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FINANCIAL FEASIBILITY ANALYSIS OF URBAN WASTE PROCESSING AS REFUSED DERIVED FUEL FOR CEMENT COMPANY

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ABSTRACT

Waste generated from community life activities continues to increase along with economic development and population growth. Systematic, comprehensive, and sustainable waste management is needed to overcome problems related to waste generation, both through efforts to reduce and handle waste. One waste management innovation is using fuel waste, called Refuse Derived Fuel (RDF). Utilization of RDF can process waste on a large scale and can be a substitute for fossil fuels for industry, one of which is the cement industry. This research analyzes the financial feasibility of processing waste into RDF for cement factories. The case study was carried out at a landfill in Ogan Komering Ulu Regency - South Sumatra Province, with PT Semen Baturaja Tbk as offtaker of RDF. Financial feasibility analysis uses Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PP), and Profitability Index (PI) indicators. A sensitivity analysis of financial feasibility was carried out on changes in RDF selling prices and operational costs. This analysis of the scenario 1 (70% equity : 30% debt) and the scenario 2 (30% equity : 70% debt) shows that the Project of RDF Plant is feasible to implement. Sensitivity analysis of scenario 1 and 2 are not feasible at 20% decrease in selling price and scenario 2 is not feasible at 20% increase in investment.

KEYWORDS *Financial Feasibility, Cement Industry, Refuse Derived Fuel (RDF), Municipal Waste.*

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INTRODUCTION

Waste generated from community life activities continues to increase, along with population growth and economic development (Dianda & Munawar, 2018; Infiesta et al., 2019; Khawaja et al., 2024). Based on data from KLHK (2022) in Indonesia, the average waste generation is 0.7 kg per day per person. Data from the Ministry of Environment shows that the national waste generation during 2022 is 37,667,251.90 tons or a daily generation of 103,198 tons. With such a large amount of waste, systematic, comprehensive, and sustainable management is needed to reduce and handle existing waste. Waste management in Indonesia still faces many challenges, due to low public awareness regarding disposing of waste in its place, limited modern and environmentally friendly management infrastructure and facilities, availability of funds for waste management, and waste management has not been a priority compared to other infrastructure such as roads and bridges.

Waste management into Refuse Derived Fuel (RDF) is one of the efforts that can be done to reduce the volume of waste disposed of in landfills, reduce GHG (Greenhouse Gas) emissions from waste generation in landfills, and utilize waste as alternative fuel in the cement industry (Hemidat et al., 2019; Mandala et al., 2024; Ugroseno & Warmadewanthi, 2023). In general, the main fuel for cement plants in Indonesia is coal, a fossil energy source whose reserves will continue to decrease along with the increase in consumption by industry and power plants (PLTU) as well as fulfilling exports. The option of managing municipal waste into RDF as an alternative fuel source is an alternative solution, especially in cities adjacent to cement plants (Widowati, 2023). The processing of municipal waste into RDF for cement plants is still competitive compared to the utilization of rice husks, which can also be used as an alternative fuel, in addition to the continuity of rice husk supply. According to Widowati (2017), the existing barriers to the utilization of waste as an alternative fuel in Indonesia are improper waste collection and sorting systems, lack of uniform waste-to-alternative-fuel processing plants, absence of incentives/policies supporting waste processing management in cement kilns and lack of knowledge of co-processing technologies and operations.

Studies on the utilization of municipal waste processed into an alternative fuel source (RDF) in the production process of cement plants have long been conducted in developed countries. In Indonesia, several studies on RDF and its utilization as a substitute fuel have been intensively conducted (Paramita et al., 2018; Sagala et al., 2018; Yulinda & Sumirat, 2013) and the Ministry of Industry has also issued a technical specification guideline for RDF as an alternative fuel in the cement industry in 2017. Various studies have been conducted to analyze the technical feasibility of using RDF as fuel in cement plant kilns. The study by Dianda et al. (2017) showed that municipal waste in Banda Aceh can be processed into RDF and produce fuel with a calorific value of 17 - 36 MJ/kg with an average organic composition waste is 62.74 percent. Paramita et al. (2018) also showed that urban waste at the Jeruk Legi landfill site, Cilacap has the potential to produce an average RDF calorific value of 3,563 kcal/kg and the cement industry in Indonesia can accept a minimum calorific value of 3,000 kcal/kg. Calorific research from municipal waste by Dong et al (2009), has been conducted so that it can be estimated from each component of municipal waste according to the calorific value in Table 1.

Table 1: Calorific Value of Different Types of Waste

Description	Caloric Value (kcal/kg)
Wood, Twigs, Leaves	4.400
Paper	3.588
Plastic	8.000
Fabric/Textile	7.200
Rubber/Leather	5.200

Source: Dong, et al (2009)

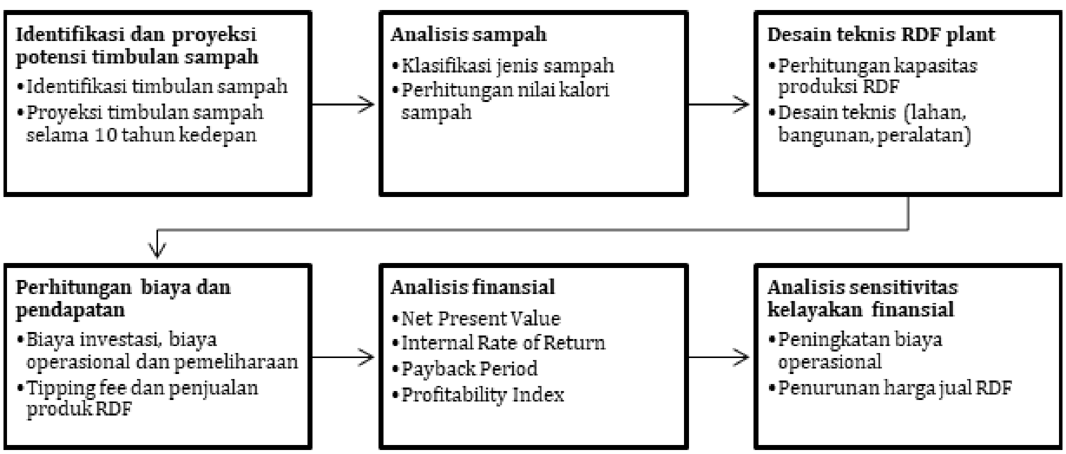
Financial feasibility studies related to RDF treatment have also been conducted. The study by Yulinda & Sumirat (2013) in their analysis of TPPAS Nambo, West Java shows that RDF processing in the case study landfill will be financially feasible if there is government support. The financial support is in the form of investment support of 60 percent to produce an IRR of 14.37%. Rehman, et al. (2020) analyzed the costs and benefits of processing municipal waste into RDF as a cement factory fuel. The results of the study showed a BCR value of 1.39. The study also showed that the utilization of recycled waste as RDF feedstock can increase the BCR to 3.80. An analysis of the costs and benefits of processing waste into RDF was also conducted by Ummatin, et al (2017). This study analyzed the BCR of renewing the Gresik city waste processing unit with hydrothermal technology to become an alternative RDF fuel for the cement industry. The BCR calculation results showed a value of 1.07. Sensitivity analysis was also conducted in this study and showed that RDF processing investment is feasible if the interest rate is less than 14%.

Energy use in the cement industry is dominantly in the form of heat energy up to 80% of the total energy, while electrical energy is about 20% of the total energy needs. Heat energy needs are mostly met by coal, while the rest is met from diesel as preheating. By utilizing RDF, it will reduce dependence on fossil fuels, reduce greenhouse gas emissions, be environmentally friendly and indirectly reduce production costs. For this reason, city areas adjacent to cement plants can utilize waste as an alternative fuel for cement plants, thus contributing to reducing and managing urban waste.

Ogan Komering Ulu (OKU) Regency is one of the regencies in South Sumatra Province that has a cement plant. The cement plant is also located close to the main energy source, which is coal. This is a challenge for cement plants in OKU Regency to utilize RDF as a substitute fuel, especially in terms of the RDF price that will be charged to cement plants compared to the current (fossil) coal fuel as the main kiln fuel. This condition is different from cement plants located on Java Island, because they have to bring their main fuel source from Kalimantan Island or Sumatra Island. Based on the description above, it is necessary to conduct a study on the financial processing of municipal waste into RDF to be utilized by cement factories located in OKU district, South Sumatra Province.

RESEARCH METHOD

The financial feasibility analysis of RDF processing was carried out with a case study at the landfill in OKU Regency. The financial feasibility was analyzed from cost parameters and revenue parameters of RDF sales to PT Baturaja (Persero) cement factory in OKU Regency-South Sumatra Province. Data for cost parameters consist of investment costs for the RDF Plant Development, which consists of land, building, and equipment costs. Revenue parameters consist of tipping fees and sales of RDF products to cement plants. Cost and revenue data are secondary data processed from various references; standards issued by the Ministry of PUPR; and technical studies on RDF processing in various landfills in Indonesia. Financial analysis was conducted using NPV, IRR, PP, and PI indicators. Based on economic considerations of the main production equipment, the financial feasibility analysis of RDF processing in OKU Regency was carried out for a 10-year analysis period. Sensitivity analysis on the aspects of operational costs and RDF selling price was also conducted to assess the financial feasibility of RDF processing in OKU Regency. Broadly speaking, the stages



of this research can be described as follows:

Figure 1: Research Stages

RESULT AND DISCUSSION

Waste Generation Potential

The identification of potential waste generation is carried out to determine the amount of waste volume that can be generated in OKU Regency as a case study area. Based on data published on https://sipsn.menlhk.go.id/sipsn/public/data/timbulan, the waste generation that occurs in OKU Regency is shown in Table 2.

Table 2: Waste generation in OKU Regency

Year	Waste Generation (Ton/Year)
2019	53,566
2020	54,330
2021	*data not available
2022	55,557
Average	54.484

The waste generation data in Table 1 shows that the average waste generation in OKU Regency is 54,484 tons/year with an average increase of 1.84% per year. Based on the percentage increase in waste generation, a waste generation projection calculation was then carried out, as shown in Table 3.

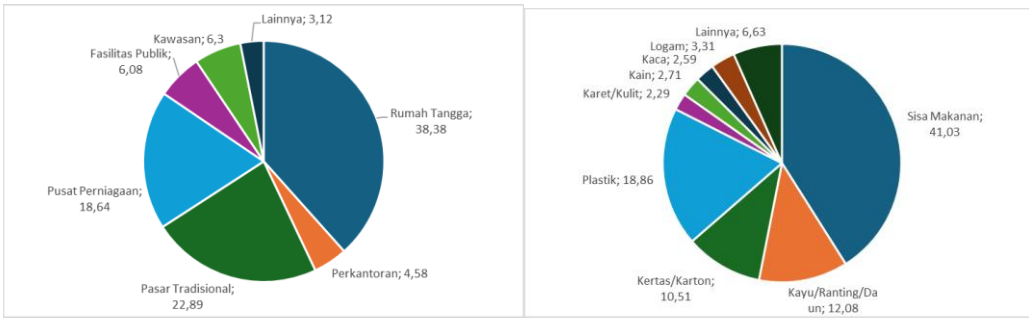
Classification of Waste Types and Calorific Value

Waste generated in OKU Regency mostly comes from households and traditional markets, so the composition of waste is mostly organic waste. Figure 2 shows data on waste sources and waste types in the case study area in 2022, respectively.

Table 3. Projected Waste Generation of OKU Regency in 2023-2033

Year	Projected Waste Generation (Ton/Year)
2023	56.579
2024	57.620
2025	58.681
2026	59.760
2027	60.860
2028	61.980
2029	63.120
2030	64.281
2031	65.464
2032	66.669
2033	67.896

2034	69.145



a. Percentage of Waste Sources b. Percentage of Waste Type

Figure 2. Sources and Types of Waste in OKU Regency

RDF production involves separating waste that cannot be processed into fuel, such as metal materials, glass, demolished building materials, or food waste. This is due to the standard heating value required for RDF. For cement plants, the required standard heating value of RDF is at least 3,000 kcal/kg (MOI, 2017). Table 4 shows the results of the calorific value calculation of waste in OKU Regency.

Table 4 shows that not all waste in the OKU Regency landfill can be processed into RDF. However, the types of waste that can be processed into RDF have high heating potential, such as plastics, textiles, and rubber/leather. These types of waste have a high composition as RDF material. Based on the calculation of the calorific value that can be generated by existing waste types, the potential calorific value is 5,920 kcal/kg. This calorific value indicates that waste generated from landfills in OKU Regency can be processed and meets the requirements to become RDF for fuel in cement plants.

Table 4. Waste Calorific Value of Waste Composition

Type of Waste	Process Processing	Waste Composition (%)	RDF Composition (%)	Potential Calories (kcal/kg)
Leftovers	Separated	41,03	-	-
Wood, Twigs, Leaves	-	12,08	26,26	4.400
Paper	-	10,51	22,85	3.588
Plastic	-	18,86	41,00	8.000
Metal	Separated	3,31	-	-
Fabric/Textile	-	2,71	5,89	7.200

Rubber/Leather	-	2,29	4,98	5.200
Glass	Separated	2,59	-	-
More	Separated	6,63	-	-
Total		**100%**	**100%**	**5.920**
Standard				**3.000**

Conceptual Design of RDF Plant

The RDF production process is carried out in several stages, starting from weighing waste, drying, shredding, grinding or mixing waste. All these processes will be carried out in the RDF plant, so that the RDF produced has good homogeneity and allows more stable combustion in the cement kiln. Technical requirements for RDF for cement plants include a minimum heating value of 3,300 kcal/kg, a maximum moisture value of 25%, a maximum chlorine content of 0.75%, and a maximum particle size of 50 mm. The RDF that has been produced will then be distributed to the cement plant using a conveyance that has a special dispensing system to prevent dust flying during RDF unloading. Schematically, the RDF production and distribution process in this case study object can be designed as shown in Figure 3.

In line with the RDF production and distribution process design in Figure 3, the RDF plant design can be identified as follows:

a. The RDF plant is assumed to be able to produce an RDF production capacity of 50 tons per day.
b. RDF plant equipment (consisting of waste separator/sorter, shredder, dryer, conveyor, truck, and supporting tools and equipment).

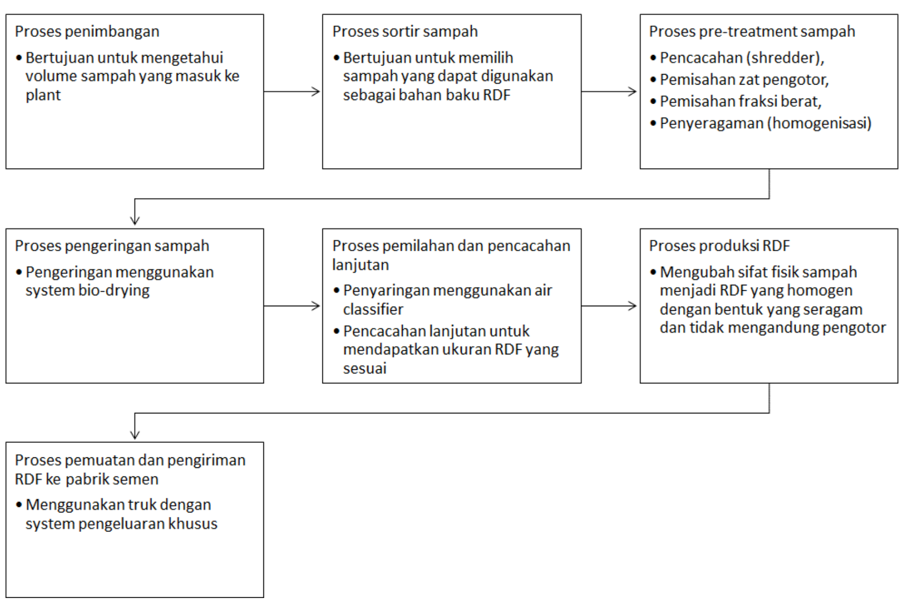


Figure 3. RDF Production and Distribution Process Design for OKU Regency

Financial Analysis

The construction of RDF facilities requires large investment and operational costs to produce RDF products as a substitute fuel for coal, while revenue is only obtained from product sales to cement factories located in the case study area. For this reason, it is necessary to analyze the feasibility of building this RDF facility in terms of financial feasibility. Broadly speaking, the financial feasibility analysis is carried out based on cost considerations and revenue considerations. The RDF plant operation will use a cost sharing system between the local government (Pemda) of OKU Regency and the cement industry in OKU Regency, namely PT Semen Baturaja Tbk. Broadly speaking, the RDF plant development costs consist of investment costs and operational costs, as shown in Table 5.

Table 5. Investment Cost of RDF Plant in OKU Regency

Investment Cost Component	Formula	Amount (Rp)
Procurement of RDF plant equipment	A	17.971.523.561
Equipment installation	0.3 A	5.391.457.068
Instrumentation	0.15 A	2.695.728.534
Piping installation	0.1 A	1.797.152.356
Electrical installation	0.15 A	2.695.728.534
Building	0.25 A	4.492.880.890
Public facilities and site preparation works	0.3 A	5.391.457.068
Land rent	0.05 A	898.576.178
Total Direct Cost	B = 2.3 A	41.334.504.191
Engineering and supervision	0.1 B	4.133.450.419
Construction	0.1 B	4.133.450.419
Overhead	0.1 B	4.133.450.419
Total investment cost	C = 1.3 B = 2.99 A	53.734.855.448

Table 5 shows the initial investment cost for the RDF plant. The main component of the initial investment cost is the cost of procuring the RDF plant equipment, which is determined from the prices in the electronic catalog. Other cost components were determined based on a certain proportion of the RDF plant procurement cost, with reference to Caputo and Pelagagge (2002).

Table 6. Operating Costs of RDF Plant in OKU Regency

Year	2019	2024
RDF Plant OKU	**Rp/month**	**Rp/month**
Cost Component	**OKU Regional Government**	
Electricity	116.249.306	122.179.189

Maintenance	84.254.835	88.552.678
ATK	1.000.000	1.051.010
Fuel Support	1.000.000	1.051.010
Total	338.741.508	356.020.729
Cost **Component**	**Semen** Baturaja	
Labor	125.845.137	132.264.504
Mob demob 20 km	241.776.000	254.109.006
Total	367.621.137	386.373.510
Total Operation and Maintenance Cost	706.362.645	742.394.239

Table 6 shows the operational cost components for the RDF plant in OKU Regency. The RDF plant operational cost calculation uses the assumption of benchmarking data from the Cilacap-Central Java RDF plant for 2019. The Cilacap-Central Java RDF Plant has the same production capacity and cost sharing scheme as the planned RDF Plant capacity in OKU Regency. The waste generation in OKU Regency in 2023 is 56,579 tons/year, with the assumption that it becomes RDF by 30%, then the waste generation becomes RDF by 16,974 tons/year, assuming 1 year of operation for 365 days, RDF production is 45-50 tons / day. Price adjustments are made by considering inflation that occurs during 2019-2023. It is assumed that the inflation rate is 1% per year, so that the total operational cost per month is Rp 742,394,239, with the division of costs borne by the OKU Regional Government of Rp 356,020,729 and costs borne by PT Semen Baturaja of Rp 386,373,510. Assuming the RDF production capacity per day is 50 tons or equivalent to 1,500 tons per month, the production cost per ton of RDF is Rp. 494,929.

Table 7. Total Operation and Maintenance Cost of RDF Plant

Year	**Waste Volume**	**RDF Production Volume**	**Total Operating and Maintenance Costs**		
			Operational Costs	**Maintenance Cost**	**Total**
	Ton/ Year	**Ton/Year**	**Rp/Year**	**Rp/Year**	**Rp/Year**
1	24.000	7.200	1.209.612.820	531.316.070	1.740.928.890
2	48.000	14.400	2.636.854.440	1.073.258.462	3.710.112.901
3	48.000	14.400	2.858.593.893	1.083.991.046	3.942.584.939
4	48.000	14.400	2.887.179.832	1.094.830.957	3.982.010.789
5	48.000	14.400	2.916.051.630	1.105.779.266	4.021.830.896
6	48.000	14.400	2.945.212.146	1.116.837.059	4.062.049.205
7	48.000	14.400	2.974.664.268	1.128.005.430	4.102.669.697
8	48.000	14.400	3.004.410.911	1.139.285.484	4.143.696.394
9	48.000	14.400	3.034.455.020	1.150.678.339	4.185.133.358

10	48.000	14.400	3.064.799.570	1.162.185.122	4.226.984.692

Table 7 shows the RDF plant in year 1 with 50% production capacity, the total operational and maintenance cost is IDR 1.74 billion and increases every year assuming cost inflation of 1% per year.

The main source of income for the RDF Plant in OKU Regency is the sale of RDF to PT Semen Baturaja (Persero). The selling price of RDF produced at the OKU Regency RDF Plant is assumed to be Rp. 350,000/ton. The selling price is determined based on benchmarking the selling price of RDF from several RDF Plants with cement factory offtakers. Other revenue from processing waste into RDF is in the form of tipping fees. Tipping fee is a fee paid by the local government to waste managers. Based on the results of interviews with the local government, the amount of tipping fee that the local government is willing to pay for waste management in OKU Regency is set at Rp. 150,000 per ton of waste.

Table 8. Total Revenue of RDF Plant

Year	**Waste Volume**	**RDF Production Volume**	**RDF Selling Price**	**Tipping Fee**	**Revenue**
	Ton/year	**Ton/year**	**Rp/ton RDF**	**Rp/ton Waste**	**Rp/year**
1	24.000	7.200	350.000	150.000	5.814.000.000
2	48.000	14.400	353.500	151.500	12.053.340.000
3	48.000	14.400	357.035	153.015	12.486.024.000
4	48.000	14.400	360.605	154.545	12.610.884.240
5	48.000	14.400	364.211	156.091	12.736.993.082
6	48.000	14.400	367.854	157.652	12.864.363.013
7	48.000	14.400	371.532	159.228	12.993.006.643
8	48.000	14.400	375.247	160.820	13.122.936.710
9	48.000	14.400	379.000	162.429	13.254.166.077
10	48.000	14.400	382.790	164.053	13.386.707.738

Table 8 shows the RDF Plant revenue from the first year was IDR 5.8 billion and increased in the year with the RDF Plant production in the first year at 50% of capacity.

The results of the analysis based on operational costs, maintenance and RDF Plant revenue, the calculation of the financial feasibility of waste management into RDF for cement plants in OKU Regency with scenarios according to Table 9.

Table 9: Feasibility Analysis of RDF Plant

Parameters	**Scenario** 1 **(70% Equity: 30% Debt)**	**Scenario** 2 **(30% Equity: 70% Debt)**
IRR	13,05%	12,51%

NPV (IDR Million)	10.967	8.819
Payback Period	10 years 3 months	10 years 7 months
Profitability Index	1,20	1,15

Based on the results of the feasibility analysis, the RDF Plant is feasible to implement.

Financial Feasibility Sensitivity Analysis

Scenario 1

Based on the results of the calculation of the feasibility of the RDF Plant, a sensitivity analysis of scenario 1 is carried out on the selling price, RDF Plant operating costs and investment which can be seen in Table 10 and Table 11 and Table 12 with a sensitivity decrease of 10% and 20% and an increase of 10% and 20%.

Table 10 Sensitivity Analysis Based on RDF Selling Price with Scenario 1

RDF Selling Price Sensitivity	IRR	NPV	Payback Period	PI	Feasibility Analysis
-20%	9,96%	IDR (2,630) Billion	12 Years 5 Months	0,95	Not Feasible
-10%	11,57%	IDR 4.185 billion	11 Years 2 Months	1,08	Worth
0	13,05%	IDR 10.967 billion	10 Years 3 Months	1,10	Worth
+10%	14,44%	IDR 17.749 billion	9 Years 6 Months	1,32	Worth
+20%	15,75%	IDR 24,530 billion	8 Years 11 Months	1,44	Worth

The results of the RDF Plant feasibility analysis are very sensitive to changes in selling prices where with a 20% decrease in selling prices, the RDF Plant becomes unfeasible. With a 10% decrease in selling price and a 10% and 20% increase in selling price, the RDF Plant is feasible.

Table 11. Sensitivity Analysis Based on RDF Plant Operating Costs with Scenario 1

RDF Operating Cost Sensitivity	IRR	NPV	Payback Period	PI	Feasibility Analysis
-20%	14,13%	IDR 16.187 billion	9 Years 8 Months	1,29	Worth
-10%	13,60%	IDR 13.577 billion	9 Years 11 Months	1,24	Worth
0	13,05%	IDR 10.967 billion	10 Years 3 Months	1,10	Worth

+10%	12,50%	IDR 8.356 billion	10 Years 7 Months	1,15	Worth
+20%	11,92%	IDR 5.746 billion	10 Years 11 Months	1,10	Worth

Table 11 shows the results of the RDF Plant feasibility analysis are not sensitive to changes in operating costs by decreasing and increasing by 10% and 20%, so the RDF Plant is feasible to implement.

Table 12 Sensitivity Analysis Based on RDF Plant Investment Costs with scenario 1

Investment Cost Sensitivity	**IRR**	**NPV**	**Payback Period**	**PI**	**Feasibility Analysis**
-20%	15,83%	IDR 19.977 billion	8 Years 10 Months	1,45	Worth
-10%	14,33%	IDR 15.472 billion	9 Years 7 Months	1,31	Worth
0	13,05%	IDR 10.967 billion	10 Years 3 Months	1,10	Worth
+10%	11,95%	IDR 6.461 billion	10 Years 11 Months	1,11	Worth
+20%	10,99%	IDR 1.956 billion	11 Years 7 Months	1,03	Worth

The results of the RDF Plant feasibility analysis are insensitive to changes in investment costs by a decrease and increase of 10 and 20%, so the RDF Plant is feasible to implement.

Scenario 2

Furthermore, the sensitivity analysis of scenario 2 on the selling price, RDF Plant operating costs and investment can be seen in Table 13 and Table 14 and Table 15 with a sensitivity decrease of 10% and 20% and an increase of 10% and 20%.

Table 13 Sensitivity Analysis of RDF Selling Price with scenario 2

RDF Selling Price Sensitivity	**IRR**	**NPV**	**Payback Period**	**PI**	**Feasibility Analysis**
-20%	9,45%	IDR (4.885) Billion	12 Years 11 Months	0,92	Not Feasible
-10%	11,04%	IDR 1.967 billion	11 Years 7 Months	1,03	Worth

0	12,51%	IDR 8.819 billion	10 Years 7 Months	1,15	Worth
+10%	13,89%	IDR 15.671 billion	9 Years 10 Months	1,27	Worth
+20%	15,20%	IDR 22.523 billion	9 Years 2 Months	1,39	Worth

The results of the RDF Plant feasibility analysis are very sensitive to changes in selling prices where with a 20% decrease in selling prices, the RDF Plant becomes unfeasible. Whereas with a 10% decrease in selling price and a 10% and 20% increase in selling price, the RDF Plant is feasible.

Table 14 Sensitivity Analysis of RDF Plant Operating Cost with scenario 2

RDF Operating Cost Sensitivity	IRR	NPV	Payback Period	PI	Feasibility Analysis
-20%	13,58%	IDR 14.093 billion	9 Years 11 Months	1,24	Worth
-10%	13,05%	IDR 11.456 billion	10 Years 3 Months	1,20	Worth
0	12,51%	IDR 8.819 billion	10 Years 7 Months	1,15	Worth
+10%	11,96%	IDR 6.182 billion	10 Years 11 Months	1,11	Worth
+20%	11,39%	IDR 3.546 billion	11 Years 4 Months	1,06	Worth

The results of the feasibility analysis of the RDF Plant are insensitive to changes in operating costs by a 20% decrease and increase, so the RDF Plant is feasible to implement.

Table 15 Sensitivity Analysis of RDF Plant Investment Cost scenario 2

Investment Cost Sensitivity	IRR	NPV	Payback Period	PI	Feasibility Analysis
-20%	15,28%	IDR 18.378 billion	9 Years 1 Month	1,40	Worth
-10%	13,78%	IDR 13.598 billion	9 Years 10 Months	1,26	Worth
0	12,51%	IDR 8.819 billion	10 Years 7 Months	1,15	Worth
+10%	11,42%	IDR 4,040 billion	11 Years 4 Months	1,06	Worth

+20%	10,46%	IDR (740) Billion	11 Years 7 Months	0,99	No Worth

The results of the RDF Plant feasibility analysis are very sensitive to changes in investment costs where with an increase of 20% the RDF Plant becomes unfeasible. Whereas with a decrease in investment costs of 10% and 20%, as well as an increase in investment costs by 10%, the RDF Plant is feasible to implement.

CONCLUSION

Domestic waste generated in OKU Regency has the potential to be further processed into waste-derived fuel or RDF and used as a substitute for coal for the cement industry. Although not all waste in the OKU Regency landfill can be processed into RDF, the types of waste that can be processed into RDF have high calorific potential as RDF raw materials for the cement industry. The financial feasibility analysis of the RDF Plant conceptual design in this study indicates that the RDF Plant Development in OKU Regency is financially feasible with a cost sharing scheme between investors, local governments, and cement factories as RDF offtakers. Sensitivity analysis shows that the financial feasibility of processing waste into RDF in OKU Regency is affected by a decrease in the selling price of RDF, while increasing operational and investment costs by up to 20%.

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