

Case Study 1: Alandur Sewerage Project

1.1 Project Description

The Alandur Sewerage Project (ASP) was initiated in the year 1996 by the Chairman of the Alandur Municipality (AM). AM, located adjacent to Chennai, forms a part of the Chennai Metropolitan Area. With a population of around 165,000, the municipality is a residential suburb of Chennai with predominantly residential and commercial activities. Approximately one-fourth of its population lives in slums.

Prior to 1996, the town did not have an underground sewerage system and all sewage was managed with individual septic tanks. The largely unregulated disposal of sewage in storm water drains was an environmental and health concern for the local residents and was frequently raised as a political issue. Around 98% of 19,800 households used either septic tanks or holding tanks collected periodically by tankers and disposed in the low-lying areas outside the municipal limits.

In 1996, AM announced an ambitious plan to construct an underground sewerage system and waste water treatment facility with the participation of the private sector, contribution from the public, and payment to be provided by the city. The proposal was 'transformational' as it involved a service never before made available by the municipality, with financial and management responsibilities being shared by the municipality, the residents, the private sector, and state government bodies.

The ASP was designed with the following objectives:

- To improve the standard of living of the residents of Alandur (on par with that of Chennai);
- To provide the most essential basic facility to all the residents of the town;
- To eradicate the mosquito menace;
- To avoid the recurring expenditure on septic tank cleaning; and
- To avoid ground water contamination.

The proposed sewerage system was to be designed for the estimated population of about 300,000 in 2027 and was planned to be completed within a five-year period from its inception date. The project components included:

- A sewerage network consisting of the main sewer line, branch sewer line and manholes;
- Construction of a sewage pumping station;
- A sewage treatment plant; and
- Low cost sanitation

In the initial phase the plant was to treat 12 million litres per day (mld) of sewage supplied to it by the municipality. The ultimate capacity was to be 24 mld.

To plan this complex and politically challenging project, the AM worked in partnership with the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL), the state asset management company and with USAID's Financial Institution Reform and Expansion (FIRE) Project.

1.2 PPP structure of the Project

The ASP was the first project in the municipal water sector to be taken through the Public Private Partnership route in India. The construction of the underground sewerage system in Alandur town, involving the laying of pipes, construction of pumping station, etc., was done on a BOQ (Bill of Quantities) basis, and the sewerage treatment plant (STP) on a BOT (Build, Operate and Transfer) basis. Besides the construction responsibility, the contractor was also required to undertake the operation and maintenance of the sewerage system for a period of five years from the date of completion of the construction, on a fixed fee basis. The collection of tariff and provision of new connections during the O&M phase was to be undertaken by the municipality directly.

Accordingly, the PPP structure of this complex project was governed by three contracting mechanisms awarded to one engineering, procurement, and construction (EPC) contractor selected through a competitive bidding process:

- A **Works Contract** for construction of the sewage network, using the World Bank's Contract for National Competitive Bidding (NCB-W2) as the template;
- An **Operations and Management Contract**, also using NCB-W2. The selected contractor would operate and maintain the underground sewerage system for a period of five years on a fixed fee basis.
- A **Lease Contract** (in the nature of a BOT Agreement) for the STP, using guidelines from the International Federation of Consulting Engineers (FIDIC). Through this Agreement, the contractor would finance, build and operate the STP for a period as proposed in the contractor's successful bid. The contractor would be required to recover the investment on the STP on the basis of a per unit rate payment from the municipality for treatment of sewage delivered. The municipality agreed to provide a minimum payment level per annum regardless of the volume of sewage actually delivered. It was designed to cover the company's minimum fixed operating cost and capital investment. Accordingly, the PPP structure was technically in the nature of BOT-Annuity.

Following the bid process, the project was awarded to IVRCL Infrastructures and Projects Ltd in technical collaboration with Va Tech Wabag Technologies Ltd. A Special Project vehicle (SPV) called 'First Sewerage Treatment Plant Pvt Ltd' (First STP) was incorporated and was the concessionaire company with whom the BOT Agreement was signed. Once the project achieved financial closure, First STP Pvt. Ltd signed contracts with IVRCL and Va Tech Wabag. IVRCL was to carry out the civil works for the project. Va Tech Wabag, through the electro mechanical contract, was to design the process, supply, install and commission the equipment. It was also to carry out a contract for operating and maintaining the facility for 14 years. The land on which the plant was set up was leased by the municipality to First STP.

1.3 Current Status

As per the Agreement the date of completion was 31st March 2003. By end 2001, the laying of the sewer pipes and main sewers was completed, as also the construction of the Pumping Station, Pumping Mains and the Sewerage Treatment Plant. The overall date of completion was October 2003. Of the 23,000 households who paid for the services, 8,350 households were connected in the first phase, i.e. by 2005. Nearly 500 slum households out of 7,000 had sewerage connections, and 43% of slum dwellers had opted for and paid for individual sewerage connections. By 2010, of the 30,600 households who paid for the services, 29,300 households were connected; 14 community toilets were constructed to serve poor clusters.

The management contract for the operations and management of the sewerage system expired in 2005, after the stipulated contract period of 5 years. Following this the operations and management function has reverted to the municipality. The AM is currently in the process of sourcing an O&M manager for the operations of the sewerage system.

The STP Agreement will terminate in the year 2019.

1.4 Financing Information

Initially, the cost of the project was estimated to be ` 45.31 crore, which was later revised to `40.86 crore. To finance the municipality's portion of the capital cost, a package of loans and grants was structured as shown in the table 1. All loans were from domestic sources and denominated in Indian

rupees. A unique aspect of the project funding was the initiative of bringing in people's money to fund public infrastructure by generating public awareness and interest right from inception

Financing Information

Grant from TNUIFSL	3.00
Loan from TNUIFSL	6.00
Loan from TUFIDCO	16.00
Grant from TUFIDCO	1.00
Deposits from public	12.40
Interest from deposits	2.46
Total	40.86

Source: Alandur Municipality

Loans

The majority of financing to the municipality (59%) was made through loans provided by the Tamil Nadu Urban Infrastructure Development Corporation (TUFIDCO) and TNUIFSL. The loan provided by TUFIDCO was payable over eight years (after a two-year moratorium) at an interest rate of 5% per annum (as against prevailing market rates of 15% at that time). TNUIFSL's loan was set at a rate of 16% per annum payable over a period of 15 years with a five year moratorium.

The term loan conditions resulted in the municipality assuming significant financial risks. One condition of the TNUIFSL's loan was that the disbursements would be provided for three years, after which they would be subject to the condition that the municipality meets its connection targets. Should targets not be achieved, further disbursements would be terminated. Interestingly, no funds were required to be disbursed under the TNUIFSL loan as the revenues generated from the one-time connection fee exceeded the amount anticipated when the finance package was structured.

Both the term lenders stipulated an escrow account, to the extent of the debt finance, where all the revenue receipts of the municipality (including property tax, stamp duty, and the grant from GoTN) as well as the sewer tariff was to be deposited in favour of TNUIFSL and TUFIDCO. The municipality also accepted limits imposed on future indebtedness.

Grants

As no funds were available either with the municipality or with TNUIFSL to oversee and monitor the progress of the project, TUFIDCO provided a special grant from the Tamil Nadu urban development grant fund for this purpose, which worked out to nearly three per cent of the total project cost.

GoTN agreed in principle to bridge the gap in the sewer account during the life of the project, after providing for operations and maintenance (O&M) expenses, debt servicing and contribution to the sinking fund. In addition to the above, GoTN also agreed to fund the monthly operating costs of the system above the ` 150 per household sewer charge to a maximum of ` 30 per connection per month.

Public Contribution

On the basis of a financial analysis of the project, the AM decided to collect one-time deposits in the form of connection charges from the citizens of Alandur. The connection charges for different categories of users were fixed as follows:

Connection Charges

Domestic	5000 per house connection
Commercial	10000 per connection
Industrial	10000 per connection

The municipality targeted to provide about 22,000 connections both for domestic and non-domestic categories of users by the end of 2004-2005. This would yield an estimated income of nearly ` 13 crore, which it proposed to put into a revolving fund for repayment of loans to the lenders.

As the above connection charges on sewer were considered to be very high especially for domestic consumers, the GoTN, in consultation with TNUFSL, suggested to the authorities of the AM to collect the connection deposits in two instalments. The local branch of the Punjab National Bank also offered financial support to the citizens of Alandur by creating a scheme for lending the connection deposit amount to them. However as the rate of interest on the scheme was quite high (14.1 %), it was reported that no one had availed this facility.

In addition to the above, it was also decided by the municipality to collect the sewer maintenance charges at the rate of ` 150 per month per connection from the domestic users, ` 450 per month per connection from commercial users and ` 750 per month from industrial users. The domestic monthly charges were proposed to be increased to 6% annually till they reached a level of ` 180 per month. Similarly, the commercial and industrial maintenance charges were proposed to be increased by 6% annually up to the level of ` 540 and ` 900 respectively. These limits were later reduced on the basis of a willingness to pay (WTP) survey, and discussions with the citizens and officials concerned.

1.5 Process Analysis

Inception: In 1996, the Chairman of the Alandur Municipality initiated the proposal of implementing an underground sewerage system in the Municipality of Alandur. This was because the present sewerage system and sanitation facilities presented major health threats to the citizens and created serious underground contamination.

Soon after, in 1997, the Government of Tamil Nadu decided to provide a sewerage system in 12 selected major urban centres, including Alandur, under the aegis of the World Bank, which was the leading financial institution facilitating state level reforms in urban infrastructure financing in Tamil Nadu.

PPP Project Preparation:

- As the first step, TNUFSL, the state asset management company formed with the objective for improving the urban infrastructure levels in the state, was nominated as the agency to coordinate the investigation and detailed studies, and to structure the project. TNUFSL procured and managed a private engineering contractor to prepare the detailed technical design and prepare engineering reports for the Alandur project. The scope of work included project design, identification of the locations of pumping stations and the treatment plant, and cost estimates.
- While conducting the feasibility study on the project, a 'Willingness to Pay' (WTP) survey was also conducted by the consultants in order to assess the scheme's acceptability by the citizens of Alandur town, and their willingness to pay for the service. The WTP survey covered more than 10 per cent of the population of the AM, spread over to 42 wards. It indicated that the average household income of the majority of the people was in the range of ` 1000-5000 per month. According to the survey, although the public strongly supported the project and accepted that users should pay for sewage services, this willingness had its limits. About 29% of the respondents were willing to pay a one-time connection fee lower than ` 500 per household and 21% were open to paying a one-time connection fee more than ` 2000 per household. Further, about 86% of the respondents were willing to pay monthly sewer charges in the range of ` 21 to ` 50 per month, comparable to the existing water charges structure.
- GoTN accorded administrative sanctions to the project on 9 December 1998 and technical

sanction on 27 January 1999.

As part of the project preparation, land for the project was identified and proposed to be acquired through the Alandur Municipality.

Public Participation: The ASP project is a unique case of public participation in financing of a municipal infrastructure project. The collection of sewer charges and convincing the community to pay for it was a difficult and challenging task. Since there had been no precedence of private participation in municipal water and sanitation services in the state, or a BOT Agreement awarded anywhere in India, public outreach was critical to overcome initial resistance as well as public concerns about the need to pay for the new sewage services.

To gain acceptance and build consensus among the public, the municipality mounted a vigorous public outreach/public participation campaign with extensive media coverage to explain the projects benefits, costs, and tariff system. The municipality adopted the following procedures:

- A detailed discussion was held among the officers and staff along with the Chairman about
- the sewerage project.
- All the holidays including Saturdays and Sundays were used for discussion with the residents' welfare associations. During the discussions, the scheme was explained in detail: its advantages on the city environment and quality of life of the residents of Alandur.
- Residents were motivated through corner meetings and advertisements on the public transport system such as auto rickshaw, buses; cable network; local newspapers; distribution of pamphlets, etc. In addition, all the staff including sanitary workers earnestly carried out door-to-door canvassing of the benefits of the underground sewerage scheme.
- Although, initially a sizeable population of the town was not ready to pay the high deposits on account of sewerage connection charges and monthly tariff (as indicated through the survey), later through active canvassing and educating the people on the benefits of the project they agreed to pay the sewer charges as per the municipal tariff structure.
- By the end of May 2000, more than 13,000 connection seekers (domestic and non-domestic) had deposited the one time connection fee to the municipality. In order to assess the commitment of the citizens of Alandur to the proposed sewerage scheme, the lending institutions, including TNUDF and TNUIFSL, had stipulated that the municipality should collect deposits from at least 10,000 residents before the award of work to the selected contractor. This would not only confirm effective public participation in the project but would also provide positive signals to the lending institutions on the sustainability of the project as also recovery of their investments. Accordingly, the municipality started collecting one-time deposits from the residents, and completed the target before awarding the contract for the project to the selected contractor.
- In order to facilitate the collection procedure, the municipality opened collection centres at different locations keeping in view the convenience of the residents. Arrangements were made for collection of deposits even on the receipt of phone messages and at the designated bank.
- With a view to inform the public on the progress of the project at various stages, as also to seek their opinion on different issues concerning the successful implementation of the

project, the authorities of the AM called for the meeting of representatives of welfare associations on a monthly basis. This procedure created a system of effective participation of the community in the project implementation process.

Procurement:

The project was structured such that an engineering, procurement and construction contractor, selected through competitive bidding process, would design and implement the sewerage system, on turnkey works contract, and would also finance, design, build, and operate the STP on BOT (Annuity) basis.

The procurement of private contractor for the execution of the project was carried out as per the standards prescribed by the World Bank. A two stage bid process was adopted - a technical proposal followed by a financial proposal.

The technical capabilities of the contractors and their experience in similar works were given importance. Of the 13 entities who submitted the bids, three were short-listed, and the financial proposals were received from such technically qualified firms. As per the financial evaluation criteria, the bidder quoting the lowest cost for the sewerage system and lowest lease period for the STP was selected as the final, successful contractor.

Based on the evaluation of the proposals and on the recommendations of TNUIFSL, the project was awarded to the IVRCL Infrastructures & Projects Limited, in joint venture with Va Tech Wabag Technologies Limited in February 2000, and the site was handed over to them subsequently.

The contract document signed on 2 March 2000 was in three parts and included (i) a construction contract, (ii) and operation and maintenance contract; and (iii) a Lease Contract for the sewage treatment plant.

Implementation:

As per the Agreement, the expected date of completion was 31st March, 2005. In order to ensure timely implementation of the project and adherence to quality specifications, Consulting Engineering Services Limited (CESL) was appointed as Project Management Consultants for the detailed supervision and quality control. Along with the consultants, the Chairman, Commissioner and Engineer of the AM reviewed the progress of the project on a weekly basis. The Commissioner of Municipal Administration, GoTN, the Secretary of the Municipal Administration & Water Supply and the Chief Executive of TNUIFSL also reviewed the progress of the project every month, and provided administrative support for acquiring the necessary clearances from agencies such as the railways, highway authority, PWD, etc.

Delivery:

The project work was carried out in two phases. In the first phase (the first two and a half years), 50% of the branch sewers, main sewers, pump house including installation of machinery, pumping main and one 12 MLD capacity sewage treatment plant, were completed and commissioned. The remaining work relating to the project was to be carried out in the next phase.

By end 2001, the laying of the sewer pipes and main sewers was completed, as also the construction of the Pumping Station, Pumping Mains and Sewerage Treatment Plant. The overall date of completion was October 2003.

With respect to funding, by March 2001, approximately ` 9.16 crores was received from TUFIDCO in the form of grants and a loan and more than ` 6.84 crores was generated as a one-time sewer connection charge from about 13,434 households.

Exit:

The management contract for the operations and management of the sewerage system expired in 2005, after the stipulated contract period of 5 years. Following this the operations and management

function has reverted to the municipality. It is understood that the AM is currently in the process of sourcing an O&M manager for the operations of the sewerage system.

The STP Agreement will terminate in the year 2019 at the end of the stipulated lease period of 14 years at which time the STP will be transferred to the AM free of cost. The defect liability period, however, will extend for one year beyond the expiry of the STP lease period.

It is understood that the STP Agreement has worked well with no penalties being imposed during the contract and no significant lapses in obligations, till date. There has been only one issue that arose at the beginning of the Agreement and is currently in the process of being resolved, through arbitration. The issue concerned the date of commencement of the Sewerage System and payment due for the first six months from AM to the Private Developer. The reason for this was the obtaining of the approval from the Pollution Control Board (PCB) - apparently the period for which operations were performed and payment claimed from the AM did not have the PCB approval in place. It is understood that AM has been cooperative in this matter and has no objection to making the payment – however, approval from the government for making the payment is under process.

Risk Allocation Framework

Risk Type	Sensitivity	Risk Period	Primary Risk Bearer	Comments
Land acquisition	High	-	Government	AM took the responsibility for directly acquiring the land for the construction of the STP
Delay in obtaining permits	High	0-3 months	AM, Private developer	The AM took responsibility under the contract for key approvals, including road cutting, shifting of services and environmental clearances. The developer was responsible only for the works related approvals.
Design risks	High		Private developer	Design for Sewerage System as well as the STP was developed by the AM as part of the feasibility study. The same was provided to the developer as part of the RPF document.
Construction risk	High	0-2 years	Private developer	The Construction Contract for the under ground Sewerage System specified strict construction milestones linked to the payment along with a one year defect liability period to address any construction related risk. Liquidated damages were prescribed in the contract for every day of delay limited to 10% of contract price. In respect of STP, the construction risk was borne by the Developer as the investment was made by him. The STP was constructed in two phases under tight deadlines. The defect liability period for the STP was one year beyond the lease period of 14 years.
Construction Cost Over runs	High	0-2 years	Private Developer	The construction of the Sewerage System was based on detailed bill of quantities with rigorous clauses related to cost over-runs. In respect of the STP, though the developer bore the construction cost, the design and cost was based on detailed costing pre-determined at the bid stage. Since the construction cost was also the basis of the annuity payment determined in the bid, it was carefully controlled. Since the construction did not experience any time over-runs, cost over-runs were also controlled. The project was implemented as per the original cost estimation.
Change in Scope Risk				As the design and costing had been drawn up at the bidding stage itself, this risk was largely controlled. And did not arise on the ground
Payment Risk (Capital Cost for		3 years	Government	The key risk in respect of payment of capital cost for the sewerage system was the component of

Sewerage System)				the cost that had to be met through public contribution. While the AM assumed significant risk in this regard, the risk was addressed effectively through extensive public consultation and interactions. In fact that the collection exceeded initial plans and the AM did not have to draw upon the debt as planned from TNUIFSL
Payment Risk (STP Annuity Payment)		Through the Lease Period for the STP	Government	The question of periodic payment arose only in respect of the Annuity Payment for the STP for which the AM was contractually bound over the period of lease. Here the AM assumed significant risk. However, based on the 'willingness to pay' survey, the Government had agreed to extend subsidy support to meet operational cost to the extent of `30 per person per month. On the ground, the AM has been able to collect the monthly sewer fees effectively and has not faced any issues in this regard.
Payment risk (Debt Repayment)			Lenders	Lender's risk was addressed through an escrow arrangement opened in favour of the term lenders where all the revenue receipts of the AM (including property tax, stamp duty, and the grant from GoTN) as well as sewer fee was deposited. The AM had also accepted limits on future indebtedness. In addition, a State Government guarantee also backed the borrowing of the AM
Technology risk			Government	There are no clear references to this in the agreement. However, the design was prepared at the bidding stage and thereafter accepted by the Bidder during submission of proposal. Also since the project was implemented without significant delays, the question of technology up-gradation due to passage of time did not arise.
Operation risk	High		Private Developer	The performance parameter mainly referred to the treatment of sewage as fed into the STP during the lease period. The Agreement prescribed a fine if the treated effluents failed to meet the required standards at the rate of Rs. 10,000 per day of default.
Financial risk	High	0-4 years	Government and Private Developer	The AM bore the financial risk in respect of the Sewerage System while the Private developer bore the risk for the STP. While the AM's capital investment plan was carefully planned even before the bidding process, the key risk arose from the portion of the capital cost that was to come from public contribution towards connection charges. In respect of the STP, the Private Developer was able to raise the capital funds effectively as repayment was protected by the annuity payments as assured by the AM, including acceptance of 'take or pay' charges for the minimum assured sewage to be fed into the STP.
Force Majeure			Government and Private Developer	Both the Construction Contract and the Lease Contract had suitable provisions for Force Majeure protecting the ensuing risks for both the AM and the private developer.

1.6 Post facto VfM Analysis

The ASP was not a commercial project but an initiative at the municipal government level to improve the life style of its residents. Taking this into account, a qualitative VfM assessment has been undertaken here with the purpose of highlighting the benefits drawn by way of private sector participation in the implementation and continued operation of the project.

Suitability for PPP

One of the parameters used for the VfM assessment is the suitability of the project to be undertaken on a PPP basis. The greatest challenge (as well as accomplishment) of the ASP, was that both the municipality and the public recognized and accepted the ‘value’ of bringing in private participation. Indeed, this project truly demonstrates the benefits of bringing in PPP in the municipal sector in terms of drawing private sector expertise while addressing important risk related aspect that would make the project attractive for the private sector.

The bid criteria for the project ensured that the municipality obtained the best offer in terms of the ‘lowest Evaluated Construction Price’ and the ‘lowest Lease Period’ both of which were the selection criteria with a weightage of 90:10. As the municipality had already undertaken a feasibility study and also prepared the detailed design and costing for the project, the private sector was able to bid for the project with considerable background information. The ensuing offer, therefore, provided value for money.

The PPP structure evolved also facilitated an effective implementation of the project. The ASP was one of the few projects with a complex PPP structure wherein the works contract of the sewerage system and the BOT contract of the STP was jointly bid for and awarded to the same developer. The bidding parameter was also combined and addressed the best commercial aspect of both projects. Thus the bidder offering the lowest cost for the sewerage system and lowest lease period for the STP was selected. By combining both the projects under an effective structure the municipality ensured a competitive bid that gave value for money.

Impact of PPP

A brief on the difference made by the ASP, as captured at Table 4, illustrates that the ‘value for money’ brought in by the project far exceeded any monetary consideration:

Sr. No	Parameter	Situation Before PPP Intervention	Situation After PPP Intervention
1	Urban service	No sewerage system for a population of 165,000	120 km of underground sewerage system, pumping stations and an STP of 24 MLD
2	Urban service	Water borne sanitation facilities, septic/ holding tanks for disposal of night soil	Underground sewerage system with direct connection to each household
3	Urban service	Unregulated disposal of sewerage in storm water drainage and low lying areas	Modern sewerage treatment plant designed to international standards
4	Environment and health	Open storm water drains stagnating in outer areas of town – environmental and health hazard	Underground sewerage system has eliminated risk of mosquitoes and related diseases for the citizens of Alandur and surrounding areas.
5	Environment and Health	Contamination of underground water sources due to open drains	Almost 100% eradication of ground water contamination through underground sewerage system and waste water treatment plant.
6	Public participation		~ 12 crores out of the capital cost was through public contribution
7	Public participation		Collection of sewerage fee from the public (on a graded structure amounting to a weighted average of ~ 75 per connection) amounts to ~ 2 crores per month and covers both debt repayment and O&M costs of the AM

1.7 Key Learning and Observations

- **Beneficiary participatory approach:** People’s participation in the project, including the fact that almost 29% of the project cost was garnered from public contributions, was the most outstanding aspect and learning from the ASP. The project established that mobilising people’s participation for infrastructure projects is possible through collective

efforts and transparent procedures.

The success of the project from the outset depended highly on effective collection of connection charges and monthly sewer fees as also public acceptance of engaging a private BOT participant. Community awareness, support and on-going cooperation was, therefore, critical. The aggressive public outreach campaign conducted by the municipality and GoTN and the engagement of stakeholders was essential to assure the lending agencies and city officials that repayment provisions would be met.

▪ **Stakeholder involvement and interdepartmental coordination:** Continued involvement of stakeholders throughout the project ensured timely completion of the project and addressing of issues even as they arise.

To maintain support for the project, a citizen's committee was formed and it met frequently to review the status of the project, monitor performance of the BOT contractor and provide a forum in which citizens could air their concerns.

The ASP established that close involvement of all stakeholders/departments at the key decision-making stages of the project, as also for review and monitoring, is critical to ensuring that the project stays on-track.

▪ **Political will and strong decision making, especially at the grass-root level:** The ASP demonstrated that 'political will and quick decisions make projects happen'. The political leadership and strong advocacy for the project provided by the chairman and council of the municipality proved to be critical element of the success. While strong support for the sewerage system within Alandur existed, political will was essential to convince the customers and citizens to pay a significant share of the cost and accept the entry of the private sector. Throughout the project decision making stages, the members of the municipality maintained full support for the project.

▪ **Acceptance of fiscal discipline:** The term lenders, TNUIFSL and TUFIDCO, placed strict lending conditions on the municipality, requiring the municipality to accept and implement strong fiscal discipline measures. TNUIFSL required the municipality to establish a separate sewer account distinct from the general budget of the municipality, forcing discipline and transparency on the officials managing the system. The municipality was also required to limit new debts to a certain percentage (typically 30%) of their revenue. GoTN, which provide loan guarantee, stipulated that any payment made to these entities on account of default by the municipality would be recovered from the annual transfer of payments from the municipality to the state government.

Similarly the contractual obligations between the municipality and the BOT operator forced the municipal government to ensure timely payment for management and waste water treatment services.

Thus, the loan as well as contractual obligations ensured strong fiscal discipline by the municipal body, by making it take difficult decisions on capital priorities, closely oversee the sewer system management, and ensure budgeting of sufficient funds to meet payment schedules

▪ **Implementing an effective fee system:** Despite the willingness to pay survey that indicated that public willingness was far below the tariff requirement to meet the capital and operational cost of the project, the municipal council, through its rigorous public outreach measures, managed to impose reasonable levels of connection charges and sewer fee on the public. The municipality also managed to collect the connection charges fairly well in time to pre-empt the need for the TNUIFSL loan.

A large part of the success of the municipality in this aspect sprung from the fact that they provided sympathetic measures that addressed the concern of the public. For example, the

connection deposits were collected in two instalments as per the convenience of the consumers; the local branch of the Punjab National Bank also offered financial support to the citizens of Alandur by creating a scheme for lending the connection deposit amount to them.

▪ **Assurances on payment to the Private Sector Participant:** The municipality agreed to provide the BOT operator a minimum level of income by accepting the 'take or pay' condition in the Agreement. Thus, the municipality assumed the risk of minimum payment to the operator while the private partner assumed all other responsibilities and risks of financing, constructing and operating the STP for a period of 14 years.

▪ **Access to finance for the municipality:** An important aspect of the success of the project stemmed from concession financing and subsidies from the Government and public-private entities, established specifically to meet the credit needs of the municipalities without access to private capital, due to a low or non-existent credit rating. Though almost 30% of the capital was generated by the municipality from connection fees, grants from GoTN and loans from TUFIDCO were crucial. The loan agreement from TNUIFSL, while proving to be unnecessary in the end, was imperative for participation in the finance package by all the parties.

▪ **Technical and financial assistance:** The expertise needed to plan and manage the technical and financial aspects of the project far exceeded the capacity of the municipality. Assistance from the other government bodies in the state, the Chennai Corporation, and sources, such as the USAID's FIRE project, was critical. TNUIFSL and FIRE played a substantial role in structuring the project, managing the feasibility studies, and preparing the bid and contract documents crucial to project success. The review and approval of the engineering reports by the management committee, consisting of senior officials of the AM, the Tamil Nadu Water supply and Sewerage Board, Chennai Metropolitan Water Supply and Sewerage Board, and TNUIFSL, were essential for successful project management.

▪ **Transparency in bidding and contracting procedures:** The transparent approach to the project, right from inception to selection of contractor/operator and implementation, was critical to providing the necessary assurance to the private sector bidders on the professional approach of the municipality. This included strict application of World Bank and FIDIC processes, oversight and approval of the process by the World Bank. Public participation in the deliberations of the management committee overseeing the tendering process execution was also important.

Case Study : Timarpur Okhla Integrated Municipal Solid Waste Management Project

1.1 Project Description

Delhi generates 7,000 metric tonnes (MT) of Municipal Solid Waste (MSW) daily, which is expected to increase to 18,000 MT by 2021. The present landfill sites that are being utilized for disposing the garbage are approaching their full capacity and even with the envisaged capacity addition, the situation is unlikely to improve.

The Municipal Corporation of Delhi (MCD) has thus embarked on a project to reduce the amount of MSW being disposed in the landfill sites and utilizing the waste for productive purposes such as generation of power from waste. MCD has identified two locations, namely Timarpur and Okhla, for implementing this project.

The following facilities are to be developed as a part of the integrated municipal waste handling project:

1. Plants for converting MSW to Refuse Derived Fuel (RDF), capable of processing 1300TPD at Okhla and 650 TPD at Timarpur.
2. A bio-methanation plant capable of handling of 100 TPD of green waste at Okhla.
3. A water recovery plant capable of handling up to 6 MLD of treated sewage at the Okhla site for recycling into process water and cooling water.
4. A Power plant with a generation capacity of 16 MW at Okhla.
5. Transportation of RDF from Timarpur to Okhla for combustion in the boiler of the power plant mentioned above.

The project is registered with the United Nations Framework Convention on Climate Change (UNFCCC) for the Clean Development Mechanism (CDM) to earn 2.6 million Certified Emission Reductions (CERs) over a ten-year period.

1.2 PPP structure of the Project

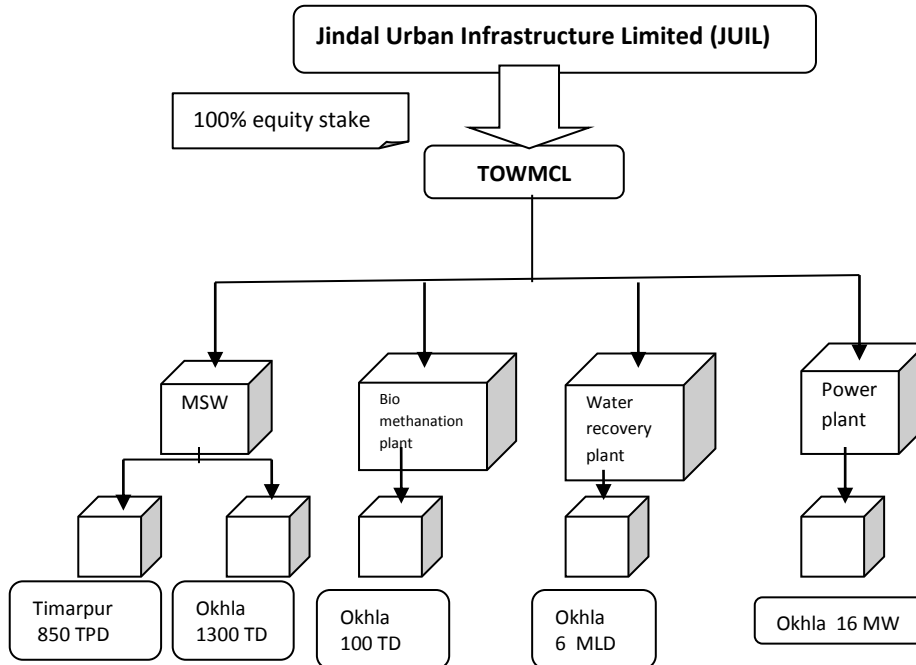
The project has been undertaken on Built, Own, Operate and Transfer (BOOT) basis. IL&FS Infrastructure Development Corporation Limited (IL&FS – IDC) was mandated to structure the project, evaluate various technologies, carry out project development activities and select suitable developer through competitive bidding. IL&FS IDC and the Andhra Pradesh Technology Development & Promotion Board established an SPV known as the Timarpur-Okhla Waste Management Company Private Limited (TOWMCL) prior to the bid itself.

The successful bidder M/s Jindal Urban Infrastructure Limited (JUIL) acquired 100% equity in the SPV - TOWMCL. The following were the agreements executed by the SPV for this project

1. The SPV signed the main concession agreement for the development, construction, operation and maintenance of an integrated municipal waste processing plant with NDMC.
2. The SPV signed a lease agreement with the Delhi Power Company Limited (DPCL) for the land at Timarpur. DPCL, the owner of the Timarpur site, is a holding company with shares in Indraprastha Power Generation Company Limited (the electricity generation company), Delhi Power Supply Company Limited (the electricity procurement, transmission and bulk supply company) and in the three power distribution companies (Central & East Delhi Electricity Distribution Co. Ltd., South and West Delhi Electricity Distribution Co. Ltd. And North and North West Delhi Electricity Distribution Co. Ltd.)
3. The SPV signed a lease agreement with New Delhi Municipal Council (NDMC) for the land at Okhla for 25 years. NDMC had taken this land on lease from the Delhi Development Authority.
4. The SPV entered into agreements with the MCD and NDMC for the supply of municipal waste.

5. It entered into an agreement with the Delhi Jal Board (DJB) for receiving sewage and disposing treated effluent.
6. The SPV entered into a Power Purchase Agreement with BSES Rajdhani Power Limited.

Project Structure



The figure 3 explains the structure.

Asset Ownership: As per the bid document the ownership of all the land would always remain with Delhi Power Company Limited and the Delhi Development Authority (DDA) as NDMC had taken the land on lease from DDA. The ownership of plant and machinery will be with financier of the project during the term of the loan. After the loan has been repaid, the ownership of the plant and machinery will be with the SPV.

Asset Transfer on Termination: On the expiration of stipulated concession period of 25 years, all the structures, all equipments, machinery, ancillaries, etc would be handed over to NDMC.

1.3 Current Status

M/s Jindal Urban Infrastructure limited (JUIL), was awarded the project in January 2008. JUIL was among the six bidders which had submitted their bids from 30 potential bidders. JUIL was awarded the contract on the basis of the lowest levelised power tariff of ` 2.83 per unit, which was the financial bid parameter as per the bidding documents.

The project is currently under development and is expected to commence operations with a delay of six months. Accordingly, the original start date of mid-2010 has now been postponed to the end of calendar 2010.

1.4 Financing Information

JUIL had estimated the project cost to be ` 200 crores, ` 25 crores more than the stated DPR cost of ` 175 crores. The increase in cost was principally due to the increase in the capacity of the power plant from 16 MW to 20 MW.

JUIL arranged finance through a mixture of equity and debt, with the debt being raised from financial

institutions. Axis bank was the lead consortium bank for lending towards the project.

Project Details

Particulars	Without CDM	With CDM
Project IRR	9.6 %	16.5 %
Average DSCR	1.08 %	1.96 %
Minimum DSCR	1.06 %	1.21 %
Debt Equity Ratio	70 : 30	70 : 30

Note: The financial indicators mentioned above have been taken from the application for carbon credits to the UNFCCC. The financial indicators with CDM Support were calculated considering the sale of energy at ` 4.75 per kwh. However the final selected bidder quoted a levelised tariff of ` 2.83 per kwh

1.5 Process Analysis

Inception:

India has been experiencing the difficulty of finding and assessing methods of disposing municipal solid waste (MSW) and sewerage in an efficient and non-polluting manner. The problem is more acute in the case of urban metropolitan areas, where rapid population growth has resulted in over utilization of the infrastructure.

In order to identify a solution to the MSW disposal problem in Delhi, NDMC and MCD desired to implement an Integrated Municipal Waste Processing Facility at Timarpur & Okhla in Delhi.

Feasibility:

MCD mandated IL&FS– IDC to identify a suitable waste management solution from various technologies, to structure the project, carry out project development activities and select a suitable developer through competitive bidding.

In order to meet the above objective of MCD and NDMC, IL&FS, in cooperation with Andhra Pradesh Technology Development & Promotion Board (APTDPB), decided to implement the technology developed by the Department of Science & Technology (DST). DST had developed a technology for segregating MSW at source, converting it into Refuse Derived Fuel (RDF) and using the RDF to generate fuel power. The technology has been successfully implemented at two locations in the state of Andhra Pradesh. APTDPB was given the mandate by DST to commercialize the said technology for MSW processing.

The project incorporated a unique concept which overcame the shortcomings of other technologies. The previous applied technologies did not succeed due to the mixed & un-segregated nature of Indian waste. The technology developed by DST involved integrating the solid waste with liquid waste under an integrated municipal waste-processing complex, resulting in cost optimization and a commercially viable project.

The salient features of the integration concept are:

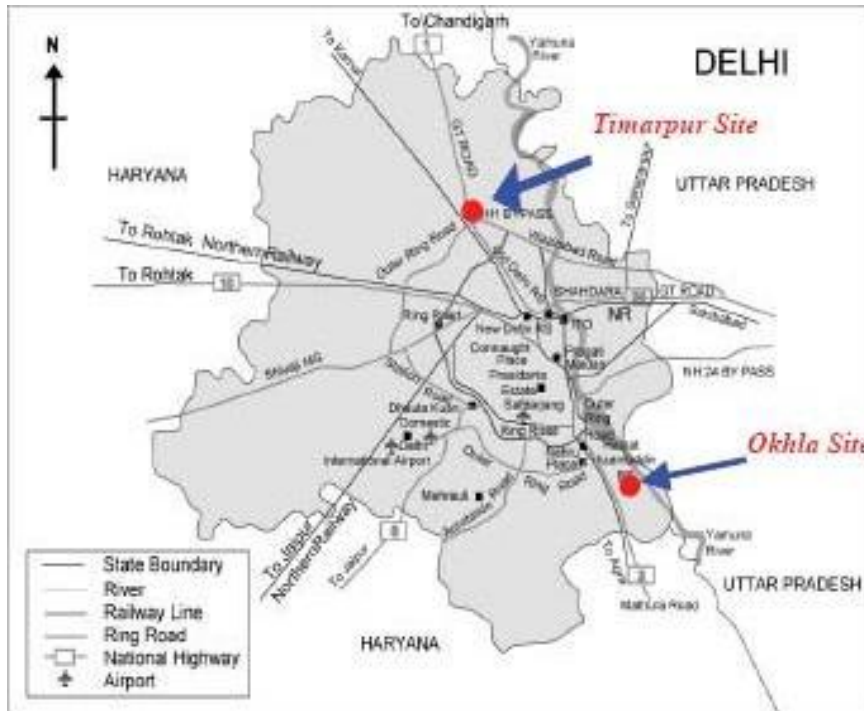
1. Solid and liquid waste can be treated in the same complex.
2. The treatment process is well integrated in terms of inputs and output.
3. The complex generates compost and methane from the Bio-methanation process, fuel from the RDF plant and power from the RDF fluff and methane.

The integration is desirable for the following reasons:

- The integration improves the viability of the project, as it leads to cost optimization.
- The integration is also environmentally desirable, as it uses wastewater. Secondly, it substantially reduces the need for land for landfill and produces very high quality compost.

- It produces green fuel and reduces methane emission – one of India’s commitments towards the Kyoto Protocol
- It is technically desirable to use the produced methane (from green waste) in a boiler of RDF. It reduces the cost of the bio-methanation process, because separate fuel engines are not required.

The Delhi Government identified two locations: one in Timarpur and the other in Okhla for implementing the waster to power concept.



In terms of the financial feasibility of the project, revenues from the sale of carbon credits under CDM have the potential to substantially improve the Internal Rate of Return (IRR) for the project. The project IRR without sale of carbon credits under CDM is expected to be 9.6%, whereas with sale of carbon credits the project IRR improves to 16.5%.

Procurement:

IL&FS undertook the bidding process for selecting a developer to develop the project on BOOT basis in August 2007. The project received interest from as many as 35 parties from all over the world including Europe, USA, and other parts of Asia. Finally the following 6 bids were received:

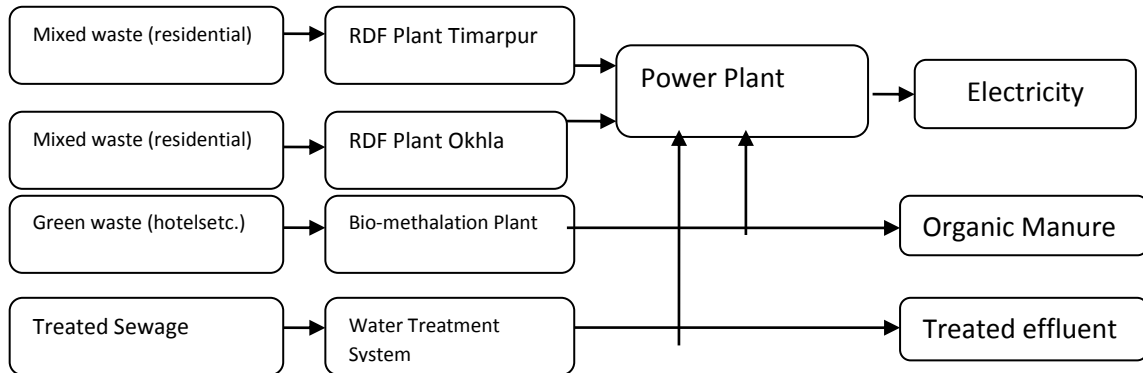
- M/s Acciona Services Urbanos SRL
- M/s Delhi International Airport Ltd. in consortium with M/s Selco International Limited
- M/s Jindal Urban Infrastructure Ltd.
- M/s Ramky Enviro Engineers Ltd.
- M/s SMV Agencies in consortium with M/s Jaipuria Advance Technologies Pvt Ltd. and
- M/s Veolia Environmental Services Asia Pvt. Ltd.

Out of the above six, four bidders qualified for opening of financial proposals. Based on the specified criteria of the lowest power tariff quoted, JUIL was selected as the successful bidder for implementing the project. JUIL quoted a first year tariff of ` 2.49 and a levelised tariff of ` 2.83 per kwh. The Letter of Intent was issued to JUIL on 29 January 2008.

Development and Delivery:

The project is currently under development and is expected to commence operations with a delay of six months. Accordingly, the original start date of mid-2010 has now been postponed to the end of calendar 2010. The operational structure of the project is depicted at Figure 6.

Operational Structure



Exit

As per concession agreement the developer shall undertake the operation and maintenance of the plant facilities for a period of 25 years.

Risk allocation framework

Risk type	Sensitivity	Risk period	Primary risk bearer	Comments
Delays in land acquisition	High	First year	Government	In case NDMC failed to handover the land after signing the concession agreement, NDMC was liable to reimburse the Development Costs incurred by the developer
Delays in linkages	High	Throughout	Government	As per the agreement signed with NDMC, NDMC shall ensure the provision of a sanitary landfill site for the disposal of refuse and inert material. However, as on date, MCD does not have an engineered landfill site. The site at Narela is under development and the other dumping grounds of MCD have already reached their full capacity. Therefore, the scientific disposal of refuse and inert material is a risk the NDMC shall have to manage
Regulatory, administrative delays	Low	Pre project period	TOWMCL	
Construction Risk		0-2 years	TOWMCL	In the event the construction of the plant is not completed within 24 months from the date of financial closure, TOWMCL shall be liable to pay NDMC Rupees 100 per ton of MSW that is being disposed by NDMC at the MCD landfill site, for each day of delay in the construction of the Plant
Change in Scale Risk	Low	Throughout	TOWMCL	Solid Waste during the Term of this Agreement would be accommodated at the Plant either by an increase in working hours or by putting in place additional capacities at the sole cost and expense of TOWMCL. NDMC shall not incur any liability in this respect
Market Risk	Low	Throughout	TOWMCL	There are two saleable end products from the plant – Electricity and Organic fertilizer. In terms of revenue potential, the sale of power contributes a major share of the expected revenue. A Power Purchase agreement has been signed with DERC for purchase of electricity generated from Integrated Waste Management Plant

Operation risk				
Repairs of weigh bridge	Moderate	Throughout	TOWMCL	In case TOWMCL is unable to get the weighbridge repaired within 24 hours, TOWMCL shall be liable to pay a penalty to NDMC at the rate of `10,000/- per day (Rupees Ten Thousand per day) and NDMC shall have the right to get the weighbridge repaired on its own, but at the cost and risk of TOWMCL.
Determination of rejected waste	Moderate	Throughout	TOWMCL	If determination of any Rejected Waste is made after the relevant consignment had been accepted and mixed with the stored MSW at the Site, then TOWMCL shall bear all costs associated with the transportation of such Rejected Waste to the Landfill.
Supply of minimum quantity of Waste	Moderate	Throughout	NMDC	If NDMC is not able to deliver the agreed MSW quantity for a period of six consecutive days, it shall pay TOWMCL for each day of such failure after the six day period, as pre agreed compensation
Provision of landfill site for the disposal of residual / rejected waste	High	Throughout	NMDC	The Residual Inert Matter shall be accepted at the Landfill made available by MCD at no cost to TOWMCL and/or to NDMC. However, if such a Landfill is not made available by MCD due to any reasons whatsoever, or at a later date MCD refuses to accept Residual Inert Matter generated by the NDMC MSW Quantity, then NDMC shall cause the Landfill Site to be made available for the purposes of this Agreement at its own cost and expense (including payment of all levies, charges and taxes whatever) and as per the requirements and conditions as prescribed under Applicable Law. In case if any tipping fee is charged by MCD for the disposal of waste on the landfill provided by MCD, the expenses for the same shall be borne by NDMC.
Financial Risk				
Revenue Streams	High	Throughout	TOWMCL	Major financial risk results from the realisation of carbon credits, as the project cash flows bank on the same. there is no mention of any guarantee from either NDMC or MCD to provide for the funds in absence of realisation of revenue from carbon credits. The risk of non realisation of revenue from carbon credits is thus borne by the developer. Another financial risk may result from the upward movement of interest rates.
Financing the project	High	0 – 5 years	Government	NDMC agreed to enter into agreement with the lenders to enable the financing of the project. Usually, the developer must ensure the financing of the project
Force Majeure	High	Throughout	TOWMCL	Upon termination of the Agreement due to a Force Majeure Event, NDMC shall not be liable to pay to any Termination Payments to TOWMCL. All Termination Payments shall be as made good by Insurance only under the provisions of Insurance obligations of TOWMCL. In case of losses and damages, NDMC will not be liable in respect of any losses, damage cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existing of any Force Majeure Event
Change in Law	High	Throughout	TOWMCL	If TOWMCL has to bear any additional expenditure over and above their agreed project expenditure on account of change in law, NDMC shall reimburse 100% of the amount, or make changes in the agreement provided such additional cost is not more than 5% of the project cost.
Transfer and Hand back of project facilities	Medium	On completion or termination of contract	TOWMCL	If at the end of the term of the agreement or in the event of the termination of the agreement, NDMC decides not to take over the operations of the plant then in that case the developer shall be required to provide the site free of all encumbrances at its own cost.

1.6 Post facto VfM analysis

The successful bid process of this project, laid the foundation for other PPP projects in MSW. An increasing number of PPP projects in this sector reflect the benefits being derived by the government and the citizens from the participation of the private sector.

A qualitative VfM assessment is as follows:

Viability: The Government of National Capital Territory of Delhi (GoNCTD) in 1980s had initiated a similar project for converting waste to power, but was unsuccessful due to the low calorific value of waste and the inability of MCD to segregate the waste at source. The participation of a private entity in this project is expected to address the issues related to the conversion of waste to power and reduction in the amount of garbage being dumped in the landfills.

MCD will be accountable through a bidding contract with the private party / SPV for supplying waste, since there are penalties against the non-supply of the same. At the same time, the private entity will try to increase the operational efficiencies in order to maximise its profits. By serving its own motive, the private party will ensure that society benefits from the project in the most efficient manner. The private party will deploy specialised staff trained or having experience of this sector which will also add to the efficiency gains.

Desirability: The project in question is quite desirable, because it addresses the twin problems of a growing city. The first is to reduce the amount of waste being dumped in the landfills and the second is how to generate more electricity through its own resources. These problems will be addressed by the project because it ensures that the plant is operational through the year, there is off take of waste and a new technology is adopted which will convert most of the waste into RDF with minimum pollution levels. The Agreement with MCD, NDMC and the power utilities ensures that there will be a fixed supply of raw material and agreed minimum off take of electricity. The project is expected to reduce carbon emissions substantially. Total estimated reductions in carbon emissions are expected to be 2.66 million tonnes of CO_{2e} over 10 years of operations.

Achievability: This project is envisaged to be economically viable and does not require any kind of support. With the available grants like MNRE (Ministry of Natural Resource Environment) grants, the cost of assets will reduce and thereby the electricity tariff could be revised. The revenue from the sale of carbon credits is sufficient to increase the viability of the project, which the previous project was unable to do. Clearances from various government departments have already been obtained, due to which the private entity can focus primarily on developing the project.

1.7 Key Learning and Observations

When this particular project was awarded in the year 2008, it was one of its kinds in the sector. Generally MSW was not regarded as a sector for attracting private participation. The development of the project has outlined the following learning:

Project Preparedness

Observation

The extent of preparation prior to the launch of the bid process was considerable. This phase

entailed detailed technical studies and reviews, financial evaluation, contractual clarity, risk evaluation and obtaining regulatory as well as statutory approvals. In fact the SPV to implement the project was also incorporated prior to the launch of the bid.

Learning

Good project preparation is critical to ensure project attractiveness and faster financial closure. Clarity on the contractual and regulatory framework reduces the extent of uncertainty faced by the private investors.

Government Support:

Observation

IL&FS and APTDPB had the support and the backing of the Chief Minister of GoNCTD and the Principle Secretary (Power and Urban Development of GoNCTD). Despite this government support, it took three years to bid out the project. One of the reasons was the time taken to convince stakeholders, along with procuring clearances and no-objection certificates from various government departments.

Learning

It is quite essential the government establishes a single clearance window or an authority to resolves such issues. This process will assist in reducing the time lag between expected and the actual time for completing the project. It is also essential to have complete government support which helps in obtaining a buy in from the general public.

Technology:

Observation

The consortium chose RDF over the other proven technologies owing to the nature of Indian waste. The technology is able to efficiently convert majority of the waste into pellets to be utilized in the power plant. The technology was experimented at two different locations before being implemented in Delhi.

Learning

When there is a choice of technology or method to achieve the said output, the benefits and losses by adopting that particular method or technology should be thoroughly assessed by way of a comparative study.

Consumer Education:

Observations

- The project is located in the vicinity of residential localities, resulting in protests about its development and pollution from burning waste.
- To address these concerns, five public hearings were organised; three in Timarpur, one in Okhla and one in the Delhi Electricity Regulatory Commission. The public hearings helped address substantial doubts regarding the project.

Learning

Implementation of a new technology requires consumer or end user education, so as to appreciate the benefits. Projects which have multiple stakeholders should have public hearings or stakeholder interactions to obtain a buy-in.

Convenience:

Observation

Involvement of multiple stakeholders increases the complexity of the project. In case of this project, the SPV had to take clearances from multiple government departments, appraise

different departments about the progress and at the same time achieve financial closure.

Learning

It is essential to have a single clearance window, which will facilitate smooth flow on information and transactions. Even if this is not possible, a government entity could be appointed to take care of such formalities. With this the private entity could focus more on the core development issues rather than being entangled in administrative processes.

*Source: Public Private Partnership Projects in India – Compendium of Case Studies issued by
Department of Economic Affairs, Ministry of Finance, Government of India*