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## IN THIS ISSUE











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*Area of Activity*

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

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**Mr. S. K. Ray,**
Executive Secretary,
Member - Executive Committee

*ICPE-ENVIS Co-ordinator*
**Mr. T. K. Bandobadhyay,**
Sr. Technical Manager



## EDITORIAL

'ENVIS' has been disseminating information on various processes of Recycling of Plastics Waste. In the last edition we carried information on 'Disposal of Plastics Waste through Co-processing in Cement Kiln' – an energy recovery process. In this edition, we are carrying a report on a very important issue – 'Plastics Waste Management and Recycling' – through mechanical recycling process. The report pertains to the system, as practised in Milano – the commercial capital of Italy. Such a system, if implemented in India, could resolve the Plastics Waste Management issues to a great extent. We will carry more information on the subject in our forthcoming editions.

ENVIS has been carrying articles on the issue of Plastics Carry Bags highlighting the facts supported by scientific studies. In this edition, a report from the European country of Norway has been published. Though the infrastructural facilities and littering habits of the common mass of India and Norway are vastly different, nevertheless there are common view points in the report, which are supported by scientific evidences.

Importance of creating awareness among the citizens has been realised by all. ICPE has been active in this activity since its inception. Recently, Mr. K. G. Ramanathan, President – GC, ICPE had appealed to all major Plastics Associations of India for organizing Awareness Programmes for school children in their respective localities, as a part of creating mass awareness in various parts of the country, with commitment of technical and material assistance from ICPE. The effort is giving the desired result to some extent. Plastics Associations and Institutes have started organising Awareness Programmes in different areas and about 8000 students and community members in about 50 schools / locations have been covered under the programme during the period December 2008 to March 2009. A brief report has been published in this edition.

ICPE had participated in Plastindia 2009 Exhibition held in the month of February. Awareness Programme for School Students was organised at the Exhibition stall.

Electronic version of the Newsletter is now available and would be forwarded to the readers whose e-mail IDs are available with ICPE data base. Readers may like to send in requests for receiving the same with their own e-mail IDs as well as details of other interested / potential recipients.

We continue to look forward receiving comments and suggestions from the readers.

T. K. Bandopadhyay
*Editor*

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COVER STORY

# Plastics Waste Management & Recycling at Milano, Italy

## A Report on Visit of Indian Delegation to Plast-09, International Exhibition on Plastics at Milano, Italy

On the invitation of Italian Trade Commission in India in association with ASSOCOMAPLAST – Italian Plastics and Rubber Processing Machinery and Moulds Manufacturers Association, a delegation of Members from Indian Plastics Industry visited Plast-09 – International Exhibition on Plastics, at Milano, Italy during 25th-31st March, 2009. Representatives from CIPET, Plastindia Foundation (PIF), All India Plastics Manufacturers Association (AIPMA), ICPE and Plastics Processors from Mumbai, Delhi and Kolkata comprised the 15 Member Indian delegations. ICPE Management had deputed its Sr. Technical Manager – Mr. T. K. Bandopadhyay for the visit. On the specific request of ICPE and CIPET representatives, Italian Trade Commission and ASSOCOMAPLAST had made special arrangement for the Indian Delegations to visit a large scale Plastics Recycling/Reclaiming Plant and some important Machinery Manufacturers near Milano. Following is a brief report.

**Montello S.p.A. –** A large scale Plastics Recycling/Reclaiming Plant near Milano (www.montello-spa.it).

The company processes about 120,000 MTs of post consumer plastics waste per year. It also processes about 165,000 MTs of organic waste to produce Biogas, Electrical Energy and Organic Fertiliser. The process is machine controlled. Separation of different plastics material is by Gravimetric Floatation and other Patented Processes. Manual labours are also employed in limited number for sorting on line. It has full fledged laboratory with effluent treatment plants conforming to EN Specifications.

The company receives dry plastics waste from the local County Authorities. All waste received is segregated at source and contain only plastics waste free from organic waste (household waste only). The waste is supplied by County Authorities who pay Euro 200 per MT to the company for pre-cleaning, sorting into different categories of plastics and baling – ready for delivery to recycler. County Authorities then collect the clean and prepared plastics waste for selling the same to potential recyclers/processors. If the company (Montello in this case) wants to use the cleaned plastics waste in its own downstream recycling plants, it has to buy the quantity from the Country Authority @ Euro 300 per MT. In practice, the company purchases all the PET and HDPE bottle waste which are converted into PET flakes (intermediate product for PET multifilament/sheet manufacturers) and into HDPE Dimpled Sheets (final product) using a separate in-house sheet plant, for road construction application. Other types of sorted and cleaned plastics waste is returned back to the County Authority for onward selling to recyclers/processors. **State Authority monitors and supervises the commercial transactions at site.**

**It is reported that the city of Milano also faced problem of littering about 20 years ago. Government Authorities imbibed awareness among the general public by campaign through electronic media.**

This system of plastics waste collection and recycling the same to useful products is sustainable as the County Authorities earn for the collection process, reclaiming industry earns for its service and the recycler also gets raw material ready for its commercial production. The city remains clean and the environment also remains pollution free as the reclaiming industry deploys all pollution control arrangements, which are monitored and inspected by the regulatory authorities. It is reported that the city of Milano also faced problem of littering about 20 years ago. Government Authorities imbibed awareness among the general public by campaign through electronic media.

Brief descriptions of the recycling processes of different types of plastics waste have been illustrated below:

- **Packaging sorting plant:**





The sorting plant separates and prepares the plastics packaging waste for subsequent recycling process. The sorting, which is carried out by means of high-resolution NIR (Near Infra Red) detectors, is done by polymer and in case of PET containers for liquids, also by colour. Afterwards, the material is packaged and stored in the warehouse, ready to be sent to the recycling plants.

- **Polyolefinic granule production:**







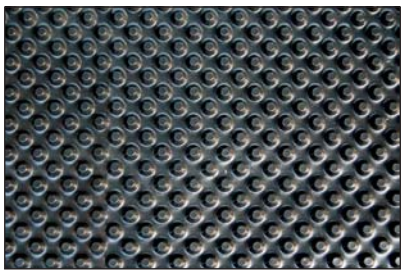


Mixed Polyolefinic packaging waste is converted, through grinding, washing, floatation to eliminate foreign materials and centrifugation, into flakes and granules used for various productions, from extrusion to moulding. Products resulting from the use of flakes and granules are employed especially in the building sector (claws, spacers, bituminous sheaths, etc.) and in the production of flower vases and various articles for urban fittings.

- **Dimpled Sheet production:**

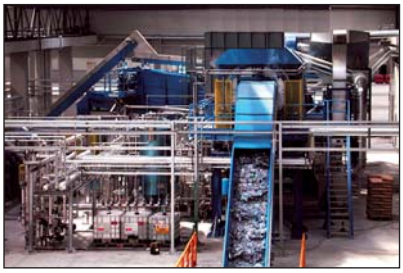


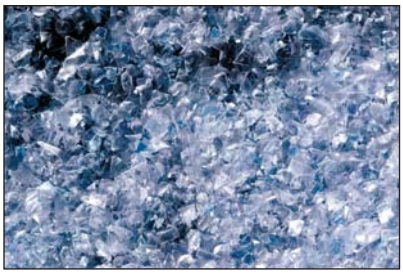




Starting from HDPE containers for liquids, the company produces Dimpled Sheets for the building industry. This product is excellent as insulation for both sub-soil construction works and horizontal laying for its unquestionable draining and waterproofing capacity.

- **PET Flakes production:**



The PET bottles divided by colours (clear, light blue, mixed colours) are converted into flakes through grinding, washing, floatation to eliminate foreign materials and centrifugation. Upon subsequent processing these PET Flakes are converted into heat-formed blisters, plates, triple layered containers, carpets for industry and automobiles, textile industry etc.

- **Heterogeneous Waste intended for energy recovery:**



The heterogeneous waste of packaging which result from various processes (sorting and recycling) and which are no more recyclable into material are prepared for energy recovery.

*Mechanical Recycling Plant like the one at Montello S.p.A. can resolve the plastics recycling issues in India. Such plant, even with reduced capacity, one in each of the 4 metros to begin with, could provide an answer to all environmental and economic issues relating to disposal of plastics waste. Some modifications in the process can be made to include manual labourers to segregate the input waste from municipality and other sources. Increased capacity of the recycling plant would also encourage waste pickers/waste traders and even the local bodies to divert their plastics waste to this kind of facility near the city limits. Common mass will start segregating the household waste at the waste generation source itself.*

About the plant suppliers, Sorema, a division of Previero and Amut S.p.A. are among the largest manufacturers of complete recycling plant system in Italy. The design of the plant depends on the type of contamination and plastics in the waste stream. The companies provide free service for this.

For the benefit of interested entrepreneurs, a list of major manufacturers of Plastics Recycling Plants of Italy is given below:

| Manufacturers | Website | e-mail |
|---|---|---|
| • Sorema, a division of Previero | www.previero.it | sales@previero.it |
| • Amut S.p.A. | www.amut.it | amut@amut.it |
| • Gamma Meccanica | www.gamma-meccanica.it | info@gamma-meccanica.it |
| • Technova | www.tecnova-srl.it | tecnovaesteri@msoft.it |
| • Adler | www.adlerbuzzi.com | granulator@adlerbuzzi.com |
| • Tria | www.triaplastics.com | info@triaplastics.com |
| • PRT Service & Solutions | www.prtinnovation.com | info@prtinnovation.com |
| • Technofer | www.tecnofer.biz | info@tecnofer.biz |

## International Meeting

*L to R: Mr. Gerard Wolters - Inspector General; Ms. Jenny van Houten - Secretary to Inspector-General; Mr. B. B. Bansal, Commercial Advisor, Office of Consulate General of the Kingdom of the Netherlands in India; Mr. K. G. Ramanathan; Mr. V. Merchant; Mr. Gerrit Markvoort - Deputy Inspector, Mr. Johan Huijbregts - Project Manager, India*

Representatives of the Ministry of Housing, Planning and the Environment of the Government of the Netherlands (VROM) led by Inspector General - Mr. Gerard Wolters accompanied by four other Ministry Members, had called on ICPE team at ICPE office on 5th March 2009.

Mr. K. G. Ramanathan, President – Governing Council led ICPE team. Mr. Vijay Merchant, Member – Governing Council and Mr. T. K. Bandopadhyay – Sr. Technical Manager were the other team members of ICPE.

*The team members during discussion.*

Salient points of discussion included Waste Disposal Methods, Recycling Technologies and Environmentally sound many waste treatment streams in India. The issue of Illegal Waste Shipments from Europe to developing countries including India was also discussed.

ICPE team emphasised on the Health, Safety and Environment issues relating to contaminated waste, including the e-waste being shipped to India by many developed countries. The two teams exchanged information and shared their view points on the issues and agreed to cooperate and work together for a common goal of keeping our environment clean and safe. Possible areas of cooperation could be decided after further discussions.

REPORT

# Plastic Carrier Bags "Sustainable Trade and Recovery"

**A report by Mepex Consult AS for the Stakeholders of Plastretur AS in Collaboration with Grønt Punkt Norge AS (Green Dot Norway Ltd.)**

Abbreviated Version (Summary), 21.08.08
Peter Sundt, Mepex Consult AS, peter.sundt@mepex.no

## Background

In the course of 2008 we have seen a number of political initiatives, national and local, involving proposals to ban plastic carrier bags in Norway. Following one such proposal put forward by Environment Minister Erik Solheim on television on 8 March, the ministry instructed the Pollution Control Authority (SFT) to undertake a review of the issue to be completed by 1 September.

## Remit and Objectives

On commission from Plastretur and its stakeholders:

- DMF/ Norwegian Retailers Forum on Environmental Affairs
- Plastindustriforbundet/ Plastics industry
- NHO Mat og Drikke/ Confederation of Norwegian Enterprise, Food and Beverage

Mepex Consult has prepared a report. Its aims were as follows:

- to bring to light all aspects of the ways in which plastic carrier bags are now used (chapters 1-3 and 6),
- to consider alternatives to the plastic carrier bag on an objective and neutral basis (4-5),
- to prepare an action plan with concrete proposals for reducing the environmental impacts (7-8).

The action plan takes as its starting point the lifecycle of the plastic carrier bag with the aim of extending it and so supporting the principle of "sustainable trade and recovery".

The work has benefited from a useful dialogue with the business community as well as constructive discussions and meetings with the waste sector. Solheim's initiative is seen as a constructive challenge.

## 1. Facts about the Plastic Carrier Bag

About a billion plastic carrier bags are used in Norway each year. Globally, we are looking at an annual consumption somewhere between 500 and 1000 billion.

The average carrier bag in Norway weigh is about 15 grams, can carry up to 15 kg and accommodate 10-15 litres by volume. A plastic carrier bag can therefore carry a thousand times its own weight. Approximately 80 per cent of the carrier bags are larger than 10 litres, while the rest are smaller bags under 10 litres.

The consumption of plastic carrier bags in Norway, about 14,000 tonnes, has been relatively stable for the past five years. This works out to roughly 3 kg of plastic per person per year, or 20 per cent of the annual total of plastic packaging used by households. The plastic carrier bags account for less than one per cent of household waste in Norway. The vast majority of the plastic carrier bags, moreover, also serve an important additional function: wrapping up other kinds of waste and other used packaging.

In comparison with other materials, little energy is required to make plastic: a kilogram of plastic needs a total two kg of oil, one of which is used as energy in the process. Based on lifecycle analyses (source: Stiftelsen Østfoldforskning) it is arguable that through material recovery up to two kg of oil can be saved for each kilo of plastic recycled. Oil used to manufacture plastic products can be seen as "on loan", in the sense that we can get it back through recycling either as energy or as new plastic products.

Four per cent in total of the world's oil resources are used to manufacture plastic; the rest is burned as transport fuel or for generating energy and heat. On a global basis plastics are used as raw material in a huge range of products; 35 per cent is used to make packaging. Plastic is also produced from (Norwegian) natural gas, and is expected in future to be produced from renewable raw materials such as sugar and maize, and ultimately even wood waste, carbon dioxide and more. An international debate is in progress as to whether it is advisable to speed up this development by making more plastic from renewable raw materials, raw materials which are often used in food production.

In Norway we mainly use low density polyethylene (PELD) to make plastic carrier bags, as this type of plastic produces somewhat thicker and sturdier bags that can be re-used and finally recycled or utilized as energy. Reuse in this context mainly involves the use of the carrier bag as a rubbish bag as opposed to frequent reuse for shopping.

Some 60 per cent of all plastic carrier bags in Norway are ultimately used to wrap up household rubbish, about 18 per cent to transport bottles and cans to reverse vending machines, 15 per cent to collect plastic packaging or otherwise participate in that return system for material recycling, and about four per cent to transport other used packaging (glass/metal), as well as clothing, etc., to various collection points. In this way the plastic carrier bag serves as a useful "tool" in a number of sorting-at-source systems in Norway.

Altogether about 18 per cent of all the plastic carrier bags are recycled as material, while ca. 52 per cent are utilized as energy and ca. 29 per cent sent to landfill. The introduction in 2009 of new restrictions on waste disposal will reduce the volume of residual waste and therefore the numbers of carrier bags ending up in landfill.

The lifecycle of the plastic carrier bag is illustrated on the front page of the report. The figure shows that plastic carrier bags are used several times and therefore have a long life before finally, as a rule, being recycled as new plastic products or utilized as energy. In the meantime the bag has been used first for shopping, quite possibly several times, and then for recovery, i.e. wrapping up used packaging and residual waste. In addition, new plastic bags can be made of recycled plastic from carrier bags and other plastic films (PELD).

Most recently, other types of carrier bags have come onto the market, so that ***in a short time we have gained access to a variety of solutions and consumers have had more freedom to choose what they use to carry their goods home and package their waste.*** In particular, promotions in boutiques and in the media have featured various types of reusable mesh bags in recent months. To a large extent these are also made of plastic, mainly nylon and woven PP (polypropylene).

Plastic carrier bags are only one of many plastic film products with which we surround ourselves. There are also fruit bags, freezer bags, bread bags, rubbish bags, etc. To some extent these bags are used arbitrarily. Based on the experience of other countries, in Ireland for example, reducing the consumption of plastic carrier bags will lead to certain adjustments in the market and an increase in the use of other types of plastic bags.

A royalty is paid to Grønt Punkt for all plastic carrier bags. The bags are labelled with a green dot and incorporated in the recovery system for plastic packaging. A similar arrangement for reusable mesh bags is currently under consideration.

## 2. Litter

Litter in Norway – in parks, along the roads and in the countryside – normally consists of many different fractions (source: Hold Norge Rent/Keep Norway Clean), of which the plastic carrier bag accounts for only a small proportion: of the total volume of plastic carrier bags we are talking about less than one per cent that end up as litter. Litter is a nuisance but scarcely a major problem in Norway. In any case, a ban on one product in a particular material – such as the plastic carrier bag – can scarcely reduce the problem, such as it is. (Of course, litter can present a bigger challenge in some developing countries.)

In the debate about litter many have argued that plastic should be biodegradable. Generally speaking, plastic at end-of-life should be recycled and never discarded in the environment. However, additives are available that enable plastic to break down, and some plastics can be composted in industrial facilities. On the other hand, such biodegradable bags, if materially recycled, could damage the reprocessed plastic; they would not be suitable for biogas production in plants currently under construction for food waste in Oslo and elsewhere.

A ban on plastic carrier bags has been discussed in several countries, and the media have also become engaged in the issue. On the internet and through images on TV the issue is often depicted in terms of alleged damage to the natural environment, e.g. harm to marine life and littered coastlines. To date, however, documentation confirming the scale of such damage has been hard to find. In this report, we conclude that it would be helpful for all concerned to acquire more information on littering and the biodegrading process generally, not least in regard to pollution of the sea.

## 3. Fundamental Conditions

A ban is a very powerful tool in environmental policy and should therefore be deployed only when there are substantial grounds for such a measure. Before introducing a ban it is also important to consider the various consequences of a ban, not least environmental. In principle, there should be an emphasis on the consumer's options, i.e. the right to choose how to transport your goods home and package your waste. A diverse range of solutions also makes for more dynamism and competition in the market, where environmental considerations also play an important role.

As previously noted, in Norway most carrier bags are reused in connection with sorting of domestic waste at source. Most households have developed routines for waste disposal. Sorting at source in the home is in turn based on regulations for the packaging of waste set by the local authorities. In addition,

more and more local authorities, for example Skien and Oslo, are developing optical sorting systems based on plastic bags, and the larger cities are also introducing solutions involving waste suction which also presuppose the use of especially strong bags, normally plastic carrier bags.

Such established practical solutions linked to the use and reuse of carrier bags would accordingly be disrupted by any ban. Furthermore, the local authorities could have some difficulty explaining how sorting at source can be based on plastic bags when at the same time the government has banned the use of plastic carrier bags.

In other respects, any ban on plastic carrier bags would be in conflict with the EU Packaging Directive, which stipulates that a nation cannot ban a particular material so long as it fulfils specific requirements. *The Commission has also made this clear to France, which has therefore been obliged to withdraw its proposals for a ban on plastic carrier bags.* Plastic carrier bags are in any case already regulated through voluntary industry agreements in Norway and are consequently included in the take-back system for plastic packaging which most local authorities have now joined.

***The Commission has also made this clear to France, which has therefore been obliged to withdraw its proposals for a ban on plastic carrier bags.***

## 4. Alternative Solutions

In comparison to plastic carrier bags in PE-LD (Polyethylene – Low Density), which are most commonly used in Norway, there is also a thinner variant in PE-HD (Polyethylene - High Density) which is used in many other countries. Because it is thinner and lighter in weight, the PEHD bag requires smaller quantities of raw materials in production than the thicker PELD bag. On the other hand, PE-HD bags fall apart (tear) more often and are therefore less suitable for reuse, e.g. in optical sorting or waste suction systems. (Users often double up PE-HD bags when carrying heavier loads.) In many countries it is customary to hand out these thin bags for free — a practice which is often thought to encourage over-consumption and generate more litter, as opposed to bags that consumers must pay for and which are seen to have a reuse value. Against this background, shops in many countries have been urged to charge for PE-HD carrier bags as well.

In Norway and some other countries plastic carrier bags have been introduced which can be broken down in sunlight (oxo-degradable) or biologically, or which can be composted in industrial facilities. Bags can also be made entirely or in part of renewable raw materials, e.g. maize and sugar.

Different types of nets or mesh bags are also now offered to customers in many Norwegian shops. Reusable shopping nets are often made of plastic (PP or nylon) or textiles such as cotton (other materials such as hemp or jute may also be used). Local businesses have often promoted these, handing them out for free. Customers are also given paper bags in many shops, in Norway primarily specialist retailers, but also in a number of grocery shops.

Cardboard boxes, rucksacks, wheeled bags and handbags have of course been used for years to carry the shopping home. One can also picture solutions based on the trolleys and baskets used in the shop.

In short, we can say that there are now a number of solutions, especially in grocery shops, and that the consumers have a real choice in how they carry their purchases home. When it comes to residual waste, the consumer can choose to buy special rubbish bags by the roll, bags which are often thinner than ordinary carrier bags. Such rubbish bags can also be a "back-up" solution for the use of carrier bags for residual waste.

## 5. Lifecycle Analysis (LCA)

In connection with the international debate on plastic carrier bags, a number of environmental analyses have been carried out involving different types of carrier bags and shopping nets. However, we have no such studies for Norwegian conditions. In this report we therefore refer to the following reports and recommendations:

- Plastic shopping bags, analysis of levies and environmental impacts, Nolan-ITU for Environment Australia, 2002
- LCA of degradable plastic bags, RMIT University (Australia), 2004
- Study by PriceWaterhouseCoopers/ ECOBILAN, for Carrefour (France), 2004
- Pompeu Fabra University (Spain) presentation of environmental study of carrier bags, 2007
- The ULS Report (USA), Review of life cycle data relating to disposable, compostable, biodegradable, and reusable grocery bags, 2007
- Thesis: Environmental assessment of emerging technologies, the case of biopolymers, Chalmers University Of Technology (Sweden), 2006
- Hippo Døvigens, recommendations on website www.hippo.no
- Grønn Hverdag, recommendations on website www.gronnhverdag.no

Foreign studies give us a certain amount of general information. On the other hand, a good deal of expertise is required to read and understand such reports, not least to take account of the underlying premises: for example, assumptions as to how

many times the bags are used and the recycling options in the particular country.

A few of the lifecycle analyses, such as the French and Spanish, were conducted in accordance with current ISO 14040 standards. This means that the studies have been carried out in a certified manner. Nevertheless, the conclusions must be treated with a degree of caution. In any case, no solution emerges as a clear winner in all the studies: it seems that each of the various alternatives has its advantages and disadvantages. In assessing the environmental impacts of the various alternatives, a variety of environmental parameters are used. The Australian study, for example, uses material consumption, $CO_2$ equivalents, primary energy consumption and littering. Some solutions can be good for material consumption, another with regard to littering, etc. Moreover, other environmental parameters figure only to a small extent in the analyses: water consumption, the use of chemicals, hygiene issues and last but not least the implications of the various solutions for the national collection and recycling systems.

***Some studies have estimated that a reusable (plastic) net is used on an average 104 times.***

***Cotton bags, which are used an estimated 52 times, fall far short of the PE and PP nets.***

As a general idea, following is a summary of some preliminary conclusions from the Spanish study:

i. The most significant environmental impact attributable to plastic carrier bags is in the consumption of raw materials and the production process.

ii. Environmental impacts in connection with transport are normally of little relevance (exception: log-range transport of heavier nets/bags).

iii. The environmental impact of the production process (see point 1) is offset to some extent by high levels of material recycling and energy recovery.

iv. The reuse of bags and nets, including their use as rubbish bags, is an important consideration: estimates as to the number of times a bag is reused can often be decisive.

v. Some types of bags create more of a litter problem than others

Taken together, these conclusions largely reflect the familiar principles of the waste hierarchy: REDUCE, REUSE, RECYCLE, RECOVER. During its lifecycle the same bag or net can (and should) exemplify all the elements in the hierarchy: for example, reduced material consumption together with arrangements for multiple reuse and ultimate recycling.

When it comes to bags that are used only once or a few times – PE-LD, PE-HD, various biodegradable bags and paper bags – ***a general conclusion is that the plastic materials PE-LD and PE-HD come out well in the reports to date – in part because the plastic bag can be superior to other materials in a number of respects. Environmentally, it is therefore arguable that a change to other materials can aggravate the environmental impact.*** In a Norwegian context this can be even more obvious as plastic carrier bags are so much more widely reused in connection with sorting at source, and because the rate of both material and energy recovery is so much higher, than in other countries. However, plastic bags come out much worse in studies that also assess litter. In such studies calculations take into account a range of variables: units, weight, volume, flow properties. In addition, there is the likelihood of changes to the bag in the natural environment. It seems that there is no consistent approach to quantifying litter.

The major divergence in the reports is between bags that are used only once and bags and shopping nets that are used many times. ***Some studies have estimated that a reusable (plastic) net is used on average 104 times.*** These alternatives also come out best in the Australian study, i.e., a woven PE-HD bag tops the list ahead of a shopping net in PP. However, none of the studies has dealt with the nylon bags that have now been introduced in several chains in Norway. As these nylon bags are suitable for reuse many times over, can be put in the pocket, are durable and weigh no more than an ordinary plastic carrier bag, it's a safe assumption that these shopping nets would do very well in an environmental analysis.

***Cotton bags, which are used an estimated 52 times, fall far short of the PE and PP nets;*** in the Australian report they rank alongside the thick PELD bag, which is used twelve times, in terms of material consumption and $CO_2$, but substantially below as regards primary energy consumption. From other studies it is also clear that cotton requires large quantities of water and chemicals, factors which are hardly taken fully into account in the environmental analyses. Textile nets of other materials might be an improvement, but are not considered in these studies.

The French study takes as its starting point a customer who shops 45 times a year, buying 20 litres of goods each time for a total 900 litres. This report concludes that thick PELD reusable bags are the best environmentally, assuming that they are used four times or more.

Building on the Australian report, the Swedish study focuses on the so-called green PE, i.e., the ordinary PE plastic that is seen as a renewable raw material. The use of renewable raw materials can often improve the environmental qualities of plastic. The study therefore shows that new materials and new technologies can alter the results of the results of the various studies.

Even if the plastic carrier bags and plastic shopping nets come out well in the studies, all bags and nets have the potential to be even better environmentally. In all solutions there is room for improvement in a number of areas:

i. The bags can be even lighter (less use of raw materials/ energy)

ii. The bags can be used even more times (dividing the environment into more" rounds")

iii. The bags can contain even more recycled material (gains in material recovery)

iv. The bags can be materially recovered to a greater extent (e.g. bags used to return used packaging/items for deposit refunds) Renewable raw materials can be used, e.g. for making "Green PE"

v. A variety of measures can reduce litter and encourage tidiness.

## 6. The Debate in other Countries

By comparison with countries where there has been most debate about plastic carrier bags, the situation in Norway is arguably different, in that:

i. We use PE-LD bags which are suited to multiple uses, not the very thin PE-HD bags

ii. In Norway's grocery sector consumers must pay for carrier bags.

iii. Carrier bags are used to wrap up residual waste which is mostly utilized as energy.

iv. Carrier bags are also used to wrap up the various fractions in an advanced sorting at source system, including a deposit - and-return system for all beverage packaging.

v. Norway is one of very few countries in the world with a take-back system for all types of plastic packaging, including plastic bags, a system in which plastic bags in PE-LD are particularly suited to material recovery.

vi. Problems with litter in Norway are different from those in developing countries, some of which must also cope with floods and inadequate drainage systems that are vulnerable to being blocked with waste.

## 7. Sustainable Trade and Recovery

We can envisage an optimal total solution (best practice) for a future retail-and-recovery system. In developing such a system, it is important to look at the entire lifecycle, from the design and packaging of different products to recycling. Other key factors include the freedom of choice for the consumer, good labelling and information, and a carefully planned, integrated approach. One example of such a total solution is plastic carrier bags in different colours which can also be used in systems for optical sorting of different waste fractions (cf. plan for Oslo). Some areas in Norway, e.g. the county of Troms, have already introduced such systems.

## 8. Action Plan

There is still room for improvement in our use of carrier bags. We propose that the business community take the initiative to bring about the required concrete improvements in such areas as environmental information and the development of guidelines both for consumers and for those who work in the retail sector. Information can be distributed via a special website, labelling on the bags, general fact sheets, etc.

Assuming a more informed use of carrier bags, we recommend as a target reducing the consumption of plastic carrier bags by approximately 20 per cent by the end of 2010. A reduction of this size would not have any negative consequences for sorting at source in Norway. Any change to e.g. reusable nets would require a parallel development of relevant environmental standards: in that context, the establishment of a body concerned with "recoverability" is proposed.

It is further proposed that a joint initiative be launched to increase the material recycling of plastic carrier bags that are used to carry deposit bottles, glass/metal, textiles, etc., to collection points. Here too the development of concrete recycling targets is recommended.

At some stage we propose that goals also be defined for the use of recycled material in bags and nets. In that way a material lifecycle can be developed for plastic bags. Based on a joint initiative, financed through an environmental fund, additional environmental measures are also recommended: for example, more R&D, information, and clearing up. As previously noted, here too there is a need for more study of littering and the biodegrading of plastic. This work is to be further developed shortly.

## 9. Conclusion

Any ban on plastic carrier bags would be a drastic measure in relation to their actual environmental impact.

Such a measure would be illegal under the EU packaging directive.

Moreover, a ban (on plastic carrier bags) could stimulate the use of other types of bags and nets *with greater environmental impacts. Alternative solutions could also damage existing collection and recycling systems for plastic packaging.*

In addition, a ban could lead to less flexibility and a loss of efficiency in the distribution and use of bags in sorting at source in many Norwegian local authorities.

Finally, the effects of a ban would probably be far more damaging than efforts to achieve environmental improvements through initiatives involving the business sector which can be developed in constructive collaboration with the local authorities and government.

# Awareness Programme at PLASTINDIA 2009

*Awareness booklets being distributed among school students*

*School students watching the display boards at the exhibition*


*School students at the exhibition*

## Awareness Programmes in Schools

ICPE and ICPE sponsored Awareness Programmes addressed to about 8,000 school/college students in about 50 institutions during the period December 2008 to March 2009.

While ICPE organised the programmes in Mumbai and Delhi, Gujarat State Plastics Manufacturers Association (GSPMA) organised programmes at Ahmedabad and Indian Plastics Institute's local Chapters organised programmes at Chandigarh and Chennai. Polymer Engg. students of an Engineering College in Chennai involved its final year students for organizing Awareness Programmes in various schools in the city and its vicinity. The initiative was well accepted by all schools.

*Common observation:* It was observed that students realised the importance of practising 2 bin culture. They also observed that in most cases Municipality transport do not carry all waste separately.

*Glimpses of the Awareness Programmes are given below:*

DELHI

### Apeejay School
**January 2, 2009**

### DTEA Senior Secondary School
**21st February, 2009**

### Delhi Public School
**January 16, 2009**

### Mothers' International School
**January 21, 2009**

NANDED

### Shri Guru Gobind Singhji Institute of Engineering and Technology
**8th March, 2009**

AHMEDABAD

### Gujarat School Programmes

Awareness Programmes in GLS School and UDGAM School, Ahmedabad, were organised by Gujarat State Plastics Manufacturers' Association (GSPMA), December 2008.

# AWARENESS PROGRAMMES

## MUMBAI


**SIES College, Nerul**
13th February, 2009

**J B Khote School, Borivali**
13th and 14th March, 2009

**Nalanda Vidyalaya, Chembur**
22nd January, 2009

**Kendriya Vidyalaya, Mankhurd**
27th February, 2009

**Sai Vidyalaya, Mankhurd**
17th January, 2009

***Rally of school students on 26th January, 2009 in Mankhurd locality***

## CHENNAI

**"Catch them Young"**
**– Handling Plastic Waste for Clean Environment**
**28th January, 2009**

Polymer Technology Students of BSA Crescent Engineering College, Chennai, organised Awareness Programmes in about 30 schools in and around Chennai city of Tamil Nadu.

*Photographs of Awareness Programmes conducted at some of the schools at Chennai*

# Plastic Carry Bags – Global Matrix


***Salient Points of the Rules concerning the use of plastic carry bags in some major countries: Collation by ICPE***

The use of plastic carry bags are under review in several countries in the world. Regulations restricting the use and disposal of plastic carry bags have been put in place in many countries. Some examples are given below:

***U.S.A.***

***Plastic bags are not banned. In March 2007, city of San Francisco had passed an ordinance effectively banning Use of Plastic Grocery Bags at supermarkets and large pharmacies and asked the supermarkets and large malls to use biodegradable plastic bags. In August 2008, the California Court has struck down the ban on plastic carry bags and asked for conducting a further environmental impact review on the issue.***

i. In Alaska, plastic bags are banned in 30 communities.

ii. Customers are required to pay for plastic bags in some states.

**BRAZIL**

Plastic bags are not banned – Multitask bags are available.

**AUSTRALIA**

Plastic bags are not banned. Customers usually have to pay for plastic bags in some states.

**RUSSIA**

Plastic bags are not banned.

**JAPAN**

Plastic bags are not banned. There is plan for levy on plastic bags (Yen 5 per 10 bags).

**CANADA**

Plastic bags are not banned. Ontario Government called for 50% reduction in 5 years.

**U.K.**

Plastic bags are not banned. Customers have to pay for bags.

**SCOTLAND**

Plastic bags are not banned. Authorities are considering for levy on plastic bags. Customers have to pay for the bags.

**ITALY**

Plastic Bags are not banned. There is levy on all packaging materials including plastic materials. Customers have to pay Euro 0.5 per bag

**SWITZERLAND**

Plastic Bags are not banned. Customers have to pay for bags in Supermarkets.

**IRELAND**

Plastic Bags are not banned. There is levy on plastic bags. Customers have to pay for the bags.

**ICELAND**

There is no ban on plastic bags. Levy Euro 0.2 per bag.

**DENMARK**

There is no ban on Plastic Bags. However, there is Green Tax on Retailers-DKK 22/kg. Usually customers have to pay for bag.

**THE NETHERLANDS**

Plastic Bags are not banned. Customer have to pay Euro 0.2 per bag (thick).

**FINLAND**

No ban on Plastic bags. There is levy on plastic bags. Customers have to pay for the bags.

**FRANCE**

***Receiving directive from the European Union Parliament, France has withdrawn the proposal to ban plastic bags***

**GERMANY**

No ban on Plastic Bags. In all large super markets, customers have to pay – Euro 0.5 – 0.2 for bags.

**HONGKONG**

No ban on plastic bags. There is levy on plastic bags. Customers are required to pay for bags.

**SOUTH AFRICA**

Ban on less than 24 microns. There is levy on plastic bags. Customers have to pay for bags.

**KENYA**

Ban on less than 30 microns.

**NEW ZEALAND**

There is no ban on plastic bags.

**CHINA**

Ban on less than 25 microns. In some provinces, customers are required to pay for bags.

**REPUBLIC OF SOUTH AFRICA**

Ban on less than 25 microns.

**TAIWAN**

Ban on less than 60 microns.

**TANZANIA**

Ban on less than 35-60 microns

**BANGLADESH**

**Plastics carry bags are banned.**

DATA SHEET

# Rules of Plastic Carry Bags in different States of India

| State | Min. Thickness (microns) | Size (inches/cms) |
|---|---|---|
| West Bengal | 40 | 12″ x 16″ |
| Maharashtra | 50 | 8″ x 12″ |
| Himachal Pradesh | 70 | 12″ x 18″ |
| Goa | 40 | 8″ x 12″ |
| Chandigarh | Total Ban on Plastic Carry Bags with effect from 2nd October 2008 | |
| Meghalaya | 40 | 8″ x 12″ |
| Punjab | 30 | 8″ x 12″ |
| Kerala | 50* | 20 cms x 30 cms |
| National Capital Territory of Delhi (Delhi Gazette – January 07, 2009 | All types of plastic bags are banned in Five star hotels, Hospitals of more than 100 beds (except for handling bio-medical waste), Restaurants with 50 seating capacity, Fruits & vegetable outlets of Mother Diary, Retail & Wholesale outlets, Shopping Malls, Shops in main and local markets | In all other places only use of Bio-degradable plastic bags is allowed |

* Though the State Gazette Notification has imposed the thickness restriction of minimum 50 micron in Kerala, however, due to the Court Stay Order, the minimum thickness in use at present is 30 microns.

- Almost all the States have imposed ban on the use of Plastic Carry Bags and throw away cups etc. in places of tourist attraction/ zoos/national parks etc.

All other States follow the MoEF Rule, i.e., minimum thickness 20 microns and size 8" x 12"

*As on July 2009*

## Air & Water Pollution by Polyethylene & Paper

| Environmental Burden | Polyethylene | Paper |
|---|---|---|
| Energy in GJ for Manufacture | 29 | 67 |
| $SO_2$ | 9.9 | 28.1 |
| NOx | 6.8 | 10.8 |
| $CH_4$ | 1.5 | 3.8 |
| CO | 1 | 6.4 |
| Dust | 0.5 | 6.8 |
| COD | 0.5 | 107.8 |
| BOD | 0.02 | 43.1 |

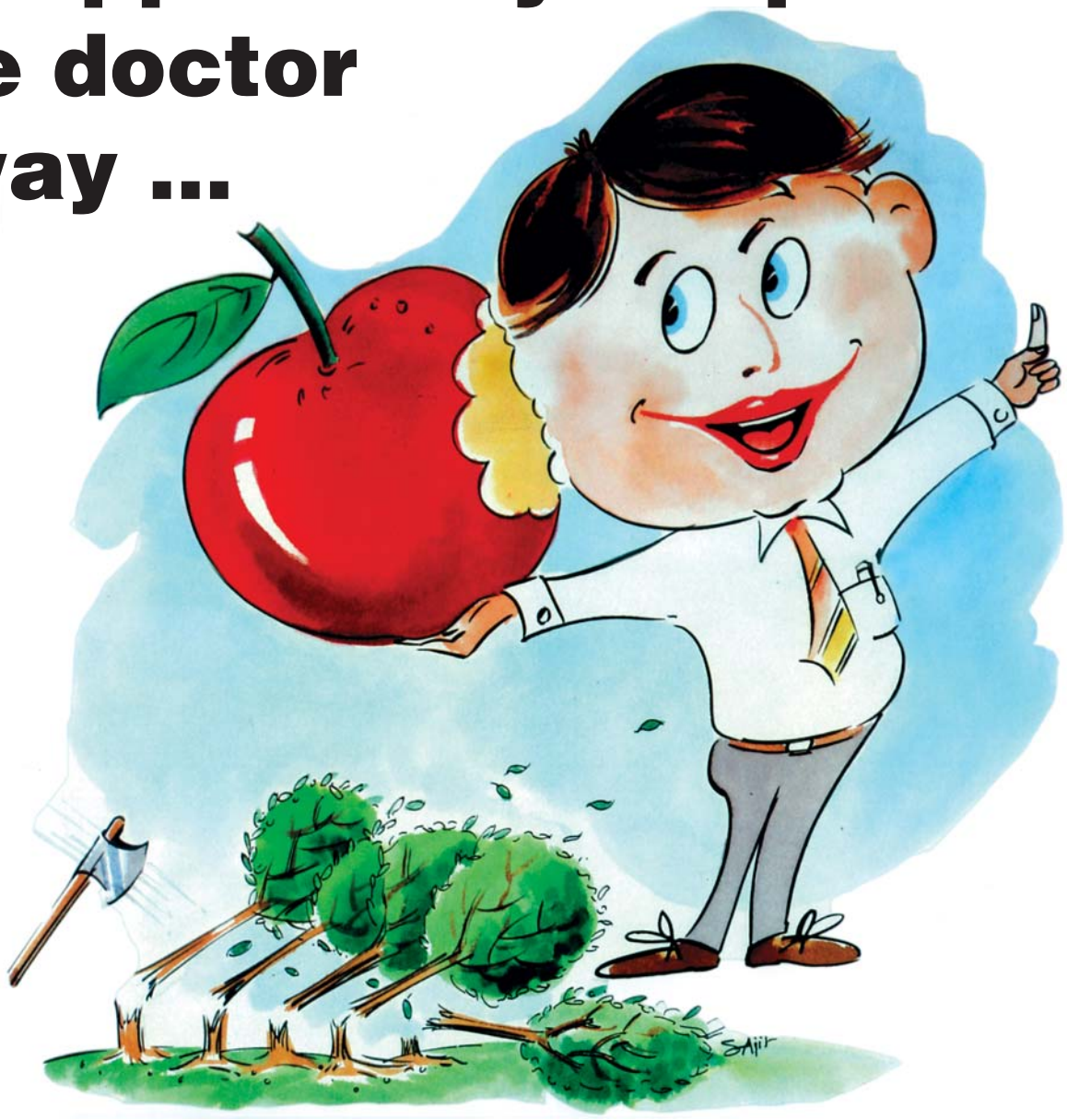
*Fabbri, A in Scott, G and Gilead, D., editors, Degradable Polymers, Principles and Application, Chapman & Hall, 1995, chapt*

## Environmental Burden During Production of Raw Material & Bags

| Environmental Burden | | Jute Bag | Plastic Bag |
|---|---|---|---|
| *Air Pollution* | | | |
| CO | kg | 54.3 | 0.6 |
| $CO_2$ | kg | 6610.2 | 760 |
| SOx | kg | 134.8 | 5.2 |
| Nox | kg | 68.1 | 4.8 |
| $CH_4$ | kg | 39.5 | 3.2 |
| HCL | kg | 5.3 | 0 |
| Dust | kg | 67.6 | 1.4 |
| *Water Pollution* | | | |
| Suspended Solids | kg | 352.3 | 0.2 |
| Chlorides | kg | 4535.5 | 0.1 |

*The values are for packaging of 1,00,000 MTs of Atta (Flour).*
*Source – Report by Centre for Polymer Science and Engineering, IIT - Delhi*

# An apple a day keeps the doctor away ...



# It also fells a tree not so far away

In India, Apples are packed and transported in wooden boxes – an eco-unfriendly system which has led to large scale deforestation. Each wooden box holds 20 kgs apples and for every 175 kgs of apples we consume, we use 35 cubic feet of wood consequently felling a large number of trees.

By using eco-friendly plastic crates in place of wooden boxes for packing apples alone, millions of trees are saved from the axe every year thus preventing deforestation of precious forest cover.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