**Annex 9. Economical and financial assessment**

***Note: based on the Preinvestment Technical Design Study (in Spanish: Estudio de Diseño Técnico de Preinversión (EDTP)) the following information is presented as a reference.***

1. **Costs of implementing integrated solid waste management**

When the project becomes operational, an annual budget will be required for its operation and administration throughout its useful life. These costs will allow for the financial and economic evaluation of the project, which will be reflected in the cash flow.

* 1. **Operating Costs**

Providing urban sanitation services in its various components, or when the project becomes operational, entails operational costs for each component. These costs vary depending on the amount of solid waste collected, processed, and disposed of. The details and descriptions are as follows:

1. **Labor Costs**

These costs are related to salaries and wages paid to all human resources working in the various components of urban sanitation services, including sweeping, collection and transport, utilization, and final disposal. These costs are determined based on the salary scale in force in the municipality, including employer contributions as required by law.

A projection has also been made for the 20-year useful life of the project, using an average salary increase of 7.2% for the period 2010–2019. This projection aims to determine the annual cash flow and financial and economic evaluation of the project.

1. **Costs of Supplies and Work Tools**

Operating each component of urban sanitation services requires the annual purchase of various supplies and materials, such as work clothing, biosafety equipment, fuel, lubricants, minor tools, and other necessary items. Additionally, maintenance costs for vehicles, machinery, and equipment are included.

These costs are recurrent annually since they involve goods with a useful life of one year or less, requiring them to be programmed and executed each year.

A projection of these costs has also been made for the 20-year useful life of the project, using an average inflation rate of 3.96% for the period 2010–2020. This projection serves as a basis for the project's final financial and economic evaluation.

1. **Depreciation Costs of Machinery and Equipment**

These costs correspond to the annual depreciation of all machinery and equipment used in each component. The depreciation rates established by Supreme Decree No. 24051 have been considered based on the type of fixed asset and its useful life.

1. **Depreciation Costs of Civil Works**

These costs correspond to the annual depreciation of infrastructure over the project's 20-year useful life.

* 1. **Administrative Costs**

These costs recur annually and relate to expenses incurred by the Integrated Solid Waste Management Unit. Unlike operational costs, these costs are not linked to the amount of solid waste collected, treated, or disposed of in the landfill.

1. **Personnel Costs**

These are costs related to the salaries and wages of administrative personnel in the Integrated Solid Waste Management Unit, including employer contributions as required by law.

For calculation purposes, the salary scale of the Autonomous Municipal Government of Yamparáez has been used.

A projection has been made for the 20-year useful life of the project, with an average salary increase of 7.2% for the period 2010–2019. This projection is also used for cash flow analysis and economic and financial evaluation indicators.

1. **Training and Environmental Education Costs**

Technical training for personnel in the Integrated Solid Waste Management Unit is essential to update and enhance their knowledge. Additionally, annual environmental education and awareness programs will be organized for communities receiving sanitation services.

1. **Costs of Basic Services**

The operation of the Integrated Solid Waste Management Unit, treatment plant, and landfill requires the use and consumption of basic services such as water, electricity, telephone, and internet. These costs must be included in the annual operating budget of the project.

1. **Material Costs**

These are costs incurred annually by the Integrated Solid Waste Management Unit for office supplies and other accessories necessary for administration and service monitoring.

For the financial and economic evaluation of the project, a projection for the 20-year useful life has been made using the average inflation rate of 3.96% recorded between 2010 and 2020.

* 1. **Financial Costs**

There are no financial costs, as the project will be funded by the Ministry of Environment and Water (MMAyA), the Chuquisaca Governorate, and the municipality of Yamparáez with public state resources.

* 1. **Maintenance Plan**

A maintenance plan is not required because the project includes only the acquisition of a dump truck equipped for collection and transportation services and a motorcycle for supervision and control by the GIRS officer. However, a maintenance budget for these vehicles is included in the operational costs.

* 1. **Summary of Costs**

Finally, a summary table of operational, administrative, and financial costs for the project's 20-year useful life is presented.

|  |  |  |  |
| --- | --- | --- | --- |
| **Year** | **Operating Costs (Bs.)** | **Administrative Costs (Bs.)** | **Total (Bs.)** |
| 1 | 253.067,35 | 49.897,00 | 302.964,35 |
| 2 | 268.820,11 | 52.495,00 | 321.315,11 |
| 3 | 285.609,34 | 55.240,67 | 340.850,02 |
| 4 | 303.505,79 | 58.143,09 | 361.648,88 |
| 5 | 322.585,16 | 61.211,91 | 383.797,07 |
| 6 | 342.928,42 | 64.457,44 | 407.385,86 |
| 7 | 364.622,24 | 67.890,63 | 432.512,87 |
| 8 | 387.759,33 | 71.523,20 | 459.282,53 |
| 9 | 412.438,91 | 75.367,58 | 487.806,49 |
| 10 | 438.767,15 | 79.437,08 | 518.204,23 |
| 11 | 527.506,52 | 83.745,84 | 611.252,36 |
| 12 | 561.639,83 | 88.308,96 | 649.948,79 |
| 13 | 598.078,39 | 93.142,56 | 691.220,95 |
| 14 | 636.982,14 | 98.263,80 | 735.245,94 |
| 15 | 678.522,32 | 103.691,00 | 782.213,32 |
| 16 | 722.882,21 | 109.443,71 | 832.325,92 |
| 17 | 770.258,06 | 115.542,77 | 885.800,84 |
| 18 | 820.859,98 | 122.010,45 | 942.870,43 |
| 19 | 874.912,91 | 128.870,48 | 1.003.783,40 |
| 20 | 932.657,72 | 136.148,22 | 1.068.805,93 |

1. **Operational sustainability of the project**

**Classification and Estimation of the Number of Users**

Fieldwork and market studies have established the following relationship and quantity of users:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Residentia** | **Commercia** | **Public & Private Institutions** | **Special (Health Centers & Posts)** | **Special (Airport)** |
| 2022 | 1,149 | 2 | 15 | 3 | 1 |
| 2023 | 1,150 | 2 | 15 | 3 | 1 |
| 2024 | 1,151 | 2 | 15 | 3 | 1 |
| 2025 | 1,152 | 2 | 15 | 3 | 1 |
| 2026 | 1,153 | 2 | 15 | 3 | 1 |
| 2027 | 1,154 | 2 | 15 | 3 | 1 |
| 2028 | 1,155 | 2 | 15 | 3 | 1 |
| 2029 | 1,156 | 2 | 15 | 3 | 1 |
| 2030 | 1,157 | 2 | 15 | 3 | 1 |
| 2031 | 1,158 | 2 | 15 | 3 | 1 |
| 2032 | 1,159 | 2 | 15 | 3 | 1 |
| 2033 | 1,160 | 2 | 15 | 3 | 1 |
| 2034 | 1,161 | 2 | 15 | 3 | 1 |
| 2035 | 1,163 | 2 | 15 | 3 | 1 |
| 2036 | 1,164 | 2 | 15 | 3 | 1 |
| 2037 | 1,165 | 2 | 15 | 3 | 1 |
| 2038 | 1,166 | 2 | 15 | 3 | 1 |
| 2039 | 1,167 | 2 | 15 | 3 | 1 |
| 2040 | 1,168 | 2 | 15 | 3 | 1 |
| 2041 | 1,169 | 2 | 15 | 3 | 1 |

Due to the socioeconomic characteristics of the inhabitants in the beneficiary communities of the project, there is only one category of users at the household level. For the commercial category, there is a lodging center and a food outlet. The identified institutions are public and private, while the special category includes health centers, health posts, and the airport.

* 1. **Structure of Urban Waste Collection Fees**

***A collection fee was determined in the EDTP, this is an output to be evaluated and updated if necessary.***

The basic waste collection fee has been structured and determined based on the *Methodological Guide for Determining Municipal Waste Collection Fees* issued by the Ministry of Environment and Water and the Ministry of Economy and Public Finance.

To determine the fee, the estimated cost methodology was used, which includes operational, administrative, and financial costs. These costs include personal services, non-personal services, materials, supplies, and real assets.

Additionally, the number of beneficiary families and/or future service users was considered. The fee was determined by dividing the annual operational and administrative costs by the number of household-level service users, as established in the guide.

The average waste collection fee determined is **71.19 Bs/month**. However, due to the socioeconomic conditions of the population, it is not feasible to charge this amount. This means that a significant portion of the service cost will be subsidized by the municipality and other income generated by the project through the sale of recyclable materials and compost.

Another factor justifying this decision by the municipality is the results of the diagnosis conducted in the beneficiary communities, where **63.59%** expressed their willingness to pay, with an average amount of **2.15 Bs/month**.

Given this reality and the aforementioned criteria, the designed fee for the project has been set at **12 Bs/month** for households. This fee will be established during project execution and agreed upon with service users.

|  |  |
| --- | --- |
| **Category** | **Fee (Bs.)** |
| Residential | 11 |
| Commercial | 22 |
| Institutional | 33 |
| Special | 5,000 |

* 1. **Other Sources of Income**

Two significant sources of income have been identified for the project:

* Sale of collected recyclable materials
* Sale of compost

Income from the sale of recyclable materials corresponds to recyclable waste that is sorted, washed, and collected at the plant, which will then be sold.

Income from the sale of compost is generated by the commercialization of organic fertilizer (compost) produced by the project's composting plant.

* 1. **Billing System**

Since the municipality will manage the waste collection service through the Integrated Solid Waste Management Unit, it has been agreed that the billing system for the waste collection service will be integrated with the electricity service billing. This agreement will be finalized during project execution, particularly with the DESCOM-FI Plan.

The definitive billing system for the waste collection service will be defined during the execution of the DESCOM-FI component, following the guidelines of the DESCOM-FI guide.

* 1. **Summary Table of Income**

The income generated by the project is related to the sale of recyclable materials, the sale of compost, and the collection of waste collection fees.

The project's income also includes the annual subsidy provided by the municipality. The income generated from these sources is reflected in the following table:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Income from Households** | **Income from Commercial** | **Income from Public & Private Institutions** | **Income from Special (Health Centers & Posts)** | **Income from Special (Airport) (Bs./year)** | **Income from Sale of Recyclable Materials (Bs./year)** | **Income from Sale of Compost (Bs./year)** | **Total Income from Services and Sales (Bs.)** | **GAM Subsidy** | **Total Income** |
| 1 | 165,456 | 576 | 6,480 | 1,296 | 60,000 | 13,621 | 30,991 | 278,420.36 | 360,000.00 | 638,420.36 |
| 2 | 165,600 | 576 | 6,480 | 1,296 | 60,000 | 13,707 | 31,187 | 278,845.65 | 378,000.00 | 656,845.65 |
| 3 | 165,744 | 576 | 6,480 | 1,296 | 60,000 | 13,791 | 31,377 | 279,263.68 | 396,900.00 | 676,163.68 |
| 4 | 165,888 | 576 | 6,480 | 1,296 | 60,000 | 13,875 | 31,568 | 279,683.35 | 416,745.00 | 696,428.35 |
| 5 | 166,032 | 576 | 6,480 | 1,296 | 60,000 | 13,963 | 31,769 | 280,115.72 | 437,582.25 | 717,697.97 |
| 6 | 199,411 | 691 | 7,776 | 1,555 | 72,000 | 28,096 | 63,925 | 373,454.97 | 459,461.36 | 832,916.33 |
| 7 | 199,584 | 691 | 7,776 | 1,555 | 72,000 | 28,268 | 64,315 | 374,189.04 | 482,434.43 | 856,623.47 |
| 8 | 199,757 | 691 | 7,776 | 1,555 | 72,000 | 28,448 | 64,726 | 374,953.07 | 506,556.15 | 881,509.22 |
| 9 | 199,930 | 691 | 7,776 | 1,555 | 72,000 | 28,622 | 65,120 | 375,693.88 | 531,883.96 | 907,577.84 |
| 10 | 200,102 | 691 | 7,776 | 1,555 | 72,000 | 28,796 | 65,517 | 376,438.00 | 558,478.16 | 934,916.16 |
| 11 | 240,330 | 829 | 9,331 | 1,866 | 86,400 | 43,470 | 98,903 | 481,129.70 | 586,402.07 | 1,067,531.77 |
| 12 | 240,538 | 829 | 9,331 | 1,866 | 86,400 | 43,735 | 99,505 | 482,204.38 | 615,722.17 | 1,097,926.55 |
| 13 | 240,745 | 829 | 9,331 | 1,866 | 86,400 | 44,003 | 100,116 | 483,290.65 | 646,508.28 | 1,129,798.93 |
| 14 | 241,160 | 829 | 9,331 | 1,866 | 86,400 | 44,281 | 100,750 | 484,617.82 | 678,833.69 | 1,163,451.51 |
| 15 | 241,367 | 829 | 9,331 | 1,866 | 86,400 | 44,566 | 101,397 | 485,757.46 | 712,775.38 | 1,198,532.84 |
| 16 | 289,889 | 995 | 11,197 | 2,239 | 103,680 | 59,786 | 136,026 | 603,812.89 | 748,414.14 | 1,352,227.04 |
| 17 | 290,138 | 995 | 11,197 | 2,239 | 103,680 | 60,167 | 136,892 | 605,309.22 | 785,834.85 | 1,391,144.07 |
| 18 | 290,387 | 995 | 11,197 | 2,239 | 103,680 | 60,535 | 137,731 | 606,765.68 | 825,126.59 | 1,431,892.27 |
| 19 | 290,636 | 995 | 11,197 | 2,239 | 103,680 | 60,906 | 138,575 | 608,229.33 | 866,382.92 | 1,474,612.26 |
| 20 | 290,885 | 995 | 11,197 | 2,239 | 103,680 | 61,294 | 139,457 | 609,748.00 | 909,702.07 | 1,519,450.07 |

1. **Economic evaluation**

The economic evaluation of the project has been conducted based on the provisions of the Basic Pre-Investment Regulations and the guide for preparing the EDTP in comprehensive solid waste management for medium-sized projects, following the cost-efficiency methodology, as this is a social development project.

The cost-efficiency analysis is related to the average cost per unit of benefit, using the criterion of achieving the project's objectives at the lowest possible cost.

The main indicators analyzed are:

- Equivalent Annual Cost per unit (beneficiary, service, and/or product).

- Investment Cost per unit (beneficiary, service, and/or product).

The project's lifespan has been considered to be 20 years, a period for which revenue and operational cost projections have been made. These projections have allowed the generation of the cash flow necessary for the project's evaluation and the calculation of the aforementioned indicators.

Additionally, the analysis has been conducted in accordance with Ministerial Resolution No. 132 of September 8, 2020, issued by the Ministry of Development Planning, which establishes new efficiency price-accounting ratios and the social discount rate.

Ministerial Resolution No. 713 of December 12, 2018, has also been considered, which defines methodologies, indicators, and tools for the Economic and Social Evaluation of Solid Waste Management Projects.

* 1. **Summary of Revenues**

The project will generate its own revenues, summarized as follows:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year** | **Household Income** | **Commercial Income** | **Public & Private Institutions Income** | **Special Income (C.S. & P.S.)** | **Special Airport Income (Bs./year)** | **Recyclable Material Sales (Bs./year)** | **Compost Sales (Bs./year)** | **Total Service & Sales Revenue (Bs.)** | **GAM Subsidy** | **Total Revenue (Bs.)** |
| **1** | 165.456 | 576 | 6.480 | 1.296 | 60.000 | 13.621 | 30.991 | 278.420,36 | 360.000,00 | 638.420,36 |
| **2** | 165.600 | 576 | 6.480 | 1.296 | 60.000 | 13.707 | 31.187 | 278.845,65 | 378.000,00 | 656.845,65 |
| **3** | 165.744 | 576 | 6.480 | 1.296 | 60.000 | 13.791 | 31.377 | 279.263,68 | 396.900,00 | 676.163,68 |
| **4** | 165.888 | 576 | 6.480 | 1.296 | 60.000 | 13.875 | 31.568 | 279.683,35 | 416.745,00 | 696.428,35 |
| **5** | 166.032 | 576 | 6.480 | 1.296 | 60.000 | 13.963 | 31.769 | 280.115,72 | 437.582,25 | 717.697,97 |
| **6** | 199.411 | 691 | 7.776 | 1.555 | 72.000 | 28.096 | 63.925 | 373.454,97 | 459.461,36 | 832.916,33 |
| **7** | 199.584 | 691 | 7.776 | 1.555 | 72.000 | 28.268 | 64.315 | 374.189,04 | 482.434,43 | 856.623,47 |
| **8** | 199.757 | 691 | 7.776 | 1.555 | 72.000 | 28.448 | 64.726 | 374.953,07 | 506.556,15 | 881.509,22 |
| **9** | 199.930 | 691 | 7.776 | 1.555 | 72.000 | 28.622 | 65.120 | 375.693,88 | 531.883,96 | 907.577,84 |
| **10** | 200.102 | 691 | 7.776 | 1.555 | 72.000 | 28.796 | 65.517 | 376.438,00 | 558.478,16 | 934.916,16 |
| **11** | 240.330 | 829 | 9.331 | 1.866 | 86.400 | 43.470 | 98.903 | 481.129,70 | 586.402,07 | 1.067.531,77 |
| **12** | 240.538 | 829 | 9.331 | 1.866 | 86.400 | 43.735 | 99.505 | 482.204,38 | 615.722,17 | 1.097.926,55 |
| **13** | 240.745 | 829 | 9.331 | 1.866 | 86.400 | 44.003 | 100.116 | 483.290,65 | 646.508,28 | 1.129.798,93 |
| **14** | 241.160 | 829 | 9.331 | 1.866 | 86.400 | 44.281 | 100.750 | 484.617,82 | 678.833,69 | 1.163.451,51 |
| **15** | 241.367 | 829 | 9.331 | 1.866 | 86.400 | 44.566 | 101.397 | 485.757,46 | 712.775,38 | 1.198.532,84 |
| **16** | 289.889 | 995 | 11.197 | 2.239 | 103.680 | 59.786 | 136.026 | 603.812,89 | 748.414,14 | 1.352.227,04 |
| **17** | 290.138 | 995 | 11.197 | 2.239 | 103.680 | 60.167 | 136.892 | 605.309,22 | 785.834,85 | 1.391.144,07 |
| **18** | 290.387 | 995 | 11.197 | 2.239 | 103.680 | 60.535 | 137.731 | 606.765,68 | 825.126,59 | 1.431.892,27 |
| **19** | 290.636 | 995 | 11.197 | 2.239 | 103.680 | 60.906 | 138.575 | 608.229,33 | 866.382,92 | 1.474.612,26 |
| **20** | 290.885 | 995 | 11.197 | 2.239 | 103.680 | 61.294 | 139.457 | 609.748,00 | 909.702,07 | 1.519.450,07 |

As shown in the summary table, the project's main revenue sources include sanitation fees, recyclable material sales, and compost sales.