

## Mitigating Environmental Risk Through Environmental Management Accounting?

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**Abstract:** Environmental accounting system is relatively a new field for environmental reporting and performance evaluation of a firm, particularly in terms of social costs that the organization incur on the society. These costs represent an organization's impacts on the environment and society, which may not be covered under normal accounting practices. The study with the help of an example tries to answer how environmental risk, an important aspect of environmental management can be addressed in environment.

**Key words:** Environmental management accounting, environmental risk, MEMA, PEMA, origin energy, eco-efficiency

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### INTRODUCTION

Developments in environmental management and disclosures have gathered momentum internationally over a past decade. Environmental impacts and management is becoming a major priority for corporate strategists. The study tries to answer how environmental risk can be addressed in environmental management accounting. The research has taken an Australian company and analysed how it has incorporated risk in its management accounting.

#### **Environmental risk and management accounting:**

Environmental management accounting can assist in improving decisions relating to cost allocation, capital budgeting and process design<sup>[1]</sup>. The information can be used to:

- Identify opportunities to eliminate unnecessary costs that provide no added value
- Identify environmental costs that may be hidden in 'overhead' accounts
- Identify opportunities for revenue from such things as sale of waste
- Implement and maintain an environmental management information system (EMIS) by integrating the environment with other aspects of business management
- Identify more accurate methods to correctly cost and price products
- Design more environmentally acceptable processes, products and services.

Environmental risk, on the other hand, has various definitions about how 'risk' and related terms should be defined. For the purpose of this discussion environmental risk is defined as the probability of occurrence of a particular adverse effect on human health or the environment as a result of exposure to an environmental hazard. An environmental hazard may be a hazardous chemical in the environment, a natural hazard, or a hazardous technology<sup>[2]</sup>. Environmental risk assessment refers to any formal or informal scientific procedure used to produce a quantitative estimate of environmental risk. The process of risk assessment, identified by many<sup>[2-4]</sup> involves the following four steps:

1. Hazard identification: determining whether a particular chemical causes a particular health effect
2. Probability of occurrence: determining the relationship between magnitude of exposure and probability the health effect will occur
3. Exposure assessment or evaluating consequences: determining the extent of exposure before or after application of regulatory controls
4. Risk assessment: describing the nature and often the magnitude of risk, including attendant uncertainty

Risk and liability assessment of a company addresses the assessment of environmental-related risk and financial liabilities. Management accountants can play a crucial role in estimating the potential cost of these contingent liabilities to the firm, the likelihood of their occurrence (risk factor), as well as their appropriate allocations<sup>[4]</sup>.

Environmental management accounting (EMA) is different from conventional accounting as the former

‘separately identify, measure, analyse and interpret the information about environmental aspects of company activity’ – a distinction that is not clear in conventional accounting<sup>[5]</sup>. Companies further divide EMA into monetary environmental management accounting (MEMA) and physical environmental management accounting (PEMA). MEMA deals with past, present or future stock and flows, expressed in monetary terms whereas PEMA deals with past, present or future material and energy amounts (in physical terms) that have an impact on the environment<sup>[5]</sup>.

The EMA practices are widely documented by companies and studies have revealed that such practices have resulted in cost saving and comparative advantage<sup>[6,7]</sup>. A detailed outline of framework for EMA, based on MEMA and PEMA and time frame is explained in Table 1.

On the basis of above framework it can be seen how this framework is applicable to an actual company. For this an example of an international oil and gas company has taken that is focusing on green energy production and its use in homes and businesses.

**Example: Origin Energy:** Origin Energy provides energy to over 2 million Australian homes and businesses. Its is an Australian company with over 140 years experience in the energy industry, as its history dates back to the Launceston Gas Company, established in 1858<sup>[8]</sup>. Origin Energy is committed to providing environmentally friendly energy solutions. Their objective was to search for new ways to provide customers with environmentally friendly solutions including green energy from solar, hydro and wind.

Their Green Power program has the largest number of customers purchasing renewable energy that is accredited

by the National Green Power Accreditation Scheme, managed by the sustainable energy development authority (SEDA). As an energy producer, they have worked to ensure that their operations are managed effectively to reduce company’s greenhouse gas emissions and to minimize the environmental impact of customer’s use of energy.

Origin Energy has contracted to purchase total generation from Codrington Wind Farm for the next 10 years<sup>[8]</sup>. This commitment is enough to power 14,000 households and reduce emissions by up to 88,000 tones each year. This is equivalent to removing 20,000 cars from the roads each year. Origin Energy does not invest in any coal fired generation-Origin’s portfolio of gas-fuelled cogeneration and power generation plants reduce greenhouse gas emissions, because of the energy efficiency of modern technologies and the low emissions from natural gas.

**Company activities and environmental effects:** Origin Energy is a leading Australian energy provider, supplying gas and electricity more than 2 million customers. It is a participant in most segments of the energy supply chain including natural gas and oil exploration and production; power generation; energy retailing and trading; and asset management services. Moreover the company produces and distributes lubricating oils and, indirectly, contributes to the supply and refining in the group plants.

Origin Energy's current reserves are estimated at 12 years supply at current production rates. Approximately 85% of their reserves are natural gas, of which about 63% are located in the South Australian and South West Queensland portions of the Cooper Basin. Over half of the gas reserves are committed to long-term take-or-pay contracts. The company owns and operates

Table 1: An outline of framework for EMA based MEMA and PEMA

	Environmental management accounting (EMA)			
	Monetary environmental management accounting (MEMA)		Physical environmental management accounting (PEMA)	
	Short term	Long term	Short term	Long term
<b>Past</b>				
Routinely generated information	Environmental cost accounting	Environmentally induced capital expenditure and revenues	Material and energy flow accounting	Environmental capital impact accounting
Ad-hoc information	Ex post assessment of relevant environmental costing decisions	Environmental life cycle costing	Ex post assessment of short term environmental impacts	Life cycle inventories
<b>Future</b>				
Routinely generated information	Monetary environmental operational budgeting (Flows)	Environmental long term financial planning	Physical environmental budgeting	Long term physical environmental planning
Ad-hoc information	Monetary environmental operational budgeting (Stocks)	Monetary environmental project investment appraisal	Relevant environmental impacts	Physical environmental impacts

Source: Burritt *et al.*<sup>[9]</sup>

three gas-fired power plants to meet peak electricity demand. The merchant plants derive revenue from selling directly into the National Electricity Market. These plants are only dispatched when prices are above their marginal operating costs. In 1999, Origin developed the first fully merchant power plant in Australia - the Roma power station that can produce up to 73 MW.

Origin Energy supplies natural gas to one million customers in Victoria, South Australia, Queensland, New South Wales and the Northern Territory. It supplies LP gas (liquefied Petroleum), directly and through our distributors, to more than 260,000 residential and business customers in Australia, New Zealand and the Pacific. It supplies electricity to 582,000 customers, mainly in Western Victoria.

**Environmental effects:** Although initial report on environmental performance briefly explained on minor oil spills and its environmental impact<sup>[9]</sup>, later report explains the position in detail<sup>[8]</sup>. The main environmental effects of the company are related to oil spills and managing operational risks, however, it is assumed that accidental risks like land pollution and emissions into air are also taken into account. The company implemented a health, safety and environment (HSE) management system in order to manage operational risk and to minimise the impact of its activities on the environment. Under the HSE management system, every work place will have its own risk-control plan that ensures every risk and worksite is assessed for risk<sup>[8]</sup>. The company activities that could have environmental effects are analyzed in various ways:

**Energy:** The company's power projects save more than one million tones per year of greenhouse gas emissions compared with electricity market average. One of upcoming projects is wind farm in Victoria that will abate 55,000 tones of GHG each year<sup>[8]</sup>.

**Eco-efficiency:** Origin's commitment to eco-efficiency is demonstrated by reducing waste through recycling, reducing costs through offering professional energy advice to customers to reduce energy use and by using sustainable technologies.

**Air emissions:** The emissions into air of the company are triggering reduction in greenhouse gas emissions compared with electricity generation industry average (around one million tones per annum)<sup>[9]</sup>. The main environmental effects of the emissions into air related to the health of the employees that manage oil products in the bulk storage terminals and in the service stations is taken care of by the HSE management system.

**Environmental risk:** The main environmental issue related to company's activities is represented by the oil spill risk. In particular it is often difficult to manage the oil spill risks because of the large area it can cover in a short period of time. This is the main environmental issue of the oil marketing companies, which could require very high investments or disposal costs if the company has not a proactive policy. Origin Energy, following the proactive approach of its environmental policy strictly adhere to its environmental legislation and license conditions. As a result of these policy one minor spill was recorded in 2000 and five minor ones in 2001. However, in all no major or long-term environmental threat occurred.

**Policy on health safety and environment (HSE):** Origin Energy has developed a policy to eliminate the risk in HSE and also the indicators to implement the policy. One example of a policy instrument and its implementing indicators is as follows:

**Policy:** Eliminating or managing hazards and practices that could cause illness or injury to people, damage to property or unacceptable impacts on the environment.

**Indicators to implement the policy:**

- Integrating health, safety and environment management into planning and operational activities of the company.
- In the event of environmental accidents, all necessary steps shall be taken to minimize the impact of the incident.
- Taking all viable opportunities to reduce waste and GHG emissions, conserve energy and recycle materials.

**Environmental risk in EMA:** Now from the Health and Safety Department's perspective we would try to trace and incorporate environmentally related costs to see how environmental issues affect the company both on short and long-term basis. The bold sentences are the action taken by the company in respective areas (Table 2).

The scope on an environmental accounting system is influenced by its intended use, whether for reporting, performance evaluation or ongoing management. Generally, most environmental costs discussed are internal costs, but some relate to external or social costs<sup>[1]</sup>. These external costs ('externalities') represent an organization's impacts on the environment and society for which business may not necessarily be legally accountable. It is difficult to value these social costs but extremely necessary for an organization that is seeking to embrace reporting against sustainability issues.

Table 2: Effect of EMA on long term and short term basis

Environmental management accounting (EMA)				
Monetary environmental management accounting (MEMA)			Physical environmental management accounting (PEMA)	
	Short term	Long term	Short term	Long term
<b>Past</b>				
Routinely generated information	Environmental cost accounting <b>Electricity generation</b>	Environmentally induced capital expenditure and revenues <b>Cash flow from inventory activities like purchase of property, plant, equipment or business</b>	Material and energy flow accounting	Environmental capital impact accounting <b>Exploration and production activities of natural gas and oil</b>
Ad-hoc Information	Ex post assessment of relevant environmental costing decisions	Environmental life cycle costing	Ex post assessment of short term environmental impacts	Life cycle inventories
<b>Future</b>				
Routinely generated information	Monetary environmental operational budgeting (Flows)	Environmental long term financial planning <b>Revenues from electricity generation, Environmental provisions, Cost of environmental clean up</b>	Physical environmental budgeting	Long term physical environmental planning <b>Contingent liabilities *, Third party audit of its environmental accounts</b>
Ad-hoc Information	Monetary environmental operational budgeting (Stocks)	Monetary environmental project investment appraisal <b>Cost in preparing policy document for health, safety and environment</b>	Relevant environmental impacts <b>Oil spills</b>	Physical environmental impacts

Source: Burritt *et al.*<sup>[5]</sup>, \* A number of sites within Origin Energy have been identified as contaminated as a result of prior activities at the site. For the sites where requirements can be assessed and costs estimated, land has been valued by taking into account the estimated cost of remediation. Certain entities within the consolidated entity are subject to various lawsuits and claims including native title claims<sup>[9]</sup>

Origin Energy's environmental accounting process is in initial stages. The future goal of the company should be to use environmental accounting in a way that is useful for internal management decisions and which provide accountability to society as well.

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