

FINANCING SOLID WASTE DISPOSAL IN ISRAEL

FINANCIAL INNOVATIONS LAB® REPORT



MILKEN INSTITUTE

MAY 2013

Financial Innovations Labs® bring together researchers, policy makers, and business, financial, and professional practitioners to create market-based solutions to business and public policy challenges. Using real and simulated case studies, participants consider and design alternative capital structures and then apply appropriate financial technologies to them.

This Lab® report was prepared by Vered Blass, Shiri Heffer, Steven Zecher, and Glenn Yago.

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Introduction

6 million tons of waste are produced in Israel every year, of which 4.5 million tons are domestic waste. In view of the scarcity of land and resources, the national challenge of managing solid waste is constantly growing. The Ministry of Environmental Protection is now in the middle of a complex process aimed at turning the tables and leading a revolution: treating waste through minimum burial and maximum recycling and recovery. The present waste handling system is not sustainable and the various incentives provided for changing the status quo have not yielded the expected results.

There was no waste disposal policy in place in Israel until the end of the eighties. There were about five hundred illegal dumps throughout the country, and these contaminated lands, surface water and underground water. They took up valuable real estate space and impaired the value of lands and buildings. New laws regulating waste disposal were passed in the nineties. The illegal dumps were closed down, and new waste disposal sites were established under stringent standards. The new policies encouraged waste reduction, recycling and recovery. Despite the considerable progress achieved in this area in Israel over the past two decades, the recovery rate, as of 2010, was



just 20%, which is lower than that of other Western countries whose annual waste production volumes are similar to those of Israel.¹ The rate of recycling and recovery has remained unchanged since 2004, despite the fact that the Ministry of Environmental Protection has invested more than NIS 70 million to further this issue. These findings have motivated the Minister of Environmental Protection to establish a challenging target of zero percent burial by the year 2020.

In order to significantly decrease the quantities of waste buried in landfills, an appropriate infrastructure must be provided for the handling of waste along with the mechanisms for financing the construction and operation of such a system. A combination of waste burial tax, and legislation focused on increasing producer liability for packages and various waste streams, provides a financially leverage-able flow of income and increased motivation for finding appropriate alternatives to waste burial.

The Ministry of Environmental Protection has already taken a series of steps intended to support local authorities and entrepreneurs in establishing infrastructure for source separation. These steps include, inter alia, partial financing of infrastructures for waste collection and recycling in the form of grants to local authorities and entrepreneurs, providing local authorities with general consultancy and guidance, and various activities for educating the public and disseminating information. Waste management requires a methodical approach in order to encourage cooperation between all players in the market. Unfortunately, present efforts to achieve “the waste revolution” are not completely coordinated from an economic, technological and scientific point of view. One way to combine financial, scientific and technological issues and achieve maximum effect and rapid change, is to establish a forum where academic researchers, government representatives, financing experts, environmental organizations and technology specialists can combine forces and quickly formulate long-term solutions to the problem.

It was with this goal in mind that the Milken Institute conducted the Financial Innovations Lab® in January 2011, in Jerusalem. The Laboratory focused on the analysis of financial models for the financing of solid waste disposal in Israel, in the aim of providing the Ministry of Environmental Protection with solutions to problems associated with finding strategies for reducing the volume of buried waste and fostering cooperation between the private and public sectors by leveraging government funds. The Lab® was financed as a mutual project of the Ministry of Environmental Protection and the Milken Institute, with the support of the Goldman Fund. More than 60 representatives of government, academia, environmental organizations and banks participated in the Lab® day, along with entrepreneurs, private investors and independent consultants from various sectors, including guest specialists from overseas. The Lab® participants discussed various solutions adopted by other countries, and the adjustments that would be needed to adapt these solutions to Israel. Among the conclusions reached by the Lab®, one may include the need to involve local authorities throughout the chain of solid waste disposal, rather than limit their responsibility to just the collection of waste, as is the present practice. Various financing approaches were suggested in addition to grants, in which the private sector becomes involved in waste disposal and local authorities can share the profits generated by the recovery and recycling of solid waste.

The main points of the Lab® were summarized in a final meeting and it was decided to establish a work team to examine the ideas raised in the Lab® in greater depth.



“If we do not want to fall behind the rest of the West within the next decade, and if we want the revolution to go forward, we must find the right financial model. A budget may be available, but it must be treated with great reverence as any mistakes will cost the public money.”

Gilad Ardan, Minister of Environmental Protection



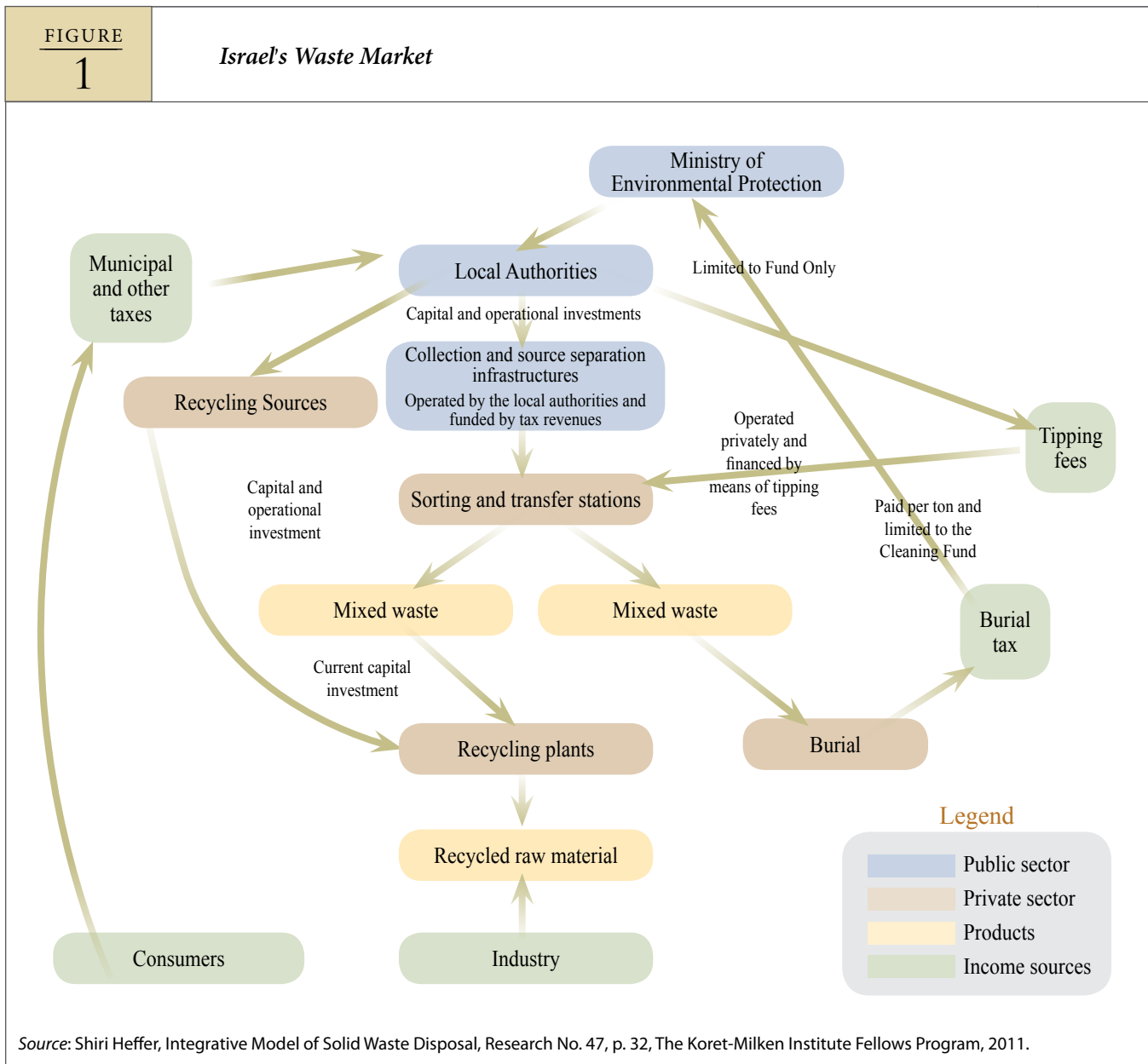
Background and Issues

In recent years, the Ministry of Environmental Protection has promoted a number of different projects in an attempt to implement the “zero burial” policy. The Ministry has taken a number of steps such as partially financing the construction of recycling infrastructures, general consultancy and guidance for local authorities, various activities for educating the public and disseminating information, and publication of RFPs for funding infrastructures supporting source separation in local authorities and end facilities for handling separated waste, at a total cost of NIS 650 million.

According to Ministry of Environmental Protection estimations, the funds accumulated in the Cleaning Fund will increase considerably in the coming years, thanks to the increase in burial tax. By the end of 2011 there were already about NIS 200 million in the Fund. In future, as appropriate alternatives to landfills are implemented, these sums will decrease following the decrease in the volume of buried waste. The Ministry of Environmental Protection estimates that in the coming years it will invest NIS 750 million in financial aid to local authorities for the construction of source separation infrastructures, and a similar sum in supporting entrepreneurs who will establish end facilities for handling separated waste. All in all, the Ministry intends to invest about NIS 1.5 billion over the coming decade, in order to ensure appropriate disposal of municipal waste. The Ministry estimates that the costs of constructing municipal infrastructures and end facilities will amount to NIS 3 billion.

In the context of the present model of the Israeli waste market (Figure 1), the waste is taken to sorting and transfer stations. Waste is separated into different streams and handled accordingly only in one of these transfer stations, while all other stations sort the waste in order to dispose of it in different landfills. The authorities pay a tipping fee in order to enter the sorting stations and the landfills, and they also pay the burial tax. The funds received from the burial tax are channeled to the Cleaning Fund operated by the Ministry of Environmental Protection. In addition, there are waste streams that are appropriately handled by operators specializing in specific streams, such as bottles and cans covered by the “Deposit Law”, or paper. These latter waste streams are recycled and subsequently used as industrial raw materials.

This market is expected to change following the granting of support grants and the construction of end facilities, and additional players are expected to join it. Additional revenue sources will also be created through the sale of recovered energy and compost to consumers or to the agricultural sector, and the sale of recycled materials as raw materials. The entry fees for the various sorting stations will be adjusted according to the type and quality of the waste. The new model provides an opportunity to develop the recycling market and involve the private sector as an active partner in the management of solid waste disposal in Israel.



Despite the planned changes in the waste market, and despite the fact that there are funds available from the Cleaning Fund, thereby providing partial funding for infrastructure construction; the process presents three levels of challenge:

- Limited ability to construct end facilities** capable of providing an initial response to future quantities of sorted waste. 42 local authorities responded to the first round of RFPs issued by the Ministry. In the event that all authorities which responded to the RFPs shall meet the criteria and indeed establish an appropriate infrastructure for the separation and collection of separated waste, there is some concern that the number of end facilities will not be sufficient to handle the sorted products produced. This may hinder public response to the initiative and deter additional local authorities from joining in the future. A situation may arise in which authorities that have

invested a great deal of money in setting up infrastructures in order to save the burial tax, will be forced to bear the cost of both infrastructures and burial taxes, as a consequence of defective planning.

- **The time-frame allocated for implementing the plan on a national scale is far too long.** In its present format, the plan for transition to source separation will take too long to implement, and its first goal is to achieve 50% separation over the next ten years. The expansion of the separation system has been planned on the basis of the existing budget and on the basis of expected Cleaning Fund revenues, but it does not consider capital leverage that may be able to speed up the process of building the required infrastructure. It is possible that with more appropriate planning, and through leverage, the same financial investment will allow faster integration of more local authorities than envisaged by the original plan.
- **Financing challenge.** Despite the fact that funds are already available in the Cleaning Fund for the next few years, the cost of grants requested in the first cycle of RFPs was as high as NIS 600 million - a far greater sum than originally allocated to the first grant making stage. Grants can only provide a partial solution, which does not provide an immediate response to the needs of weaker authorities or particularly large authorities. In order to carry out the transition to source separation on a national scale, it is necessary to leverage the existing capital so as to bridge the gap between the existing budget and the required one. Also required are innovative models capable of providing a solution to bureaucratic red tape through cooperation between the public and private sectors of a kind that has not been implemented in Israel up until now.

The steps taken by the Ministry of Environmental Protection, the heightened public awareness of environmental issues and their importance, the fact that the Israeli waste market is small, and the private sector is willing to participate in environment-related projects - create a golden opportunity for making significant headway in the handling of



solid waste in Israel. In the medium-term, the recycling and recovery revolution may be accelerated through correct leverage of Cleaning Fund resources, revenues generated by implementing the extended Manufacturer's Liability law, technological developments, innovative policies and long-term economic development – thus positioning Israel at the forefront of solid waste disposal.

In preparation for the Lab®, the Ministry of Environmental Protection has defined a number of issues that require specific insights.

- How can one establish more infrastructures in less time, without deviating from the available budget?
- How can one create end solutions for the separated waste of two million citizens within two years, when the actual demand is four times greater than that originally estimated?
- How can one cut through the bureaucratic red tape involved in building plants, when the standard planning process requires five years?
- How does one overcome red tape in the large cities – Jerusalem, Tel-Aviv, Haifa – which cannot undertake to institute change within three years?

The Financial Innovations Lab®

The Milken Institute convened a Financial Innovations Lab® in January 2011, in Jerusalem, in order to discuss strategies for leveraging public funds by means of private capital in order to finance the disposal of solid waste. The Lab® examined specific financial models capable of bridging the financing gaps and providing a wide range of solutions for the various players in the waste market.

Representatives of government, academia, and environmental organizations participated in the Lab®, along with bank representatives, entrepreneurs, private investors, independent consultants, local authorities and local and international experts on the financing of waste projects.

The Lab® focused on two main issues:

- Analysis of tools for cooperation between the public and private sectors, through consideration of investment instruments and financing solutions based on the Israeli capital market and the banks.
- Leveraging the Clean Fund funds in order to accelerate the process and reach separation and recovery rates of 75% within five years (instead of 50% within 10 years).

The financial innovations Lab® is a research tool that has been developed and enhanced by the Milken Institute and is being applied all over the world for finding policy and financing solutions. On this solid research basis, a structured brainstorming session took place in the Lab® around the question of how one can implement leading waste solutions in a way that would be suitable for Israel. The specific question discussed was how would it be possible to carry out a waste revolution in the near future, a revolution that would include support for the various local authorities, creation and upgrading of end facilities for handling the separated waste, and engaging the private sector in the finance and operation of projects. After Ministry of Environmental Protection representatives surveyed present conditions in Israel and various models implemented in Europe and the US, participants split into workgroups and discussed the various difficulties involved (financial, regulatory and planning) and various models that may provide a solution to the needs of the Israeli market. The ideas generated and the local models suggested were subsequently developed further in the course of an intensive year following the Lab®.



“The process should not start in such a way that the separated waste is transferred to burial instead of being properly handled. It is important that the larger municipalities be allocated funds and that the most efficient use of the funds is understood.”

Dr. Yossi Inbar

Former CEO, Ministry of Environmental Protection



Problems and Possible Solutions

Lab® participants identified the main obstacles and problems involved in financing the construction of infrastructures for source separation and treatment of various waste streams. Obstacles and problems are associated with the various stages of the process, the various parties involved in it, and the various needs of local authorities.

Problem: The situation of the local authorities

- There are many differences between various local authorities and their willingness to enter the process is not the same. The following issues were identified as problematic and as requiring attention when planning the process and exploring possible solutions:
- Limited loaning ability, especially where weaker authorities are concerned.
- Differences in the needs and abilities of large, medium and small authorities, both as regards professional personnel and as regards the ability to tackle the logistics aspects of the process.
- The process is already in motion. We are not “starting from scratch”: some of the authorities are stronger and are already moving forward on the subject of handling solid waste in different ways.
- Absence of professional parties and professional ability in the area of waste and financing at the level of the local authority. This sometimes prevents response to RFPs.
- A limited economic vision as far as the possibility of innovative financial solutions is concerned.

Lack of experience in the area of the private-public association and cooperation usually required for such projects.

Possible solutions:

- Establishing an association of cities for the specific purpose of waste disposal.
- PPP cooperation.
- Establishing companies for specific purposes.

Problem: The recycling market is undeveloped

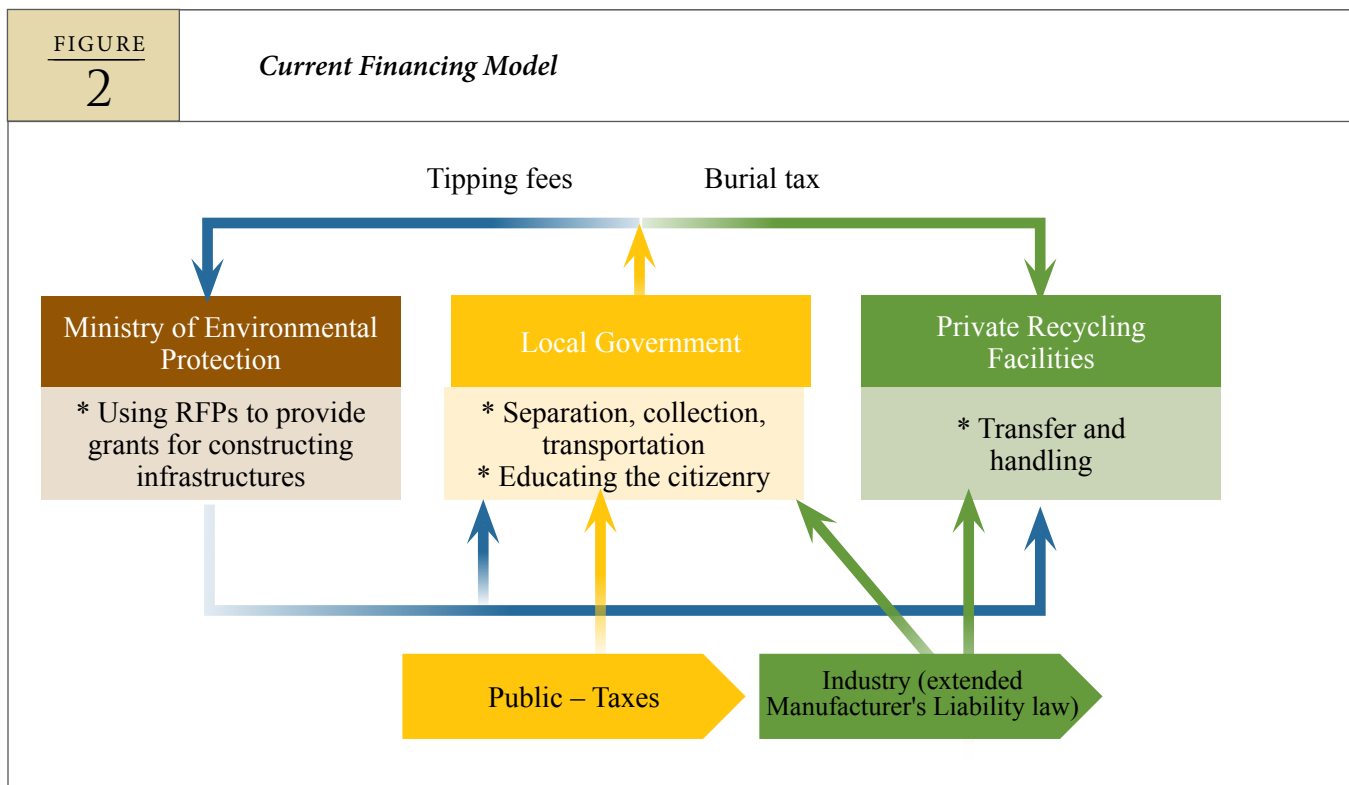
The Israeli recycling market is still underdeveloped when compared to countries that have attained great achievements in the recycling of waste. Under current conditions, even if government grants are made available, the risks are high for entrepreneurs and the conditions for financial assistance are perceived as not being sufficiently attractive. In addition, the small market is presently controlled by a small number of players. The prevailing system allows entrepreneurs to dictate the national waste map. The market is inefficient, non-competitive and not sufficiently developed.

Possible solutions:

- Providing collaterals for minimum volumes and reducing the entrepreneurial risk.
- Entry of new players into the market.
- Increasing the recycling market size and promoting the recycling market by establishing high recycling and recovery targets.

Problem: The present separation between waste disposal segments

At the moment, the expenses involved in separation and transportation are separated from the income streams derived from waste disposal, and this situation limits the repayment capacity. Moreover, there is no business model capable of combining all revenue sources in order to leverage the repayment ability. The significance of this state of affairs is that when the waste disposal process is divided into a number of different segments (in-city, transfer, out of the city/end facilities) the flow of income is artificially separated from the costs. This separation becomes problematic when some of the financial instruments require an integrated vision of costs and future income flows. Figure 2 shows the areas of responsibility assigned to various parties and the possible distribution of cash flows among the various parties.



Possible solutions:

- To construct an integrative financial model in which the future income stream is used to repay loans and cover operating expenses.

Problem: Bureaucratic red tape

Entrepreneurs receiving grants in the context of RFPs will not be able to make sure that they overcome such statutory obstacles as the need to secure building permits, removing environmental nuisances, public objections (NIMBY), difficulty of collecting from local authorities, etc. Specifically, the standard planning time in Israel, including all required permits, may take up to five years. Required end facilities are to be constructed within three years, and this means that planning time should be cut down drastically.

Possible solutions:

- To establish an inter-departmental team charged with accelerating the process and finding solutions to bureaucratic problems.
- PPP agreements, wherein part of the government's responsibility is to provide quick solutions to bureaucratic problems.





Financial Innovations in the Disposal of Solid Waste

Lab® participants proposed a number of solutions in different categories: financial instruments, support mechanisms, and policy tools. Most of the difficulties identified may be overcome by combining these solutions.

Table 1 summarizes the main financial instruments identified.

TABLE 1	<i>Financial Instruments</i>					
	Bonds		Loans			Grants
	Bank Bonds	Revenue Bonds	Revolving Fund	Bank Syndication	Commercial Loans	
Definition	Bonds issued for financing a number of projects by minimizing the risk inherent in each project, without encumbering any additional public assets	Bonds issued against the future revenues of a specific project, without encumbering any additional public assets	Loans for worthy projects. Loan repayments are used to finance additional projects	Loans to local authorities or private operators, granted by a number of banks and/or commercial bodies	Loans to local authorities or private operators, granted by a single financial body	Grants to local authorities
Sources	The capital market, i.e., both private and public funds	The capital market, i.e., both private and public funds	Government assets based on capitalization of future profits such as tipping fees. A secondary source of capital are collaterals issued against repayments of governmental loans in the capital market	Bank deposits; non-banking sources such as pension funds and insurance companies	Bank deposits	Profits from current operations of waste treatment facilities, such as current tipping fees
Management	Bonds issued by a local authority or a financial body	Bonds issued by a public body, a local authority, or a municipal company	Underwriting by fund managers; fees and interest payments support the fund's current management	Usually one of the banks which initiates the loan and also underwrites it on behalf of the other banks	The loan is underwritten and managed by commercial bodies	The grants are managed by the Ministry of Finance

	Bonds		Loans			Grants
	Bank Bonds	Revenue Bonds	Revolving Fund	Bank Syndication	Commercial Loans	
Main beneficiaries	Local authorities and private operators/ entrepreneurs	Local authorities and private operators/ entrepreneurs	Local authorities and private operators/ entrepreneurs	Local authorities and private operators/ entrepreneurs	Local authorities and private operators/ entrepreneurs	Local Authorities
Local Authorities role in financing the loan	Responsible for managing profits from bonds and loan repayments	Responsible for managing profits from bonds and loan repayments	Borrower	Optional borrower	Optional borrower	Meeting contractual terms, management and reporting
Governments role in financing the loan	Approval and permits: management of pledged profits flow	Approval and permits: management of pledged profits flow	Initial capital, management of pledged profits flow	Management of pledged profits flow	Management of pledged profits flow	Payment of grants and project management
Advantages	<ul style="list-style-type: none"> ▪ New sources of long-term capital; ▪ Competitive interest rates; ▪ Option for bundling projects so as to create a more attractive loan; ▪ Transaction costs 	<ul style="list-style-type: none"> ▪ New sources of long-term capital; ▪ Competitive interest rates; 	<ul style="list-style-type: none"> ▪ Flexible conditions; ▪ Recycling of interest payments and principal repayment 	<ul style="list-style-type: none"> ▪ An opportunity to involve a number of banks in the project; ▪ Decreasing the risk of each separate borrower; ▪ Access to a large source of capital; ▪ Recruitment of professional lenders who can help manage projects in an efficient manner 	<ul style="list-style-type: none"> ▪ Involvement of commercial lender in public/ municipal project 	<ul style="list-style-type: none"> ▪ Simple ▪ Fast ▪ Low management costs
Disadvantages	<ul style="list-style-type: none"> ▪ Complexity; ▪ Limited market; ▪ Requires additional credit and many collaterals 	<ul style="list-style-type: none"> ▪ Complexity; ▪ Limited market; ▪ Requires additional credit and many collaterals; ▪ High transaction costs 	<ul style="list-style-type: none"> ▪ Complex program management requiring professional manpower; ▪ Financial risk 	<ul style="list-style-type: none"> ▪ Complexity; ▪ There are few banks in the Israeli market; ▪ Participation of overseas banks involves currency and hedging risks; ▪ The underwriting process by banks is bureaucratically complex; ▪ Requires large initial equity and adherence to regulations assigned to bank loans; ▪ Much red tape and high commissions; ▪ Possibility of double underwriting and bureaucratic processes 	<ul style="list-style-type: none"> ▪ A small and not very competitive market; ▪ High commissions; ▪ Regulation and requirements for relatively large equity 	<ul style="list-style-type: none"> ▪ Inefficient use of financial capital; ▪ No reuse of capital; ▪ Limited incentives and lack of incentives to efficient and good performance of project operators

Lab® discussions indicated that in projects funded by both private and public funding, one of the main keys to successfully spreading the risks is the project financing approach. While in countries like Germany, local authorities have the option of obtaining loans at the lowest interest rates in the market, thus ensuring their financial advantage as partners to any venture, the situation is quite different in Israel: A supportive financial system capable of providing guarantees and collaterals is needed in order to involve local authorities as partners, and make it easier for them to raise the funds they need. Collaterals and guarantees can be provided with government assistance. Various support mechanisms that can serve as platforms for various financial instruments have been identified to this end (Table 2). It is important to emphasize that the use of different mechanisms may be appropriate for more than a single financial instrument.

TABLE 2		<i>Support Mechanisms</i>	
Instrument	Description	Applicability	
Reserve Fund	Establishing a reserve fund in order to cancel the capital risk of a number of projects or a number of authorities	<ul style="list-style-type: none"> ▪ A legal entity that will establish and manage the fund. ▪ Projects structured in a way that makes it possible to return some of the financing to the fund; ▪ Required: Fund guidelines and appropriate structure; ▪ Implementation: 3-6 months of planning; ▪ Implementation: depends on financing 	
Bank Syndication	Helping banks by participating in loans to a single project, so that the capital requirements are reduced and the risks spread among a number of lenders	<ul style="list-style-type: none"> ▪ Banks participate in the syndicate for real estate transactions and the financing of business operations; ▪ The banks are interested; ▪ It is necessary to find banks willing to participate in the program. 	
PPP – Private Public Cooperation	Tenders for creating a unique financing instrument controlled by PPP cooperation in planning, financing and implementing all required stages in the solid waste handling system.	<ul style="list-style-type: none"> ▪ PPP projects are now being implemented in the areas of water and transportation. ▪ It will allow the issue of PPP tenders in the area of solid waste disposal. 	
Fund for a designated purpose	To establish a municipal or regional trust managed by a trustee in order to receive and distribute pledged income for debt repayment.	<ul style="list-style-type: none"> ▪ A regulation mechanism that will make it possible to establish a separate municipal account that many be pledged to lenders. 	

Source: Milken Institute, 2012.

TABLE
3

Policy Instruments

Finally the Lab[®] has identified three policy instruments (Table 3) that may be able to help promote and implement the various financial tools in order to overcome the problems described at the beginning of this document.

Instrument	Description	Applicability
Tax Benefits	A grant in the form of tax credit on company taxes for investments in infrastructure, with an option of a 10 year benefit.	<ul style="list-style-type: none"> Requires adaptation of tax laws and accounting principles
Special Arrangements	Provide authorities with the authority to impose special taxes on real estate in order to create collateral for capital loans	<ul style="list-style-type: none"> Requires adaptation of municipal tax laws and accounting principles
«Round Table» Project Development Teams	An ad hoc team comprising governmental experts (including experts from the Ministry of Environmental Protection, the Treasury, the Ministry of the Interior, and the Ministry of Industry, Trade and Labor), as well as paid financial specialists and technical consultants. This team will establish a plan for creating an appropriate structure of solid waste projects.	<ul style="list-style-type: none"> Identify appropriate and engaged participants Required: Adaptation of the trading process so as to allow speedy handling and finding of appropriate participants Implementation: fast

Source: Milken Institute, 2012

The Experience of Other Countries

Many concrete examples of projects and plans for handling solid waste in various countries were presented in the course of the Lab[®] – these included examples of project financing challenges, including bank liquidity, credit costs, collaterals and problems of access to new capital through the local and international capital markets. These examples covered rural areas, city centers and regional projects in the US. Additional examples were brought from plans and projects developed in Britain and developing East European countries. The following is an abstract of the various plans presented by Steven Zecher, Project Director, Regional Development and Project Finance, Milken Institute Israel Center.

Availability and cost of conventional credit

Banks can establish consortia and share project risks, thus leveraging their loans, reducing the cost of loans by means of a revolving fund and securing third party collaterals. The instruments used to reduce risks, increase liquidity and improve bank loan conditions include bridging loans, syndication with additional banks, revolving funds and collaterals.

Example 1: Syndication – Solid Waste Project in Zgos-Zagre, Croatia

Zgos was established in order to secure credit without the support of regular banks, by means of an EBRD loan and banking syndication. The banks share the full debt among them, thus minimizing the exposure of any single bank to risks. Debt repayment is based on revenues from services, and the project's capital structure protects local government from the credit risks associated with debt.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> Zgos is a company owned by the local regional authority responsible for the Jakusevac landfill and its rehabilitation. The landfill serves 309,000 citizens or 9 cities and 25 local authorities. The project includes the completion of two landfill areas in the context of rehabilitating the dump's support. This rehabilitation will lead to significant environmental improvements and the protection of underground water sources, by providing reliable and orderly disposal of waste in a "sanitary" landfill. The renewed financing included part of an existing Zgos loan and the completion of two additional landfill spaces within the site. 	<ul style="list-style-type: none"> The total cost of the project was EUR 66.5 million Part of the project was financed by an EBRD loan. The Zgos loan was guaranteed by a municipal support agreement of the Zagre district. The balance of the debt is spread over additional banks by syndication. The loan for the new investment component and the renewed financing are covered by a tax for solid waste disposal. This is the first Croatian public utilities transaction that is funded by banks without guarantees. 	<ul style="list-style-type: none"> Bank syndication in order to spread the risks Debt repayment is based on system user payments Financing with local authority guarantees

Example 2: Bridging Loan - Rural Community Assistance Partnership (RCAC), US.

This plan provides small rural communities with credit for cases in which a loan recipient cannot repay the loan expenses for the purpose of solid waste disposal in the short term. This plan bridges the time gap by providing short-term loans up until such time as the revenues derived from service users can be used to repay the debt.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> The Rural Community Assistance Partnership (RCAC) provides assistance for water purification plants and solid waste disposal systems of small non-profit municipal authorities, in eleven states in the West USA. Incorporation as a non-profit financing institute for community development, with USD 87 million in assets (2009) and USD 24 million in notes (2009) 	<p>The usual loan sum does not exceed USD 10,000</p> <ul style="list-style-type: none"> No collaterals. Promissory notes only Is usually payable at all times of the year Loan cost: one percent Both the entity and the project must be entitled to long-term financing by the government or from another source, and have a reasonable chance of receiving such financing. The entity must agree to repay the loan, under extended conditions if necessary, in the event that the project is discontinued. <p>Acquisition</p> <ul style="list-style-type: none"> The maximum loan sum is the estimated worth of the site plus the cost of the loan and Federal Reserve interest. This sum rarely exceeds two million dollars. A guarantee is required in the form of a right to the asset Loan period: up to three years Loan cost: one percent The RCAC is entitled to pledge assets to the lender for pre-development or erection expenses. 	<p>Short-term loans (one to three years) pre-development</p> <ul style="list-style-type: none"> The loan sum is based on a specific pre-development budget The real estate asset serves as collateral The loan period: up to three years Loan cost: one percent The RCAC is entitled to pledge assets to the lender to cover erection expenses. <p>Creation</p> <ul style="list-style-type: none"> Loan sum - rarely exceeds USD 2 million A guarantee is required in the form of a right to the asset Loan period: corresponds to the project erection period Loan cost : one percent Fixed funding must be available

Example 3: Regional Solid Waste Disposal in the Arges district of Rumania

The Arges district in Rumania has obtained European financing and a bank loan for developing an integrative system for solid waste disposal. The capabilities of the private market were also leveraged by the issue of contracts for collection and waste burial administration by private companies.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ 120 tons of daily waste produced by a population of 652 thousand citizens in the district ▪ Regional facilities for collection and burial of solid waste; awarding concessions for handling waste in the private sector and providing waste collection and burial services ▪ Institutional development of regional waste supervision, concession contracts management and regulation ▪ The plan supports private sector competition and involvement; collection and treatment of leachate, transfer stations, weighing stations, "green points" for recycling and compost creation, and modern waste collection vehicles 	<ul style="list-style-type: none"> ▪ EUR 24.5 million ▪ A loan of EUR 6.5 million ▪ Mutual funding by means of an EUR 18 million ISPA grant 	<ul style="list-style-type: none"> ▪ Integrative system ▪ Revolving fund ▪ Regional disposal system

Example 4: USAID Institutional Guarantee of Czech Solid Waste Disposal Project

USAID provided guarantees to a municipal Czech financing company, which subsequently transferred the guarantees to commercial banks as collateral for loans issued to local authorities for the purpose of carrying out solid waste disposal projects. This structure enables authorities to receive loans under good conditions and low interest rates. The Czech government, on its part, provides USAID with a counter-guarantee that offsets the risks arising from changes in currency rates. Most importantly, this financing structure teaches the capital markets in Eastern Europe to handle municipal debts and loans.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ A partnership program sponsored by USAID, involving the Czech Republic and the Municipal Finance Company («MUFIS»), a regional financial authority ▪ USD100 million available for long term financing of municipal environmental infrastructures. ▪ MUFIS receives the funds and provides long-term capital to commercial banks so that they can lend funds to municipalities for solid waste disposal projects 	<ul style="list-style-type: none"> ▪ USAID guarantees bank debt, enabling favorable terms (up to 30 year loans with a 10 year grace period). Fees include 1% of the initial principal and .5% annually of the unpaid balance. ▪ Extends the available terms for projects from 3 years available on the Czech capital market to 15 years at competitive fixed rates. 	<ul style="list-style-type: none"> ▪ Leverages participation of banks, covering credit and collateral risks ▪ The sovereign government underwrites the foreign exchange rate risk.

Credit Quality and Collaterals

Local authorities can augment their incomes by imposing taxes and tipping fees for the use of landfills, setting various tariffs for recycling activities, levying damage fines, collecting waste disposal fees, and the like. In addition, the authority can enjoy a net income from the sale of energy, recycled materials and compost. Sometimes the authority can also benefit from credit for reducing greenhouse gas concentrations. In order to do so, authorities are entitled to involve private contractors as partners and establish PPP cooperation with them. Such partnerships provide the basis for financing projects through private banks, banking consortia or the capital market. Such partnerships are built as SPCs and operate in the area of assets and revenues, while fully protecting the loaning capacity of the partners. Such companies are capable of leveraging private capital as a new source of capital, based on profits (losses) and amortization expenses, according to the rules of the game prevailing in the private market. Most importantly, these examples indicate that the way to improve credit quality and financial robustness is to combine various activities, including the collection of solid waste and treatment processes, so that the expenses and income of processes are integrated within a balanced and sustainable business model. Examples of such approaches include tipping fees to waste disposal sites, targeted taxes and concession fees.

Example 1: Disposal of Solid Waste in the Broward District, Florida, USA.

A regional initiative for the disposal of solid waste in the region was implemented by means of a PPP structured WTE contract. The balance of the project cost (92%) is paid by the revenues collected through tipping fees, and the rest (3%) by the sale of recycled materials.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ The regional initiative of the Broward District serves 1.75 million persons and collects 3.4 million tons of waste every year - 1.9 tons of solid waste per person. ▪ The system includes two “waste to energy” (WTE) plants, a recycling center and a landfill. 	<ul style="list-style-type: none"> ▪ The WTE plants process 4500 tons per day according to a contract with Wheelabrator Environmental System, Inc., which provides for the planning, erection, and operation of two WTE plants. ▪ Burial operations - 10,000 tons per day, tipping fees: USD 22.60 per ton ▪ Recycling - 300 tons per day, recycling rate of 24% ▪ Total cost of handling solid waste: USD 47.72 per person per year. 	<ul style="list-style-type: none"> ▪ Tipping fees generate 92% of system income. The District management sets the rates, plans the program, and oversees it ▪ WTE plants are planned and operated under PPP ownerships ▪ Direct revenues from WTE plant operations are not used to pay for the waste system. The energy is used to indirectly reduce the cost of energy for the citizens.

Example 2: The METRO Regional System for Solid Waste Disposal, Portland, Oregon, USA.

The METRO Company operates in the Portland area and constitutes an example of a regional solution that operates as a business in all respects. The company sells its services to communities in the area and collects fees for its services. The company is able to decrease its marginal costs by increasing the number of customers using its services.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ The METRO system serves more than 1.5 million citizens in three districts and 25 cities in the Portland area ▪ The authority supervises the solid waste produced by METRO or removed by METRO, and all the solid waste facilities within METRO ▪ Every year, METRO brings in USD 56 million in revenues from fees for solid waste deposited in METRO transfer stations. 	<ul style="list-style-type: none"> ▪ These payments are financed by regional plans for minimizing the quantities of solid waste (planning, information about recycling, and education), collecting and removing dangerous waste, managing the solid waste disposal system (paying debts, general management costs, planning), and additional plans beneficial to the entire region. ▪ Within the METRO area, such payments are levied by the operator of the disposal site and transferred to METRO. The same applies to disposal facilities located outside the area, which have signed an appropriate agreement with METRO (USD 110.85 per ton plus another USD 11 transaction fee) ▪ According to METRO rules, an excise tax may be levied for the use of facilities, equipment, systems, services and improvements owned or operated by the district, or operated under license or commission. ▪ Within the METRO district, this tax is collected by the disposal facility operator and transferred to METRO. 	<ul style="list-style-type: none"> ▪ Regional services and financial basis ▪ Combination of taxes and payments for services within the area, and payments for services by contract, outside the area.

Example 3: The Solid Waste Authority, Palm Beach District, Florida, USA.

The Palm Beach district has established a WTE project for the conversion of waste into energy, thereby demonstrating a regional project that combines income from energy sales on the basis of long-term contracts, usage fees by the citizenry, and special real-estate taxes to support debt coverage.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ A financing plan based on USD 750 million in bonds for the erection of a WTE facility. ▪ A new WTW facility that handles 3,000 tons per day, will be located by the existing facility, which handles about 2,000 tons per day. 	<ul style="list-style-type: none"> ▪ The guarantee for the bonds does not correspond to their estimated value, but is included in the annual taxes imposed on the asset. ▪ The annual payment per household is USD 156, and the sum will increase to USD 180 when the facility is completed. 	<ul style="list-style-type: none"> ▪ Sales support financing by means of the capital market ▪ Special evaluations of the citizenry's additional credit structure. ▪ The debt is rated as Aa3 by Moody's and AA by Standard & Poor's.

Example 4: Concession Agreement, Coral Springs, Florida

The Coral Springs District demonstrates the use of concession agreements as a method for raising the funds necessary to finance capital costs. Moreover, a concession agreement provides a unique method for citizens to pay for services, wherein the agreement enjoys the “force of tax”. In addition, the agreement requires that costs be actually covered, so that when necessary, the required tax rate may be reevaluated.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> A concession agreement between Coral Springs and Waste Management, for the collection and disposal of solid waste. Waste Management collects the waste twice a week and recycles office paper. 	<ul style="list-style-type: none"> Coral Springs levies a tax on citizen>s assets regardless of their value, in order to fund the service costs of collecting and removing solid waste, based on the operator>s cost of waste disposal. The disposal component in the price paid by the citizenry is adjusted to reflect changes in tipping fees collected by the receiving facility. The prices of collection and maintenance are adjusted according to the Consumer Price Index. 	<ul style="list-style-type: none"> Use of concession agreements for waste management services. Use of special evaluations in order to pay for service agreements. Adjustment of evaluations so that they correspond to the real cost of services.

Example 5: The Waste Disposal Authority, Greater Manchester, England

The Manchester District has created an advanced integrated regional system for waste reduction. The authority has taken a loan from the European Investment Bank (EIZB), based on a Public-Private Partnership (PPP), in order to develop and operate a system for the prevention, reuse, recycling and recovery of energy from waste.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> The Greater Manchester Waste Disposal Authority (serves 2.54 million citizens) has built and maintains an integrated waste management system that handles 1.6 million tons per year. 42 facilities in 28 sites are covered by a PPP agreement with “Viridor Laing (Greater Manchester)”. 29 of these facilities have already been completed, 11 are in construction, and the construction of the remaining 2 is scheduled to begin. 	<ul style="list-style-type: none"> A loan of EUR 200 from the EIB. The system includes recycling, compost production and burial. Payment covers operational expenses, including a debt service supplied by a tax imposed on the entire district according to the number of tons. 	<ul style="list-style-type: none"> A PPP structure A regional system focused on reducing the amount of waste. The financing is provided by the EIB.

Example 6: Solid Waste PPP Cooperation, Kirklees Metropolitan, Britain

The Kirklees project is an integrated regional project utilizing the PPP model for developing, financing and operating its facilities. The project is funded by a government loan and SPV private credit. Operational costs and debt service are financed by tipping fees and facility usage fees.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ Kirklees serves 404,000 citizens. The plan includes a new WTE plant, a recycling center capable of handling a variety of materials, a transfer and loading station, two compost plants and two recycling centers for domestic waste. ▪ A 25 year partnership agreement with United Waste Services Limited, in order to provide an integrated waste solution. 	<ul style="list-style-type: none"> ▪ A new capital investment of about GBP 41 million. GBP 33 million were provided by a government loan. ▪ A special body entitled "Kirklees Waste Services Ltd." has been established. ▪ Gradually increasing tariffs were paid during the facilities construction period, as well as fixed and variable fees by tons and lower recycling fees. Once the project becomes fully operational, an assured minimum quota in tons and a fixed tipping fee have been established. 	<ul style="list-style-type: none"> ▪ An integrated system of waste management and the reduction of burial. ▪ PPP ▪ Tipping fees

Access to New Capital Markets

The access to capital markets improves with combinations of taxable and tax-exempt financing, financing based on good business models and the creation of bond participation groups or bank bonds, in order to decrease the risks and increase access to a wider range of bond buyers. In addition, access is improved by creating backup funds for covering unequal revenue flows, and even partial losses. The following examples include project financing and bond participation.

Example 1: Solid Waste Revenue Bonds, Tampa, Florida, USA

The Tampa project demonstrates the use of long-term contracts for the sale of energy and the collection of tipping fees in order to cover the debts incurred by a solid waste disposal program. The project conforms to tax-exempt financing conditions under a special tax regulation encouraging WTE projects, solid waste and other public infrastructures erected in cooperation with private operators.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ USD 98 million income from bonds for the purpose of debt repayment and capital improvement. ▪ The system collects all domestic waste and 60% of the commercial waste. 	<ul style="list-style-type: none"> ▪ The system controls the waste stream by implementing regulations. ▪ About 80% of system revenues derive from tipping fees that are collected through the monthly water and sewage bill. ▪ The sale of electricity from a WTE facility. MacKay Bay is responsible for a modest rate of 14% of the system's revenues. ▪ The obligation to pay a specific rate and the test of additional bonds are based on a requirement of 110% coverage, which Fitch views as the lower end of acceptable tests. ▪ Collaterals are limited to revenues and pledged assets. 	<ul style="list-style-type: none"> ▪ Debts are covered by a combination of user payments and energy sales. ▪ Legal requirements regulating the flow of waste ensure a constant flow of income.

Example 2: Bond Bank, Main, USA

A particularly important and interesting model is the Maine bond bank. In addition to providing access to capital markets, the bond bank has successfully created innovative structures and approaches for spreading risks among municipal borrowers, such as merging the various credit levels in order to generate strong general credit, and expanding the exposure of the bond buyers' market by providing a greater variety of municipal holdings.

The Plan	The Financing Structure	Significant Features
<ul style="list-style-type: none"> ▪ State sponsored financing authority ▪ Issues bonds in the capital markets on behalf of municipalities. ▪ Funds municipal projects, including transportation, solid waste, water and sewer, etc. ▪ Issued over USD 4 billion in bonds since 1972; USD1billion outstanding. 	<ul style="list-style-type: none"> ▪ Pledges state funds to cover bond obligations; uses a reserve fund model to cover debt service obligations. ▪ Able to offer taxable and tax exempt rates. 	<ul style="list-style-type: none"> ▪ Pools bond risks among municipalities, blending asset classes. ▪ Offers bond buyers a diverse municipal bond portfolio.

Private-Public-Partnerships (PPPs)

Professor Heiko Höfler, a guest of the Lab® from Germany, gave an extensive lecture on the issue of Private-Public-Partnerships (PPP). Höfler surveyed the background of this mechanism in the German waste market. In Germany, the responsibility and management of the solid waste market were traditionally vested in the hands of the public sector, so that all components of waste management, such as ownership, management, operation, budgeting, collection and burial, were carried out by local authorities. Funding was derived from public budgets based on taxes and fees levied from the populace. The traditional approach began changing in Germany in the mid-nineties, as it did all over the world. The two central forces that drove the change were: 1) an understanding that landfill areas were becoming scarce and that burial of waste contaminates the soil and the ground water and causes many other hazards; 2) a growing recognition that waste streams can become an economic resource if separated into a number of streams that are handled with appropriate technologies, such as recycling materials or recovering energy from waste. Since it was beyond the abilities of German local authorities to understand and implement these insights, and since the investment required in order to build and operate infrastructures was far greater than municipal budgets, partners with technical know-how and capital were needed in order to support the construction and operations of enterprises of this kind.

The Approach

1. The PPP model is a flexible one that can be adapted to projects on a variety of scales according to the scope of financing they require. Beyond a certain threshold (from the point of view of costs and profits) the PPP model is a scalable platform suitable for both large and small projects.
2. Privatization of the municipal department charged with managing solid waste segment, incorporating it as a limited company.
3. Inviting entrepreneurs and capitalists to participate in PPP projects right from the planning stage. Developing a business model that would be acceptable to all parties involved in a PPP.
4. Planning of long-term contracts with sufficient flexibility to cope with changes in technology and with deviations from operational plans, without requiring a new RFP to be issued.²
5. Tenders for service contracts within the PPP framework are competitive as regards price, costs and technological innovativeness. Managed competition of this type ensures that local authorities will meet “public needs” (see “requirements” below).

The Solution

- Using the PPP model in order to establish cooperation with private entrepreneurs who will supply expertise and share both financial risks and profits with the public.
- The public authority has formulated the structure of contracts and the privatized public department was converted into a company limited. This company was the main partner (49/51)³ in the PPP, which was in fact “an instrument for special purposes”.
- Since the public sector has access to loans with very low interest rates, the PPP project financing costs were very low.⁴

Requirements

1. Expectation of specific performances and the cooperation of the general public.
2. Long-term contracts (15-20 years) capable of flexible adaptation to changing circumstances.
3. Safeguarding profits (see “risks” below).
4. Control of the public body (ownership of 51% of shares) using the special instrument created.
5. According to the business model, the competitive economic advantages inherent in the implementation of a PPP model (low cost, ROI, etc.) must be 20% greater than what is attainable using a wholly-public service.

Order of Operations

1. The steps required in order to set up a project according to the PPP model are expected to take 18 months. These steps include:
 2. A PPP stability test – this includes a series of tests aimed at determining the feasibility of developing a business model, a financial plan and an operational plan that the partners are capable of implementing. The PPP model may be set up in a flexible and scalable way, so long as the fixed costs are covered.
 3. Planning a business model – development of a complete business model with a potential for public and private partnership, including a scalability test.
 4. Issuing a tender in order to select the private partners.
 5. Establishing the PPP – through the purchase of shares and a clear contract detailing the split of ownership and control between the privatized public entity and the private partner for specific purposes.
 6. Ensuring financial collaterals - the private partner is responsible for its own initial equity and financing.
 7. Signing of a services agreement – which includes the scope of the work, the price and the performance expectations of all parties.

Risks

Ensuring profits – the private sector will finance projects with an assured, well defined and clear income flow capable of covering all project needs.

Guarantee of profits – the private sector will expect a fixed flow of profits that is not dependent on the quantity or quality of the waste streams. This will require a “Give or Take” type agreement.⁵ Guarantees of this type are particularly important in view of the expectation and intention of the authorities and the public to decrease the quantities of waste over time.⁶

Disagreements and contract termination – since the contracts are long-term ones, changes in expectations, in conditions, or in technologies are liable to lead to contract termination. The contract must address the comportment of the parties in the event of a crisis and include steps capable of settling disputes. In the event that the contract is terminated, the assets must revert to the main shareholder - i.e., the public body.

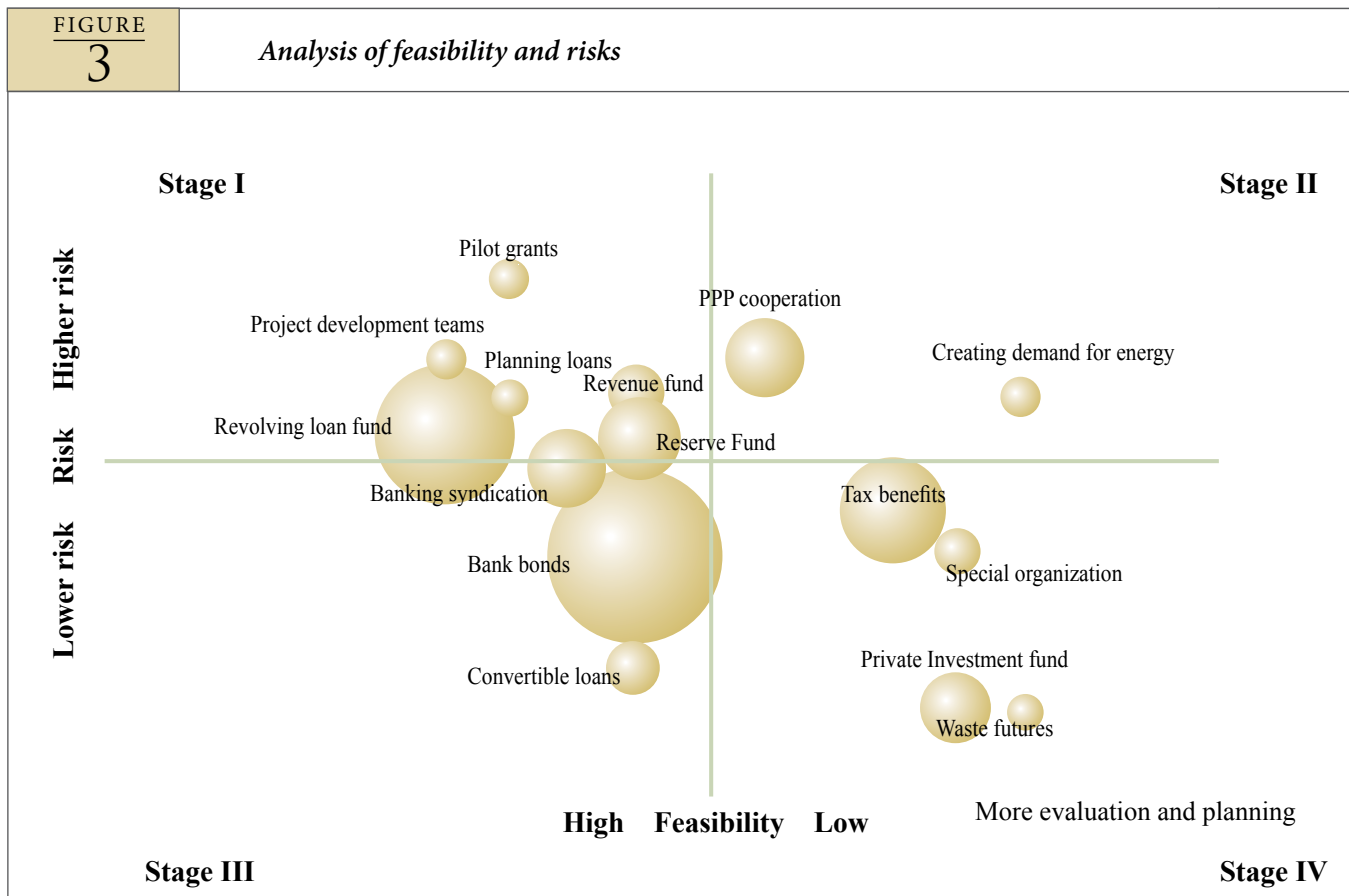


Leading Solutions

Once the initial analysis of feasibility and risks has been applied to every one of the various instruments proposed by Lab[®] participants, leading financial instruments were selected for further examination. Every instrument received a weighted grading based on the categories of feasibility⁷, risk⁸ and influence⁹. The results of this analysis are presented in Figure 3. It can be seen that the chosen instruments were a revolving loan fund, creation of a loan securitization mechanism and pilot grants. The leading mechanisms included PPP cooperation and bank syndication in order to arrange loans. The revolving fund was chosen for the following reasons: it has the ability to minimize the risks taken by local authorities; its capital cost is low, and it serves as a springboard for raising new capital for projects of this type; it will ensure correct business planning and will make it possible for local authorities interested in entering the process to implement it in practice. Pilot grants received high priority since part of the money is already available in the Cleaning Fund, and there are projects ready to start immediately. The grants can serve to demonstrate the ability of the market and the system to enter the source separation process, and provide an indication of the quality of the separated waste, the quantity of the waste in various streams, and the number of products that can be sold and used as a source of profits.

FIGURE
3

Analysis of feasibility and risks



The feasibility of implementing a revolving fund, bank bonds and banking syndication was considered in view of the fact that pilot grants are already being implemented in the context of Ministry of Environmental Protection activities, and the subject of PPP was extensively surveyed in the Lab®. Table 4 summarizes the main points raised, followed by details of implementation conditions and principles.

TABLE

4

Financial alternatives for funding solid waste projects

Instrument	Description	Applicability
<p>Revolving Fund: Funds with initial capital designated for a specific purpose. Such funds are capable of recycling loan funds in order to finance long-term projects along various time segments. In fact, the fund serves as a mediating tool between government authorities seeking to finance projects and financial bodies looking for investment opportunities.</p>	<p>A mechanism that provides long-term loans to local authorities in order to finance the construction of source separation infrastructures, collection mechanisms and end solutions for handling recycled waste.</p>	<ul style="list-style-type: none"> Similar successful funds are already operating in Israel. Some of the tipping fee revenues can be used to finance loans. Required: Current profit sharing Time to implement: 6-9 months
<p>Bank Bonds: Raising funds in the capital markets; the government or a number of authorities bundle a number of projects together and issue bonds against them. The bonds are issued at the government level rather than the local level, and the financial brokerage costs are low.</p>	<p>A local financial authority should be established in order to consolidate the municipal debts associated with solid waste, so as to provide access to capital, and reduce the risk element by pooling all risks in one place.</p>	<ul style="list-style-type: none"> There are presently no financial bodies with the authority to govern. An appropriate financial mechanism should be developed in order to make it easier to enter financial markets. Bonds should be planned with a competitive rating, and should be rated by international rating agencies. Required: A statutory financial authority Time to implementation: 1-2 years
<p>Bank Syndication: loans given directly to local authorities by a number of banks. This funding source usually characterizes short-term projects (up to 5 years).</p>	<p>Help to banks by participating in loans issued for single projects, so that the capital requirements are diminished and the risk spread over a number of lenders.</p>	<ul style="list-style-type: none"> Banks participate in syndication financing real estate acquisitions and business operations. The banks are interested Banks interested in participating should be found.

Leading Solution 1: Revolving Fund

Definition: Revolving funds mediate between government authorities wishing to promote and finance projects, and financial bodies and private investors seeking investment opportunities. Revolving funds have their own initial equity and are capable of recycling funds issued as loans, and using them to finance projects in various time segments.¹⁰

Operating Principles:¹¹

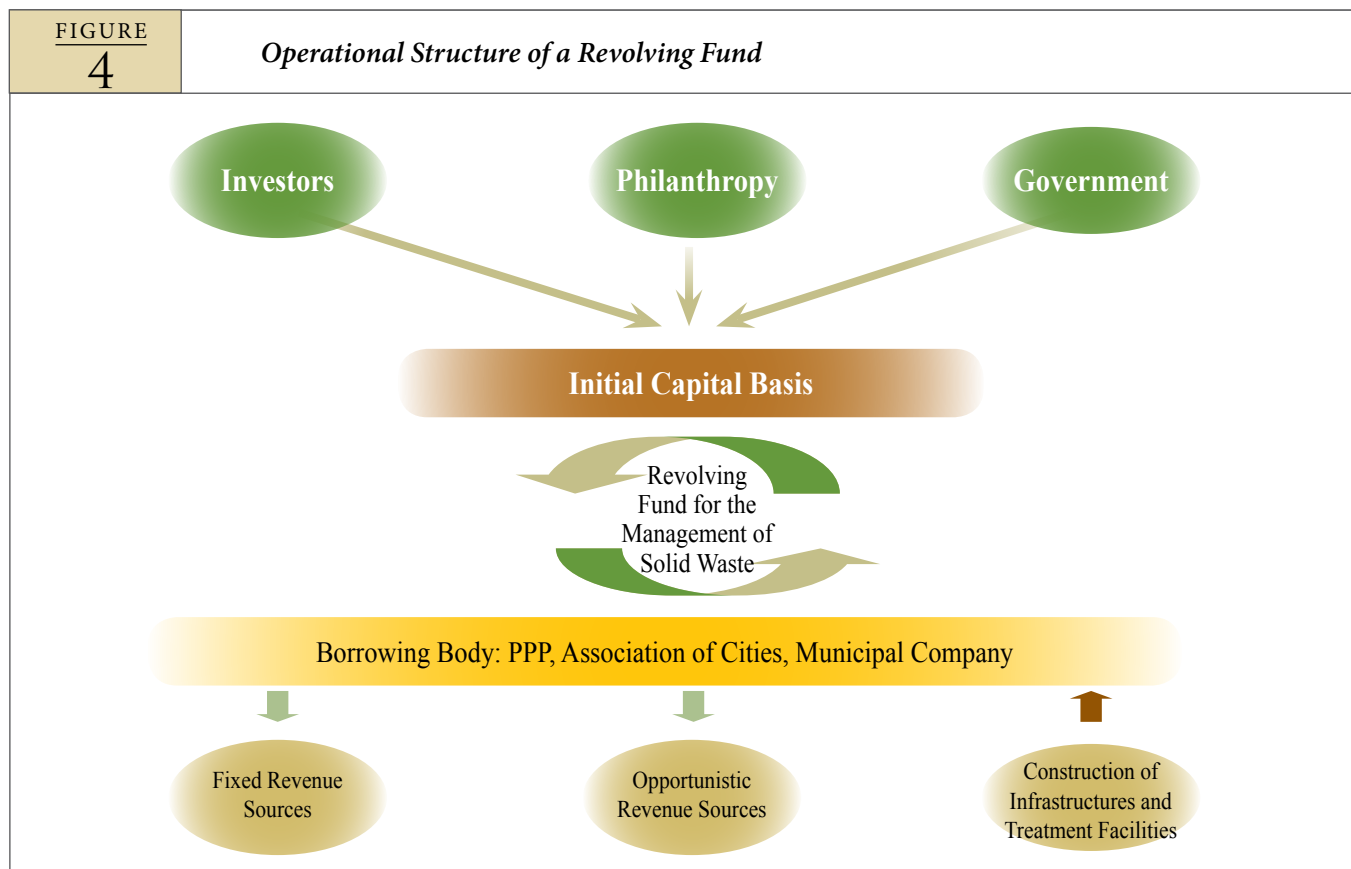
Project bundling: Project bundling makes it possible to reduce the cost of loans, thus enabling smaller projects to receive loans. When a bond is issued against a project bundle, the costs of issue per project are reduced as are the risks for bond investors. If a certain project encounters difficulties in covering its debts, the financial losses incurred will be smaller.

Specifically designated cash flows: Loans are repaid from project profits, which are earmarked from the outset for loan repayment and project operating costs. The project's cash flow structure must therefore allow a higher current cash flow than the sums required for loan repayment, so as to avoid problems with debt repayment when cash flow goals are not met.

Government involvement in Fund: The division of work between the government and the fund stakeholders must be clearly defined: who has the final say and responsibility in regard to prioritizing projects, in evaluating the solvency of loan recipients, in supervising construction progress and in managing borrower payments. Although the government is involved as an investor, its interests and responsibilities differ from those of private investors in the Fund. Moreover, it may be expected that the government will absorb greater project risks than would private investors, i.e., the government will be the second creditor, after private investors, in cases of insolvency.

Project development: A revolving fund can be constructed as a financing mechanism contingent on various project milestones such as the planning stage, model development and implementation. Alternatively, funds may be allocated as fixed amounts contingent on project success.

As may be seen in Figure 4, Fund capital is based on government sources, philanthropic sources and investors wishing to make a yield-bearing social investment. This capital basis can be leveraged by issuing revenue bonds, so that the revenues from each issue will be added to the Funds' capital basis.¹² The national government and the local authority thus share in the financing process, wherein the local authority receive a government budget on the one hand, and is obliged to augment it by 20 percent, on the other hand. The local authority may be an association of local authorities, an economic development company, or a PPP venture.



Financial Conditions:

Interest: Interest rates should be based on investment costs, project risks and management costs. Nevertheless, the Fund can issue low-interest loans to projects that are accorded national priority or projects that attain national goals (such as an association of local authorities or the construction of end facilities in peripheral or less-populated areas).

Due dates: A revolving Fund can issue variable-term loans. In general, the shorter the loan repayment period, the faster it may be possible to recycle the funds and issue new loans. Moreover short-term loans have lower interest rates for the Fund, so a balance must be sought between the scope of the loan and the ability to cover the Fund's expenses.

Collaterals: A revolving fund can finance 100% of the loan. In such a case, the Fund will be assigned the status of preferred creditor (accorded the same level of priority as customers and assets). Nevertheless, Funds commonly issue loans along with other lenders, in which case the status of the Funds is secondary to that of other lenders from the point of view of guarantees and participation in cash flows – according to the value of the project.

Management: Such a Fund may be managed by a government Ministry, a governmental authority, or an extra-governmental body established specifically for this purpose.

Loan recipients: The Fund will issue loans to bodies charged with the promotion and execution of projects that serve the purpose of the Fund in all that relates to the disposal of solid waste: to local authorities, to associations of authorities or to PPPs involved in establishing source separation infrastructures, sorting facilities, and facilities for handling separated waste.

Advantages: The advantages of revolving funds based on the American model are: the bundling of a number of projects together reduces insolvency risks; issue of bonds at a government rather than local-authority level; reduction of financial brokerage costs.

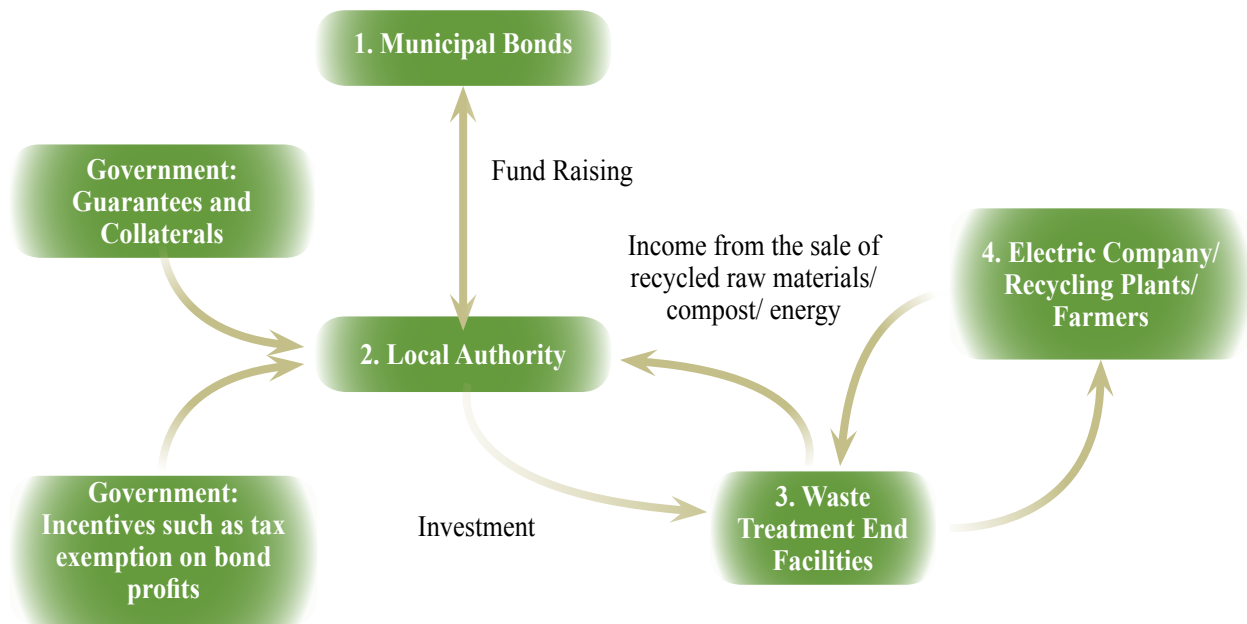
Leading Solution 2: Municipal (Revenue) Bonds

Definition: Bonds are tradable debt instruments issued by a borrower for a preset period. Bonds pay their bearers a fixed rate of interest (subject to the bond's conditions) up to the redemption date when the balance of the loan is repaid (the principal). Purchasing a bond is equivalent to giving the issuing party a loan.

The bond mechanism may be depicted in the following way:

FIGURE
5

Operational Structure of Municipal Bonds



Source: Shiri Heffer, Integrative Model of Solid Waste Disposal, Research No. 47, p. 26, The Koret-Milken Institute Fellows Program, 2011.

As shown in Figure 5, municipal bonds are issued by local authorities (either a single local authority or an association of authorities) or by local government bodies, in order to finance their activities. Loans are issued against municipal tax revenues or the expected profits of a specific project, and the project assets are usually pledged as loan collateral. Such bonds are tradable and the lender can sell them in capital markets. In the US, the interest revenues received on municipal bonds are tax exempt.¹³

Operating Principles:

There are two types of municipal bonds:

1. General Obligation – these are bonds used to cover authority deficits and current activities. The debt is paid out of local authorities' current revenues, and no specific revenues are earmarked for this purpose. This type of financial instrument therefore requires clear financial stability as a precondition for its use. Such strong authorities with budgetary surpluses as Tel-Aviv and Raanana are able to issue such bonds.¹⁴
2. Revenue Bonds – these are bonds issued in accordance with the expected cash revenues from a project. A separate municipal company is sometimes established in order to issue such bonds. In this way, no budgetary funds are pledged, and the credit risks involved are significantly reduced. This is in fact equivalent to capitalizing future project income flows to present values, and payment is made from said project's income flow. The project's cash flow structure must therefore allow a higher current cash flow than the sums required for loan repayment, so as to avoid problems with debt repayment when cash flow goals are not met.¹⁵

Sources: Capital market funds serve as the cumulative capital basis, i.e., funds belonging to both the private and public sectors.

Interest: Interest rates should be based on investment costs, project risks and management costs. The more risky the project and the less stable the local authority, the greater the risk and the higher the price of the bonds. Interest is fixed for the entire life of the bond. Since most municipal bonds in the US are tax-exempt, the interest rates are relatively low and encourage local authorities to borrow funds by means of this mechanism.

Due dates: Like any other type of bond, municipal bonds also pay interest at the end of each pre-determined period (quarterly, semi-annually, or annually), and the principal is paid along the life of the bond at fixed intervals, or at the end of the bond's life. The length of a bond's life depends on its type: In the case of revenue bonds issued against a specific project, bond life usually falls in the range of 10-30 years, but no longer than 120% of the life of the project assets against which the loan was taken (in the case of revenue bonds).

Collaterals: In the case of General Obligation bonds, the authority is required to show financial stability and budgetary surplus. In cases where funds are to be raised against expected profits from a specific project, the authority must prove that it has sufficient collaterals, which may be of a number of kinds: a. A government guarantee given in order to encourage this move; b. Pledging the assets of the planned project, and in the case of waste treatment facilities – pledging the buildings; c. Income flows such as municipal taxes or other income, to be used by the authority only in cases of insolvency.

Fees: The more complex the transaction, the higher the fees that will have to be paid to those involved in configuring it, but such costs may be included in the cost of the general transaction and depreciated along the life of the loan, as part of the loan itself.

Management: The bond issue can be managed by the relevant division of the local authority or by a company specifically established for managing the project, such as water and sewage corporations.

Potential partners: Government – the government can guarantee the bonds or provide collaterals, thus lowering their price. Additional potential partners are banks or financial companies that can support the entire issue process.

Loan recipients: Local authorities or companies set up by local authorities for specific purposes, such as companies handling water and sewage in Israel. Local government bodies can bundle together a number of projects initiated by a local authority or a number of local authorities, and issue bonds to finance them. This reduces the risk inherent in each project (cross-financing) and saves on transaction costs.

Advantages:

- More efficient handling of the authority's credit costs.
- This is sometimes the only option for receiving a loan. Because of their many deficits, some local authorities are forced to take loans at higher interest rates than market prices, and some of them are refused loans altogether.
- Extending the repayment period can lighten the financial burden of local authorities.
- Decreasing the volume of pledges that local authorities are obliged to provide in order to raise funds.
- Reducing the dependency of local authorities on central government, thanks to the reduced share of government funding in the total budget of the local authority.¹⁶
- It is possible to recycle the debt by issuing another bond series.
- The greater variety of financing sources increases in the area of interest rates on local authority loans, which usually leads to decreased interest rates.¹⁷

The greater variety of financing sources makes it possible to develop and promote social-economic projects and initiate projects that were not developed before.

In general, raising capital by means of bonds is a relatively new instrument in Israel. Only four local authorities out of 253 have applied it until now. According to the Budgetary Foundations Law, the issue of municipal bonds is contingent on the approval of the Minister of Finance and the Minister of Interior. The four authorities that have issued municipal bonds to date are Ramleh, Raanana, Yahud and Eilat. In November 2005, Ramleh raised NIS 140 million with a CPI-linked interest rate of 5.9%; In July 2006, Raanana raised NIS 150 million with a CPI-linked interest rate of 5.35%, in order to cover its deficits; In August 2006, Yahud-Neve Monsoon deployed a company established specifically for this purpose to raise NIS 100 million with a CPI-linked interest rate of 5.8%; Eilat raised NIS 80 million by securitizing its municipal taxes. Raanana issued a General Obligation type bond.

Leading Solution 3: Bank Syndication

Definition: Loans issued by a number of lenders, wherein one or more commercial banks, called the syndication organizers, manage and supervise the loan, and define its structure and conditions.¹⁵ The operational structure of bank syndication is depicted in Figure 6.

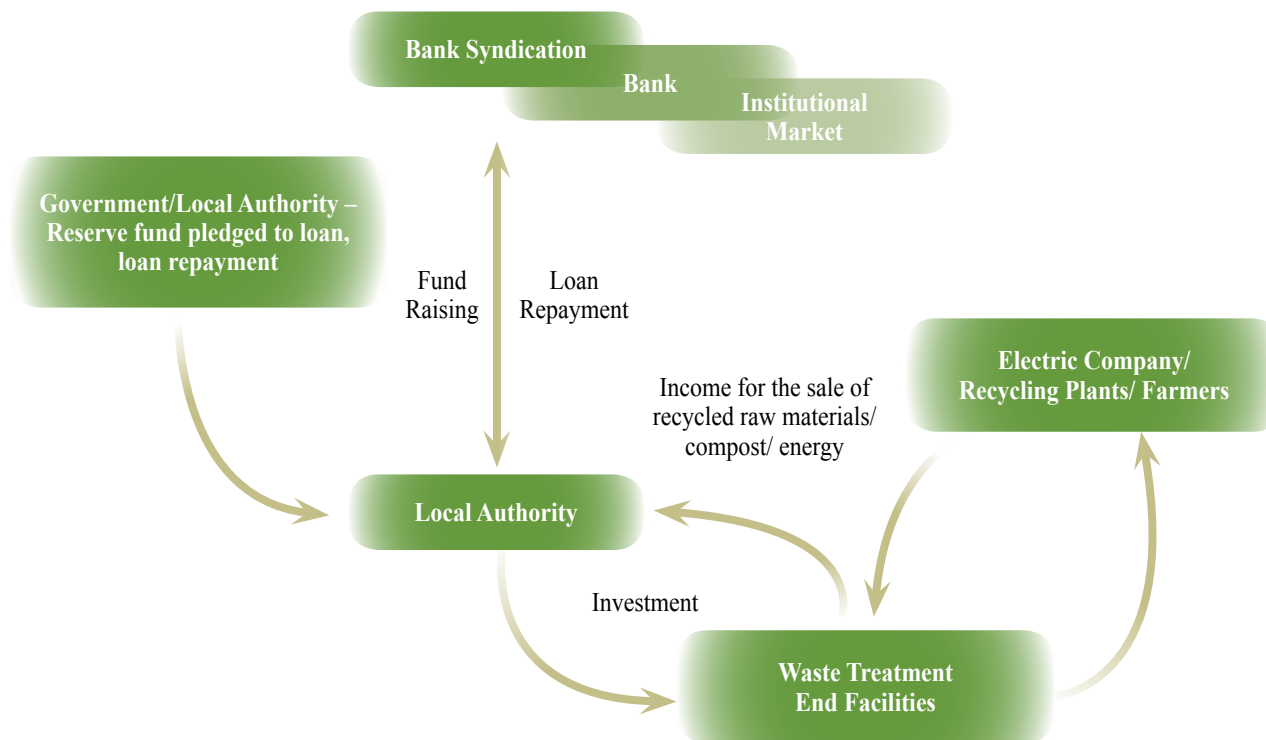
Operating Principles:

Project bundling: Project bundling makes it possible to reduce loan costs and issue loans for smaller projects. This also cuts financial losses in cases where a project encounters difficulties in repaying its debt.

Cash flow for a specific purpose: The loan is repaid from project revenues, which are earmarked from the outset for the sole purposes of loan repayment and project operations. The project's cash flow structure must therefore allow a higher current cash flow than the sums required for loan repayment, so as to avoid problems with debt repayment when cash flow goals are not met.

There are a number of common types of bank syndication:¹⁸

1. **Full underwriting:** The bank organizing the syndication guarantees the entire sum of the loan, and then offers the loan to additional bodies that purchase certain parts of it. Sometimes, in cases where it was unable to sell it in full, the initiator retains a higher percentage of the loan.
2. **Best Effort:** The initiator of the loan only guarantees a part of the full loan, but attempts to market it in full.
3. **Club Deal:** The loan is marketed to a number of lenders, and the initiator and the other lenders hold the loan in equal shares. This type of loan is more common for amounts not exceeding EUR 150 million, and usually only banks participate.

FIGURE
6*Operational Structure of Bank Syndication*

Source: Shiri Heffer, Integrative Model of Solid Waste Disposal, Research No. 47, p. 29, The Koret-Milken Institute Fellows Program, 2011.

Sources: Obviously, the capital sources for the loan are the funds provided by the banks or the financial companies and institutional market companies that have joined the syndicate. As can be seen in Figure 6, loan guarantees may be given by pledging the assets of plants to be erected (or other assets held by the authorities), or against a designated Fund based on local authority funds (where strong local authorities are concerned), or a designated governmental Fund, such as funds allocated by the Cleaning Fund, or an additional loan issued under the terms of the bank syndication. This latter loan will be invested in profitable channels, so that the interest return on them will be higher than the loan interest.

Financial Conditions:

Fees: Many kinds of fees are involved in bank syndication loans, including:

- Organizer's fee: paid by the loan recipient to the loan organizer for underwriting and organizing the loan (one-time fee).
- Management fee: Annual fee paid the bank or banks that manage the syndication.
- Retail fee: A fee paid by the organizer to the various lenders (one-time fee).
- Obligation fee: A fee paid to the lenders for outstanding loans.

Interest: The interest rate is determined by the banks, and is usually the CPI-linked market interest rate. The rate of interest changes from one syndication deal to another depending on the policy of the organizing bank or banks and the number of banks assuming the risk of non-repayment.

Due dates: Bank syndication can provide variable-term loans, but most loans are for the short to medium term, between one and five years, reflecting bank investments and loans policies.

Collaterals: Based on the syndication structure it is possible for one bank to guarantee the entire loan (full underwriting structure) or for several banks to share the collaterals according to the size of the loan and their share in the cash flows. The collaterals depend on the value and fluidity of the assets pledged for the loan. In the case of waste facilities, the assets are fixed and their purpose sufficiently important and permanent to make it difficult to convert to other purposes (owing to public limitations). It is therefore plausible that banks should demand additional guarantees to support the loan. The assets of end facilities and/or a reserve Fund or a Fund established specifically for this purpose on government funds, can be used as collaterals for loan repayment.

Management: In fact, the organizer raises capital for the borrower, and the borrower pays the organizer a fee for this service. Naturally, the larger and more complex the loan, the greater the risk involved, and the higher the interest paid.

Potential partners: Banks in Israel and/or overseas, financial companies, venture capital funds, capital funds and the institutional market.

Loan recipients: Bank syndication is an extremely common financing instrument both in Israel and the world. Loan recipients are usually financial companies, but there is nothing to prevent local authorities, associations of authorities, or PPPs, from obtaining loans of this type for the purpose of setting up source separation infrastructure, waste sorting facilities and waste handling facilities.

Advantages:

- Syndication loans are usually cheaper.
- Syndication loans are transactions with better capital and risk management, since the initiator of the loan can decide how much of the loan to leave with the bank, and how much to sell to other bodies.
- Such loans are financed by many bodies that share the risks involved in the transaction.
- Such transactions allow the initiator to collect fees for organizing loans.
- Such transactions offer an opportunity to raise bank funds, including foreign banks, in order to finance the loan.

Commencing from 1999, syndicated loans have become the norm in Europe for raising money from banks, financial bodies and institutional bodies. In Israel too, this is an accepted loan mechanism. One of the most famous transactions in Israel was the Haifa Refineries transaction, which was managed by a syndicate that included Bank Hapoalim in collaboration with Bank Leumi, Bank Discount, the International Bank, The Mizrachi Bank, Bank Igud, Amitim – Vetran Pension Funds, and the Insurance companies Clal and Harel.¹⁹

Summary and Recommendations

The “Waste Revolution” led by the Ministry of Environmental Protection constitutes a golden opportunity to upgrade the disposal of solid waste and turn it from a nuisance into a resource, while creating a variety of business opportunities.

Instead of issuing one-time support grants, which exploit the financing potential in a very limited way, it is possible to deploy a variety of financial instruments for use with different platforms. In order to leverage the insights produced by the Lab®, it is recommended that the following steps be taken immediately:

1. Establish an order of priorities for the solutions presented herein, according to their applicability to Israeli reality. How would one go about implementing each of the proposed models in the best way, considering existing Israeli policies, laws and regulations?
2. Conduct an in-depth analysis of the leading solutions and their applicability to short-term and long-term problems, by means of a model for analyzing the various models, including various scenarios with actual data relating to the expected costs and profits, based on plans already submitted by various authorities and research studies conducted by the Ministry of Environmental Protection’s economic unit. The model should be integrative and allow various stakeholders to consider project profitability from a number of perspectives (authorities, investors, government, etc.). The analysis may be carried out by developing tools for evaluating the various options, including models of graded financing in a variety of different scenarios.²⁰
3. Begin planning PPP projects by creating various PPP mechanisms similar to those implemented in Germany and other places. One should start the process with the Treasury and identify projects that may be suitable for small and medium scale PPPs.
4. When establishing a PPP model suitable for financing solid waste disposal in Israel, consideration should be given to the following issues:
 - Begin with projects requiring relatively low investments, with potential for expansion.
 - In the event of small local authorities, in which the quantities of waste collected, recycled and recovered cannot generate the scope of revenues required by a PPP project, all waste management components may be unified under a single project, or a number of authorities may be united within a single PPP project.
 - In addition to profits from the sale of recovered energy, it will be necessary to identify additional available sources of income, in order to create easily available and flexible capital for financing the project.
 - PPP agreements and the structure of business models must be compatible with the national goals of reducing waste streams (and securing the potential profits generated by them). It is possible that industrial waste would have to be included or waste transported from more distant sources.
 - There should be a ready source of funds available for financing the initial loans or capital investments. One option is a revolving fund or a reserve fund that will remunerate PPPs according to the attainment of national goals.
5. Establish a joint Milken Institute and Ministry of Environmental Protection team, in order to promote current work and examine solutions supporting decision making at President and Vice-President level.
6. Establish a professional administrative division at the Ministry of Environmental Protection in order to handle the issue of solid waste and support the actual planning and execution. This team will include technical personnel and people with a background in economics and project finance.
7. Establish a work group for the issue of financing in collaboration with the Treasury, the banks and representatives of the capital market. This group will offer a mixed perspective on the various issues, and provide relevant real-time feedback in regard to current data.
8. Include end facility beta-sites with innovative waste disposal technologies.

APPENDIX

Financial Innovation Lab® Participants

*(Affiliations at time of Lab®)***Gal Alon**

Collective Insights

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ENDNOTES

1. Eurostat, 2010 (29.3.2010), “Newsrelease”, Retrieved 11.6.11, from: http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/8.19032010-AP-EN.PDF-19032010-AP/EN/8
2. This is an important subject under the umbrella of European and German laws, as the changes are liable to be detrimental to the long-term contracts required for private investments.
3. According to European purchase laws, all agreements between the public and private sectors must be made through a tendering process. The only exception to this rule is that of an “In-House Business”. In this situation a public body contracts with a private one, but the contract and the agreement are managed and held by a majority of the public body (the main partner). In such cases, the contract does not require a tendering process.
4. In Germany, the advantage of the public partner is based on tax exemptions that are given to local authorities. German local authorities are also entitled to take out very low interest loans, for they have an AAA credit rating. The situation in Israel is different and the advantage of the public partner will be expressed in the formation of a reserve/revolving fund or some other financing instrument that will serve as collateral against loans taken (see the recommendations section).
5. The public body has identified the demand for waste and is contractually obligated to make sure that a certain quantity of waste is provided within a specified period. Otherwise, the public sector will be obliged to cover the difference.
6. A situation of cross-interests may arise when a PPP project relies on long-term waste streams as a source of future revenues, while at the same time the goal of the public and the authorities is to reduce the amount of waste to the greatest extent possible. The German experience indicates that when waste streams gradually decline, industrial waste or waste transported from more distant sites may be added to the process. In any case, the agreements between the private partners and the public partner will be of the “Bring or Pay” kind, or some other such adjustment, so that a steady stream of revenues may be counted on.
7. Applicability was examined on the basis of speed – the ability to carry out the project in the medium or short term, existing legislation, regulation and project planning; of project scope - the availability of stakeholders capable of implementing the plans with existing teams, organization and structure; of demand – available markets, removal of barriers to immediate entry; and of capital - the availability of financing sources.
8. The risk was considered on a political basis – political groups with conflicting interests, support, win-win; a financial basis – inbuilt risks, benefits and loss of control; and implementation – the ability to implement the original planning, and to construct and complete projects.
9. The impact was examined on the basis of results – the raising of large volumes of private capital, growth in net capital, new market players; industry – high quality, added value, new employees, growth potential; fiscal - balancing the income from taxes with the cost of services; sustainability - long-term and independent sustainability; technology - beta-sites for new technologies.
10. Johnson, C. L. 1995. “Managing Financial Resources to Meet Environmental Infrastructure Needs: The Case of State Revolving Funds”, *Public Productivity & Management Review*, 18 (3): 263-275.
11. Susan Weil’s lecture on river revitalization, at the Milken Financial Innovations Lab®, 2008, Israel.
12. Ashkenazi, A. 2009. “Financial Tools for River Restoration in Israel”. Research Report, Koret-Milken Institute Fellowship Program.
13. Dafni, G. 2007. “Municipal bonds – are there alternatives”? *Arnona – Periodical for Law, Taxes and Real Estate*.
14. Ibid.
15. Ibid.
16. Ibid.
17. Office, U.S.G.A. 2008. *Tax-Exempt Status of Certain Bonds Merits Reconsideration, and Apparent Noncompliance with Issuance Cost Limitations Should Be Addressed* U. S. S. Report to the Committee on Finance.
18. Polenberg, R. M. L. Sucheet and C. Gupte. 2010. *A Guide To The European Loan Market*, Standard & Poor.
19. Godlewski, C. J. 2008. *Banking Environment, Agency Costs, and Loan syndication. A cross-Country Analysis*. Sciences Economiques. Foret Noire, France, Louis Pasteur University.
20. Rauchenberegger M., 2010. “Bank Hapoalim expands its activity in the areas of credit loans”, *TheMarker*, Haaretz.
21. A model of this type was developed in the context of work done by Koret-Milken Institute Fellow, Shiri Heffer. Her research was published in the context of the Koret-Milken Institute Fellows Program and is available at: www.kmifellows.org.



Financial Innovations Lab® Report


Financial Innovations Labs® bring together researchers, policy makers, and business, financial, and professional practitioners to create market-based solutions to business and public policy challenges. Using real and simulated case studies, participants consider and design alternative capital structures and then apply appropriate financial technologies to them.

This Lab® report was prepared by Dr. Vered Blass, Shiri Heffer, Steven Zecher, Prof. Glenn Yago, and Caitlin MacLean.

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About The Milken Institute

A nonprofit, nonpartisan economic think tank, the Milken Institute believes in the power of finance to shape the future. The Milken Institute produces rigorous, independent economic research — and maximizes its impact by convening global leaders from the worlds of business, finance, policy, academia, and philanthropy. By fostering collaboration between the public and private sectors, we transform great ideas into action.



FINANCING SOLID WASTE DISPOSAL IN ISRAEL



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