. Since the discovery of manmade polymers, continuous and systematic efforts have been made to make polymers more stable, mechanically stronger and chemically resistant and environmentally safe and durable. Plastics have replaced materials such as metal, glass, wood, paper, fiber, ceramics etc. in packaging, automobiles, building construction, biomedical fields, electronics, electrical equipments, appliances, furniture, pipes and heavy industrial equipments. In a nutshell, from agriculture to transport and from aerospace to food packaging, the use of plastics has become an integral part of our modern daily living. However, for certain applications, the properties of plastics are desired minus its long life. Though some of the world leaders in the field of polymer manufacture have stated developing and manufacturing degradable polymers which are compostable and are considered as biodegradable polymers - safe for the environment, there are some other manufacturers, who have developed different types of degradable plastics, which self destructs itself when left in the open environment. It is claim that the products will automatically degrade in the backyard or in the field and vanish in the presence of oxygen, relieving the civic authorities and the residents of the plastics waste littering problem. Executive Summary of a research report of Loughborough University on the subject has been published in this edition.

Plastics are one of the major savers of Green House Gas emissions on the Earth – a fact, perhaps not properly realised by everybody. ICPE Panels on the subject, as displayed in the Exhibitions for Mass Awareness, have been published in this edition.

We receive encouraging feed back from the readers, which keeps us motivated for bringing in environmental facts about plastics. Readers may suggest any area of their interest to be covered in the Newsletter within the scope of the agenda.

Tushar K. Bandopadhyay
Editor

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

Construction of Asphalt Road with Plastics Waste at Chandannagar and Ashoknagar near Kolkata

Since 2005-06, ICPE has been propagating on the usefulness of Utilisation of Plastics Waste for the Construction of asphalt Roads through its Newsletters and various Seminars, Exhibitions and Workshops throughout the country. The successful trial of constructing a stretch of 1.5 Km Asphalt Road in Kalyani Municipality (near Kolkata) was reported in earlier ENVIS Newsletter. Encouraged by this success and due to keen follow-ups by Indian Plastics Federation (IPF), Kolkata, another two Municipalities near Kolkata came forward to construct such roads in their areas. ICPE provided the on-the-field support and assistance for the construction.

Chandannagar Municipality Corporation – 17th March, 2010

A stretch of about 1 KM road in the Ward No. 19 was selected by the local authority for the trial construction. The Municipality purchased the plastics waste as they were convinced that they would save in cost due to partial substitution of bitumen with plastics waste. Batch mixing machine was used.

The Chairman, the Mayor-in-Council and the Chief Engineer of the Municipality were present during the trial. Contractors, who were awarded the work order for constructing roads in other parts of the Ward, were also present during this trial so that they could construct the road themselves without any further technical assistance from ICPE or IPF.

Mayor, Mayor-in-council & Chief Engineer of Chandannagar Municipality being briefed

Shredded plastics waste being added to aggregates

Hot bitumen being added to the heated aggregate – plastics waste mix

Charge outlet

Road to be constructed with bitumen – aggregate

Road under construction

Road laying using plastics waste under progress

Ashok Nagar Kalyangarh Municipality – 18th March, 2010

Total length of about 1 KM was selected by the Municipality authority for the trial construction of asphalt road with plastics waste. Municipality Chairperson, Mayor, Mayor-in Council, Chief Engineer, Leader of the opposition party – all attended and witnessed the trial. The Municipality Chairperson informed that after observing the performance of the road in the coming monsoon, all roads of the municipality would be constructed using waste plastics in future. They also informed that they were encouraged by the good performance of the road constructed at Kalyani municipality last year.

Formulation was similar to the one conducted at Chandannagar. Seal coat was used on the top layer.

Inaugural function

Selected road for laying

Chairperson and Mayor formally inaugurate the process of mixing plastics waste

Plastics waste being spread over aggregates

Charge being taken out

Chairperson carrying the trolley load of mix

Chairperson herself pouring down the mix on to the road. Also seen in the picture: Mayor and other VIPs.

Seal coat being laid

Constructed road

Construction of road at Kalyani Municipality in April 2009 and its good performance report encouraged other Municipality authorities to take decision to replicate the same in their areas too.

People of Ashok Nagar, having 100% literacy rate (it has 100 primary schools) and Chandannagar Municipality – a former French Colony, basically do not indulge in littering in general. IPF team's persuasion helped the civic authorities to take decision of disposing of the plastics waste in a scientific way. ICPE had provided all technical assistance before and during the road construction.

The great enthusiasm showed by the Heads of the Civic Authorities and the conviction of the Executive Engineers of both the Municipalities helped in undertaking the trial constructions. It is hoped that the awareness programmes would help spread the message to other areas as well facilitating disposal of waste plastics in an environment friendly manner and at the same time enhancing the life of the Asphalt Roads at a lower cost.

Polymerized Road Tarring at Cochin

On 27th January, 2010 Cochin Corporation under the supervision of BPCL has constructed a stretch of asphalt road using plastics waste at Kaloor Manapatty Road. The plastics waste was shredded by CREDAI Clean Kochi Movement for Road Tarring.

City Mayor and other officials of the civic authority were present during the construction period. The demonstration brought confidence among all that plastics waste which is difficult for recycling could be utilized for road construction. The organisers used, among other types of waste, shredded PS foam (Expanded Polystyrene) waste for the construction of asphalt road.

Nine World Cup sides to wear shirts made entirely from recycled plastic bottles in South Africa

Footballers including Cristiano Ronaldo and Robinho will take to the pitch in the World Cup in South Africa this summer wearing shirts made out of recycled plastic bottles.

Nike announced yesterday that for this first time its nine national teams, which include Brazil, Portugal and The Netherlands, will wear tops made entirely from polyester.

The environmentally-friendly move will see each shirt made from up to eight recycled plastic bottles.

Players model the new kit – with each shirt made from recycled plastic bottles

Green: Footballers including Portugal's Cristiano Ronaldo will wear Nike shirts made entirely from plastic bottles at this summer's World Cup in South Africa

Manufacturing the shirts this way has prevented nearly 13million plastic bottles, totalling almost 254 tonnes of polyester waste, from going into landfill sites. This amount would be enough to cover more than 29 football pitches.

Nike claimed the move is its biggest ever commitment to sustainability.

Nike Brand president Charlie Denson said: 'We are equipping athletes with newly designed uniforms that not only look great and deliver performance benefits, but are also made with recycled materials, creating less impact on our environment.'

To make the 2010 national team kits, Nike's fabric suppliers sourced discarded plastic bottles from Japanese and Taiwanese landfill sites and then melted them down to produce new yarn that was ultimately converted to fabric for the jerseys.

Nike claimed making the shirts has prevented nearly 13million plastic bottles from going into landfill sites

This process saves raw materials and reduces energy consumption by up to 30 per cent compared to manufacturing virgin polyester.

Mr. Denson added: 'Consumers should not be penalised for choosing environmentally-friendly products. Our goal is less impact and lower cost.'

The shirts cost £50 each.

The teams wearing Nike's new national team jerseys in South Africa are: Brazil, The Netherlands, Portugal, USA, South Korea, Australia, New Zealand, Serbia and Slovenia.

Read more: http://www.dailymail.co.uk/news/worldnews/article-1253892/Nine-World-Cup-sides-wear-shirts-entirely-recycledplastic-bottles-South-Africa.html#ixzz0h0BqjlWj

Source: Daily Mail

EV0422
Assessing the Environmental Impacts of Oxo-degradable Plastics Across Their Life Cycle

Loughborough University

A research report completed for the Department for Environment, Food and Rural Affairs (January 2010)

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1. Introduction and objectives

1.1 Introduction

The subject of this study is oxo-degradable plastics and their impact (positive or negative) on the environment. Oxo-degradable plastics are mostly made of polyethylene (PE) but may be made of polypropylene (PP). They are plastics that contain special additives that cause them to degrade after a certain amount of exposure to either sunlight or heat. The time over which the degradation process takes place depends on the concentration of additive in the plastic and the amount of sunlight and/or heat to which it is exposed.

The aim of this research project is to review existing data and published research on the environmental impact of oxo-degradable plastics during their whole life cycle. In addition to the hard data and evidence collected in reviewing the published literature, the project has also involved interviewing stakeholders. The reason for engaging with stakeholders has been to gauge perceptions of the environmental impact of these materials. The stakeholders have included additive manufacturers and masterbatch producers, retailers, end-users and those involved in end-of-life issues such as recycling and composting.

A key driver for this project was to assess the evidence behind the claims being made about oxo-degradable plastics. They are variously described as '100 % degradable' or '100% biodegradable' but it is not clear what is meant by this. What is the evidence that these materials actually degrade or biodegrade and under what conditions and over what timescale?

1.2 Objectives

The purpose of the research is to assess the environmental impact (both positive and negative) of oxo-degradable plastics. The specific objectives of the project are enumerated below:

1. To gather and review existing data, research and stakeholder views on the environmental impact of oxo-degradable plastics across their life-cycle.
2. To assess the evidence of the impact of oxo-degradables on the environment considering the following:
   - What happens to the polymers and metal salts after the oxo-degradable plastics disintegrate?
   - Are the claims that oxo-degradable plastics degrade or biodegrade completely, often within a certain timeframe, accurate? What is the evidence to support this?
   - How do oxo-degradable plastics affect the recycling stream? Do they contaminate recycling and affect the value or application of the recycled product?
   - How do oxo-degradable plastics behave in, and affect, other disposal environments such as composting and landfill?
   - What is the wider effect of oxo-degradable plastics if they are left to degrade the natural environment? This addresses issues such as toxicity and bioaccumulation.

- How would the environmental impacts of an oxo-degradable product compare with the environmental impacts of the same product without the additive?

3. To identify any deficits of information that prevent a completely confident assessment being made.

The main focus of the study has been evidence for degradability, biodegradability, bio- accumulation, toxicity and the impact on recycling. Hence, in the conclusion and results sections (sections 2 and 4), the work is considered under these headings:

Executive Summary

This report addresses the environmental impact of oxo-degradable plastics. These plastics are mainly based on polyethylene (polythene) and contain additives that cause the plastic to degrade by a process initiated by light and/or heat. The additives are typically organic compounds of transition metals (such as iron, nickel, cobalt and manganese). Applications using oxo-degradable plastics include degradable plastic bags, refuse sacks, flexible packaging and agricultural mulch films.

The reason for using these additives in plastic packaging or film is to cause premature degradation of the product. For example, it is claimed by the producers that agricultural mulch film containing these additives will break down and effectively disappear at the end of the growing season, thus saving farmers the time and cost in collecting it. Similarly, the producers claim that oxo-degradable plastic bags that are released into the environment as litter will degrade and disintegrate in a much reduced time.

Aims and Methodology

The aim of this study is to assess the evidence for the effects (both positive and negative) of oxo-degradable plastics on the environment, across their life-cycle. The difference between oxo-degradable plastics and other petroleum based plastics is the use of additives to give them the accelerated property of degradation, hence the focus of the study was on the environmental effects at disposal or end of life. In particular the study has assessed:

- The extent and timeframe of degradation or biodegradation of oxo-degradable plastics.
- The effects of degradation or biodegradation of oxo-degradable plastics on the natural environment (e.g. soil, water) and different disposal facilities (e.g. recycling, landfill, compost)

The methodology employed in the study has been to review the published research on oxo-degradable plastics, assess other literature available in the public domain, and also to engage with stakeholders throughout the life-cycle of the product, including the additive manufacturers, producers, retailers, end-users and those involved in recycling and composting.

Issues for Examination

The most important issue regarding oxo-degradable plastics is the extent to which they degrade or biodegrade and the impact of this on the environment. There are various claims made on degradable packaging, such as: 'photodegradable polythene', '100% degradable plastic', '100% biodegradable', 'the plastic will start to degrade in 18 months from the date of manufacture and the whole process will take 3 years'. The extent to which such claims can be substantiated has formed an important element of the investigation reported here.

A key question is whether oxo-degradable plastics **biodegrade** (i.e. whether the plastic can be colonised and metabolised by microbes) and if so, what is the extent and time frame of this process.

That oxo-degradables do **degrade** when exposed to either sunlight or heat (~60°C) is not in any doubt. The additives serve to catalyse and accelerate break-down of the polyethylene by a process known as oxidative degradation.[†] The mechanisms of these reactions have been studied over a period of several decades and are widely reported and well established in the scientific literature. This degradation process causes deterioration in the strength of the plastic, which becomes brittle and easily fragments into small pieces. The time taken for fragmentation to occur will depend on the amount of additive in the plastic film and the environment to which it is exposed. For example, degradation reactions leading to fragmentation of polythene films will occur much more quickly in Florida compared with the UK because of the differences in the intensity of the sunlight.

Biodegradation, however, is caused by the action of living organisms rather than physical or chemical processes. However, the term **biodegradable** does not specify the extent, time-scale or conditions under which biodegradation has taken place. The term **compostable** is more precisely defined. According to the European standard on compostable packaging materials, EN13432, a biodegradation level of at least 90% must be achieved in less than six months for a plastic to be described as compostable. This study examined (so far as was possible) the length of time it would take for oxo-degradable plastics to degrade and bio-degrade, although there were limitations in the evidence beyond 6 months to 1 year.

Furthermore, after the oxo-degradable plastics start to degrade it is unclear what happens to the small fragments of plastic in the environment. Are they able to be completely assimilated by micro-organisms (bacteria, fungi and/or algae) and ultimately converted to carbon dioxide and water vapour, so that they disappear? Does it matter if they remain as fragments in the soil? Does it matter if they become air-borne or enter water courses?

[1] ***Oxidative degradation*** *is a complex series of chemical reactions in which the long chains of polyethylene molecules are broken down into shorter lengths by the action of oxygen, ultra-violet light and/or heat).*

Consequently this study has reviewed the timeframe within which oxo-degradable plastics biodegrade and the effects of the degraded plastics and additives on the environment. Evidence of **biodegradation** of oxo-degradable plastics has formed a major element of this review. Also examined is the potential for **bio-accumulation** of plastic fragments that remain in the soil. Another issue examined is the potential for transition metal additives to accumulate in the soil and hence to have a toxic effect on plants and potentially enter the human food chain. Hence **toxicological** studies on oxo-degradable plastics have also been reviewed.

Other issues examined are **re-use** of oxo-degradable bags and end-of–life scenarios including **recycling** (i.e. the impact of oxo-degradables on mechanical recycling), **incineration** and also **landfill**.

The key findings and recommendations of the report are summarized below:

1. Key findings

The overall conclusion of this review is that incorporation of additives into petroleum-based plastics that cause those plastics to undergo accelerated degradation does not improve their environmental impact and potentially gives rise to certain negative effects.

(a) Degradation and biodegradation

- The length of time to degradation of oxo-degradable plastic cannot be predicted accurately because it depends so much on the environmental conditions. It is suggested that oxo-degradable plastics left in the open environment in the UK degrade to small fragments within 2 to 5 years.

- Oxo-degradable plastics are not compostable, according to established international standards EN13432 and ASTM 6400. Oxo-degradable plastics should not be included in waste going for composting, because the plastic fragments remaining after the composting process might adversely affect the quality and saleability of the compost.

- It is thought that labelling the oxo-degradable plastics as biodegradable can lead to confusion on the part of consumers, who may assume that 'biodegradable plastics' are compostable. This may lead to contamination of the composting waste-stream with oxo-degradable plastics.

- Biodegradation of oxo-degradable plastics can only occur after they have fragmented and then proceeds very slowly, for example, at a rate many times slower than that of a compostable plastic.

- The fact that the term 'biodegradable' can be applied to materials with extremely widely differing rates of biodegradation demonstrates that the term is virtually meaningless unless the rates of biodegradation and conditions under which it is measured are specified, preferably with reference to a widely recognised standard.

(b) Bio-accumulation of plastic fragments in the environment

The fate of plastic fragments that remain in the soil is an area of uncertainty. Although these are regarded as beneficial by the producers, concerns have been raised that these particles of plastic may be ingested by invertebrates, birds, animals or fish. No evidence was found in this study that oxo-degradable fragments have a harmful bio-accumulative effect but neither was there evidence that they do not.

(c) Toxicological Impact

No evidence of a toxicological impact of oxo-degradable additives was found in this review. It is concluded that the transition metals used are present in such small amounts that they will not significantly increase the concentrations naturally present in the soil at expected levels of usage.

(d) Re-use

The fact that they are degradable limits the re-use of oxo-degradable bags: they are unsuitable for storing items for an extended length of time.

(e) Recycling

Oxo-degradable plastics are not suitable for recycling with main-stream plastics. The recyclate will contain oxo-degradable additives that will render the product more susceptible to degradation. Although the additive producers suggest that stabilisers can be added to protect against the oxo-degradable additives, it would be problematic for recyclers to determine how much stabiliser needs to be added and to what extent the oxo-degradable plastic has already degraded. On this basis it seems unreasonable to claim recyclability of oxo-degradable plastics in existing recycling streams.

(f) Disposal – Incineration and Landfill

The potential for problems to be caused by incorrect disposal of oxo-degradable plastics means that any packaging should be clearly labelled with the appropriate means of disposal. Life cycle analysis suggests that the best means of disposal for oxo-degradable plastics is incineration. If incineration is not available then landfill is the next best option.

There is a lack of evidence about what actually happens to oxo-degradable plastics in landfill. It is possible that they will degrade in landfill sites if sufficient oxygen is present but the most likely scenario is that they remain un-degraded.

(h) Litter

Some oxo-degradable producers maintain that their products are a solution to the littering problem because oxo-degradable packaging will eventually degrade and then biodegrade. However, as the plastics will not degrade for approximately 2-5 years, they will still remain visible as litter before they start to degrade.

2. Recommendations

The recommendations regarding oxo-degradable plastics made on the basis of all the evidence reviewed in this study from the peer-reviewed literature, non-peer-reviewed literature (reports and websites) and also from stakeholder interviews are given below:

- The term 'biodegradable' does not indicate the environment or timescale required for biodegradation to occur and is therefore problematic for labeling packaging. There are two possible solutions to this:

  (i) One solution is that if the term 'biodegradable' is used then it is necessary to define the disposal environment, extent of biodegradation in a short given time period or the time taken to complete biodegradation.

  (ii) The other solution is not to use the term biodegradable for labeling / packaging at all but to only label with instructions on the means of disposal.

- The fate of oxo-degradable plastic after it has fragmented to a fine powder is not clear. Therefore it is recommended that further research is carried out to determine whether complete degradation to carbon dioxide and water is achieved, and if so, over what time scale. If the fine particles are found to persist in the environment for a long period of time, research should be carried out to determine the effect of the particles on the wider environment.

- The uncertainties surrounding the effect of oxo-degradable plastics on the conventional plastics recycling process means that the safest solution is to keep oxo-degradable plastics out of mainstream plastics recycling processes.

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Scientists Accidentally Discover a Compound that can Strip Air of CO_2

In what could be called as an accidental discovery, chemists have found a catalyst that strips only carbon dioxide from the air – ignores oxygen – and converts it into a useful compound.

However, the copper-based compound is still far from being a practical air-scrubber for removing CO_2, because the catalyst takes hours to be recycled to its original state.

But the innovative chemistry has led scientists to believe that a catalyst could one day selectively and efficiently remove the greenhouse gas from the air, turning it into organic chemicals.

Many catalysts with a structure based around a metal centre – such as a copper atom – can grab CO_2 from a pure stream of the gas, but when in contact with air, they prefer to couple with the more abundant and more reactive oxygen.

So the selectivity of the new compound is 'completely unexpected', Nature quoted Elisabeth Bouwman at Leiden University in the Netherlands, who led the team that discovered the catalyst, as saying.

The researchers were investigating compounds that mimicked the activity of biological enzymes.

Bouwman took the chemical shell off the nickel centre of one such mimic, and tried wrapping it around copper for comparison.

But, she noticed that this structure produced a yellow solution, which turned green-blue after sitting in the open air for a few days.

Analysis of the green-blue product showed that it contains a segment called oxalate – made of two CO_2 molecules – which form a bridge linking two copper atoms together. This fragment could occur only if CO_2, not oxygen, had oxidised the copper compound.

Bouwman said that she doesn't know why the copper complex prefers CO_2 to oxygen, but it could be because the oxalate bridge within the molecular structure of the green-blue product is extremely stable. The results of the study has been published in the scientific journal Science1.

Source: Mumbai Mirror; 16 January, 2010

Press Conference on Issue of "Plastics Bags"

A Press Meeting was organised at Press Club of India, Azad Maidan, Mumbai jointly by ICPE, All India Plastics Manufacturers' Association (AIPMA) and Plastindia Foundation on 29th January to appraise the Media on the environmental burden due to a total ban on all types of plastics bags.

The Press Meet was attended by all major media representatives. ICPE awareness film was screened and 'Note' prepared on the issue was shared. Mr. Vijay Merchant, Mr. Arvind Mehta and Dr. Mahendra Parmar interacted with the media representatives.

Following Note along with other awareness materials were circulated during the Meet:

Note for the Members of the Press at Press Club, Mumbai, 29th January, 2010

Plastics have gained widespread applications from the common household goods to high technology instruments. Plastics have made significant contribution in the area of medical safety and health care. Light weight yet tough, inert, excellent barrier properties, ease of moulding into flexible or rigid products, transparency when desired, low consumption of energy and least effect on environment during its production and processing – all these attributes have made plastics indispensible in modern day life. Its uses in Agriculture, Building, Automotive Components; Electrical & Telecommunication; Electronics and Appliance; House wares, Packaging of food and pharmaceutical are some of the areas of major significance.

Plastics reduce the emission of Green House Gases and leave lower Carbon Footprint compared to alternative materials. Plastics have replaced wood in many applications thereby, saving millions of trees. However, despite all these positive attributes, plastics attract the attention of critics due to wrong reasons.

Often Plastics are accused of being a health hazard. The reality is that, plastic products are mostly inert. Plastic products have been implanted into vital human organs clearly disproving the myths. Plastics are used for packaging of blood and vital pharmaceutical products. Plastics Disposable Syringes are widely used in healthcare sector. There are clear international and national regulations / standards for usage of plastics that comes into contact with food, pharmaceutical products and drinking water, etc. Emissions and wastes emitted during the production of plastics are much less as compared to the alternative materials.

There are concerns raised that plastics carry bags are not biodegradable and create disposal problem. While it is true that plastics are not amenable to biodegradation like other organic matters, many alternate materials such as glass, metals are also not biodegradable.

LCA studies carried out for various products clearly prove that the energy required for production of plastics is much lower than that of alternate materials. Thus non-biodegradability alone cannot be a consideration while deciding on the appropriate needs of a material. Biodegradation results in depletion of resources while reuse and recycle is more desirable.

Plastics are blamed as the major cause of Solid Waste problem. This is mainly due to the poor littering habit of general mass and inadequate infrastructure for management of solid waste. Due to this we find all types of dry waste, including plastic waste, littered in our surroundings. Even wet waste is also found littered around the street corners and elsewhere, creating serious health hazards.

Plastics waste form only about 5% of the MSW stream in major Indian cities. There is no technical problem of disposing the plastics waste. Plastics waste can be 100% recycled. Very thin plastic bags, though per se not hazardous and are recyclable, are often left behind by the waste pickers due to economic reason. These very light weight plastic film waste do not generate reasonable return to waste pickers and hence are left behind creating waste management problem. To avoid this, MoEF, Government of India had in 1999 and later in 2003, come up with Rules restricting the thickness and size of plastic carry bags (20 micron / 20 x 30 cm). Some State Governments had further modified the rules by increasing the minimum thickness. Maharashtra Government, in 2006 had notified the minimum thickness at 50 microns.

Plastics bags are widely used in developed countries like the USA, Canada, UK and the EU Countries and Japan without any restriction. There exist appropriate waste management systems to handle all types of MSW including waste plastic bags. The real solution in India lies in the segregation of dry and wet solid waste at the source for which an effective mass awareness campaign is required to be launched. Creation of efficient Solid Waste Management

infrastructure coupled with establishment of recycling centres would help address the SWM problem. Plastics can be recycled to produce articles for mass use augmenting the concept of resource management.

Apart from the conventional recycling, alternate processes of plastics recycling also are required to be encouraged. Low-end, mixed and co-mingled plastics waste can be used safely for co-processing in cement kilns. Industrial fuel can be produced from all types of plastics waste. Plastics waste has been used to construct asphalt roads. All these processes have been successfully tried and established in Indian conditions. ICPE has taken lead in establishing and popularising these concepts in India.

Banning of all types of plastics bags is not the solution. Rather banning of plastics bags would aggravate the situation by creating additional environmental burden and would also inconvenience the people. The poorer sections would be the worst sufferer.

A fruitful partnership between Government, local bodies, plastic industry and general public is required to be developed. Plastics Associations are willing to cooperate with the Administration in evolving more sustainable solutions to plastic waste management problems.

Awareness Programmes in Schools/Colleges

Indira Gandhi Institute of Technology (IGIT), New Delhi

An awareness programme was organised at Indira Gandhi Institute of Technology (IGIT), New Delhi, for interactive talk and presentation on the theme of "Sustainability" in their "XEBEC 2010" Green Summit Festival on 4th & 5th March, 2010. Apart from ICPE, various prominent organisations – TERI, CSE, WWF & KRITI also attended and screened their Eco-films and made presentation on various Environmental issues on Sustainability. ICPE had screened Two Short films – "Living in the Age of Plastics" and Plastic Recycling (English) followed by a presentation on "Plastics in the Environment". The program was concluded by an interactive section participated by students and teachers. The students showed a keen attention and interest in ICPE's films and presentation. Their interest was particularly on the unconventional plastic recycling applications viz. Use of Plastic Waste for Better Roads and Carbon Recycling – Fuel from Plastic Waste. Besides the above, they empathized with the current issue on Plastic Carry Bags in Delhi, NCR and the "DO NOT LITTER" campaign being done by ICPE besides popularizing the concept of Reuse.

Seminar on 'Plastics Recycling and Waste Management in the Country'

A Seminar on 'Plastics Recycling and Waste Management in the Country' was organized by CIPET at Deenbandhu Choturam University of Science and Technology, Murthal (Sonepat district, Haryana) on March 15, 2010.

Prof (Dr.) S. K. Nayak, Director General, CIPET, highlighted the positive role played by plastics in our day-to-day lives and the widespread applications of plastics wherein plastics have replaced conventional materials owing to its special properties. He also threw light on the issues related to plastics waste management in the country because of mismanagement of waste and littering habits which has put plastics in the wrong perspective and measures to be undertaken for efficient management of the waste. Mr. H. S. Chahal, Vice Chancellor of Deenbandhu Choturam University of Science and Technology, in his special address spoke about the need for generating awareness at educational institutes and universities on environmental issues. Others who spoke during the seminar were Mr. Sundar Balabtishnan, Harita NTI Ltd., Ms. Savita Pradeep, ICPE, Ms. Bharati Chaturvedi, Chintan, Mr. Alok Sahu, CIPET.

A Panel Discussion chaired by Mrs. Geeta Menon, Director, DCPC, and joined by Mr. Ajit Joshi, Deputy Commissioner, Sonepat, Mr. Arunava Guha, ICPE, Dr. Sunil Nigam, CPCB, and Mr. Sugumar, CIPET Corporate had an open session on: • Myths and realities of Carry bags • Recycling of plastics and products made from recycled plastics • Recycling of multilayered laminates • Fuel from waste.

ICPE awareness film was shown and awareness literature and newsletters was distributed among all the participants of the seminar.

Mass Awareness through Participation in Exhibitions

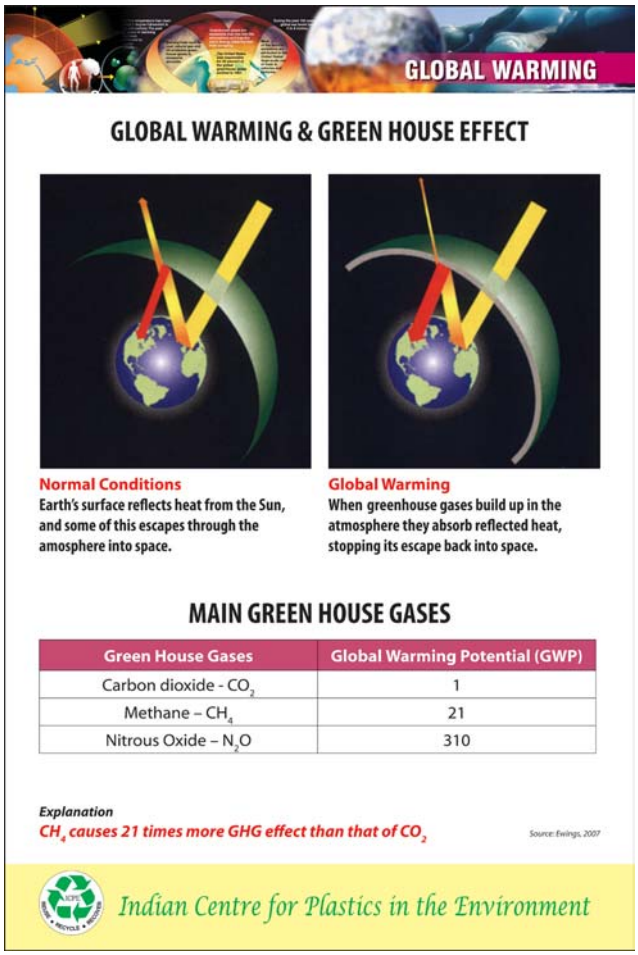
PLEXPO 2010
9-12 January, 2010

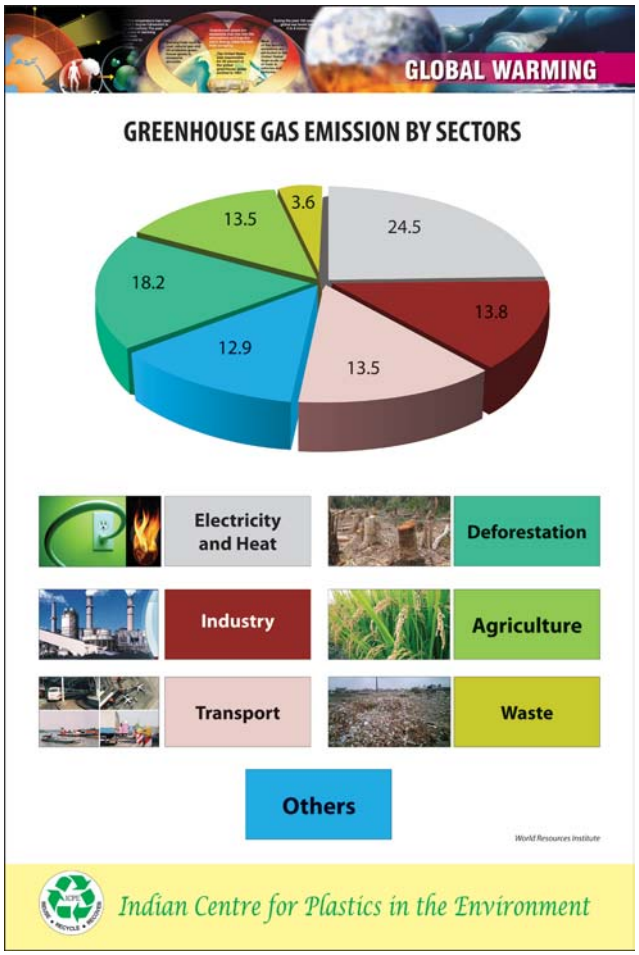
PLASTPACK - 2010
19-22 February, 2010

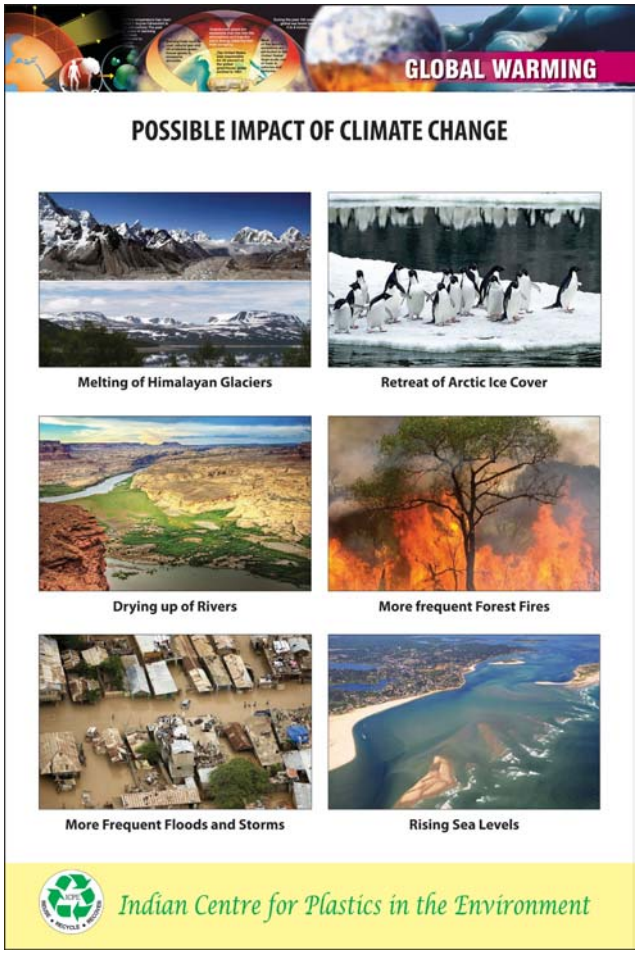
ICPE participated in two Exhibitions during the period – **PLEXPO 2010** organised by Gujarat State Plastics Manufacturers Association during 9-12 January, 2010 at Ahmedabad and in **PLASTPACK - 2010** organised by Indian Plastpack Forum, Indore during 19-22 February, 2010.

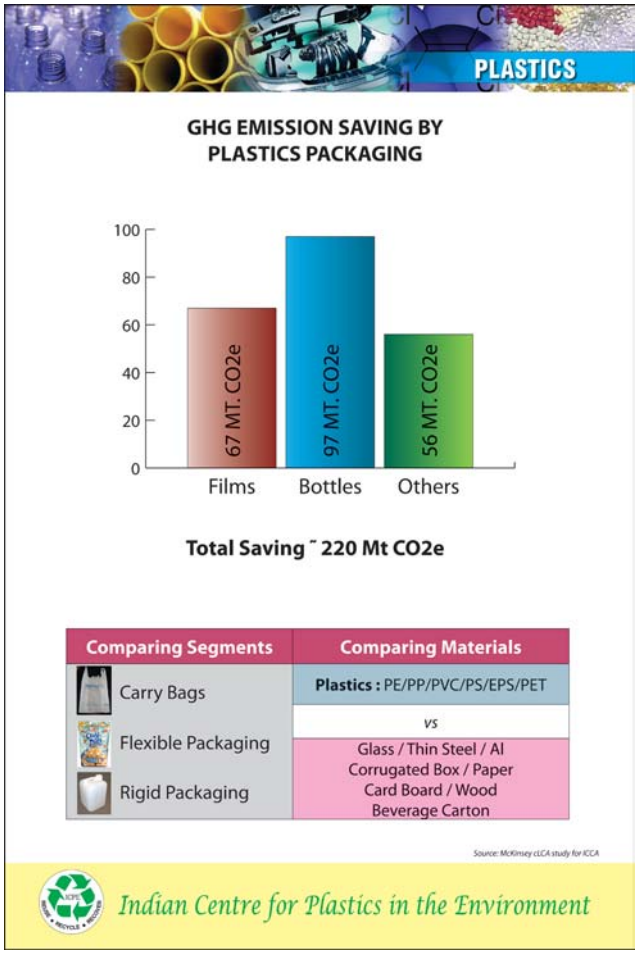
In both the Exhibitions the reduction in Green House Gas Emissions and thus reducing the effect of Global Warming by Plastics – was showcased along with Plastics Waste Management and Plastics Recycling.

Display Panels for Mass Awareness



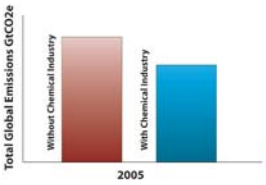






PLASTICS

Plastics
TOP GREENHOUSE GAS EMISSION SAVER



In 2005, Total Global Emissions was 46 GtCO2e

It could have been 51.2 Gt CO2e, but for the savings by Chemical Industry

Savings by Chemical Industry 11%

Among The Top 10 Green House Gas Emission Saving Sectors -

4 are Plastics


Insulation Materials


Packaging


Automobiles


Piping

PLASTICS SAVE GREEN HOUSE GAS EMISSIONS

Source: McKinsey cLCA study for ICCA

Indian Centre for Plastics in the Environment

PLASTICS

ENERGY SAVING
One Lac Ltrs of Milk Packaging

Glass *vs* Plastic

Energy consumption in GJ for
Manufacture of Packaging Raw Materials, Packagings and Transportation of Milk

Energy Saving – 86%
Energy Recovery with Plastics Waste - 20 GJ

Source: LCA Study by IIT (Delhi)

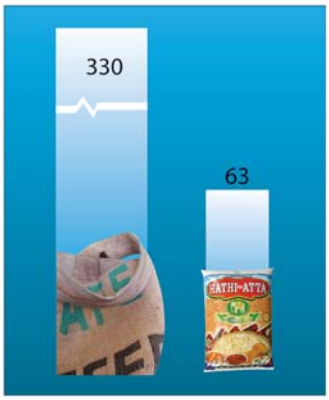
Indian Centre for Plastics in the Environment

PLASTICS

ENERGY SAVING
One Lac MT. of Atta Packaging

Jute *vs* Plastic

Energy consumption in GJ for
Manufacturing Packaging Raw Materials, Packagings and Transportation of Atta



Energy Saving – 81%
Energy Recovery with Plastics Waste - 35 GJ

Source: LCA Study by IIT (Delhi)

Indian Centre for Plastics in the Environment

PLASTICS

Environmental Burden During Production of Raw Material & Bags

Environmental Burden in Kg.	Jute Bag	Plastic Bag
Air Pollution		
CO	54.3	0.6
CO2	6610.2*	760*
SOx	134.8	5.2
Nox	68.1*	4.8*
CH4	39.5	3.2
HCL	5.3	0
Dust	67.6	1.4
Water Pollution		
Suspended Solids	352.3	0.2
Chlorides	4535.5	0.1

The values are for packaging of one lac MT of Atta.
Source – Report by Centre for Polymer Science and Engineering, IIT - Delhi

The Environmental Burden During Transportation of The Finished Bags

Emission	Gm/km	Excess Emission for Jute Bags	Plastic Bags
CO2	781*	11107.3*	Taken as Basis
CO	4.5	64	Taken as Basis
HC	1.1	15.6	Taken as Basis
NOx	8*	113.8*	Taken as Basis
Particulates	0.36	5.1	Taken as Basis
Total Regulated Tailpipe Emission	13.96	198.5	Taken as Basis

** High potential for Global Warming*

The values are for packaging of one lac MTs of Atta.
Source – Report by Centre for Polymer Science and Engineering, IIT - Delhi

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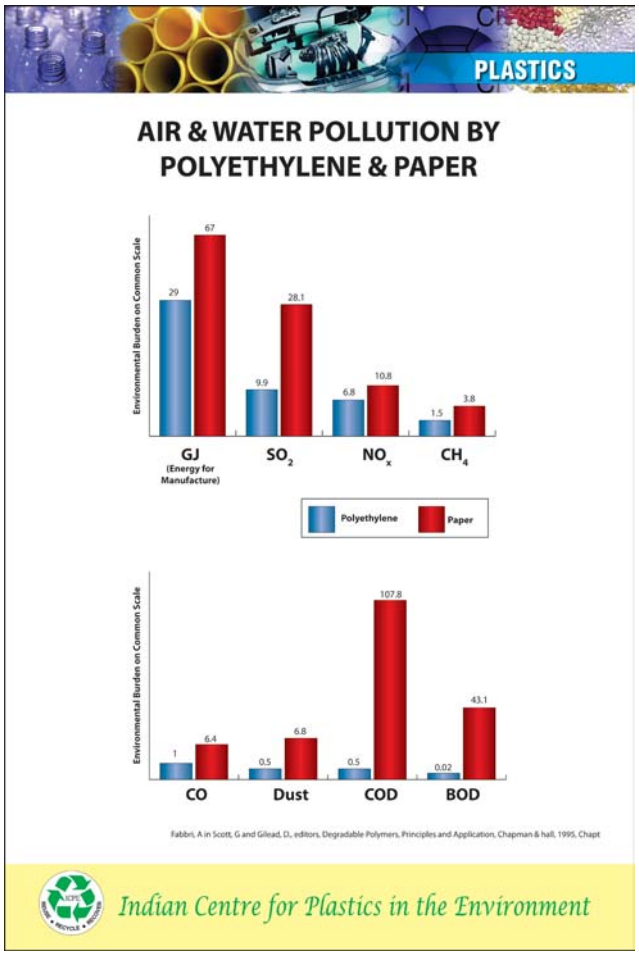
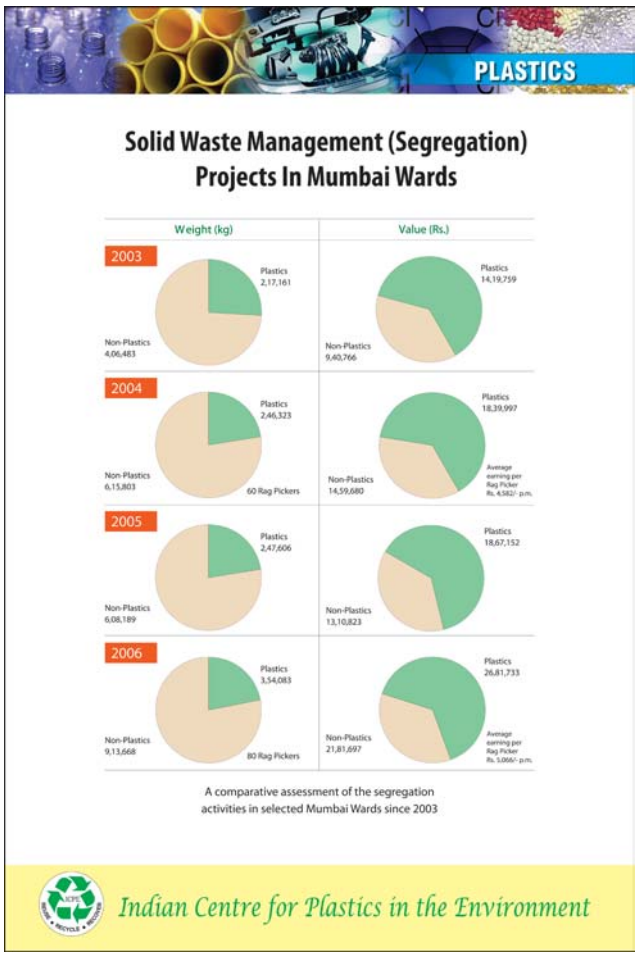
Display Panels for Mass Awareness





PLASTICS

SEGREGATION OF WASTE AT SOURCE


Rag Pickers with Van


Dry waste at Housing Colonies


Dry waste being carried for loading into Municipality Van


Loading of dry waste in Municipality van


Municipality van with dry waste on way to segregation area


Segregation of dry waste


Storing of segregation dry waste in secured place


Packing of segregated dry waste


Segregation of dry waste being weighed and sold to recyclers / traders

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PLASTICS

Solid Waste Management

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PLASTICS

Did you know that if plastics in packaging were replaced by traditional materials, **world energy consumption** would **double ?**

e = x 2

Did you know that if plastics in packaging were replaced by traditional materials, **CO_2 emissions would increase 7 times over, adding to the greenhouse effect ?**

CO_2 x 7

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PLASTICS

Scientific Solution to Plastics Waste Disposal With Recovery of Energy

All types of mixed plastics waste can be co-processed in Cement Kiln in Safe & Environment Friendly Manner

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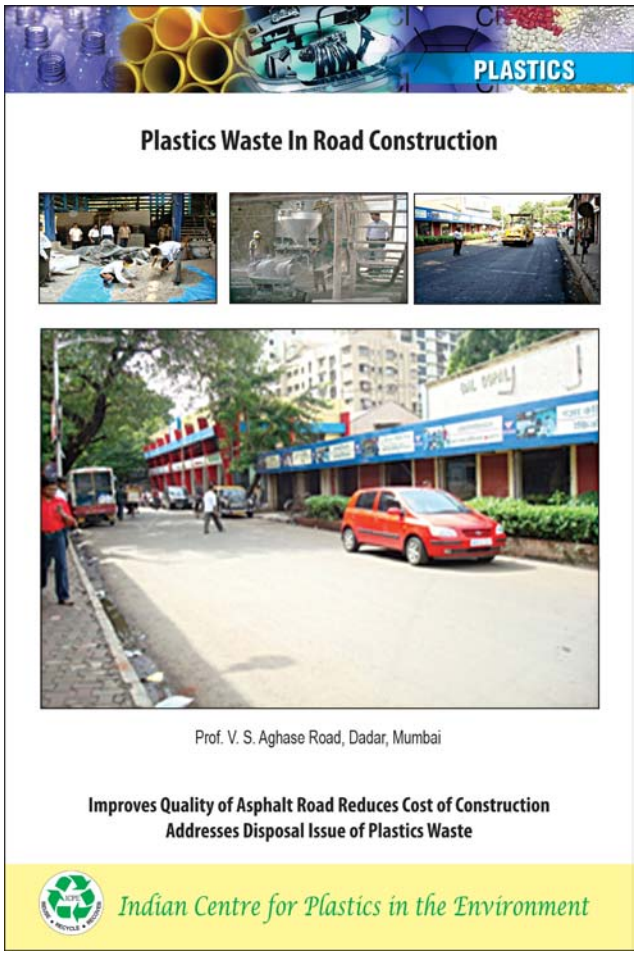
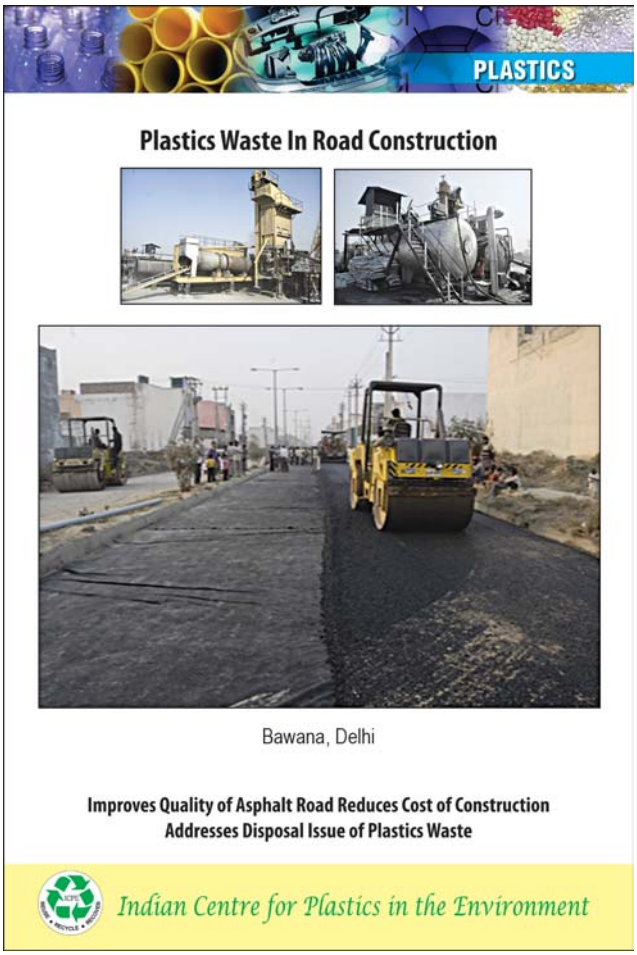
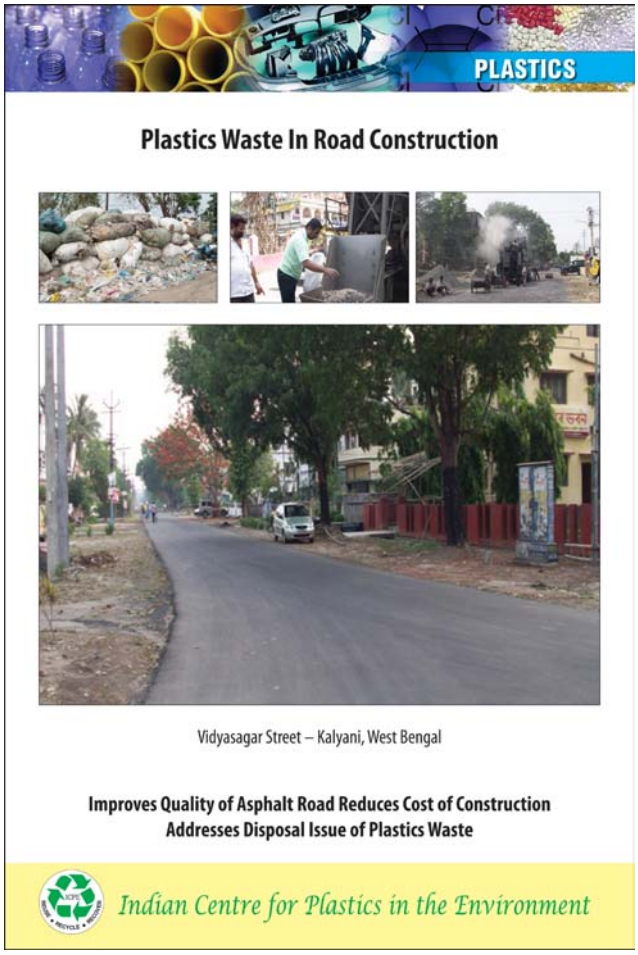
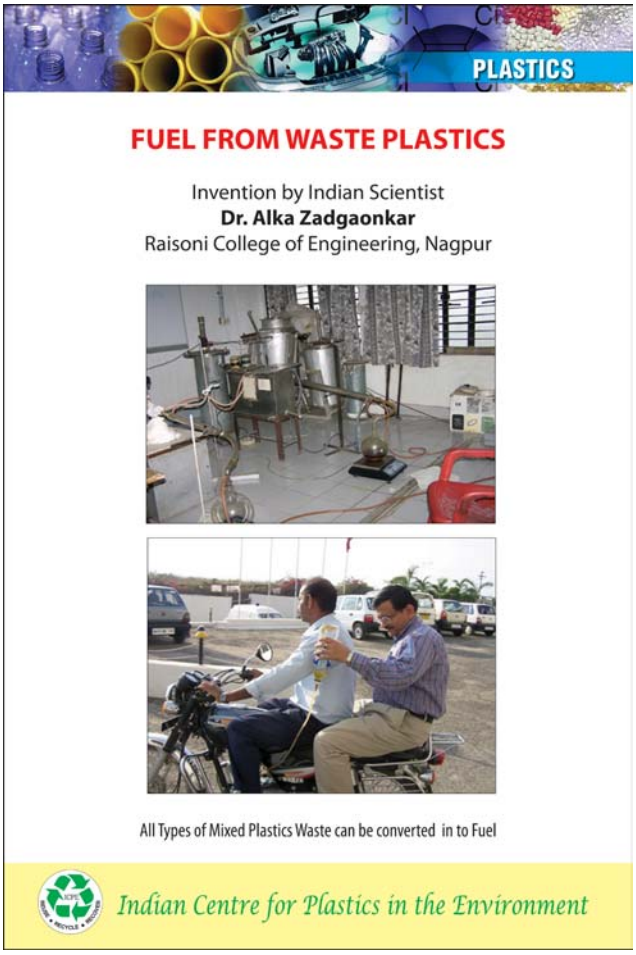
Display Panels for Mass Awareness









For the benefit of Road Engineer/Contractor, details of mixing of plastics waste for the construction of road by batch process are given below.

The continuous process will be given in the following editions of the newsletter.

PLastics Waste in Road Construction – Batch Process

Plastic Waste

Step :1 Mixing of shredded plastics waste with aggregate

Step 2 : Aggregates mixed with plastics waste being charged into hot mix chamber

Step 3 : Hot Bitumen being charged

Step 4 : Hot mix discharge - ready for road laying

Constructed Road

Do Not Litter.
Keep Your Environment Clean.

- **Segregate and Throw Waste Only in Waste Bins.**
- **Use Two Bins – One for Wet Waste, One for Dry Waste.**

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

Waste Food and other Biodegradable Waste.
Can be composted into manure.

Issued in Public Interest by

ICPE
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