The Institute of Chartered Accountants in Australia

Environmental Management Accounting Case Study

Methodist Ladies College, Perth

September 2002

CONTENTS

Executive Summary

This case study of Methodist Ladies College, Perth ("MLC") was conducted as part of the Environmental Management Accounting Project ("EMAP")[1] which has the overall objective of demonstrating how introducing environmental management accounting practices within a business can achieve positive financial and environmental outcomes. MLC is a day and boarding school for students from kindergarten to year 12.

The case study had to address a number of objectives, which we classified into three phases:

Phase 1. Identify the existing management accounting system and how the environmental impacts of the business are treated within this system.

We identified the following key environmental impacts associated with MLC's operations:

- Energy usage
- Water usage
- Paper usage
- Waste management

Under MLC's existing management accounting system the costs associated with these environmental impacts are lost amongst overheads and there is no further classification or analysis and no form of responsibility accounting for these costs.

Phase 2. Identify cost and revenue opportunities not recorded in the existing management accounting system. Determine the changes needed to the system to reflect the opportunities, achieve better environmental outcomes and improve profits.

The objective of Environmental Management Accounting ("EMA") is to identify the environmentally induced costs/benefits and account for them in a way that meets the information needs of the stakeholders. The key opportunities recognised for implementing EMA at MLC were in relation to income and expenditure transactions and capital works expenditure.

The system changes required for reflecting the opportunities and achieving better financial and environmental outcomes related to:

- Improving management control of income and expenditure transactions by establishing:
  - Responsibility Centres and activity sub-centres;
  - Drivers for apportioning costs to Responsibility Centres;
  - Records to help identify all costs associated with activities and enable allocation of those costs to sub-centres;

[1] The Commonwealth Government of Australia through Environment Australia and the Victorian Government through EPA Victoria provided funding for EMAP. The views expressed in this publication do not necessarily represent the views or reflect the policies of Environment Australia or EPA Victoria.

- Improving communication of the nature of MLC's income and expenditure transactions by changing the format of the Income and Expenditure Report to disclose Responsibility Centres and sub-centres;
- Ensuring environmental cost impacts are considered in a uniform fashion by amending the purchasing policy; and
- Improving the decision making process for capital works expenditure by including Life Cycle Costing ("LCC") in the process.

Phase 3. Trial and record the changes to determine how the changes would produce results different from those under the pre-existing management accounting system.

In phase three we trialed the changes and recorded how the results differed as a consequence of those changes. The results illustrated how Environmental Management Accounting ("EMA") contributes to good management and that it is important to consider how environmental impacts are treated within a management accounting system so management is not making sub-optimal decisions and can provide other stakeholders with more meaningful information.

In particular the trialed changes illustrated:

- Financial and environmental benefits to be achieved by applying the management accounting tools Activity Based Costing ("ABC") and LCC;
- Potential for management to identify opportunities for improvement from the additional information made available by the changes;
- Opportunity for more informed management decisions.

EMA is not a stand-alone management tool. To be effective it must be fully integrated into the organisation's management accounting system as indicated by the nature of the changes identified.

The underlying message to be taken from this study is that EMA contributes to good management and without it sub-optimal business decisions will be made. EMA raises management's awareness of environmental impact costs that also impact on the financial performance of the organisation and promotes an awareness of the inter-relationship between an organisation's operations and its impact on the environment. The motivation to embrace EMA comes from a desire for good management as much as a desire to minimise environmental impact.

1. Introduction

The Environmental Management Accounting Project ("EMAP")[2] has the objective of producing four case studies that demonstrate how introducing environmental management accounting practices within a business can achieve positive financial and environmental outcomes. For this purpose, BDO has been engaged to conduct a study on Methodist Ladies College, Perth ("MLC").

MLC occupies approximately 7 hectares on the foreshore of the Swan River, in the Perth suburb of Claremont. The School enrols 1,000 students from Kindergarten to Year 12 including 100 boarders, and has over 240 employees. Its facilities include:

- Classrooms and boarding houses
- Café, commercial kitchens and dining hall
- Outdoor swimming pool
- Playing fields, playgrounds, gardens and river foreshore
- Air conditioned auditorium
- Laundry
- Health centre
- Science centre including 11 laboratories
- Resource and information technology centre

1.1 Objective of the Study

The EMAP requires the case study to address a number of objectives, which we have classified into three phases:

Phase 1 ***Identify the existing management accounting system and how the environmental impacts of the business are treated within this system.***

In phase one our objectives were to review MLC's operations to identify the key environmental impacts associated with those operations and to identify MLC's management accounting system and how the environmental impacts were treated within the system, including the accounting, reporting, budgeting and capital expenditure systems.

Phase 2 ***Identify cost and revenue opportunities not recorded in the existing management accounting system. Determine the changes needed to the system to reflect the opportunities, achieve better environmental outcomes and improve profits.***

Having determined MLC's accounting treatment of environmental impacts, in phase two we concentrated on identifying costs and opportunities associated with the impacts that were not recorded or readily identified within the system. We then determined the changes to be made to the system to make the environmental impacts and associated costs and benefits more easily identified, providing management and other stakeholders of MLC with more meaningful information. This included considering the application of management accounting methods Activity Based Costing ("ABC") and Life Cycle Costing ("LCC").

[2] The Commonwealth Government of Australia through Environment Australia and the Victorian Government through EPA Victoria provided funding for EMAP. The views expressed in this publication do not necessarily represent the views or reflect the policies of Environment Australia or EPA Victoria.

Phase 3 ***Trial and record the changes to determine how the changes would produce results different from those under the pre-existing management accounting system.***

In phase three we trialed the changes and recorded how the results differed as a consequence of those changes. The results illustrate how EMA contributes to good management and that it is important to consider how environmental impacts are treated within a management accounting system so management is not making sub-optimal decisions and can provide other stakeholders with more meaningful information.

1.2 Scope of the Study

For the purposes of this study only environmental impacts and costs that are directly related to MLC's operations have been considered. The study does not take account of environmental impacts and costs that are external to MLC's operations (such as the trees that are chopped down to provide paper used by MLC).

2. Phase One

MLC uses the Blackbaud school accounting and reporting system. The system has functions for admissions/registrations of students, student records and accounting for non-profit organisations.

2.1 Reporting

In terms of accounting reports, and in particular management accounting reports, Blackbaud has limited outputs. The principal outputs MLC utilises are the chart of accounts, trial balance, income statement, balance sheet and general ledger. The school then manually prepares spreadsheets to produce the income and expenditure statement and cash flow forecast.

The income and expenditure statement details the actual and budgeted amounts for the period to date. The income in the statement is split between tuition fees, extra subject fees, subsidies and other income. Expenditure is separated into a number of main headings with most costs, after tuition costs, being apportioned to an administration and general overheads category. Other categories include buildings and equipment, gardens and grounds, boarding, catering, caretaking and cleaning, information technology and the health centre. The only expenses apportioned to these other categories are salaries and wages, and sundry expenses. Each category is further allocated between tuition and boarding.

The budget is set prior to the school year and each Head of Department is responsible for monitoring actual expenditure against budget. The general ledger printouts of departmental expenses are circulated monthly to Heads of Department for review.

2.2 Capital Expenditure

Capital expenditure at MLC has two arms, capital works and capital replacements. The School Council produces a priority list of capital works. The priority items are then put out to public tender to determine an estimate of the cost of each item. These costs are incorporated into the capital expenditure budget and reported monthly in the capital expenditure project list. Decisions are made based on the acquisition price of the project. There is no periodic reporting on costs associated with capital works once the work has been done.

Capital replacement decisions are based upon teacher requests. Each department has to prioritise the replacements required and is allocated a budget for the top priority requests.

2.3 Environmental Stance

The school has an ongoing rehabilitation programme for the banks of the Swan River adjoining the school grounds. The Parents and Friends of the school ("P&F") have provided extensive assistance through free labour in the form of 'busy bees' and funding for a set of stairs to the foreshore. The school is committed to the ongoing upkeep of the riverbank, providing a gardener to undertake maintenance and recently engaging consultants to update the planting programme.

Environmental considerations were only part of the motive behind the school's Swan River rehabilitation programme. The school recognised the positive publicity potential that such a project could invoke and utilised this to gain the involvement of the P&F.

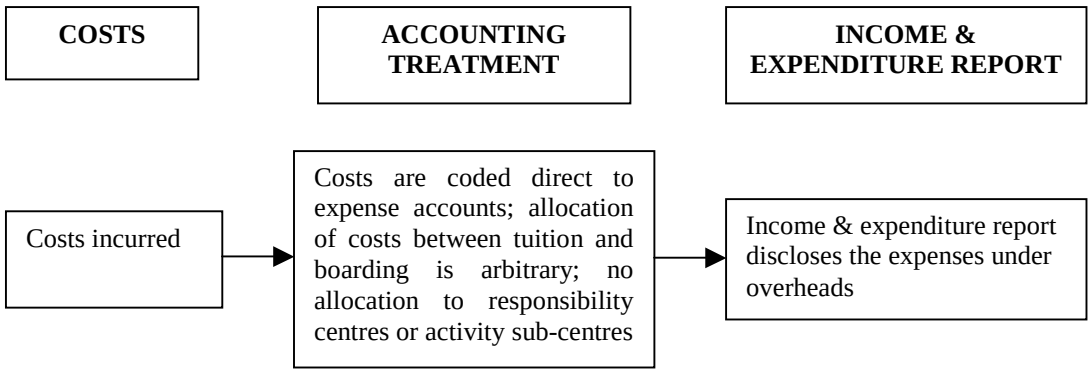
2.4 Accounting Treatment of Environmental Impacts

From reviewing MLC's operations, and discussions with the Business Manager, we identified that the key environmental impacts associated with MLC's operations are:

- Energy usage
- Water usage
- Paper usage
- Waste management

Under the existing accounting system the costs associated with energy, paper and water usage are lost in 'administration and general' overheads and waste management is reported under 'caretaking and cleaning' overheads. There is no further classification or analysis and no form of responsibility accounting for these costs.

The following diagram illustrates how the costs associated with the environmental impacts are treated and flow through MLC's accounting system:



In the income and expenditure report for the year ended December 2001 the costs associated with the key environmental impacts were reported as follows:

	Tuition $	Boarding $	Total $	Percentage of MLC's Total Expenditure %
Administration & General Overheads				
Light & power	100,705	15,916	116,621	1.0
Photocopying	106,292	2,215	108,507	0.9
Rates – Council/Water	31,376	3,381	34,757	0.3
Caretaking & Cleaning				
Waste	16,041	7,918	23,959	0.2

3. Phase Two and Phase Three

Every activity of an organisation has associated environmental costs and/or benefits and management needs to decide the extent they want to account for these costs/benefits. Different management accounting costing methods need to be considered to determine the most appropriate and useful methods to account for the costs/benefits.

The objective of EMA is to identify the environmentally induced costs/benefits and account for them in a way that meets the information needs of the stakeholders. Without EMA, environmental costs are often lost in general overheads. Implementing EMA helps ensure management decisions are made with knowledge of the associated environmental costs/benefits.

As information is only useful if it meets the needs of stakeholders, we consulted MLC's Business Manager and discussed the opportunities we had identified and the usefulness of the information that would be produced under each suggestion. We also consulted the Business Manager on any opportunities he was particularly keen to undertake to implement within the school. The key opportunities recognised for implementing EMA were in relation to:

- Income and expenditure transactions; and
- Capital works expenditure

Where possible, the opportunities for cost savings have been trialed to determine how the changes produce results different from those under the pre-existing accounting system. The quantifiable benefits resulting from these initiatives are detailed in sections 3.1 to 3.2.3 inclusive.

3.1. Income and Expenditure Transactions

Under the existing accounting system costs are lost in overheads. There is an opportunity to improve the quality of management information by restructuring the classification system in the income and expenditure report and introducing further classifications. These new classifications would be Responsibility Centres for costs only, as individual areas of the school do not have the purpose of generating additional income. Costs would be traced to the individual managers responsible for making decisions on those costs, although there would still be uncontrolled costs that the manager could not affect. There would also still be overheads allocated to the 'administration and general' classification, however these costs would represent the true costs related to the classification rather than the category being a dump of costs.

The most suitable method of classification for MLC would be by subject area and activity (such as catering or boarding). Responsibility Centres would be established as follows[3]:

- Each core subject (English, Maths, Science, Society and Environment)
- Languages Other Than English
- Music and Theatre Arts
- Information Technology ("IT"), Media and Business Education
- Home Economics and Art
- Physical Education
- Administration

[3] The Resource Centre has not been highlighted as a separate Responsibility Centre as it is utilised by all other departments. Environmental costs allocated to the Resource Centre would be re-allocated to other Responsibility Centres.

- Catering
- Building Maintenance
- Boarding (including Health Centre and Laundry)
- Auditorium
- Grounds and Gardens (including Swimming Pool)
- Primary School
- Other (student ancillary services)

ABC is a management accounting tool for understanding and allocating costs. Whilst standard costing techniques allocate direct costs to products or activities they fail to allocate or apportion overhead costs on a realistic basis. The objective of ABC is to direct management attention to the activities incurring those overheads rather than to fully recover the overheads. ABC assigns overhead costs to the activities that cause or 'drive' them to be incurred in the first place. To do this, it is necessary to first identify the major activities being performed by the organisation and assess the resources (such as labour, occupancy, IT network, power costs etc), actually consumed by each activity to establish a true cost for each activity. Then establish what causes or 'drives' each activity and the relationship between the driver and the activity and then apportion the cost using that driver.

Although introducing ABC can be somewhat daunting as can the ongoing maintenance, this needs to be weighed up against potential benefits in terms of more accurate and rational management information. ABC would be particularly beneficial to MLC as the school has a high level of costs allocated to the 'administration and general' overheads classification ('administration and general' overheads represents 27.1% of total expenditure).

ABC could be used to apportion all of the costs within the 'administration and general' overheads classification. However, for this case study we have only focused on the apportionment of costs associated with the key environmental impacts.

For each category of environmental impact cost a cost driver, or basis for allocation has been identified[4]:

- Light and power: square metres of floor space occupied as a percentage of total school floor space.
- Photocopying: the number of photocopies made per the logged copy count per department as a percentage of total copies made.
- Water: the Water Corporation, Western Australia ("Water Corp") Domestic Water Usage Percentages adjusted for MLC's suggested change to toilet and washing machine percentages and to exclude outside watering usage.
- Waste: direct allocation when the type of waste service (such as tipping fees, document shredding, grease trap removal) could be linked to one or more Responsibility Centres, otherwise allocated on square metres of floor space occupied as a percentage of total school floor space. In allocating sanitary waste, the total school floor space was adjusted to exclude primary school floor space.

It should be noted there are limitations to the cost driver basis of allocation. For example allocating light and power to a Responsibility Centre on a square metres of floor basis, if there is a reduction in power usage by that Centre, there will not be a

[4] Costs allocated to the Resource Centre were reallocated to Responsibility Centres based on periods per timetable cycle for each Responsibility Centre as a percentage of all periods in a timetable cycle.

corresponding reduction in costs allocated to the Centre because of the basis for the allocation.

ENERGY AUDIT
An energy audit identifies where and how an organisation uses energy and the costs of the energy.

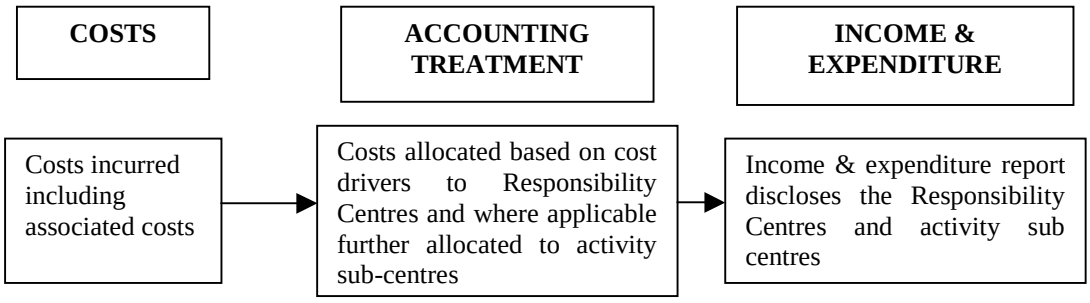
An energy audit would provide MLC with the data to be able to allocate light and power on a basis that more closely reflects actual usage. Also, whilst allocating environmental impact costs to the Responsibility Centres enables better identification of those costs, it would be more beneficial to further allocate costs to subsidiary cost centres ("sub-centres"). Each sub-centre would contain all costs associated with a particular activity. Having identified and allocated all costs associated with an activity more informed decisions would be made in managing those costs. Currently, MLC does not maintain sufficient records to enable identification and allocation of costs to activity sub-centres.

The identified Responsibility Centres and cost drivers were adopted for the trial. Although this basis of allocation does not directly affect profitability, by allocating the costs to Responsibility Centres the managers of those areas will have an increased awareness of costs and an increased motivation to control, and even decrease, those costs. Also the costs shown within administration and general overheads will more accurately reflect the true overheads of the administration function.

The following table shows the costs as reported in the Income and Expenditure Statement:

Extract from Income and Expenditure Statement for Year Ended 31 December 2001			
	Tuition $	**Boarding $**	**Total $**
Administration and General Overheads			
Light & Power	100,705	15,916	116,621
Photocopying	106,292	2,215	108,507
Rates - Council/Water	31,376	3,381	34,757
Caretaking & Cleaning			
Waste	16,041	7,918	23,959
Total	**254,414**	**29,430**	**283,844**

The following diagram illustrates the accounting treatment and reporting of the costs if they were allocated to Responsibility Centres and sub-centres.



This table shows the costs after reclassification:

Reclassification of Extract from Income & Expenditure Statement after applying EMA						
	Light & Power $	**Photo-copying $**	**Waste $**	**Water $**	**Resource Centre reallocated $**	**Total $**
Responsibility Centre						
Administration	1,360	24,206	1,383	156	0	27,105
Auditorium	6,388	60	383	735	0	7,566
Boarding	26,459	270	1,587	19,598	0	47,914
Building Maintenance	0	0	4,240	0	0	4,240
Catering	6,018	103	8,140	3,741	0	18,002
English	5,081	9,672	305	585	624	16,267
Grounds & Gardens	0	0	4,240	1,220	0	5,460
Home Economics & Art	5,716	3,760	343	658	375	10,852
IT, Media, Accounting	2,700	3,193	162	311	4,028	10,394
LOTE	2,462	5,500	148	283	352	8,745
Maths	5,043	13,484	302	580	809	20,218
Music & Theatre Arts	1,710	5,735	103	197	524	8,269
Other	4,593	3,254	275	528	0	8,650
Physical Education	4,482	4,805	269	1,034	470	11,060
Primary School	13,187	1,808	194	1,517	2,992	19,698
Science	14,815	21,280	888	1,704	729	39,416
Society & Environment	7,195	10,928	432	828	605	19,988
Recource Centre	9,412	449	565	1,082	(11,508)	0
Total Allocated	**116,621**	**108,507**	**23,959**	**34,757**	**0**	**283,844**

After allocation, administration's environmental impact costs are reduced to $27,105 reflecting the actual costs attributable to the function of administration. Those responsible for the other Responsibility Centres will now be better informed on the costs associated with each Centre. These costs can then be further allocated to activity sub-centres to assist with better managing costs associated with activities.

We identified other cost savings and revenue opportunities MLC could incorporate into its systems and practices. Each of these opportunities would impact on MLC's income and expenditure statement through the provision of cost savings or revenue enhancing opportunities. However, these opportunities require the maintenance of additional records not currently found in MLC's accounting system.

3.1.1 Paper Usage

MLC classifies the cost of plain paper to the 'photocopying' expense and all other paper stationery such as letterhead, invoices, pads and envelopes to the 'printing and stationery' expense. Plain paper represents the majority of paper usage at MLC and is used for photocopying and printing including the newsletters and student printing referred to in sections 3.1.1.2 and 3.1.1.3.

There are opportunities for cost savings in relation to paper usage through the adoption of some simple measures as detailed in sections 3.1.1.1 to 3.1.1.3. These sections also illustrate how the costs can be sourced to particular activities, which once fully costed are more easily managed and that in addition to minimising paper usage, there are many other related cost savings from reducing photocopying and printing, including labour, energy, toner and other consumables, maintenance, paper storage, capital expenditure and postage.

3.1.1.1 Photocopying

The 'photocopying' expense includes:

- Photocopier expenses (includes consumables and the copy charge levied by the company that supplies the photocopiers) $38,177;
- Rental of photocopiers $49,240; and
- Photocopying paper $22,152.

It does not include associated costs such as labour, energy and paper storage. For the actual cost of photocopying to be managed, the full cost should be recognised and then allocated to Responsibility Centres and where appropriate further allocated to photocopying activity sub-centres (an example would be newsletters, see 3.1.1.2).

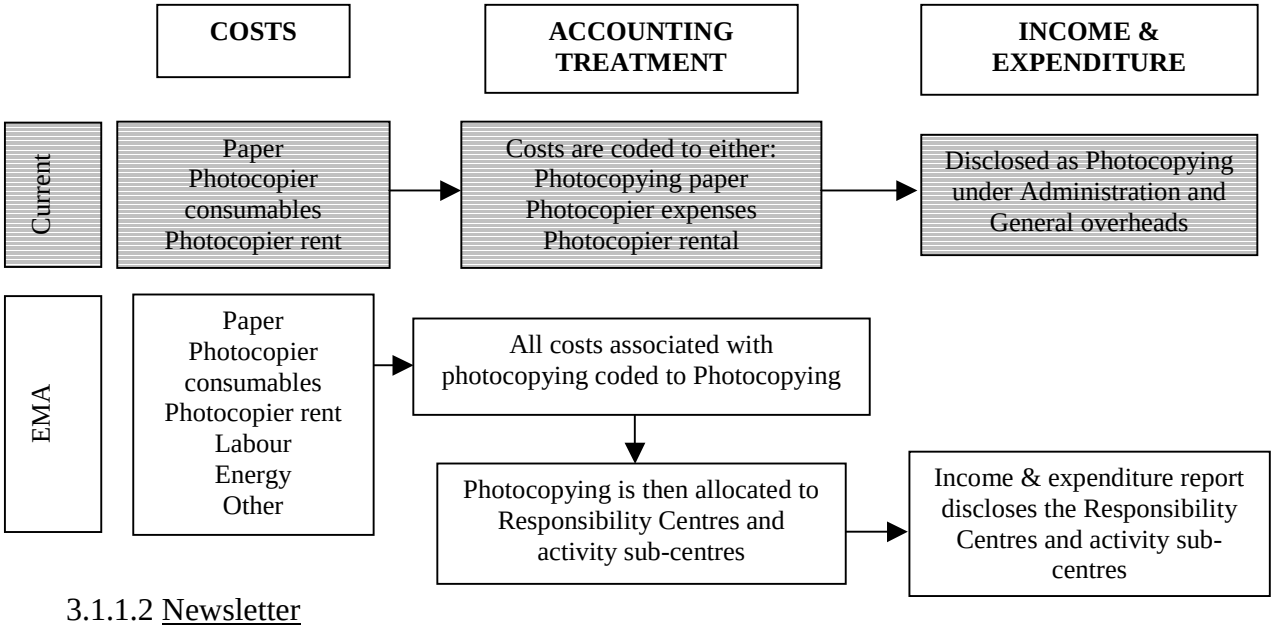
To facilitate this each photocopying activity to be costed would need to be identified and records maintained to show photocopier usage by activity to form the basis for allocating the full cost of photocopying.

Additional records would need to be maintained to capture and allocate relevant costs including:

- Labour time by activity - achieved by monitoring time spent by personnel on photocopying related activities as a percentage of their total time (note: photocopying related activities could include time spent ordering and handling the paper). This basis would then be used to allocate labour costs to photocopying;
- Energy usage of photocopiers - this information would be obtained from an energy audit and then used as a basis for allocating energy costs to photocopying;
- Photocopier usage by activity - the current system of recording photocopies by department would need to be extended to also record the activity for which the copy was made. This information would then be used as the basis for allocating total photocopying costs to sub-centres.

By allocating costs to Responsibility Centres and sub-centres the cost is matched with the Centre/activity that caused the cost to be incurred, which makes it easier for management to identify opportunities for cost reductions, or conversely highlights when cost benefits have been achieved (as demonstrated in 3.1.1.2).

The following diagram illustrates MLC's current treatment of photocopying costs and the treatment after applying EMA.



3.1.1.2 Newsletter

Throughout the school year newsletters are produced fortnightly for distribution to the school's families. Each newsletter averages ten pages printed on five sheets of paper and the first page is printed on letterhead paper. Eight times per year the newsletters are mailed to the parents, the other times they are distributed via the students. Over a year, approximately 200,000 pages are required for the newsletters. MLC has commenced a trial to encourage parents to receive newsletters via email and the school website. A neighbouring school has adopted distribution of newsletters via email and its website and found about two-thirds of the school's families now receive their newsletters this way.

Estimated costs associated with printing and distribution of newsletters are:

Cost Components	Usage[5]	Cost per Unit	Total Cost $
Photocopying	200,000 copies	4 cents each[6]	8,000
Postage	8,000 posted	40 cents each	3,200
Envelopes and labels[7]	8,000 used	$130 per 1,000	1,040
Labour	100 hours	$20 per hour	2,000
Letterhead page[7]	20,000 pages	$80 per 1,000	1,600
Total cost for the year			**15,840**
Savings on emailing newsletters @ 2/3 of total cost[8]			**10,613**

As with the photocopying costs, the other costs listed above should also be allocated to the newsletter sub-centre within the Administration Responsibility Centre, then savings achieved would be more easily identified and the reason for profit

[5] Based on usage figures supplied by MLC.
[6] Based on the photocopying expense divided by the number of copies made for the year, the cost per copy is 4 cents. This cost would increase once all associated costs are included in the photocopying expense.
[7] These costs have been treated by MLC as Printing and Stationery.
[8] The saving has been calculated as two thirds of the total cost based on the experience of the neighbouring school that distributes its newsletter by email. Savings do not take into account additional time potentially required to administer this dual system.

improvement more easily recognised. In section 3.1 it was suggested the energy and photocopying costs be allocated to the Responsibility Centres, including the Administration Responsibility Centre. A portion of those allocations represents costs associated with photocopying the newsletters. By maintaining the additional records (referred to above) on labour time by activity, energy usage of photocopiers and photocopier usage by activity, the portion associated with newsletters can be identified and allocated to the newsletter sub-centre.

3.1.1.3 Students' Printing

Paper usage could be controlled through the establishment of a user credit system for printing for each student. Under this type of system, a student must logon to a computer or photocopier by the use of a student identification number. Each time the student prints, a credit is deducted from the student's account. Once the account has no credits, it is necessary to buy back credits in order to print. The purpose of the credit system is to discourage students from unnecessarily and wastefully printing.

MLC's Business Manager estimates paper usage by students for printing and photocopying to be approximately 400,000 sheets per year. At 4 cents[9] per copy, this equates to a cost of $16,000 per annum. Energy costs would be in addition to this. Currently, MLC does not identify and allocate the costs associated with this paper usage activity. Allocation of the students' credits and all costs associated with student printing to an activity sub-centre for student printing would enable management to make informed decisions on this paper usage. The sub-centre should also be linked to the system with the student identification numbers.

3.1.2 Energy Usage

An energy audit of the school to obtain information on patterns of energy usage and levels of consumption would provide the basis for MLC maintaining records on energy consumption for all installations and equipment used at the school. These records would assist with cost control and make it possible for MLC to carry out more accurate costing exercises and allocate energy costs to activity sub-centres. It would also assist Responsibility Centres with identifying opportunities to reduce energy usage.

In addition to energy cost savings, there are associated benefits which may be derived from reducing energy usage including reduced:

- Wear and tear on equipment;
- Maintenance service costs;
- Amount of consumables required (eg toner for photocopiers and printers);
- Need for upgrades to increase capacity;
- Need for cooling to counteract heat given off by operating equipment.

As already noted, if costs are being allocated to activity sub-centres it will be easier to recognise and report on these types of benefits when they are achieved.

3.1.3 Water Usage

Based on domestic water usage percentages issued by the Water Corp the cost of water for each usage can be estimated for MLC and used as a basis for allocating the

[9] Based on the photocopying expense divided by the number of copies made for the year.

cost of water usage to Responsibility Centres. This information also enables each Responsibility Centre to look at opportunities to reduce costs.

The following table shows the percentages issued by the Water Corp and MLC's adjusted percentages to reflect the school's use of bore water for outside watering:

Water Corp Domestic Water Usage		MLC	
	%	Adjusted %	Cost Apportionment $
Outside watering	43%	0%	0
Shower	17%	30%	10,427
Washing machine[10]	14%	19%	6,604
Toilet[6]	11%	25%	8,689
Taps	8%	14%	4,866
Other	5%	8.5%	2,954
Swimming pool	2%	3.5%	1,217
Total			**$34,757**

Estimated annual savings from installing dual flush toilets and flow restrictor valves to showers and taps have been quantified from the above table and the following:

- Single flush toilets use 11 litres of water per flush; dual flush toilets use 6 litres per full flush and 3 litres per half flush. Currently, approximately one-third of the school's toilets are dual flush;
- Conventional showerheads allow an average flow of 25 litres per minute; flow restrictor valves reduce this to one third, an average 8.3 litres per minute;
- Standard taps run at 15 to 20 litres per minute, flow restrictor valves reduce this to one third, 5 to 6.7 litres per minute, alternatively fitting aerators halves the flow.

Based on this, water usage savings from installing dual flush toilets and flow restrictor valves are estimated to be a 46% reduction for toilets and 66% for showers and taps. This equates to annual cost savings of $14,243 (41%) being $3,997 from toilet usage, $6,986 from shower usage and $3,260 from tap usage. These estimated annual cost savings could then be included in LCC to identify the full cost/benefit of installing dual flush toilets and flow restrictor valves. The allocation of water usage to Responsibility Centres, based on MLC's adjusted percentages (as trialed in section 3.1) provides for better management of the cost and when savings are achieved they will be more easily recognised. Also, obtaining detailed information on what the cost represents assists management in identifying opportunities to reduce the cost.

Other savings arising from reduced water usage such as energy costs for heated water have not been included in these calculations. An energy audit would provide the information required to identify and allocate the energy costs for heated water.

It should also be noted there are environmental and financial risks associated with MLC's usage of bore water. These risks relate to MLC being located within an area of potential saltwater interface problems due to the school's close proximity to the Swan River; and MLC's reliance on a 'free' resource, which may change given the water shortage issue in Western Australia.

[10] The Business Manager considers MLC's water usage for toilets is higher and washing machines lower, the adjusted percentages reflect this.

3.1.4 Waste Management

Paper is the only waste recycled by MLC. MLC should undertake the Waste Wise Schools Programme ("Waste Wise") initiated by the Department of Environmental Protection ("DEP"), which shows schools how to save money while making a contribution to the environment. In participating schools waste has been reduced by up to 95%[11].

MLC does not maintain sufficient records to enable identification and allocation of costs associated with waste. Costs associated with waste that have not been considered by MLC include:

- Waste management: labour, containers, handling equipment and training;
- Waste disposed: cost of products disposed.

These costs should also be included with waste costs and allocated to the Responsibility Centres. In this way management would be aware of the total cost associated with waste. It would be preferable for MLC to establish the records required for full costing of waste before implementation of Waste Wise so as to measure the total savings from this programme. Development of the additional records required for identifying, allocating and managing the associated costs of waste, would include:

- Labour time by activity: this would be achieved by monitoring time spent by personnel on waste management related activities as a percentage of their total time. This basis would then be used to allocate labour costs to waste.
- Containers and handling equipment: for items that are expensed, the expense would be allocated to waste, and for capitalised items the depreciation would be allocated to waste.
- Training: where associated with handling and management of waste, the cost would be allocated to waste.
- Cost of products disposed: to include this cost in waste, a waste audit would need to be conducted to identify MLC's waste profile, which would then be costed and allocated to waste.

After allocation of waste costs to the Responsibility Centres using ABC, any financial benefits achieved from implementing Waste Wise would be directly attributed to the Centres achieving those benefits. A saving of up to 95%[11] on the annual waste removal cost (excluding sanitary waste costs) would result in savings of $18,313 per annum (excluding the additional associated costs not currently being allocated to waste, which if allocated would increase this savings).

3.1.5 Other

3.1.5.1 Purchasing Policy

MLC's purchasing policy requires that the lowest price is paid, and account is taken of whether the supplier has a stated and proved policy of environmental sensitivity. Additionally, for goods or services over $10,000 consideration must be given to suitability, durability, safety and service support.

[11] Department of Environmental Protection (2002) *The Waste Wise Schools Program* (Western Australia).

To ensure environmental impact costs are considered in a uniform fashion a purchasing policy for all capital acquisitions should include the aforementioned considerations, not limited to expenditure over $10,000, and consideration should also be given to other factors which affect the environmental impact of the acquisition including energy usage and other operating consumables, warranty, maintenance requirements and disposal. The benefits of such a policy are:

- It is consistent with and supports LCC (purchasing decisions are based on the total costs not just the acquisition cost);
- It helps ensure hidden costs such as early replacement, operating, maintenance and disposal costs are included in the decision making process before purchasing;
- It minimises environmental impact costs of capital items by highlighting issues such as low energy efficiency, maintenance requirements for optimum efficiency, possible early replacement and disposal considerations.

Implementing this policy would lead to a reduction in operating, maintenance and/or capital costs. It would also result in reducing associated environmental costs.[12]

Using energy usage and warranty as examples, the following table indicates the types of issues to be included in the policy that would need to be considered for each capital acquisition:

Energy Usage	Warranty
➢ Type of energy used ➢ Energy usage rating ➢ Built in energy saving features ➢ Capacity appropriate for the job	➢ Period of time covered by a warranty ➢ What the warranty covers – labour, parts, replacement

3.1.5.2 Outside Funding

There is an opportunity to fund ventures of an environmental nature by calling upon the P&F of the school and, in some cases, the local community. Consumer awareness of environmental matters is ever increasing. Stakeholders want to know the environmental stance and attitude of businesses and organisations within the local community. This together with the impact that having an environmental outlook would have on the reputation of the school, would make environmental initiatives attractive to the P&F for funding. With the P&F providing funding in the past for the river foreshore rehabilitation, it is evident there is the opportunity for future funding for environmental initiatives.

The objective of environmental initiatives is to achieve a reduction in environmental impact and reduce operating costs. If P&F funding were obtained for environmental initiatives, MLC would not only receive the funding but also the benefit of reduced operating costs. To support any proposals for funding from the P&F for environmental initiatives, MLC would need to ensure appropriate records were kept to demonstrate the financial and environmental benefits to be gained from the initiative.

[12] Many government organisations that have a focus on service provision similar to schools, are moving to include environmental considerations in their purchasing policies. Further information and useful tools can be found through Environment Australia's website: http://www.ea.gov.au/industry/sustainable/greening-govt/index.html

3.2 Capital Expenditure

LCC is a useful management accounting tool that focuses on capturing all the costs of a product, service or physical asset over its useful life, often referred to as 'cradle to grave' costs. LCC includes costs incurred from the research/design stage, throughout the operational phase to the retirement/disposal stage. As a budgeting tool, much of the data for LCC is estimated and care must be taken to ensure the data is realistic and captures all costs.

Implementation of a capital investment appraisal system utilising LCC would ensure all capital decisions were appraised in a thorough and comparable manner. When capital investment decisions are being made all costs associated with the investment should be considered, that is the initial acquisition costs, finance costs, maintenance costs, operational costs and disposal costs. This holistic approach to the decision making process is beneficial when comparing alternatives for a capital project and ensures decisions are made on a fully informed basis. A decision would not be made based on the least expensive acquisition cost when this decision may incur much higher ongoing operational costs.

The operational, maintenance and disposal stages of capital items can incur significant environmental impact costs as well as financial costs. The inclusion of costs associated with these stages in LCC helps highlight these costs as well as issues such as consumption and maintenance requirements, energy efficiency, requirements for optimum efficiency and disposal considerations. Including this information helps ensure informed decisions are made in terms of the environmental impact costs of capital acquisitions.

3.2.1 Air-Conditioning

In the past two years, the school has undertaken three major air-conditioning capital works projects and additional air-conditioning projects are under consideration.

The capital expenditure decisions were based purely on initial tender costs when consideration should have been given to total costs associated with the projects. The capital works expenditure relating to air-conditioning was based upon agreed tender costs for air-conditioning installation of $488,449. If a LCC approach had been adopted as part of the decision making process there would have been additional and ongoing costs taken into consideration.

The table following highlights the agreed tender cost, the additional costs associated with the installation of the air-conditioning and the estimated ongoing costs to be incurred over the life of each project. Estimated disposal costs have not been included, as they were not known.

Costs	Auditorium	Resource Centre	Primary School	Total
Estimated Life (years)	**15**	**12**	**12**	
	$	**$**	**$**	**$**
Capital Expenditure				
Agreed Tender Costs[13]	**238,170**	**83,120**	**167,159**	**488,449**
Additional direct costs[14]	32,369	13,185	14,096	59,650
Additional indirect costs[15]	33,536	64,130	58,778	156,444
Total Capital Expenditure	**304,075**	**160,435**	**240,033**	**704,543**
Expenses over expected life[16]				
Estimated energy costs	32,000	26,000	39,000	97,000
Estimated service & maintenance costs	75,000	36,000	120,000	231,000
Other estimated costs	2,000	2,000	5,000	9,000
Total Expenses	**109,000**	**64,000**	**164,000**	**337,000**
Total LCC	**413,075**	**224,435**	**404,033**	**1,041,543**
Impact on Income & Expenditure Statement				
Depreciation–Tender costs (10%)	23,817	8,312	16,716	48,845
Depreciation–Additional direct & indirect costs (10%)	6,591	7,732	7,287	21,610
Estimated energy cost per annum	2,000	2,000	5,000	9,000
Estimated service, maintenance & other costs per annum	5,133	3,167	10,417	18,717
Annual Impact on Income & Expenditure Statement[17]	**37,541**	**21,211**	**39,420**	**98,172**

The above analysis shows the total costs associated with the three air-conditioning projects, and before disposal are taken into account, are more than double the tendered costs upon which the capital budget for air-conditioning was agreed. The capital expenditure decision was made without consideration of the ongoing expenses that will be incurred over the life of each project or the additional capital expenditure required as a consequence of proceeding with the projects.

As previously noted, operational, maintenance and disposal stages of capital items can incur significant environmental impact costs as well as financial costs. In this LCC exercise the apparent environmental impact cost is the energy required to operate the air-conditioning. The estimated energy cost is based on the air-conditioning operating at optimum efficiency and hence the service and maintenance costs required helping maintain this efficiency. MLC gave no consideration to the disposal stage in terms of the financial cost of disposal as well as environmental impact costs such as wastage and landfill and whether there were opportunities for re-using or recycling the old system. Consideration of these factors in the decision making process may have influenced the decision made.

[13] Actual costs incurred by MLC.
[14] Additional direct costs included minor variations agreed to after the tender, air-conditioning consultants and design engineers fees.
[15] Additional indirect costs included upgrading the electrical supply to meet the additional load required for the air-conditioning and $10,447 for extra insulation required in the primary school to optimise the efficiency of the air-conditioning system.
[16] Estimates provided by MLC based on information provided by their air-conditioning contractors.
[17] The 'Annual Impact on Income and Expenditure Statement' will differ in the first year and after the tenth year because there should be no service and maintenance costs in the first 12 months of operation as they are covered by warranty; and capital expenditure will be fully depreciated after 10 years (MLC applies a 10% depreciation rate to air conditioning plant).

Had MLC included LCC in its decision making process it may have made different decisions and considered other options. Consideration of alternatives to air-conditioning was not part of the decision making process, with the exception of the Resource Centre project. The Centre had originally been designed to make the best use of passive atmospheric conditions to moderate the internal temperature of the building, including fine mist sprays in the gardens surrounding the building. However, over time the increasing number of computers added to the heat load and the passive systems were no longer sufficiently effective and the humidity generated by the sprays was also unsuitable for a Resource Centre. For this latter reason, evaporative air conditioning was also considered an unsuitable option.

If MLC had implemented the allocation of energy usage and other overhead costs to Responsibility Centres it may be that managers responsible for those costs would have considered the additional costs incurred by air-conditioning to be unacceptable and requested alternatives be considered.

As mentioned the school has additional air-conditioning projects under consideration. For reasons given, inclusion of LCC in the decision making process together with the allocation of the estimated air-conditioning costs to Responsibility Centres should ensure alternatives will be considered, operational costs and environmental impact costs will be kept to a minimum, disposal issues will be factored in and fully informed decisions will be made.

3.2.2 Classrooms

Currently, there is a proposal to build additional classrooms. The average occupancy of a classroom is less than 80% with each teacher having his/her own classroom. The capital expenditure associated with further construction is extensive and must be considered in conjunction with the additional costs associated with further classrooms, such as energy, cleaning and maintenance.

To provide the additional classroom space, minimise capital outlay and ongoing operational costs, MLC should consider maximising the occupancy of existing classrooms through the use of timetabling (similar to universities), staggered recess and lunch times, and earlier start times or later finish times for different year groups. This would potentially increase occupancy from 80% to 100%. A 20% increase in occupancy would equate to 12 additional classrooms at no extra capital cost.

The only increase in operating costs would be energy for lighting, heating and cooling. These costs are not currently identified and allocated by MLC's accounting system. An energy audit would provide MLC with information on energy used for lighting, heating and cooling classrooms. In deciding whether to proceed with building additional classrooms, a full LCC exercise should be undertaken and compared with costs associated with maximising the use of existing classrooms.

Environmental impact issues to be considered and costed in the LCC exercise would include:

- Design:
  - Design alternatives that meet usage and aesthetic requirements, and minimise 'cradle to grave' costs of the building.
- Building Materials, Installations and Equipment:
  - Life expectancy of materials, installations and building;

- Use of recycled materials;
- Maintenance requirements;
- Operational requirements;
- Efficiency in terms of energy and other consumables;
- Easily recycled or re-used on disposal.

This exercise will assist the school to address the environmental as well as financial consequences of building additional classrooms.

3.2.3 Swimming Pool

Although MLC has a pool, it does not meet all of the school community's requirements and, therefore, the students often swim at a local pool facility. The pool is maintained throughout the year and there are costs associated with its upkeep. The ongoing costs along with the limited remaining life of the pool would make it appropriate for the school to undertake a cost/benefit analysis of maintaining the pool as compared to not having the pool and utilising the local pool facility for all swimming events. Alternatively, alongside MLC is a boys' school that has an outdoor pool that is thermally heated. It may be possible for MLC to share the use of the neighbouring pool.

The cost/benefit analysis would include LCC to compare total costs associated with the different options available to MLC. The analysis would determine the most cost effective course of action to satisfy the school's requirements whilst also highlighting environmental impact costs associated with each option, including:

- Maintaining the status quo: Maintaining the pool over its expected life, providing for the pool's replacement and utilising the local pool facility.
  - Energy to run the pool pump for the existing and replacement pool;
  - Water usage of existing and replacement pool;
  - Chemicals to maintain the existing and replacement pool;
  - Bus hire and other transport costs;
  - Annual cost of using local pool;
  - Estimated remaining life of existing pool and expected life of replacement pool;
  - Capital expenditure required for replacement pool;
  - Estimated annual operational and maintenance costs of existing and replacement pool.
- Upgrading the pool: Maintaining the pool over its remaining life, providing for replacement of the pool, undertaking the necessary changes to meet the school community's requirements and removing any need for the local pool facility.
  - Energy to run the pool pump for the existing and replacement pool;
  - Water usage of existing and replacement pool;
  - Chemicals to maintain the existing and replacement pool;
  - Capital expenditure required to meet school community requirements;
  - Additional operational costs to be incurred from meeting school community requirements, such as energy costs for heating;

- Estimated remaining life of existing pool and expected life of replacement pool;
- Capital expenditure required for replacement pool;
- Estimated annual operational and maintenance costs of existing and replacement pool.

➢ Removing the pool: Filling in the pool and either sharing the neighbouring school's pool facility or utilising the local pool facility.

- Bus hire and other transport costs;
- Annual cost of using local pool or neighbouring school pool;
- Capital expenditure removing the pool.

4. Summary

The opportunities for cost savings or revenue generation and the changes required to MLC's current system and practices are summarised below:

Details	Opportunity	Change Required to System
Savings associated with reduced paper usage through use of electronic communication.	Cost saving - income & expenditure statement	Establish sub-centres for paper usage activities. Identify and allocate associated costs to sub-centres.
Savings in paper usage through controlling use of paper by students.	Cost saving - income & expenditure statement	Establish a student identification system and sub-centre to which the credits and associated costs are allocated.
Managing energy costs - commission energy audit.	Cost saving - income & expenditure statement	Establish and maintain records on energy consumption for all equipment used at the school.
Minimise water usage costs.	Cost saving - income & expenditure statement	Establish information records for costing water usage, associated costs and basis for allocating costs to Responsibility Centres or sub-centres.
Minimising waste and the costs associated with waste.	Cost saving - income & expenditure statement	Establish records to provide information for costing each waste type. Establish waste sub-centres. Allocate associated costs to sub-centres.
Consider environmental impact costs of acquisitions in uniform fashion.	Cost saving -capital outlay -income & expenditure statement	Amend purchasing policy.
Generate funding for environmental initiatives.	Revenue generating - income & expenditure statement	Establish records to demonstrate financial and environmental benefits to be gained from the initiatives.
Adopt holistic approach in capital expenditure decision making process – examples considered were air-conditioning, additional classrooms, swimming pool options.	Cost saving -capital outlay -income & expenditure statement	Identify all associated costs for LCC exercise and include in decision making process.

5. Conclusion

This case study is one of four produced to meet EMAP's objective of demonstrating how performing management accounting practices within a business could achieve positive financial and environmental outcomes.

The underlying message to be taken from this study is that EMA contributes to good management and without it sub-optimal business decisions will be made. EMA raises management's awareness of environmental impact costs that also impact on the financial performance of the organisation and promotes an awareness of the inter-relationship between an organisation's operations and its impact on the environment. The motivation to embrace EMA comes from a desire for good management as much as a desire to minimise environmental impact.

5.1 Lessons Learned

5.1.1 Existing Management Accounting System and Environmental Impacts

MLC's existing management accounting system is similar to many small to medium enterprises ("SMEs") in that:

- There are limited outputs in terms of accounting reports;
- Environmental impact costs are 'lost' amongst overhead expenses;
- There is no attempt to identify environmental impact costs within the accounting system;
- Associated costs are not identified;
- There is no form of responsibility accounting for these costs.

The key environmental impacts associated with MLC's operations (energy, water and paper usage and waste management) are common to many organisations.

5.1.2 Costs, Opportunities and Changes

Opportunities identified were in relation to income and expenditure transactions and capital works expenditure. The system changes required for reflecting the opportunities and achieving better financial and environmental outcomes related to:

- Improving management control of income and expenditure transactions by establishing:
  - Responsibility Centres and activity sub-centres;
  - Drivers for apportioning costs to Responsibility Centres;
  - Records to help identify all costs associated with activities and enable allocation of those costs to sub-centres;
- Improving communication of the nature of MLC's income and expenditure transactions by changing the format of the Income and Expenditure Report to disclose Responsibility Centres and sub-centres;
- Ensuring environmental cost impacts are considered in a uniform fashion by amending the purchasing policy; and
- Improving the decision making process for capital works expenditure by including LCC in the process.

EMA is not a stand-alone management tool. To be effective it must be fully integrated into the organisation's management accounting system as indicated by the nature of the changes identified. The need for these changes also indicates the

potential that exists for MLC to make sub-optimal business decisions and miss opportunities to reduce financial and environmental impact costs. This potential would also apply to the SMEs referred to in section 5.1.1.

The trialed changes illustrated the:

- Financial and environmental benefits to be achieved by applying the management accounting tools ABC and LCC;
- Potential for management to identify opportunities for improvement from the additional information made available by the changes;
- Opportunity for more informed management decisions.

5.2 Skills and Resources

5.2.1 Environmental Impact Costs

Without prior experience, it may be difficult initially to review an organisation's operations in terms of associated environmental impact costs. The review is best done with the assistance of a person who knows the organisation and its operations intimately. The organisations' chart of accounts may provide some guidance on the types of environmental impact costs likely to be encountered and it is hoped this case study will assist with providing an indication of such costs.

5.2.2 Accounting Treatment of the Costs

Firstly an understanding is required of the organisation's management accounting system including:

- The treatment of costs, in particular overhead costs, and whether these costs are apportioned or allocated in some way;
- Reports produced;
- Budgeting process;
- Capital expenditure procedures in particular costing and decision making processes;
- Purchasing policy.

From here the accounting treatment of the environmental impact costs can be determined.

5.2.3 Identify Changes

Identifying changes requires a working knowledge of management accounting practices to help identify the weaknesses in the existing system and opportunities for improvement. Whilst the changes identified in this case study may apply to other organisations, the mechanics of implementing those changes will vary between organisations and the assistance of an experienced management accountant may be required. In addition there will be other changes not identified in this study.

5.2.4 Trial the Changes

The changes should be trialed to assess the benefits from introducing the changes. Depending upon the changes, it may be possible to do this using historical information, for example where the cost is known but needs to be apportioned. If previously unrecorded information is required, such as photocopier use and labour time by activity as identified in section 3.1.1.1, a period for gathering the information will be required before the change can be trialed. Finally if the benefits appear

worthwhile, the changes should be integrated on a trial basis in the actual management accounting system for final assessment of the benefits.

5.4 Opportunities for change applicable to other businesses

As already indicated, MLC's management accounting system is common to many SMEs and the environmental impact costs identified are also common to many organisations. Consequently, this case study should have relevance to a wide range of organisations.

To incorporate environmental management accounting there needs to be a proactive and thorough effort to incorporate environmental considerations into the management process. A planned approach with established steps will minimise the difficulties organisations face when deciding to undertake such a process. The steps are:

- Identify the areas of the business or process where environmental costs occur and how these costs are treated within the current accounting system:

  As discussed, this is best done with the assistance of someone who has an intimate knowledge of the organisation's operations. In this case study MLC's Business Manager provided us with this information as he has a detailed knowledge of the schools' operations and management accounting system.

- Determine opportunities that provide potential for cost savings, revenue generation or reduced environmental impact:

  At this step it is important to identify the information needs of the stakeholders of the business and the most appropriate and useful management accounting methods to account for the costs/benefits. We discussed these aspects with MLC's Business Manager to ensure any changes would be appropriate to MLC and its stakeholders.

  In this case study, the opportunities became apparent after completing the previous step and identifying some of the activities, which caused the costs to be incurred, such as the newsletters and student printing for paper usage. Also, as referred to several times in the study, an energy audit will provide useful information for apportioning and allocating energy costs.

- Determine the benefits of changing from the current process to an alternative:

  Before any change is made it should be trialed to assess the benefits, as discussed in section 5.2.4.

- Decide if a change would be beneficial and, if so, implement that change:

  Depending upon the type of trial used in the previous step and the nature of the change, it may still be advisable to install the change for a trial period for further assessment.

- Once implemented, review the new processes periodically and make improvements as necessary.

  It is always advisable to periodically review processes to ensure they are still appropriate and as effective as possible in achieving the intended purpose.

6. Disclaimer

This case study is based only on the information made available to us. We believe on reasonable grounds this information is reliable, complete and not misleading. This

report has been prepared exclusively for the information and consideration of the EMAP Committee and for the purpose stated. No responsibility is accepted to any other party who relies on this report for any purpose.

Yours faithfully
BDO Consultants (WA) Pty Ltd

Sherif Andrawes
Director