

How to Run A Profitable Greenhouse Gas Reduction Strategy.

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Executive Summary.

A key component in any greenhouse gas reduction programme requires the management and reduction of energy use per unit of production. For the programme to be profitable, certainty in energy prices will allow projects to be undertaken with certainty in the economic outcome.

Currently electricity prices in Australia are at an all time low which are not sustainable in the longer term. The recent financial results from major electricity generators would confirm this position. Thus it can be expected that electricity prices must rise over the coming years. Additional uncertainty exists over natural gas prices under a de-regulated regime. Also, the imputed change to diesel costs through the abolition of the excise fuel rebate and its replacement with a G.S.T. adds to be uncertainty about diesel costs.

Under these circumstances of great uncertainty in energy prices, we believe that it is necessary to take a longer term view to develop an appropriate greenhouse gas reduction programme. Also within this context, we consider that it can be profitable to develop and manage a comprehensive greenhouse gas reduction programme.

Introduction.

The Minerals Industry Greenhouse Challenge Workbook provides a comprehensive methodology for a greenhouse gas reduction programme. Basically the programme will include an evaluation of all aspects of the business to identify economic opportunities to reduce those greenhouse gases.

For the mining industry, opportunities will come from a number of identified areas as follows:

1. Energy Management
2. Projects (mostly energy related)
3. Chemical Processes
4. Mining Processes
5. Explosives
6. Training
7. Environmental

With the recent changes in energy prices offering a significant reduction in electricity prices particularly for large users, the question must be asked whether greenhouse gas reduction programmes will and can remain profitable. Also the imputed change to the excise fuel rebate scheme and its replacement was a G. S. T. will change the purchase price for diesel with consequential changes on the project economics which use diesel as a fuel source. Additional uncertainty in natural gas prices under a de-regulated environment poses extra challenges.

Also, these uncertainties do not address other variables which can impact on overall

programme economics such as world commodity prices, economic buoyancy etc.

The Opportunities and the Essential Organisational Commitments

Within this framework of uncertainty, are there opportunities?

We consider that opportunities definitely exist and remain within a well run greenhouse reduction programme. In addition other opportunities have developed and should be considered within the context of a greenhouse programme.

So what are the opportunities?

From our experience with greenhouse challenge and energy management over the past fifteen years, these opportunities may be summarised as follows:

- Cost Reduction
- Energy Reduction Per Unit of Production
- Specific Energy Cost Reduction Projects
- Energy Performance Benchmarking
- Emissions Trading
- Energy Trading

The commitments.

Whilst these commitments may have been mentioned elsewhere, we consider that it is worth repeating the essential commitments from an organisation for a greenhouse gas reduction programme to be successful. They are:

- Full Board and Senior Management Commitment and Support
- Allocation of Responsible Person
- Necessary Resources (Financial and Other) and Authority
- Ideally A Champion for the Programme
- Willingness to Accept Change Which Will Occur As A Result of the Programme
- Involvement of Employees in the Programme

In addition a key part of the process in establishing a cost effective greenhouse gas reduction programme will be to undertake a comprehensive and professional audit of all aspects of the business that relate to this complex task.

We will deal with these aspects in turn.

Cost Reduction Aspects of the Programme

For many businesses, cost reduction within the framework of a greenhouse gas reduction

programme will arise from a well run energy management programme. It is worthwhile revisiting the work which we have undertaken in the coal mining industry in NSW and Queensland.

Our findings in recent years have been that typically, *energy efficiency improvements of 20% and higher are possible at many mines* leading to a commensurate reduction in the controllable operating cost, i.e. *ENERGY*. Two years ago, on the basis that annual energy costs and net profit were similar for many mines, a reduction in energy costs by 20% would lead to an increase of 20% in net profit. Energy costs have of course reduced significantly since then, but so has net profit. The same relationship would apply today!

A number of opportunities for the mines were identified as follows:

1. Better management of equipment, improved operator training, and better mine planning (significant savings).

Note: from the work which we have undertaken, energy performance indicators for the different operational areas in the coal mine, e.g. washery, drilling, shovel operations, stacking etc, will form useful efficiency indicators for areas which previously would have been considered too complex or having too many variables for assigning efficiency measures.

2. Measure energy and use for performance measurement
3. Fine tune shovels/draglines/drills.
4. Maximum use of off-peak energy rates.
5. Power factor correction (tariff choice/amalgamation)
6. Energy projects:
 - Bath house heating systems
 - High efficiency motors
 - Drive belt systems
 - Transport alternatives and operation
 - Electric versus diesel for lighting, drilling, shovels, conveying
 - Trolley wire assist
 - Co-disposal
 - High efficiency lighting
 - Plant expansion - measure existing loads
7. Energy as a management tool

Subsequently, these initial findings have been incorporated in a comprehensive table of generic improvements in the Minerals Industry Greenhouse Challenge Workbook which is reproduced on the next page.

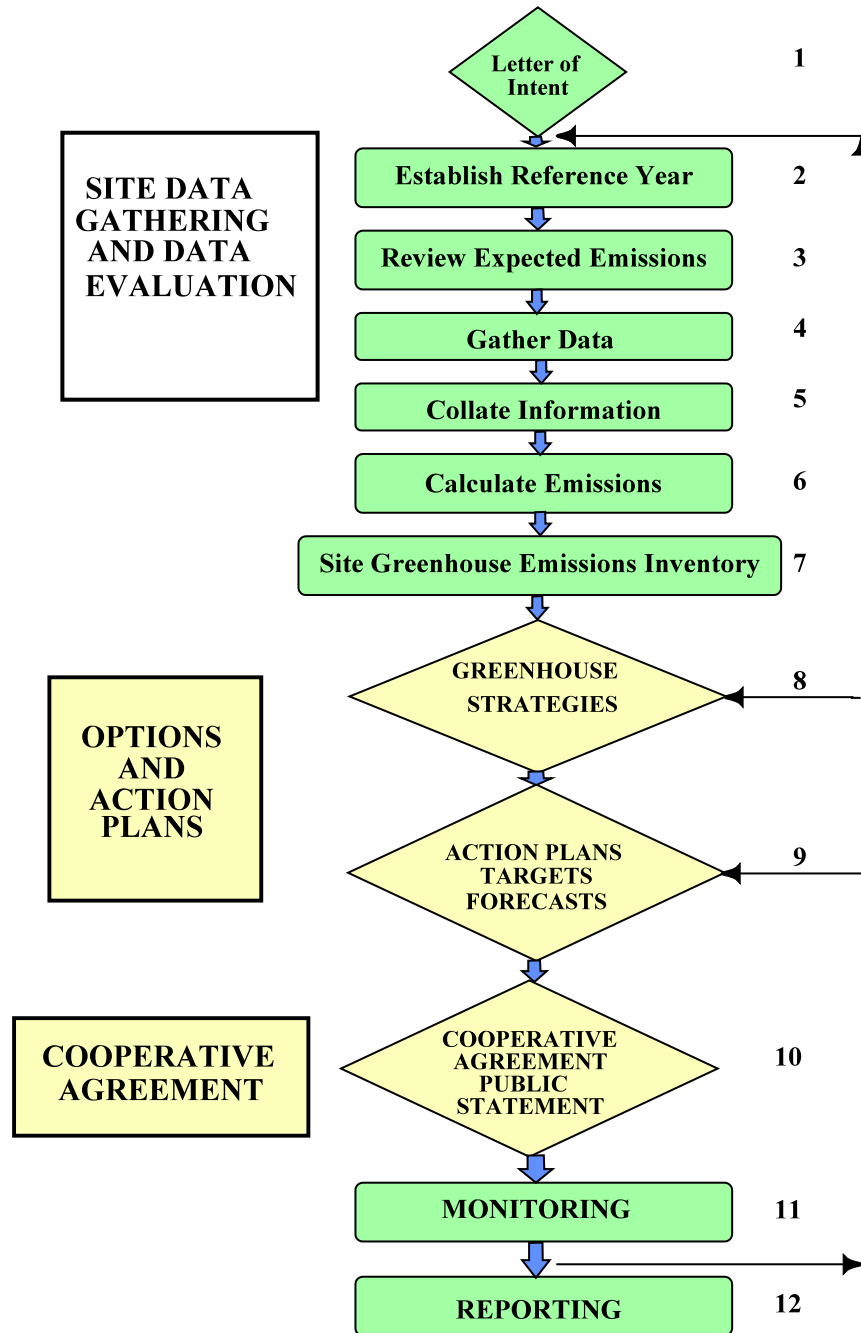
The table provides the full range of strategies that may be used to reduce greenhouse gases.

Table 5.4: Strategies For The Minerals Industry:

Strategy	TECHNOLOGY TYPE	TECHNOLOGY DETAILS	
1	ENERGY MANAGEMENT	Energy Audit	
2		Energy Management Program	
3		Energy Monitoring as a Management a Tool	
4	ENERGY PROJECTS	Air Compressors and compressed air systems	
5		Bathhouse heating systems	
6		Boiler Controls, Steam Systems	
7		Building Air Conditioning and Space Heating	
8		Buildings - Insulation and Shade	
9		Collect methane and use to generate electricity	
10		Combined Heat and Power (Cogeneration)	
11		Computerised Energy Management System	
12		Drive Belts and Coupling Systems	
13		Fuel Efficient Diesel Engines	
14		Fuel Substitution: electricity instead of diesel	
15		Fuel Substitution: LPG/CNG instead of diesel	
16		Furnace Controls and Improvements	
17		Heat Pumps	
18		Heat Recovery	
19		High Efficiency Electric Motors	
20		Lighting Systems	
21		Optimisation of Face Shovel and Dragline Performance	
22		Remote Area Power Supplied Photovoltaic Panels	
23		Remote Site Electricity Generators/Diesel Generators	
24		Solar Water Heating and Solar Cells	
25		Trolley Wire Assist for Haulage Trucks	
26		Variable Speed Drives for Fans	
27		Variable Speed Drives for Pumps	
28		Ventilation Systems	
29		CHEMICAL PROCESSES	Energy efficient metallurgical processes
30			Fine Grinding Technology
31			Flare methane
32	Oil Reclamation System		
33	Substitution of chemicals in recovery process		
34	Water Management		
35	MINING PROCESSES	Alternative Transport Overland Conveyors	
36		Codisposal of Fines	
37		Improve recovery of resource	
38		Larger trucks, shovels, graders	
39		Minimise blasting of coal - Use hydraulic backhoe	
40		Recover coal to reduce spontaneous combustion	
41		Reduced weight of dragline and shovel buckets	
42	EXPLOSIVES	Blast Management	
43	TRAINING		
44	ENVIRONMENTAL	Clearing vegetation from areas to be inundated by dams	
45		Tree plantings/Revised rehabilitation programs	

Also, the Minerals Industry Greenhouse Challenge Workbook sets out an appropriate methodology to implement the Greenhouse Challenge Programme in that industry as shown in the chart below:

Minerals Industry Greenhouse Challenge Program



Energy Reduction Per Unit of Production

Reduction in energy use per unit of production will often come about as a result of a continuous improvement process.

Generally, energy use is a useful measure of efficiency and hence continuous improvements which aim to do things better will show up as a reduction in energy usage per unit of production.

Thus monitoring energy usage per unit of production can be used to monitor the results from a continuous improvement programme.

Specific Energy Cost Reduction Projects

Specific energy projects which reduce costs are often one-off projects which are identified as part of an overall energy audit. Examples of typical projects of this type are given in the table on the previous page.

Also, in undertaking an energy audit, it is important to consider the outcomes which should be provided by the auditor. Details of the contents of an energy audit are included later.

Energy Performance Benchmarking

Energy reduction per unit of production can be achieved through a comprehensive energy benchmarking exercise. We have found consistently that the energy performance per unit of production is a key indicator to overall production and business efficiency. Sites which have poor energy performance can benefit from a benchmarking exercise.

Ideally, energy performance benchmarking across similar industries and operations is extremely valuable because it will show the relative performance of the particular operation in comparison with its peers.

Alternatively, benchmarking may be undertaken with no comparative data available. In this case, the benchmarking is recorded against time and evaluated for consistency, deviation and absolute value.

Often, benchmarking for individual areas within an organisation is valuable as a performance measure. Consideration should be given to incorporating appropriate energy performance benchmarks as key performance indicators for a definable business activity.

Energy performance benchmarks can be used to drive down overall energy use, reduce costs and improve overall production efficiency.

Emissions Trading

A possible opportunity emerging from Kyoto and subsequent international agreements is the possibility of emissions trading. There is no established mechanism in place at present for emissions trading. There would be many issues to be covered by government and players before an emissions trading system, most likely in CO₂ or CO₂ equivalents could be established.

For example, some of the include quota allocation, verification of emissions, avoidance double accounting, the position of smaller players and so on. Also, within an emissions trading system where quotas have been allocated, policing and penalties for exceeding quotas would need to be established.

However, it is possible that emissions trading will eventuate and provide opportunities for a profitable contribution to a Greenhouse Gas reduction Strategy.

Energy Trading

The possibility of energy trading is with is today.

It is most likely that most organisations will not have addressed the issue of actively trading energy to minimise energy costs and possibly assist with greenhouse gas reduction. This example refers to electricity purchase and use.

By now, all large industrial customers will have arranged some form of contract for the supply of electricity based (mostly) on a low electricity unit price. Most of these contracts for customers in the southern states will offer a total electricity price which is at least 50% less than the price which they were paying for electricity two - three years ago.

However, where a business is large enough (such as a large industrial consumer), and that business can control its operations at relatively short notice, the business is able to purchase electricity through the pool or through contracts directly with electricity generators and then manage that usage to minimise costs.

In times of electricity shortage on the pool (for any of a number of reasons), the customer would be in the position of ceasing production and selling the surplus contracted electricity back into the pool. At times of very high electricity prices, this approach could quite possibly be cost effective for the business.

Whilst the pool price for electricity is currently quite low, the price must rise in the longer term which in turn will open up the possibility for cost effective electricity trading at least for the larger industrial user.

The Greenhouse Audit

We consider that the Greenhouse Audit should address all aspects as defined in the Minerals Industry greenhouse Challenge Workbook, viz: Energy Management, Projects (mostly energy related), Chemical Processes, Mining Processes, Explosives, Training, and Environmental matters.

Other aspects which should be covered include historic energy (and greenhouse) performance including absolute values and values in relation to production with observations made about trends and absolute values (where industry comparative performance data is available), i.e. what has been the historical energy performance benchmarks for the business.

Additionally, the greenhouse audit should include an evaluation of opportunities through emissions and energy trading.

Summary

Currently low energy prices have changed the economics of energy and greenhouse gas reduction projects in the short term. However, it must be recognised that low energy prices are not sustainable over a long term and that project economics will change to restore ROI rates to previous levels.

Whilst this change may take a number of years to occur, other opportunities are appearing such as energy and emissions trading which in turn will ensure that greenhouse gas reduction strategies continue to make good business sense.

When well run, these programmes offer an exceptional method by which a business may continuously review and improve performance whilst saving money.

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Denis Cooke & Associates has been in the business of energy management and greenhouse challenge for the past fifteen years. Project undertaken include:

- Auditing and project identification in mines/industry.
- Assistance with detailed project analysis and feasibility studies
- Assistance with project implementation.
- Assistance with energy monitoring techniques, data gathering equipment, (specification and installation) software, use of information and report design as part of an energy management package.
- Assistance with on-going monitoring of energy usage and appropriate management reports.
- Assistance with energy management planning and incorporation of energy management practices into the day to day management of the mines.
- Reassessment (re-evaluation of energy saved from project implementation and/or energy conservation measures) at a later stage following project implementation.
- Reappraisal of comparative performance, either as one off or occasional exercise, or on an on-going basis.
- Greenhouse gas reduction strategies
- Greenhouse Challenge Cooperative Agreements
- Greenhouse Challenge Annual Reporting

For more details, please see our web site.