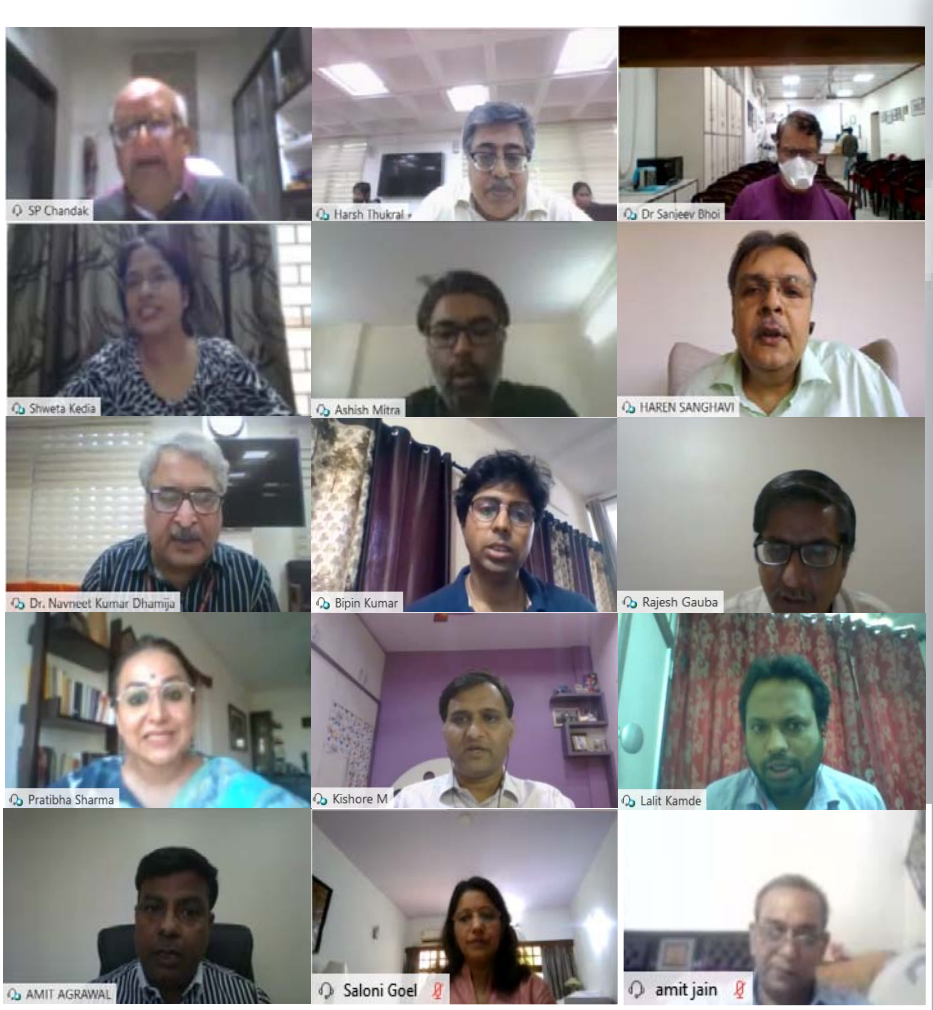
Proceedings

National Policy Workshop Webinar Series on "Countermeasures for Riverine and Marine Plastic Litter in India"

20 May 2020 | 14:30 – 17:30 hrs



WEBINAR 5

Impact of COVID-19 on Plastic Waste Generation (used PPEs and wastes from HCFs) and Upcoming Challenges

WEBINAR 5

Proceeding

Impact of COVID – 19 on Plastic Waste Generation (used PPEs and wastes from HCFs) and upcoming challenges

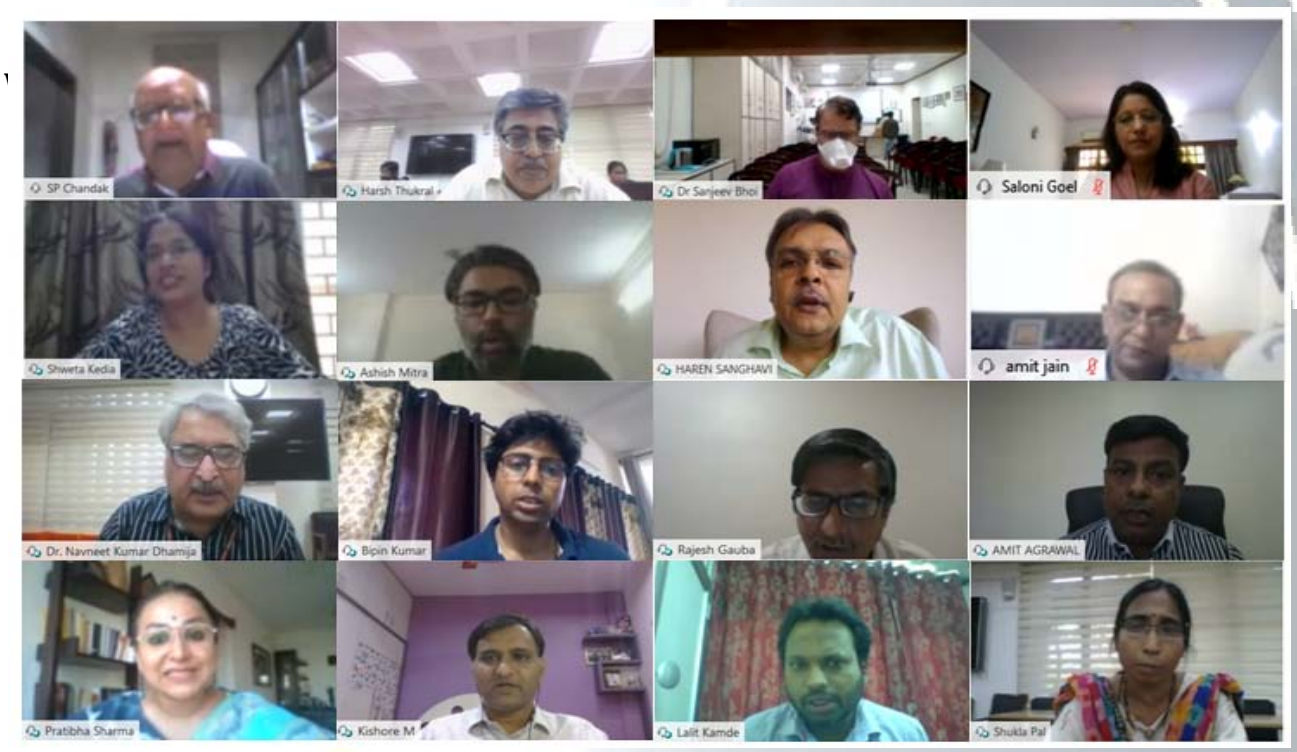
20 May 2020 | 14:30 - 17:30 hrs

Moderator
Mr. SP Chandak
Former Deputy Director, UNEP & Professor Emeritus, BIMTECH

Coordinator
Dr. Harsh Thukral
Deputy Director, NPC

INTRODUCTION

The global and local economic systems are facing a number of challenges due to the current pandemic from the novel Corona Virus (COVID – 19) impacting the health sector (besides various other sectors directly or indirectly) and with implications on Bio – Medical Waste Generation and its management, and the range of applications of plastics and polymers be it for innovative spectrum of medical devices or Personal Protective Equipment (PPEs), and on production and consumption of plastics and the generation of plastic wastes needing due care and attention. As research progresses in the medical front on health effects and search for vaccine for COVID – 19, parallel efforts on research and innovative product designs being made to protect, treat and / or secure the health fraternity and disaster management agencies and the citizens from the harm from COVID – 19, which also is reflecting on the logistical issues and challenges through lockdown phases and in the new scenarios of demand – supply characteristics to tackle the emergent needs via industrial production and in the bio-medical and plastic waste management and handling domain. The objective accordingly is to collate insights from the spectrum of essential services and health and economic sectors, with attention to plastics and to identify issues for policy interventions.

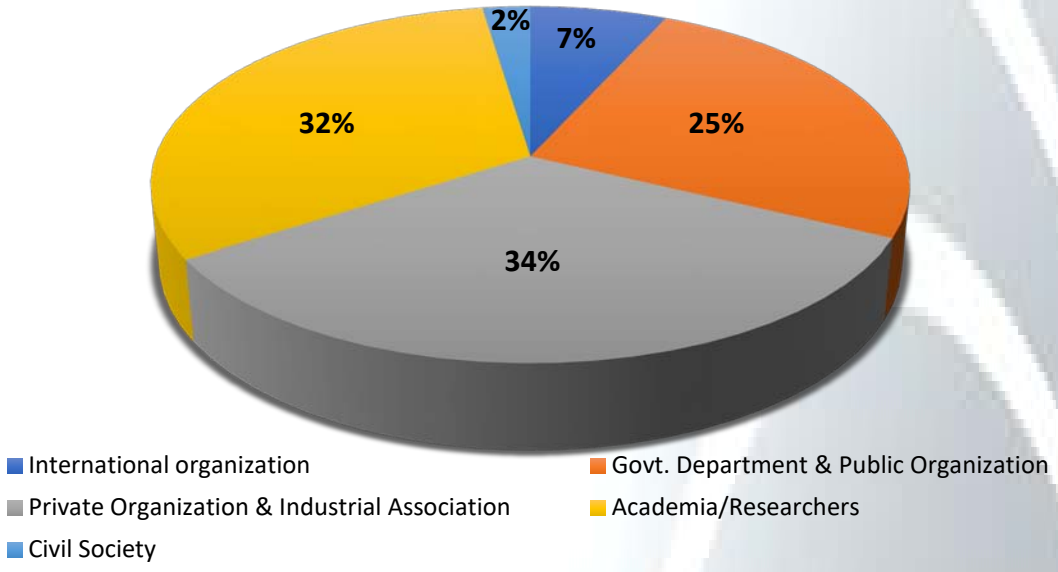


Time (hrs)	Theme/Topic	Speaker
14:30 – 14:35	Introduction to the Session	DR. Harsh Thukral, Dy. Director, NPC and Coordinator
14:35- 14: 50	Covid 19 as the pandemic impacting Health sector in India	Dr. Sanjeev Bhoi, Professor, Emergency Medicine, AIIMS
14:50- 15:05	Use of PPEs by Doctors, Nurses and health care specialists and desired features to enable due patient care and patient testing and diagnostics stages while addressing pathogen related risks control	Dr. Shweta Kedia Associate Professor, Deptt. Of Neurosurgery, AIIMS
15:05 – 15:20	PPEs and Medical equipment: Historic designs and emerging innovations for plastics and polymer usage - besides need for reuse - recycling, disinfection and microbes control and management	Shri. Ashish Mitra, CEO Endoluminal Sciences, Australia
15:20 – 15:35	Plastics for Health Sector and Management of Bio Medical Waste – Issues and Challenges in supply side	Shri HarenSanghavi, Managing Director, GMS Plastic Machinery Pvt Ltd.& former President AIPMA
15:35 – 15:50	Covid 19 and pandemics - the implications on plastic material consumption (Training for Health Sector in respect of Covid 19 including PPEs)	Dr. Navneet Kr. Dhamija, Advisor MoHFW
15:50 – 16:05	PPEs - Materials and Composition, Supply Chain Scenario, Standardisation and Testing (National / International)	Prof. Bipin Kumar Deptt of Textile Technology IIT Delhi
16:05 – 16:20	COVID 19 – Impact on Recycling Industry	Shri Rajesh Gauba Vice President, Petrochemicals Div., RIL
16:20 – 16:35	Single Use disposable Masks and increasing challenge on waste management	Ms. Pratibha Sharma, Project Manager, UNDP
16:35 – 16:50	Existing Bio Medical Waste Management system in India and the guidelines and initiatives to tackle Covid 19 epidemic scenario for the BMW Management facilities	Shri Kishore Malviya Chief Operating Officer SMS Envocare Ltd.
16:50 – 17:30	Panel Discussion & Questions and Answers	Additional Panelists Ms. Saloni Goel, UNEP Mr. Amit Jain, IRG System South Asia Mr. Amit Agrawal, GTech Infra. Mr. K.D. Bhardwaj, Delhi, NPC Dr. Shuklapal Maitra, NPC Mr. Lalit Kamde, NPC

PARTICIPANT PROFILE

The webinar was attended by 600 plus participants as located across 13 countriessuch as Bangladesh, Brunei, Denmark, Ethiopia, India, Ireland, Nepal, Norway, Philippines, Sri Lanka, Taiwan, Thailand, United States of America etc. The participants were from across various sectors (public / private organizations, civil society, academia, and from across a range of national and multilateral institutions such as UN Organisations, SINTEF, World Bank, SACEP etc). The Webinar has been highly appreciated by participants and is attracting attention from a wide range of stakeholders. The participant profile details are depicted in **Figure 1**.

Figure 1: Participant Profile



Sl. No.	Countries Attended	
1	Bangladesh	**Total Attendance 633**
2	Brunei	
3	Denmark	
4	Ethiopia	
5	India	
6	Ireland	
7	Nepal	
8	Norway	
9	Philippines	
10	Sri Lanka	
11	Taiwan	
12	Thailand	
13	United States of America	

WEBINAR PROCEEDINGS

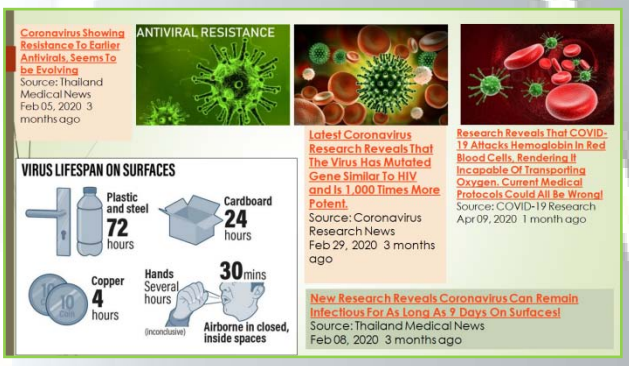
The session was opened by a welcome to the moderator Shri S.P. Chandak former Dy. Director UNEP and Professor Emeritus BIMTECH, and all the resource speakers, panelists and attendees / participants on behalf of NPC and UNEP by Mr. Oinam Samuel, Deputy Director, NPC.

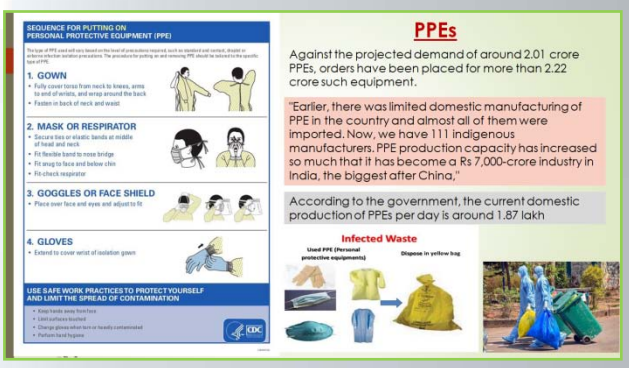
Shri SP Chandak thanked the organizers and briefly reflected on the Webinar series and the insights being generated on the project theme and objective of the National Policy Workshop through webinars 1 – 4 and exhorted the speakers / panelists to maintain the momentum and to reflect on various dimensions of the works and towards sharing significant case examples and key recommendations that could guidepolicy initiatives. He appreciated the way NPC had structured the programme by keeping an exclusive session on Impact of COVID-19 and its effects on Plastics sector and Plastic Waste Generationand for bringing on board a galaxy of speakers having expertise on various dimensions. He introduced Dr. HarshThukral, Deputy Director, NPC to introduce the theme of day to the participants.

PRESENTATION 1:

Introduction to the Session 'Impact of COVID 19 on plastic waste generation and challenges ahead' by Dr. Harsh Thukral, DD, NPC

The first presentation by Dr. Harsh Thukral, NPC began with the statistics of confirmed COVID cases in India and its projection by June 2020 and the research studies carried out worldwide on how the novel corona virus affects the human body and also regarding the assessments of the life of the virus on various surfaces.





He further shared how this pandemic is contributing to the tsunami of plastics on a daily basis, in the form of ventilators, PPEs like Apron, gloves , goggles, masks etc., and the growing demand scenario and industrial and production response in India to meet the surge in requirements.

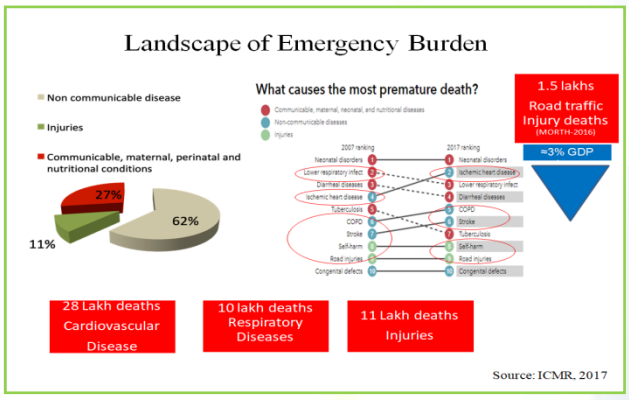
He concluded by highlighting that the webinar was designed to address various dimensions of the engagement of plastics in the emergent scenario that could cover the following aspects:

- The impact COVIDon Health Sector & implications on plastic material consumption
- PPEs - Types and composition, production and consumption scenario and value chain features
- Demand analysis and Supply and coordination of delivery of Plastics and PPEs to establishments including Health Care Facilities and other agencies engaged in epidemic / Pandemic management
- Innovations, Standards, testing and specifications concerning Medical devices and PPEs
- Single Use disposable Masks and increasing challenge on waste management
- Existing Bio Medical Waste Management system in India and the guidelines and initiatives to tackle Covid 19 epidemic scenario
- Discussions and recommendations to explore approaches to PPEs value chain management during epidemics / pandemics

PRESENTATION 2:

Covid 19 as the pandemic impacting Health sector in Indiaby Dr. Sanjeev Bhoi, Professor Emergency Medicine, AIIMS

The second presentation was made by Dr. Sanjeev Bhoi, Professor of Emergency Medicine, AIIMS, to reflect on Covid 19 pandemic by reflecting on a case scenario and the challenges to address symptoms and complaints from a patient needing immediate attention and to address concerns as to wherefrom, and quality and type and nature of care that could be received. The burden of disease and its landscape further reflected.Dr. Bhoi indicated that modern and traditional care system coexists in India, and there existed a challenge of a lack of adequate quantum of trained frontline providers. The variation between emergency care and specialized care system also highlighted along with the dimensions.



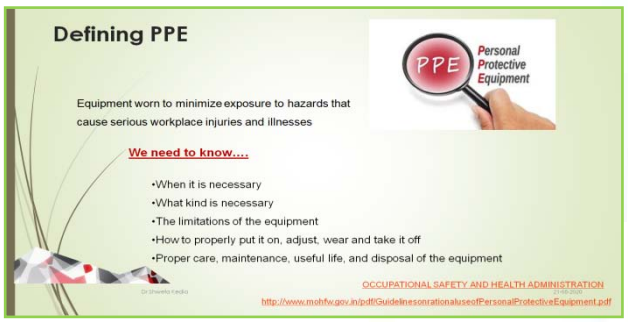
Dr. Bhoi emphasized that pre-hospital and emergency care neededstrengthening to check premature mortality. He indicated significance of ambulance aggregator model, prehospital notification aspects, key performance indicators and financial model of prehospital care services to be linked to KPIs and the immediate and long term measures required. The recommendations include creation of dedicated COVID facility within health facility, quarantine at home / isolation facility for asymptomatic cases, training of health care workers, and to address surge capacity by rearrangement of human resource, equipment, supplies and diagnostic testing including PPEs.

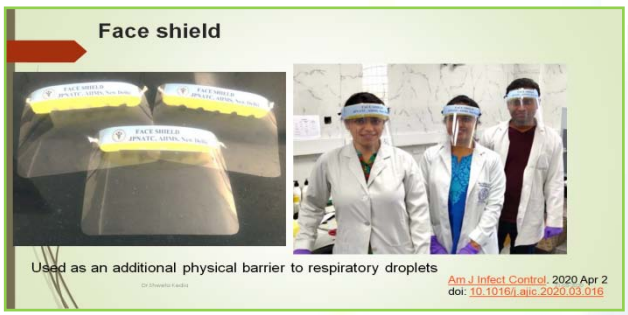
The key recommendations include the use of telemedicine, undertaking research and innovation (pertaining to drugs, devices, diagnostics etc.), Continuing Medical Education / CME for care providers in a hub and spoke model, psychological support aspects and establishing a robust emergency care system with protected funding, epidemic intelligence service program, suitable stock pile (drugs, devices, diagnostics), suitable audit of acute care, incentive system for acute care facility etc.

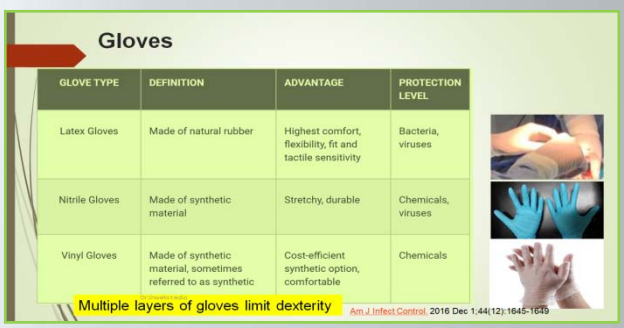
PRESENTATION 3:

Use of PPEs by Doctors, Nurses and health care specialists and desired features to enable due patient care and patient testing and diagnostics stages while addressing pathogen related risks controlby Dr. Shweta Kedia, Associate Professor, Deptt. Of Neurosurgey, AIIMS

The third presentation was undertaken by Dr. Shweta Kedia Associate Professor, Deptt. Of Neurosurgery, AIIMS who elaborated on the types of personal protective equipment being used by the health care staff from masks to air purifying respirators, goggles, face shield to gloves and gowns. She also discussed about the limitations of inappropriate PPEs in terms of increased breathing resistance, Fit-testing needs, the issues of visibility, communication difficulties, psychological issues and about increased risk of infection.







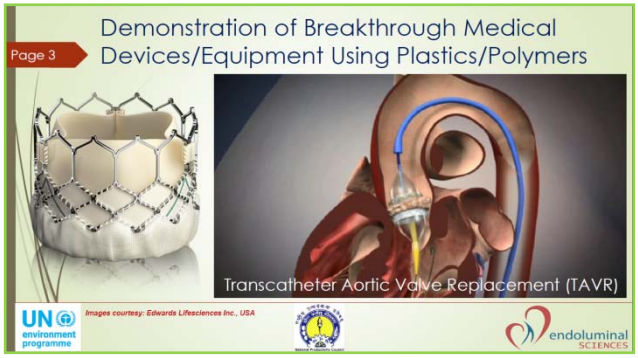
Dr. Shweta highlighted about key requirements and innovations that would be needed to be addressed from the innovators and manufacturing phases for health sector.

She concluded her talk by highlighting that Right PPE, donned correctly, worn in safely and safe doffing is must and that assessing the impact of PPE on health care worker's performance is significant.

PRESENTATION 4:

PPEs and Medical equipment: Historic designs and emerging innovations for plastics and polymer usage - besides need for reuse - recycling, disinfection and microbes control and management by Shri Ashish Mitra, CEO, Endoluminal Sciences, Australia

Shri Ashish Mitra in his presentation delved on breakthrough medical devices and equipment that utilized plastics and polymers with case examples of cardiovascular devices (example Delivery catheter for TAVR devices, Balloon Catheter etc) and neurosurgery devices (including shift from stereotactic surgery to micro-stereotactic surgery) in particular. He showcased the transcatheter Aortic Valve replacement technique and also shared statistical insights from clinical observations about the success rates of the alternative procedures vis a vis open heart surgery and the importance of plastics that make it possible to enable such procedures and provide good patient treatment outcomes, be it from anaesthesia time requirements, procedure time aspects, ICU stay needs etc.



In his concluding perspectives he emphasized the importance of bringing design considerations in for recycling devices including for example ventilators (from greater application of plastics vis a vis the earlier trends on using more metal) and also design for reusability especially in the context of PPEs. He reflected on the importance of using polymers judiciously in medical equipment development and also shared reusability prospects of PPEs via suitable product and component elements amenable to washing, sterilizing etc. He also indicated need for impactful incentives for significant innovations to occur that would benefit the health sector and utilize material including plastics efficiently.

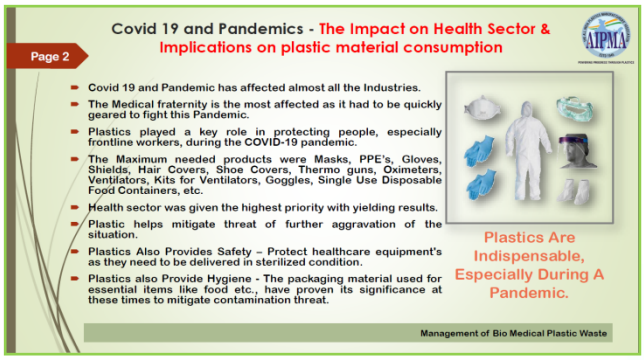
He addressed various questions on the design aspects for PPEs and of differentiations between taped and untapped and woven and non – woven fabrics and reflected on seams as well, all of which add to the protection of health care professionals by serving as barriers to fluids and microbes at locations on PPEs where the stitches and ties are provided as well.

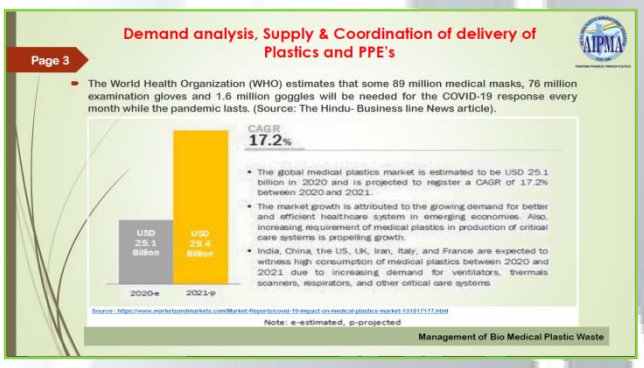
PRESENTATION 5:

Plastics for Health Sector and Management of Bio Medical Waste – Issues and Challenges in supply side by Shri HarenSanghavi, MD GMS Plastic Machinery Pvt. Ltd. and former President AIPMA

The fifth presentation was delivered by Shri Haren Sanghvi who emphasized that plastics are indispensable, especially during a pandemic. He discussed about the increased consumption of plastic during COVID outbreak in the form of PPEs, Masks, Gloves, Shields, Hair Covers, Shoe Covers, Thermoguns, Oximeters, Ventilators, Kitsfor Ventilators, Goggles, Single Use Disposable Food Containers etc. He highlighted that plastic helps mitigate threat of further aggravation of the situation.

He further presented the expected monthly demand of PPEs in India and the adequacy of our country in meeting these demands. He then talked about how this increase in plastic consumption is leading to the problem of waste management and mixing of Biomedical and Infectious solid/plastic waste and the increased burden on Biomedical Waste Treatment Facilities.





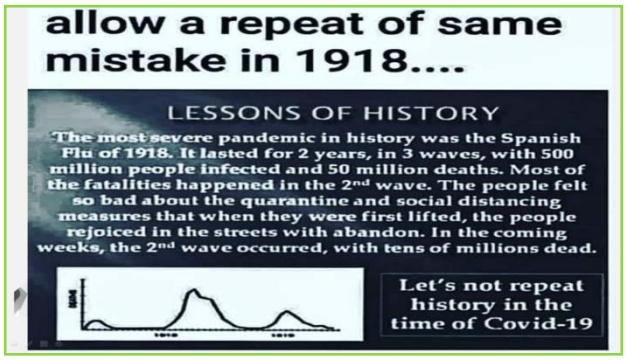
He shared recommendations for the handling, treatment and disposal of waste generated during COVID 19, which included the following

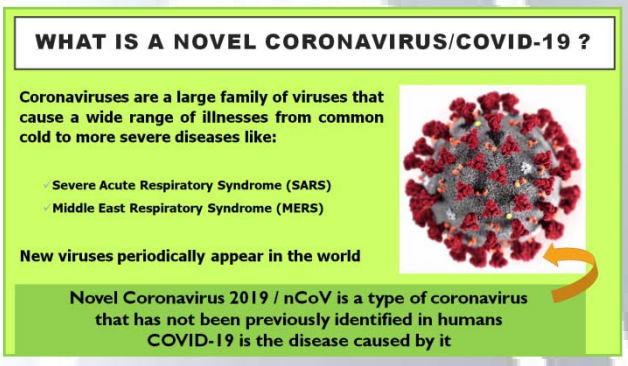
- To break the chain of transmission of the virus, waste segregation at source should be emphasized to the best possible extent.
- A separate collection mechanism should be ensured to avoid the risk of community spread
- Civil society should also be made aware of this requirement so as to facilitate collection of segregated waste and avoid any unscrupulous reuse that can enhance the risk.
- A need to prepare infrastructure and operation modalities for fastest disposal and aggressive disinfestation during the holding period.
- Other locations such as stadiums, hotel rooms, marriage halls etc. should be made available exclusively for Corona patient treatment facility so that management of active Covid-19 waste from singular location can be made more efficiently.
- Real time data of waste generation and disposal should be monitored to ensure that none of the infectious waste is left out undisposed

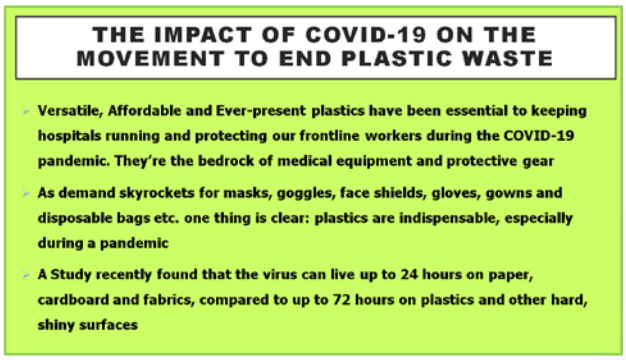
PRESENTATION 6:

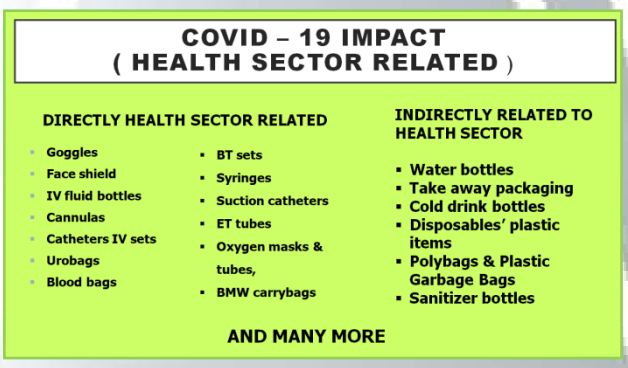
COVID 19 and pandemics - the implications on plastic material consumption (Training for Health Sector in respect of COVID 19 including PPEs) by Dr. Navneet Kumar Dhamija, Adviser, Ministry of Health and Family Welfare

Dr. N.K. Dhamija in his presentation highlighted the historic problem concerning pandemics (about 9 before 20th century and 7 pandemics during 20th century respectively) and that over 352 Million lives having been lost due to pandemics since 165-180 AD. He further reflected on how plastics were a bedrock of medical equipment design and of protective gear and emphasized that a study highlighted that Corona Virus could live upto 72 hours on plastics and other hard shiny surfaces. Dr. Dhamija enumerated a spectrum of plastics based equipment such as goggles, face shield, IV Fluid bottles, Cannulas, Catheters IV sets, Urobags, Blood bags, BT sets, syringes, suction catheters, ET tubes, oxygen masks and tubes, BMW carrybagsetc that are directly related to health care besides reflecting on PPEs and further emphasized on the importance of training for COVID Warriors for use of the equipment besides indicatively on the quantum of plastic waste generation anticipated. He further highlighted initiatives by Ministry of Health and Family Welfare.





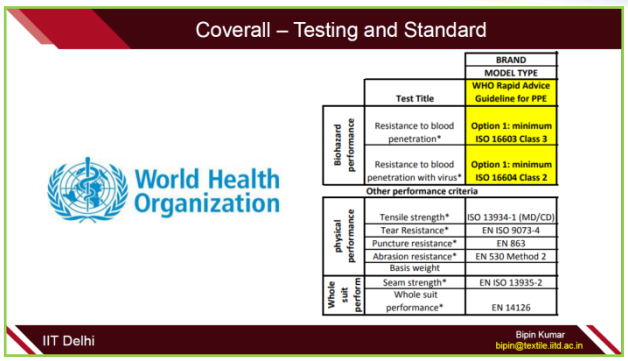


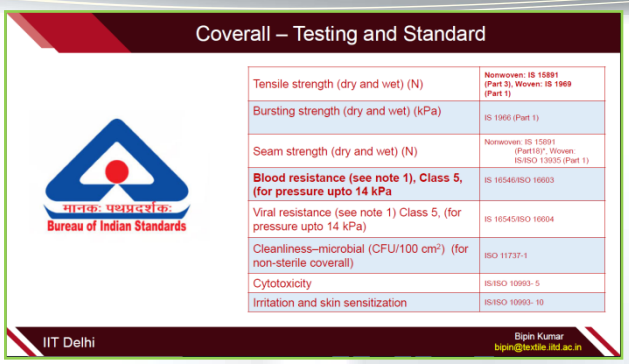


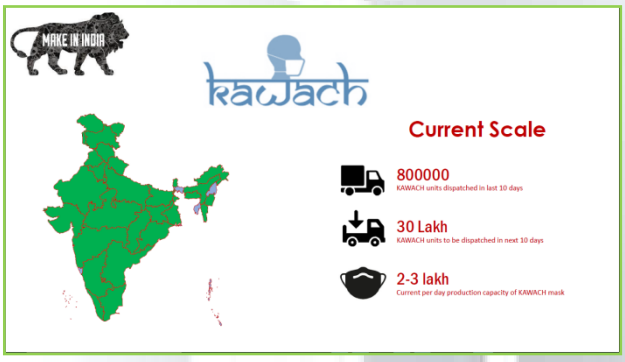
PRESENTATION 7:

PPEs - Materials and Composition, Supply Chain Scenario, Standardisation and Testing (National /International) by Prof. Bipin Kumar, Deptt. Of Textile Technology, IIT Delhi

The presentation by Prof. Bipin Kumar as a review on PPEs for COVID – 19 delved into various technical aspects of PPEs, specifically Coverall, Masks of various types and the mask / product developed at IITD called Kawach.







The focus on raw materials and technology aspects provided an understanding on the types of coveralls (woven, nonwoven, knitted) and the associated technologies such as weaving (plain), spun-bond / Melt Blown or weft knitting. The raw materials for woven and knitted being used have been primarily PET / Nylon and for non woven is polypropylene. It is indicated that laminated material could be amongst TPU/Teflon/PE in all cases. Dr. Bipin Kumar further highlighted aspects of Coverall testing and standard from the whole suit performance, physical performance and bio-hazard performance contexts and enumerated test titles such as seam strength and whole suit performance, and for physical performance abrasion resistance, puncture resistance, tear resistance, tensile strength as performance criteria considerations. In the context of biohazard the importance to resistance to blood penetration and resistance to blood penetration with virus as well amongst criteria elements. He highlighted the Guidelines or ISO standard references etc for the tests and the units involved.

In addition he highlighted aspects of tests such as viral resistance, cleanliness – microbial for non sterile coverall, cytotoxicity measures and irritation and skin sensitization tests etc. He also indicated the variations in parameters amongst different coverall brands / companies providing PPEs as a comparison on various test parameters. He also indicated cost factors for tests such as synthetic blood penetration resistance test as per ASTM F 1670 (@ Rs. 3700/- per sample + GST) and Viral penetration resistance test ASTM F 1671 (@ Rs. 10000/- per sample + GST) along with pictorial depiction of the PPEs.

Similarly Prof. Bipin Kumar highlighted features of Masks and their types such as Medical (N95), Surgical, Textile Based and Protective Mask and Normal textile based mask and their technology, raw materials (polypropylene or Cotton/PET/Nylon alternatives) and filter materials aspects (whether melt blown or no filter layer etc). He also delved on European

standards EN 149 + A1:2009 and compared FFP1, FFP2, and FFP3 regarding filtration protection (0.3 Micron) ranging from 80% to 99% for propylene microfibers, and indicated that WHO recommends that FFP2/3 for 4-6 hours usage.

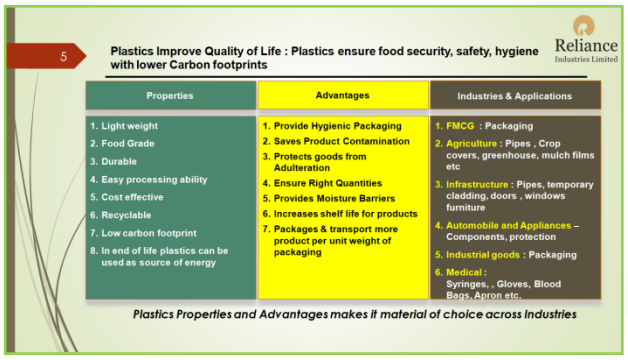
He also compared N95, N99 and N100 masks for their filtration protection (0.3 Micron), ranging from 95% to 100% for high penetrating aerosols (0.3 micrometer diameter). He also clarified that N95 / R95 / P95 was indicative of N = Not Resistance to Oil; R = Resistant to Oil and P = Strongly resistant (oil proof) and indicated importance of additional tests such as fit test and others. Further, a comparison has been provided between kawach (a mask from IITD startup ETEX), N95 and Surgical masks across parameters such as Filtration (3 micrometer), Filtration (0.3 Micrometer), Fit, Delta P (in Pascals / cm2), Splash (at 160 mm Hg), biodegradability aspects and weight and on price which was found to be highly competitive (@ Rs. 45 per mask) and how it has been found suitable for India. He also highlighted the scale and pace at which Kawach was gaining market share.

PRESENTATION 8:

COVID 19 – Impact on Recycling Industry by Shri Rajesh Gauba, Vice President, Sustainability and Recycling, Reliance Industries Ltd.

The eighth presentation by Shri Rajesh Gauba, RIL, commenced with the government decisions in various states to revoke the ban on plastics, as plastic are proving to be a life savior in the prevailing pandemic though PPEs, packaging, relief material etc.

He discussed about the plastics properties and advantages and that these makes it material of choice across Industries and ensures food security, safety, hygiene with lower Carbon footprints. He also highlighted that many studies indicate alternatives to plastics are at higher environmental costs.



He emphasized that, Plastic is not a problem, the management of plastic waste is. He went on to discuss that plastics usage in health care has increased due to Covid19 and capacity augmentation is required for managing waste.

He further talked about aspects of plastic recycling in India and that major usage is in mixing with virgin plastics for reducing cost. He also flagged the challenges of plastic recycling and indicated operating cost for recyclers to go up because of labour shortages and HSE issues.

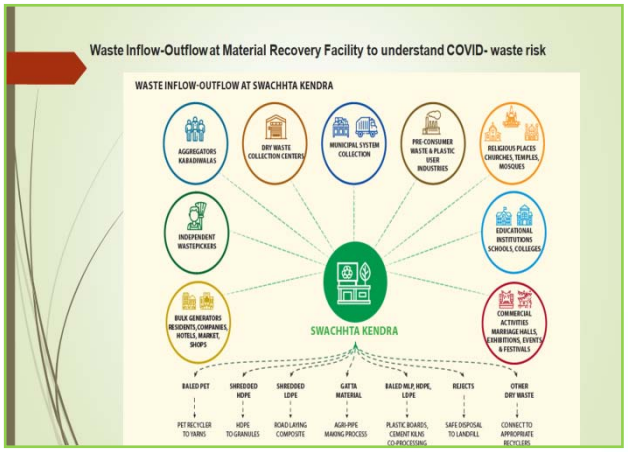
In the end he showcased the case study of Versova beach clean-up and concluded that with right focus, all kinds of plastic waste can be managed.

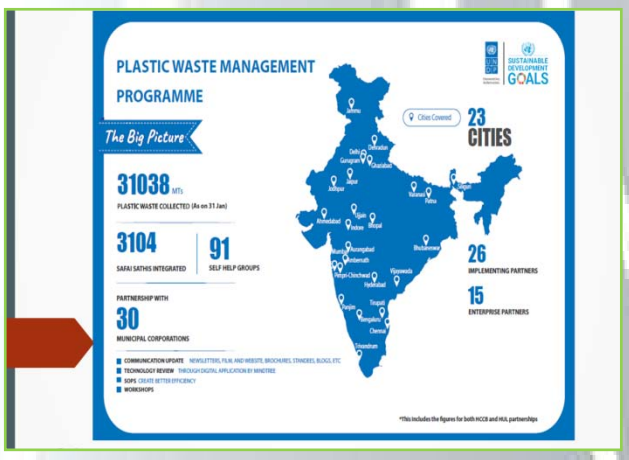
PRESENTATION 9:

Single Use disposable Masks and increasing challenge on waste management by Ms. Pratibha Sharma, Project Manager, UNDP

In the ninth presentation by Ms.Pratibhasharma, the aspects of single Use Disposable Masks and increasing challenge on Waste Management was discussed. She began with the waste Inflow-Outflow at Material Recovery Facility to understand COVID. She elaborated on the Challenges Faced by the Waste Management Sector w.r.t to COVID Waste in terms of increase in single-use disposable PPEs in Municipal Solid Waste and lack of segregation practice , lack of/ Inconsistent Labelling of waste as either "infectious"/ safe to handle, and colour coded bags protocols not being followed, handling of COVID waste and risk to waste workers, limited/ no access to hygiene and sanitation facilities for waste workers making it difficult to practice isolation or social distancing etc.

She showed visuals of MRF at UNDP Swachtakendra, Mumbai which showed heaps of used masks, PPEs, plastic food containers from relief work etc. She then discussed about Role of UNDP's Plastic Waste Management Programme which targets to mainstream 1000 SafaiiSathis; develop an economically sustainable model for collection of 8000 tons of plastic per year; engage & create systems, procedures, processes-partners at different levels with a circular economy approach; formalize the informal sector & provide better work opportunities & work conditions; training for skilled performance & entrepreneurship support& development





She recommended the following while concluding the presentation:

- Strict Enforcement of 3 Ways Source Segregation –Wet, Dry and Domestic Hazardous Waste and identifying Household Gloves, Masks as "Domestic Hazardous Waste" for preventing waste workers from contamination.
- Enforcing standard protocols by CPCB and SPCBfor Clear Labelling for safe collection, handling and disposal for managing all types of waste
- Providing access to sanitation and hygiene facilities to waste workers and their community for continued operation of Dry Waste Collection Centers and waste management systems.
- Clear Guidelines to Material Recovery Facility to prevent exposure to covid-19
- Enforcing use of Cloth Masks/ Reusable masks as per Union Health Ministry advisory for healthy persons.

PRESENTATION 10:

Existing Bio Medical Waste Management system in India and the guidelines and initiatives to tackle Covid 19 epidemic scenario for the BMW Management facilities by Shri Kishore Malviya, COO, SMS Envocare Ltd.

In his presentation Shri Kishore Malviya brought practical insights on the management of Common Bio Medical Waste Management Facilities and reflected on challenges faced by CBWTF and the initiatives being undertaken to address COVID 19 scenario. He shared the process flow diagram of a typical Bio Medical Waste Management System and color coding elements and emphasised the relevance of segregation at source and of following of guidelines in the segregation process and presented snapshots of facilities in the value chain from transportation to treatment (autoclave, incinerator, ETP aspects etc).

Shri Malviya also delved on PPEs and their disinfection process being followed and reflected upon CPCB guidelines pertaining to managing COVID 19 wastes. He shared the challenges faced by CBWTFs from the perspective of administrative to operation to financial and social challenges and highlighted key initiatives taken or could be addressed by Government, Health Care Facilities and CBWTFs.

He reflected on some findings of concern about quality and supply of PPEs and that segregation needed due attention as otherwise there are risks for BMW workforce and indicated that an application is likely to be developed for live tracking of COVID 19 wastes as well.

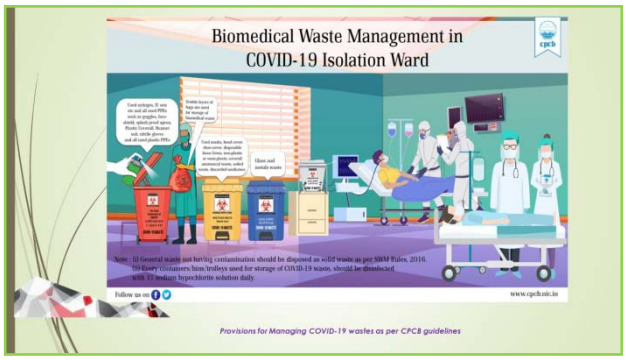
He reflected on current gaps including interpretation aspects of guidelines especially at HCFs and about the excessive fear of COVID waste that was observed in the field and emphasised that MSW wastes and their disinfection aspects be taken up at MSW facilities rather than at CBWTFs and that there is a need to check food waste entering CBWTFs for incineration as well that cause technical problems in incinerators on the one hand and reducing capacity to handle the more critical BMW waste that should be part of yellow bags for incineration at CBWTFs.

He suggested further training to HCEs and strict monitoring of quarantine centres and emphasised the importance of addressing MSW (food, water bottles, cartage, plates and disposable cups etc) from COVID isolation wards to be suitably color coded or with a black label to be sent to separate disposal process with separate collection, disinfection and disposal channel.

PRESENTATION 11:

Provisions for Managing COVID 19 wastes as per CPCB Guidelines by Shri Lalit Kamde, AD, RD Hyderabad, NPC

As part of the panelists Shri Lalit Kamde came forward to reflect through a few slides as requested by the moderator / coordinator to add to insights on COVID 19 waste management related guidelines. He touched upon COVID 19 isolation wards, Sample Collection centres and laboratories for COVID 19 and Quarantine Camps, Non - Quarantined Homes related aspects and guidelines. He provided a quick overview of the importance of color coded bins, dedicated collection systems and reporting of operations and of the features of addressing various types of PPEs such as goggles, face shield, splash proof apron, hazmet suit, nitrile gloves to be routed into red bags for appropriate treatment from isolation wards.

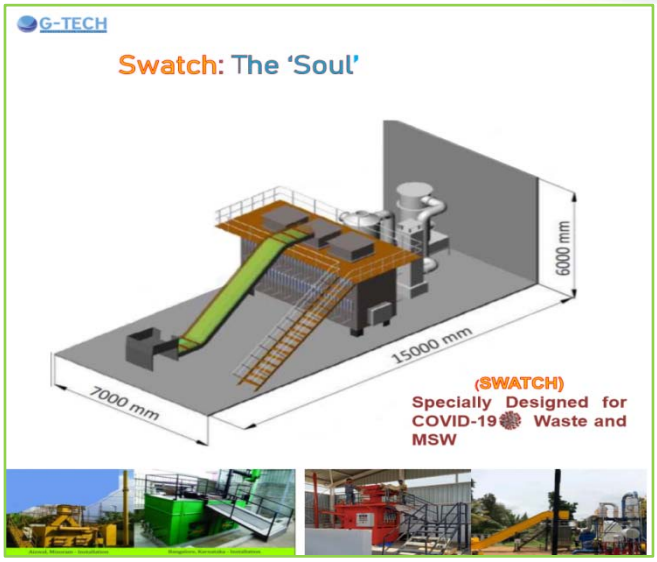


In additionShri Lalit emphasised the importance of pre-treatment of viral transport media, plastic vials, vacutainers, Eppendorf tubes, plastic cryovials, pipette tips etc and routing to red bags from laboratories. He also highlighted roles and duties of the process of management inquarantine camps/home care areas, CBWTFs, Waste water treatment issues from HCFs or Isolation Wards and highlighted the standard practices for disposal of used masks and gloves including disinfection actions required. He reflected on the plastics involved in the PPEs and emphasised the need for creating greater awareness on using and disposing PPEs and on guidelines for handling COVID 19 wastes.

PRESENTATION 12:

SWATCH – Smart Garbage Decomposition Machine – Designed for COVID - 19 Waste and MSW by Shri Amit Agrawal, CEO, G-Tech Infra

As part of the panelists Shri Amit Agrawal introduced the Smart Garbage Decomposition Machine named SWATCH to the participants as developed by the firm G-Tech Infra. He reflected upon its focus on both COVID – 19 Waste and Household / Organic Waste. It was indicated that the machine decomposes wastes other than glass and metals and uses about 3KW power to clean exhaust, and that the machine uses about 1000 – 1500 sq.ft. area and the emissions meet CPCB norms, It has a chamber with strong magnetic field and hyperthermia (at 300 – 450 Degree Celsius).



Shri Agrawal indicated that there is a closed chamber destruction/decomposition using plasma and ionization techniques along with concentrated magnetic action technology. It was emphasised that mixed waste can be fed into the system, including COVID – 19 waste and MSW and that a residue of ash is generated, and that operation and maintenance needs are low and that the plant can have a life of 20 years. A comparative perspective with incinerators is provided along with data on air emission test results. It has been indicated to have scrubber system. Further, that the machine could handle waste upto 2 tonnes per day and that it could be used in areas in proximity to hospitals and community centres and remote areas.

SALIENT FEATURES OF THE WEBINAR 5

The session and presentations highlighted the following aspects:

(a) The research initiatives in health sector and beyond pertaining to COVID 19 and impacts across various sectors (positive and negative) and the emergent tsunami of plastics; (b) Elaboration by Doctors regarding types of personal protective equipment being used by Doctors and the health care staff (including in Emergency medicine and Surgical Departments etc), addressing components such as masks and air purifying respirators, goggles, face shield, gloves and gowns and deliberations on the need for innovations in PPEs to improve breathability, fit aspects, issues of visibility, enabling overcoming communication difficulties and checking risks from infection etc, besides strengthening reusability and recyclability aspects along with emphasis on mass training in the use of PPEs for a vast spectrum of

COVID - 19 warriors; (c) Highlights regarding breakthrough medical devices and equipment that signalled importance of plastics and polymers with case examples of cardiovascular devices and neurosurgery devices contributing to enhanced quality and outcomes of health care, in addition to emphasis on incorporating principles for 'design for environment'; (d) Insightful review of PPEs for COVID – 19, detailing the type (woven, non-woven, knitted etc), and the materials including polymers and composition, and standards and testing of parameters desirable for health sector; (e) Aspects of Demand and Supply of polymers and

industry response for various plastics for health sector and issues concerning recycling / recyclability of plastic waste; (f) Single Use disposable Masks and increasing challenge on waste management in the community; (g) Deliberations on pre-covid and during COVID 19 related Bio-Medical Waste Management systems and practices, and new developments concerning COVID 19 related guidelines to help tackle emergent waste streams – amongst domestic hazardous infectious wastes and from quarantine centres, isolation wards, and laboratories etc. and the significance of segregation of waste streams for efficient operations; (h) Insights on machinery and equipment to handle and manage Bio-Medical Wastes in the wake of COVID 19 and their operational considerations etc.

KEY QUESTIONS RAISED BY ATTENDEES / PARTICIPANTS

The session was concluded by answering of a series of questions by the speakers and panellists that were put up by several participants in the workshop.

ENCLOSURES:

- **Press Release (s)**
- **Programme Agenda**
- **Session Flyer**
- **Concept Notes**
- **Presentation by each resource speaker**