

Quarterly Publication of Indian Centre for Plastics in the Environment





Office Bearers

Mr. K. G. Ramanathan President, Governing Council

Mr. M. P. Taparia Chairman, Executive Committee

Mr. S. K. Ray Executive Secretary, Member – Executive Committee

Mr. Rajiv Tolat Treasurer, Member – Executive Committee

Mr. Vijay Merchant Member, Governing Council, Convenor – NGO Projects

Mr. P. P. Kharas Member, Governing Council, Convenor – Communications

Editorial Board

Editor

Mr. T. K. Bandopadhyay Sr. Technical Manager, ICPE, Mumbai

Members

Mr. P. P. Kharas Member, Governing Council, Convenor – Communications

• • •

Mr. Vijay Merchant Member, Governing Council, Convenor – NGO Projects

• • •

Ms. Savita Pradeep Technical Manager, ICPE, Delhi

Edited and Published by Mr. T. K. Bandopadhyay and Printed by him for and on behalf of Indian Centre for Plastics in the Environment, Olympus House, 2nd Floor, 25, Raghunath Dadaji Street, Fort, Mumbai - 400 001.

Tel.: +91 22 4002 2491 / 2261 7137 / 7165 / 7168 E-mail: icpe@vsnl.net

> Websites: • www.icpenviro.org • www.envis-icpe.com • www.icpeenvis.nic.in

Contributions represent the opinions of authors and are not necessarily the official view of this journal or the Indian Centre for Plastics in the Environment



Mumbai

Olympus House, 2nd Floor, 25, Raghunath Dadaji Street, Fort, Mumbai - 400 001. Tel.: +91-22-4002 2491 / 2261 7137 / 7165 • Fax: 2261 7168 • E-mail: icpe@vsnl.net Websites: www.icpenviro.org • www.envis-icpe.com • www.icpeenvis.nic.in

New Delhi

1009, Vijaya Building, 10th Floor, 17 Barakhamba Road, New Delhi - 110 001. Telefax : 011-2332 6376 • E-mail: icpedelhi@airtelmail.in

EDITORIAL

The benefits of plastics in various applications in almost all areas of our daily life are well known all over the world including India. Plastics as energy saver is a well understood phenomenon which puts plastics as one of the top listed man-made eco friendly materials. Plastics cause minimal CO₂ emission during its manufacture (basic raw material), production (products for use) as well as during its transportation / usage compared to alternative materials for the same applications. A recently published Carbon Life Cycle Analysis conducted by McKinsey & Company under a study project sponsored by International Council of Chemical Associations (ICCA) reveals that **out of top ten Green House Gas Emission Savers in the industry, plastics account for four application areas** – Insulation in the Building Construction, Packaging, Automotives and Piping. The Executive Summary of the cLCA study report has been published in this edition of Eco-Echoes with the consent of ICCA. Eco-Echoes will continue to bring out such international and national study reports to its readers in India and elsewhere.

In spite of the fact that plastic carry bags and plastic bags have contributed significantly in creating a sustainable, cost effective, energy efficient, hygienic and environment friendly packaging system for carrying, storing various types of commodities / products including food products, plastic bags / carry bags are under the scanner and are blamed for causing floods by clogging drainage system. Though plastics constitute only about 5% of MSW in major urban cities in India, it has been realised that thin plastic bags are not picked up by waste pickers due to economic reasons and are left in the waste stream creating waste management problem. To arrest the problem, the Union Government had already banned production and use of plastic carry bags below 20 microns in the entire country in 1999. However it is a reality that thin plastic carry bags are still seen in the market place. It is also a reality that poor littering habits of our people coupled with inadequate infrastructure for waste management have aggravated the problems. A report on the answer given by the Hon'ble Environment Minister of India, Mr. Jairam Ramesh, to a question raised in the Indian Parliament on this issue, has been published in this edition of Eco-Echoes.

Existing rules and regulations have to be followed properly or else the authorities have to enforce the same strictly. Plastic carry bags are not banned any where in the world except however in major cities of Bangladesh including its capital city of Dhaka. The global matrix of plastic carry bags and the Indian rules along with comparative environmental pollution created by plastic bags vis-à-vis paper and jute bags have been published in this edition.

More attributes of plastics in general and plastic bags / carry bags in particular with comparative analysis with alternatives, would be serially published in Eco-Echoes. Readers may like to respond expressing their views on the issue.

Innovations for Greenhouse Gas Emission Reductions

A new ICCA report on a life cycle quantification of carbon abatement solutions enabled by the chemical industry

Executive summary

The International Council of Chemical Associations (ICCA) is the worldwide voice of the chemical industry. Amongst other initiatives, ICCA promotes and co-ordinates Responsible Care®, a voluntary program that commits the chemical industry to continuous improvement in all aspects of health, safety and environmental performance.

In line with Responsible Care®, the chemical industry recognizes its responsibility to contribute to efforts to mitigate global warming. The industry's goals in this regard are to reduce its own emissions by improving its processes and to encourage the use of chemical products that create a net emission reduction along the value chain.

ICCA has commissioned this work as one step towards achieving these goals, and as another tool to provide transparency on the chemical industry's role in reducing GHG emissions. The report's objective is to provide reliable, independently verified facts and analyses upon which the industry and regulators can base decisions that improve chemicals' emissions impact. It analyzes the chemical industry's global GHG emission impact 'from cradle to grave', i.e., through the entire life cycle of the chemical products and the applications in which they are used. The chemical industry is the first global industry to embark on such an initiative.



Executive Summary

Under the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change (IPCC) has reviewed the scientific literature and concluded that a significant reduction of greenhouse gas emissions is necessary to slow the rate of growth in atmospheric concentrations of CO₂. The IPCC analysis highlights that to achieve emissions reductions on the scale necessary, the world economy will need to be rapidly "decarbonized", with action taken on all of the available abatement levers. In most cases, the required shifts in behavior are unlikely to happen on a sufficiently large scale without effective policies and regulations – hence the importance of providing policymakers with reliable facts on the impact of the available options and levers most relevant to the chemical industry.

The study drew on a wide range of published data and independently audited original research to calculate the chemical industry's impact on emissions in 2005. McKinsey then assessed how this impact would change in two scenarios to 2030, a "business-as-usual" (BAU) scenario and an alternative "abatement scenario". Both future projections were based on McKinsey modeling and their global GHG abatement cost curve work.

1. A Robust and Transparent Methodology to Evaluate the Chemical Industry's Contribution to the Decarbonizing of the World Economy

The study utilized a full life cycle CO_2e analysis to determine emissions linked to the chemical industry, from extraction of feedstock and fuel, through production, to disposal.

Further, to assess the impact of chemicals in enabling greater carbon efficiency throughout the economy, the study conducted " CO_2 e life cycle analyses" (cLCAs)¹ for over 100 individual chemical product applications. These cLCAs span the major sectors of the industry and cover a representative portion of the CO_2 e savings linked to chemical products. All the production emissions of the industry are included, whereas only the major portion of the in-use savings have been covered. Further cLCA work could therefore yield a higher level of savings than reported in this study.

The cLCAs compared the CO₂e emissions of a chemical industry product in a specific application with the next best non-chemical industry alternative that preserves current life style, through the extraction, production, inuse and disposal phases. For simplicity, the term chemical product is used to define a product that is produced by the chemical industry.

The report adopts two metrics to reflect the chemical industry's impact on carbon emissions. The first is a **gross** savings (or X : 1) ratio, where the amount of CO₂e saved

through the use of a chemical product is measured against the amount of CO_2e emitted during that product's entire life cycle. The second metric is the **net emission abatement**, which represents the difference between the gross CO_2e savings enabled by its use and the CO_2e emitted during its own production including indirect and supply chain emissions and disposal. The term cLCA is used throughout the report to indicate CO_2e life cycle analysis.

Two alternative principles were applied in allocating CO₂e savings. In most cases, where chemical industry products play the enabling role in GHG abatement or provide the GHG saving component, 100 per cent of the CO₂e savings were attributed to the chemical industry. In three cases where the use of the chemical industry product only contributed to an improvement in CO₂e emissions, savings based on the chemical's cost share of the overall product costs were attributed to the chemical industry. By adopting this approach the authors acknowledge that other parties with an enabling contribution to the same measure may adopt the same approach, which could then lead to multiple counting. The basis for this is explained in the methodology section. Allocations of abatement volumes differ from CO₂e accounting rules within carbon markets. This report is not intended to make any financial claims linked to these GHG savings.

2. Today's Impact – The Chemical Industry's Current Emissions, and the Savings it Enables

The chemical industry has improved its energy savings at manufacturing sites and in this regard reduced its GHG emissions over the last decades significantly as illustrated by the examples below:

- Between 1990 and 2005, chemical production in the EU rose by 60 per cent, while total energy consumption was stable. This meant that the chemical industry has cut its energy intensity by 3.6 per cent annually. Absolute GHG emissions, meanwhile, fell by almost 30 per cent;
- The Japanese chemical industry reduced unit energy consumption by 2002 to 90 per cent of the 1990 fiscal year level eight years ahead of target. By 2006, further improvements meant that the performance achieved was 82 per cent of the 1990 level;
- Since 1974, the US chemical industry has reduced its fuel and power energy consumed per unit of output by nearly half. Since 1990 the US industry's absolute GHG emissions fell 13 per cent, a reduction that exceeds the target of the Kyoto protocol;
- The Brazilian association members reduced specific overall energy consumption between 2001 and 2007 by 25 per cent while increasing overall production by almost 30 per cent. By 2007, more than 50 per cent of energy came from renewable sources. Total CO₂ intensity declined by 16 per cent between 2001 and 2007.

¹ Carbon Life Cycle Analysis; assessment that focuses only on the $\mathrm{CO}_{\rm 2}$ equivalent emissions

In 2005, CO_2e emissions linked to the chemical industry amounted to about 3.3 $GtCO_2e$ +/- 25 per cent. The majority of these emissions, 2.1 $GtCO_2e$, were a result of the production of chemicals from feedstock and fuels delivered to the chemical industry.

An additional 1.2 $GtCO_2e$ of emissions – included in this study in line with life cycle thinking – arose during the extraction phase of the feedstock and fuel material, and during the disposal phase of the end products.

Gross savings vary from 6.9 to 8.5 $GtCO_2e$ depending on the scope and assumptions used¹. This translates into a gross savings ratio of 2.1: 1 to 2.6 : 1. In other words, for every $GtCO_2e$ emitted by the chemical industry in 2005, it enabled 2.1 to 2.6 $GtCO_2e$ in savings via the products and technologies it provides to other industries or users.

Depending on the assumption and scope, the net CO_2e emission abatement enabled by the chemical industry's products across the economy amounted to 3.6 to 5.2 GtCO₂e +/- 30 per cent in 2005. Net CO_2e savings refer to the difference in GHG emissions with and without the use of chemical products assuming no substantive changes to current life style. In other words, and compared to total

global emissions of 46 GtCO₂e in 2005, there would have been 3.6 to 5.2 GtCO₂e, or 8 to 11 per cent, more emissions in 2005 in a world without the chemical industry.

Taking account of current societal needs and the impact of a growing global population, these savings highlight the vital role of the chemical industry in decarbonizing the economy. In reality, achieving the equivalent CO₂e savings without the benefits of chemical products and technologies would not be possible.

The biggest levers evaluated for emissions savings enabled by the chemical industry were:

• **Insulation** materials for the construction industry, which reduce the heat lost by buildings and thus the use of heating fuel. Insulation alone accounted for 40 per cent of the total identified CO₂e savings.

This report did not address cooling applications where additional emission reductions in the building industry would be anticipated:

 The use of chemical fertilizer and crop protection in agriculture, which increases agricultural yields – so avoiding emissions from land-use change. Due to the uncertainties in land-use changes, yields, soil quality effects and modes of CO₂ – binding and assimilation in different conventional and organic agricultural processes, this study adopts two scopes, one with and one without this case;

Among the Top Ten Greenhouse Gas Emission Savers, Plastics account for four!

- Plastics in Packaging
- Plastics in Automobiles
- Plastics in Insulation materials in construction industry
- Plastics in Piping

- Advanced **lighting solutions**: compact fluorescent lamps (CFLs), with longer lifetimes and greater luminous efficacy than incandescent bulbs, save significant energy;
- The seven next most important levers in 2005 were plastic packaging, marine antifouling coatings, synthetic textiles, automotive plastics, low-temperature detergents, engine efficiency, and plastics used in piping.

3. Tomorrow's Opportunity – Two McKinsey Scenarios to 2030, and Chemicals' Potential Decarbonizing Role

The business-as-usual (BAU) scenario developed by McKinsey and shown in this study was characterized mainly by volume growth, assumptions for efficiency gains and regional production shifts. No additional regulatory push for low-carbon development is assumed in this case. The abatement scenario, which was derived from McKinsey's global GHG cost curve scenario, assumes aggressive implementation of measures leading to a low-carbon economy.

> The BAU scenario model shows life cycle emissions linked to the chemical industry almost doubling. The number is essentially derived from doubling current emissions to 6.6 GtCO₂e, an additional 1.5 Gt due to increased production in countries which are relatively coal dependent for their energy partly offset by BAU assumed efficiencv improvements of ~1.6 Gt. The net result from this modeling is global chemical industry linked emissions of 6.5 GtCO₂e +/- 35 per cent in 2030.

Depending on the assumptions and scope, the industry's gross savings ratio improves to approximately 2.7 : 1 to 3.1 : 1 in the BAU scenario. The net emission abatement enabled by use of the chemical industry's products will be more than double to 11.3 to 13.8 GtCO₂e +/- 40 per cent under the BAU scenario.

In the **abatement scenario**, the McKinsey model assesses the full abatement potential across all sectors. This means that industries further reduce both their direct and indirect production emissions, and includes also a reduction of the carbon intensity of the utilized power. Under this scenario, the chemical industry's CO₂ intensity would fall by about 25 per cent. Its emissions would be 5 GtCO₂e +/- 35 per cent. This equates to only a 50 per cent increase on current emissions despite a greater than doubling of the production. However, this comes at significant cost at typical industry discount rates and payback periods. The CO₂ abatement costs for the final increments rise from about 50 to 150 Euro/t CO₂e. Thus a broadly accepted



¹ The lower end of the range is due to an alternative study scope that excludes the fertilizer case as explained

and global carbon price in the upper range would be one of the essential components to realize this scenario.

On the savings side, this scenario foresees a gross savings ratio of 4.2: 1 to 4.7 : 1 and a net emission abatement of approximately 16 to $18.5 \text{ GtCO}_2\text{e}$ +/- 40 per cent. This scenario is thus also reliant on a greater use of insulation, high-efficiency lighting, lignocellulosic (LC) ethanol, solar and wind energy components, and carbon capture and storage (CCS).

The chemical industry's incremental abatement (composed of both own emissions and product savings) between the above two scenarios is 4.7 GtCO₂e. This corresponds to 12 per cent of the 38 GtCO₂e abatement opportunity identified in the GHG abatement cost curve published by McKinsey & Company in February 2009. This number assumes, of course, that all opportunities for abatement within the sector are met, and that all opportunities for abatement across the other sectors described in this report are realized. But within the context of these two conditions, the study underlines the important role of the chemical industry in global GHG reductions.

Beyond the savings projected for the abatement scenario, numerous industry innovations currently under development could further increase the chemical industry's net abatement potential. In addition to the technological abatement measures provided by the chemical industry, other measures including changes in consumption pattern will be needed to achieve the longer term aim of absolute global GHG reductions. Such behavioural changes linked to different consumption patterns are beyond the scope of this study.

4. Policy Implications : Optimizing the Chemical Industry's Abatement Potential

The emissions saving potential identified in this study will not materialize without effective policy and regulation. ICCA suggests the following guiding principles for consideration when devising policies directed towards a low-carbon economy:

- Develop a **global carbon framework** to accelerate GHG reductions, avoid market distortions and minimize carbon leakage²;
- Focus first on the largest, most effective, and lowest cost abatement opportunities;
- Push for **energy efficiency**, as this is one of the largest and most cost efficient sources of CO₂e abatement, by providing incentives for the use of energy savings products and materials such as insulation;
- Support the development of new technologies that reduce energy consumption and abate CO₂e including new catalysts, new syntheses, process intensification & integration, use of Combined Heat and Power (CHP), and Carbon Capture and Storage (CCS). A portfolio of

technology development initiatives will need to be accelerated, which will require public support and financing. This is most important during the research and demonstration phases. As technologies are commercialized, financial support should be reduced and finally removed to allow the market to work effectively;

- Support the development of the most efficient and sustainable use of available feedstocks and energy for the production of chemicals in conjunction with the development of the above mentioned process emission abatement technologies;
- Allow markets to incentivize fast action by rewarding early movers that proactively reduce their CO₂e footprint;
- Support the development of new technologies and practices that ensure the most efficient and sustainable disposal, recovery and recycling options are implemented; Support a technology cooperation mechanism for the transfer, sharing and funding of abatement technology between developed and developing countries;
- Design the implementation of the above mentioned measures to complement a future carbon framework. The goal must be to produce GHG intensive products – taking the whole production value chain into account – as carbon efficiently as possible irrespective of the location. This future carbon framework should be designed to ensure this happens as cost effectively as possible;
- As the global framework is being developed, local policy should ensure that carbon burdens do not apply unilaterally within their regions thus avoiding market distortions and unintended consequences such as carbon leakage.

2 Carbon leakage is the migration of production into non-regulated regions with higher production footprints, or substitution by less stringently regulated products with higher CO_2e footprints.

Acknowledgement

Executive Summary of the Innovations for Greenhouse Gas Emission Reductions Report produced and published by International Council of Chemical Associations (ICCA) in Rome on July 7th, right before the G8 summit.

ICCA is the world voice of the chemical industry (of which Cefic is a member, from the European side), that produced this report.

McKinsey made the search and analysis on behalf of ICCA and the Öko Institut (Germany) checked the scientific basis of the Carbon Life Cycle Analysis.

The Executive Summary has been published in Eco-Echoes with the consent of ICCA (www.icca-chem.org).

Environment Day Celebration-cum-Seminar on Waste to Wealth Kolkata: 5th June, 2009



L to R: Mr. Buddhadeb Bhattacharjee, Hon'ble Chief Minister of West Bengal discussing the various aspects of environmental impacts by industrial development process. Mr. Sailen Sarkar, Environment Minister and Prof. A. N. Basu, Chairman - WBPCB, are seen on dais.

Department of Environment, Government of West Bengal and West Bengal Pollution Control Board had organised a function at Kolkata on 5th June to celebrate World Environment Day 2009. A seminar was organized covering four issues including the issue of 'Management of Waste Plastics'. The organizers had requested Indian Plastic Federation (IPF), Kolkata, to address this issue. On the request of IPF, the ICPE Management deputed Mr. T. K. Bandopadhyay to make the presentation in the seminar.



A section of delegates.

The Chief Minister of West Bengal, Mr. Buddhadeb Bhattacharjee, was the Chief Guest and the Environment Minister, Mr. Sailen Sarkar presided. Chairman and Member Secretary, WBPCB briefed the gathering about the programme and achievement of the WBPCB during the year.

The Chief Minister presented an award to the Chairman, Kalyani Municipality Corporation, for his pro-active action in the cause of maintaining a clean environment in the municipality area. One of the leaderships taken by Kalyani Municipality was the initiative to use waste plastics in the construction of asphalt road. (ICPE had provided technical guidance and financial assistance in the project.) Mr. T. K. Bandopadhyay made a presentation on 'Utilisation of Plastics Waste – Technological Advances'. The presentation covered the issues related to Plastics Waste and the Possible Solutions by highlighting advantage and disadvantage of various routes of recycling of plastics. The presentation highlighted ICPE's initiatives in providing technical guidance for the construction of tar road using plastics waste at Kalyani and the initiative in co-processing plastics waste in cement kiln. The cement kiln process was appreciated very much by the audience. However it was informed by the Member Secretary, WBPCB that there is no cement kiln in the State (all use the grinding route). Hence an alternative arrangement could be undertaken in the State.

New Road Constructed: Kalyani Municipality Corporation (near Kolkata)



Vidyasagar Street, Kalyani – constructed with Plastics waste.

The concept of using plastics waste in the construction of Asphalt Road has been successfully implemented for the first time in Eastern India. A public road of about 1.5 KM long and over 21 feet wide has been constructed in Kalyani Municipality Corporation, about 70 KMs from Kolkata. Indian Plastic Federation (IPF), Kolkata, had coordinated the project and Kalyani Municipality Authority took initiative to construct a road in the Corporation. ICPE had provided the complete technical support / guidance by first appraising the Executive Engineer and the Contractor of the project on the technology and process, then guiding the recycler about specifications of the plastics waste and conducting a pre-trial of the operation to train the bitumen mixing plant operators. The actual construction work was conducted under the supervision of ICPE technical person. The whole project was coordinated by IPF. The road -Vidyasagar Street, would be under observation by the corporation authority.



WORKSHOPS & SEMINARS

Workshop on 'Solid Waste Management with emphasis on Plastics Waste Management' - New Delhi: 5th & 6th June, 2009



Mr. K. G. Ramanathan welcoming *Dr.* Kanwar Sain, Hon'ble Mayor of Delhi. *Mr.* Deepak Pahwa and *Mr.* Krishnan Kalra of PHD Chamber of Commerce are also seen.

A two-day workshop on Solid Waste Management was jointly organized by Indian Centre for Plastics in the Environment in association with PHD Chamber of Commerce and Industry at PHD House, New Delhi, on June 5-6, 2009, on the occasion of World Environment Day. The workshop was supported by Ministry of Environment and Forests and co-sponsored by All India Plastic Industries Association and Tirupati Structurals Ltd. The programme comprised of an Inaugural Session and five technical sessions spread over two days. Hon'ble Mayor of MCD, Delhi, Dr. Kanwar Sain was the Chief Guest. Mr. K. G. Ramanathan, President, ICPE delivered the Keynote Address. Mr. Deepak Pahwa, Chairman, Environment Committee, PHD Chamber of Commerce and Industry, also addressed the gathering. The workshop was also graced by Mr. Arvind Mehta, President, PLASTINDIA Foundation. The issues of the enormous quantity of waste generated in the country and the need to evolve sustainable solutions for management of the same were deliberated in the session. The



Section of delegates. Mr. Arvind Mehta, President - Plastindia Foundation is seen on left row.



Dr. Sunil Bose – CRRI, Mr. Mihir Banerji – RIL, Mr. Krish Iyenger – RIL and co-ordinator – ICPE Delhi, Dr. U. K. Niyogi – SIIR during one Technical Session.



Dr. K. S. Bhagodia – ISHWM, Mr. Mihir Banerji – RIL, Dr. R. S. Dhaliwal – ICMR, Dr. A. Panda – Paper India Foundation and Ms. Kanchan Zutshi – PHD Chamber of Commerce in another Technical Session.

responsibility of citizens for segregating waste, anti-littering, misconceptions about plastics materials were also deliberated upon in the session.

The workshop was attended by around 80 delegates who were from government officials from MoEF, BIS, Ministry of Urban Development, officials from US Embassy, officials from educational and research institutes – CIPET Panipat; Shriram Institute of Industrial Research, NEERI, Indian Council of Medical Research; Waste management companies – IL&FS, SPML, Indian Society of Hospital Waste Management, municipal authorities; NGOs – Samyak Vikas Sanstha, Centre for Environment Engg., Toxics Links, Advit Foundation; officials from educational institutes, consultants, industry members – AIPIA, IPI, Max Speciality Products, manufacturers, recyclers, etc.

Encouraging feedback has been received from all the delegates who have rated the workshop as time-worthy and useful, subjects discussed at the workshop as very informative, appreciated the arrangements made for the workshop and have desired to attend more such workshops planned by the organizers in future. Overall, the workshop was a grand success. Dr. Hota from Ministry of Environment and Forests also applauded the successful programme organized by ICPE.

Keynote Address by Mr. K. G. Ramanathan in PHD Chamber at the Seminar on Solid Waste Management

- 5th June 2009

Ladies & Gentlemen, I am indeed delighted to be amongst such distinguished gathering and participate in this important seminar. PHD Chamber deserves our compliments for organising the seminar and assemble a galaxy of experts to discuss the problem of solid waste management. I strongly believe



that such open discussion and debate amongst policy makers, experts, NGOs and members of civil society are essential for evolving a rational and practical approach for solving problems such as waste management.

Friends, It is indisputable that the requirements of human beings for modern living have increased enormously over the past decades. For meeting the basic needs of food, clothing and shelter to other requirements such as travel, health, leisure, etc., there is a heavy demand and consumption of wide variety of materials. Waste is only the flip side of our ever increasing consumption needs.

Without being judgemental, let me say, that however much one may romanticize the concept of "simple living", the age of idyllic pastoral life is over. We need to meet the needs of modern man and also solve the problem of waste generation which inextricably is linked to consumption.

Today, I am going to talk about plastics, which are in wide usage from common household items to high technology products. Light in weight yet tough, inert, excellent barrier properties, ease of moulding into flexible or rigid products, transparency when required, have all made the usage of plastic products grow rapidly. Products made from plastics



have made significant contribution in the area of medical safety and health care. Agricultural productivity has dramatically improved with plastic water delivery systems,



mulching and green houses made from plastic materials. High technology products required for aviation, industry, space science, telecommunication and computers use plastics extensively.

It is important here to note that plastic products consume least amount of energy during its production and usage in comparison to alternate materials such as glass, metals, paper, cloth, etc. In fact plastic products when properly handled leave very low carbon footprint on the earth. Despite all these positive attributes, plastics are generally criticised on the following grounds:

First it is said that plastics are derived from non-renewable resources, viz. oil and hence the usage of plastics should be curbed.

The reality is that only about 4% of crude oil is used in the entire chain of petrochemicals of which plastics is only a part. Moreover use of light weight plastics materials in various applications including in automobiles, reduces the consumption of fuels to such an extent that it more than compensates its use of the crude oil for its production. While the economy of usage of crude oil is always welcome, curbing the use of plastics is not the solution.

The second aspect of criticism relates to the alleged health hazards arising out of usage of plastics.

Plastic products are being subjected to in-depth scientific analysis. These have clearly proved that plastics are not hazardous to health. On the contrary plastic implants are widely used in orthopaedic field and many plastic products are extensively used in the medical field. Plastics are used for blood bags, IV fluid bottles, tubes and for packing of pharmaceutical products. Use of plastics disposable syringes have made treatment of highly transmittable diseases safer. There are clear international and national regulations / standards for usage of plastics that comes



into contact with food, pharmaceutical products and drinking water, etc. Therefore, much of the alleged health hazards are pure scare mongering and not based on



WORKSHOPS & SEMINARS

scientific facts. The issue of dioxin emission during the processing / burning of plastics has also been studied and documented to indicate that plastics and dioxin are not directly related. It is also documented that air and water emissions of various gases and other products during the production of plastics are much lesser compared to the alternative materials for same applications.

The third major criticism is its non-biodegradability.

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. Moreover, many of the applications for plastics arise from the need for the product to be long-lasting.

Again, LCA and other studies carried out the world over clearly prove that the energy required for production of plastics is much lower than that of alternate materials. Thus the production and usage of plastics demand minimum



The waste characterization study by NEERI and Others further reveals following categories of waste for which appropriate processing technologies have to be selected and installation of facilities is done:

1.	Compostable matter (Short-term biodegradable: Food waste, leafy matter, fish, meat, fruits, etc.)	30-40%	approx. 2340 tpd
2.	Energy content material (Long-term biodegradable: Tree prunes, paper products, coconut shells, textiles, bamboo baskets, banana stump, etc.)	12-20%	approx. 936 tpd
3.	Recyclables plastic, glass, metals, rubber	8-15% (largely sc	approx. 624 tpd avenged)
4.	Miscellaneous mixed waste including sand, silt, sanitary diapers, etc.	20-30%	approx. 1560 tpd
5.	Debris & construction material	30-35%	approx. 2340 tpd
	Total (based on minimum rang	le)	7800 tpd

Source: NEERI report on Solid Waste Management (2006), Mumbai

energy in comparison to other materials and therefore nonbiodegradability alone cannot be a consideration while deciding on the appropriate needs of a material. It is also worth noting that biodegradable plastic products have already appeared on the scene, though technology and costs make them currently too expensive for widespread usage. I am sure the problem would be overcome with more R & D in this field.

Lastly the problem of disposal of plastic waste is held against the usage of plastics. Plastics are blamed as the major cause of municipal Solid Waste problem.

Undoubtedly disposal of plastics waste is indeed posing a serious problem, particularly in the urban areas. Unfortunately the very strengths of plastics, viz., light weight and durability have become enemies of plastics. In our country the problem is compounded by the unfortunate littering habits amongst our people, coupled with inadequate solid waste management infrastructure. As a result, we find all types of dry wastes including plastic waste littered in our surroundings. Even wet waste is found accumulated around street corners and elsewhere.

Without minimizing the problem of plastics waste, the reality is that plastics waste form only about 5% of the MSW stream in major Indian cities. There is no problem of disposing the plastics waste per se, as they are 100% recyclable. Even thin plastic carry bags, which are considered as villain by the authorities, can be recycled into products, which are of non critical usage. The main problem is in segregation of waste at source and efficient collection of all wastes including plastic wastes from households. Developed nations, which consume plastics in much higher quantities than India have put in efficient system of segregation and collection coupled with public awareness programmes on anti littering and recycling. Unfortunately, we are far behind the developed countries in this area.



The thin plastic carry bags, though recyclable are thrown around carelessly after use. As picking of lightweight carry bags do not pay a reasonable return to the waste pickers for their efforts, they leave them behind. As a result, these plastics bags end up as a major urban nuisance. In order to minimise this problem, Ministry of Environment, Government of India had come up with rules specifying minimum thickness of plastic carry bags. Some State



L to R: Mr. K. G. Ramanathan, Mr. Deepak Pahwa, Dr. Kanwar Sain, Mr. Krishnan Kalra and Ms. Kanchan Zutshi.

Governments had further modified the rules by increasing the minimum thickness. These steps are meant to promote reuse and better collection after disposal of plastic bags. Strict implementation of these rules should minimize the plastic carry bag nuisance.

However, the long-term solution lies in putting up an efficient solid waste management infrastructure. It should start with segregation of dry and wet waste at source backed by a continuous public education programme. Since plastics are valuable material and are fully recyclable, we should promote setting up recycling centres at different points in major cities for converting post consumer plastics waste into products for non-critical applications such as furniture, buses, shelters, etc.

Apart from conventional mechanical recycling, alternate processes of plastics recycling are also required to be encouraged. Low-end plastics waste can be disposed of safely for co-processing in cement kilns. Recent trials undertaken by ICPE in co-operation with ACC and Madhya Pradesh Pollution Control Board with support from Central Pollution Control Board has clearly established the viability of such disposal. In fact, many European countries dispose all their post consumer plastics waste in cement kilns and steel furnaces. Similar successful experiments have been done for production of industrial fuel from all types of plastics waste. Plastics wastes have also been used to construct asphalt roads successfully in Tamil Nadu, Karnataka and Mumbai. These trials undertaken by ICPE with local authorities have clearly established the viability of disposing plastics waste, which can add economic value without dilution of any safety norms.

Friends, it is my belief that the problem of plastics waste can be solved on a long-term basis, only on the basis of fruitful partnership between Government agencies, local bodies, plastic industry and general public. Mass awareness against littering and for segregation of waste at source has to be created. Adequate infrastructure and systems for efficient disposal of Solid Waste including Plastics waste will have to be developed. I believe Government should take lead in initiating a dialogue between local bodies, plastic industry and NGOs to develop a successful model for handling plastics waste. The plastic industry along with retailers and packers, have to play a very important role in assisting the authorities to set up an efficient solid waste infrastructure system.

There cannot be any quick fix solution to the problem of handling Solid Waste including Plastics waste. Plastic products are useful, valuable and economic. They are in fact widely used by general public. There are no viable alternative to these products, which are economic and efficient or less energy consuming. Let us therefore not throw the baby with bath water; but let us solve the problem in a scientific manner with the support of all the stakeholders.

Lastly let my address be not misunderstood as plea for irresponsible consumption and usage of materials resulting into a huge waste management problem. On this World Environment Day, we should dedicate ourselves to the cause of conservation and sustainability, which demand responsible use of materials whether natural or manmade. Therefore the slogan of three R's, viz., Reduce, Reuse and Recycle is of great relevance to use of all materials including plastic products.

Discussion Forum on Our Responsibility to Keep the Environment Clean - Mumbai - 6th June, 2009



Mr. Jagdish Thakkar of Tata Consultancy Engineers discussing on Climate Change.

On the occasion of Environment Day, a half-day Discussion Forum was organised jointly by ICPE and National Solid Waste Association of India (NSWAI) on 6th June at AIPMA Auditorium, to discuss 'Our Responsibility Towards Keeping the Environment Clean'. Mr. Jagdish Thakkar, General Manager, Environment, Tata Consultancy Engineers, discussed on the issue of Climate Change and Mr. T. K. Bandopadhyay discussed on the issue of Role of Plastics in Maintaining a Cleaner Environment.



AWARENESS PROGRAMMES

Awareness Programmes in Schools



Awareness Programmes at Chandigarh & Mohali Schools

Awareness programmes were conducted by IPI, Chandigarh Sub-Chapter in schools of Chandigarh and Mohali. This was part of ICPE initiative to create awareness among school children with the support of local Associations and IPI Chapters. ICPE had provided material and financial support for conducting the programmes.

The programmes were held at following schools:

Swami Ram Tiratha Public School, Phase-4, Mohali – 20th April, 2009. 60 students and 5 teachers participated.

Shivalik Public School, Phase-6, Mohali – 29th April, 09. 240 students and 5 teachers participated.

Sri Guru Harkrishan Sr. Sec. Public School, Sec-40-C, Chandigarh – 2nd May, 2009. 125 students and 7 teachers participated.



Er. Gurpreet Kaur, Secretary - IPI, Chandigarh, addressing students of Sri Guru Harkrishan Sr. Sec. Public School.

The students were appraised about the plastics & its role being played in safeguarding the environment through video presentations and removed many of the myths by telling about the realities/facts about the versatile plastic in a direct interaction session. The children saw the documentary film with great enthusiasm which was depicted by the questions asked by them in the interaction session. They were very much surprised by knowing the real facts and advantages of the Plastics over the other conventional



Prof. Paramjit Singh, Chairman - IPI, Chandigarh, addressing the students of Shivalik Public School.



Er. Gurpreet Kaur and Er. Tejinder Pal Singh are seated in the front.

materials. From the interaction with the students, it was observed that earlier they were being taught only anti-plastic in relation to environment. Besides the interaction with the school children, there were separate discussions with the School Principals for their feedback. All the discussions led to the conclusion that more concrete steps like awareness talks/workshops/advertisements in the newspapers/banners at public places need to take place to mobilize the general public which includes children, parents, teachers, manufacturers, workers, rag pickers, scrap dealers, etc., focussing all the important facts, minimum & mandatory standards of manufacturing, care in handling, waste management systems and other issues related to Plastics.





An awareness programme on 'Plastics and Environment' was conducted on **April 30**, **2009** at **Kala Niketan Senior Secondary Bal Vidyalaya.** Around 100 students of Class VI to IX and 12 teachers attended the programme. Ten students expressed their views on the topic 'Plastics – A Boon or Bane' and prizes were awarded to the best three speakers.



An awareness programme on 'Plastics and Environment' was held on **April 28**, **2009** at **Ryan International School**. Around 240 students of Class VII and 6 teachers attended the programme. At the programme, the students also enacted a skit on 'Present situation of SWM in the country'.



An awareness programme was conducted at **Salwan Public School**, on **May 12**, **2009**. Around 60 eco-club students of Class V and VI attended the programme.



Awareness programme was conducted at **Arunoday Public School** on **24th April 2009**. Ms. Savita Pradeep of ICPE, Delhi, conducted the programme. Around 250 students of Class VIII and IX and 5 teachers attended the programme.

THE TIMES OF INDIA, NEW DELHI | THURSDAY, JULY 9, 2009

'Total ban on plastic bags bad idea'

Pushing Paper Bags Will Only Lead To More Cutting Of Trees, Says Minister

THES NEWS NETWORK New Delhi: The government made it clear that it is not in fayour of a blanket banon using plastic hags while it is work-oolouring elements like dyes are a bodh hazard and hin bags and material can severely jam up sevage systems. Minister of state for body lastic as severely jam up sevage systems. Minister of state for body lastic as not exceed the state for body lastic as not exceed the south to argue there and and the set and the state for body and trees. Hazardan the state for body and trees. Hazardan the state for to man-ge their solid wraste, the plastic prob-lem would reduce considerably. The government, he said, was work-ing on use of blodegardable plastic araber more hazardous to the environment. Peo-head switch of use of blastic rather than paper the world over some 20 years



ago to slow down deforestation "Plastic itself is a chemical ago to slow down deforestation. "Plastic itself is a chemically inert substance, used worldwide for pack-aging and is not per-se hazardous to health and environment. Recycling of plastic, if carried out as per approved procedures and guidelines, may not be an environmental or health hazard,"

NEW DELHI: The government made it clear that it is not in

favour of a blanket ban on using plastic bags while it is

working on use of biodegradable plastic as colouring

elements like dyes are a health hazard and thin bags and

material can severely jam up sewage systems.

Plastic is a chemically inert substance, used worldwide for packaging and isn't per se hazardous to health & environment. Recycling of plastic, if carried out as per approved guidelines, may not be an environmental or health hazard Jairam Ramesh | MINI

esh said, assuring the House that overnment would have a strin-Ramesh said, assuring the House that the government would have a strin-gent monitoring mechanism in place to ensure that the right kind of re-cy-cleable plastic is used. In his response, Ramesh clarified that it was in the wake of the failure of civic bodies to collect and dispose waste that

various states like Himachal Pradesh, Jammu and Kashmir, West Bengal and Delhi had resorted to banning use of plastic bags. The government, he said, had notified Recycled Plastics Manu-facture and Usage Rules, 1999 (amend-et masses) and the said states of the rest and recycling of plastic wastes. "We are moving towards thicker and bio-degradable bags. Bio-degradable is at a nascent stage... some establish-ments have stated using it, the said to some state of the said state of the said the sould be undertained the advantage of the said state of the Bu-reau of indian Standa (BIS). He also advocated use of plastics (BIS). He also advocated use of plastics of the Bu-reau of indian Standa (BIS). He also advocated use of plastics, it was an ecor Friendly material. The minister said the for conservation of Dai Lake in Stringgr which is expected to be com-t plated in the next three years. various states like Himachal Pradesh Jammu and Kashmir, West Bengal and

"Plastic itself is a chemically inert substance, used worldwide for packaging and is not per-se hazardous to health and environment. Recycling of plastic, if carried out as per approved procedures and guidelines, may not be an environmental or health hazard," Ramesh said, assuring the House that the government would have a stringent monitoring mechanism in place to ensure that the right kind of re-cycleable plastic is used.

– Mr. Jairam Ramesh, Hon'ble Minister of State for Environment and Forests, GOI

In his response, Ramesh clarified that it was in the wake of the failure of civic bodies to collect and dispose waste that various states like Himachal Pradesh, Jammu and Kashmir, West Bengal and Delhi had resorted to banning use of plastic bags. The government, he said, had notified Recycled Plastics Manufacture and Usage Rules, 1999 (amended in 2003) to regulate the use and manufacture of plastic carry bags, containers and recycling of plastic wastes.

"We are moving towards thicker and bio-degradable bags. Bio-degradable is at a nascent stage... some establishments have started using it," the minister said. On the recycling of plastic, he said it would be undertaken in accordance with specifications of the Bureau of Indian Standards (BIS). He also advocated use of jute bags as another alternative to paper bags, as jute was an eco-friendly material. The minister said the government had undertaken a project for conservation of Dal Lake in Srinagar which is expected to be completed in the next three years.

Minister of State for Environment and Forests lairam Ramesh told Lok Sabha on Wednesday that while reducing plastics was necessary, the material had been promoted initially to save paper and trees. He sought to argue that if municipalities made a better effort to manage their solid waste, the plastic problem would reduce considerably.

The government, he said, was working on use of biodegradable plastic as reverting to paper bags could be even more hazardous to the environment. People had switched to use of plastic rather than paper the world over some 20 years ago to slow down deforestation.

Forthcoming EVENTS



4th - 7th September, 2009 Chennai Trade Centre, CTC Complex, Nandambakkam, Chennai, India

The 9th China Plastics Exhibition & Conference

17th - 19th September, 2009 Taizhou International Convention & Exhibition Center, Taizhou City, China

Saudi Plas

18th - 21st October, 2009 Riyadh Exhibition Centre, Saudi Arabia



6th - 9th November, 2009 Science City, Kolkata, West Bengal, India

Plastimagen Mexico

23rd - 26th March, 2010 Centro Banamex, Banamex, Mexico

Koplas

31st March - 3rd April, 2010 KINTEX (Korea International Exhibition Center), South Korea

Plastec East

8th - 10th June, 2010 Jacob K. Javits Convention Center, New York, USA



DATA SHEET



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:



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.

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	

Rules of Plastic Carry Bags in different States of India

- * 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
СО	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							
со	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

There are times when load shedding is welcome





Eco-friendly plastics have enabled the Automobile Industry to design downsized, light-weight, fuel efficient vehicles which also cause less pollution. Plastics help in improving fuel efficiency conserving precious fuel to the tune of above 20% for the same capacity and in ensuring a cleaner environment.

