

**Integrating Energy Management
Into Your
Environmental Management System**

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1. Introduction:

Environmental management is concerned with protecting the environment for ourselves and future generations. It is a significant priority for our society.

In practice, environmental management means the application of a range of tools, programs and reviews to insure that appropriate actions are taken for particular issues and that overall objectives are met.

Within this framework, energy management is sometimes discussed as one component of an environmental management program, more often as a waste minimisation strategy. However, with the current Greenhouse 21C Challenge program, energy management will become of increasing importance for companies in meeting their environmental commitments and responsibilities.

2. The Greenhouse Challenge:

In March 1995, the Commonwealth Government announced a package of additional measures to reduce greenhouse gas emissions and a major element of these measures was a commitment to a program of cooperative agreements with industry. That is, the Commonwealth agreed to work with industry to put in place cost-effective, flexible, voluntary measures which will constitute credible commitments to greenhouse gas reductions through improvements in energy efficiency and/or process efficiency on a continuing basis and/or by enhancing greenhouse gas sinks. This program has become known as the Greenhouse Challenge or 21C Program.

At the time of the announcement, the Government estimated that the program could yield in the order of 15 Mt of greenhouse gas emissions reductions annually by the year 2000. An assessment of the uptake of the program in 1996, and subsequent reports, will provide a better quantitative picture of the emissions reductions which cooperative agreements can and will deliver.

The main responsibility lies with industry for developing greenhouse gas abatement plans and monitoring and reporting progress in implementing these plans. In turn, the Commonwealth will promote the program, support the development and implementation of cooperative agreements, seek to remove impediments to improved greenhouse gas performance by industry, and evaluate and report on the program's performance.

Also, State, Territory and local governments will explore their capacity to promote and contribute to the program, remove impediments to greenhouse gas abatement measures, secure the participation of government business enterprises and avoid duplication in the development and implementation of greenhouse gas abatement policies and measures.

2.1 21 C Program Description and Guidelines

The objective of cooperative agreements is to ensure industries seek continuous improvement

in energy and process efficiency, achieve maximum practicable greenhouse abatement performance, and at the same time enhance their competitive advantage. Also, it is intended to encourage the development of long term sustainable strategies in response to climate change concerns.

Cooperative agreements with industry include an appropriate emissions baseline, an assessment of opportunities for abating greenhouse gas emissions, development of specific greenhouse action plans, a commitment to regular monitoring and reporting of performance against action plans and provision for performance verification. Parties to agreements will make a public statement of commitments, the mode and content of which will be agreed between them.

2.2 21C Program's Marketing and Technical Support

The Commonwealth's marketing and technical support strategy includes development of promotional material, development of technical support materials, and the holding of workshops with industry to inform and educate enterprises about the program.

2.3 21C Program Reporting and Evaluation

Those entering into cooperative agreements will report annually, or as agreed, to the Commonwealth on progress under their action plans.

The Commonwealth will prepare an annual assessment of the program's performance against a set of indicators, including the uptake of the program and the extent to which cooperative agreements forecasts are being met.

2.4 21C Program Key Components

The 21C Program agreement will:

- I. Be the responsibility of the industry
- II. Be voluntary and appropriate
- III. Recognise energy efficiency as a key area for abatement of greenhouse gas emissions
- IV. Provide any other policies or measures that will abate greenhouse gas emissions and enhance sinks
- V. Be formalised and include the following:
 - i. an appropriate emissions baseline
 - ii. specific greenhouse action plans
 - iii. a commitment to regular monitoring and reporting of performance against action plans
 - iv. provision for verification of performance
 - v. a public statement, as agreed by the parties, on the undertakings contained in the agreement.
- VI. Use indicators and methodologies developed through consultation between industry and the Commonwealth that are consistent with those used nationally
- VII. Recognise international projects and R&D relevant to abating greenhouse gas emissions and/or enhancement of sinks
- VIII. Include a Commonwealth commitment to consult with industry to identify and seek to

remove inconsistencies in government policies which impede emissions abatement and sink enhancement.

2.5 21C Program Requirements

A participating industry would:

1. Identify potential policies and measures to improve energy efficiency, process efficiency and/or effective use of resources that will also abate greenhouse gas emissions and/or enhance sinks
2. Develop and implement action plans based on I. above consistent with innovation, continuous improvement and sound business practices, including financial, environmental and other considerations
3. Prepare and report to the Commonwealth a baseline inventory of greenhouse gas emissions
4. Annually conduct an appropriate emissions assessment and report to the Commonwealth changes in the levels of greenhouse gas emissions, including comments on factors affecting changes
5. Annually report progress on action plans including the effectiveness of policies and measures to improve energy and process efficiencies, abate emissions and/or enhance sinks
6. Annually provide the Commonwealth with forecasts of impacts of measures.
7. Promote the cooperative agreements program, as appropriate.

2.6 21C Program Emissions Baseline

A base-year inventory of significant absolute greenhouse gas emissions and sinks will be prepared and reported between signing a letter of intent and concluding a formal agreement. The baseline should cover all gases not covered by the Montreal protocol (CO₂, CH₄, N₂O, NO_x, NMVOCs, fully fluorinated compounds and, as appropriate CO).

In most instances an emissions baseline will be derived from a greenhouse inventory or energy and greenhouse gas audit. The baseline should have sufficient detail to identify all significant emissions. Emissions inventories can be prepared annually but should be prepared not less frequently than every three years.

Qualitative and or preferably quantitative comments should accompany reported inventories to include:

1. Benefits arising from previously reported measures
2. Other factors which influenced changes in emissions from previous inventories (eg production base, acquisitions or divestments, new projects or changes in productive capacity).

2.7 21 C Program Action Plans

Typical projects and measures to be included in action plans would be:

1. Capital and operating projects which improve energy and process efficiencies and/or abate greenhouse gas emissions, such as in:
 - operations and processes

- products and services
 - associated upstream and downstream activities and enterprises including end uses by customers;
2. Management initiatives (eg policies and directives)
 3. Direct enhancement of sinks
 4. Use of alternative and renewable energy technologies.
 5. Research and development projects and activities which generally require time before benefits are realised and involve potential uncertainty of outcome
 6. Participation in other appropriate domestic and international joint projects and initiatives which may contribute to emissions abatement
 7. Adaption to the possible impact arising from climate change.

3. The Energy Audit for the Mining Industry

The energy audit is a systematic evaluation of energy usage in a mine to establish

1. Current energy usage and costs
2. Current energy usage trends
3. Current specific energy usage and costs (i.e. energy per production
4. Current specific energy usage trends and to identify:
5. Opportunities to improve energy performance
6. Opportunities to reduce energy costs
7. Financially viable energy reduction projects

For The Greenhouse Challenge Program, the energy audit would be extended to include the following:

- ◆ Greenhouse gas emissions from base year, current year and projected year(s)
- ◆ Effect of identified opportunities on greenhouse gas emissions
- ◆ Prioritised action plans to implement viable projects resulting from the energy audit to also reduce greenhouse gases
- ◆ Energy monitoring and management of processes

3.1 Methodology for Coal Mine Energy Audit

The methodology used for a coal mine energy study would be as shown below. Whilst the example given is for a coal mine with open cut and underground operations, the approach would be similar for other mines:

1. Establish and examine general trends in energy usage for each fuel type over the previous three years and relate this usage to coal production and BCM movement using statistical techniques.
2. Evaluate the energy usage for each major energy consuming process. This activity will involve on-site metering, relating energy usage to production on a process basis and highlighting energy inefficiencies. The processes to be evaluated include: above ground draglines operations, electric face shovels operations, high wall mining operations, diesel powered hydraulic backhoes, conveying of coal, overburden and coal transport by truck, coal preparation, lighting, compressed air, pumping,

stockpiling and train loading, and workshop / office / bathhouse energy systems; below ground continuous miners and shuttle cars operations in panel development, mobile crushers, long wall shearers, armoured face conveyors, stage loaders and crushers, chock power packs, underground conveying systems, underground pumping, diesel man and materials transport, ancillary diesel equipment, e.g. u/g grader and diesel powered front end loaders, ventilation fans, associated workshop / office / bathhouse energy systems, and major surface compressors.

3. Establish energy performance benchmarks for the mine(s), for major items of plant and for individual processes at the mine(s). Identify differences in these benchmarks in comparison with the benchmarks which we have established at other coal mines and for similar equipment and processes.
4. Establish energy targets based on the energy benchmarks, using both best practice techniques and implementation of worthwhile energy projects.
5. Identify areas of opportunity for improved energy efficiency and productivity including strategies to reduce waste. Identify specific projects, including efficient technologies where relevant. Quantify the size of avoidable waste and hence savings in greenhouse emissions which are possible through the implementation of energy management strategies.
6. Provide full financial analysis of energy cost reduction projects including reference to other parameters which may affect the decision making process where relevant.
7. Other matters considered relevant to achieve energy efficiency, e.g. the use of energy as a management tool, which could result in an improved culture with a consequent valuable spin off into other areas; improved productivity for individual mining machinery and equipment by an estimated 10% or more with some consequent improvement in energy efficiency.
8. Greenhouse gas emission levels for each of the previous steps as appropriate.
9. On-going energy monitoring and greenhouse gas emissions resulting.

4. Expected Outcomes from Energy Audits and Energy Management

Our work in the coal mining industry has shown that significant savings can be expected from an energy audit, followed by an energy management program.

Typically, an energy audit and energy management program of this type will:

- provide the means by which energy costs may be reduced. For most open cut coal mines in the Hunter Valley savings of more than 20% of the current total energy usage and costs appear readily achievable, with a similar reduction in baseline greenhouse gas emissions.
- provide an essential component for the mine to respond and work with the Greenhouse 21C commitment.
- allow the mine to demonstrate energy efficiency.

An important outcome is that often these energy and cost savings can be achieved with little or no capital expenditure.

Thus for the mining industry, energy auditing and energy management is an essential component of the Greenhouse Challenge program which has the potential to allow mines to meet the multiple objectives of:

- **Reducing Greenhouse Gas Emissions**
- **Reducing Energy Usage**
- **Reducing Energy Costs**
and if implemented comprehensively will lead to
- **An Improved Work Culture**

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