



Toxics Link  
for a toxics-free world

# REPORT



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## 1. BACKGROUND

Dioxins and Furans, a group of one of the deadliest Persistent Organic Compounds known to cause endocrine disruption and diseases like cancer, happen to be the trickiest chemicals to mitigate. Through the atmospheric route they enter and move up the food chain. The biggest challenge to their mitigation is their nature of production and their highly persistent character. Commonly known as unintentional, they are produced inadvertently through various common processes such as industrial smelting process, cement and brick kilns operations, crematorium, coal fired power plant, waste incineration or even open burning of waste. All these sources of dioxins / furans are present in India and as per estimates (National Implementation Plan of India, 2011), 8656.55 gTEQ of Dioxin/Furan is released annually.

**Stockholm Convention on Persistent Organic Pollutants** an international environmental treaty (signed in 2001 and effective May 2004) categorizes dioxins and furans as part of the first twelve Persistent Organic Pollutants, the 'Dirty Dozen'. The Convention as we are aware, aims to eliminate or restrict the production and use of persistent organic pollutants (POPs). Article 5 of the Stockholm convention requires taking measures to reduce or eliminate release of the unintentionally produced PoPs in Annexure C.

India has ratified the Stockholm Convention in 2006 and the convention came into force from April 2006. Hence as a signatory to this international treaty and considering the wellbeing of environment and people, India needs to make efforts towards reduction and elimination of dioxins and furans. While broad estimations have been done for these molecules, we need to devise a comprehensive strategy for their mitigations that would involve all stakeholders. Apart from devising suitable policies and ways for implantation, building capacity and providing best available technical solutions for mitigation, one of the major tasks is to create awareness regarding the dangers of dioxins and furans that surrounds all of us in our vicinity. The NIP 2011 also stresses on building awareness across stakeholders and citizen groups for better understanding on the issues that would help to find the way for a ecologically sound management of dioxin and furans in the near future.

As yet, the issue has not drawn adequate public attention. Capacity and awareness level is quite poor too.

In the above backdrop and keeping in view India's commitment towards global treaties, Toxics Link in association with ALMANAC Mumbai organized a one day stakeholder's meet at Mumbai on 23 December 2013.

The objectives were:

### **Objectives**

- **To create awareness among the relevant stakeholders on U-PoPs**
- **To promote effective monitoring and management system**
- **To develop strategy and road map for future actions**

## 2. CONFERENCE REPORT

### Inaugural Session:

The inaugural session started with the welcome address by **Mr. Satish Sinha** (Associate Director, Toxics Link) on behalf of Toxics link & ALMANC. Initiating the discussion he said that dioxins and furans are unintentional persistent organic pollutants (U-POP) and are a part of original dirty dozen lists of POPs, which have been banned or restricted in Stockholm Convention. These chemicals are unintentional by-products of certain industrial activities and incomplete combustion. He added that dioxins and furans are relatively unknown to the public and are released on combustion of plastic and chlorinated material and remain in the environment for a very long time. Most importantly these chemicals are trans-boundary in nature.

The other eminent panelist included **Prof Neela Dabir, Deputy Director**, (Tata Institute of Social Science) and **Dr. Neeta Thacker**, (Scientist, Head, Instrumentation, of National Institute of Engineering (NEERI). Prof Dabir shared the social issues related to waste management and briefed on some of initiatives like biomethenation promoted by Tata Institute of Social Science Institute. **Dr Thacker** expressed her appreciation for the initiation of Toxics Link in organizing awareness conferences & meetings on the issue.

**Mr. Rajkumar** (ALMANC) briefed on the scenario of Chembur in waste generation & dioxin production. He informed that landfill is one of the major problems in Chembur & nearby area while open burning of wastes is a common practice even by municipality. Deonar dumping ground receives almost 7,800 metric tones of garbage from all over Mumbai in a day. Residents of Chembur, who live close by, have reportedly complained of health issues due to fumes and effluents that emit from the dump. He added that segregation of waste will play a big role in reducing emission of dioxins.

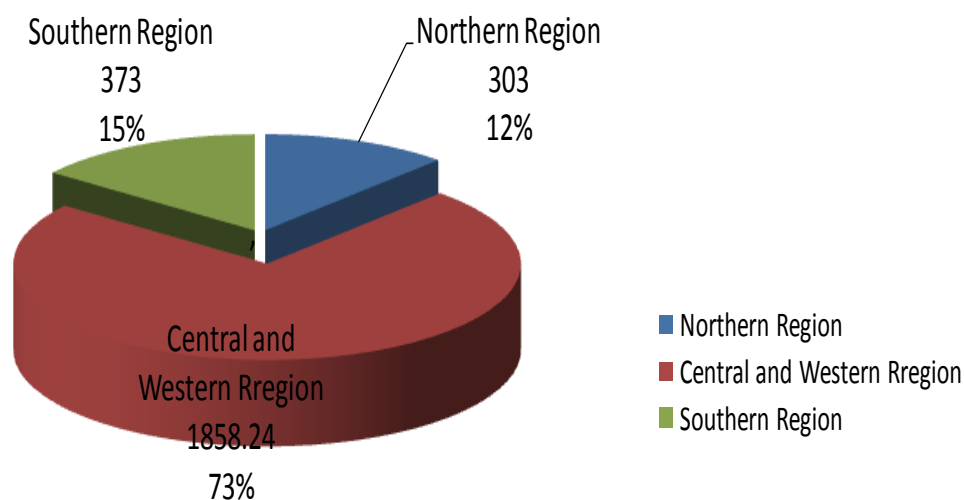
The inauguration session was followed by the technical session.

## Session 1 – Dioxin and Furans: An Overview

**Mr. Piyush Mohapatra** (Program Coordinator, Toxics Link) started the first technical session where he introduced Toxics Link and briefed about the interventions of the organization. Elaborating about Dioxins and Furans he informed that they are designated as POPs and has been put under Stockholm Convention in Annex C as unintentional PoPs. Article -5 of the convention requires for taking measures to reduce /eliminate the release of U-Pops. He further noted that half-life of these chemicals is 12 years. Citing the IPEN study he pointed that the study has revealed detection of dioxins in egg samples collected in some places across India. Also, in 2007, EU had banned the Guar gum consignment from India because of dioxin contamination. He detailed out the harmful effects caused by these chemicals. WHO has given the guidelines for tolerable level of dioxin which is 70 pictograms/kg of body weight/month. EPA & EU also sets standards for dioxins and furans in food items and water. However, India has no standards for Dioxins in foods & tolerable daily intake (TDI). Mr. Piyush further threw light on the major sources of dioxins and furans in the environment. He attributed lack of awareness, improper disposal technologies and absence of standards as some of the major issues for the release of dioxin and furans in the country. Strategies for mitigation and reduction of dioxins were also discussed by him. Effective monitoring systems, Research on exposure to risk groups, testing labs for dioxins/furans, Capacity of State Pollution Control Boards in dealing the issues, Technology availability in unorganized sector, and implementation of standards came forward in discussion as major challenges in dioxins regulation.

**Dr. Neeta Thacker**, taking over from Mr. Piyush, presented the basics of dioxins & furans and their impacts. She took through the details of the Stockholm Convention and National Implementation Plan (NIP) of India as NEERI had participated in formation of NIP. India has signed the Stockholm Convention so it is the duty of government institutions to work on inventorization & minimization of these pollutants, added Dr. Thacker.

Dioxins are not produced or manufactured rather they are produced while the manufacture of some chemicals. She also listed all the POPs banned under Stockholm Convention and noted that POPs are highly stable against chemical & microbiological degradation. POPs are chemical substances that persist in the environment, bio-accumulative, long range transportation and pose a risk to human health and environment.



Dr. Neeta described the chemical structure and production of dioxins & furans. She said that the sources of dioxins include industries, incinerators, cement kilns, waste & coal burnings etc. These pollutants are produced by incomplete combustion of plastics or chlorinated / halogenated products. These dioxins via air, water & soil ultimately enters the food chain. The World Health Organization (WHO) estimated that over 90% of human exposure to dioxins is via dietary intake while other routes of environmental exposure such as breathing and skin contact are uncommon. She explained the diseases caused by U-POPs exposure include cancer, chloracne, and impairment of reproductive, developmental & immunologic systems. She informed that Tolerable daily intake (TDI) guidelines for dioxins are set in many countries like US, EU, Japan, Sweden, Canada but no such guidelines are available in India.

As per the UN guidelines NEERI has studied (the study was conducted on 2008-2009) dioxins in different matrix in air, land, water, soil and product. Dioxin release & emission inventory for the country as well as for different regions especially western & central region were also discussed. Western & Central region are the major contributor to annual release of dioxins. Total annual release found to be 8656.55 (gTEQ/a) in 2011. Waste incineration sector is reported as the major source for release/emission contributing 66.75% of the total annual release.

Dr. Neeta informed that the levels of dioxins are increasing due to medical & hazardous waste incinerators which are poorly designed and/or operated, unorganized iron, steel & foundries, Fossil fuel & biomass based power plants, uncontrolled open burning processes etc. The emission standard for dioxins set by CPCB in 2003 is 0.1 ng TEQ/Nm<sup>3</sup> which is similar to the

European Union standards. She shared that to minimize this pollutant either Best Available Technology (BAT) or Best Environment Practices (BEP) can be used.

While answering the query of sample collection from ground water or other habitats Dr. Neeta informed that two approaches can be used either can modify industrial procedures, check the pollutants at their premises or if it form then method should be used to reduce. And awareness programme should be used to minimize human exposure. She suggested that all stakeholders should come forward in minimizing the dioxins production / formation.

One of the participants asked how to control pollutants when waste incineration itself produces pollutants and also contaminating the sites to which Dr. Neeta responded that waste should be disposed off according to guidelines.

At the end she explained the dioxins sampling methodology and testing procedures practiced in NEERI. She also shared that NEERI has limited capacity to do countrywide survey thought it is the fact that significant amount of dioxins & furans are being release in the country.

**Jyoti Mhapsekar** (Convener Stri Mukti Snghthan). **Rani Shivsharan** from SWACHA, Pune gave the local perspectives of dioxins & furans release. The focus of their presentation was on the importance of segregation, recycling and composting and other forms of waste treatment and biogas plants. They linked up the dioxins and furans issue with the issue of livelihood.

Some of the key suggestions which came out from the discussion were:-

- Waste segregation practices should be promoted at household
- Municipality should create awareness program and should follow waste segregation practices.
- Open burning of wastes should be discouraged.

After the technical session, **Mr Rahul Shewale** esteemed Chairman of the Standing Committee, the Municipal Corporation of Greater Mumbai briefed about the position of MCGM on the issues of waste management in the context of dioxins and furans. Focusing on dioxin production from waste burning, he informed that the civic body plans to embrace modern and eco-friendly ways to process waste. He assured that MCGM will engage in dialogue with the stakeholders on

technologies for processing which will resolve the health issues caused by poor disposal of waste. Mr. Shewale added that in order to encourage residents to segregate waste at source, the BMC is mulling over offering 5% rebate in property tax to societies. The plan may come into effect in 2014-15. Along with this MCGM are also going to bring out documentaries as part of a new public awareness campaign on waste management. On the issue of setting up incinerator plant under waste-to-energy projects Mr. Shewale replied that MCGM is not planning to set any such plant presently as in the past many such technologies have failed. MCGM will go for the technology that will provide efficient results. At the end he assured all that the civic body will look into the issue of waste segregation and disposal issues very seriously. **Mr. Minesh Pimple** Deputy Chief Engineer of SWM project, MCGM also participated in the discussion and briefed on the difficulties MCGM is facing in handling the municipal waste. Mr Rajkuma Sharma and other members of ALMANC also intervened during the discussion and sought some concrete actions from MCGM to look into the issue of waste management seriously without harming the environment.

## **Session 2 – Alternative Strategies to Incineration Technologies**

The second session focused on the alternative strategies for the development of non incineration based technologies in managing municipal wastes.

On behalf of Hanjer Biotech, **Mr. Debraj Roy** (AGM) & **Mr. Aamir Furniturewala** jointly presented the technology of Hanjer Biotech that will provide sustainable waste management solution without releasing the dioxins and furans in the atmosphere.

Mr. Roy informed that Hanjer has patents on products so produced by non-incinerated disposal of wastes such as Methane gas, RDF in charcoal form, Green energy from RDF, Liquid RDF and Furnace oil from RDF. They are converting inert materials into finished sand that can be use in any garden.

Dr. Thacker informed that there are possibilities of residues of dioxins and furans in some of the products. Any product containing chlorine then it will definitely contain dioxins. So the product should be getting tested for their presence. Mr. Aamir assured that they will try to test for dioxins & furans in their products.



On participants query regarding authenticity of work Mr. Aamir informed that Hanjer Biotech is having ISO certifications. The plants are visited and inspected by ICLEI (International Council for Local Environmental Initiatives), an external agency appointed by Hanjer, to maintain international standards in all the plants. Environmental Experts from DEG and Proparco (Development financial institutions of Germany and France) have validated the standard environment, health and social aspects of Hanjer's Technology. Their green technology is approved by Pollution Control Board of nine states in India such as Maharashtra, Himachal Pradesh etc.

Mr. Aamir shared the environmental & social benefits of green technology as lowering carbon footprints, Rejuvenation of farmland with the usage of compost, no/ Low emission of landfill gases and many. Hanjer Biotech is operating 12 MW of thermal plant on 100% RDF from a part of current RDF produced, he added.

Last presentation of the session was by Mr Debarth Banerjee on behalf of **Padmashree Dr. Sharad Kale** (Bhaba Atomic Research Center, BARC). Mr. Banerjee shared that the reason of dioxins & furans release in environment is largely incineration or burning of wastes at low temperature especially the chlorinated waste. Roadside burning, dumping grounds, and waste incinerators are very common source. He presented on "Hazardous Wastes Management - Nisargruna a way forward" which is based on the decentralized waste management system. According to him their technology will be able to solve the waste issues as far as possible without harming the environment. He informed that 9,000 tons of waste is generated in Mumbai every day and the city lacks adequate transportation facilities for separate collection of dry waste and wet waste. According to WHO, app.20, 000 waste pickers are working in the city. Their technology will be able to solve the environmental problem like dioxins and furans and at the same time will be able to provide employment opportunities.

Mr. Rishi Agrwal, shared some of his photos of roadside waste burning and harmful fumes so release in the air representing that burning is not done in a controlled mechanism and large quantities of dioxins and furans are released. He also showed videos of waste segregation by a waste picker and emphasized on importance of waste segregation.

**Mr. Satish Sinha** in his closing remark thanked all the speakers and participants and pointed that it is imperative to practice waste segregation at source. Every material has different disposal

methods /technology thus it is essential and fundamental principal of waste management to segregate the waste. Some of the problem of dioxins can be addressed by waste segregation. He shared that at present only two wastes to incinerations plans are operational. The main problem is that technology is too costly and imported from abroad, mixed wastes are used. Proper monitoring methodology should be there to assess the environmental parameters like dioxins and furans. As per the law any chlorinated materials are not allowed for incineration, yet these are being used for incineration, hence releasing dioxins. He informed that there are limited testing labs for dioxin available in India and is very costly. So the decentralized waste management system needs to provide support like subsidy in order to sustain. He said that there are many challenges and though we have come up a long way and there is a need to interact on a continual basis.

**This meeting was attended by various stakeholders including Municipal Committees members, Waste technology companies representatives, Industries persons, Social activists, Journalists and enlighten citizens.**

### **3. PRESENTATIONS**

- **Mr. Piyush Mohapatra, Toxics Link**
- **Dr. Neeta Thacker, NEERI**
- **Mr. Debraj Roy & Mr. Aamir, Hanjer Biotech**
- **Mr. Debartha banerjee, BARC**

**By**  
**Mr.Piyush Mohapatra**  
**Project Coordinator,**  
**Toxics Link**



# Toxics Link

[www.toxicslink.org](http://www.toxicslink.org)

## MISSION



*“We are a group of people working together for environmental justice and freedom from toxics. We have taken it upon ourselves to collect and share information about the sources and dangers of poisons in our environment and bodies, as well as about clean and sustainable alternatives for India and the rest of the world”*

## PROGRAMME AREAS



- **Waste and sustainability**

- Mercury in healthcare
- Medical waste (biomedical and immunization)
- Clean Industry

- **Chemicals and Health**

- Heavy metals
- Pesticides and POPs



### Information and communication

- Media Management
- Website
- Resource Centre
- Outreach

## Dioxins and Furans The Unintentional POPs



**“Unseen Damage: Time to Act”**



Piyush Mohapatra  
23 December 2013  
TISS

## Facts about Dioxins/Furans

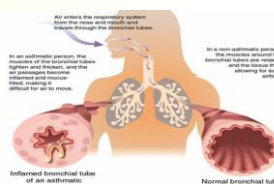


- Family of toxic substances (chemicals) having similar chemical structure
- These chemicals are not man made or produced intentionally
- Released during creation of products /chemicals and combustion
- Mostly released into residue form / air emissions
- Persistent Organic Pollutants (PoPs)/ Half Life period -12 years
- Banned in Stockholm Convention -“ Dirty Dozen” in Annexure C
- Article -5 of the convention requires for taking measures to reduce /eliminate the release of U-Pops
- Dioxin was detected in the egg samples from India (IPEN study)
- EU banned export of dioxin contaminated guar gum from India in 2007

## Dioxins and Furans are harmful



- Exposure through contaminated food chain
- Build up in the fatty tissues of animals
- Cancer causing substances to human
- Endocrine/hormone disruptors
- High exposure can cause skin diseases “chloracne”
- Pregnant women, new born and developing fetus are sensitive to exposure
- Tolerable level of dioxin is 70 pictograms/kg of body weight/month (Source WHO/FAO)
- EPA& EU set standards for dioxins and furans in food items and water
- Harmful to domestic and wild animals



### Tolerable Daily Intake (TDI) of Dioxins

Regulatory Body/Act	TDI (pg/kg of body weight/ day)
WHO	1-4
FDA EPA	0.7
European Union	1-4
Japan	4
Canada	2.3
Australia	2.3
Joint FAO/WHO Expert Committee on Food Additives	2.3
India	Does not have any standards

### Standards for Dioxins in Food items

Standards in pg TEQ/kg bw/day	Fish & shell fish	Milk & milk products	Pork	Egg	Beef
US EPA	5			1	
EU	4	3	1	3	3
Australia		3	2	5	6

India has no standards for Dioxins in foods & TDI

## **Indian Scenario**

- Annual release of dioxins and furans estimated: 8656.55 gTEQ
- In form: Residues 63.12%, Air 32.66%

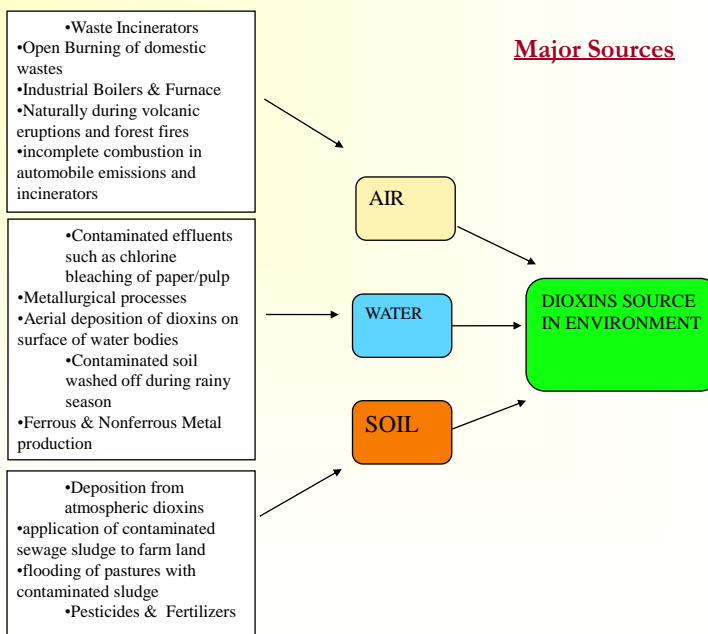
### Major Sources

- Waste Incineration ( Biomedical and Hazardous)
- Ferrous and Nonferrous Metal Production
- Heat and power generation
- Production of mineral products
- Transportation
- Uncontrolled combustion process ( forest fires/open burning of wastes /accidental fires)
- Production and use of chemicals and consumer goods
- Miscellaneous
- Disposal/Landfill

**National Implementation Plan**



## Major Sources



## Issues for India

- Use of Incinerators for disposal of waste ( biomedical/Hazardous)
- “Slow” combustion of plastics and beached materials
- Burning of biomass, wastes and forest fire
- Lack of segregation of wastes
- **Research data on dioxins/furans** ( air, water, lands, food stuffs)
- Standards for dioxin release ? and content in food items
- Lack of understanding and awareness



## Strategy for Mitigation /Reduction



- Strengthening legal/Institutional framework
- Setting up of standards for emissions
- To generate **Public Awareness**
- Research and Development for monitoring
- Establishment of evaluation system to check reduction
- Promote the use of BAT/BEP

NIP

## Challenges



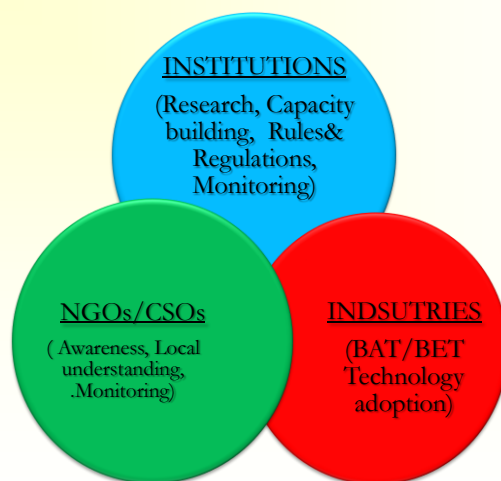
- Effective monitoring systems in place
- Implementation of **Rules/ Regulations /Standards**
- Research on exposure to risk groups
- Technology availability in unorganized sectors
- Testing labs for dioxins/furans
- Capacity of State Pollution Control Boards in dealing the issues
- Public and Industries participation
- Information Penetration on the issues
- Lack of standards in Foods
- Low Priority/Climate Change

## Issues for Western/Central Region



- Highly industrialized region of the country
- Gujarat and Maharashtra are the topmost producer of haz waste
- Dioxins and Furans pattern: 48.63% “residue” and 23.49% “air”
- State specific emission data for better management
- Adoption of non burn technologies.
- Capacity of the state pollution control board
- Mitigation strategy need to be localized

## Possible Approach



# ENVIRONMENTAL RELEASE OF DIOXINS AND FURANS– A HUMAN CONCERN

Dr. (Mrs.) Neeta Thacker  
Chief Scientist and Quality Manager (NABL)  
Pesticide Residue Laboratory  
Analytical Instruments Division &  
Academy of Scientific and Innovative Research



**CSIR-National Environmental Engineering  
Research Institute, Nagpur**



## Unintentionally Produced POPs : Dioxins and Furans

- Created inadvertently in industrial activities where chlorine based compounds are exposed to high temperatures (250 – 450°C), in presence of organic material
- Highly stable against chemical and microbiological degradation and therefore persistent in the environment
- Fat-soluble and tend to bio-accumulate in tissue lipid and in the food chain.
- These factors increase their potential hazards to humans and animals

### POPs listed under Stockholm Convention

#### Initial POPs

1. Aldrin
2. Chlordane
3. DDT
4. Dieldrin
5. Endrin
6. Heptachlor
7. Hexachlorobenzene (HCB)
8. Mirex
9. Toxaphene
10. Polychlorinated biphenyls (PCB)
11. Polychlorinated dibenzo-p-dioxins (PCDD)
12. Polychlorinated dibenzofurans (PCDF)

#### New POPs

1. Alpha hexachlorocyclohexane
2. Beta hexachlorocyclohexane
3. Chlordane
4. Technical endosulfan and related isomers
5. Hexabromobiphenyl
6. Hexabromodiphenyl ether & heptabromodiphenyl ether (commercial octabromodiphenyl ether)
7. Lindane
8. Pentachlorobenzene
9. Perfluorooctane sulphonic acid, its salts and perfluorooctane sulfonyl fluoride
10. Tetrabromodiphenyl ether & pentabromodiphenyl ether (commercial)

## Background : National Implementation Plan on POPs

- POPs are chemical substances that persist in the environment, bio-accumulative, long range transportation and pose a risk to human health and the environment
- Induce cancer, cause damage to the central and peripheral nervous system, immune system diseases and endocrine disruption
- Due to the trans-boundary movement pattern of POPs it is not just a national but a regional/global issue
- The STOCKHOLM CONVENTION 2001 is a global treaty to protect human health and the environment from POPs which became legally binding on 17 May 2004 (Signatories: 151, Parties: 176)
- In implementing the Convention, Countries will take measures to eliminate or reduce the release of POPs into the environment

## Measures in relation to UpPOPs : Dioxins and Furans

- Develop inventories of sources & estimates of release
- Formulate strategies & action plan for the control of Dioxins & Furans
- Evaluate and contribute to relevant Policies, laws and promotional schemes

## Polychlorinated dibenzo-p-dioxins PCDDs & Polychlorinated dibenzofuran PCDFs

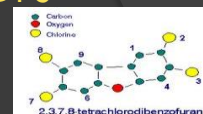


### Dioxins

#### Dioxins (PCDD)

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)  
 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)  
 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)  
 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)  
 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)  
 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)  
 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)

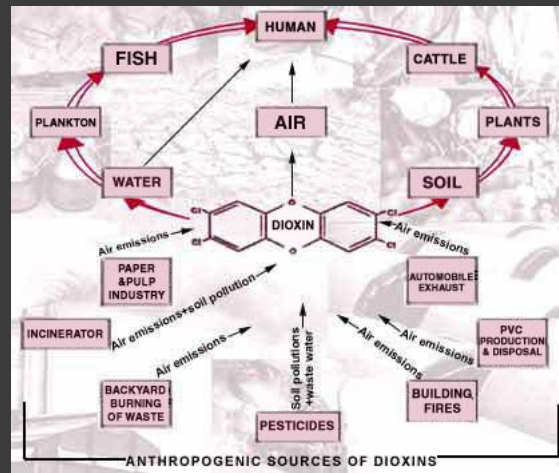
➤ Only 7 of the 75 possible PCDD congeners, and 10 of the 135 possible PCDF congeners, those with chlorine substitution in the 2,3,7,8 positions, have dioxin-like toxicity



#### Furans (PCDF)

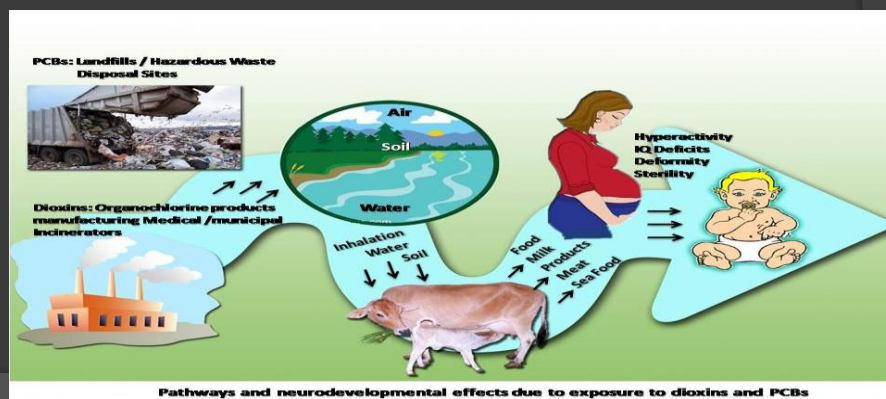
2,3,7,8-Tetrachlorodibenzofuran (TCDF)  
 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)  
 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)  
 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)  
 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)  
 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)  
 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)  
 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)  
 1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)  
 1,2,3,4,5,6,7,8-Octachlorodibenzofuran (OCDF)

## Ultimate Exposure



## Effects of Dioxins

- Oral exposure is considered as the most important pathway, accounting for about 90% of the total human exposure to dioxins [WHO 1999]
- Dioxin contamination is usually associated with carcinogenic, reproductive, developmental and immunologic effects
- Increased risk of severe skin lesions (hyperpigmentation), altered liver function and lipid metabolism, general weakness associated with drastic weight loss, changes in activity of various liver enzymes, depression of the immune system, and endocrine and nervous system abnormalities





A Multi-Product Recycling &  
Waste Minimization (MPRWM) approach

## Composite Facility Set up Across India

1

### Hanjer turn waste into green



- Proven track record for over 8 years
- Capability to handle Mixed and Residual Solid Waste
- A complete recycling solution with Green Technology  
No Emission. No Discharge
- Recycling to Green Products
- Processes and designs adaptable to varied customer needs and markets
- Achieving less-than-20% landfill by using Cost-effective, Green technology in keeping with Global Objectives

3

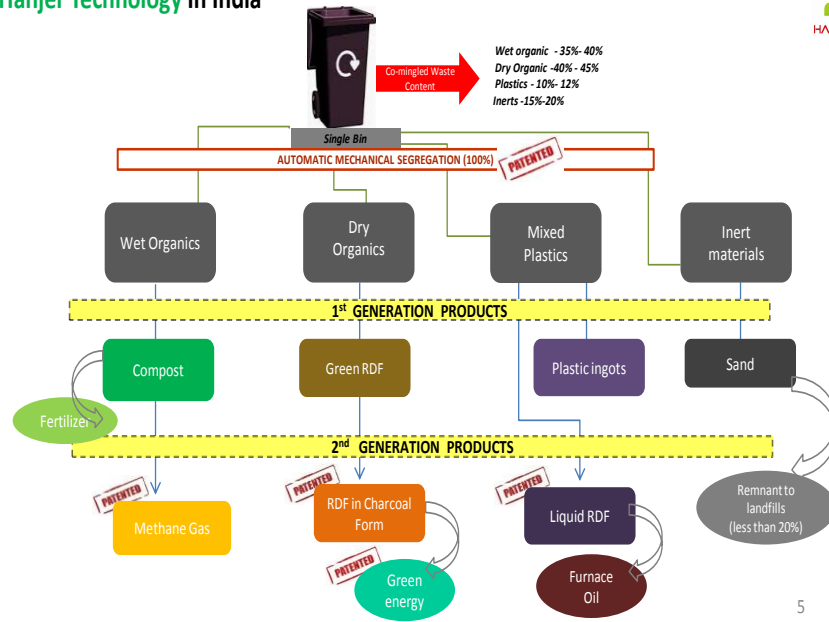


## Operations in India

- 24 operating plants in varied locations & climatic conditions
- Annual multi-product recycling capacity of around 4 million tonnes.
- 6 more projects with an additional 1 million ton processing capacity are in implementation stage

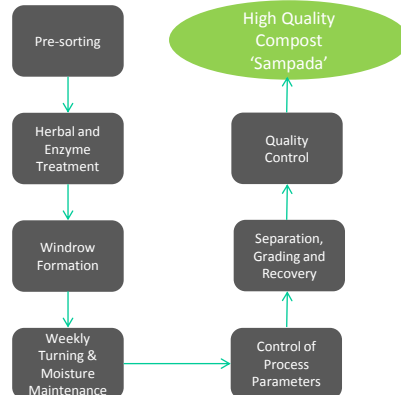
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## Hanjer Technology In India



5

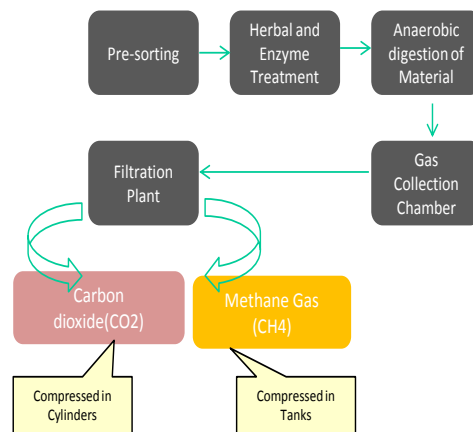
## Process Flow Chart: Wet fraction to Compost



6

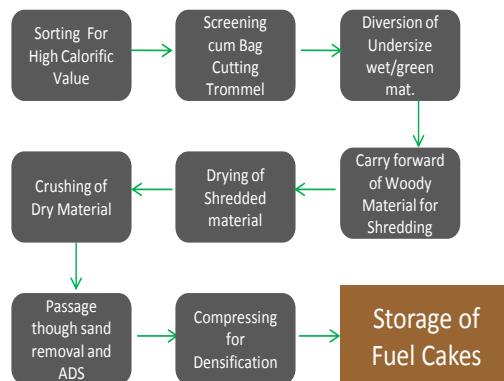


## Process Flow Chart: Wet fraction to Methane



8

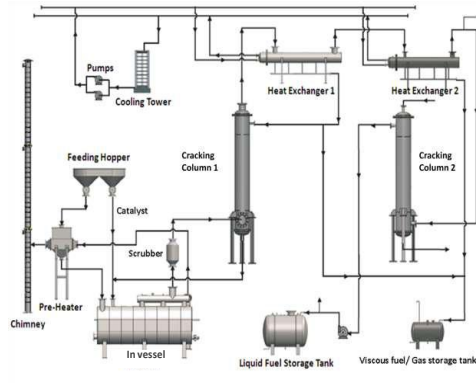
## Process Flow Chart: Dry Fraction to Green RDF (Green Fuel)



10

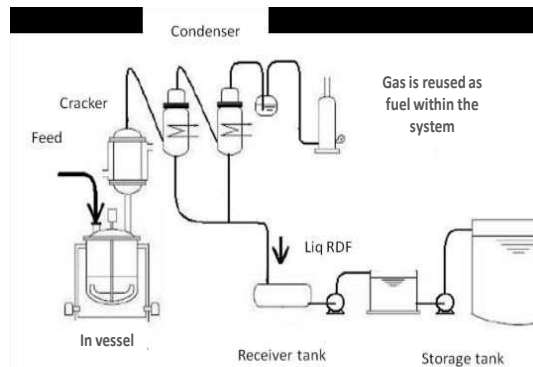
## Process Flow Chart: Dry Fraction to Green RDF in charcoal form

The Green RDF is further processed by gasification technology to improve its calorific value and reduce moisture content thereby making a higher quality fuel to replace conventional fossil fuel in boilers like imported coal.



13

## Process Flow Chart: Recyclables like plastics to Liquid RDF



15

## Comparisons of Emission Standards for Incineration

PARAMETERS	REFERENCE STANDARDS		
Measurement at 12% CO <sub>2</sub> in mg/m <sup>3</sup> at STP	Europe	China	India
Total Suspended Particles	10	30	50
Sulphur Dioxide	50	300	NA
Oxides of Nitrogen	200-400	na	450
Carbon Monoxide	50-150	-	NA
Hydrochloric Acid	10	50	50
Hydrogen Fluoride	1	2	na
Cadmium + Tl	0.05-0.1	na	na
Mercury	0.05-0.1	0.2	na
Total Metals	0.5-1.0	-	na
Dioxins and Furans	0.1ng TEQ/m <sup>3</sup>	na	1.0 ng TEQ/m <sup>3</sup>

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## Environmental Benefits to Nation

- Minimum footprint of land required for recycling & resource recovery facilities
- Minimum land consumed for landfill
- Low emission of landfill gases
- Rejuvenation of farmland with the usage of compost
- Lowering carbon footprint of the country by providing alternative green fuels to industries

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## Social benefits to Nation

- Generating employment for over 3000 people at various locations
- Setting up industries in low-industrialized rural areas
- Creating awareness about better waste handling to citizens of Hanjer Cities
- Technology to minimize intrinsic odour of waste

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## **Alternative handling for Hazardous Waste – Nisargruna a way forward**

Debartha Banerjee, Representing  
**Padmashri Dr. Sharad Kale (Bhaba Atomic  
Research Center)**

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### Where are we heading?



~9,000 Tonnes of waste Generated by  
Mumbai every day.

The city lacks in adequate transportation  
facilities for separate collection of Dry  
waste and Wet waste.

15,000-20,000 waste pickers working in  
the city.

A very small percentage of waste gets  
recycled, processed and properly  
disposed off.



## Contd..

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- ▶ Waste handling - Recycling and Processing is the best option! But segregation is the key
  - ▶ Incineration at low temp produces Dioxins & Furans  
-Roadside Burning, Dumping Grounds, Waste-Energy Plants
  - ▶ Sources of Dioxins and furans - electronics and electrical waste & plastics
  - ▶ Other sources - Dye industries, Textile industries, Pesticide industries
- 

## Nisargruna Biogas Plant-Highlights

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- ▶ The idea and meaning of Nisargruna
  - ▶ Supports the idea of decentralized waste management system
  - ▶ Can take in wide-variety of inputs, Low processing time, Requires Less Space,
  - ▶ About 150 plants running in India
  - ▶ IMT plant produces 60-100 Cu m of biogas and 80-100Kgs of manure
  - ▶ Multi Use of Gas
-

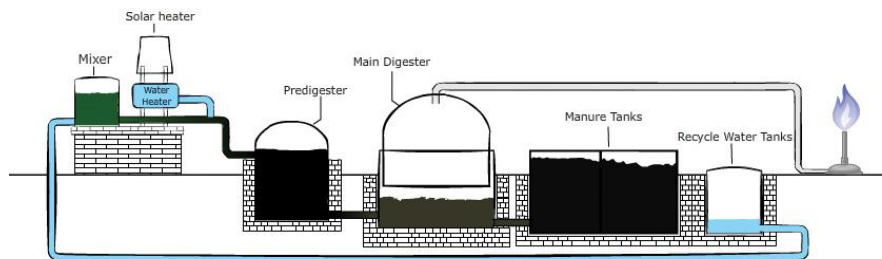
Contd..

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- ▶ High Concentration of hazardous (forming) molecules in biological sludge of STPs
  - ▶ Processed this in Nisargruna- at Baddi HP, Anjar Gujarat, Budhni MP
  - ▶ Volume reduction by 90%
  - ▶ No formation of dioxins and furans. Decomposed into simpler molecules
- 

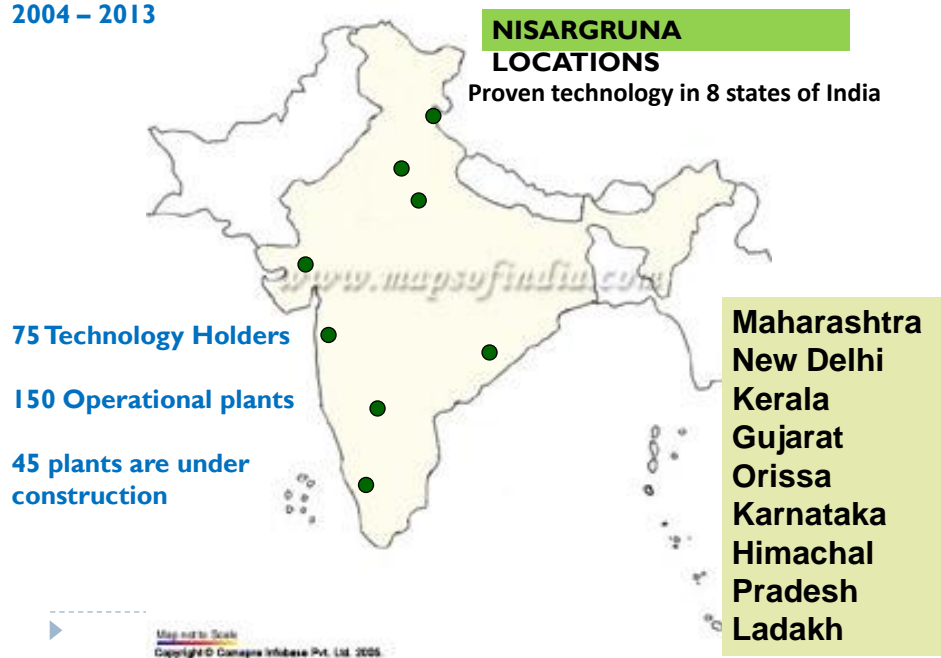
## Nisargruna Biogas Plant-Schematics

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**Progress:**  
**2004 – 2013**





#### 4. CONFERENCE IN VISUALS





## 5. CONFERENCE AGENDA

*Regional Stakeholders Meeting*  
*On*  
*Dioxin/ Furans- The Unintentional POPs*

December 23<sup>rd</sup> - 2013

09:30am – 05:00pm

TATA INSTITUTE OF SOCIAL SCIENCES  
MUMBAI

Organised  
By



Toxics Link  
for a toxics-free world

ALMANC

## Meeting Schedule & Sessions

Registration: 9.30-10.00AM

### **Inaugural Session: 10.00-10.30 AM**

Welcome Address:	Satish Sinha, Associate Director, Toxics Link
Inaugural Panel:	Mr Rahul Shewale, Chairman Standing Committee, MCGM Dr. Neeta Thacker, Scientist, Head, Instrumentation, NEERI Prof Neela Dabir, Deputy Director, TISS
Vote of Thanks:	Mr.Rajkmuar Sharma, Convenor ALMANAC

**Tea: 10.30-10.45**

### **Session 1 – Dioxin and Furans: An Overview:** Chair—

Schedule Time	Topic	Speaker
10.45-11.00	Dioxin and Furans – an overview of the unintentional POPs (Film + PPT)	Piyush Mohapatra/Alka Dubey , Toxics Link
11.00-11.20	Emission Inventory of Dioxins /Furans - Indian Scenario	Dr. Neeta Thacker, Head, Instrumentation, NEERI
11.20-11.40	Issues of Dioxins and Furans from the local perspectives	Jyoti Mhapsekar,Convneor SMS
<b>DISCUSSIONS</b>		

## **Session 2 – Strategies for Mitigation and Management Chair –**

<b>Schedule Time</b>	<b>Topic</b>	<b>Speaker</b>
12.00-12.20	Hazardous Wastes Management -Alternative Options	Dr Sharad Kale BARC/Mr. Jayanth Nataraju, SAMPURN(E)ARTH
12.20-12.40	Dioxins and Furans Standards in Waste Inceneration Technology	Concord Blue
12.40-1.00	Non Incineration Technolgy in Waste Management : Industries Perspectives	Mr. Irfan Funiturewala, Hanjer Biotech
1.00-1.20	Waste and Unintentional POPs – time for effective management	Rani Shivsharan SWACHA, PUNE
<b>DISCUSSIONS</b>		

**LUNCH: 01:40 pm– 02:15pm**

**Panel Discussions: 2.15 -3.30**

**Final Session: Pollution Control Board Strategy**

<b>Schedule Time</b>	<b>Topic</b>	<b>Speaker</b>
3.30-4.00	CPCB Preparedness in Dioxin Management in the country	CPCB
4.00-4.30	MPCB capacity on dealing with Dioxins and Furans in the region	MPCB
<b>TEA</b>		

**Summing up and Way Forward: Mr. Satish Sinha & Mr. Rajkumar Sharma**