APPENDIX G
PILOT STUDY

G.1 INTRODUCTION

To qualify the EEGECOST model, its outputs were compared to that of the Total Cost Assessment (TCA) system. The same input data was used, based on a case study presented in the Total Cost Assessment literature (Little, 2000). The case study data is hypothetical, however, it still proves to be comparable and representative of actual data to provide information regarding the functionality of the EEGECOST model for corporate decision making, with the main intent to show how the results of the EEGECOST model compares with that of the TCA system.

G.2 THE CASE STUDY

The objective of the case study is to determine the priority of two waste streams for research and development (R&D) funding. In this hypothetical example, a company has articulated several goals aimed at reducing waste generation from its industrial processes. The main question is how to decide which waste stream will receive priority for R&D funding in the implementation of the company's waste reduction strategy. The case study is a baseline assessment of the manner in which the wastes are currently being treated. The waste treatment options and their evaluations would be developed as part of the R&D assessment activities that presumably would occur later in the decision-making process.

Relying on conventional cost data (that is, total Types I and II costs, or Types I and II costs presented as per ton disposed values) indicates that waste stream 1 (liquid hazardous waste) is consistently more expensive than waste stream 2 (aqueous sludge) for the company. Thus, the company could reasonably be expected to prioritise R&D funding towards reducing the more costly waste stream. The potential value in applying environmental accounting is to determine how the cost profile and possibly the prioritisation decision may change when Types III, IV, and V costs are considered. By incorporating these costs into the environmental accounting system will assist the initial comparison of the costs associated with the management and disposal of the two waste streams.

G.3 METHOD

The first step is to determine the average annual operating costs for managing and disposing of each waste stream. It is assumed that waste stream 1 is incinerated onsite and waste stream 2 is landfilled offsite. Tables G.1 and G.2 present the Types I and II costs associated with the management and disposal of each waste stream.

Table G.1 Waste stream 1 conventional costs.

DESCRIPTION	COST
Corporate overheads	R 290 000,00
Depreciation	R 1 230 000,00
External services	R 130 000,00
Internal services	R 850 000,00
Labour	R 300 000,00
Utilities	R 600 000,00
Raw materials	R 600 000,00
Total	R 4 000 000,00

Table G.2 Waste stream 2 conventional costs.

DESCRIPTION	COST
Corporate overheads	R 50 000,00
Depreciation	R 100 000,00
External services	R 2 200 000,00
Internal services	R 250 000,00
Labour	R 150 000,00
Utilities	R 50 000,00
Raw materials	R 200 000,00
Total	R 3 000 000,00

After annual costs are forecasted using readily available data, the next step is to identify the cost driver or the overall cost on a per mass basis. For example, if the amount of waste stream 1 (liquid waste) incinerated annually is roughly 25 000 tons, then the cost per ton would be:

R 4 million/25 000 = R 160,00 per ton.

Similarly, if 20 000 tons of aqueous sludge was disposed of annually, the associated cost would be:

R 3 million/20 000 = R 150,00 per ton.

Using these, an initial evaluation of the Type I and II costs associated with each disposal option would lead the decision-maker to make the judgement that waste stream 1 is more costly than waste stream 2 per ton.

Environmental accounting are subsequently applied to assess how the above results could change by looking at the additional Types III, IV, and V costs. The case study uses similar data as a starting point but also incorporates additional costs, which include the following (see Table G.3):

Table G.3 Additional costs for environmental accounting.

DESCRIPTION	COST CATEGORY
Future compliance cost	Type III
Future contingent liabilities	Type IV

Incorporating Types III and IV costs into the analysis, allows consideration of future and hidden costs that can greatly influence the overall decision making process. Risk scenarios for each waste stream are defined that fully incorporate these future potential costs. In practice, these risk scenarios would ideally be constructed by a multi-disciplinary team that can use brainstorming techniques, life cycle inventory principles and data, as well as other internal resources to identify appropriate risk scenarios that include more precise probabilities and consequences.

To illustrate the method, Tables G.4 and G.5 represent the risk scenarios and associated costs that are applied to each waste stream over a three year forecast period. For the most part, these risks were arbitrarily defined, although they are generally plausible for each waste stream.

Table G.4 Additional costs for environmental accounting (waste stream 1).

RISK NO	DESCRIPTION	COST TYPE	COST	PROBABILITY
1	Air pollution control system upgrade in year 2	Type III	R 1 200 000,00	100%
2	Non-compliance fine in year 2	Type III	R 150 000,00	20%
3	Company image cost in year 3	Type IV	R 15 000 000,00	2%
4	Increase in utility costs in year 3	Type III	R 300 000,00	100%

Table G.5 Additional costs for environmental accounting (waste stream 2).

RISK NO	DESCRIPTION	COST TYPE	COST	PROBABILITY
1	Community impact per year	Type III	R 50 000,00	5%
2	Non-compliance fine in year 1	Type III	R 100 000,00	1%
3	Company image cost in year 3	Type IV	R 2 500 000,00	100%

The risk scenarios developed above were used to tabulate the results and calculate a total present value cost for each waste stream over a three-year evaluation period. These costs were discounted to present day using a 12% discount rate. The choice of discount rate here is purely arbitrary and is not intended to imply any statement on the appropriateness of the value.

G.4 RESULTS

Tables G.6 and G.7 illustrate the results of the TCA system and the EEGECOST model for the hypothetical case example respectively. The results of the TCA system indicate that the costs per ton for waste stream 2 (R 504,39) are now larger than those expected for waste stream 1 (R 493,88) as opposed to the conventional cost results.

Table G.6 Total Cost Assessment system.

RISK NO	YEAR 1	YEAR 2	YEAR 3	PRESENT VALUE TOTAL
WASTE STREAM 1				
I & II	R 4 000 000,00	R 3 570 000,00	R 3 200 000,00	R 10 770 000,00
1	-	R 1 070 000,00	-	R 1 070 000,00
2	-	R 27 000,00	-	R 27 000,00
3	-	-	R 240 000,00	R 240 000,00
4	-	-	R 240 000,00	R 240 000,00
Total	R 4 000 000,00	R 4 667 000,00	R 3 680 000,00	R 12 347 000,00
WASTE STREAM 2				
I & II	R 3 000 000,00	R 2 680 000,00	R 2 400 000,00	R 8 080 000,00
1	R 2 500,00	R 2 230,00	R 1 990,00	R 6 720,00
2	R 1 000,00	-	-	R 1 000,00
3	-	-	R 2 000 000,00	R 2 000 000,00
Total	R 3 003 500,00	R 2 682 230,00	R 4 401 990,00	R 10 087 720,00

The results from the EEGECOST model also indicate that the costs per ton of waste stream 2 (R 503,57) are larger than the costs of waste stream 1 (R 493,53). The results from the TCA system and the EEGECOST model delivered the same findings.

Table G.7 The EEGECOST model.

RISK NO	YEAR 1	YEAR 2	YEAR 3	PRESENT VALUE TOTAL
WASTE STREAM 1				
I & II	R 4 000 000,00	R 3 572 000,00	R 3 189 000,00	R 10 761 000,00
1	-	R 1 072 000,00	-	R 1 072 000,00
2	-	R 26 800,00	-	R 26 800,00
3	-	-	R 239 200,00	R 239 200,00
4	-	-	R 239 200,00	R 239 200,00
Total	R 4 000 000,00	R 4 670 800,00	R 3 667 400,00	R 12 338 200,00
WASTE STREAM 2				
I & II	R 3 000 000,00	R 2 679 000,00	R 2 391 580,00	R 8 070 580,00
1	R 2 500,00	R 2 250,00	R 1 993,00	R 6 743,00
2	R 1 000,00	-	-	R 1 000,00
3	-	-	R 1 993 000,00	R 1 993 000,00
Total	R 3 003 500,00	R 2 681 250,00	R 4 386 573,00	R 10 071 323,00

G.5 CONCLUSIONS

The results from the EEGECOST model compared well to the results from the TCA system, based on the same case study scenario. The model is therefore quantified and verified in terms of its functionality and applicability as a corporate decision making tool.