Waste treatment

Environment, Pollution

This PwC Report documents the key proceedings during the seminar It is for internal usage of iNDEXTb and other Government of Gujarat agencies and departments only. July 2012 Detailed Report: Integrated Waste Management — Emerging Trends, Challenges and Way Forward Seminar on Integrated Waste Management: Challenges and Way Forward Table of Contents 1. Summary and Way

Closing

Remarks..... ..... 17 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Forward Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 1. Summary and Way Forward The following table summarizes the key parameters of the Seminar: Parameter International Speakers Domestic Speakers Total Participants Total Number 2 17 350+ The Way Forward across different dimensions as suggested by the speakers and participants are mentioned below Integrated waste management concept should focus on waste reduction along with recycling and reuse. This can be done by raising awareness towards generation of waste. Cities doing better in the fields of urban development including waste management should start sharing their learning and experience with smaller towns and cities. This can also be facilitated by PEARL initiative under JnNURM. Source-based segregation needs to be encouraged through awareness drives among citizens and other consumers of waste management services. This would also require suitable collection mechanisms and vehicles which can transport segregated wastes. Government needs to promote adoption of new technologies and processes for waste treatment suitable for the heterogeneous nature of Indian waste. Waste to energy solutions for Indian waste are possible despite lower calorific value and the same need to be encouraged through adoption of emerging technologies like gasification, concord blue tower, co processing among others. Viability of waste-to-energy solutions and other treatment disposal / recycling facilities can be boosted by clubbing smaller

municipalities which do not have the financial wherewithal so that a common facility can be created and shared. Liquid waste management requires better collection efficiency which calls for sewerage network and other supporting infrastructure especially in smaller towns and cities. There is need for building more bio-medical and electronic waste treatment facilities. Both these categories of hazardous waste are rapidly emerging waste streams which need dedicated facilities for disposal and treatment. Private sector participation in waste management needs to be bolstered further which calls for development of suitable framework, capacity building of Urban Local Bodies and proper sharing of risk between the public and private sector. Private participation in the sector also needs to be facilitated through creation of a market for recyclables, raising awareness among citizens to increase willingness to pay and transparent pricing for levying user charges along with billing systems on the lines of electricity and water bills for waste management services. Zero waste scenario is achievable — a paradigm shift in waste management activities that is required. PwC Page 3 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 2. Inaugural Plenary The Seminar on “ Integrated Waste Management: Emerging Trends, Challenges and Way Ahead" was held in Surat at Science Centre on 06 July 2012. Gujarat which is today one of the fastest urbanizing states in the country is also a strong industrial and economic hub. Unprecedented growth in its cities and urban sprawl are making adoption of new ideas in urban development sector inevitable. Waste management is a critical area and it requires special efforts to plan and manage the spiralling waste generation that is taking place, given the complex issues viz. new

emerging waste streams, environmental challenges of waste handling and treatment among others. Towards this end, a 1-day seminar on integrated waste management was organized to brainstorm on emerging ideas, technologies, and systems in waste collection, treatment, disposal and recovery. The seminar was held at Surat, a model city for waste management processes in not just Gujarat but the entire country. The Inaugural session began by lighting of the lamp by the honourable dignitaries gracing the event. These dignitaries included — Name Shri Ranjitbhai Gilitwala Shri Narottambhai Patel Dr. M Ramachandran, IAS Mr. I P Gautam, IAS Mr. S J Haider, IAS Mr. M K Das, IAS Mr. Piyush Shah Organization Government of Gujarat Government of Gujarat Ministry of Urban Development, Government of India Urban Development and Urban housing department, Government of Gujarat Gujarat Urban Development Company Surat Municipal Corporation Confederation of Indian Industry Designation Honourable Minister of State Cottage industries, Salt Industries, Printing and stationery, Planning and Transport Honourable Minister — Panchayat, Rural housing and Rural Development, Food, Civil Supplies and Consumer Affairs Former Secretary Principal Secretary Managing Director Commissioner Chairman, CII Gujarat State Council PwC Page 4 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 2. 1 Welcome Address and Introductory Remarks Mr. M K Das, IAS, Commissioner, Surat Municipal Corporation (SMC) delivered the opening address by greeting and extending a warm welcome to all esteemed dignitaries and august audience to the 1-day event organized at Surat, as a run up to the Vibrant Gujarat 2013 Summit. Mr. Das said that the pace of

urbanization was posing multiple challenges to urban local bodies including development of physical and social infrastructure which not only meets current demand but also sustains future growth. One of the biggest challenges is provision of a healthy and clean environment to the citizens and in this context, scientific management of waste becomes very important. He said that the seminar was a good platform for knowledge sharing and he hoped that it would provide useful insights into the current and future trends in the sector. Introducing the city of Surat, Mr. Das said that Surat is among the fastest growing cities in the country. It is the 2nd largest city of Gujarat and 9th largest city in India with a population of ~ 4. 5 million and an area spread of 320 sq km. Large scale presence of industries especially the textile and diamond industry has contributed a lot to this growth. Greater potential of employment and options for better livelihood has attracted a large influx of migrants. This enormous growth has simultaneously tested the waste management processes in the city with around 1, 200-1, 400 metric tonnes of solid waste and 700 million litres of liquid waste being produced in the city per day. It is therefore a big challenge for SMC to ensure effective systems and processes for collection and disposal of municipal waste. Government of Gujarat, Mr. Das said, has been progressive with a futuristic outlook and today’s seminar is a part of its proactive initiatives to bring out innovative and practical solutions in the field of waste management. This seminar aims at coordination of waste management efforts across the country and plans to provide a platform for sharing information related to various initiatives and programs. Mr. Das concluded by expressing hope that ideas generated in this seminar will act as a catalyst for further development of the waste

management sector and provide clear action points for providing a clean, green and healthy environment for the people. 2. 2 Address Principal Secretary, Urban Development and Urban Housing department, Government of Gujarat opened his note by introducing to the audience the Vibrant Gujarat Summit 2013 and the seminars organized by the Urban Development and Urban Housing department as a run up to the main event in January 2013. He said that the venue for Seminar on Integrated waste management was carefully chosen as Surat because of the excellent work being done by Surat Municipal Corporation (SMC) and the seminar would therefore offer an opportunity to delegates and other urban local bodies to incorporate learning from work done in this city. Underscoring the importance of change required in waste management sector, Mr. Gautam said that it was necessary to discard age old ideas and adopt emerging technologies and systems which countries and leading cities around the world are practising. Mr. Gautam also briefed the audience about the inception of Gujarat Urban Development Company in 2001 for reconstruction of earthquake affected towns and its expansion later as a nodal agency for the urban development department providing coordination and support to all 159 municipalities across various areas of urban development. He ended his note inviting all the experts present to share their ideas and experiences and make the seminar fruitful. PwC Page 5 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 2. 3 Key Note Address Dr. M Ramachandran, IAS, Former Secretary, Ministry of Urban Development, Government of India opened his note by congratulating Surat City for featuring 4th in the list of fastest developing cities. He pointed out

that various models in the area of waste management emanating out of Suart could be practised cross the country. He said that with more than 2 lakh MT of waste produced everyday by approximately 8, 000 towns and cities in the county, it has become imperative to handle waste in an effective manner so that cities remain clean and wastes can be re-cycled and re-used in the best possible manner. He also highlighted the change of composition in waste produced in India. He said that over the last 10 years, plastic waste has increased 10-fold whereas paper waste has gone up to just 2 times so we need to choose waste handling technology with these changes in consideration. Dr. Ramachandran stressed upon the need for 0verall waste management policy at the state level so that cities have clear guidelines for waste management. He also insisted that overall waste management policy should have guidelines for waste handling, resources allocation and should clearly define roles and responsibility of various bodies like pollution board and local bodies wh0 are involved in waste management. He said that creating awareness among masses for waste reduction is equally important and urged electoral representatives to prioritize this factor of 3R. He also said that creating awareness cannot be left to local bodies as every citizen should be made aware of ways to reduce waste and different eco-friendly ways of doing things. Dr. M Ramachandran pointed out that we have various service level benchmarks and National Sanitation Policy and it is important to timely implement these policies so that in a comprehensive manner, fundamentals of solid waste management can be addressed. He concluded by saying that we need to quantify actions at the city level so that changes can be achieved with long term perspective. 2. 4 Inaugural Address by Guest

of Honour Hon’ble Minister of State for Cottage Industries, Salt Industries, Printing and Stationery, Planning and Transport, Mr. Ranjitbhai Gilitwala was the Guest of Honour. In his address, he congratulated Surat Municipal Corporation (SMC) for organizing this important seminar on Integrated Waste Management and also appreciated the laudable work done by SMC. After the plague epidemic that gripped the city in 1994, tremendous work was undertaken to make the city clean and green by SMC. Today, Surat has emerged as one of the best cities to live and work and offers quality lifestyle, said Mr. Gilitwala. Hon’ble minister also said that waste treatment and recycling should not alone be the focus and called for efforts from people to reduce the generation of waste. Reducing generation can go a long way in addressing sustainability concerns, along with recycling and reuse of the waste generated. Government of Gujarat under the visionary leadership of Hon’ble Chief Minister, Shri Narendra Modi aimed to focus on environmental issues and seminars such as these were an important platform for sharing of ideas and knowledge collaboration. PwC Page 6 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 2. 5 Inaugural Address by Chief Guest Hon’ble Minister of Panchayat, Rural Housing, Rural Development, Food, Civil Supplies and Consumer Affairs, Government of Gujarat Sheri Narrottambhai Patel was the chief guest. In his inaugural address, he lauded the efforts of Surat Municipal Corporation and people of Surat City in significantly transforming Surat from a plague-ridden city to one of the cleanest city in India. Hon’ble minister said that effective waste management is integral to overall development of Gujarat. He also said that with 158 municipalities and 8 municipal corporations in the state,

there is need for continuous learning from mutual best practices. Hon’ble minister reinforced the commitment of government towards waste management and also said that Government of Gujarat wants to develop all its cities in the line of Surat in the waste management area. 2. 6 Concluding Remarks Mr. Piyush Shah, Chairman, CII State Council, Gujarat and Managing Director Hitachi HiRel Power Electronics Pvt Ltd, concluded the session by thanking all speakers and dignitaries for sharing their knowledge and sparing time for attending the event. Mr. Shah lauded the efforts being undertaken by Government of Gujarat to promote information sharing and brainstorming on the important issue of waste management having wide spread ramifications for the development of our cities. PwC Page 7 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 3. Technical Plenary — I: Sustainable Waste Management List of Speakers Name Dr. M Ramachandran, IAS Prof. Chetan Vaidya Dr. A N Vaidya Dr. Juergen Porst Organization Ministry of Urban Development, Government of India National Institute of Urban Affairs National Environmental Engineering Research Institute (CSIR — NEERI) Bavarian Waste Association Incinerators Designation Former Secretary Director Senior Principal Scientist and Head Solid Waste Management Division Senior Advisor, GIZ (IndoGerman Bilateral Agency) 3. 1 Introductory Remarks by Session Chairman Dr. M Ramachandran, Former Secretary, Ministry of Urban Development, Government of India opened the session by introducing the speakers and setting the context for the discussion. He urged speakers to talk about new models, ideas and ways to move towards better waste management in our cities and deliberate on the challenges facing waste

management sector in India. 3. 2 Waste Management Prof. Chetan Vaidya, Director, National Institute of Urban Affairs (NIUA) talked about the trends in the waste management sector. Municipal Solid Waste Management rules in India were formed in the year 2000 and there was a need to relook at those since there had been several challenges in implementing them. Public private partnership models have also been facing issues of absence of user charges, labor rationalization etc. Quoting an NIUA report, Prof. Vaidya highlighted that waste management is essentially an operation and maintenance issue and steps were needed to overhaul the sector keeping in view this important perspective. Integrated waste management is the need of the hour and Kanpur city in the northern state of India, Uttar Pradesh presented a good example of outsourcing end to end solutions in the waste management sector. Surat in Gujarat too with a combination of operators providing different services presented an alternate example of effective waste management solutions. Dr. Vaidya also spoke about PEARL (Peer Experience and Reflective Learning) initiative under JnNURM (Jawaharlal Nehru National Urban Renewal Mission), the ambitious program of Government of India, being an effective source of promoting knowledge sharing among cities so that learning emerging from urban centres can be shared across the country for wider benefits. There was a need felt to raise awareness about PEARL across cities in India which was being done by NIUA through its various efforts and initiatives. PwC Page 8 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 3. 3 Handling Emerging Waste Streams: E-Waste and Hazardous Waste Management Emerging waste streams in India like biomedical and

electronic waste need technologically superior solutions to handle them, said Dr. A N Vaidya, Scientist at the National Environmental Engineering Research Institute (NEERI). Dr. Vaidya started his note by highlighting the changing composition of pollution, both air and water in the country over last few decades. The composition of waste generated had also changed and reflected new types of pollutants and this had made new approach in waste sector inevitable. The new approach had shifted to management of waste from treatment only perspective and cleaner technologies along with advanced treatment, equipments etc were now available. The major challenge in managing hazardous composites of waste streams is the heterogeneous nature of waste generated and dealing with this requires that waste minimization strategies remain at the core of our approach. This included both reduction at source as well as recycling and extracting as much as possible. Dr. Vaidya, apprised the audience of the advanced treatment processes which are available in the market today viz. membrane based processes, advanced oxidation processes among others. He also talked about ways for selection of an appropriate treatment process based on composition of waste and elaborated on how various processes worked. Remediation methods that could go a long way in preventing damage to environment and living conditions include regular assessment of contamination levels and selection of the right treatment process along with other initiatives. To conclude, Dr. Vaidya underlined that waste management is a dynamic sector with changing composition of wastes and there is a need to rapidly adopt newer and better technologies and treatment processes. 3. 4 Need for Mixed Technologies in Waste Disposal: Focus on Waste to Energy

Dr. Juergen Porst has been working for over three decades in the waste management sector. He is currently working for GIZ German International Cooperation, Government of Bavaria and several state governments in India along with over 26 countries across the world. Dr. Porst talking about waste to energy trends briefed the audience about the waste management sector in Germany and the strategy that European countries had adopted which had led to them excelling in the sector. European strategy of following a hierarchic approach through prevention, reuse, recycling, recovery and disposal had led to excellent results. The heating values in developed economies were higher while the nature of Indian waste resulted in it having a low value. However, Dr. Porst stated that this was slowly changing and calorific value of Indian waste was also on the rise. The options available for non-recyclable waste management broadly included mechanical-biological processes and thermal treatment processes. Land filling however proved to be a more expensive decision over the longer run due to the high cost of operations and after care costs. Dr. Porst also busted several myths surrounding waste incineration techniques like it not being eco-friendly and being expensive than mechanicalbiological treatment (MBT). He underscored that waste recycling and waste to energy did not conflict — they in fact complemented each other. Dr Porst, presented several products where energy produced from waste could be used for marketable products and earnings that could accrue. Waste to energy conversion methods were also environmental friendly and facilitate efficient climate protection due to their far less emissions than equivalent landfill sites. Coincineration also provided for carbon credit benefits though the reliability over long term remained low.

PwC Page 9 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead Enabling waste to energy based projects called for conducive conditions to be created in terms of legal frameworks, market conditions prevalent and generating favourable public opinion and acceptance among masses. 3. 5 Closing Remarks by Session Chairman The technical plenary on Sustainable waste management was concluded by the session chairman, Dr. M Ramachandran who thanked the speakers for their valuable inputs and ideas. PwC Page 10 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 4. Panel Discussion: From Door to Dump A panel discussion was held on the topic of " From Door to Dump: Issues and way forward in segregation, collection, transportation, treatment and disposal". The panel which consisted of eminent panellists expressed their views and concerns and proposed solutions to move faster towards end to end solutions for the waste management sector effective to combat challenges across the value chain. List of Speakers Name Mr. I P Gautam, IAS Mr. N M Tabhani Prof. Dinesh Mehta Dr. Amiya Kumar Sahu Mr. Arun Gor Mr. Debashish Tripathy Organization Urban Development and Urban Housing Department, Government of Gujarat Gujarat Pollution Control Board Centre for Environmental Planning and Technology National Solid Waste Association of India All India Institute of Local Self Government, Mumbai IL & FS Environmental Infrastructure and Services Ltd Designation Principal Secretary Sr. Environmental Engineer Professor Emeritus President Vice President PwC Page 11 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead ï‚§ Mr. I P Gautam, IAS,

Principal Secretary, Urban Development and Urban Housing Department, Government of Gujarat: Opening the session, Mr. Gautam welcomed all the esteemed speakers on the dias. On the topic “ From Door to Dump", he said the topic was very aptly termed as an effective management of waste calls for working across all activities of the process. Mr. Gautam said that one of the potential ways of overcoming issues in the waste management sector was to facilitate some form of clubbing of municipalities so that economies of scale could be leveraged where in municipalities benefit from common land could fill sites and treatment plants. Doing this would also help smaller municipalities who due to lesser generation of waste currently find investing in treatment and processing activities unfeasible. He stated that though creation of scientific landfills was easy, it was often the operation and maintenance of these landfills which was a concern. Concluding his remarks, Mr. Gautam lauded the efforts of Surat Municipal Corporation in the city — he also requested for support from the people in sustaining these initiatives and making them fruitful. Mr. N M Tabhani, Sr. Environmental Engineer Gujarat Pollution Control Board (GPCB): On behalf of GPCB, Mr. Tabhani spoke about the challenges in waste processing and newer ways of handling waste for all round benefits. Mr. Tabhani talked about Co-processing as an effective way of handling waste from industrial processes while recovering energy and material value from them which in turn could be supplied to energy intensive industries like cement production units. Use of cement kilns also offers large scale benefits over traditional hazardous waste incinerators due to high temperatures, long residence time and oxidizing conditions present leading to reduction in emissions. While there are several others methods of

processing waste for energy to meet treatment challenges, a distinct advantage that co-processing offers in handling heterogeneous Indian waste is its ability to process plastic and non recyclables from composting plants as well. However, there are certain materials like leather, iron, stones, x-ray films etc which should not be sent for processing and municipalities must ensure proper segregation. Prof. Dinesh Mehta, Professor Emeritus, Centre for Environmental Planning and Technology: Prof. Mehta in his note threw light on the major issues facing waste management sector in India and Gujarat. After giving an overview of the waste characteristics in the state of Gujarat, he underlined that though waste collection efficiency was high in its cities, the extent of segregation and recovery still called for more efforts, especially in towns and smaller urban centres. Scientific disposal of waste needed focus even in larger cities having municipal corporations. Financial sustainability also remains an area which needed attention due to low recovery of costs. Apart from these, Prof. Mehta also highlighted other issues where work was required like focus on collection of liquid waste with non-sewered liquid waste content still remaining substantial in smaller urban centres. Bio medical and e-waste collection was yet another emerging area where there was a need to have more treatment facilities for these. Dr. Amiya Kumar Sahu, President, National Solid Waste Association: National Solid Waste Association of India (NSWAI) is the only leading professional non-profit organization in the field of Solid Waste Management including Toxic and Hazardous Waste and also Biomedical Waste in India. Speaking on the challenges and way forward in the area of solid waste management, Dr. Sahu started his presentation by giving an overview of current scenario of

waste management in India and also pointed out the changing composition of waste produced in India. He suggested several way forward including segregation of waste streams at the household level, provision of suitable and different transport vehicles as per demands of the nature of waste generated locally, stimulating market for recyclables. Dr. Sahu said that Government should incentivize private sector participation and promote new concepts like waste to energy through renewable energy certificates. He stressed upon the need of bringing in appropriate government policy initiatives for the same. ï,§ ï,§ ï,§ PwC Page 12 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead ï,§ Mr. Arun Gor, All India Institute of Local Self Government, Mumbai: Mr. Gor started his presentation by giving an overview of types of waste and various laws pertaining to waste management. He pointed out that till date we don’t have any separate law dealing with e-waste. He then spoke about principal areas of management and handling of municipal solid waste. Mr. Gour highlighted the importance of segregation at source and how this can help in achieving more recycling of waste. He said that real problem is selection of appropriate technology depending upon waste generation and availability of land and further suggested that large ULBs with waste generation above 300 T/day should have centralized plants with priority of generating Organic Fertilizer from Bio-Waste; Waste to Energy Options are suitable for those generating 1, 000T/ day and above. He concluded by saying that areas like segregation at source, storage, collection, transport, recycling, processing and final disposal requires coordinated action and policy changes so that issues of Municipal Waste Management can be addressed. ï,§ Mr. Debashish

Tripathy, Vice President, IL&FS Environmental Infrastructure and Services Ltd: IL&FS Environmental Infrastructure and Services Ltd (IEISL) is one of the leaders in the waste management sector in India which has adopted an integrated approach in the sector and offers services from collection, processing to energy conversion. Speaking on the challenges encountered in the waste management sector, Mr. Tripathi underlined issues facing the much needed public private partnership models. He mentioned that budgetary allocations of municipal authorities was often not sufficient and also that a major cost was incurred on collection and transportation while not enough was being spent on treatment and energy conversion. Development of institutional and financial capability in the municipalities was also required as was the need to carve out viable business models for private sector involvement. The absence of willingness to pay among the citizens was a major hurdle and Mr. Tripathi suggested that it was necessary to start charging citizens for waste management services and billing systems on the lines of electricity and water bills were required. He also recommended profileration of education and benefits of segregation and waste disposal among children so that awareness seeps in the society. Carbon financing advances and post financing were other options that need to be looked at. PwC Page 13 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead 5. Technical Plenary — II: Harnessing Waste for Wealth List of Speakers Name Shri M K Das, IAS Ms. Caroline Twigg Mr. Rahul Bedmutha Mr. Prayas Goel Organization Surat Municipal Corporation World Business Council Sustainable Development for Designation Municipal Commissioner India Coordinator Associate Director

Managing Director CRISIL, Risk and Infrastructure Solutions Rochem India Pvt Ltd 5. 1 Introductory Remarks by Session Chairman Shri M K Das, IAS, Commissioner, Surat Municipal Corporation opened the session by welcoming all the speakers and highlighting that in the emerging scenario waste is becoming a sector where ample economic opportunities exist and effective waste management called for tapping these opportunities for creating a win-win situation for all. 5. 2 Presentation by Surat Municipal Corporation Surat Municipal Corporation, the hosts of the event made a brief presentation introducing to the audience the city and its glorious development over the last few decades. In the presentation made on “ sewerage management function" of the corporation, several systems, functions and initiatives were highlighted which have made the city one of the leading urban centres in waste management sector across India. The current status of the sewerage and waste management in the city and key achievements were also highlighted. Apart from clearly defined functions at head quarter and zonal level, the corporation had focussed on adopting latest technologies by leveraging funds received under JnNURM. Carbon credit mechanism is also being tapped and it is estimated that the corporation from its 3 sewerage gas based plants would generate more than 0. 5 lakh of CER (Carbon Emission Reduction). Technology adoption had also penetrated data monitoring and control in the sewerage plants. The corporation is now focussing on development of tertiary treatment plants to ease the pressure on drinking water resources. Solid waste management activities which received a major thrust by the corporation after the plague epidemic in the city in the 1990s had undergone a sea change with several

initiatives being taken like concept of zero garbage on roads, privatisation of municipal solid waste (MSW) related activities, infrastructure development for disposal among others. An overhaul and modernisation of the refuse transfer stations has been carried out resulting into reduction in odour and no storage of MSW. Multiple technologies for waste processing have been adopted which are preceded by segregation of the heterogeneous waste that is collected. Several sustainability initiatives have also been carried out in the city in the form of centralized biomedical waste collection, treatment and disposal, effective management of hotel and kitchen waste along with innovative schemes like ‘ Anudan Scheme’ for urban dwellers and adoption of improvised equipments and provisions for its citizens. Private sector participation has been a PwC Page 14 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead key strategy and several projects are still available in the pipeline where private sector collaboration can be successful. 5. 3 Facilitating Public Private Partnerships in Waste Management Ms. Caroline Twigg, India Coordinator of the World Business Council for Sustainable Development (WBCSD) introduced to the audience the organization which has over 200 companies spanning more than 22 sectors across 35 countries as its members and works towards thought leadership for business role in sustainability concerns. Under the Urban Infrastructure initiative, the organization has been working across the complete functional chain from design and planning, building, financing and operations. Briefing the audience on Public Private Partnerships (PPPs), Ms. Twigg defined PPPs as a transformational form of procurement where government could create new ways of delivering services. She gave a brief

description of the various PPP models which comprised different levels of participation from the private sector like service contracts, lease, annuity, BOOT (Build, Own, Operate and Transfer) and divesture among others. She also delineated benefits and challenges for both the parties in PPP model — Government and private sector. Ms. Twigg also talked about the waste management hierarchy which spanned from reducing usage, reuse, recycle, co processing, incineration to land filling and presented a few case studies including those from waste to fuel and waste water sectors underscoring the success of PPP based projects in these sectors. In Asia Pacific, however, Ms. Twigg noted that though there had been a boom in PPPs in this region, it still called for better oversight from public sector agencies and a stronger political will to make the models work. There is a tremendous scope for private sector participation in waste sector in India where only 8-9% of the total waste is currently being disposed off scientifically. Gulbarga, Hubli, Haldia were a few urban centres which presented successful PPP model projects. Management contracts, lease and BOOT models were emerging as the more popular ones. She highlighted that the success factors needed for development of PPPs were a strong will, robust institutional frameworks, well structured projects, a clear understanding of strengths and limitations of each party and an objective, transparent tariff fixing procedure among several others. Ms. Twigg concluded her presentation by talking about Urban Infrastructure Initiative of WBCSD and the support available for various sources including Government of India portals etc for leveraging and development of PPPs in India. 5. 4 Cost Economics: How to create a revenue model An overview of contract structures in Waste management sector along

with revenue accrual models was presented by Mr. Rahul Bedmutha, Associate Director, CRISIL Risk and Infrastructure Advisory. Mr. Bedmutha started of his note by talking about the status of municipal solid waste management (MSWM) in India and the rising trends in waste generation being witnessed in the sector. He highlighted that though waste collection was reasonable at 70-80% in large cities it was abysmally low in smaller cities, often below 50%. An estimated Rs. 49, 000 crore is required to plug the gaps existing the sector over the next 20 years. Currently, processing and disposal as well as integrated projects were seeing growing investments. PwC Page 15 of 18 Seminar on Integrated Waste Management: Emerging Trends, Challenges and Way Ahead Funding in MSWM projects has progressed from being funded by external agencies to local city governments and further now from service providers. A viable model for funding that has emerged now is based on capital investment from service provider and recovery through tipping fee and sale of products from treatment/processing of waste. Mr Bedmutha presented a few case studies on the same and underlined that tipping fees still remains a significant contributor ~ 68% of the revenues. Contract structures of MSWM projects also need to be reviewed from the viewpoint of integrated waste management to avoid overlap in the scope of processing and disposal and integrated contracts. Also in the scope of work, the contracts must focus on minimization of residue after processing. Mr. Bedmutha concluded his presentation by talking about the various risks that could challenges investments in waste management sector including - waste quality risks, technology risk both from the perspective of power generation and pollution

control and counterparty risk in the form of paying capability of the ULBs. 5. 5 Towards Zero Waste: Exploring the Systems Approach Mr. Prayas Goel, Managing Director, Rochem India presented on the topic — “ Towards Zero- A Systems Approach- Harnessing waste for wealth" Zero waste is a concept that calls for a paradigm shift and views waste as a resource that can be remoulded for usable components and profitable ventures. Speaking on the topic, Mr. Goel talked about the heterogeneity of the MSW and the fact that approximately 60% of it is organic and another 15% recyclable. He said that the low calorific value of Indian MSW can be attributed to its high moisture content. Due to absence of source segregation a total solution to treat mixed waste was warranted in the Indian context. Mr Goel also presented a comparison of various technologies like composting, landfill, incineration and the new concord blue solution on various indicators like emissions, maintenance cost, recovery of energy etc. Elaborating further on the Zero waste, Mr. Goel said that the concept focussed on maximizing the 3-R concept — Reduce, Recycle and Recover as well as ensuring that only true inerts are sent to the landfill. This could be achieved by raising public awareness and involving all concerned agencies including the un-organized sector. An integrated approach towards zero waste that he presented highlighted the need for receipt of waste with minimal storage along with efficiency in pre-conditioning activities followed by conversion of pre-conditioned waste to energy. An elaboration of Gasification technology apprised the audience about the details of this non-incineration thermal waste to energy solution and its suitability for disposal of mixed solid waste. The process is also environmental friendly since it does not release toxic

dioxins and furans due to the plastic present being thermo chemically degraded instead of being burned. Other benefits include the low space requirement, negligible rejects and no storage requirements. Summarizing his presentation, Mr. Goel negated the widely held notion that Indian waste due to its low calorific value based on