

**Seminar on**  
**"Organic Waste For Biogas, Compost,  
Fertiliser and Power"**

**by Ahmedabad Management  
Association (AMA) with  
Innovative Thought Forum (ITF)**

**7<sup>th</sup> March 2020**

### Preamble

- Waste management and sanitation are crucial for holistic and healthy development of our country. In line with aims of Swachh Bharat Mission+ (SBM+), AMA and ITF together had organised first seminar cum workshop on 13th Dec, 2019 on “Plastic Waste for Roads, Buildings and Construction” that was highly successful
- Though all stakeholders are aware, collection and conversion of organic wastes into valuable resources is extremely low. There are many proven technologies and techniques that are in use for decades at many places. And yet, the overall utilisation of organic wastes is not picking up despite schemes like GOBAR Dhan, SATAT, NBMMP, etc.
- This seminar cum workshop on “Organic Waste for Biogas, Compost, Fertiliser and Power” is designed to bring together solution providers, solution seekers, specifiers, biotechnologists, researchers, entrepreneurs, financiers, government officials etc.

### Programme for the day

- Welcome and introduction to seminar  
Mr. S. B Dangayach,  
Founder Trustee, Innovative Thought Forum
- Business opportunities for bio energy and organic fertiliser in India  
Dr. A. R Shukla,  
Adviser Bio energy (Retd) MNRE, Government of India
- Integrated waste management -Indore model  
Mr. Asad Warsi,  
Consultant, Indore Municipal Corporation
- Biogas and PROM from animal wastes for prosperity of India  
Mr. Gajanan Patil,  
Urja Biosystems
- INORA solutions in organic waste composting and urban farming  
Mr. Anil Gokarn,  
INORA
- Opportunities in organic waste composting  
Dr. Suneet Dabke,  
Concept Biotech
- Innovation in Biomass/Waste Gasification Solutions for generation of Energy & Biofuels”  
Mr. Ashok Chaudhari,  
V. P -Business Development, Ankur Scientific Energy Development (P)Ltd
- GOAU -an initiative towards organic farming research, education and extension  
Dr. B. R Shah,  
V. C, GOAU (Gujarat organic agricultural university)

- Way forward  
Mr. S. B Dangayach,  
Founder Trustee, Innovative Thought Forum

### Summary of presentations/ discussions

**Mr. S. B Dangayach;** Founder Trustee, Innovative Thought Forum

Welcome and introduction to seminar

- Organic waste converted into valuable resource such as biogas, compost, fertiliser and power can help in completing circularity of economy
- Organic waste including gobar, poultry waste, crop waste, food waste, human and animal excreta having large amount of biomass
- There are different things being done with biomass
  - Organic waste into biogas
  - Organic waste into compost
  - Organic waste into fuel and power
- Organic fertiliser or soil nutrients from biogas plant slurry
- Though all stakeholders are aware, collection and conversion of organic wastes into valuable resources is extremely low
- Many proven technologies and techniques that are in use for decades at several places but the overall utilisation of organic wastes is not picking up despite schemes like GOBAR Dhan, SATAT, NBMMP, etc.

**Dr. A. R Shukla;** Adviser Bio energy (Retd) MNRE,

Business opportunities for Bio-energy and organic fertiliser in India

- Collection, segregation and transportation of biomass from all resources having great business opportunities
- Biomass not free but having cost because of collection, transportation, alternative utility etc.
- Biomass is bulk waste available in decentralised manner in which segregation plays key role
- Adapting bio-refinery strategy with integrated approaches
  - Solid biomass waste to pellets and briquettes for thermal application
  - Biofuels
  - Bio-fertilizers
  - Animal feed

Technologies for above available

- Biomass waste resource bank should be established
- Commercial co-operative types of approach for this sector to be considered
- Hybridization of technology for utilisation of all types of waste
- Need to facilitate connection of CBG to gas grid
- Bio-CNG/ CBG should be connected with city gas distribution

**Dr. Asad Warsi;** Consultant, Indore Municipal Corporation,

Integrated waste management- Indore model

- Project Design and Management Consultant of Indore Municipal Corporation under Swachh Bharat Mission
- Detailed planning for resource requirement and implementation strategy
- Opportunities for reclamation and bio-mining of old dump sites, E waste and Plastic waste.
- Strategies of 100 per cent source segregation and door to door collection of household & commercial waste from everywhere, Also collection of street sweepings, silt removal, vegetable & fruit market waste, slaughter house waste etc. and suitable incentive structure to promote source segregation & recycling including action of decentralized treatment of MSW at ward level
- Detailed transportation plan from the primary, secondary collection points to the proposed processing or landfill plant with detailed process put on place
- Reasons behind success of Indore model
  - Planned bin free, dust free and litter free Indore in 2016
  - planned GPS based vehicle tracking and monitoring for SWM
  - Strong political will and administrative support
  - Public awareness and behaviour change
  - Door to door collection with social volunteer for every 1000 house hold
  - Deployment of adequate vehicles
  - Training and motivation of volunteers
  - Robust system of user fee collection
- Processing of organic waste with all possible technologies which given below
  - 50,000 plus home composting units
  - 350 units for biogas or compost for bulk waste generators
  - 1100 composting units in municipal gardens
  - 8 to 10 decentralised units for biogas for treating from 1 to 20 tonnes of organic waste

- 2 Bio-CNG plants for getting 97 per cent pure methane
- Big compost plant of 600 MT
- Automatic material recovery facility developed for dry waste
- Dry waste purchase from citizens at the rate of 2.5 Rs/ kg

**Mr. Gajanan Patil;** Urja Biosystem,

Biogas and PROM from animal wastes for prosperity of India

- Urja Biosystem exclusive and leading player in turnkey projects in biogas energy generation since last 13 years
- Have more than 200 biogas & biogas to power generation plants in 18 states across India and outside. 4 Projects of Bio-CNG, 10 projects for community biogas for villages
- More than 8000 installations of family size plants in Maharashtra
- Soil Organic carbon which plays key role in soil fertility has declined to 0.3 to 0.4 per cent which has to be 1 to 1.5 per cent
- Chemical fertiliser use has increased from 100 Kg per hectare to 166 Kg per hectare from 2001 to 2019 with an annual increase in consumption of around 3.80 per cent
- Less than 30 per cent of phosphorus applied to the soil in the form of chemical phosphatic fertilizers is used by plants; the rest is carried away into ground water.
- Soil health is deteriorating
  - Micro flora is reducing from the soil
  - Moisture retention capacity is being lost
  - Agricultural productivity is reducing, with lower and lower output every year
  - Chemical fertilizers and pesticides finding their way into food chain, creating harmful health conditions
- Energy & PROM Production Potential from One Indigenous cow
  - Dung generation = 7 to 10 Kg/cow/day
  - 25 Kg dung generates = 1 cum biogas
  - 1 cum biogas produces = 1.5 Kwh electricity
  - 1 cow gives can replace 50 Kg LPG per year
  - In a year on an average 1 cow gives 150 units power and around 1 tonne of value added organic fertilizer (PROM)
  - 1000 litres of value added liquid fertilizer/year

- Individual Household Biogas plant with slurry filter 2 cum
  - Prefabricated easy to install in one day, avoid the costs & troubles of construction or fabrication
  - Moulded with HDPE, does not rust or leak, mfg by Sintex group & approved by MNRE
  - 1 cum/day of biogas is sufficient for a family of 3-4 members for its entire fuel needs for morning & evening cooking
  - Each plant will save 1 LPG cylinder or 17 lit Kerosene or 150 to 200 kg firewood per month
  - Each user will get excellent organic manure, which will improve the soil. 2 Ton SSP can be replaced per year
- BIO-PROM- a viable and sustainable substitute
  - PROM is Phosphate Rich Organic Manure
  - PROM is produced by co-composting (or mixing) organic matter/manure with rock phosphate
  - Addition of phosphate solubilizing microorganism enhances the effect
  - Research efforts since last 16 years show that PROM is as efficient as any other chemical phosphatic fertilizer
  - It shows equal residual effect
  - PROM is in the FCO since 2012
  - Digested Manure or Cake + Rock Phosphate + Microbial Inoculums = PROM
- Challenges
  - Need marketing support from fertiliser companies like IFFCO, RC, etc.
  - No clear guidelines from Ministry of fertilizer about PROM promotion and marketing
  - MOF GOI should give subsidy like SSP and DAP to PROM and support for setting laboratory for PROM

**Mr. Anil Gokarn; INORA,**

Solutions in organic waste composting and urban farming

- INORA's activities recognised in Food and Agriculture section of Circular Economy in India: Rethinking growth for long-term prosperity
- Integrated Approach to Waste- INORA's vast experience provides a 360° solution
- Waste Management and Sustainable Organic farming
- 150 tonnes of waste treated daily across INORA's projects
- Choice of appropriate technologies for different waste streams

- Impact: Waste Management
  - Municipal Solid Organic Waste
  - Kitchen Waste
  - Garden Waste
  - Agro Waste
  - Industrial Waste and Sludge
  - Grey Water
- Awareness and training of all stakeholders in the system
  - 100 per cent Door to door collection
  - Segregated transport
  - Separate systems for special waste stream
- Process of decentralised composting
- Training and awareness to ensure 3 way segregation and collection
- Suggestions on systems for best recovery of recyclables
- Recommend tried and tested shredders and appropriate technology to reduce space requirements and increase speed and quality of composting
- Ergonomic, low cost and maintenance
- Trained manpower for daily operations
- Regular supervision
- No odours, no pests and minimum energy use
- Harvest and testing of compost
- Jobs for urban underprivileged
- Compost buy back
- Direct use in gardening and rooftop green spaces in urban areas
- Uniqueness of INORA's Approach
  - Clear specifications based on waste quantity
  - No odours, flies, chemicals and minimum or no external energy
  - All stakeholders made aware of their responsibilities
  - Bringing a culture shift in source segregation. Cleaner recyclable waste with higher market value

- Easy to construct by any mason or fabricator round the corner
- High manpower efficiency: 1 unskilled person can treat upto 1 ton per day in 5-6 hours
- No short cuts: Biological process which ensures complete curing of compost for direct use as a soil conditioner
- Focus on maintenance and sustainability: Low cost of operation Rs. 1 per household per day basic
- Social Entrepreneurship and Satellite Center models to add scale to activities
- Scientific Composting: Complete investigation of all factors to arrive at a customised solution
  - Input waste composition & volume
  - Space available for treatment
  - Climatic conditions of the location
  - Enriched compost production – ensuring a usable end product
- Composting solutions
  - Conventional Composting: Microbiological - Bacterial & fungi culture based
  - Vermi-Composting & Vermi Bio-filtering
  - Specialized microbiological cultures break down complex compounds in the waste/sludge
  - Aids worms to better treat the compound
- New areas of research
  - Decomposition of poultry feathers
  - Decomposition of Urban Bio-degradable Waste
  - Reduction of space required for treatment – Divide & Conquer approach
  - Increase cost efficiency: Setup and running cost, reduced man power and reduced agents
  - Quality of Compost produced
  - Fertilizer control order (FCO) standards, organic manure (enriched compost to act as a soil nourisher)
- Challenges
  - Attitude change towards source segregation will require a sustained and long term vision and action
  - Space constraints critical: More innovation required to address space efficiency
  - A one-fit-all strategy is not possible. Every location requires a customised solution
  - Lack of reliable data on waste
  - Approach has strong dependence on regulations and sustained long term enforcement



- Fragmented approach towards decentralisation. Focus still on centralisation
- No incentives or structured support from local bodies to push decentralisation in spite of clear benefits

**Mr. Ashok Chaudhari;** Ankur Scientific Energy Development Ltd,

Innovation in Biomass/Waste Gasification Solutions for generation of Energy & Biofuel

- Gasification is conversion of various biomasses/ wastes to a combustible (something that can be burnt) gas called Producer Gas.
- This gas can then be burnt in Engine Gensets to produce electricity or can be used for process heat applications.

Ankur's solution works for all types of MSW

- Distributed Solution
  - Relevant for villages, towns and cities of all sizes
  - Single systems to handle 5 to 100 tonnes per day
- Lowest Emissions
  - No harmful solid emissions
  - No liquid or leachate emissions
  - Capex and opex ensure fastest recovery of capital
  - Versatile for handling wide variety of wastes
- Syngas to fuels/ chemicals
  - New technology for converting syngas to fuel or chemicals
  - Very good for private market
  - Syngas to ethanol, methanol and hydrogen now feasible

**Mr. Sunil Dabke;** Concept Biotech,

Opportunities in organic waste composting and its challenges

- Co-composting is a technique that combines solid waste with de-watered biosolids (Sludge)
- World's largest Co-Composting is Edmonton composting facility, Canada
- The facility turns 2,20,000 tonnes of Solid waste & 22,500 dry tonnes of sludge per year to 80,000 tonnes of compost
- First project coming up with Delhi Jal Board for Composting of 30 tonnes per day

#### Options for Wet waste management at Building level

- Options in Composting
  - Mechanized composting
  - Tumbler composting
- Biogas
  - Biogas good option for Industry canteen and hotels but not best option for housing complex as storing biogas is not possible and utilizing is also difficult
- Other areas which have good scope for innovation
  - Industrial sludge bio conversion into non-toxic manure
  - Bio remediation of contaminated land using compost/ vermi compost
  - Bioremediation of mining sites and contaminated sites
  - Organic farming
  - Increasing fertility of barren land
- Benefits of Vermi compost
  - Restore soil health
  - Recreate ecological functions of soil
  - Decrease bioavailability of toxic pollutant
  - Decrease leachability & mobility of contaminants
  - Decrease erosion & improve soil drainage

**Dr. B. R Shah; V.CGOAU,**

#### An initiative towards organic farming research

- Gujarat divided along eight agro climatic zones based on soil type, climate and water resource availability
- At present in Gujarat 90,000 hectare area under organic farming in which 50,000 farmers engaged with organic farming
- First university for organic agriculture in Gujarat will be established at Halol for which 23 hectare land allotted
- The university will exclusively focus on organic farming, research and extension
- Various programme for farmer training, organic certification, diploma courses will be carried out under Gujarat organic university along with identification for proper organic farming method
- Need based research in organic industry will be done under

- There are four pillars of organic movement
  - Health of human, soil and air
  - Ecosystem diversity remain relatively stable
  - Fairness of traders
  - Next generation care

### Key takeaways

- All the relevant acts and rules in place
- Responsibilities and authorities of different stakeholders also defined
- Several surveys for biomass availability done by GERMI, GIZ, GOI etc.
- All technologies and solutions available and tried in several places for composting, biogas, compressed biogas, power, slurry, fertiliser etc.
- Several schemes also in existence since long and also added recently
- Yet very small portion of potential realised demanding a fresh look
- Subsidy regime continuation beyond reasonable period probably a hindrance to market forces
- Value of liquid slurry from biogas plants not captured due to it's non inclusion in fertiliser control order
- Likewise no integrated efforts from agriculture or fertiliser ministry to mainstream use of these organic outputs essential for sustainable and healthy crops
- Segregation at source of waste into dry and wet recommended and found suitable in select places and yet not spread by authorities and communities
- Recovery of value from each stream by using bio refinery approach to enhance bankability and viability
- Huge entrepreneurial opportunity in supply chain management of biomass as in case of fossil fuels like coal, gas or petroleum products
- Involving all milk cooperatives to motivate members to set up family biogas plants for waste management, cooking energy security and organic fertiliser
- Successful models of places like Indore or cooperative biogas and PROM models in Chondha village to be spread far and wide
- Connecting organic waste management to health, environment, waste treatment, organic fertiliser and employment in perspective for capturing all the benefits for the country

### Way forward

1. Promote segregation of municipal solid waste into dry and waste at source as per rules
2. Work aggressively for inclusion of liquid slurry, PROM and other organic fertilisers in appropriate rules and schedules for massive propagation

3. Capture full value of all outputs of biogas and composting plants to improve feasibility and returns
4. Attract capital in the organic waste management sector in the way solar space has secured
5. Push all milk cooperatives harder to work for installation of family size biogas plants for multiple benefits
6. Support entrepreneurs in biomass supply chain for removing key constraint to success

YouTube link

Part 1: <https://youtu.be/H13A2sinnxo>

Part 2: <https://youtu.be/gm-h-GvEHZw>

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