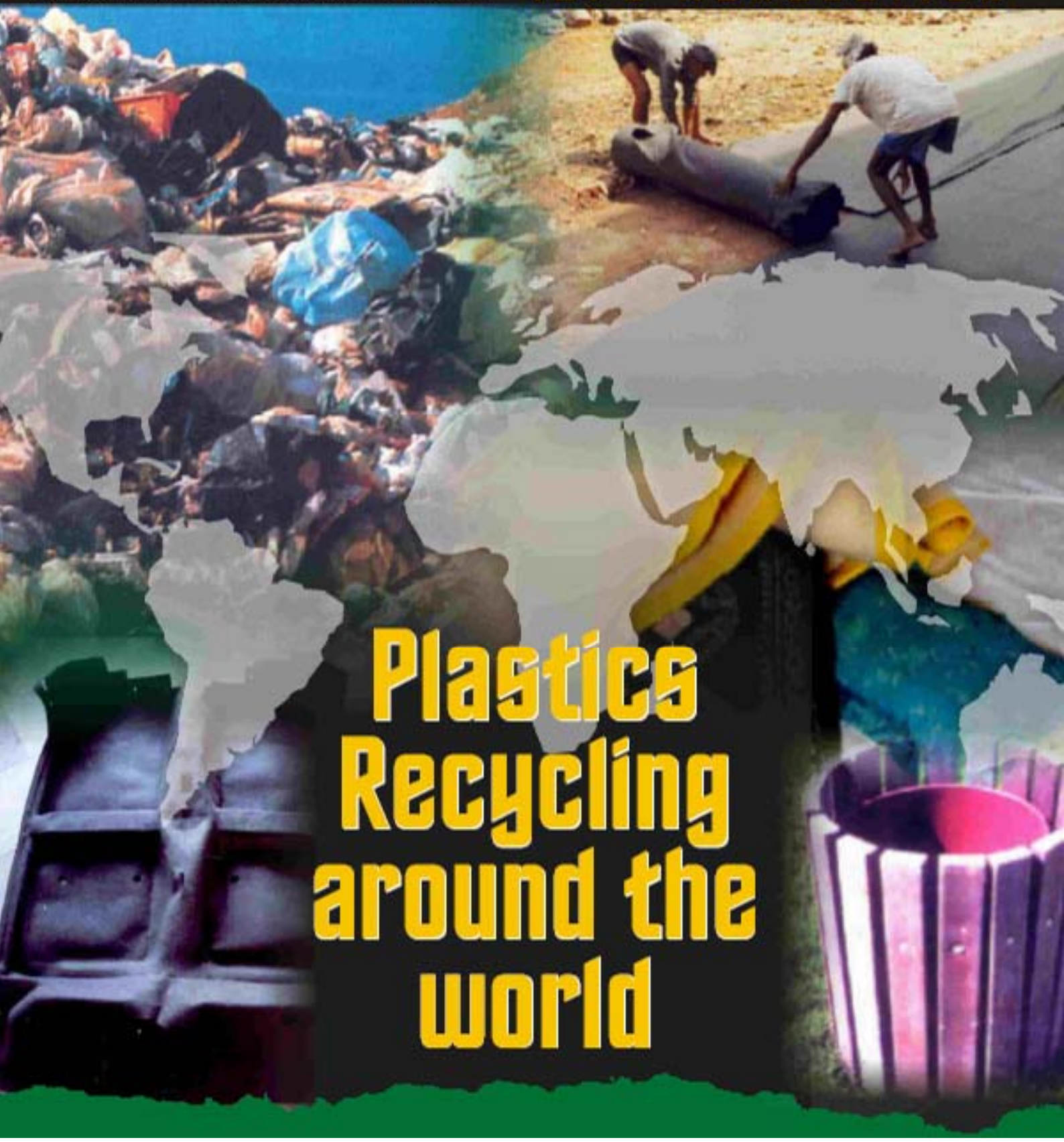
Indian Centre for Plastics in the Environment

# Eco-Echoes

Vol 4, Issue 2, April - June 2003

Quarterly Publication of Indian Centre for Plastics in the Environment

ICPE NEWSLETTER



# Plastics Recycling around the world

## Plastics recycling around the world

Plastics can be recycled and recycling during the manufacturing phase of plastic products has been widely practiced since their first appearance on the market around 50 years ago. But the recycling of post consumer plastics is a new phenomenon, this is because plastics are not a single material like glass, but consist of many different families with specially tailored properties.

*Read More on Page 1*

## 'Plastics for Environment and Sustainable Development' launched by Dr. R.A. Mashelkar

Materials have played such a pivotal role in human development that the appearance of materials has marked the Stone Age, the Bronze Age and the Iron Age. Imagine life without plastics today! Plastics have become so much a part of everyday life that ours is almost certain to be described by later historians as the "Plastics Age". As a result, the demand for plastics is ever increasing. This is where this well-produced monograph about how plastics are key to human welfare, environmental protection and sustainable development is timely.

*Read more on Page 6*

## In this Issue



**Indian Centre for Plastics in the Environment**

205, Hari Chambers, 58/64, Shaheed Bhagat Singh Road, Fort, Mumbai 400 023
Tel: 022 5635 1686-87, 2269 4105-06
Fax: 022 5634 9705 Email: icpe@vsnl.net
**www.icpenviro.org**

**New Delhi Office**
1009, Vijaya Building, 10th Floor, 17 Barakhamba Road, New Delhi - 110 001
Tel: 011 2332 6377 Fax: 011 2332 6376
Email: icpedelhi@sify.com

*Readers are welcome to send their suggestions, contributions, articles, case studies, and new developments for publication in the Newsletter to the above address. Reproduction of material from this Newsletter is welcome, with prior permission.*

**Used PET bottles as seen collected by the ragpickers, are traded for recycling**

# Plastics recycling around the world

Dr. Neil Mayne, (APME)

Almost all of the common plastics can in principle be recycled and the recycling during the manufacturing phase of plastic products has been widely practised since their first appearance on the market around 50 years ago. The recycling of post-consumer plastics, however, is a relatively new phenomenon, which often only takes place as a result of legislation. This is because plastics are not a single material like glass, but consist of many different families with specially tailored properties. They are not compatible with each other and are difficult to identify and separate. Add to this the costs of collection and it is easy to understand the overall economics of recycling such materials is not usually favourable when compared with the price of virgin plastics. Yet in spite of this, there has probably been more pressure to recycle post-consumer plastics than any other materials. Such pressure has arisen not only in W. Europe but literally around the whole world, no matter how developed the country. Why should this be?

The answer is probably because of the very rapid and visible growth of plastics compared to other materials. Since 1970 the volume of plastics produced worldwide has increased fivefold and continues to grow each year at a faster rate than GDP. (Fig. 1)

Such an increase is many times higher than steel, and more than double that of aluminium. Such high rates are due to substitution of other materials (e.g. bottles) as well as their application in new areas (e.g. mobile phones). In earlier times this would have been considered an unquestioned success story, but with increasing environmental awareness, the public and politicians focussed on the inevitable increasing plastics waste mountain. And the perceived solution to the waste issue is of course to recycle.

**Plastics growth vs other materials**

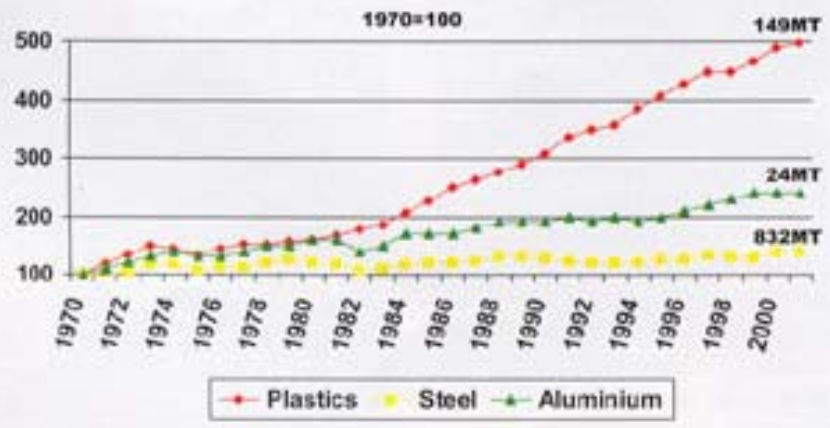



Fig. 1

A number of different schemes have evolved around the world in order to increase the rate of post-consumer plastics recycling. (Fig. 2).

**Evolution of plastics recycling schemes**

| Direct economic return | Avoided costs | Funded collection & gate fees |
|---|---|---|
| Collection/treatment costs < virgin price > | Single stream plastics | Mainly via initial fee on product to cover collection/gate fee for recycling process |
| Often integration with a converting operation | Collection/treatment net costs less than alternative disposal | Some examples of industry chain obligations |
| Often some collection support from municipality for MSW related | | |
| All regions ind. USA High rates in developing countries due to low labour costs and many markets W.E. Often voluntary schemes Landfill restrictions help Japan, W.E.Wide range of schemes and costs | | |

Fig. 2

These different schemes fall into roughly three categories. The first is where the driving force is purely economic whereby the collection and treatment costs are lower than the price which customers will pay for the recycled product. In developing countries (such as India or China), where labour costs are low, good organisation can result in relatively high recycling rates as the combined collection and treatment costs for many waste streams remain lower than the virgin prices. Other examples of "economic return" are when the municipality gives some support for the collection of selected items (such as for bottle collection in the USA).

The second category is where because of various restrictions on disposing of waste, the recycling can actually avoid costs which would otherwise have to be made. In many developed countries where land-filling of certain waste is either prohibited or taxed, and alternative incineration costs are high, such an "avoided cost" model is applicable. Here, for example, industry-led schemes for industrial packaging are common and are often voluntary. An example is whereby supermarkets agree to separate their plastic film waste for collection and recycling which is organised by a consortium of stakeholders in the packaging chain. In this case the supermarket saves

money by avoiding the cost of conventional 'waste' collection while costs of sorting are avoided for the recycling operation. There are several such examples in Europe.

The third category, the "funded collection/gate-fee" model is needed when legislation demands high levels of recycling. Here the funds are used to pay for collection and subsidise recycling treatments by paying a gate fee. The first example was in Germany in the early 1990's but is now common in European countries as well as in Japan. The Packaging and Packaging Waste Directive in Europe (1994) has in fact been the main reason for the impressive growth in plastics recycling of 8-10% per year in W. Europe. Here the European legislation initially set targets for each Member State to reach overall recycling targets for all packaging materials of between 25 and 45% by weight. A minimum level of 15% was set for any given material to be reached by 2001. This target proved difficult for a number of countries, but in the meantime a revision of the Directive is close to agreement, whereby each packaging material is set a different minimum level. For plastics this is likely to be established at 22.5%, which while ambitious is significantly lower than other materials. Although this at first sight does not look like a level playing field, in reality it does recognise the complex nature and broad range of plastics materials which hinder successful recycling, compared to other, more homogeneous packaging materials. (Fig. 3)

The growth seems even higher than that forecast in an earlier in-depth study based on European market demand, but differences can be explained by the significant volume of waste exported for recycling outside of Europe. Accurate figures are difficult to obtain, but estimates of exports from Europe to Asia range from 200kt up to half a million tons, with additional significant quantities being exported from the west coast of the United States.

Each country in Europe has developed its own scheme for the recycling of packaging waste, all with different structures and ultimate costs to the consumer. A common feature in all countries is the need to target specific plastics waste streams rather than all plastics, and ensure the most efficient sorting into mono-plastic steams. Although mixed plastics can in some cases replace traditional materials such as wood or concrete, markets are often limited by economics and the environmental benefits need to be carefully assessed.

One solution to the problem of recycling mixed, contaminated or complex waste streams such as laminated packaging is that of feedstock recycling. Here large scale technologies are used to break the plastics into their molecular constituents which can be then used to manufacture other products, including in some cases new plastics. Despite many successful technical demonstrations at a pilot level, commercial exploitation is currently limited to Germany and Japan. Major barriers to a more widespread use of such options include obtaining guaranteed supply commitments with associated gate fee and the high cost of building new installations.

In viewing the recycling performance by the individual member states, there is, however, a very wide difference in the levels achieved, with no clear correlation of costs and performance.

**Plastics packaging recycling in W. Europe, 2000**

| Recycling, % | Country |
|---|---|
| > 20% | Germany<br>Austria<br>Netherlands<br>Belgium |
| 15 - 20% | Spain<br>Italy<br>Sweden |
| 10 - 15% | United Kingdom<br>France<br>Finland<br>Denmark |
| 5 - 10% | Ireland |
| 0 - 5% | Portugal<br>Greece |

In any event the mechanical recycling of plastics is a truly international activity with the collected waste crossing borders not only within Europe but across to other global regions such as the Far East. In this respect plastics are no different from other materials collected for recycling.

An analysis of the European situation shows that the additional recycling required to meet the likely targets of the revision of the Packaging Directive will be extremely challenging. In fact an additional 1M tonnes (or +53%) more recycling

**Recycling progress to date in W. Europe, 2000**

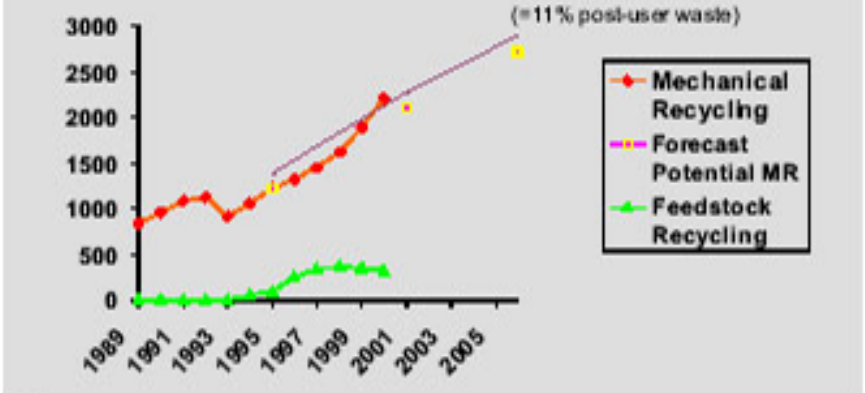



Fig. 3

will be required to reach a minimum level of 20% in each country compared to the achievement in 2000. In all likelihood countries will have to rely on even more exports of waste to outside of Europe due to lack of market demand for plastics recyclate within the member states. The question can of course be raised as to whether the exports of such plastics waste are sustainable in the long term, as the importing countries continue to develop their own virgin plastic manufacturing industries and associated collection infrastructures.

Faced with such challenges, it is perhaps necessary to consider in more detail the stated reasons for the recycling targets, namely to reduce the burden of packaging on the environment. One major study assessed both the environmental impacts as the economics of different scenarios. Based on actual data, it considered the effect of increasing the recycling rate, while the balance was recovered as energy via municipal incineration.

The base case was land filling. It was concluded that diversion from landfill was the single most important factor in environmental terms, and when combined with landfill, there was no significant benefit in increasing recycling from 15% to 50%, but the costs increased by a factor of 3. A more recent study related to the European Packaging Directive assumed increasing recycling rates for plastics packaging from 15% up to 35%, with those for other packaging materials being


Basket made from recycled plastic


Home textile products (Blankets and Pillow)

reduced to maintain the same overall benefit to the environment. It concluded there would be very significant extra costs to the European Union (estimated at 3200 M) if plastics recycling rates were increased in such a way.

In view of the above results with plastics packaging recycling it can be concluded that the new recycling targets will be at the upper limit for achieving a good cost-benefit or eco-efficiency. It is expected the rates in the better performing countries will level off as they seek to achieve cost efficiency while the lower performing countries will adopt the most appropriate best practices of others. In this respect it is interesting to note that not all "best practices" are located in the top performing countries which would tend to give a north-south split of Europe. In reality there are several leading municipal or regional examples in countries such as Italy, Spain and Portugal. It is the widespread adoption of effective schemes throughout individual countries which is the determining factor for achieving significant national recyclingrates.

It is also to be expected that there will be an increasing recognition of the benefits of energy recovery - whether it be via municipal incineration or by the use of treated plastics waste as a fuel in industrial manufacturing installations. As with recycling, there are large variations in the extent of energy recovery from plastics waste between different European countries, ranging from zero up to as high as 75%.

**Energy recovery in W. Europe, 2000**

| Energy recovery % plastics waste | Country |
|---|---|
| 50 - 75 | Denmark, Switzerland Netherlands |
| 25 - 50 | Sweden Norway France Germany |
| 10 - 25 | Belgium Portugal Austria Finland Greece |
| < 10 | Italy Spain United Kingdom Ireland |

W. Europe : 23%

Mainly MSWI with some use as fuel in power generation and cement manufacture.

Source: TN Sofres for APME

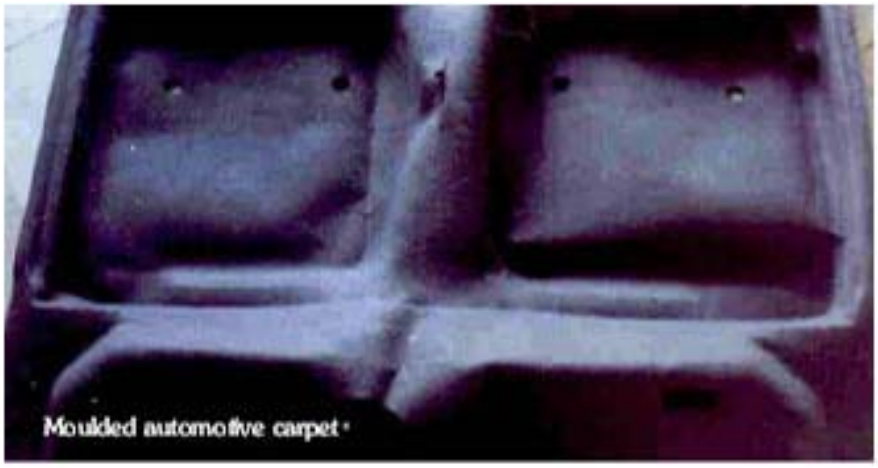
However, the fear of environmentalists that promotion of energy recovery would hamper efforts to recycle is not borne out in practice. The countries with the highest levels of energy recovery are generally those with good recycling rates. Currently municipal incineration accounts for the majority of energy recovery but the preparation of recovered fuel from treated waste is growing rapidly, and will be encouraged further by the development of CEN standards for such fuels. As well as alleviating security of supply concerns, greenhouse gas emissions from such fuels are significantly lower than from traditional fuels such as coal.

In Europe the recent Waste Incineration Directive has given new impetus to energy recovery from waste as this ensures good operation and emission control, with facilities acting as dioxin sinks and drastically reducing their dispersion. Energy recovery is also widely practised in Japan, where old installations are being replaced by better performing units. In the U.S.A. however, there is less focus on energy from waste

facilities as landfill is not considered a major problem and there is no comprehensive legislation for the recovery of waste.

While packaging accounts for up to 40% of all plastics consumption, plastic materials are used in virtually every other application sector, from medical devices through sports goods and transportation to IT equipment. The automotive and electric & electronic sectors, in particular, are the focus in a number of countries around the world, to ensure that at the end-of-life they are recovered and have a minimum impact on the environment. The European Union was again in the lead with Directives for the end-of -life recovery of automotives (ELV) and electrical & electronic equipment (WEEE), with another Directive restricting the use of hazardous substances in such equipment. Japan has also introduced demanding new laws to enable it to become a "recycling society".

Unlike packaging which is often made of a single material, and where material specific targets are stipulated, only overall recycling and recovery targets have been established for the ELV and WEEE Directives. For end-of-life vehicles an overall re-use / recycling rate of 80% by weight should be achieved by 2006. Schemes will need to be expanded to meet this goal, but the metal content alone will approach this figure. The challenge will be to increase the recycling figure to 85% by 2015 in view of the fact that there will be an increasing amount of lightweight plastics materials in future ELV's to assist fuel efficiency and solve design challenges. For electric and electronic equipment, the proposed Directive is again non specific for the recycling of individual materials, but specifies that a minimum recycling rate should be achieved according to the type of equipment. This varies from 50 to 75% and furthermore stipulates that a minimum weight of old E&E



Moulded automotive carpet

equipment is collected per inhabitant. Old cars and some electrical equipment have to some extent always been recycled to recover their metal content, usually by treatment in a shredder operation. The new directives mean that other materials will in future almost certainly also have to be recovered and recycled. In principle this can be done by dismantling and sorting before the shredder operation. Studies demonstrate, however, that such dismantling can be extremely costly.

The alternative is to treat the light fraction containing plastics after shredding and removal of the metals. Because of the mixed nature of the product, the opportunity of recovering well defined plastics materials for mechanical recycling is limited, and large scale feedstock recycling or energy recovery technologies (e.g. by gasification) may be more appropriate, even if more expensive. Whatever the operation, it is clear that the plastics content of such durable equipment will never be the economic driver of the recycling operation.

The metal content will always represent the greatest value in the operation, while the presence of hazardous materials may dictate the need for some dismantling or special separation. Feedstock recycling technologies for plastics have been demonstrated for packaging plastics and studies are underway in both Europe and Japan to investigate the options for treating shredder residues from ELV and WEEE. The challenge will be to find solutions which are the most sensible in eco-efficient terms and not just meet the targets stipulated at whatever the economic or environmental cost.

Comparisons of plastics recycling rates around the world are extremely difficult to make. This is not only as a result of a lack of relevant reliable statistics, but because the definitions used can vary significantly. Where there is no comprehensive legislation, figures-if any exist- are often just based on the best estimate of a particular consultant and are restricted to a specific waste stream (e.g. bottles in the USA). One comparison that is possible is that between the plastics recycling performance of Japan and W. Europe. (Fig. 4).

**Recovery rates of plastics in W. Europe and Japan, 2000**

| Treatment | Japan | W. Europe | W.E. range |
|---|---|---|---|
| Mechanical recycling | 9% | 11% | 2-19% |
| Feedstock recycling | 1% | 2% | 0.10% |
| Energy recovery via RDF | 2% | 2% | 0-8% |
| Energy recovery via MSWI | 32% | 21% | 0-75% |
| Total recovery | 44% | 36% | 6-83% |

Fig. 4

*Source: TN Sofres for APME, PWMI (adjusted)*

A comparison across all applications shows that whereas Europe is ahead on the recycling of post-consumer plastics, the overall recovery rates (recycling + energy recovery) are lower. The large proportion of plastics being lost as a resource to landfill, coupled with the wide range of achievements in different European countries means there is much scope for improvement. In all cases, though, the goal should be to improve the overall use of resources, including recovering as much as possible at end of life. It should be noted that across the whole life-cycle of products it is the use phase which has by far the largest environmental impact. Whether it is as a result of their light-weight in vehicles, their insulating properties in buildings or protective properties in packaging, plastics products are probably the most resource efficient materials available and contribute to significant resource savings compared to the use of other materials. The recycling of plastics should therefore never become an end in itself, but rather be an important part of an optimised framework of resource efficiency.

The key to the future is of course innovation. New plastics will continue to be developed, which are even more resource efficient than current materials. And new technologies for treatment at end of life will ensure their recovery either as a material or as a valuable source of energy.

For this to be achieved in an effective way, a close cooperation is required between all the different actors in the chain from raw material suppliers through equipment designers, OEM's, waste management companies and recyclers. Such cooperation should be facilitated with realistic and enabling policies and legislation. Provided this is done, then plastics will surely be increasingly recognised as the material of choice for the 21st Century.

*Source: Dr. Neil Mayne - Association of Plastics Manufacturers in Europe (APME)*

## New Appointees at ICPE, Mumbai

**Mr. T.K. Bandopadhyay, Technical Manager – ICPE**

Mr. T.K. Bandopadhyay is a B.Sc (Pure Science), Calcutta University (1967) and B.Tech. in Plastics and Rubber Technology (1971) from the Department of Applied Chemistry, University College of Science and Technology, Calcutta University. Mr. Bandopadhyay has an experience of 31 years in the Plastics Industry, of which 23 years were at Plastic Applications Centre, IPCL heading its LDPE-LLDPE and PVC - All India Technical Services Group at different periods. He also was the principal co-ordinator of IPCL's Marketing Department for preparation, implementation and maintenance of ISO 9000. He has also been closely associated with the IPI movement in India and has been Hon. Treasurer and Hon. Secretary of the Bangalore Chapter and Chairman of the Vadodara Chapter.

**Mr. P.V. Narayanan, Advisor, ICPE**

Mr. P.V. Narayanan is a recognized UNIDO, ITC, and CFTC expert with vast experience in Production, Quality Control, R & D and Packaging Sciences and Technology. He currently leads the SIES-School of Packaging Technology Centre as Chair Professor & Director and also serves as Director in leading packaging companies. Mr. Narayanan is a Postgraduate in Physical Chemistry, Plastic Technology with Diploma in Marketing Management and has won accolades in academics and sports. Mr. Narayanan has also completed a number of national and international assignments spanning Institution building, Packaging training and Education and Package Development. Mr. Narayanan is also the Secretary General, Institute of Packaging Machinery Manufacturers of India (IPMMI) and General Secretary of Indian Flexible Intermediate Bulk Container Association (IFIBCA) and visiting faculty in various institutions.


## ICPE News

***ICPE is an ENVIS Node***

*ICPE has been selected as one of the Nodes in the country to work on this World Bank funded project. The Ministry of Environment and Forests (MoEF) has identified ICPE as a node for the capacity enhancement program relating to* ***'Management of Plastics, Polymer Wastes and Bio-polymers and Impact of Plastics on Eco-system'.***

*ENVIS (Environmental Information System) has begun implementing the World Bank assisted Environment Management Capacity Building Technical Assistance Project (EMCBTAP) since January, 2002 which aims at structuring the ENVIS scheme by extending its reach through involvement of Institutions/ Organizations in State Governments, academic sector, corporate sector, NGO sector, etc.*

*ENVIS is a decentralized system with a network of distributed subject oriented centres ensuring integration of national efforts in environmental information collection, collation, storage, retrieval and dissemination to all concerned.*

***www.envis-icpe.com***

Dr. R.A. Mashelkar, DG, CSIR with K.G. Ramanathan, President, Governing Council, ICPE, K.P. Nanavaty, Member Governing Council, ICPE and Dr. S.K. Verma, DG, CIPET during the release of Encyclopaedic Study on 'Plastics for Environment & Sustainable Development'

Dr. R.A. Mashelkar, Director General, CSIR and Secretary, Department of Scientific & Industrial Research (Govt. of India) released "Plastics for Environment & Sustainable Development' a first-of-its-kind scientific "Eco-Assessment Study" addressing the multifaceted issues and dimensions of plastics concerned with environment and sustainable development. The study was released on May 2, 2003 in New Delhi.

The study was initiated by the Indian Centre for Plastics in the Environment (ICPE) and the Central Institute of Plastics Engineering & Technology, Chennai. It was released in the presence of leading scientists and technologists, including some of the experts from leading Indian R&D institutes who contributed to the study.

The 250-page colour publication, which is encyclopaedic in its approach to the subject, covers topics like Biodegradability: Myths & Realities; Plastics in Healthcare and Safety; Plastics as Safe & Hygienic Medium for Packaging Food and Food Products; Plastics - Materials for National Security; Plastics and Resource Conservation; and Recycling of Plastics and Integrated Waste Management. The study aims at providing a basis for a more informed and enlightened discussion about plastics and their role in national development since plastics play a major role in every aspect of life in today's technology-driven world. It is the first in a series being developed to provide comprehensive independent research studies on plastics.

The importance of the study is spelt out by Prof. M.M. Sharma, (Padma Vibhushan), Kothari Research Professor, Jawaharlal Nehru Centre for Advanced Research and Dr. Mashelkar, in the foreword. They say: "We truly live in a 'Plastics Age'. Our daily lives would be very much poorer without these benign and environmentally friendly materials. Growing population and consumption in India has put severe pressure on our natural resources and fragile eco-systems, and plastics offer a cost effective alternative."

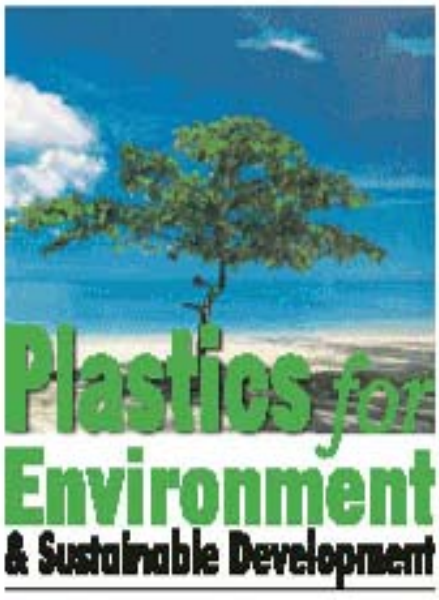
"Plastics have moulded the modern world and transformed the quality of life. Yet there are so many misgivings and myths about plastics. We do believe that the monograph will set to rest any lingering doubts about the sustainability of plastics as materials or their adverse impact on our environment to a more enlightened discussion on the role of plastics in the armoury of materials used by men."

Mr. K.G. Ramanathan, President, Governing Council, ICPE said, "Our endeavour is to address misperceptions and concerns about plastics, highlight its benefits and uses, understand its impact on the environment and provide a scientific basis for discussion."

Mr. K.P. Nanavaty, Member, Governing Council, ICPE said, "We believe this study will be a knowledge driver in the plastics industry. With inputs from the best scientific minds in the country, this and the other subsequent volumes that will follow will be encyclopaedic references that will add to public knowledge about plastics which has been described as 'one of the greatest inventions of the millennium'."

The nine scientific and technology institutes that collaborated on the study include the Indian Institute of Technology, Bombay - Mumbai; National Chemical Laboratory - Pune; Indian Institute of Technology, Delhi - New Delhi; Indian Council for Medical Research - New Delhi; Indian Institute of Packaging - Mumbai; Defence Material and Stores Research and Development Establishment - Kanpur; The Automotive Research Association of India - Pune; Indian Institute of Technology, Kharagpur - Kharagpur; and the Central Institute of Plastics Engineering & Technology - Chennai.

*Note: For a copy of the book please write in to ICPE at email: icpe@vsnl.net*



# Events

## Industry Meet on Plastic Waste Management

*Mumbai, June 14, 2003*

An Industry Meet was held at the Indian Merchants Chamber to discuss and share ideas on the critical issues related to Plastic Waste Management. It was attended by various members from the industry, which included AIPMA, TAPMA, Parle Bisleri, HLL, Kolsite, Coca Cola India and members of ICPE. Amongst various issues discussed were the industry's initiative in terms of recycling of PET bottles, strict compliance of the law by the plastic industry on plastic bags, involving the Municipalities in collection and recycling process etc. It was also mentioned at the meet that technologies for biodegradable carry bags are already on the anvil and such biodegradable carry bags, food trays etc. have already been made in the European markets.

## Academicians Meet on Plastics for Environment and Sustainable Development

*Kolkata, June 16, 2003*

An Academicians Meet was held in Kolkata on Plastics for Environment and Sustainable Development. Prof Shekhar Chaudhuri, Director, Indian Institute of Management, Calcutta (IIMC) graced the occasion as the chief guest. Prof Chaudhuri in his speech urged the need for setting up effective plastic waste management systems and welcomed ICPE for working on such management systems with IIMC. Distinguished academicians Prof P Ghosh and Prof B Das of Calcutta University, Prof R P Singh and Prof Sukumar Maiti of IIT Kharagpur and Dr T Guha, ex Vice President, Shaw Wallace unfolded various sectors of applications of Polymers and explained how Polymers have become an inseparable part of our society. They also spoke on waste management and plastics waste recycling methods.

The meet was attended by delegates from various educational institutes, which included IIT, Calcutta University, CIPET etc. Industry representatives included HPL, RIL, and Shiva Polymers besides government officials.

## World Environment Day celebrated at Maharashtra Nature Park

*June 5, 2003*

The lush green Maharashtra Nature Park in Mumbai organised an Environmental Film Festival to celebrate World Environment Day. The festival included nature walks, interactive sessions and screening of various films on the environment. An animation film made for children by Indian Centre for Plastics in the Environment (ICPE) was also screened on this occasion.

Academicians Meet on Plastics for Environment and Sustainable Development *Kolkata, June 16, 2003*

# News

## NATIONAL

### Jayalalitha's plastic road laying scheme for villages launched

Tamil Nadu Chief Minister Jayalalitha's innovative 'plastic road laying scheme' in rural areas has been launched. Women self help groups can now handover plastic and polythene wastes to the contractor in their respective areas and get Rs 10/kilo. Jayalalitha had ordered laying of plastic mixed tar roads in the villages for a stretch of 1000 kms since the unrenewable plastic waste gets strewn around and affects the environment.

The processed plastic and polythene waste is utilized by mixing it in tar, for roads being laid in rural areas. As a trial measure, about 1000 kms stretch roads will be laid using the plastic waste mixed with tar for this purpose in the villages.

*(Source: Thirty Mirror Chennai, July 19, 2003)*

*Note:* ICPE had co-sponsored road laying projects with plastic wastes at Chennai and Madurai jointly with Chennai Plastic Manufacturers' Association and Thiagarajar College of Engineering, Madurai.

Recently looking at the success of the project and the quality improvement of the experimental road stretch, Ms. Jayalalitha instructed the State Department to extend this technology for 1000 kms of road.

ICPE will keep the readers informed about further developmental initiatives in other places.

### Plastic management, not elimination is the answer

Plastics are present everywhere - in the kitchen-water bottles, milk sachets, microwave; vehicles-dashboard, steering wheel; office-computers, telephones; school-labels, book covers, identity cards, water bottles, lunch boxes; space- rockets, satellites; sports-tennis racquets, cricket

gear. In short plastics and its variants are everywhere.

The alternative to plastics would be a trying existence with our streets and homes dogged by broken glass bottles and the stains left by their contents; non plastic carry bags which are fragile, unwieldy, tough to handle and split constantly. But the advantages of plastic are such that it's virtually impossible to imagine a world without it at this point of time.

The onus therefore ought to be not on plastic elimination, but on plastic waste management. And it is to this end that the NGOs and others must push civic administration. To start with, better recycling plants and better waste disposal units must be started in every village. The fact that even big cities do not have recycling plants and have also not budgeted for it tells its own tale.

Pune scientists have discovered that sugar bonding would rapidly break down plastics, Japan has stringent recycling regulations and plans to control litter till a substitute is found for plastics and in Australia they claim to have found a substance that can decompose at low temperatures. They claim that the substance will decompose when simply exposed to moisture and micro-organisms in the soil.

*(Source: The Vijay Times, Bangalore, May 25, 2003)*

Waste management : Develop the Bin culture

### *India to turn third largest polymer consumer by 2010*

*After the US and China, India will be the largest consumer of polymers in the world by the year 2010. The polymer consumption in India will touch 12.5 million metric tonnes (MMT) in 2010 from 4.2 MMT in 2000. With the demand for plastics growing consistently over the years in different applications, a surge in demand for polymers is expected. The per capita consumption of plastics in India has improved to 4 kgs in 2002 from 0.5 kg a decade ago but is still lagging behind the world's average of 20 kgs. While North America's consumption level is as high as 90 kgs followed by Western Europe (65kgs), Latin America (18 kgs), China (18kgs) and Eastern Europe (10kgs). The end user sectors such as consumer and industrial packaging, automobiles, consumer goods, fibres and multifibres, infrastructure and miscellaneous applications are poised to give the polymers a robust growth till the year 2010.*

*(Source: The Financial Express, New Delhi, May 26, 2003)*

## INTERNATIONAL

### APR -USA challenges biodegradables in waste stream

ARLINGTON, VA. -- Biodegradable plastics often are touted as having all the benefits of conventional plastics with fewer of the environmental downsides. But one plastics recycling trade group is wondering if biodegradable bottles could do some unexpected environmental harm.

The Association of Post Consumer Plastic Recyclers said it is concerned that the biodegradable bottle could hurt the environment by making it more difficult to recycle existing PET and high-density polyethylene bottles. The group's message prompted California officials to put the brakes on a legislative proposal that would have given companies using the biodegradable bottles more flexibility complying with one of the state's plastics container recycling laws.

Arlington-based APR is not saying that biodegradable bottles definitely will cause problems, but Executive Director Robin Cotchan said the industry has questions. Preliminary data raises concerns that the different melt temperatures of biodegradable plastic may cause problems during manufacturing and that mixing it with PET could leave PET bottles cloudy.

If the inclusion of degradable plastic with normally recycled plastic hampers the reclaiming process or renders the recycled PET and HDPE unfit for its uses, the environmental consequences of the biodegradable plastic bottle is likely to be negative, APR said in a news release. Cotchan said APR received a presentation of performance data of biodegradable polylactic acid-based resin from manufacturer Cargill Dow LLC.

Cargill Dow said the presentation did not address recycling, but rather outlined general performance characteristics of the material. Cotchan said the group does not have data from commercial testing but is trying to develop that, and it would like Minnetonka, Minn.-based Cargill Dow to go through the group's Champions for Change process to evaluate the material for recyclability. With reliable and complete data, APR could then form an opinion about the compatibility of biodegradable plastics and recycled PET and HDPE, APR said. "While we do not have definitive statements on the compatibility of biodegradable bottle materials and either PET or HDPE, we are seeking to confirm the chemical compatibility of the biodegradable plastics." Cargill Dow spokesman Michael O'Brien said his company has not run recycling tests on biodegradable bottles because it is not close to commercializing any, and isn't even clear what bottle markets it may go into.

"It's so wide open in terms of where this bottle could and couldn't go, he said. If you have a milk bottle, that's one problem. If you have a water bottle, that's another problem. The challenge is we need to define what market we have." The California proposal came from State Sen. Betty Karnette, D-Long Beach. It would have allowed companies to use biodegradable containers to comply with California's rigid plastic packaging container law. The RPPC law requires companies to use recycled content. Karnette's proposal would have added biodegradable containers to the list of options. But a Karnette aide, who spoke on condition of anonymity, said that the office has received complaints from recyclers, including APR, and has put the legislation on hold.

We definitely don't want to mess with the recycling system in California, the aide said. It is working very well. Karnette proposed the law because plastic packaging is a significant part of the pollution in the Los Angeles drainage basin and along the ocean front, and she wanted to create an incentive for companies to use biodegradable material, the aide said.

The Senator is very concerned with improper disposal of trash, particularly plastics, because they don't break down, the aide said. "We don't want to mess with the recycling stream but we want to do something about improper disposal."

*(Source: Extracts of News reports on Plastics and Environment from International publications)*

## Recycling Of PET

There is a quantum jump in the use of stretch blow moulded PET bottles in the country, for varying appli-cations with market acceptability. The trend is expected to continue.

Used bottles find their way into the waste stream and organised efforts are being made to collect the bottles and route for recycling. This would be further augmented to ensure maximum collection. Various institutions and R&D bodies are continuously striving to evolve processes and technologies to help useful business opportunities.

One major thrust would be entrepreneurship development. R & D efforts from The Synthetic and Art Silk Mills' Research Association (SASMIRA) has worked on used PET bottles to convert those into a variety of non-woven products with specific and extensive applications.

The recycling options for PET bottle wastes may be broadly classified into:

- Chemical methods like Glycolysis, Methanolysis etc.
- Physical methods like extrusion
- Recycling into bottles

Recycling by chemical routes yields products of high quality, but operating costs are high. On the other hand, bottle to bottle recycling may take some time in India as the technology is new and the related regulations are yet to be understood properly. Whereas physical recycling by extrusion seems to be most effective. Physical recycling of PET bottles has been pioneered by Wellman, Erema et al in the West. However, such a technology is said to be expensive in the Indian context.

SASMIRA claims to have minimized the cost of physical recycling by incorporating its own R & D efforts and has applied for a patent of its process. The PET Bottle Grade Waste Recycling process, as attempted by SASMIRA involves the following steps:

- Bottle collection from various sources
- Sorting of other plastics and washing of bottles
- Grinding and densification to produce spinnable chips
- Optimisation parameters on a melt spinning machine
- Fibre production on industrial scale
- Evaluation of fibre properties
- Development of different products

The non-woven products developed include:

- Geotextiles
- Blankets
- Automotive moulded carpets
- Filter fabrics
- Shoe linings
- Filling material for pillows, sleeping bags – especially for use in extreme cold conditions.
- Thermal insulation layer for protective suits
- Knitted wares also have been developed.

SASMIRA claims that these products in quality are techno-economically advantageous compared to other alternatives. They are also carrying out further work on recycling the PET bottle wastes into products like filament yarns, Air textured yarns, spun yarns, woven fabric etc.

For further details please contact:
**The Synthetic and Art Silk Mills' Research Association**
Sasmira Marg, Worli
Mumbai - 400 025
Email: sasmira@vsnl.com

**Indian Centre for Plastics in the Environment**

205, Hari Chambers, 58/64, Shaheed Bhagat Singh Road, Fort, Mumbai 400 023
Tel: 022 5635 1686-87, 2269 4105-06
Email: icpe@vsnl.net
www.icpenviro.org