ICPE
INDIAN CENTRE FOR PLASTICS IN THE ENVIRONMENT (ICPE)
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>>> NEWSLETTER <<<

ECO-Echoes

Publication of Indian Centre for Plastics in the Environment

Special Edition | October - December 2024

PLASTICS WASTE MANAGEMENT - THROUGH 100%RECYCLING / RECOVERY

"ONLY 9% OF THE TOTAL 9 BILLION TONNES OF PLASTIC WASTE IS RECYCLED CURRENTLY"?

By Tushar K Bandopadhyay

Ever since the UNEP Report on 'Single – Use Plastics, A Road Map for Sustainability', was published during the World Environment Day, 2018 event, which, among others, declared that "Only 9% of the total 9 billion tonnes of plastic waste is recycled currently", it raised doubts about the correctness of the UN Report.

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BUSINESS GIANTS COMMIT $ 1BN TO LAUNCH

By The Alliance to End Plastic Waste (AEPW)

Major companies from across the plastics value chain, including Procter & Gamble (P&G), Veolia and ExxonMobil, have today (16 January) committed more than $1bn (£777m) as part of a new alliance aimed at eliminating plastic waste in the environment.

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ICPE NEWSLETTER

Special Edition

October - December 2024

ABOUT ICPE

THE INDIAN CENTRE FOR PLASTICS IN THE ENVIRONMENT (ICPE) IS A NATIONAL BODY, SET UP ON 27TH JANUARY, 1999 ON THE RECOMMENDATION OF A TASK FORCE CONSTITUTED BY THE MINISTRY OF ENVIRONMENT AND FORESTS (MOEF), GOVERNMENT OF INDIA, WITH AN OBJECTIVE TO HANDLE ENVIRONMENTAL, SOCIAL AND TECHNICAL ISSUES RELATED TO PLASTICS IN THE ENVIRONMENT. THIS IS A NON-PARTISAN NOT FOR PROFIT VOLUNTARY ORGANISATION SUPPORTED BY THE PLASTICS INDUSTRY. ICPE IS REGISTERED UNDER SOCIETY'S ACT WITH THE CHARITY COMMISSIONER, GREATER MUMBAI, MAHARASHTRA STATE. DONATIONS TO ICPE ARE EXEMPTED UNDER SECTION 80G OF INCOME TAX ACT, 1961. ICPE IS A REGISTERED ENTITY OF GOVERNMENT OF INDIA FOR UNDERTAKING CSR ACTIVITIES

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EDITORIAL

Since the inception of ICPE, publication of Eco – Echoes Newsletter has been an essential part of our mass communication tools. The Newsletter has been bringing important information on various issues on plastics; its positive impact on the environment; issues of plastics and the possible scientific solutions; vital data on Lifecycle Analysis of Plastics and energy savings by plastics have been provided in various issues of the Newsletter. It will be our endeavour to continue our work in this direction to build up more data in the area of activity and to reproduce the same in more user-friendly way without any interruption. We assure the readers to appraise them of important information and development of plastics as a whole with specific emphasis on the Indian perspective.

UN Environmental Program (UNEP) - initiated intergovernmental negotiating committee (INC) has been trying to develop an international legally binding instrument on plastic pollution, including a resolution to reducing the production of plastics resin across the world. Five meetings of INC from 2022 to 2024 remain inconclusive. Government of India did not agree to reduce the production of plastics resin due to the fact that per capita consumption of plastics in the country is about 15 kg (2021 – 22) which is 50% of average per capita global consumption. India needs more plastics for developing its infrastructure. This need cannot be met by imports. There are many other countries who also did not agree to the proposal of reduction in production. However, India fully agreed to improve plastics waste management system and reduce dumping the plastics waste in landfill. In fact, India has already taken steps towards this direction. ICPE, through its various activities, is actively engaged in developing plastics waste management and awareness activities, glimpses of which have been and would be captured in future editions of Eco – Echoes Newsletter.

There is no denying that the plastics world has not given the due attention the waste stream needed for maintaining the sustainability status of plastics through recycling. Nevertheless, there remain some misconceptions about plastics and its recycling status worldwide. The summary report of UNEP's INC commented that world has produced 500 Mn tons of plastics raw material out of which 400 Mn ton would go to the waste stream. To voice our views on the subject, we have carried out the lead article of this edition of the Newsletter to draw the attention of the readers that recycling and energy recovery of plastics waste are capable of reducing the gap between waste generation and recycling. Greater emphasis on collection of waste is thus of paramount requirement. Readers' comments are welcome on this issue.

Tushar K Bandopadhyay

Editor

Designed & Recreated By: Sudheer Khurana

PLASTICS WASTE MANAGEMENT THROUGH 100% RECYCLING / RECOVERY

"ONLY 9% OF THE TOTAL 9 BILLION TONNES OF PLASTIC WASTE IS RECYCLED CURRENTLY"?

By Tushar K Bandopadhyay

ABSTRACT

Ever since the UNEP Report on 'Single – Use Plastics, A Road Map for Sustainability', was published during the World Environment Day, 2018 event, which, among others, declared that "Only 9% of the total 9 billion tonnes of plastic waste is recycled currently", it raised doubts about the correctness of the UN Report. There were genuine reasons for casting such doubts which has been substantiated in reports published by other sources. The current article focused on this aspect mentioning that long to very long-life applications still are in use and hence there is no question of recycling of those products.

UN body's report of 2020 focused on environmental benefits of plastics vis-à-vis alternatives, except the pollution aspects created due to its littering. Waste management issue thus attains a priority. Current article attempts to highlight on the methodology of calculation of life span of plastics products to help understand the core issue.
Having said that, this article deliberates on the benefits of using plastics and technologies available for recycling of plastics – the main tool of Plastics Waste Management. The article indicates how the entire quantum of abandoned plastics waste could be recycled or their latent energy could be recovered for useful utilisation without creating any environmental pollution. Indication has been given as to the responsibilities of manufacturers and users of plastics materials towards plastics waste management. This has to be done as alternatives to plastics would create much larger impact on the environment by increasing greenhouse gas emissions causing greater threat of climate change on mother Earth.

INTRODUCTION

The caption statement raises the main issue that plastics products which have attained the phenomenal growth in production from 1.5 MN Tonnes in the year 1950 to about 350 MN Tonnes within next 65 to 68 years, have created undesired waste on earth resulting in a severe environmental challenge. The global market value of plastics is expected to increase from $523 billion in 2018 to over $750 billion by 2027. Plastics are one of the most ubiquitous man-made materials on Earth. By addressing the issue of recycling of waste, the overall benefit would be phenomenal.

Fig: 1

Ever since the UN Report on 'Single – Use Plastics, A Road Map for Sustainability', was published during the World Environment Day, 2018 event, which, among others, declared that "Only 9% of the total 9 billion tonnes of plastic waste is recycled currently", it became the more frequently discussed point among the policymakers in the governments and stake holders in major user sectors of plastic products across the globe, including India, which was the host country of the World Environment Day Event 2018. The Report had drawn up a 10-point roadmap for governments for practically curbing several types of 'single-use plastics products' including that of 'single use plastics bags (SUPBs)'. Fig 1.

Single-use paper bags have less impact of littering, compared to SUPBs, but often have higher impact on most other environmental categories (Climate Change, Ozone Depletion, Acidification, Eutrophication, Land use change). When defining policies on bags, these trade-offs should be evaluated in the specific geographical context. Fig 2. (UNEP LCA Report 2020)

Fig: 2

A publication by Science Advances, reported that from 1950 to 2015, total global plastic production has been 8.3 BN Tonnes out of which 2.6 BN Tonnes are still in use and 5.7 BN tonnes have been discarded / incinerated and recycled etc. Fig 3

This indicates there is doubts on the volumes of waste plastics, claimed as remaining on earth unattended.

Life span of some products like Plastic Pipes, Plastic Cables and some other infra-structure products are long to very long exceeding 100 years. Hence it is obvious that most of the long-life plastics products produced since 1970's is still in use and would not be considered as part of waste waiting to be recycled. It is also to be noted that most of the large-scale development activities in these sectors occurred after around 1970. Fig 3

The figure of total production of plastics raw materials in the world is rather comparatively approachable. One such statistic of Global Plastic Production from 1950 to 2018 compiled by 'Statista' is reproduced below. Fig 4

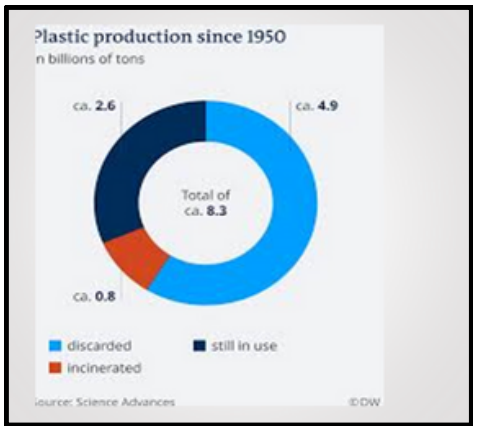


Fig: 3

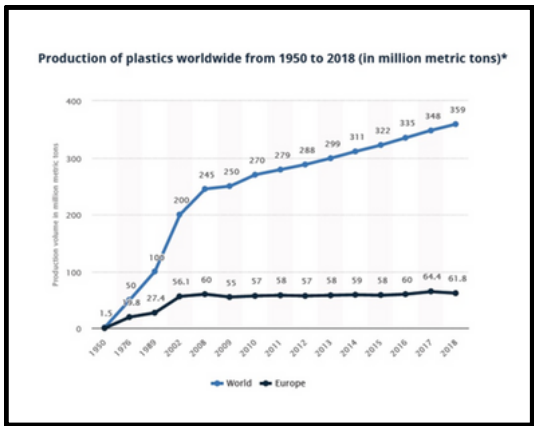


Fig: 4

However, assessing the quantum of waste generation and the subsequent estimation of recycling component of the waste is a complex situation. One such approach attempted in Indian condition is given in Fig 5, which is based on estimation of life span of different products and representing the end-of-life volume cumulatively.

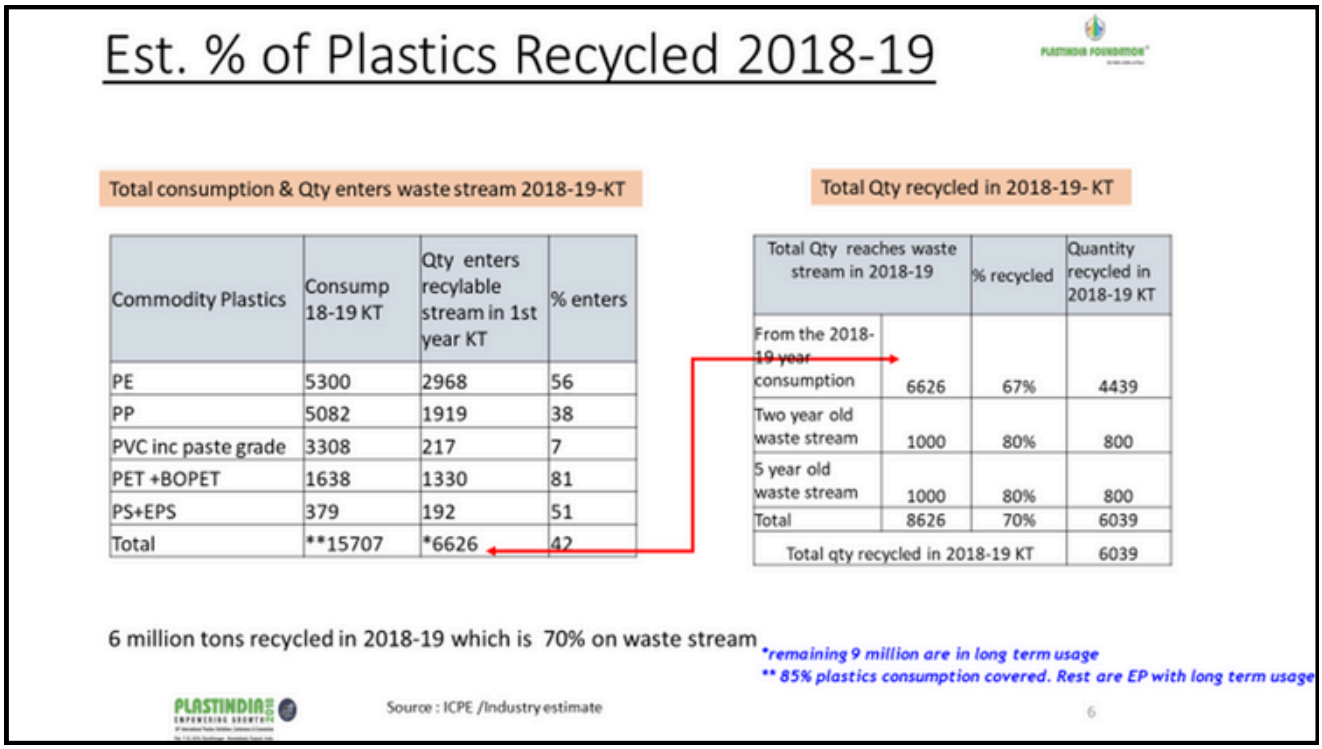


Fig: 5

Application wise consumption figure is reasonably practical, which has been calculated with the participation of major stake holders. It is obvious that percentage of plastics waste generation at the end of 1st year of consumption varies with types and application sector of plastics, minimum being for PVC and maximum being for PET + BOPET followed by PE and PS+EPS. Total quantum of plastics recycled in 2018 – 19 in India was estimated at 6039 KT which is ~ 70% of the total plastics waste generation of ~ 8626 KT.

Estimation of MSW recycling / recovery in Europe is gathered in the chart in Fig 6:

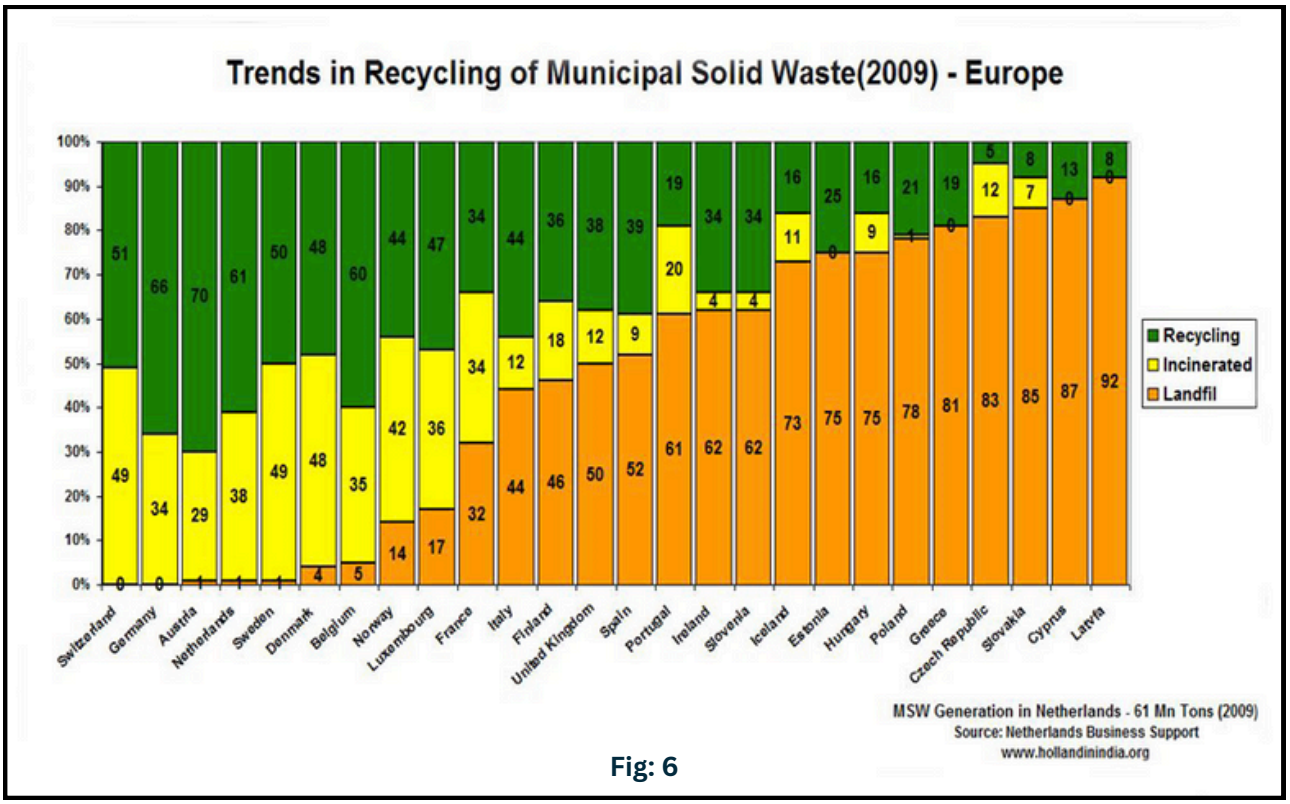


Fig: 6

Though the slide is little old (Year 2009), nevertheless present trend has improved in at least some of the Scandinavian countries. It is observed that in Western Europe some countries do not have any landfill at all. All waste, including plastics waste, are recycled or the energy is recovered fulfilling a proper scientific disposal system without making any negative impact on the environment. It is also observed that the waste recycling and recovery system is best in the Western European countries which consume most of the 60 MN Tonnes of plastics. Japan, Australia and some more countries in South – East Asia are doing well in recycling of plastics.

In 2006, nearly 20% of plastics was recycled, and 30% was recovered as energy.

Ref: Neil Eisberg, Chemistry & Industry with reference to Plastic Europe. (Reproduced in January – March 2008 issue of ICPE ENVIS Newsletter: Closing the Loop: www.icpe.in)

EU has been a major user of plastics raw materials and China, till 2017 was the major plastics waste importer and recycler in the world till it announced ban on import of plastics waste from other countries in 2018). Detailed analysis could reveal the actual ground level data regarding the quantum of plastics waste recycling.

It is thus imperative that the caption statement of the UNEP report needs modification or clarification. Otherwise, the same caption is being referred even in 2023 – 24.

Having said that, there is no denying that world needs efficient plastics waste management system with the principal tool of recycling on the principle of circular economy.

"A circular economy development path in India could create annual value of 14 lakh crore (US$ 218 billion) in 2030 and 40 lakh crores (US$ 624 billion) in 2050 compared with the current development scenario. This conclusion emerges from comparison of costs in the three focus areas. The analysis indicates that costs to provide the same level of utility would be significantly lower in the circular development scenario. Cost savings amount to 11% of current Indian GDP in 2030 and 30% in 2050.

A circular economy development path could significantly mitigate negative environmental externalities. For example, greenhouse gas (GHG) emissions could be 23% lower in 2030 and 44% lower in 2050 compared with the current development scenario, helping India deliver on

its targets promised in the recently ratified Paris Agreement. This comparison is derived from the accumulated emissions in the three focus areas. Other negative externalities, such as those resulting from the linear use of virgin materials and water, and the consumption of synthetic fertilisers, would also decrease." (1)

In India, recycling of plastics is known to be in practice since the '60s.The driving force for recycling in the initial stage was mainly economics. The plastics waste was too valuable a product those days to throw away as the availability of basic raw material was limited and was expensive. Even today, almost all rigid plastics waste including plastic bottles (PET / HDPE) are recycled. No rigid plastics go to the waste stream; these are collected and recycled.

PET bottle waste, which attract global attention as one of the major polluting products in ocean and land, is almost completely absent in the waste stream in India. Informal and organised waste collection system pick up these high value waste for recycling. Out of 1.638 MNT of PET + BOPET production in India in 2018 – 19, 56% was used for rigid applications, mostly bottles. More than 90% of the bottle waste was recycled.

"Estimation of Global PET bottle production during 2004 to 2016 was about 485 billion and it is forecasted that in 2021, some 583.3 billion of these plastic bottles will be produced." (2)

As PET bottle waste creates value - added recycled products in India, it is not impractical to suggest replication of the Indian model elsewhere too. More complex issue is non – collection and subsequent non - recycling of plastics waste generated from flexible plastic packaging, especially in the developing economies. Management of waste generated by the discarded, used plastics items, especially the ones used for flexible packaging applications, has become a challenging task, in the developing countries. Developed countries have established effective infrastructure for the management of plastics waste of all kinds by adopting proper collection system and different recycling technologies. However, in the developing countries the general trend is to opt for selecting its input (types of plastics wastes) leaving a large chunk of plastics waste, which are difficult for conventional mechanical recycling, for disposal in the landfills or simply abandoning such waste to remain in the surroundings, creating an environmental pollution. New technologies and economics have come to play an important role in plastics recycling. When we talk about plastics recycling, it principally refers to 'Recovery', which is divided into 'Material Recycling' and 'Energy Recovery'. Various options for plastics recycling / recovery have been described by International Standard. The choice between Mechanical Recycling, Feedstock Recycling or Energy Recovery will depend on the types of plastics wastes and the relative ease / difficulty in total or partial segregation of different groups of plastics materials from each other or from other waste materials / contamination.

Though all types of plastics are 100% recyclable either by mechanical recycling, feedstock recycling or by energy recovery, substantial quantity of plastics waste still remain abandoned in the environment due to lack of infrastructure for collection. To increase the recycling activity worldwide, large users of plastics have recently announced actions to replace virgin plastics by recycled plastics in substantial quantum. Latest commitments declared by top MNC's viz, Coca-Cola, PepsiCo, Nestle, Unilever, P & G and Colgate Palmolive to use more and more recycled plastics in their products gives some indication of further reduction of virgin plastics in packaging by the year 2025 to 2030. This would result in environmental benefits by way of resource management and energy saving.

Fig: 7

Global Petrochemicals operators also have now committed to put their efforts for collection of plastics wastes for recycling (recovery). Plastics Raw Materials manufacturers also have come forward to extend their active support in plastics waste management and recycling. **Dow Announced 100% of its Products Will Have Reusable or Recyclable Packaging by 2035.** By 2030, Dow will help "stop the waste" by enabling 1 million metric tons of plastic waste to be collected, reused, or recycled through its direct actions and partnerships. The company is investing and collaborating in key technologies and infrastructure to significantly increase global recycling.

Beyond mechanical recycling, following non-conventional recycling processes have already been established in the world. Except a few, most of the options are practised in India.

Feedstock Recycling

Light Diesel Oil (LDO) from plastics waste: Waste generated out of mixed plastics, co-mingled plastics and plastics materials made out of a combination of different types of plastic are generally difficult for conventional mechanical recycling process and are mostly abandoned in the waste stream, and hence creates environmental issues. Pyrolysis technology helps to establish decentralised recycling process in urban localities without creating any environmental pollution.

Reducing Agent in Blast furnace for production of iron: Waste plastics are used as reducing agent in the blast furnace for the manufacture of iron from its ore. Use of coke in the blast furnace provides only one type of reducing agent – Carbon Mono-oxide - (CO). In contrast, use of plastics waste provides one additional reducing agent – Hydrogen (H) apart from Carbon Mono-oxide. The process also reduces generation of 'ash'. A steel manufacturing facility having production capacity of 3 million tons per anum, can consume 600, 000 MTs of plastics waste. Japan is the leader in the world for implementing such process in various steel plants in their country. The chemical reactions involved is described below:

WITH ONLY COKE

$C + O_2 = CO_2$

$C + CO_2 =$

$Fe_2O_3 + 3\,CO = 2\,Fe + 3\,CO_2$

WITH COKE + PLASTICS WASTE

$½\,C_2H_4 + CO_2 = Fe_2O_3 + 2\,CO + H_2 = 2\,Fe + 2CO_2 + H_2O$

H_2 is an additional reducing agent hence demand for COKE is less. About 20% Coke is replaced with Plastics Waste

Energy Recovery

1. **Co-Processing of plastics waste in Cement Kilns.**
2. **Incineration for energy recovery / power generation**

Co-Processing in Cement Kilns: One of the most effective methods of recovery of energy from plastics waste is its use as an alternative fuel in cement kilns in partial replacement of coal. The high temperature used in the cement kilns gives a scope for use of even some type of plastics waste contaminated with toxic chemicals like pesticides and some other hazardous materials without creating any increased emissions in the air or water. Elaborate cleaning of the waste is not required for such type of disposal.

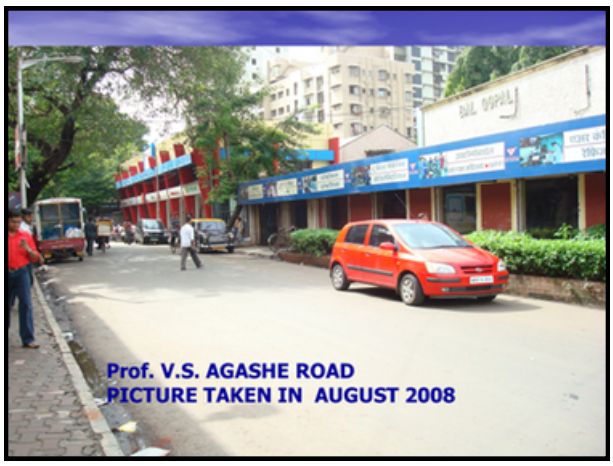
Around 60% coal has been substituted by plastics waste in the cement kilns in Germany. Coal requirement in a cement kiln is around 15% of the clinker capacity. Clinker Capacity in India in 2019 was around 300 Mn Tons. At the rate of 20% replacement of coal, plastics waste requirement would be 9 MN Tonnes. It is possible to co-process all abandoned and difficult to recycle plastics waste including thermosets, in cement kiln. The issue is collection of waste and transporting the same to the cement kilns. Generally, one tone of coal can be replaced by 600 kg of plastics waste due to higher calorific values of plastics compared to coal. Manufacturers and users of plastics should take the responsibility of this aspect so that all types of plastics wastes could be co-processed in the cement kilns. Cement companies have already started taking initiatives in bearing the transportation cost of the plastics waste from the nearby areas.

4 Bn tonnes of cement kiln capacity in the world can handle at least 120 Mn Tonnes of unattended plastics waste in a year. This can be a big step in reducing the plastic pollution in the world.

Incineration for Energy Recovery / Power Generation: After the selection of various types of plastic waste for mechanical recycling, there may still remain some types of plastic waste, heavily contaminated with various types of contaminants including different toxic chemicals or hazardous products. The best way of re-utilizing these wastes is to use the latent energy content of the plastics waste by co-processing in cement kilns or to incinerate them and recover the heat energy, instead of dumping them diffusely on landfills. This recovers their calorific values. The choice of incinerators is very important. Modern incineration technology has answers to tackle any incineration problem without polluting the environment. Heavily contaminated plastics waste collected from different waste stream can be utilized for energy recovery by waste incineration plants. Cost of this system of recovery is considered highest among all the other options of recycling and recovery. When considering incineration as an option, it is to be remembered that waste incineration plants are not operated with the aim of producing energy. The main purpose is and remains to reduce the volume of waste to a considerable degree by means of incineration in an environment friendly manner. Plastics waste contain calorific values equivalent to fuel.

Use of plastics waste in the construction of asphalt road

Use of plastics waste in the construction of asphalt road has been demonstrated by at least two to three technologies in India. There is scope of using some types of plastics wastes without elaborate cleaning, for improving the property of asphalt road by replacing bitumen to an extent of about 10 – 15 %. Such roads have been laid in different parts of the country. Key properties of asphalt roads like Marshal Stability, stripping value of bitumen layer on the aggregates, penetration value on the road etc., are improved resulting in extending the life of the road by several years without repair. Cost of road construction also gets reduced due to lower cost of plastics waste compared to bitumen.About one million ton of mixed plastics waste can be consumed in this sector in India in about next five years.



Lastly and most importantly, plastics save energy, natural resource and greenhouse gas emissions compared to the alternatives. Figs 8, 9 & 10.

Fig: 8

Fig: 9

Fig: 10

A study by Franklin Associates assessed the energy requirements and greenhouse gas emissions of six general categories of plastic packaging, found that for the baseline year 2010, replacing all plastic packaging with non-plastic alternatives for six types of packaging in the United States would:

- require 4.5 times as much packaging material by weight, increasing the amount of packaging used in the U.S. by nearly 55 million tons (110 billion pounds);
- increase energy use by 80 percent equivalent to the energy from 91 oil supertankers; and
- result in 130 percent more global warming potential—equivalent to adding 15.7 million more cars to our roads.

Conclusion:

Plastics are most environment friendly products. Alternatives will have negative impact on the environment. Plastics waste, if remain unattended would cause environmental issues. As plastics are 100% recyclable, it is the responsibility of the manufacturers and users (packers) to arrange proper management of the plastics waste jointly with the respective government authorities. It is important for all of us to address the waste management issues to reap the benefits of the safe & environment friendly material – Plastics.

Tushar K Bandopadhyay
Technical Director,
Indian Centre for Plastics in the Environment (ICPE)

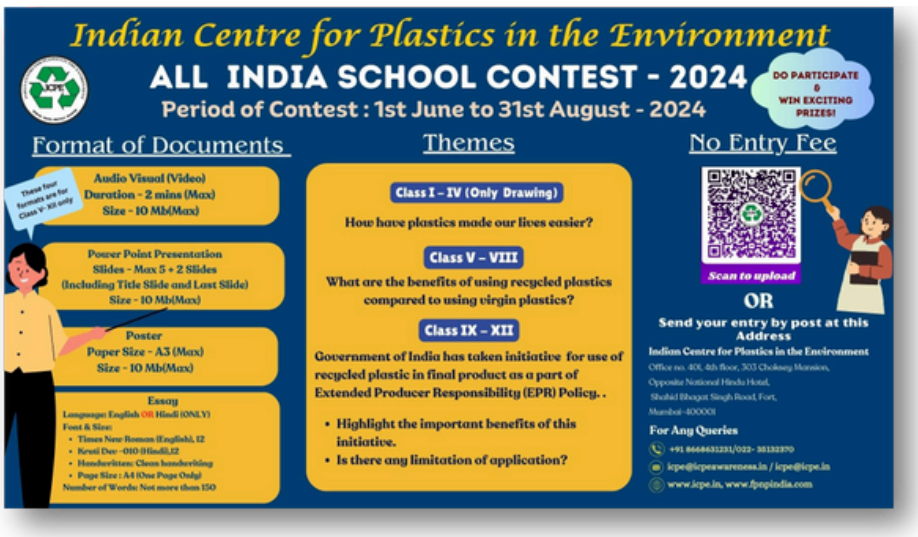
AWARENESS PROGRAMMES IN SCHOOLS & COLLEGES

Since inception, ICPE has been engaged in creating awareness among the general mass especially the young generation in the schools and colleges, on the responsible use of plastics and its proper disposal. ICPE regularly conducts awareness programmes in schools and colleges with emphasis on developing right attitude towards waste management in general and plastics waste management in specific, encouraging the students to inculcate the habit of antilittering and segregation of waste at source into Dry and Wet to facilitate solid waste management and recycling different types of waste properly. These programmes are conducted directly by ICPE staffs as well as in co-operation with Plastics Manufacturing Associations and NGO partners in various locations across the country. While about 110000 students and their teachers were addressed between early 2000 and 2018 in about 1000 schools in physical mode, similar number of students were addressed during last five years by virtual as well as physical mode all over the country.

This year's contest theme has been given below.

All India School Contest - 2024

ICPE conducts "All India School Contests" every year among school students on the theme of plastics and the environment, inviting ideas from the younger generation for improving plastics waste management in the country. This is the flag bearing event of the ICPE since several years. School Students from class I right up to class XII, in three categories – Primary, Junior and Senior from all four zones of the country are invited to take part in the contest – conducted on – line as well as via postal route. Zonal and National level winers are awarded prizes and certificates. Efforts of mentoring teachers and schools sending maximum number of students are recognised. About 5000 entries from school students of all the four zones of the country were received and 54 students won prizes in different categories. All winners are felicitated in physical events at four zonal locations. All results are published in ICPE website. Results of All India School Contest – 2024 with representative photos are given below.



ICPE - ALL INDIA SCHOOL CONTEST 2024 WINNERS

National Level Winner

PRIMARY **JUNIOR** **SENIOR**

Zonal Level Winners

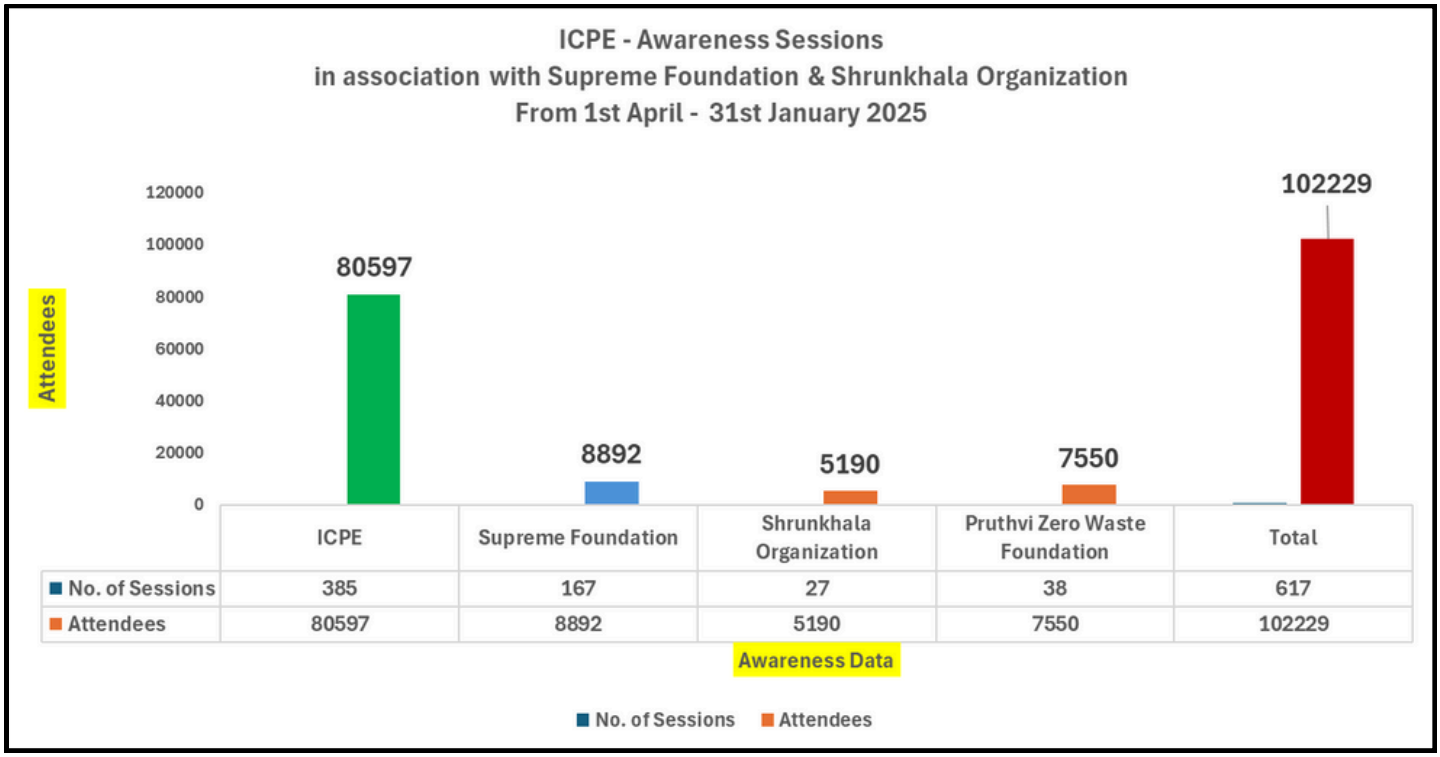
EAST ZONE **WEST ZONE** **NORTH ZONE** **SOUTH ZONE**

WINNERS OF TOP - 10 SCHOOLS CATEGORY

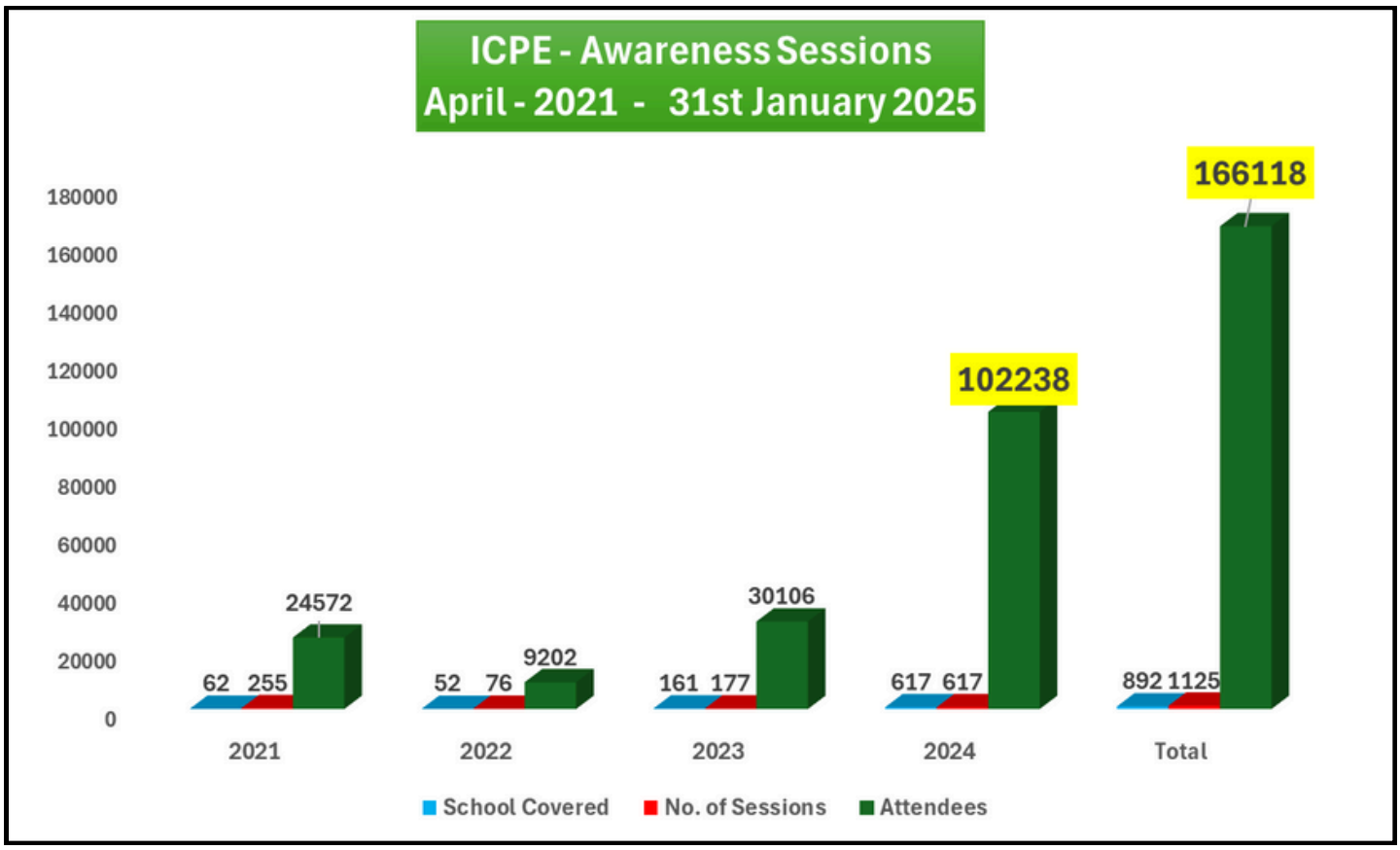
Felicitation at all four zones of India

AWARENESS PROGRAMMES IN SCHOOLS & COLLEGES - DATA FACTS

ICPE has also established an innovative programme of establishing permanent plastics waste collection centres in schools which volunteered for such activity primarily for inculcating the habit of anti-littering and bringing clean plastics waste from their homes and societies to their respective schools for depositing at designated storage bins, which are collected by ICPE NGO Partners for forwarding to recyclers. Till now 97 institute & households from Delhi, Mumbai, Navi Mumbai, Sangli areas have volunteered for this activity. ICPE provides basic infrastructure in the willing schools.



	ICPE	Supreme Foundation	Shrunkhala Organization	Pruthvi Zero Waste Foundation	Total
No. of Sessions	385	167	27	38	617
Attendees	80597	8892	5190	7550	102229



ICPE - RECYCLE OLYMPIAD 2024

ICPE - Recycle Olympiad 2024: A Landmark Initiative in Plastics Recycling Awareness

The Indian Centre for Plastics in the Environment (ICPE) successfully organized the ICPE - Recycle Olympiad 2024 on 5th October 2024, marking a historic milestone as the first-ever Olympiad on plastics recycling conducted by a non-profit organization in India.

The Olympiad was designed to engage students across three categories:

- Category A: Class IV - VII
- Category B: Class VIII - X
- Category C: Class XI - XII

The response was overwhelming, with 118 schools registering for the competition and 99 schools actively participating. A total of 17,230 students registered, and 11,023 students appeared for the exam, demonstrating remarkable enthusiasm and awareness towards plastics recycling. ICPE announced the 35 winners on 30th November 2024. The list of winners is given below. This initiative by ICPE has set a new benchmark in fostering environmental consciousness among young minds, encouraging them to become future leaders in sustainable waste management.

ICPE - RECYCLE OLYMPIAD 2024.....CONT.

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category A

2nd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24015	Bal Bhavan Public School, Delhi	Kushagra Rathore	Ms. Swati Poornanand	VII - F	03823	90	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Samrat Suman	Ms. Swati Poornanand	VII - D	03806	90	Delhi
IRO24019	Shaheed Rajpal DAV Public School, Delhi	Amrit Sagar	Ms. Trishala Kaul	VII - E	04787	90	Delhi
IRO24032	Amity Internatioal School, Saket	Sabhya Aggarwal	Ms. Ambreen Kauser	V - D	07652	90	Delhi
IRO24057	Children's Academy, Ashok Nagar - Mumbai	Vrushti Kotecha	Mr. Vipin Singh	VI - B	10545	90	Mumbai
IRO24086	S. L. Suri DAV Public School, Janak Puri - Delhi	Nandani Suman	Ms. Ruby Sharma	VI - B	11763	90	Delhi

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category B

2nd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24025	Prime Academy ICSE - Mumbai	Abdullah Sharif	Ms. Flory D'Souza	IX - A	05249	90	Mumbai
IRO24105	Childrens Academy Thakur Complex - Mumbai	Ahaan Pravin Damle	Ms. Manali Kanavje	IX - A	13705	90	Mumbai
IRO24105	Childrens Academy Thakur Complex - Mumbai	Purva Pranav Desai	Ms. Manali Kanavje	X - B	13979	90	Mumbai
IRO24105	Childrens Academy Thakur Complex - Mumbai	Revah Jitendra Soni	Ms. Manali Kanavje	X - A	13944	90	Mumbai

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category C

2nd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24015	Bal Bhavan Public School, Delhi	Aditi Arunima	Ms. Swati Poornanand	XI - E	04338	76	Delhi
IRO24043	Shri Tulsiram Ramnarayan Sen. Sec. School. Shobhasar, Rajasthan	Anjali Meena	Mr. Keshar Singh	XI - B	09753	76	Rajasthan
IRO24043	Shri Tulsiram Ramnarayan Sen. Sec. School. Shobhasar, Rajasthan	Kanishka Parihar	Mr. Keshar Singh	XI - B	09755	76	Rajasthan

ICPE - RECYCLE OLYMPIAD 2024.....CONT.

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category A

3rd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24005	Campion School, Mumbai	Ryan Shenoy	Ms. Gyzel Rodrigues	IV - B	01894	88	Mumbai
IRO24008	Bluebells School, Delhi	Ayana Samridhi Sahoo	Ms. Neeru Bhushan	VII - D	02896	88	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Rishit Yadav	Ms. Swati Poornanand	VII - F	03818	88	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Manasvi Tyagi	Ms. Swati Poornanand	VII - A	03776	88	Delhi
IRO24019	Shaheed Rajpal DAV Public School, Delhi	Tanzil Aggarwal	Ms. Trishala Kaul	VII - A	04956	88	Delhi
IRO24108	Swami Vivekanand International School & Jr.College - Mumbai	Swar Snehal Gangan	Mr. Manjitsinh Ratansinh Chauhan	V - M	15229	88	Mumbai

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category B

3rd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24005	Campion School, Mumbai	Aarav Kharwar	Ms. Gyzel Rodrigues	IX - B	02032	88	Mumbai
IRO24006	MNR School of Excellence, Navi Mumbai	Ishwari Shivaji Therade	Ms. Lata Sugandhi	X - F	02054	88	Navi Mumbai
IRO24015	Bal Bhavan Public School, Delhi	Varun Kumar	Ms. Swati Poornanand	IX - F	04068	88	Delhi
IRO24019	Shaheed Rajpal DAV Public School, Delhi	Kumar Anubhav	Ms. Trishala Kaul	X - A	04906	88	Delhi
IRO24037	Balvantray Mehta School - Morning Shift - Delhi	Vidhi Bhatt	Ms. Garima Gupta	VIII - B	09565	88	Delhi
IRO24057	Children's Academy, Ashok Nagar - Mumbai	Bhavya Bankeraika	Mr. Vipin Singh	X - D	10668	88	Mumbai
IRO24063	Bhavan's Netaji Subhash Chandra Bose Vidyaniketan - Kolkata	Shreyan Mallick	Ms. Pousali Maity Das	IX - B	10796	88	Kolkata
IRO24115	Shri A. B. Patil English School, Sangli	Kore Ovee Sachin	Ms. Manjushree Kale	X - DAFFODILS	17588	88	Sangli

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category C

3rd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24015	Bal Bhavan Public School, Delhi	Piyush Singh Dangwal	Ms. Swati Poornanand	XI - A	04220	74	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Tushar	Ms. Swati Poornanand	XI - A	04231	74	Delhi
IRO24043	Shri Tulsiram Ramnarayan Sen. Sec. School. Shobhasar, Rajasthan	Arjun Swami	Mr. Keshar Singh	XI - B	09751	74	Rajasthan
IRO24043	Shri Tulsiram Ramnarayan Sen. Sec. School. Shobhasar, Rajasthan	Raju Nayak	Mr. Keshar Singh	XI - B	09754	74	Rajasthan
IRO24050	Gsss Khariya Kaniram- Rajasthan	Babita Gurjar	Mr. Vijaya Pal Dudi	XII - 1204	10232	74	Rajasthan

ICPE - RECYCLE OLYMPIAD 2024.....CONT.

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category A

3rd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24005	Campion School, Mumbai	Ryan Shenoy	Ms. Gyzel Rodrigues	IV - B	01894	88	Mumbai
IRO24008	Bluebells School, Delhi	Ayana Samridhi Sahoo	Ms. Neeru Bhushan	VII - D	02896	88	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Rishit Yadav	Ms. Swati Poornanand	VII - F	03818	88	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Manasvi Tyagi	Ms. Swati Poornanand	VII - A	03776	88	Delhi
IRO24019	Shaheed Rajpal DAV Public School, Delhi	Tanzil Aggarwal	Ms. Trishala Kaul	VII - A	04956	88	Delhi
IRO24108	Swami Vivekanand International School & Jr.College - Mumbai	Swar Snehal Gangan	Mr. Manjitsinh Ratansinh Chauhan	V - M	15229	88	Mumbai

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category B

3rd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24005	Campion School, Mumbai	Aarav Kharwar	Ms. Gyzel Rodrigues	IX - B	02032	88	Mumbai
IRO24006	MNR School of Excellence, Navi Mumbai	Ishwari Shivaji Therade	Ms. Lata Sugandhi	X - F	02054	88	Navi Mumbai
IRO24015	Bal Bhavan Public School, Delhi	Varun Kumar	Ms. Swati Poornanand	IX - F	04068	88	Delhi
IRO24019	Shaheed Rajpal DAV Public School, Delhi	Kumar Anubhav	Ms. Trishala Kaul	X - A	04906	88	Delhi
IRO24037	Balvantray Mehta School - Morning Shift - Delhi	Vidhi Bhatt	Ms. Garima Gupta	VIII - B	09565	88	Delhi
IRO24057	Children's Academy, Ashok Nagar - Mumbai	Bhavya Bankeraika	Mr. Vipin Singh	X - D	10668	88	Mumbai
IRO24063	Bhavan's Netaji Subhash Chandra Bose Vidyaniketan - Kolkata	Shreyan Mallick	Ms. Pousali Maity Das	IX - B	10796	88	Kolkata
IRO24115	Shri A. B. Patil English School, Sangli	Kore Ovee Sachin	Ms. Manjushree Kale	X - DAFFODILS	17588	88	Sangli

ICPE RECYCLING OLYMPIAD 2024

RESULT

Category C

3rd RANK

School Code	School Name	Student's Name	Teacher's Name	Class	Roll No	Score	Place
IRO24015	Bal Bhavan Public School, Delhi	Piyush Singh Dangwal	Ms. Swati Poornanand	XI - A	04220	74	Delhi
IRO24015	Bal Bhavan Public School, Delhi	Tushar	Ms. Swati Poornanand	XI - A	04231	74	Delhi
IRO24043	Shri Tulsiram Ramnarayan Sen. Sec. School. Shobhasar, Rajasthan	Arjun Swami	Mr. Keshar Singh	XI - B	09751	74	Rajasthan
IRO24043	Shri Tulsiram Ramnarayan Sen. Sec. School. Shobhasar, Rajasthan	Raju Nayak	Mr. Keshar Singh	XI - B	09754	74	Rajasthan
IRO24050	Gsss Khariya Kaniram- Rajasthan	Babita Gurjar	Mr. Vijaya Pal Dudi	XII - 1204	10232	74	Rajasthan

Question Papers with Answer Key

Category - A

Category - B

Category - C

Business giants commit $1bn to launch Alliance to End Plastic Waste

16 January 2019, source edie newsroom

Major companies from across the plastics value chain, including Procter & Gamble (P&G), Veolia and ExxonMobil, have today (16 January) committed more than $1bn (£777m) as part of a new alliance aimed at eliminating plastic waste in the environment.

The Alliance will focus heavily on the prevention and cleanup of plastics in rivers and oceans

The Alliance to End Plastic Waste (AEPW) has launched today, consisting of 26 companies representing chemical and plastic manufacturers, consumer goods firms, retailers and manufacturers across the plastics value chain.

AEPW will use the $1bn in committed funding to scale solutions that minimise the amount of plastic in the environment by utilising closed-loop solutions. AEPW has set a goal of investing $1.5bn over the next five years.

The Alliance membership represents global companies and located throughout North and South America, Europe, Asia, Southeast Asia, Africa, and the Middle East and will focus heavily on the prevention and cleanup of plastics in rivers and oceans.

The first Alliance members are: BASF, Berry Global, Braskem, Chevron Phillips Chemical Company LLC, Clariant, Covestro, Dow, DSM, ExxonMobil, Formosa Plastics Corporation, U.S.A., Henkel, LyondellBasell, Mitsubishi Chemical Holdings, Mitsui Chemicals, NOVA Chemicals, OxyChem, PolyOne, P&G, Reliance Industries, SABIC, Sasol, SUEZ, Shell, SCG Chemicals, Sumitomo Chemical, Total, Veolia, and Versalis (Eni).

Commenting on the launch, P&G's chief executive David Taylor said: "Everyone agrees that plastic waste does not belong in our oceans or anywhere in the environment.

"This is a complex and serious global challenge that calls for swift action and strong leadership. This new alliance is the most comprehensive effort to date to end plastic waste in the environment. I urge all companies, big and small and from all regions and sectors, to join us."

INTERNATIONAL NEWS....CONT..

To kickstart progress, AEPW has announced a range of new projects to focus on over the coming months. Business members will partner with cities to design integrated waste management systems in areas where infrastructure is lacking. The Alliance will also work with other city-focused programmes such as Project STOP, a business-led initiative aiming to prevent plastic pollution from leaking into waterways and oceans across South-East Asia.

AEPW will provide funding to The Incubator Network by Circulate Capital to develop technologies and business models that prevent ocean plastic waste. It will also create an open source, science-based global information project to assist waste management projects across the globe.

Representatives from 2,000 companies across the globe tuned in to watch the launch of the Alliance and were provided with information on how their organisations can join the initiative.

“Never before has such a large number of companies from across the whole value chain come together on this issue - the Alliance is unprecedented in terms of size, scope, position in the sector and geographic spread," World Business Council for Sustainable Development (WBCSD) chairman Peter Bakker said at the launch event.

“No company can solve this alone. Consumer demand will change quickly, demanding solutions, as regulators look at the issue more closely.

"But we can’t solve the issue by just adding more companies. We need to create an infrastructure to share solutions and transfer them across the world quickly, partnering with cities and governments to put them into action. “

edie’s Plastics Hub

The launch of the Alliance comes at a time of renewed focus on the global plastics crisis. While companies such as Nestlé have announced new commitments to plastic packaging, more than 30 major companies have reaffirmed their commitment to reaching plastic commitments by pledging to edie’s Plastics Hub.

The new Hub, which is inspired by edie’s ongoing Mission Possible campaign, will host content that supports businesses with their single-use plastics phase-outs and encourages sustainability professionals to submit new commitments to tackle plastic pollution on the Mission Possible Pledge

DATA SHEET

Emissions During Processing of Plastics

Volatile Organic Compounds(VOCs)
&
Hazardous Air Polutants(HAPs) (ppm)

Polymer (Processed at temp C)	VOC as per ASTM D-3686 (GC)	Formic Acid, Acetic Acid, Acetaldehyde (HPLC)	Formaldehyde (UV Spectrophotometry)	Hydrochloric acid (Calorimetry)
LDPE (170-205 C) Extrusion / Injection Moulding	Nil	Nil	<1	Nil
LLDPE (180-240 C) Extrusion / Injection Moulding	Nil	Nil	<1	Nil
HDPE (210-245 C) Extrusion / Injection Moulding	Nil	Nil	<1	Nil
PP (210-270 C) Extrusion / Injection Moulding	<1	Nil	<1	Nil
PVC (150-250 C) Extrusion / Injection Moulding	Nil	Nil	Nil	Nil
PS (190-270 C) Extrusion / Injection Moulding	<1	Nil	<1	Nil

PROCESSING OF PLASTICS IS SAFE UNDER STANDARD PROCESSING CONDITIONS.

Threshold Limit For Toxic Air Pollutants In Industrial Environment

S.No.	Toxic Pollutants	PPM Level
1.	Acetaldehyde	100
2.	Benzene	10
3.	Acetone	5
4.	Acetic Acid	10
5.	Formic Acid	5
6.	Styrene	100
7.	Formaldehyde	2
8.	Hydrochloric Acid	5
9.	Methanol / Ethanol	5

*Source : 1) American Conference of Gove. Industrial Hygienists (ACGIH)
2) Fedral Occupational Safety & Health Administration (OSHA)*

Source : Shriram Institute for Industrial Research, Delhi

DATA BANK

CALORIFIC VALUES OF PLASTICS WASTE		
MATERIALS	VALUE	UNIT
MIXED PLASTICS	10934.1283	Cal / gram
PP RAFIA TAPES	7646.8902	Cal / gram
COAL (INDONESIA) (Typical)	3199.5796	Cal / gram

- Samples of plastics waste supplied by ICPE
- Samples of coal supplied by Tulsyan Power Plant, Tamil Nadu
- Testing by Bomb Calorimeter

WWW.ICPE.IN

ICPE RECYCLING OLYMPIAD 2025

ABOUT OLYMPIAD

The ICPE Recycling Olympiad 2025 is a national-level initiative aimed at fostering awareness about plastics recycling and sustainability among students. Organized by the Indian Centre for Plastics in the Environment (ICPE), this Olympiad encourages young minds to understand the significance of responsible plastic waste management through an engaging competition.

Categories:

Category A: Class 4-7,
Category B: Class 8-10
Category C: Class 11-12

REGISTER NOW

Courseware and Preparation

Complimentary course materials are available for all categories on this website. Practice tests (mock tests) are also provided on the website to help students prepare for the competition.

Don't miss this opportunity to showcase your intelligence, compete with the best and get a chance to win!

EXAM DATE: FRIDAY, 22ND AUGUST 2025, OR SATURDAY 23RD AUGUST 2025

The Registration Deadline is 15th June 2025

ICPE

INDIAN CENTRE FOR PLASTICS IN THE ENVIRONMENT

M U M B A I

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