

7.4 Financial System

7.4.1 Current Financial Problems to be Taken into Account

It is a basic principle of SWM that all expenditure (i.e., direct and indirect costs) of cleansing services should be covered by the cleansing fee income. However, as also expressed in the Progress Report (1), in year 1999 9 municipalities out of 14 municipalities could not even cover the direct costs of cleansing services by the cleansing fees collected.

As for 4 municipalities out of 9 municipalities that use CAESS/DELSUR for MIDES landfill fee collection, the final disposal expenditure (i.e., MIDES tipping fee payment and CAESS/DELSUR commission payment) in 8 months in 1999 exceeded the income (landfill fee income collected at the same period from users by CAESS/DELSUR).

This implies the following 3 problems:

- Problems of SWM fee collection system;
- Problems of high tipping fee of MIDES landfill; and
- Problems of administration and control.

7.4.1.1 Problems of SWM Fee Collection System

Said problems can be categorized into “tariff structure problems” and “fee collection efficiency problems”.

a. Tariff Structure Problems

As for **cleansing fee (tasa de aseo)**, the majority of 14 municipalities collect it in proportion to property/floor area size that users occupy. The principal problem of this tariff structure is that people who discharge wastes but do not occupy property/floor area are not obliged to pay for cleansing services. Meanwhile, the fee payment in proportion to property/floor area size is sometimes criticized, as allegedly claimed being unfair due to irrelevancy to waste amount discharged. Under such circumstances, most municipalities apply differentiated tariff structure for domestic users and commercial/institutional users. However only Ilopango and Nejapa municipalities apply distinct tariff differentiation of more than 4 times. San Salvador municipality has a different service so-called “special collection (recolección especial)” for commercial/institutional users. Mejicanos municipality applies a specific duty (proportion to waste volume: 200.00colon/ton) for large dischargers. In April, 2000 Ilopango municipality introduced a specific duty of 225collon/ton. The specific duty (proportion to waste volume) with reasonable tariff rate is recommendable, since it could cover the costs of the same service and also it could motivate such waste generators to practice waste minimization efforts.

As for the **landfill fee (tasa de relleno)**, it is collected in proportion to electricity consumption. It is true that the electricity consumption and waste discharge amount is not a lineal proportional, however, it is general for domestic users that higher income households consume more electricity and produce more waste and lower income households consume less electricity and produce less waste. Therefore, it could be viewed that such a tariff structure should be socially acceptable.

It is important to distinguish problems of “tariff collection system (sistema de recaudacion)” and “whether tariff rate be reasonable or expensive”. This report has an opinion that the tariff collection system for household in proportion to electric consumption is acceptable.

As for the problem of “whether tariff rate be reasonable or expensive”, following problems are envisaged.

- The minimum landfill tariff rate for household (even as small as from 5colon/month in San Salvador and Ilopango to 3colon/month in some municipalities) could be a heavy financial burden for poor marginal households.
- The maximum landfill tariff rate for commercial/institutions (e.g., 300 colon/month) is not reasonable. Because waste discharge by commercial and/or institutions accounts for considerable amount, on the other hand MIDES charges the tipping fee to municipalities in proportion to amount (i.e., US\$18/ton). In this respect, Ciudad Delgado (450colon/month) Nueva San Salvador (500colon/month) and Apopa (1,000colon/month) have higher maximum rate, however, it can not cover the corresponding cost (MIDES tipping fee) charged on the amount that large commercial/institutions discharge.
- The landfill tariff for commercial/institutions (i.e., in proportion to electricity consumption) is not appropriate. Waste discharge amount is diversely different among commercial/institutions even the electricity consumption is similar, therefore it lacks fairness in burden allocation among such users.

b. Fee Collection Efficiency Problems

Fee collection efficiency is now under further investigation for both cleansing fee (tasa de aseo) and landfill fee (tase de relleno) with respective categories of domestic and commercial/institutions.

As the Progress Report (1) describes, such efficiency in 1999 was estimated to be 20 to 70% for cleansing fee and 40 to 90% for landfill fee. On the other hand, the collection efficiency through CAESS/DELSUR electricity bills ranges 70 to 83%.

A lower efficiency in cleansing fee collection (other than San Salvador and Cuscatancingo municipalities) is mainly attributable to that:

- there are no compelling measures in demanding such payment; and
- users' data base is insufficient and/or not managed well.

On the other hand, the landfill fees and cleansing fees of San Salvador and Cuscatancingo municipalities are efficiently collected by these electric companies, due to the compelling measure (i.e., suspension of electricity supply in case of more than 2 months delayed payment). However in 1999, when an electricity bill was not paid in a month, the unpaid amount of landfill fees was not accumulated on the subsequent month bill. Consequently, it contributed for lowering the fee collection efficiency. It is expected that the fee collection system will be improved that unpaid amount will be accumulated on subsequent invoice.

7.4.1.2 Problems of High Tipping Fee of MIDES Landfill

Municipalities that dispose of their waste at MIDES Nejapa landfill have too heavy burdens of the expensive unit rate US\$18/ton and minimum guarantee quantity.

Table 7-6: Billing amount by MIDES and Burden to Municipal Finance in 1999

	MIDES billing in 1999 (1000colones) (A)	Discharge amount (ton)	Unit price (US\$/ton)	Gross municipal expenditure (actual) (1000colones) (B)	Share of landfill expenditure (A/Bx100)(%)
San Salvador	25,700	70,179.4	41.9	383,030	6.7
Mejicanos	3,563	17,401.7	23.4	18,240	19.5
Delgado	1,837	7,992.0	26.3	20,841	8.8
Ayutuxtepeque	689	2,727.8	28.9	6,754	10.2
San Marcos	1,457	7,226.5	23.0	9,436	15.4
Nueva San Salvador	5,175	12,251.0	48.3	34,600	15.0
Soyapango	8,266	20,637.6	45.8	41,728	19.8
Ilopango	2,374	11,638.2	23.3	13,337	17.8
Apopa	3,190	13,795.8	26.4	11,297	28.2
Nejapa	383	1,916	22.8	4,963	7.7

Note: US\$ 1.00 = 8.75 colones

The unit rate US\$18/ton should be considered to include not only tipping service but also the services of transfer station(s) and transport, etc. However, such other services are not provided or prepared yet.

Whereas, it should be expected that the minimum guarantee quantity be reviewed and revised in the near future, member municipalities need to pay the invoice amount under such present circumstances that weighbridge data is solely controlled by the service provider CINTEC. It should be necessary that member municipalities (client of the service) should establish their own weighbridge measures control.

7.4.1.3 Problems of Administration and Control

a. Problems of Income Administration

Administration on fee collection should be such that which invoice is paid on time and which is not should be identified for example within one month in order to hasten to urge the due payment.

However under the circumstances, municipalities such as Tonacatepeque leave the fee collection as an unforced process for citizens.

Meanwhile, even municipalities that use the compelling measure (electricity bill by CAESS/DELSUR) delay the reminder that urges due payment, in many cases.

b. Problems of Expenditure Administration

All municipalities except for San Salvador municipality do not have an accountant inside the cleansing section who controls the expenditure of the same section. In a nutshell, overall control on cleansing budget is mostly absent. Furthermore, such budget is not separately controlled in categories of various cleansing service

activities. Therefore, even the expenditure itself is not monitored in a category-wise manner.

Although expenditure on fuels, lubricant and spare parts are monitored, they do not have database to monitor and control the working hours, collection/transport activities, weighbridge measurement that should be correlated with each other for the overall administration. Accordingly, cleansing services become costly.

Table 7-7: Comparison of Waste Collection Costs

	Collection cost in 1999 (1000 colons)	Cost efficiency per vehicle (1000 colon/vehicle)	Cost efficiency per worker (1000 colon/worker)	Unit cost per ton collected (colon/ton)
San Salvador	14,294	264.7	28.6	87.7
Mejicanos	2,352	235.2	48.0	97.1
Delgado	1,059	151.3	42.4	100.1
Cuscatancingo	1,296	185.1	58.9	144.1
Ayutuxtepeque	503	251.5	62.9	142.4
San Marcos	2,265	283.2	80.9	209.5
Nueva San Salvador	7,068	471.2	95.5	265.0
Antiguo Cuscatlan	4,884	444.0	88.8	337.5
Soyapango	4,159	260.0	46.2	96.2
Ilopango	1,968	218.6	35.1	132.5
San Martin	1,019	203.7	50.9	121.3
Apopa	1,210	172.8	43.2	76.4
Nejapa	224	112.0	37.3	135.5
Tonacatepeque	392	195.9	49.0	53.7
Total	42,693	275.4	44.1	120.8

Note: Calculated by JICA Study Team

7.4.1.4 Financial Problems in the Near Future

The above problems imply large difficulties in pursuing sustainable municipal SWM. Among other, collection vehicles donated by the Japanese government in 1989 and 1996 become old and their remaining service life is short. It accordingly is necessary to replace those collection vehicles in the near future which could impose notable financial burden on respective municipalities' finance.

In this context, impacts of municipal finance till the year 2010 (M/P target year) are preliminarily examined on the assumption stated below:

a. Assumptions

- **Vehicle renewal period:** Vehicles donated in 1989 should be replaced in 2001 and those in 1996 be replaced in 2003. Vehicles to be increased due to waste collection amount increase in the future should also be replaced after 7 years service life. Unit investment cost (i.e., purchase price of vehicles) is estimated as 80,000US\$/unit herewith.
- **Income projection:** SWM fees consist of cleansing fee and landfill fee. Such fee rates and fee collection efficiencies for respective categories of

domestic and commercial/institutions are currently under investigation. Therefore, the relevant data forwarded before 16th June 2000 by counterpart of Cuscatancingo and Nueva San Salvador municipalities are referred in this examination. Proportions of fee income from domestic users and from commercial/institutions are assumed to be the same proportions of waste discharge amount by respective categories obtained by WACS. The domestic fee income is projected to grow in proportion to the population increase. The commercial/institutions fee income is projected to expand in proportion to the GRDP growth. population increase.

- **Expenditure projection (disposal cost):** The MIDES landfill tipping fee is assumed to be US\$18/ton. Tipping fees of other sites are assumed to be US\$3/ton. Expenditure is projected as “future increasing disposal amount” times “such unit rate per ton”. However, MIDES’s minimum guarantee quantity is not considered for this estimation.
- **Expenditure projection (collection/transport cost):** The collection and transport cost is projected as “future increasing collection amount” times “current 1999 collection/transport unit costs per ton”.
- Other expenditures such as street sweeping costs and workshop cost are assumed to be same as that in 1999.

b. Calculation

b.1 Replacement in Year 2001

In order to replace the vehicles in 2001, following 5 municipalities need to transfer some amount from municipal budget to the cleansing budget. It will be a real heavy burden especially for Tonacatepeque municipality, since it needs to transfer about 50% of municipal budget for the collection vehicle replacement (see the table below).

Table 7-8: Municipal Burden to Replace Vehicles in 2001

	Number of replace vehicles	Share of SWM burden (Total SWM expenditure – SWM fees) to Total Budget (%)
Mejicanos	3	0.3
Ayutuxtepeque	1	5.1
San Marcos	2	14.6
Soyapango	6	3.0
Tonacatepeque*	3	49.4

Note: * There were no vehicles granted by Japanese, but the purchase of vehicles is needed.

b.2 Replacement in Year 2003

Replacing the vehicles in 2003 requires 12 municipalities to transfer some amount from municipal budget to the cleansing budget.

Antiguo Cuscatlan, and Tonacatepeque municipalities may face a heavy financial burden, because the transfer from municipal budget to cleansing budget may account for more than 20 % for them (see the table below).

Table 7-9: Municipal Burden to Replace Vehicles in 2003

	Number of replace vehicles	Share of SWM burden (Total SWM expenditure – SWM fees) to Total Budget (%)
Mejicanos	7	16.1
Delgado	7	9.6
Cuscatancingo	4	16.3
Ayutuxtepeque	1	3.9
San Marcos	2	19.9
Antiguo Cuscatlan	3	24.3
Soyapango	14	15.6
Ilopango	5	7.7
San Martin	2	12.4
Apopa	5	11.6
Nejapa	1	9.6
Tonacatepeque	2	36.2

b.3 Total Income/Expenditure Balance till Year 2010

In comparing the projected income and expenditure till 2010, it is forecast that 6 municipalities are in positive and 8 municipalities in negative.

San Salvador and Nueva San Salvador municipalities are constantly in positive balance from 1999 to 2010. On the contrary, Antiguo Cuscatlan, Nejapa, and Tonacatepeque municipalities are constantly in negative through the years till 2010.

Table 7-10: Total Balance of SWM until 2010

Unit: 1000 colones

Total Balance +		Total Balance –	
Possible to replace vehicles by waste taxes income		Impossible to replace vehicles without budget transfer from general budget of Municipality	
San Salvador	379,036	Cuscatancingo	-3,871
Nueva San Salvador	57,500	Ayutuxtepeque	-279
Mejicanos	485	San Marcos	-9,094
Delgado	7,254	Soyapango	-17,366
Ilopango	15,361	Antiguo Cuscatlan	-57,336
Apopa	4,578	Nejapa	-5,938
		San Martin	-18,370
		Tonacatepeque	-24,183

7.4.1.5 Effects of Fee Collection Improvement and Introduction of Transfer Stations

In order to examine alternatives for an optimum financial plan for the M/P, the cash flow of respective 14 municipalities is forecast for the following cases:

- Fee Collection Improvement
- Application of specific duty system (fee rate proportion to waste volume) for commercial/institutions waste
- MIDES landfill tipping fee reduction
- Introduction of Transfer Stations (T/Ss).

a. Assumptions

- Fee collection efficiency will be gradually raised up to 90% in 2010 from the present one.
- A specific duty system (fee rate proportion to waste volume) will be applied for commercial/institutions waste. Assumptions are that 50% of such waste is from large dischargers, the fee rate for such dischargers is to cover the direct cost of collection/transport services (including vehicle depreciation costs) and the landfill tipping fee.
- MIDES landfill tipping fee is US\$9/ton for 10 municipalities, and other 4 municipalities will perform their final disposal at a cost of US\$3/ton.

b. Calculation

b.1 Case A

Two (2) numbers of 300ton/day T/Ss and one (1) number of 600ton/day T/S are introduced. The assumption is that such T/Ss and transfer transport services are provided by a private sector charging such services fee as a unit rate of US\$/ton on delivered waste amount for user municipalities.

Financial conditions for a private sector, in constructing T/Ss and purchasing transfer vehicles, are assumed as follows.

- Costs for guarantee and insurance is 15.5% to the total investment cost. An interest rate of 7% is assumed for the long term loan.

As for operation and maintenance (O&M), the following are assumed:

- general administrative expenses are 10% of the net O&M costs; and
- profit rate is 5%.

It is estimated that T/Ss will be operated from Year 2004 and user municipalities for respective T/Ss are as shown in the table below.

Table 7-11: Scale of T/S and Municipalities Using T/S (Case A)

	Transfer capacity	Municipalities using T/S
T/S 2-1	300ton/day	SS (1,2,5 districts),ST,AC
T/S 2-2	600ton/day	SS (3,4 districts) , MJ,CD,CT,AY,SM
T/S 2-3	300ton/day	SY, IL,SMT

In the consequence, unit rates charged to user municipalities are calculated as shown in the table below.

Table 7-12: Unit Cost and Breakdown (Case A)

	Unit cost (US\$/ton)				
	Total	Breakdown of cost			
		T/S	Haulage	Financial cost & Taxes	Administration & Profit
T/S 2-1	5.08	1.42	2.06	1.27	0.33
T/S 2-2	3.94	0.90	1.86	0.85	0.33
T/S 2-3	5.22	1.48	2.03	1.37	0.34

b.2 Case B

One (1) number of 300ton/day T/S and one (1) number of 900ton/day T/S are introduced. The assumption is that such T/Ss and transfer transport services are provided by a private sector charging such services fee as a unit rate of US\$/ton on delivered waste amount for user municipalities.

Assumptions on financial conditions are the same that applied for the Case A.

It is estimated that T/Ss will be operated from Year 2004 and user municipalities for respective T/Ss are as shown in the table below.

Table 7-13: Scale of T/S and Municipalities Using T/S (Case B)

	Transfer capacity	Municipalities using T/S
T/S 3-1	300ton/day	SS (2,3,4 districts),ST,AC
T/S 3-2	900ton/day	SS (1,5 districts) , MJ,CD,CT,AY,SM, SY, IL,SMT

In the consequence, unit rates charged to user municipalities are calculated as shown in the table below.

Table 7-14: Unit cost and its Breakdown (Case B)

	Unit cost (US\$/ton)				
	Total	Breakdown of cost			
		T/S	Haulage	Financial cost & Tax	Administration & Profit
T/S 3-1	4.58	1.26	1.94	1.08	0.30
T/S 3-2	3.96	0.81	1.86	0.97	0.32

b.3 Improvement of Total Balance until Year 2010 by Adopting Respective Measures

The table below shows financial improvement of total balance until year 2010, when series of improvement scenarios are carried out such as, “fee collection rate increase (up to 90%)” and “specific duty (US\$/ton) application on large dischargers”, “MIDES landfill tipping fee reduction” and “use of T/Ss and transport”.

Table 7-15: Improvement of Total Balance until Year 2010 by Adopting
Respective Measures

Unit: 1000 colons

	→ →	→ →	→ →	→ →	→	→
	Original balance estimated on vehicle replacement	Balance improvement after "Fee collection rate increase"	Further balance improvement after "specific duty on large dischargers"	Further balance improvement after "MIDES tipping fee reduction to US\$9/ton"	Further balance improvement in case of "Case A T/Ss use"	Further balance improvement in case of "Case B T/Ss use"
San Salvador	392,459	454,008	same as before*	645,594	671,543	668,267
Mejicanos	485	27,310	- ditto -*	53,419	57,484	55,589
Delgado	8,652	19,132	23,174	33,411	34,603	35,443
Cuscatancingo	-4,571	-2,061	1,007	1,007	3,496	1,890
Ayutuxtepeque	-279	2,196	3,767	7,213	8,652	7,869
San Marcos	-9,094	2,938	5,076	15,798	11,274	6,024
Nueva San Salvador	57,500	73,543	84,053	113,557	140,995	139,631
Antiguo Cuscatlan	-62,936	-54,864	-49,195	-49,195	-17,199	-22,347
Soyapango	-17,366	15,277	31,826	85,208	97,143	99,071
Ilopango	15,361	24,702	28,889	44,169	50,607	51,848
San Martin	1,995	9,071	10,798	10,798	12,360	12,315
Apopa	4,578	42,108	46,275	61,853	-	-
Nejapa	-5,938	-4,443	-3,677	-2,081	-	-
Tonacatepeque	-24,183	-22,788	-20,120	-20,120	-	-

Note: * The tariff of non-domestic waste has already changed to reflect the waste weight.

Attention should be paid to that even series of the income improvement assumed above take place, Nejapa and Tonacatepeque municipalities will have a negative balance in total till 2010. Drastic measures to improve the income and/or reduce the SWM costs should be carefully considered.

The above financial improvement scenarios assumed should be taken into consideration for formulating the Master Plan (M/P).

Meanwhile, although the total financial balance until 2010 would be improved to follow the scenarios above, in 2003 when several collection vehicles should be replaced to new ones 6 municipalities may need to transfer some municipal budget to SWM budget as shown in the table below.

Table 7-16: Municipal Burden Transfer to replace vehicles in 2001 and in 2003

	2001	2003
Cuscatancingo	0%	8.8%
Ayutuxtepeque	0.8%	0%
San Marcos	3.5%	0%
Antiguo Cuscatlan	0%	14.8%
Nejapa	0%	7.0%
Tonacatepeque	48.8%	31.9%

7.5 Regulatory Framework for Competitive Services

7.5.1 Introduction

***Report by CEPAL.- April 2000**

The quantity and quality of public services has improved in Latin America. PPS generalized throughout the region during the 80's, and in the 90's there was a significant progress in the regulation of the markets. However, experience showed that competitive conditions cannot be always guaranteed, and that it is necessary to improve the regulatory frameworks and practices.

The integration in the establishment of quality control rules of the service and the sanctions for their infringement, same as the information to users, are relevant elements that must be considered more in detail for the regulation.

The absence of a regulatory instrument to render the solid waste management services in San Salvador metropolitan area is one of the main limitations to improve the performance by the service providers and to care about the inhabitants' health and protect the environment, as well as to maximize the resources devoted for such activities and promote competition.

Meanwhile, it is important to have an organization that performs as a regulator, for which the possibility of assigning that duty to the Superintendent's Office of Electricity and Telecommunications (SIGET), by modifying its law of creation, as other countries have made, and utilizing the regulatory experience achieved and decreasing regulation costs.

7.5.2 General Rules of Regulation

General rules of regulation to render a public service of solid waste management and PPS

A well designed and general regulation has several advantages, among which the following can be mentioned:

- Rent-seeking activities will be partially eliminated, since the competition rules for the sector are broadly outlined in the regulatory framework.
- The customer-provider relationships are defined. This fact reduces the problems of uncertainty and thus cuts costs.
- Incentives are promoted or created so that private capital can participate in the sector.
- Externalities are reduced (environmental damages, abuse towards certain group of customers, etc.)
- Minimum quality standards for rendering the services are fixed.
- Rules to reduce the unbalance of information through the establishment of information submission norms.
- The alternative of an excessive abuse of market power by the operator is reduced.
- Competition and thus efficiency are ensured by setting the rules for segmentation

of the markets.

7.5.3 Policies of Competition

7.5.3.1 Policies of Competition and Rules of Vertical Integration²

The analysis of vertical integration corresponds to the concept of assessing the benefits versus the costs (risks) of an integration of the markets by allowing the vertical integration of the diverse functional categories or activities.

a. Household Collection, Sweeping and Recycling

Please note that the activities of household collection, sweeping (mainly when conducted manually) and recycling are correlated. That is, the economy of scale is achieved when integrating them together. When sweeping is conducted mechanically, this activity can be isolated as another functional category, since there would be no profit from the economy of scale when aggregating it because they would behave as independent activities.

Recommendation: For the specific case of San Salvador Metropolitan Area, provided that sweeping will be carried out manually in all the markets, the vertical integration of these three activities is recommended. That is, PPS should be called through competitive tenders, and for household collection, street sweeping and recycling as a whole.

b. Vertical Integration: Household Collection-sweeping-recycling and Final Disposal

Technical evidence shows that the collection activities (including sweeping and recycling) are totally independent from the activity of final disposal. By vertically integrating these activities there are no guarantees through the achievement of economy of scale.

In general, it is convenient that the private sector participate in this activity but without getting integrated into the collection sector, because otherwise there is a risk of creating a monopoly in the long term and discrimination against other collection service providers with the purpose of integrating bigger markets in a horizontal manner.

It is expected that MIDES investment program is modified and it can determine both the actual investment cost (to be regulated according to the capital cost rate) and the real operation costs per functional activity, with the purpose of regulating the price through a formula of a "price cap with no readjustment". And it is expected to be reviewed every year.

To prevent MIDES project from falling into the "Averch-Johnson" (or over-investment) effect, it is recommended to use regulation parameters for final disposal costs in Latin America.

² It is the control by the same individual or enterprise, or by its affiliates, of the operation of several activities or functional categories of solid waste management within the same geographical market.

- a. It is recommended that PPS should be allowed in a manner that competition exists, and to become able to develop a future final disposal capacity in San Salvador. Prices should be regulated according to the service cost with the capital cost rate.
- b. Consequently, the document of Regulatory and Institutional Framework for Solid Waste Management has been formulated, for competition purposes, in order to limit the vertical integration between this final disposal activity and collection (recycling and sweeping) activity.

Final recommendation: It is recommended to limit the vertical integration. That is, an enterprise or juridical person that controls a collection area cannot possess a final disposal system. Finally, it is recommended that the rules of competition should be reviewed by the Office of Consumer Protection, since, according to law, this institution must watch for the competition and protection of the consumer against monopoly, the use of discriminatory or plundering prices or the existence of monopoly prices as a result of collusion activities.

7.5.3.2 Policies of Competition and Rules of Horizontal Integration³ (Merger of Horizontal Markets and/or Participation of enterprises in Various Areas)

The market of AMSS has been evaluated and it has been determined that the only market that can be segmented is the one of San Salvador. A further segmentation of the markets cannot be thought of, due to that the municipal governance should be respected, and the only market feasible to become segmented is that of San Salvador municipality; otherwise the economy of scale is lost in smaller municipalities.

It can be concluded that “**no horizontal integration of the markets in the future is feasible**”. In that sense, the regulatory and institutional framework proposed has established that merger is not allowed horizontally. The collection enterprises will only have participation in a single area. No relation among the providers of the collection service will be allowed in the areas or markets proposed.

Final recommendation: The regulatory and institutional framework clearly states that the person or enterprise that controls a collection area can have no further participation into another collection enterprise or into an enterprise that manages a sanitary landfill in a private manner or through a system where such enterprise sets the prices of said sanitary landfill.

7.5.4 Service Quality Parameters

The service quality parameters must be verified by an organization unrelated to the provider of the service. If the municipalities will directly conduct the rendering of the service, they cannot be in charge of verifying the quality of such services. Therefore, it is recommended that the verification of the quality of the service be in charge of regulator. For the purposes of the amount of the fines suggested, the **minimum urban salary (MUS)** is used for San Salvador metropolitan area.

³ It is the control by the same individual or enterprise, or by its affiliates, of the operation of a similar functional category or activity of solid waste management.

7.5.4.1 Service Quality Parameters for Collection and Sweeping

It is quite important that the user is duly informed on their right to claim for several typical reasons such as the following:

- Private operators, before a tariff structure of unit prices or volume prices (price per container) tend to not empty the container completely.
- The collection staff tends to ask for contributions and conditions the quality of the service rendered with the contribution received. In most of the efficient collection systems, the practices of requesting for a contribution is utterly prohibited, since it increases the collection costs and turns the quality of the service discriminatory for the users.

Table 7-17, Table 7-18, Table 7-19 and Table 7-20 detail the recommended service quality parameters and the fines suggested for non-fulfillment of the obligations by the providers of the service, be it municipal or private ones.

Table 7-17 presents the common “general” parameters (non-technical) for the collection and sweeping services.

Table 7-17: General Quality Parameters for Collection and Sweeping Services

General parameter for collection and sweeping	Type of fine and amount recommended
Lack of identification of the truck (number, plates) or the mechanical sweeper (number, plates, company, etc.)	2 MUS per truck detected
Lack of uniformity in the presentation of vehicles	1MUS per truck every time the infringement is detected
Ask for contributions (gifts)	1 MUS per person caught in the act (proven)
Staff changing their clothes on public thoroughfare	1 MUS per person caught in the act
Not using the uniform	1 MUS per person caught in the act per day
Inappropriate behavior of rudeness towards the public in general by the collection and/or sweeping staff	1 MUS per person

Table 7-18 presents the common “**technical**” parameters for the collection and sweeping services.

Table 7-18: Technical Quality Parameters for Collection and Sweeping Services

Technical parameters for collection and sweeping	Type of fine and amount recommended
Non-compliance of the days and time of collection of wastes or sweeping	3 MUS per vehicle every time the act is detected
Every act of excessive noise in the mechanical sweeping and/or collection duty	1 MUS per occurrence
Abandonment of collection vehicle or sweeping vehicle on public thoroughfare	2 MUS per vehicle abandoned per day
Deposit or discharge of wastes from collection or sweeping at unauthorized places	2 MUS per discharge
Leave wastes on public thoroughfare (scattered wastes) due to an inappropriate loading by the collection vehicle or mechanical sweeper	1 MUS per case detected
Parking of the collection vehicle or sweeper on public thoroughfare	2 MUS per vehicle every time it is caught in the act

Table 7-19 presents the “**technical**” parameters for the collection service.

Table 7-19: Technical Quality Parameters for Collection Services Only

Technical parameters for collection	Type of fine and amount recommended
Leaving wastes scattered during the collection task	1 MUS per case detected
Spilling of liquids percolated on public thoroughfare from collection vehicles	2 MUS per truck every time such infringement is detected.
Searching and selection of materials among the wastes transported by the truck staff or by third parties	1 MUS per truck every time such infringement is detected
Deficiencies in the maintenance, replacement and disinfecting of containers	1 MUS per container every time such infringement is detected
Lack of collection of vegetal wastes from persons and/or public areas	1 MUS per case detected

Table 7-20 presents “**technical**” specific parameters for the sweeping activity.

Table 7-20: Technical Quality Parameters Specific for Sweeping

Technical parameters for sweeping	Type of fine and amount recommended
Change of route by mechanical sweepers without the authorization by municipality	3 MUS per vehicle detected in each case
Lack of collection of wastes from street sweeping.	1 MUS per truck every time the infringement is detected
Lack of execution of street sweeping on the specified days and time	1 MUS per kilometer non covered

It is recommended that the quality parameters proposed above be printed out on the rear of the corresponding invoice, so that the consumers know their right and can demand the quality for the service they are paying, by claiming to the regulator.

Final recommendation: It is a requirement to inform about the service quality parameters and their corresponding fines in the tender bases, since this is one of the variables that define the final price. The service quality parameters are part of the regulatory and institutional framework, however this does not specify the fines, which in general terms are part of the contract for rendering the service that the private party enters with the municipality.

7.5.4.2 Service Quality Parameters for Final Disposal Activities

The quality parameters for the final disposal service (sanitary landfill) are defined by the Technical Rules for Sanitary Landfills that are shown in the Decree #42 in the Official Gazette of June 1st 2000. These technical rules correspond to a legislation independent from the Regulatory and Institutional Framework Law of Solid Waste Management.

7.5.5 Principles and Rules of Information Submission

In order to efficiently regulate from a tariff viewpoint, the following information should be available, be enough, adequate and timely. The regulator needs to know about the costs to evaluate the tariffs in force and estimate fees for the next period. Information to verify the quality of the service is also required.

7.5.6 Public Liability Insurance

The provider of the service will deliver and keep to itself a public liability insurance, fully enforceable and effective throughout the duration of the contract and in every term expansion, with the coverage that ensures the required protection for every event that occurs:

7.5.7 Rules for Price Fixing

7.5.7.1 Type of Markets and Price Fixing

a. Collection and Sweeping

Next, the classification of collection markets as shown in the Proposal of Law for Regulatory and Institutional Framework (see Annex-O) is detailed:

a.1 Free Competition Market for Collection with Operating Permissions

This market corresponds to the current informal waste collection market coming from constructions, industrial wastes and large generators (commercial and service ones).

In El Salvador, these service providers have no license to do so; therefore, the volume they dispose of is unknown in an appropriate manner. In AMSS, the licensing to this market is recommended in order to reduce the amount of illegal dumping sites, environmental damages and prevent diseases related to this activity.

a.2 Household Waste and Small Commerce, Services and Industry Generators' Collection Market

This market includes the collection of wastes from households, small industries, commerce and service establishments. It is recommended to conduct PPS for this market under the regulation system known as “**participation to serve the market**”. It is recommended that such participation is carried out with “**lump sum prices**” to generate efficiency, reduce monitoring (regulation) costs, partial elimination of “**rent-seeking**” and “**free-riding**” activities.

b. Final Disposal Markets (sanitary landfill)

In case of long-term investments, when these are unmovable (large sunk costs exist) and uncertainty for future investments, this form of competition and price fixing is not applicable (Madrid-Aris and Montero, 1998). Therefore, the participation for the market is not a formula applicable in the long term for the construction of a sanitary landfill.

A concession or franchise can be utilized; therefore, the price should be regulated because the contract of such concession must be consistent with the service life of the investment (generally 20 to 30 years for a sanitary landfill). In this case, the regulation of prices is required.

7.5.7.2 Indexing and Type of Adjustments for Production Costs

The following indexing rules are applicable for the collection and final disposal activities equally.

a. Types of Automatic Indexing and Recommendations for El Salvador

Automatic indexing of tariffs will be used to allow a progressive adjustment that reflects the variations in cost that affect the rendering of the service. In order to protect the service provider from the risks of production costs increase, the following is used in general:

- Polynomial indexing (it should reflect at least an “efficient” cost structure of the service).

- Single indexing (consumer price index, wholesale price index, imported product price index, etc.)

Adjustment of polynomial index:

Since a polynomial index must reflect the cost structure of an efficient enterprise, an average cost structure of fairly efficient enterprises in Latin America is shown next.

Table 7-21: Average Cost Structure of Efficient SWM (Collection and Final Disposal) in Latin America

Description of Cost	Total percentage from cost	Description
Wages and salaries	35%	Average increase index of salaries in El Salvador, published by the Ministry of Economy
Fuel	5%	Fuel increase index published by the Ministry of Economy
Lubricant	2%	Fuel increase index published by the Ministry of Economy
Spare parts	10%	It could be the increase in new engines of a standard truck. Spare parts Import Association
Capital cost	30%	This cost does not apply to a production cost readjustment index. It corresponds to an external variable that the private party must cope with as a variable in the costs of the business at the moment of presenting the project. If this cost were included as an interest rate in the polynomial index, then the business risk would be implicitly borne by the user.
Other costs (office stationery, rent, etc.)	13%	Generally, this cost is increased in a manner proportional to CPI
Taxes	5%	Income tax (a tax rate of 25% in El Salvador, and rate of return of the business of 15%)

Source: Estimates by the Study Team.

Since the capital cost corresponds to a variable that is part of business risk, it should be borne by the private party. It is common that private operators try to include an adjustment factor for interest changes in international interest rates. It is proven that the financing of these projects is carried out with a fixed interest rate; therefore, such polynomial indexes only bring about additional income for the private party.

Should a polynomial index be adopted for the case of a vertically integrated system (collection and final disposal), it should be as follows: (see Table 7-21)

$$P_t = P_o * \left[0.30 + 0.13 * CPI + 0.35 * \frac{M_2}{M_1} + 0.05 * \frac{C_2}{C_1} + 0.02 * \frac{L_2}{L_1} + 0.10 * \frac{R_2}{R_1} + 0.05 * \frac{ER_2}{ER_1} \right]$$

P_o, P_t = correspond to the unit price cost (or lump sum price, if the case is) prior to the readjustment and the unit cost the moment after the readjustment, respectively.

CPI = consumer price index published by the Central Reserve Bank (*Banco Central de Reserva*) of El Salvador

M =	minimum salary of labor
C =	fuel cost (diesel)
L =	lubricant cost (oil)
R =	Spare part costs
ER =	Taxes rate

Single index adjustment: The analysis of reasons to use the consumer price index (CPI) versus a polynomial index continues. The reasons to utilize a CPI index are as follows:

1. It is known that the CPI is robust in the sense that is already defined;
2. The readjustment is easier to calculate, manage and it is unlikely to arise disputes over its applications;
3. The public easily understands it and it sends a clear sign with respect to what is expected to occur with the service prices.

Both indexes (CPI or polynomial index) might not accurately reflect the increment in the cost structure. The choice for CPI, which is calculated by the Central Bank of El Salvador (BCR), is used as a readjustment index due to its transparency and implementation easiness, and partly due to possible estimate problems with some sub-indexes, which would be necessary to create a polynomial index (index of increase in spare parts of collection trucks, for instance).

In general, capital costs are fixed (debt by means of long-term interest rate), which represent in the order of 30% of the production cost value. With a tariff indexing of 100% of the CPI value, a value higher than the real one would be indexed on the production costs.

Recommendation for El Salvador : *For the collection and final disposal categories, an automatic annual indexing equivalent to the consumer price index (CPI) is recommended, when such index is lower than 2% per year. For CPI values greater than 2% and less than 5%, it is recommended that updating of tariffs is recommended by considering only 2/3 of the CPI value. For CPI values greater than 5%, an indexing of only 60% of the CPI value is recommended.*

7.5.8 Rate of Capital Cost

a. Introduction

For the case of PPS by means of a "**concession or franchise with regulated price**", the most important parameter to analyze corresponds to that of "rate of capital cost" or "capital cost".

The rate of capital cost is measured in percentage (%); therefore, the income allowed as capital cost (including the debt service and profits for the service provider) correspond to the capital cost rate (e.g., 14%) multiplied by the regulatory capital. Regulatory capital is the value of the required assets (which are defined according to a formula of an efficient enterprise) for rendering the service, whose depreciation (useful life) must be "clearly defined in the tariff system structure" or in the regulation.

7.5.8.1 Components or Structure of the Capital Cost Rate (R_c)

The regulator must obtain the financial information of the enterprises in order to monitor their features, particularly the structure of their capital.

The structure of capital has two parts— cost of the debt capital (R_d) and cost of own capital (R_{cp}). The weighted average of both costs is the “rate of capital cost” or, as it is sometimes called, “**earning rate**”. The debt-capital ratio explains that the percentage of capital of the company that is financed through debt, versus what is financed by stockholders. Normally this ratio is defined in the regulatory framework, in order to limit the business risk.

In order to know the own capital and debt capital of an enterprise there are two options: a) the book value (accountable) and b) the market value. In case the enterprise has no stock transactions in the stock exchange, the market value is unknown. Since most of solid waste management enterprises in Latin America have no transactions at the stock exchange, the debt-own capital ratio must be obtained from the accounting of the enterprise (books).

7.5.8.2 Rate of Own Capital Cost (R_{cp})

The financial theory offers several alternatives to estimate the “rate of own capital cost”, such as the following:

- a. Using a capital asset pricing model –CAPM
- b. Bond Yield Risk Premium Approach -BYRP

Generally the two methods are the most commonly applied for the regulation of public service enterprises.

In nominal terms a value quite similar for both approaches (CAPM or BYRA) is obtained. Please note that this last formula has the comparative advantage of being an estimate that can be easily understood by the operators, regulators and public in general. Furthermore, it is a formula with a very simple calculation.

Final recommendation: it is recommended to estimate the “rate of own capital” by using the risk-free assets (stock) formula plus a premium for business risk concept, in view of its simplicity and understanding.

7.5.8.3 Rate of Debt Capital Cost (R_d)

The debt capital cost can be normally calculated by directly using the accounting information of the enterprise or through a prefixed formula. Generally, the prefixed formula is similar to the formula of the risk-free asset” plus a premium, but in this case the premium does not correspond to the business risk but to the business debt. It is recommended to set the rate of debt capital cost as follows:

- a. Select a long-term, risk-free asset. The interest rate for the Central Reserve Bank bond mentioned before can be considered (now set in 8.75%) as a risk-free asset. This represents the debt capital cost of a local business in a good manner.
- b. Add a premium corresponding to the debt of a company. As this value is not known for El Salvador, the risk-free rate of water or solid waste companies in the United Kingdom or the United States can be considered for the premium. For

instance, for these countries the premium is estimated from 1% to 2.0%. For El Salvador the recommendation is 2%. Next, an example of the estimated rate of debt capital cost is shown.

$$\text{Value of rate of debt capital cost} = 8.75\% + 2.0\% = 10.75\%$$

7.5.8.4 Debt-total capital ratio (total assets) recommended for El Salvador

In general terms, the solid waste business is regarded as a low-risk business, given its cost structure features (small sunk and fixed costs and reversible investments) and small contingencies that might affect the supply or demand (it is not a business that depends on hydrological resources such as water business, external shocks that might affect the business are minimal, etc.). The aforementioned implies that a high debt-total capital ratio can be acceptable.

Recommendation: It is recommended that the debt-total capital ratio has an upper limit 80%, given the low risks for this business.

Final summary

Recommendation: In case of participation by the private sector whose price has to be regulated, such as PPS under a concession and/or franchise for a sanitary landfill, it is recommended to estimate the capital cost through a risk-free asset model plus a premium. A maximum debt-capital ratio of 80% for this business is also recommended.

7.5.9 Efficiency Parameters Recommended for PPS with Regulated Prices for the Competitiveness Analysis: Implications for an Effective Regulation

7.5.9.1 Current Parameters of Collection and Efficiency Standards

It is very important to know the current deficiencies of the system to properly regulate and create correct incentives, in order to generate the expected efficiency. Such efficiency creates future social benefits, since the achievement of efficiency would be reflected on the rendering of a better service and on a lower cost.

7.5.9.2 Model Enterprise and Regulating Function

The existence of efficiency parameters for the case of PPS with regulated prices simplifies the regulating action, as well as it reduces the regulation cost. Furthermore, in cases of PPS with proposal or bid, the prices presented can be verified through the use of efficiency parameters to analyze the possible presence of collusion and/or rent-seeking activities.

Table 7-22: Current Deficiencies in the System of the San Salvador Municipality, Some Parameters of an Efficient Model Enterprise for the Tariff Calculation and Regulation

Functional Category	Description of Inefficiency	Alternatives to Improve Efficiency	Current Value In San Salvador Municipality	Expected Efficient Result	Adjustment Period																																							
Generation (external structural inefficiency). Outside the control of Service Provider	Over-generation per capita and per economic activity	<ul style="list-style-type: none"> Taxes Incentives Educational policy Recycling 	In kg/day/person per income level <ul style="list-style-type: none"> High Middle low 	In kg/day/person per income level <ul style="list-style-type: none"> High Middle low 																																								
Commercial type (productive inefficiency)	<p>Insufficiency of the customer database.</p> <p>MIDES invoicing database does not match the cleansing invoicing database.</p>	<ul style="list-style-type: none"> Match databases of electricity companies with those from the municipality to identify all the customers. Create customers lists per type and district 	<p>invoices issues per customer type.</p> <p>Consumption beyond 499 kwh/month is regarded ICI</p> <table border="1"> <thead> <tr> <th>kw</th> <th>Cleansing.</th> <th>S/L</th> </tr> </thead> <tbody> <tr><td>N/A</td><td>467</td><td>0</td></tr> <tr><td>49</td><td>4784</td><td>10920</td></tr> <tr><td>99</td><td>13465</td><td>24573</td></tr> <tr><td>149</td><td>11923</td><td>18348</td></tr> <tr><td>199</td><td>9851</td><td>13985</td></tr> <tr><td>249</td><td>6851</td><td>9447</td></tr> <tr><td>299</td><td>4664</td><td>6403</td></tr> <tr><td>399</td><td>5713</td><td>7963</td></tr> <tr><td>499</td><td>2991</td><td>4371</td></tr> <tr><td>subtotal =>500</td><td>60709</td><td>96030</td></tr> <tr><td>total</td><td>7320</td><td>13411</td></tr> <tr><td></td><td>68029</td><td>109439</td></tr> </tbody> </table>	kw	Cleansing.	S/L	N/A	467	0	49	4784	10920	99	13465	24573	149	11923	18348	199	9851	13985	249	6851	9447	299	4664	6403	399	5713	7963	499	2991	4371	subtotal =>500	60709	96030	total	7320	13411		68029	109439	No. Customer/type/District: Household: ICI's:	
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	<p>Fees are neither fair nor equitable.</p> <p>Household customers subsidize ICI's</p>	<p>ICI customers</p> <ul style="list-style-type: none"> Determine the average volume delivered per each ICI customer. Bill the S/L fee per volume delivered, using a "standard volumetric unit (SVU)". A global estimate can be obtained with the indexes gathered in the field works; bill the cleansing fee just like today. <p>Household customers</p> <ul style="list-style-type: none"> incorporate all the customers. Bill S/L and cleansing fee as today. 	<p>Total volume ICI/type</p> <ul style="list-style-type: none"> Commercial Institutional Industrial Markets 	<ul style="list-style-type: none"> Billing according to energy consumption times 0.075 																																								
				<ul style="list-style-type: none"> Billing according to type of SVU delivered/day. Daily average is used. 																																								

Functional Category	Description of Inefficiency	Alternatives to Improve Efficiency	Current Value In San Salvador Municipality	Expected Efficient Result	Adjustment Period
Technical type (productive inefficiency)	• Routes	Frequencies	It is not uniform	Uniform	
	• Maintenance	Reduce spare parts cost and No. of mechanics	XXX % of the equipment value	e.g., 3 times/week XXX % of the equipment value	
	• Use of technologies				
Inefficiency of basic production factors (of assignment and production)	High capital cost due to low collection by truck	Increase of truck performance	X - X (Ton/vehicle/day)	X - X (Ton/vehicle/day)	
	• Labor Employee ratio per 1,000 persons served	Reduce the ratio per 1,000 persons served	2.3 employees per 1,000 persons served	XX Employees per 1,000 persons served	
Sweeping	Sweeping coverage (km/day/employee)	Improve performance (km/day/employee)	XX (km/day/employee)	XX (km/day/employee)	
	Sweeping load (kg/km)	Garbage bins and education	XXX kg/km	XXX kg/km	
Inefficiency of intermediate input	TYPE OF INPUT				
	• Fuel consumption	Control in supply	XX gallons/day	XX gallons/day	
	• Oil lubricants	Control in supply	XX gallon/month/truck	XX gallon/month/truck	

7.5.10 Arbitration and Decisions

The conflict settlement is fundamental to reduce the burden (costs) of regulation and create an economic efficiency. In general, developing countries have slow and inefficient judicial systems. Studies show that solving the conflicts at first instance through the judicial system is not efficient, since this increases transaction costs and generates inefficiencies that are consequently paid by the users and thus reduce social welfare.

In our regulation proposal for El Salvador, both the regulator as well as the municipalities (in case the service is provided by private parties) will be involved in the auditing of the service quality (the municipality by means of their on-site inspectors – with the collaboration by communal associations, and the regulator by means of a complaint service). Therefore, it should be convenient that a common consensus effort exist to realize an efficient function.

In case the municipality renders the service, the duty of verifying the service quality will be only by the regulator, since a service provider cannot be the judge of its own process.

Regarding the fines, in this last case, it is not recommended that fines be channeled through the municipality, since the municipality will become the judge and the party. It is recommended that the regulator executes them, and for the appealing instance a committee should be formed. It is also recommended that an independent appealing body exist.

7.5.11 Contracts, Effective Regulation and Role by Organizations

The economy of regulation suggests that specific details of each market (or regulation of the diverse private parties) be established through the contract specifications.

For such reason, there exist some model contracts that, with some work by an expert of regulation economy, can be adapted to every specific situation in El Salvador. Some of the specific aspects of a solid waste regulation are the following:

- Way of settling disputes (institutional structure and amounts)
- Who, how and when are the service quality standards monitored?
- Specific form of the operator's responsibilities such as type of wastes to be collected, volume, where are these wastes disposed of, etc.
- Guarantees of accurate compliance with the contract.
- Insurance, such as insurance of damages to third party, private property, public property, persons, etc.

Please note that the designing of an efficient contract (low-cost transaction contract) that limits rent-seeking and free-riding activities, as well as that creates the incentives to achieve efficiency, is a highly-technical matter that has to be controlled by regulation specialists. Therefore, it is recommended that the regulator or municipality hires an expert for the preparation of a contract model adapted to the reality and diverse markets of El Salvador.

7.5.11.1 Theory and Empirical Evidence on Contracts

One of the final and crucial elements for the successful conduction of PPS is that related to the contract. The new (modern) regulation theory emphasizes that a contract must be directly linked with the feasibility to create competition (prevent vertical integration), eliminate the possible search for rent-seeking activities by the private sector, avoid collusion and other ominous elements. A good designing of the contract is fundamental for PPS to generate the efficiency projected and the desired quality of the service is achieved.

The contract is a specific form of regulation. General regulation rules are detailed in the “Regulatory and Institutional Framework for Solid Waste Management” and complemented with specific element such as the following:

- Details of the market (users and volumes)
- Price fixing, revision and forms of payment (fees and forms of payment)
- Right of public usage and easement
- Guarantees for the contract
- Penalties and breach problems solution
- The operator’s duties and responsibilities
- The municipality’s duties and responsibilities.

7.5.11.2 Duration of Contracts for The PPS Forms

The contract duration in this kind of activities is different for the diverse functional categories (collection, final disposal, commercial etc.). Normally, the contract duration is related to the capital account (depreciation) of the system. For example, in collection the contract duration might have to be consistent with depreciation period of the collection equipment.

a. Contracts for Final Disposal (sanitary landfill)

The contract duration for final disposal will depend on the type of PPS and on that who is bearing the investment risk; which is obviously related to the capital account. Next, the duration of contracts for this functional category is explained.

BOT system: The contract duration for a BOT system depends on the useful life of the project. For example, the designing and construction of sanitary landfill implies that their useful life would be of more than 20 years. If the investment is carried out by the private sector, a contract duration of 20 to 25 years is recommended, according to the useful life of the land.

Service contract for operation of the sanitary landfill: If PPS is allowed for the final disposal system through a service contract, the duration of such contract is directly linked with the investment required or the investment corresponds to the contract part. Generally, a contract for final disposal service may depend on the type of service.

For instance, a contract of machinery service to construct the cells and placement of covering material can last one to two years. If the contract implies the improvement of leachate drainage and treatment system, the duration is defined by the depreciation

of the facilities to be built; therefore, it will depend on the type of technology or equipment to be installed.

Recommendation: It is recommended that the contracts of sanitary landfills operation should be carried out through inviting competitive bids (4 bids at least) that last one or two years. The duration of these contracts beyond two years is not recommended, since long-duration contracts utterly protect the expectations; therefore, a minor productive efficiency is achieved.