

Cost-Benefit Analysis Report

Plastics Recycling Program

Prepared for ReNew

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Executive Summary

Australia's plastic waste problem has led to a significant transformation of the recycling industry, driven by China's decision to cease importing certain types of recyclable materials from other countries, including Australia (Department of Agriculture, Water and the Environment, 2020). This change has prompted the federal government to implement new policies emphasising recycling and waste reduction, leading to innovative recycling programs (Tomaras, 2020).

This report will mainly focus on the investor perspective and the external benefits of the program to the government and the local community. This report's conclusion will include whether the investor should invest in this program, and recommendations will be provided on improving the program.

Introduction

This cost-benefit analysis (CBA) will evaluate the viability of the first alternative, considering the benefits and costs for the investors. In response to the new policy implemented by the government, ReNew is considering two main alternatives:

- (1) investing in a plastics recycling program to reduce waste and create eco-friendly furniture and textiles from recycled plastics, or
- (2) continuing with their current practices without implementing a recycling program. (status quo)

The plastic recycling program is anticipated to begin production in 2024 and will operate for 20 years, with the initial capital investment in 2023. This report will present the results of the market, investor, social, and disaggregated analyses, as well as a literature review and evaluation of the recycling programme's external benefits.

Methodology

The proposed plastics recycling program was subjected to a Cost-Benefit Analysis (CBA) to evaluate the program's economic and social impacts. This report was separated into three sections, which are:

1. Market and Investor perspective
2. Social and Disaggregated perspective
3. Sensitivity and threshold analysis

Market perspective would account for tangible market transactions, such as initial investment costs, salvage value and ongoing benefits and costs that accrue over the project's lifetime (Bonner, 2022). The investor perspective referred to cash flow to the individual investor engaged in the project at market prices after deducting loan service costs and payment of profit taxation.

Social perspective uses shadow prices to determine the project's overall net benefits, considering society as a whole rather than the gainers and losers. Disaggregating the results of the social CBA enables us to distribute the CBA's results to the various stakeholders.

Sensitivity analysis aims to determine how the net benefits change when the parameters of a CBA deviate from their assumed values (Bonner, 2022). Threshold analysis could identify a specific goal for a value under consideration to be achieved to overcome a threshold point.

- Discounting approach:

This analysis would use discounting approach with three discount rates, 5%, 10% and 15% to account for the time value of money and ensure that future costs and benefits are adequately weighed in the present.

- Decision rule:

The recommendation process will be governed by a decision rule based on the Net Present Value (NPV). The project will be considered economically viable if the NPV exceeds zero, indicating that the benefits' present value outweighs the costs' present value. This CBA was conducted using real value.

- Assumptions:

- The price of the chairs and tonnes of granules available for recycling were uncertain, so sensitivity analysis is conducted on how the NPV changes from the investor perspective at the 5% discount rate.
- Another sensitivity analysis is conducted on how the IRR changes from the investor perspective for the price of the chairs and tonnes of granules available for recycling.
- Threshold analysis will be carried out if the company is considering asking for additional tax breaks from the government to support this project while would like to achieve an NPV of 1.7 million at a 5% discount rate.
- Another threshold analysis was to identify the minimum price the company could charge for each chair that would achieve a minimum of 10% IRR as the investor.

Discussion

3.1 Market, Investor and Social perspectives:

Figure 1 shows the project has a positive NPV for a discount rate of 5% for all the market, investor and social perspectives. However, as the discount rate increases, the NPV slowly becomes negative. At a discount rate of 10%, the NPV for both the market and investor perspectives are negative, while the social perspective remains positive.

The discount rate at which the NPV reaches \$0.00 is known as the Internal Rate of Return (IRR) for the project, and it represents the breakeven point where the project's benefits equal costs (Bonner, 2022). The recycling program should not undertake if the discount rate exceeds the IRR. It should undertake the mentioned status quo, continuing its current project without implementing a recycling program.

- Market perspective:

At a discount rate of 9.61%, the project is expected to generate positive net benefits, and if the discount rate is above 9.61%, the project is expected to result in a loss. Hence, the project should be accepted if the discount rate is below 9.61%.

- Investor perspective:

The IRR is 8.80%, meaning the investor should reject investing in the project if the discount rate exceeds 8.80%. This will lead to a loss in returns as the project cannot generate enough returns to cover the initial costs and the required rate of return.

- Social perspective:

The project is not considered from a societal standpoint if the discount rate is higher than 14.31%, as it does not contribute positively to social welfare or improve overall well-being. The higher IRR reflects the value of the project's positive externalities, as recycling generates significant social and environmental benefits.

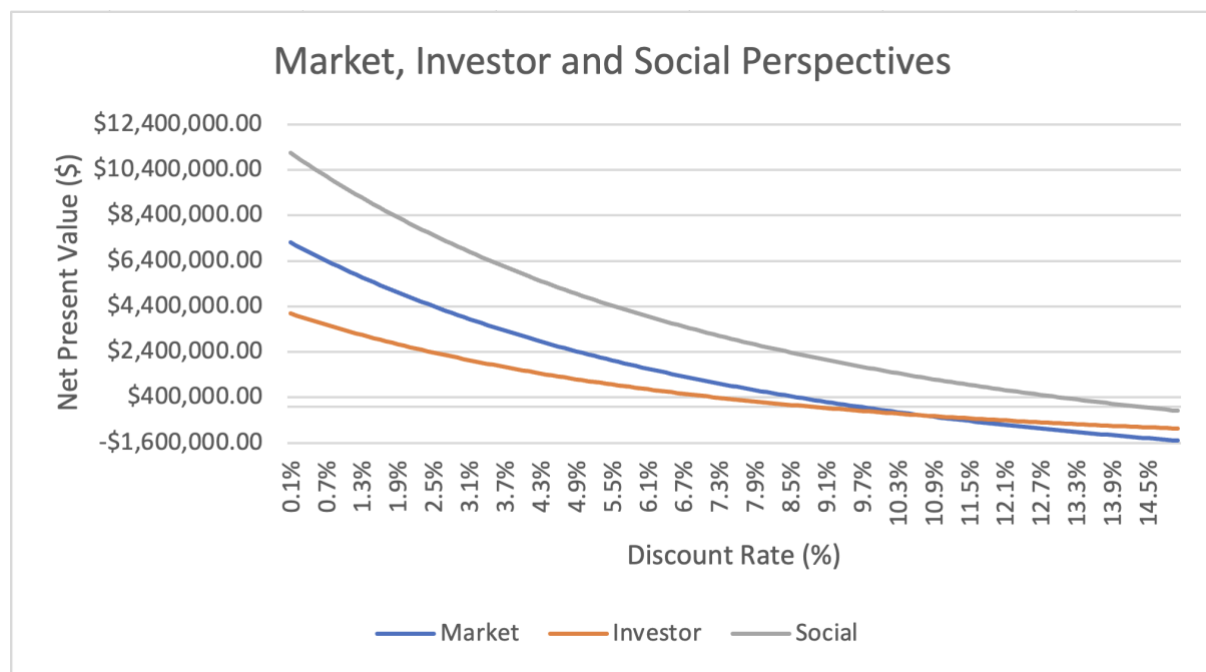


Figure 1: Market, Investor and Social Perspectives

3.2 Disaggregated perspectives:

The external benefit of this project aims to reduce the environmental impact, such as reducing CO2 emissions. The external benefits of producing plastic chairs and textiles using recycled plastics are expected to save an average of 1.5 tonnes of CO2 and 5777.9kg of CO2 equivalent per tonne of recycled plastics.

Overall, the government, landowner, labour and community have positive NPV for all three discount rates, indicating the project should be undertaken as the present value of the project's future benefits exceed its costs for each stakeholder.

For the government, a positive NPV means the government achieves its policy objectives and benefits the citizen. For the community, positive NPV suggests that the program may improve the quality of life for the community and promote sustainable development.

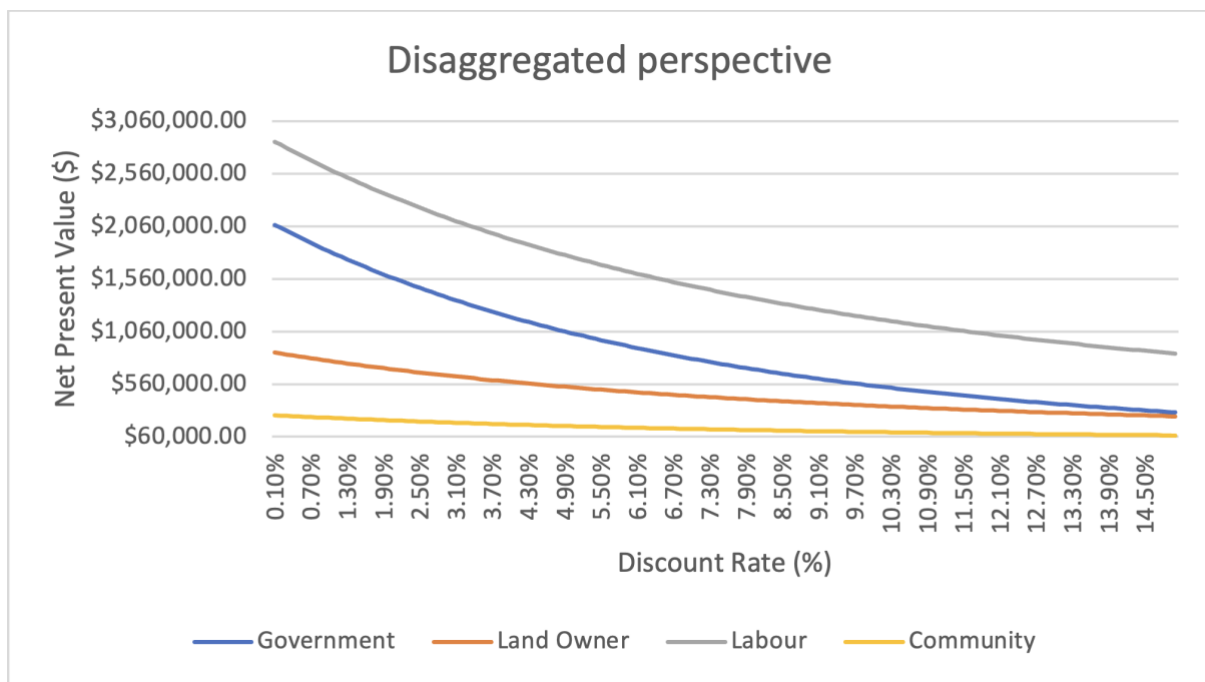


Figure 2: Disaggregated Perspective

3.3 Sensitivity and threshold analysis:

Figure 3 shows two negative NPVs when 155 and 165 tonnes of granules available for recycling at \$50.00, so it is necessary to exclude them as this will lead to negative returns for the investors. As the price of chairs increases and the tonnes of granules available increase, the NPV will also increase, which will be more profitable for the investors.

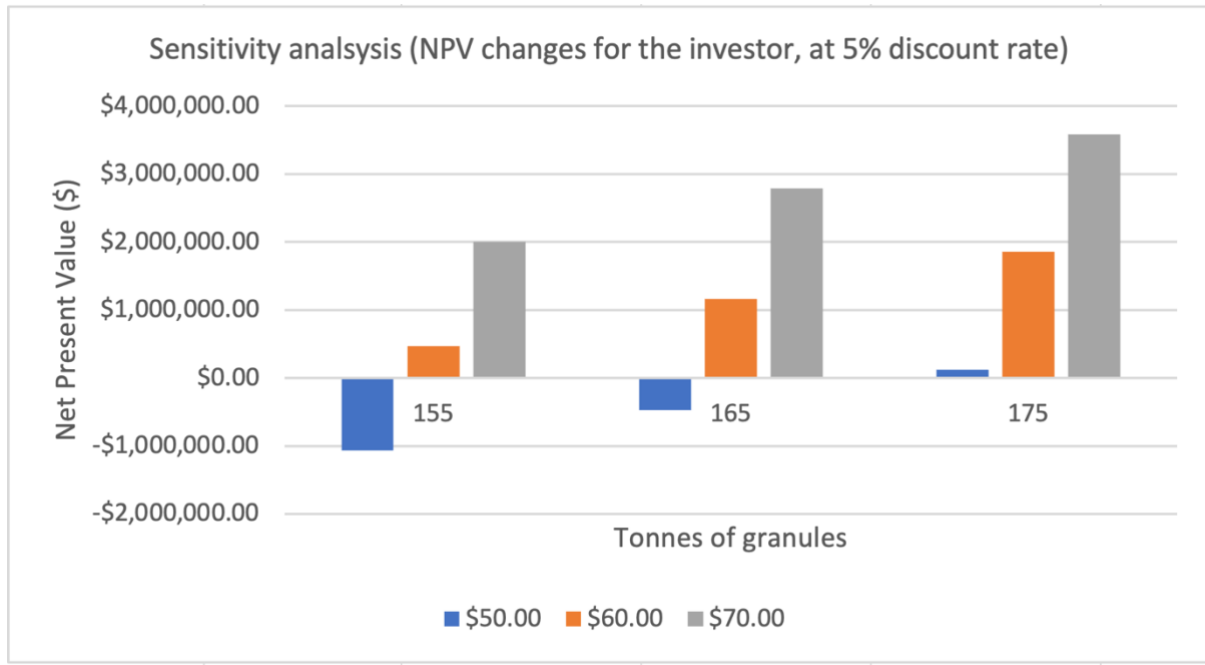


Figure 3: Sensitivity analysis (NPV changes for the investor)

Figure 4 shows the IRR changes for the investor based on the tonnes of granules available and prices. If the investor wants to achieve a minimum of 10% IRR, the tonne of granules available must be 175 at \$60.00 and \$70.00 for 155, 165 and 175 tonnes of granules.

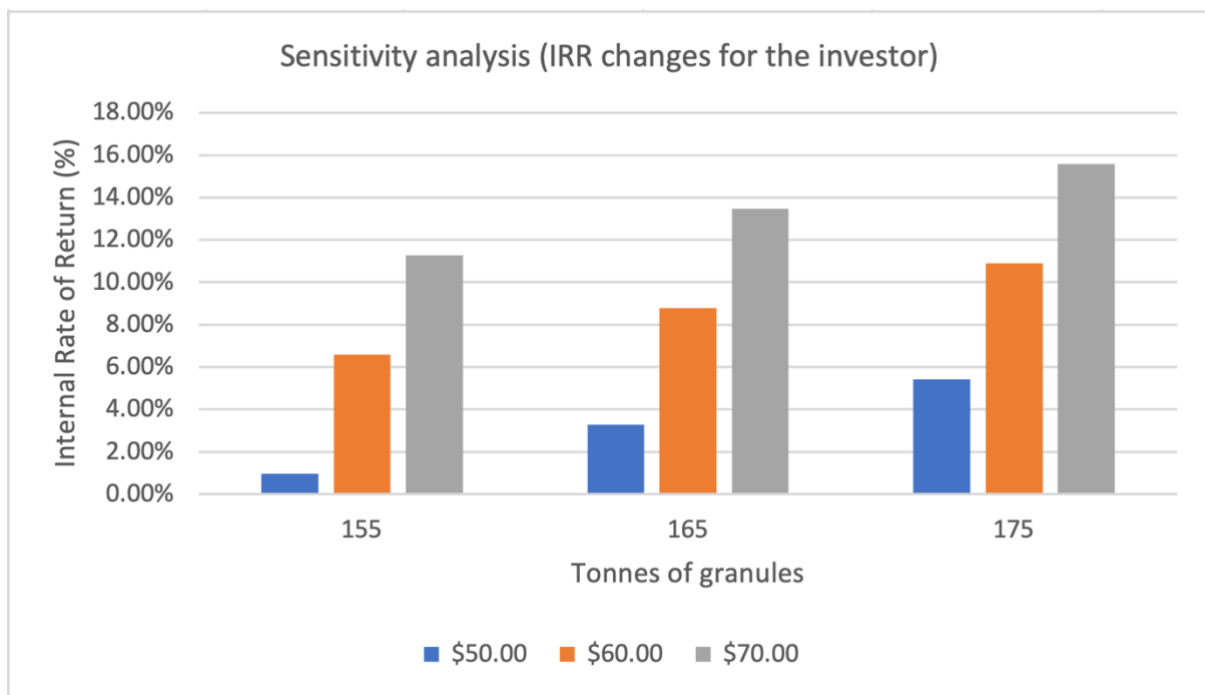


Figure 4: Sensitivity analysis (IRR changes for the investor)

Moreover, if the company (ReNew) would like to achieve an NPV of 1.7 million at a 5% discount rate, 19.58% of the tax rate need to decrease to achieve this. The higher the NPV, the higher the tax rate needs to reduce.

Original tax rate:	30%
New tax rate:	$49.68\% - 30\% = 19.58\%$

Table 1: threshold analysis for NPV

To achieve a minimum of 10% IRR as the investor, the company must charge \$62.40 for each new chair.

Current price of the chair:	\$60.00 each
New price of the chair:	\$62.40 each

Table 2: threshold analysis for IRR

Conclusion

It is recommended that the investors **reject** investing in this project if they want to achieve a minimum of 10% IRR. If the investor does not have an expectation of the IRR, this project could be accepted at a 5% discount rate, or the discount rate below 8.8% will generate positive returns for the investors. The government accepts that this project at 5%, 10% or 15% discount rates as it may benefit the government by generating revenue from taxation and promoting economic growth. For the community, this project will be accepted at 5%, 10% or 15% discount rates as reducing CO2 emissions benefit the community as a whole.

Recommendation

This report analysed whether investing in the plastic recycling programme is a viable option by examining market, investor, social, and disaggregated perspectives, as well as the costs and benefits of the project. Due to the twenty-year duration of the undertaking, it is recommended that additional external factors be considered. Observing comparable plastic recycling projects in the area could provide a good foresight of the project's future performance (Plastics Industry Feasibility Study, 2020).

The critical factor that may affect this project is the supply of the recycled plastics that need to produce the new recycled products. If the supply of recycled plastics is too low, it may affect production as the company may not be able to produce new recycled products. One solution for this issue includes encouraging people to collect and return containers for recycling for a 10 cents refund (Queensland Government, 2023). This may increase the recycling rate. Another factor could be that the quality of the new products may be inconsistent; purchasing the latest advanced machines may solve this problem (Biddle, 1993).

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