सत्यमेव जयते
Government of Gujarat

Vibrant GUJARAT 2013
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The Global Business Hub | 6th Global Summit

Technology Solution for Environment Upgradation Seminar

This PwC report documents the key discussions held during the seminar.

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Table of Contents

1. Summary and Way Forward

The following table summarizes the key parameters of the Seminar:

Parameter	Total Number
International Speakers	**1**
Domestic Speakers	**20**
Total Participants	**700**
Total Companies	**200**

The Way Forward across different dimensions as suggested by the speakers and participants are mentioned below -

- Government should encourage a facility developer to remodel sewerage and supply pipelines, CETPs, TSDFs, etc. in the existing industrial estates and that facility developer can be given a land on a lease. This company can become a member of a committee, which shall act as third party for carrying out monitoring in the State. Various authorities can monitor this development on a regular basis.

- The existing CETPs should be improved to handle variation in the waste input, energy intensiveness, sludge reuse, supervisory control and data acquisition (SCADA) and Combined Heat and Power (CHP). These CETPs should also have access to technological innovations and working capital

- Government should provide local bodies treatment technologies for the treatment of sewage so that they can afford and maintain. Industries should be offered more sophisticated processes

- For smaller municipalities, offer natural methods of treatment – which does not require electricity. This will make treatment affordable and maintainable.

- Alternative treatment methodologies for ensuring VOC treatment has immense benefits in terms of waste concentration, energy savings, maintenance costs, etc. Such technologies should be adopted by industries

- Participatory solutions, a proper 3R policy framework, sustainable business models and waste-resource flows metabolism should be implemented for ensuring 3Rs of waste

- In parallel efforts should be made to upgrade existing sewage treatment plants to permit maximum reuse and recycle for irrigation and industrial purposes.

- Coupling of cities and industrial estates for such recycling of sewage is ideal for many cities and towns of Gujarat such as Vapi, Ankleshwar etc.

Organizer

Gujarat Pollution Control Board

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2. Inaugural Session

Name	Organization	Designation
Mr. Hardik Shah	Gujarat Pollution Control Board	Member Secretary
Dr. S K Nanda, IAS	Environment & Forest Department, Government of Gujarat	Principal Secretary
Mr. A K Joti, IAS	Government of Gujarat	Chief Secretary
Dr. K.U. Mistry	Gujarat Pollution Control Board	Chairman
Dr. Tishyarakshit Chatterjee, IAS	Ministry of Environment & Forests, Government of India	Secretary
Mr. J.S. Kamyotra	Central Pollution Control Board	Member Secretary
Mr. Piyush Shah	CII Gujarat State Council Hitachi Hi-rel Power Electronics Ltd.	Chairman Managing Director

Session Details

Welcome Address

Mr. Hardik Shah – Member Secretary, Gujarat Pollution Control Board welcomed the dignitaries on the dais and the participants. He mentioned about the growing contribution of the manufacturing sector to the GSDP, stating that **Gujarat's manufacturing sector accounts for over 20%, which is above the national average of 17%.** He added that the state Government focuses on sustainable and inclusive growth, and is committed to support and facilitate industries and commercial establishments in adopting cleaner and greener technologies. **He added that environment sector should not be perceived as a compliance, but as a sector for development and economic investments.** He stated that the seminar has been organized considering this notion, with a view of benefiting all the participants.

Theme Address

Dr. S.K. Nanda, IAS – Principal Secretary, Forests and Environment Department, delivered a theme address**.** He pointed out that the thematic seminars being organized under Vibrant Gujarat 2013 aegis are very beneficial not only at the state level but the national level. He highlighted the importance of environmental technologies, mentioning that **industrial development could be a journey, but environment should be the destination.** He added that commitment to environment should not be perceived as an abstract subject or theoretical science; it should be an initiative and needs to be inculcated as a practice by industries, through various activities including the CSR.

He pointed out that with innovative technologies available today, waste is not a problem anymore, it is a resource. Principles of Reduce, Reuse, Recycle have now become a part of the society, particularly in developed countries. This should be replicated in India and Gujarat. He added that the Gujarat Government is committed to support industries in employing innovative technologies that can benefit the environment. He specifically mentioned that the speakers invited are leaders in the field of innovative environmental technologies, and their suggestions and views will be immensely beneficial to the audience.

He concluded by stating that Gujarat is the only state in the country which gives an incentive in the range of 5%-25% to industries employing innovative technologies for environment upgradation.

Special address

Mr. A.K. Joti, IAS – Chief Secretary, Government of Gujarat delivered a special address. He stated that environmental technologies are at the core of sustainable development in Gujarat. He mentioned that the state Government understands the environmental implications arising out of robust industrial development, and is committed to harness and promote increased use of clean technologies. **The Government has also set up various organizations Climate Change Department, Gujarat Ecology Commission, Forest and Environment Department, etc, committed to harness environmental technologies. He added that Gujarat is the first state in India to set up a Climate Change Department and as a commitment to inculcate the idea of clean technologies, the building of Gujarat Pollution Control Board runs completely on solar energy.**

Address by Chief Guest

Dr. Tishyarakshit Chatterjee, IAS - Secretary, Ministry of Environment and Forests, Government of India welcomed the audience and thanked the Government of Gujarat for the invitation to the seminar. Dr. Chatterjee offered a fresh perspective by enhancing industry competitiveness through novel technologies, which do not have severe environmental implications. He particularly mentioned about the waste disposal issues with coal fired power plants and coal using industries, and offered his suggestions on improving competitiveness and effectiveness by optimizing waste treatment and disposal. **He pointed out that the regulation to be introduced by the Government of India will foster the development of having captive washeries, ensuring better disposal of fly ash and utilizing waste coal for heat generation.** He also mentioned about the opportunities that industries can have in taking up waste treatment and disposal in various industrial estates and also reassured representatives of continued support from Central Government to support such initiatives.

He suggested implementing innovative technologies to the existing brown field industrial estates, wherein a facility developer to remodel sewerage and supply pipelines, CETPs, TSDFs, etc. in the existing industrial estates and that facility developer can be given a land on a lease. This company can become a member of a committee, which shall act as third party for carrying out monitoring. Various authorities can monitor this development on a regular basis.

He concluded by reassuring the audience of continued role of MoEF as a facilitator to industries in the area of innovative environmental technologies.

Concluding remarks

Mr. Piyush Shah – Chairman, CII Gujarat State Council welcomed the dignitaries on the dais and thanked the audience for attending the seminar. He enlisted the initiatives by Gujarat across various sectors that contribute to the environmental upgradation in the state. He summarized the inaugural session and on behalf of CII and the business community, concluded by wishing the participants the effective technical plenary and informative panel discussion.

3. Technical Session: Waste to resources: emerging trends and success stories

List of Speakers

Name	Organization	Designation
Dr. Tishyarakshit Chatterjee, IAS **Session Chairman**	Ministry of Environment & Forests, Government of India	Secretary
Prof. Soli Arceiwala	WHO, UN, SE Asia and Consulting Engineer	Former Chief – Environment & Health
Dr. N N Rao	NEERI	Director
Dr. Carl Adams Jr.	Wastewater Treatment ENVIRON International Corporation, USA	Global Practice Leader
Dr. Prasad Modak	Environment Management Centre	Executive President

Session Proceedings

Introductory Remarks

Dr. Tishyarakshit Chatterjee welcomed the audience to the technical session and provided a background of all the speakers. He also requested the audience to ensure that the session is as interactive as possible.

Presentation on "Sewage Treatment and its Utilization- Cost effective practices"

Prof. Arceiwala thanked the Forest and Environment Department and Gujarat Pollution Control Board for the invitation. He mentioned about the difference in waste quantity and quality from municipalities and industries. **He added that nearly 80% of waste generated in India is municipal waste, and the balance is generated by industries.** He particularly pointed that on the waste management front, the condition of India has not improved since the country's independence, as there are still many towns today which do not have a proper sewage treatment system.

He suggested speeding up of sanitation processes, and offered two rules for its implementation:

1. Give the local bodies what they can afford and maintain. Industries should be offered more sophisticated processes

2. For smaller municipalities, offer natural methods of treatment – which does not require electricity. This will make treatment affordable and maintainable.

He further suggested that the basis for the above rules is that sewage treatment facilities offered by the Government are not taken up by the local bodies. Prof. Arceiwala also showcased a model flowsheet, which can be adopted by these bodies for sewage treatment – for large, medium and small cities and towns, as indicated in the figure below:

For large cities

For medium and small cities

For very small towns

He also explained the advantages of these systems, some of them being water reuse, employment and sustainability

Presentation on "CETPs – Performance and Improvement; Issues and Opportunities"

Dr. N N Rao greeted the audience and thanked the organizers for the invitation to the seminar.

Dr. Rao initiated his discussion by focusing on CETPs for small and medium scale enterprises. He mentioned that although SMEs have an important role in the economy, they face several limitations in waste treatment facilities. **This is owing to the relatively lesser quantity of waste generated, huge capital investment for installation of effluent management systems, land availability constraint, etc. Large scale industries have their own effluent treatment facility and they operate much better than SMEs.** He added that the CETP concept has aided these SMEs in cost reduction and meeting environment regulations, but their function has been affected by the heterogeneity of the effluents, and other concerns.

He mentioned about the approach to be adopted for designing a CETP, highlighting various factors like inlet feed water quality, characterization of waste water, treatment options, sludge disposal, recycle/reuse of treated water, etc. He further added that the key considerations which experts should look into while designing a CETP are:

- Life cycle cost

- Cost effectiveness
- Reliability
- Simplicity of operation
- Performance
- Ability to meet water quality objectives
- Adaptability to change in influent quality
- Performance dependency on pretreatment
- Adaptability to varying flow rate and upgradation

Dr. Rao also offered suggestions on the kind of technologies that can be employed, based on the quality and quantity of waste generated by different industries, as well as sustainability criteria while adopting technologies He also highlighted some issues with the existing CETPs and areas of improvements in the area of energy intensiveness, sludge reuse, supervisory control and data acquisition (SCADA) and Combined Heat and Power (CHP).

Presentation on "Treatment of VOCs in Activated Sludge Plant" by Dr. Carl Adams Jr.

Dr. Carl Adams Jr. thanked the organizers for inviting him to the seminar.

Dr. Adams mentioned that the treatment of VOCs is an important issue in refineries, chemical industries and coking plants. He mentioned that although there are existing methods of thermal oxidation and activated carbon for treatment of VOCs, these methods have much higher operating and maintenance costs.

Dr. Adams explained the positive economic impacts of the VOC BioTreat™ treatment mechanism, using a case study of one of the existing refineries in USA. The key comparison factors presented are shown in the table below:

Process Technology	**COST-EFFECTIVE IMPACT**	
	Capital cost ($)	**Annual operating cost ($)**
Thermal Oxidizer	600,000	340,000
Granular Activated Carbon (6 carbon canisters on each of two API separators, 22 change-outs/yr per API) + Maintenance of N_2 blanket	240,000	500,000
Biological (piping, fans and connection to blowers)	350,000	Minimal
Process Technology	**ANNUAL IMPACT**	
	Energy Consumption Million BTUs per year	**CO_2 Emissions Tons CO_2 per year**
Thermal Oxidizer (calculated)	45,700	2,690
Granular Activated Carbon (in operation)	192	10
Biological (no additional energy required or CO_2 generated, due to minimal organics being treated)	Minimal	Minimal

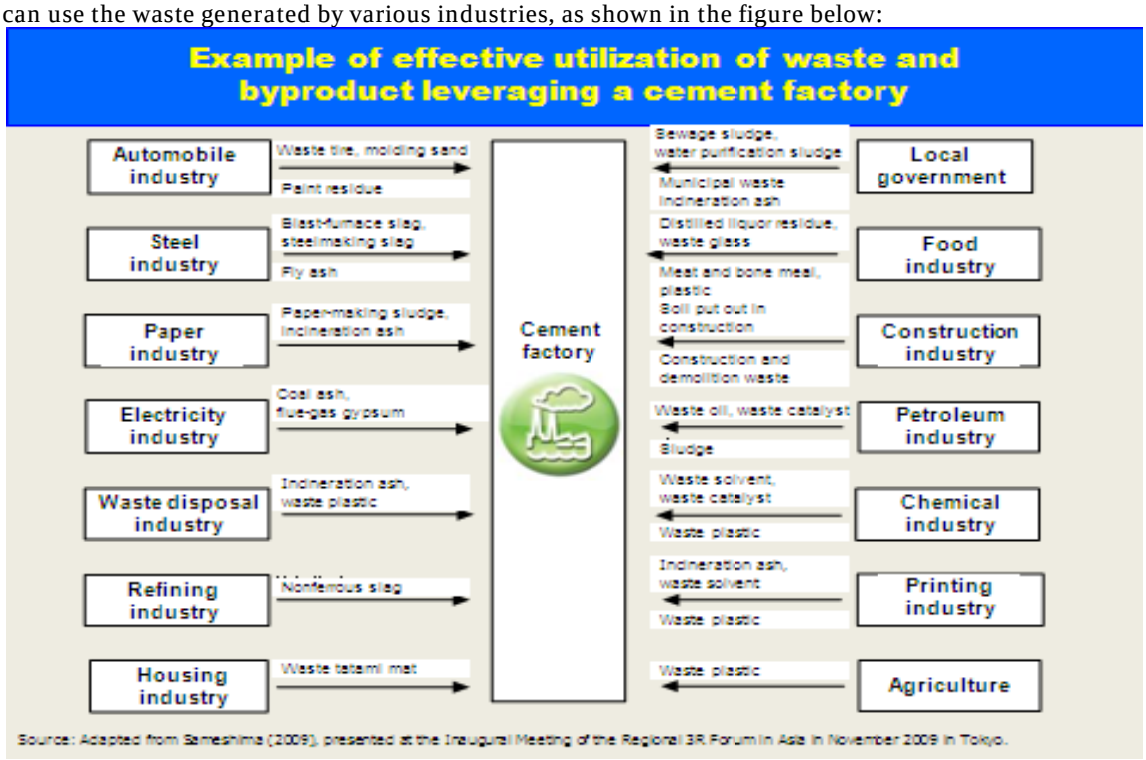
Dr Adams also demonstrated additional case studies depicting actual results of the treatment systems utilizing the VOC BioTreat™ and explained the benefits of this systems in terms of waste concentration, energy savings, maintenance costs, etc to the participants.

Presentation on "Reduce, Recycle and Reuse (3Rs) of Waste- international perspectives"

Dr. Prasad Modak thanked the organizers for the opportunity of presenting the concept of 3Rs of waste. He initiated the presentation with a visual image of the size of Mulund dumping ground in Mumbai and its growth in size from 2000 to 2010. He mentioned that the growth in size of landfills in rapidly growing cities will pose a major problem in the future.

He added that in order to address downstream processes like waste treatment and disposal, it is important to tame consumption. He pointed out that growth in spending; augmentation in surplus income will act as a driver to increased consumption, leading to waste disposal challenges. **He stated that by 2020, e-waste from used computers in emerging economies like South Africa, China and India will have increased by 200-500% over 2007 levels.** This e-waste contains metals such as mercury, cadmium and lead, which may leach into the environment and pose a health hazard to human beings, unless handled with care. Also, informal sector workers are engaged in dismantling used electrical and electronic equipment in order to recover metals, plastics and other materials for recycling, often without proper protection, exposing them to severe health risks. The local bodies are also supplied with this newer waste stream, and they are not well equipped to handle this.

Dr. Modak indicated the potential in the 3Rs of waste by depicting the potential of the cement sector – which can use the waste generated by various industries, as shown in the figure below:



Dr. Modak indicated various other case studies of 3Rs of waste and also showed the resource recovery potential across various income groups, as indicated in the table below:

	Minimum %	Maximum %	Average %
High-income	**30**	**72**	54
Middle-income	**6**	**39**	22
Low-income	**6**	**85**	27

He concluded his presentation by suggesting some key points, common for industry and regulatory authorities, including decentralized and participatory solutions, a proper 3R policy framework, sustainable business models and waste-resource flows metabolism

4. Panel Discussion: Innovative Technological Solution for Waste Treatment and Disposal

List of panellists

Name	Organization	Designation
Mr. J.S. Kamyotra **Session Chairman**	Central Pollution Control Board	Member Secretary
Dr. Deepak Kantawala	Self employed	Consultant
Prof. N J Mistry	SVNIT, Surat	Head, Environment Engineering
Mr. D.J. Yadav	Arvind Ltd.	CEO
Dr. Yogen Parikh	Self Employed	Consultant

Panel Discussion Proceedings

Introductory Remarks

Mr. J.S. Kamyotra delivered the introductory remarks for the panel discussion. He introduced the panel members and gave a background on the expertise and focus areas of each of the panellists.

Sewage generation, collection and treatment – key issues and recommendations

Dr. Deepak Kantawala thanked the organizers for the invitation and delivered a presentation on the current trends in sewage generation, collection and treatment. He categorically pointed out that although the current sewage generated is much more than a decade ago, the treatment capacity has not augmented. **He stated that of the current sewage generated, more than 75% of the sewage remains untreated, adding that 302 class I cities and 467 class II towns have no sewage treatment facility.** He further mentioned that of the 115 existing STPs studied, 80 plants reported capacity utilization (70%) and only 70 (61%) met the standards for disposal in surface waters. Thus, not only 21% of sewage passes though treatment plants, only 60% of this sewage meets the required standards. This implies that only about 12% of sewage generated in Class I cities and Class II towns meets the standards for disposal in surface water.

He offered the following suggestions to the Government of Gujarat in this area:

- **In parallel efforts should be made to upgrade existing sewage treatment plants to permit maximum reuse and recycle for irrigation and industrial purposes.**
- **Coupling of cities and industrial estates for such recycling of sewage is ideal for many cities and towns of Gujarat such as Vapi, Ankleshwar etc.**
- **This initiative will also release water being used by industrial estates for domestic and other uses**

Innovative technological solutions for wastewater treatment and disposal

Dr. Yogen Parikh initiated his presentation by stating that the present problem of waste treatment and disposal cannot be solved with the same thought through which we created waste. He mentioned that there are 4 distinct steps in waste management which is reduce, treatment, reuse recover and recycle and dispose. These steps face challenges like quality of input waste, energy requirements, land requirements, O&M problems. **He stated that any innovation that we apply should answer to these challenges. He also said that agriculture sector contributes significantly to the consumption of water. Hence, the application of technologies should focus on reduction in consumption of water in agriculture.**

He also added that rather than reuse of industrial wastewater, priority should be on recycling sewage waste water, as the waste water generated by industries is much less than sewage waste water. He also sensitized the audience on advanced biological treatments and waste water treatment methods.

Question and Answer session:

Various questions were asked, pertaining to various technology options available and ongoing issues of common effluent treatment plants, including COD treatment and volatile matter. The panel experts deliberated on these issues and also presented some case studies on successful implementation of innovative technologies in dealing with solid waste, water recycling and waste disposal.

5. Panel Discussion: Reduce, Reuse and Recycle (3Rs) of Waste – Innovative approach for resource conservation

List of panellists

Name	Organization	Designation
Dr. K.U. Mistry **Session Chairman**	Gujarat Pollution Control Board	Chairman
Mr. J.S. Kamyotra	Central Pollution Control Board	Member Secretary
Mr. Sandeep Shrivastava	Ambuja Cements Ltd.	Head, Sustainability Division
Mr. Bharat Jain	Gujarat Cleaner Production Centre	Member Secretary
Prof Ashwini Kumar	CEPT University	Professor

Panel Discussion Proceedings

Introductory Remarks

Dr. K.U. Mistry expressed his gratitude to the audience for participating in the seminar. Dr. Mistry mentioned about the importance of resource conservation and reduction of waste at all the process stages, particulary in polluting industries like chemical. He added that the processing techniques should be 'wasteless' - aimed at zero waste. He appreciated the expert panelists for sparing their time and wished the audience an informative session.

3Rs of waste – discussion

Mr. J.S. Kamyotra initiated the discussion on 3Rs of waste, mentioning about the correlation between GDP growth and its impact on the environment. He stated that the growth in industrialization and GDP leads to an increased use of resources – primarily land, power and water. He added that 33000 million tonnes of waste is generated in tier-I cities, out of which only 8000 million tonnes is treated. He stated that the ongoing problem of waste treatment is characterized by the lack of power, finance, proper technology, etc.

He stated that innovative measures are required for treating of existing sewage treatment problem. These techniques could look beyond COD/BOD and focus also on pathogens. These techniques could be advanced biological systems. He added that industrial wastewater, although accounting for only 20% of the waste generated – needs to be treated as it is high in toxicity. Mr. Kamyotra suggested that various control measures should be ensured at the process level itself, which decreases the requirement of effluent treatment and waste recovery. He also cited an example of a pulp and paper industry, a company in this sector reduced water consumption from 80-100 tonnes/tonne of production to 20 tonnes/tonne of production. He added that the steel industry has also decreased their water consumption from 8 tonnes/tonne of production to 2 tonnes/tonne of production. He concluded by stating that process level resource utilization can be reduced through simple in-house measures.

Mr. Sandeep Shrivastava mentioned about the initiatives of Ambuja Cements in using innovative methods for waste reduction reuse and recycle. He particularly mentioned about two issues – optimization of resources and minimization of waste. He stated that resources are in short supply, and pose a major challenge in optimization of resources. **He added that Ambuja cements, at their facility in Gujarat has been working in cooperation with Government of Gujarat in minimizing waste resources, utilizing waste materials like plastic and pharmaceuticals waste for the production of PPC cement.** He indicated that the thermal substitution rate in cement industry is about 1%, which is much less than the levels in developed economies ranging from 30-70%. This provides an opportunity for technological development.

Prof. Ashwini Kumar initiated a discussion on waste recycling and mentioned that India as a country ranks much higher on waste recycling, better than certain developed economies in Europe and USA. He also stated that the only challenge the industry faces is the understanding and adaptability of technology**. He mentioned that the sharing of best practices, while having a knowledge repository should be established where industry and research institutes can work together for appropriate technology for appropriate technologies**. He further added that apart from the 3Rs of waste, 3Cs should be implemented – which include co-ordinate (among agencies, industries, associations, universities), community (inclusive community participation) and cost (coordination and community will assist in cost reduction and effectiveness)

Mr. Bharat Jain mentioned about the end of pipe solutions. He stated that implementation of waste reduction at source is important, even for small scale industries. He requested the industries to enhance the participation and utilize the Government incentive for installation of cleaner/greener processes.

Question and Answer session:

The questions pertaining to 3Rs of waste focused on primary treatment options, focusing on automatic dosing system which could monitor pH and other parameters. Other questions focused on utilization of high calorific waste which can be used for cement industry. These questions were answered by the panellists, which was also followed by a deliberation on waste recycle, particularly focused on cement industry and resource conservation.

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