

The Challenges of Converting Municipal Solid Waste (MSW) to Energy in Lahore

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Introduction: New Challenges, New Fears

It was a sweltering afternoon in June 2013. Mr. Chaudhry, Managing Director (MD) Lahore Waste Management Company (LWMC), was sitting in his office and anxiously contemplating upon his options on how to pick up the gauntlet thrown at him by the Chief Minister (CM), Punjab. He used to seek great inspiration from Prometheus, his dialogical self, in such challenging situations.

“Why do you seem worried?” Prometheus asked the MD.

“The CM desires that I should plan and execute a power plant by converting municipal solid waste into electrical energy,” the MD replied.

Prometheus further asked, “So, what’s wrong with that?”

The MD said, “He wants to get it done tomorrow. He has made ambitious promises with the electorate to end energy crises in the country in the shortest possible time, therefore, he is exploring every avenue to achieve his political goals and there is zero tolerance for any non-performance.”

Prometheus said, “He is politically correct. The country is in the grip of large power and electrical shortages; load-shedding is affecting the production in industries. Punjab is the worst affected province and its economic growth has slowed down tremendously. You must do your best to actualize his vision because it is a national cause. You have done mega projects before which you started from scratch and made them successful. You can accomplish the same here as well. I extend you a hearty Godspeed.”

The MD felt encouraged but still he could not overcome his feelings of reluctance, confusion, and nervousness. Although energy was primarily a federal subject, however, provinces were also having concurrent jurisdiction. The elder brother of the CM was the Prime Minister of the country. Therefore, the aspirations of the CM were too high. He believed he could muster up all the required support at the federal level, even if it amounted to asking for the moon.

The MD called the Chairman Lahore Waste Management Company (LWMC), who was a political appointee and a close confidante of the CM. He told him about the task

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assigned to LWMC by the CM that morning in the Energy Council meeting. The Chairman said, “It was a recognition of trust and confidence of the CM in you and LWMC because we have successfully delivered on one of the CM’s earlier cherished dream of outsourcing solid waste management operations to international companies through a transparent bidding process. We would *Insha Allah* deliver the same results here as well.”

International outsourcing of solid waste management (SWM) operations to Turkish companies had produced good results in keeping the city cleaner than before. Lahore city was now being appreciated in the media and by the citizens for its better clean standards as compared to the other big cities of Pakistan. The CM was much pleased to reap political mileage out of it. The success of the outsourcing project was led by the MD and that put him in the good books of the CM. But the MD clearly understood that the CM was a hard task master in setting deadlines, monitoring progress, minutely micro managing the process as well as achieving results. The MD also understood that the new task assigned to him was not only technically complex and arduous, but the organization was also not compatible in terms of competencies and skills to accomplish it. Even the mandate of the task was inter-sectoral, and power production was not the core business of the LWMC. However, it was due to the earlier repute of the MD as a go-getter that had prompted the CM to designate him the lead actor in the process.

The CM’s political ambition was hinging on the premises to demonstrate to the electorate that he was going all out for energy production and not even sparing garbage for this purpose. This would have become a symbol for the fact that he was not leaving any stone unturned to address the energy crisis. For the MD, failure to achieve the goal would not only have caused a downgraded image in the eyes of the CM as an officer not capable of delivering, but as entailing future career and personal losses. Being the MD of a public sector company, he was getting a market-based salary package and privileges which his other fellow colleagues in the mainstream departments and ministries were lacking. The Federal Government (FG) had already issued his transfer orders to the province of Balochistan as part of rotation policy but the CM had not allowed him to leave and had requested the FG to cancel the orders, which were yet pending.

“How should I proceed?” the MD asked Prometheus.

“You should go by the book in a professional manner. Build the technical capacity of LWMC, hire a good consultant for preparing the feasibility, take the Board of Directors (BOD) along and keep the CM informed,” Prometheus replied.

The MD reminded him of the fact that the BOD was not in favor of waste-to-energy (WtE) plant and, while formulating the strategic plan and disposal strategy of LWMC, the board was inclined towards other methods of waste disposal including composting, landfilling, refuse derived fuel (RDF), etc. He further inquired of Prometheus, “How can I make a commitment with the CM in the absence of any clearly articulated

renewable energy policy at the federal or provincial level and without having any feasibility report about the viability of the project at provincial level? I feel like venturing into a deep ocean without a compass. I apprehended that any ambivalent answer to the CM will have serious repercussions for my career.”

Prometheus laughed at him and said, “Aren’t you used to it? How many times in the past you have actually sailed through the eye of the storm? And do you believe that the service career is the loftiest good of life. Don’t you remember the famous quotation by Paulo Coelho, ‘When you want something, the whole universe conspires in helping you to achieve it’.”

The MD started envisioning a feasible, technological, and environmentally sustainable plan to embark upon a waste to energy project for processing 2,000 tons of Municipal Solid Waste (MSW) on a daily basis keeping in view the characterization of MSW in Lahore. Nonetheless, it was a challenge for him to initiate a public policy dialogue with the CM and his team on the subject and try to build a consensus to choose a long-term safe route instead of a short-term risky path, which could cause significant implications on public finances and the environment of city.

Statement of the Problem

The Gordian Knot

WtE is a process of generating energy in the form of electricity and/or heat from the treatment and processing of waste. The selection of technology is based on waste characteristics and many other factors. It becomes feasible only when an optimal output is achieved in terms of cost, energy, and externalities. WtE has a popular but wrong perception of an easy, cheap, and profitable transaction and a possible solution for waste treatment everywhere. Waste disposal/treatment strategy formulated by the LWMC was heavily oriented towards a mix of different waste disposal options (RDF, composting, sanitary landfilling, etc.) other than the direct WtE option. However, the disposal of a small quantity of waste through WtE option was only to be exercised based on a detailed feasibility report. The CM wanted to pursue the goal of establishment of WtE incineration plant irrespective of considering feasibility of appropriate technology, energy cost, sustainability, and environmental effects of the project. For him, it was a high-impact political agenda worth pursuing at all costs. The MD LWMC was trapped in an ethical dilemma about his professional and personal responsibility towards meeting the objectives. The divergence of views between the CM and the MD became more pronounced due to the conflict of the style of micromanagement of the political boss and the steadfastness of the MD trained in classical bureaucratic traditions of Weberian legal rational authority. The conflict had potentially adverse repercussions for the civil service career of the MD who wanted answers to two key questions:

- (i) Was establishing the WtE incineration plant an optimal solution for municipal solid waste disposal of Lahore city?
- (ii) Was obeying the political authority of the CM without addressing the complex technical and ethical issues legitimate and obligatory for the MD LWMC?

Methodology and Literature Review

The case study has been prepared by collecting all the relevant information from different primary and secondary sources. The main source was the official documents of LWMC including minutes of BOD meetings, strategic plan, waste disposal strategy, ISTAC (international consultant) reports regarding Integrated Waste Management Plan of Lahore, waste characterization studies, WtE consultant pre-feasibility and detailed feasibility reports, etc. Technical proposals of international companies entering into MOUs with LWMC were also consulted. Interviews with the members of BODs and key stakeholders were also conducted. Different books, journals and websites were perused to explore technical parameters of WtE plants in various countries. The data and information were then critically reviewed, analyzed and incorporated in this case study to illustrate the research questions and conclusion. The protagonist recalled his own memories to reflect upon critical moments.

1. Agency – Thy Name Is LWMC

Means to An End

Mr. Chaudhry was the first MD of LWMC, a public sector company which was established in March 2010 to transform SWM operations being carried out in a non-scientific, non-professional manner by the City District Government Lahore (CDGL) into modern integrated solid waste management practices compatible with world standards. The corporate company mode was carved out to bring in professionals in the public sector and insulate political interference in the executive decision-making. Private sector participation was also envisioned as a strategic aim of carrying out the operations. The company entered into a contract, known as Services and Asset Management Agreement (SAAMA) with the CDGL on June 25, 2011, to manage all affairs related to SWM except legal and enforcement issues. The MD had successfully gathered a team of professionals who gradually gained expertise in SWM with the help of capacity building efforts undertaken by the Turkish consultant firm ISTAC. The increased capacity of LWMC team helped in successfully outsourcing the collection, transportation, mechanical sweeping and washing, and manual sweeping in Zone I and II of Lahore to Turkish companies through an international, transparent bidding process in November 2011. The financial costs of these contracts amounted to approximately \$320 million over a period of seven years. The LWMC team understood that any scientific disposal intervention like composting, RDF, material recovery facility

(MRF), or WtE would largely depend upon the success of collection and transportation of MSW to the designated disposal facility.

The MD and his team had by now realized that the foremost challenge for LWMC was to prepare a waste disposal strategy after strengthening and outsourcing of collection and transportation systems of more than 5,000 tons of MSW on a daily basis. The formulation of a disposal strategy was a tedious issue because mixed MSW was being collected, creating technological issues and causing financial constraints for effective disposal.

Challenge of Waste Disposal

Solution No Pollution

In Lahore, like all urban centers of Pakistan, SWM systems were under tremendous pressure due to rapid increase in population, urbanization and industrialization. The scale of the problem was snowballing with every passing day due to absence of a regulated scientific waste disposal system for MSW, hospital waste and hazardous industrial waste, which was resulting in serious risks to human health and environment.

Waste Disposal Strategy of LWMC

Think Green – Make It Clean

LWMC had engaged the services of M/s ISTAC², an official company of Istanbul Metropolitan Municipality, in 2010 to build the professional capacity of LWMC team and prepare an integrated waste management plan for the city of Lahore. Detailed deliberations were carried out between M/s ISTAC and LWMC officials about the waste management hierarchy and its adoption for Lahore. Waste disposal hierarchy is defined in the literature as shown in Figure-1. M/s ISTAC suggested that in the context of Lahore, the waste management strategy of LWMC may include compost, RDF and sanitary landfilling which were the most economical, environmentally safe and sustainable options. The waste disposal strategy was approved by the BOD.

² Environmental Protection and Waste Materials Recycling Industry and Trade Company (ISTAC) of Istanbul Metropolitan Municipality.

Figure 1: Waste Disposal Hierarchy – Adopted³

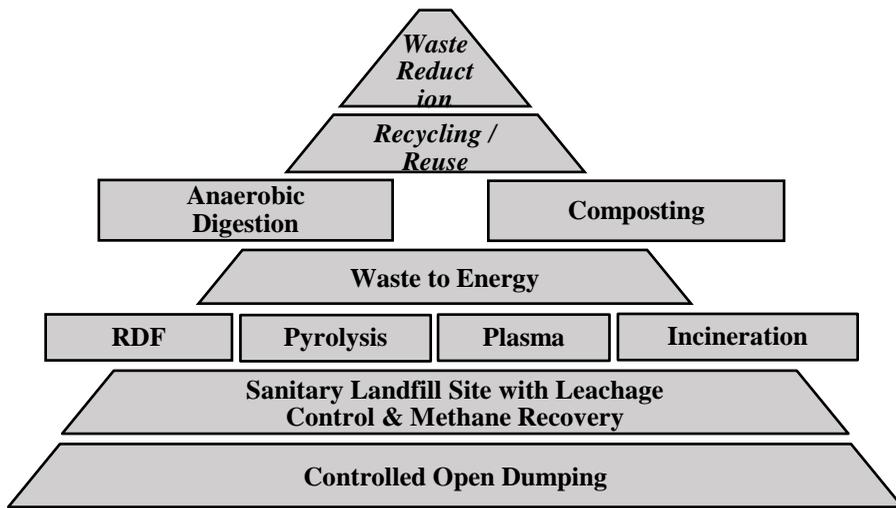
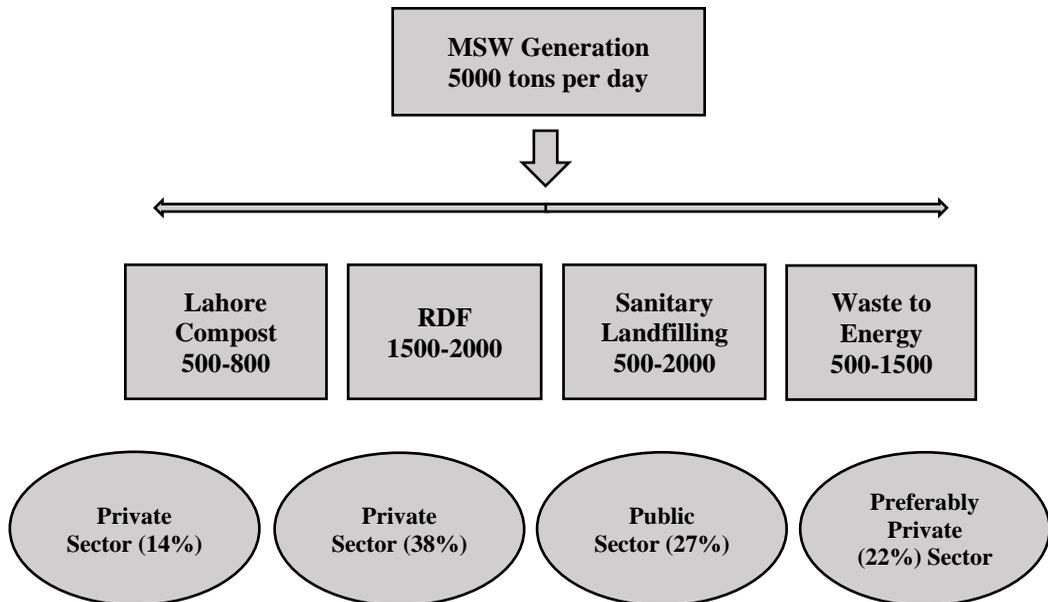


Figure 2: Waste Disposal Strategy of LWMC



² Ranjith Kharvel Annepu, Nickolas J. Themelis Stanley-Thompson Professor Emeritus, "Adopted from Sustainable Solid Waste Management in India," (Waste-to-Energy Research and Technology Council (WTERT), Columbia University, Earth Engineering Center, NY, USA).

1.1 Establishment of Landfill Site

Reduce Carbon Footprint

Pursuant to waste management strategy, 140 acres of land were acquired on the outskirts of Lahore at Lakhodair to establish a modern sanitary landfill site, the first of its kind in Pakistan. It was designed by M/s ISTAC and constructed by a Turkish company called CEVKA through an international bidding at a cost of PKR 1.2 billion. It had all the features like leachate collection and treatment system, gas capturing system, clay liner, geo-membrane, geo-textile, stone water drainage pipes, landscaping, admin block, and wheel washing area. It was completed in 2014, and three lots started functioning catering to 3,000 tons of waste.

1.2 Establishment of RDF Facility

Burn Green Fuel

Another agreement was made between LWMC and DG Khan Cement factory in July 2011. According to this, LWMC will provide MSW @ PKR 50 per ton, DG Khan Cement will establish an RDF facility with an initial capital investment of PKR 200 million along with PKR 50 million for procurement of land. LWMC would earn PKR 55 million annually from sale of waste, and save PKR 1.5 billion per year as cost of waste handling at the landfill site. The plant started functioning in 2014. RDF was an alternative fuel source replacing imported coal in the cement factory.

1.3 Waste-to-Energy Technologies

Making Value of Trash

The waste strategy of LWMC provided an option of WtE facility to be executed through the private sector. Waste to energy literature suggests a number of technologies to convert MSW into useful forms of energy. However, adoption of these technologies by a specific country/city depends upon multiple factors including socio economic conditions, waste characteristics, institutional capacity, environmental implications, financial requirements, energy policies and tariffs, and sustainability of operations. Based on these factors LWMC analyzed the various available technologies like Refuse derived Fuel, pyrolysis, gasification, incineration, Anaerobic Digestion- Mechanical biological treatment, landfill gas to energy) along with their pros and cons. The detailed comparative analysis is shown in Annexure-I.

2. Conceptualizing Waste to Energy

Well Begun is Half Done

“What should we do as a first step to embark upon this new technological adventure and also build the capacity of organization to respond to the challenge at hand?” inquired the MD at a BOD meeting. The Chairman asked, “What is the advice of our Turkish consultants?”

The MD replied, “They are not supporting the proposition of an incineration based WtE plant. In their view it is not feasible at this stage of waste management system of Lahore. They recommend sanitary landfill as the most essential and economic need at this stage which can generate electricity after maturation, i.e. four years. They have also highlighted that even an advanced waste management system of Istanbul does not have a waste-to-energy incineration plant currently.” Another BOD member suggested, “We should take a world tour. Let’s visit the WtE plants in India, Eastern Europe, China and Central Asia. The CM will have no objection. He might even consider us doing serious evaluations about the prevalent technological options.”

Prometheus had a different view. He advised the MD, “Learn from the experience of those who have actually done it. Focus on a good start as ‘well begun is half done’.” Therefore, the MD decided to learn from the private sector experience and navigate future course of action. He sought permission from the BOD to invite Expressions of Interest (EOIs) from international companies stating that the Government of the Punjab was currently exploring all possible options to meet the growing shortage of energy in Punjab and looking for one feasible option to produce energy from the municipal solid waste. The LWMC declared its intention to seek private sector partners showing interest in “waste-to-energy project having capacity of 1,500-2,000 tons/day” by the use of different technological options at Lahore. The LWMC reached out to 72 world renowned companies, in response to which 32 companies submitted their EOIs. These EOIs were related to different technologies ranging from mass burn incineration to gasification, pyrolysis and plasma. In order to find the feasible and optimal solution, the MD sought approval of BOD to hire a firm of international repute for carrying out pre-feasibility report of waste to energy project in Lahore, and evaluate the proposal at hand in the light of the pre-feasibility report.

The LWMC had already conducted a number of waste characterization studies⁴ in different seasons and weather conditions to assess the composition of waste along with its moisture contents and calorific value. This information was of great advantage in terms of saving time and was a crucial pre-requisite for selection of a feasible technology option in the context of Lahore. The average high calorific value of the Lahore waste was 1,692 kcal/kg which was far lower than the required 3,000 kcal/kg for an optimal thermal technology solution.

⁴ M/s ISTAC, “*Waste Characterization report*”, 2013-14.

After the advertisement inviting EOIs by LWMC, a number of international companies were interested in collaborating with LWMC and many of them even visited its office. Some of them also signed MOUs for establishment of the WtE project in Lahore which are as under:

- 1) Swede Tech International (Pvt.) Ltd, Sweden, MOU signed on 06-11-2013
- 2) M/s Alba Group, Germany, MOU signed on 11-11-2013
- 3) Reality Renewable Energy (Pvt.) Ltd, UK MOU signed on 19-11-2013
- 4) M/s China Western Power Industrial Co. Ltd., PR China, MOU signed on 24-11-2013
- 5) M/s Renoir Global (Pvt.) Ltd. (Renoir Group, UK), MOU signed on 28-11-2013

Bringing companies to the doorstep of LWMC obviated the need of visits around the world to see various plants. Discussions with these companies about the choice of technologies and methodology increased the knowledge base of LWMC team professionals. The pre-feasibility consultant also brought into focus all relevant aspects and evaluated their proposals.

In the view of the MD LWMC, the decision to move forward and select the most feasible option should have been first discussed at the level of BOD LWMC, Chairman Planning and Development Department, and the Chief Secretary before placing it before the CM. He tried to reach out to the Chairman P&D office for seeking guidance, but could not get a good response. He felt that the senior officers of the province were not willing to share any kind of responsibility of the process before the CM. Once again, he sought recourse to Prometheus, “I feel alone in the arena and vulnerable to political pressure.” Prometheus looked into his eyes and said in an emotional tone, “I can’t find a single example of courage that didn’t require vulnerability. And we are all scared to say things that are worth saying. Responsible action has multiple dimensions. It must not exclude personal conscience and there are certain life lessons that you can only learn in the struggle. Loneliness is proof that your innate search for connection with truth is intact.”

3. Planning WtE Prerequisites

Taming the Fury of Storm

The MD was confident that he had a number of MOUs with world renowned companies to show progress in the next meeting with the CM. The selection of international consultant for pre-feasibility study was also a good progress indicator. But that was not good enough for the CM who wanted to move ahead in a superfast tectonic manner.

Also, on finding a cue from an unknown source, the CM started mentioning the WtE plant installed in Delhi.

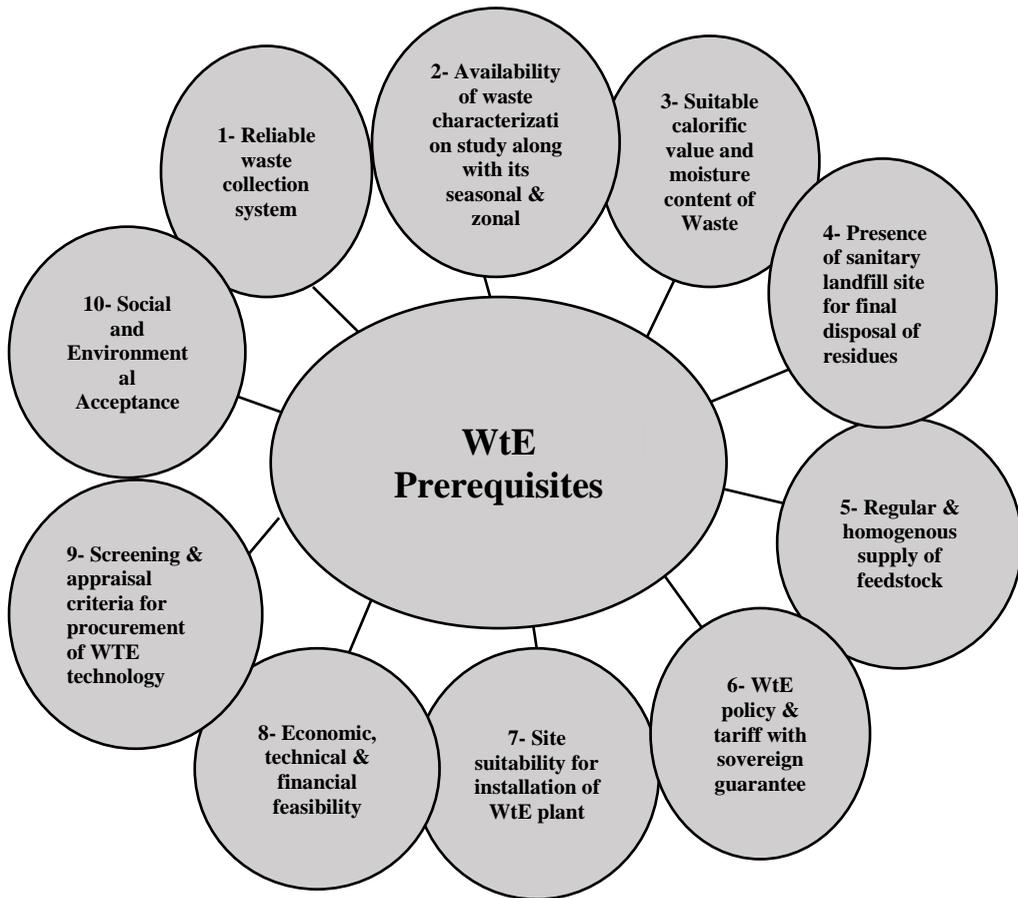
He urged the MD LWMC twice to visit Delhi and briefed him about the incineration plant built by the Jindal Group. Assessing the reluctance of MD LWMC, the CM directed MD of Punjab Power Development Board (PPDB) to visit and brief him about the incineration plant installed in Delhi. The CM was very keen to replicate the Indian model and directed the MD LWMC to study and review the Indian experience and make a presentation for the next meeting to be held on September 9, 2013.

Mr. Shah, the MD PPDB, met the MD LWMC in his office after his Delhi visit. He had a short video in his phone showing the working of the WtE plant. He claimed to be a man of the CM's trust to the extent of having access even to his personal bedroom. "Sahib is unable to sleep properly because he is haunted by his promises to people regarding the end to the energy crisis. Sahib sent me to Delhi personally to see this plant, which is owned by his family friend, i.e. the Jindal family. What we have to do is just replicate that model here. Don't go for complicated feasibility options, and do not oppose this option."

The MD LWMC was supposed to take this message seriously, but he wanted to have a detailed analysis of Indian plant based upon data which had not collected by Mr. Shah. A short video could not become the basis of any decision.

For the next meeting, the MD LWMC prepared a detailed presentation for the CM. The MD explained to the participants of the meeting that WtE was not a standalone project, rather it was a part of the long journey towards integrated and sustainable waste management systems. A number of prerequisites had to be met before even thinking of establishment of a WtE project. He apprised the meeting's participants that it was important to know the waste characterization/composition of MSW along with its calorific value and moisture contents, waste generation, detailed analysis of waste collection systems, waste transportation systems and disposal strategy of the municipality. The complete list of prerequisites was shown as under (Figure-3).

Figure 3: Prerequisites of Waste to Energy Project



The CM was, however, more interested in knowing the Indian experience and referred to his earlier direction to the MD LWMC to present his assessment of the incineration plant installed in Delhi. “Don’t become a professor Mr. MD, just tell me how the Indians have done it,” the CM said. The MD LWMC shared his assessment of the Indian experience. He said that Timarpur Waste Management Company Ltd. (TWMCL) was established in April 2005 and entered into a 25 years’ concession agreement with Municipal Corporation of Delhi under a public-private partnership (PPP) framework for processing about 2,000 (TPD) of waste with potential of 20 MW generation after several revisions. The developers selected a bid for minimum amount of financial assistance within an overall ceiling of Rs 10.50 million per MW with revised capital investment \$45 million as well as subsidies of \$2 million and land at a nominal rent. The MD also said that huge protests were frequently registered by the communities which were also supported by the courts due to emission of toxic

pollutants (Dioxin and Furon) from the plant. The MD synthesized the key lesson of Indian experience of WtE as under:

- Hefty subsidies were taken from municipal and state governments.
- MOU signed during 2005 and plant was started in 2010 indicating a long-term gestation period.
- Several revisions were made in the technical feasibility.
- Adverse environmental impacts led to socio-economic problems.

The MD further proposed that some key policy decisions were required to be undertaken which would create an enabling framework for the private sector to establish a WtE plant in Lahore.

- The federal government (NEPRA) should immediately announce a good upfront tariff for waste-to-energy projects to attract investors.
- The CM must decide about the procurement model which could be either public sector only, on PPP basis or IPP mode.
- Federal or provincial government should decide about providing an investment subsidy to the private sector on the basis of their capital investment as was being practiced in India as well as in many other countries.
- The capacity of LWMC to implement a WtE project must be augmented and its legal mandate to conduct such business be prescribed.

The CM was not pleased with the candid discussion of the issue by the MD. However, he mentioned that the government will have to spend initially because private sector would be reluctant to invest in WtE project on account of the novelty of technology and associated risks. He further opined that composition of MSW in Delhi and Lahore must be similar and, if Indians could establish WtE plant, why could we not do it. He strongly stressed the need to work on a fast-track basis and directed the MD LWMC to quickly finalize the pre-feasibility report and present a doable action plan in the coming week. The MD was disappointed that despite his hard work the CM was not able to appreciate the importance of carrying out detailed feasibilities, demonstrating the economic viability of the project first and then deciding about having or not having a WtE plant in Lahore. It was quite obvious that the CM had already taken a decision in this regard and was not willing to listen to anything else. The senior bureaucratic leaders like Chief Secretary and Chairman P&D remained silent on the issue and did not support the MD LWMC in his dialogue with the CM. The MD clearly understood that 'isomorphic mimicry' of Indian model would lead towards grave financial and environmental risks.

The MD felt disenchanted and depressed after the meeting. The Chairman of BOD came to him and said, “You are supposed to only implement what the CM is telling you, do not confront him with complex technical issues because he has limited time to deliver during his tenure. Therefore, we have to devise a shortcut for him.”

While going back to his office after the meeting, the MD looked at his luxurious vehicle, thinking of his hefty salary, a posh house in the GOR (Government Officers’ Residential) Estate, and questioned himself with a vacillating mindset, “Am I choosing the best for myself and my family?” He felt compelled to have a recourse with Prometheus again. “Why do you keep coming back to me, I have chosen a path of eternal punishment by providing knowledge and power to the human beings which I believed was a public good, so am I going to urge you to do the same? A steadfast heart does not stray from the path. You need to be like a cliff against which the waves continually break, but it stands firm and tames the fury of water around it. It is your choice to ‘be’ or not to ‘be’.”

4. Waste-to-Energy Conference

Knowledge is Power

A US-based firm, Ecoair, was selected as consultant for LWMC through a transparent international bidding for carrying out pre-feasibility of a WtE facility in Lahore. Ecoair organized a wide consultative meeting on December 6, 2013, on converting waste into energy project in Lahore. A number of public and private sector stakeholders including university research centers from Punjab University and University of Engineering and Technology Lahore participated in the workshop. Franz Paul, the chief technology expert from Ecoair, briefed the participants on various technologies used globally in waste-to-energy projects. He advocated using a technology that matches the lower calorific value (LCV) and high moisture content of waste in Lahore. He said that “fluidized incineration” technology might be the most suitable one for energy generation from waste, keeping in view the characteristics of solid waste of Lahore. He further proposed to having waste-to-energy plants installed in the industrial zones in order to utilize the heat and electricity in an efficient manner. He said that such a plant of western standards could be installed at a cost of one to five million euros for obtaining electricity from solid waste. He added that from his experience, four years were required for a waste-to-energy plant to be fully functional, depending on various factors.

5. Pre-Feasibility Results

Nostrum

After examining all available data, it transpired that the average net calorific value (NCV) of the MSW to be processed at the Lahore WtE over extended periods of time

will be on average only 5.3 MJ/kg and that a reasonable range for operation will be between 4 and 7 MJ/kg. During times of very high moisture content (values of 70 % and above), it was necessary to either use a design allowing for co-combustion of coal or use of high-tech presses for some mechanical dewatering of MSW (with the subsequent need for treatment of the highly polluted liquid derived from pressing). Because of a rather low NCV, the Lahore MSW was considered suitable for fluidized bed combustion. This technology was tested and proven over many years in Europe for mechanically pre-treated MSW at the thermal power generation levels of about 90 MW for Bubbling Fluidized Bed (BFB) systems and about 160 MW for Circulating Fluid Bed (CFB). Because of the economies of scale, it was more cost-effective to have only one rather than two or three units. For the Lahore LHV of 5.3 MJ/kg, a 160 MW capacity CFB unit corresponded to a capacity of 109 tons per hour or 2,608 tons per 24-hour day. On the basis of the proven CFB technology, the nominal capacity of a first economically-favorable large Lahore CFB unit will be about 800,000 tons of MSW per year.

6. Devious Paths of Decision-Making

Resistance by Inaction

The signals emanating from the CM Secretariat were erratic, dubious, non-transparent and not consultative. Some foreign company or investor would directly contact the CM Office with their preferred mode of technology and methodology and the CM Office would schedule a meeting of the CM with the potential investor overnight. The MD and Chairman LWMC would be called to such meetings and were expected to make pleasing and welcoming comments on the proposal there and then in the presence of the CM. This would not give the MD LWMC proper time to thoroughly appraise the proposal before hand. Any probing questions asked during the meeting would be considered as “obstructive to the proposed investment”. Most of these companies would reach the CM Office with a strong lobbying contact person close to his family or political sources. The CM would like to ink some sort of MOU or assurance with these companies on the spot and then expected the MD LWMC to take the cue and go ahead and make it happen.

A case of similar nature happened when Germany’s international group ALBA met the CM on November 17, 2017. Even before signing an MOU, the CM announced through a press conference that a 100-megawatt power plant will be installed in Lahore and the German group will make most of the investment in this power plant. The CM said that through German technology, coal will be made from solid waste for generating energy. He said that after Lahore, the launching of this project in other cities will also be considered. This announcement clearly indicated that an understanding already existed between the CM and ALBA. However, later when the ALBA group made a visit to the LWMC headquarter, interacted with LWMC WtE team, and visited the already functional RDF facility made through a PPP arrangement between LWMC and DG Khan Cement with them they were bamboozled. They were expecting a huge subsidy

from the government to construct such a plant in Lahore while the LWMC not only had such a functional facility through PPP framework, but was also earning income through sale of waste to its private sector counterpart. ALBA never returned and the CM took the impression that the MD LWMC was causing obstructions to his preferred way of working. There was clearly a widening communication gap between the CM and the MD.

Speaking to his Chairman, who was also the advisor to the CM and one of his close political aides, the MD expressed his concerns. “Sir, I hope you would be able to explain to the CM the real reason why ALBA did not come back. I have inferred from the recent discussion with the CM that he considers it our fault for not showing them the right path.”

The chairman replied, “Don’t worry, I will explain the entire situation to the CM.” Later on, in hindsight, the MD felt that it would have been much better if he himself would have requested a one-on-one meeting with the CM. However, such meetings would always be seen with a lot of suspicion by service colleagues, seniors and other stakeholders who would interpret it as by-passing the official channels and becoming a personal loyalist of the CM. Frustration of the CM was increasing day by day because he had started believing that the MD was resisting his instructions by inaction. The MD started feeling the heat and erosion of the trust relationship.

7. In the Line of Duty

The Inevitable Hour Elegy

On June 10, 2014, the CM called a sudden meeting. The MD LWMC was directed to present the progress of WtE project at the home-office of the CM in Lahore. He was perplexed about the purpose of the meeting. He had been constantly contemplating about the recent happenings with different interested parties and investors, which came to see him showing interest towards investing in the WtE project.

The CM would randomly enquire about the progress of any such interaction with investors and the way forward on previously signed MoUs. One such international company was M/s Princeton Engineering USA which came to the MD LWMC’s office along with a provincial minister known for his close proximity with the CM. A prominent Pakistani expat from Chicago was accompanying them. The minister told the MD that this person was very important for the CM and the LWMC was supposed to provide all required support and help to this company for their proposal of WtE project. The company’s CEO, who was a Chinese-American, held detailed meetings with the LWMC team.

There were a number of technical deficiencies in his proposal. First, he had not carried out any pre-feasibility about waste characterization of Lahore MSW. Therefore, his choice of technology, i.e. “gasification”, seemed inappropriate. The documents he

presented to LWMC about the experience and credibility of his past projects were reviewed and cross-checked through various sources including the internet. It transpired that the company was having legal disputes with an American municipality and there were charges of forgery and fraud against it. Hence, the LWMC team was careful in granting them a letter of intent that included a clause in LOI which suggested “further processing of the WtE project implementation with the company will take place after meeting all the legal and codal formalities of procurement”. The clause was not acceptable to M/s Princeton which wanted a blanket approval clause incorporated in the LOI mentioning award of contract to the company. The intermediary minister also telephoned the MD and apprised him of the sensitivity of the matter because the eminent expat personality was complaining against the MD to the CM for non-cooperation.

When the MD reached the CM’s residence for the meeting, his apprehensions were found to be true when he saw M/s Princeton team present during the meeting. He whispered to the Chairman showing his concern that their presence in the meeting might lead to an unpleasant scenario. When the CM entered in the meeting room, the MD could feel vibes of indignation in his demeanor. The CM enquired from the M/S Princeton team about progress of the planned investment. The expat Pakistani, who was leading the delegation of M/s Princeton, told the CM in a complaining tone, “We have travelled twice from Chicago to Lahore to bring in investments here but the attitude of bureaucracy is creating obstructions and they are not willing to issue an unequivocal LOI to us.”

The CM looked furious. In an enraged tone, he said the MD, “You are neither doing this project yourself, nor are you letting anyone else do it. What is the problem with you?”

The MD looked towards the Chairman for support and expected him to reply because he was fully aware of the whole issue. But he preferred to remain silent. The MD explained the technical issues in the proposal of M/s Princeton to the CM and apprised him that the LOI the company was insisting could not be issued without following an open competitive bidding process. The CM got blue in the face with anger, got up from his chair, looked at the MD and said, “I was wrong to retain your services in the province of Punjab. You better go to Balochistan where the Federal Government wants you to be.” Before the MD could say anything further, the CM left the room, leaving the meeting inconclusive. The next day, the MD started packing his bags for Balochistan.

8. Reflection

The Show Must Go On

Was the MD following a correct and responsible course of action?

Perhaps one can never answer it in absolute terms because various meanings of the word ‘responsibility’ stand in inevitable tension with one another. However, some kind of theorization is needed to foster a reflective conversation about ‘what to do next’, and also, seen retrospectively, what was being done to be. The theory of countervailing responsibility propounded by Michael Harman is a great tool to elucidate multiple and even conflicting meaning of ‘administrative responsibility’. He puts across a three-dimensional lens to describe this phenomenon.

- a) Political responsibility: embodies the virtue of duty. The administrator has both a moral duty and a legal obligation to implement policies enacted by democratically elected representatives who give authoritative voice to the public will. Policy/administration dichotomy is the hallmark of this category of responsible action.
- b) Professional responsibility: embodies the virtue of integrity. The notion of professional as a neutrally competent technocrat has been challenged by a growing recognition of breakdown of policy/administration dichotomy. Administrative agencies are specialized repositories of knowledge, experience and commitments that are invaluable sources for the generation and advocacy of policy alternatives. This form of responsible action provides space for administrators to say ‘no’ to proposals of their political masters.
- c) Personal responsibility: reflects the qualities of self-awareness and authentic relationship. In the standard debate, responsibility is assumed to be an attribute of the decision and not of the actor who makes it. But the notion of personal responsibility defines it as a quality that inheres in the actor, rather than in decisions. Decisions are seen as manifestations of actions taken by responsible actors. Personal responsibility derives insight from an awareness of both the existence and the social and psychological limitations of one’s role as agent or cause of one’s action.

The theory of countervailing responsibility holds that any one of these three meanings is not only inadequate for a full understanding of responsible action, it also becomes pathological unless it is ‘countervailed’ by each of the other two meanings. The following table⁵ illustrates the countervailing meanings of administrative responsibility.

⁵ Michel M. Harman, “The Responsible Actor as “Tortured Soul” The case of Horatio Hornblower,” (Sage Journal, Scholr.google.com), 1989, p.7.

Meaning of Responsibility	Pathologies	Countervailing Meanings
<p>Political: Action that is accountable to or consistent with objectives or standards of conduct mandated by political or hierarchical authority</p>	<p>Opportunism: Sycophantic obedience (or passivity) motivated by personal gain or political expedience</p> <p>Reification of Authority: obedience resulting from apprehension of authority as a compelling force that determines behavior, such that personal responsibility is disclaimed or lost to conscious awareness</p>	<p>Professional</p> <p>Personal</p>
<p>Professional: Action that is informed by professional expertise, standards of ethical conduct, and by experience rooted in agency history and traditions</p>	<p>Goal displacement: Covertly controlling the policy process and enhancing agency power through the assertion of professional expertise</p> <p>Impersonality: Dealing with people impersonality as cases, irrespective of unique needs or contexts</p>	<p>Political</p> <p>Personal</p>

responsibility provides some explanation to what happened and why it happened the way it did. However, there can be other interpretations to the unfolding of events. For the protagonist, it was an effort to carry out a difficult balancing act, one that he was intuitively bound to follow in his view of life. Rationality is bounded and limited by the tractability of the decision problem, cognitive limitations of mind, and the available time. So, as decision makers, we can act as “satisfiers” only rather than seeking an optimal solution.

10. Recommendations

- (i)** Robust planning processes including feasibility, appraisal, costing analyses, environmental impacts must be followed in all mega projects having long gestation periods.
- (ii)** All approval processes should be transparent and well publicized so that any violations based upon political expediency may be known to general public and civil society.
- (iii)** Bureaucratic mindsets need to be sensitized and trained to maintain a balance between official duties towards political bosses and society at large. The blurring of the distinction between a “government servant” and a “public servant” needs to be sharpened and well-articulated.
- (iv)** Rules and procedures should clearly enunciate the protection mechanisms available to public servants for showing any dissent to wrongful influence and directions.
- (v)** Civil servants must be trained to deal with ethical dilemmas leading to personal sacrifices of creature comforts in the line of duty. Inculcating critical historical awareness adhering to the principles of integrity may provide a moral compass to navigate through such dilemmas.

Annexure I

Sr#	Criteria	Windrow Composting	Direct Incineration	RDF Incineration	Bio-Methanation	Mechanical Biological Treatment	Landfilling
1	Scale of application in tpd (tons per day)	Minimum waste tonnage should be 25 tpd and above. For Lahore the waste tonnage is 5000+ tpd and thus suitable option.	500 tpd and above (smaller plants are not technically viable, given the cost of required environmental control equipment and boiler technology. For Lahore the waste tonnage is 5000+ tpd and thus direct incineration is feasible.	500 tpd and above (smaller plants are not technically viable, given the cost of required environmental control equipment and boiler technology. For Lahore, due to high waste availability (5000+ tpd) direct incineration is feasible.	Centralised up to 500 tpd plant as well as decentralized plants are operational in the region. Therefore scale of application may vary from 1-500 tpd. Not Suitable for Lahore as the waste goes beyond the limits. This can be possible if multiple biomethanation plants are installed in series to make them more viable.	Centralised up to 500 tpd plant as well as decentralized plants are operational in the region and globally. Therefore scale of application may vary from 1-500 tpd. Suitable for Lahore.	Applicable for small to large scales; there is no minimum waste tonnage required.
	Applicable with population size	Suitable for cities with population more than 0.1 million while Lahore is city with population more than 12.6 million.	Suitable for cities with population more than 1 million while Lahore is city with population of 12.6 million.	Suitable for cities with population more than 1 million while Lahore is city with population of 12.6 million.	Suitable for cities with population more than 0.5 million while Lahore is city with population greater than 12.6 million.	Suitable for cities with population more than 0.5 million while Lahore is city with population less than 12.6 million.	Suitable for city of any size.

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2	Waste suitability/acceptability	Food waste (including wastes from households, restaurants and markets), fats/oils/grease, paper and cardboard, landscaping and garden waste (e.g. hedge-clippings, leaves)	High moisture and organic content make it unsuitable. Requires waste with calorific value > 3,000 BTU/lb. Calorific value of the waste is higher than 6,000 BTU but due to high moisture content, it would be unsuitable without pre-drying of the waste.	High moisture content makes it unsuitable calorific value requirement is 3,000-6,000 BTU/lb for RDF with moisture less than 20% which is difficult to achieve without pre-processing/pre-drying of the waste and that would add additional costs.	Food waste (including household, restaurants and market wastes), fats/oils/grease, slaughter-house waste. Lahore's waste contains high organic content (approx. 54%), moisture content (72.49%) – suitable.	Most suitable technology to handle heterogeneous waste with no initial requirement of segregation at source.	Municipal solid waste, construction and demolition waste, wastewater sludge, non-hazardous industrial wastes.
	Organic waste composition threshold or moisture content	Higher fraction of organic content is required. Lahore's waste contains high organic content (approx. 54%) and Moisture content (72.49%) – suitable.	<50% moisture content. Moisture content in Lahore's Waste is (72.49%) which makes it unsuitable for incineration	<12% moisture content. Moisture content RDF from DG Khan cement plant is above (20%) which makes it unsuitable for incineration or direct combustion	>50% of the MSW. Lahore's waste contains high organic content (approx. 54%) and moisture content (72.49%) – suitable.	Low as possible to make the sorting process easier.	Low as possible to keep the leachate production lower. However, with leachate collection system in place moisture content does not impact the process of land-filling and its operation
	Waste to avoid	Non-biodegradable wastes (plastic, glass, metal, inerts) Mixed waste in Lahore.	Yard leaves or source separated food waste.	C&D waste and sludge from the desilting of the drains.	Non-biodegradable wastes (plastic, glass, metal, inerts), tree clippings	Medical infectious waste.	Medical infectious waste.
3	Suitability of technology for mixed waste	High – Feedstock should be free from	High – Feedstock should be free from	High – Feedstock should be free from	Unsuitable for mixed waste	Most suitable technology to	Ultimate treatment for the

	and segregated waste	non-biodegradable and debris and low on moisture.	inert and debris and low on moisture Content. In Lahore, due to mixed waste/sludge collection and higher moisture content, it's unsuitable.	inert and debris and low on moisture Content. In Lahore, due to mixed waste/sludge collection and higher.	Pre-sorting/segregation is required for Lahore.	handle heterogeneous waste with no initial requirement of segregation at source.	mixed waste.
	Pre-processing	High Required for mixed waste	Low Required for mixed waste	High Required for mixed waste	High Required for mixed waste	Not required	Not required
4	Volume reduction %	50-70%	80-85%	80-85%	50%	80-85%	Nil
5	Land requirements	High (For 500 tpd of MSW 6 ha of land is required)	Low land requirements 16-40 sq.m per ton of the waste ⁶	Low land requirements 16-40 sq.m per ton of the waste ⁷	Low to Moderate For small units: 500 sq. m for 5 MT unit For large scale: 300 tpd of MSW: 2 ha of land is required)	High (For 500 tpd of MSW: 6-8 ha of land is required)	Generally large
6	Labor requirements	Labor intensive and requires considerable technical capacity	Not labor intensive but requires considerable technical capacity	Not labor intensive but requires considerable technical capacity	Labor intensive (based on current practice)	Labor intensive (based on current practice)	Not labor intensive but requires considerable technical capacity
7	Energy requirements	Moderate	High	High	Moderate	High	Low
	Reject	30-50%	Up to 15%	Up to 15%	Up to 50%	Up to 15%	100%
8	Reliability – proven internationally for large scale	Proven technology	Internationally proven. Developed countries moving away from mass burn technology to cleaner	Proven technology	Internationally proven and many plants under operation	Highly sensitive process and plant performance is impacted by slight contamination	Proven technology

⁶ Incineration of Municipal Solid Waste February 2013, DEFRA UK.

⁷ Incineration of Municipal Solid Waste February 2013, DEFRA UK.

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			technologies				
9	Operational complexity	Least technically complex	Technically complex, requires highly skilled training and careful maintenance	Technically complex, requires highly skilled training and careful maintenance	Technically complex, requires highly skilled training and careful maintenance	Technically complex, requires highly skilled training and careful maintenance	Requires specialized training, careful maintenance, and post-closure care
10	State-of-the-art and clean technology	High percentage of rejects i.e. 30-50% requires more space for disposal of the reject and have higher emissions	High emission from waste incineration (SOx, NOx, heavy metals, Dioxins, Furans). Emission control system has high capital and operating cost	High emission from waste incineration (SOx, NOx, heavy metals, Dioxins, Furans). Emission control system has high capital and operating cost	No harmful emissions	No harmful emissions	Methane emissions
	Leachate pollution	High	Low	Low	High to slurry production. However, with the composting process can be managed easily at site.	High	High
	Carbon footprint	Low	Least	Moderate	Low	Low	High
11	Predominant skills for operation and management	Skilled and semi-skilled labour	Highly skilled labor required	Highly skilled labor required	Skilled and semi-skilled labor	Skilled and semi-skilled labor	Skilled and semi-skilled labor
12	Compliance with the regulatory requirement	Low environmental pollution	High environmental pollution if not the air purification system is substandard and temperature is maintained below 850c	High environmental pollution if not the air purification system is substandard and temperature is maintained below 850c	Low environmental pollution	Low environmental pollution	High environmental pollution

	Social acceptability	Odour issues in case of improper aeration. Public acceptance higher than waste to energy technologies	Negative public perception and low acceptability	Negative public perception and low acceptability	High public acceptance	High public acceptance	Negative public perception and low acceptability
	Market sounding	Market for products and by-products. In Pakistan compost market is very low	Readily available market for energy form waste	Readily available market for energy form waste	High demand for energy and Bio-CNG	High demand for recyclables while low to moderate demand for RDF and compost	None
	Flexible/modular and capable to adjust for lock-in effect	Highly flexible and capable to adjust according to the quantum and composition of the waste as well the possible future intervention for source separation.	Not flexible and prone to lock in effect	Not flexible and prone to lock in effect	flexible and capable to adjust according to the quantum and composition of the waste as well the possible future intervention for source separation.	flexible and capable to adjust according to the quantum and composition of the waste as well the possible future intervention for source separation.	None

