Fire Research Report

Managing Non-Operational Environmental Impacts of Fire Service Activity

MWH New Zealand Ltd

February 2007

International best practice in managing the environmental impacts of non-emergency fire and emergency service activities at the office and station levels are identified. A review of the New Zealand Fire Service's infrastructure and support activities was undertaken to identify how environmental aspects are currently managed. Issues identified relate to the energy and water a fire service uses, the waste it produces, the travel and work patterns it encourages among its staff and the products it buys. Some fire services have made significant progress in greening their operations, including development of an environmental policy, action plans and initiatives for procurement, waste and energy savings. Communications of green concepts was found to be essential to motivate staff, gain their support and encourage cultural change.

Although there is awareness among senior Fire Service staff about the potential for adverse environmental effects, the Commission has taken only limited steps to address such issues. Based on overseas experience there is scope for significant cost savings to New Zealand Fire Service by adoption of energy and resource conservation measures across the organisation. Recommendations are made on measures the New Zealand Fire Service could adopt to mitigate its environmental impacts, including initiating a data collection system for establishing environmental baselines, defining targets and monitoring.

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New Zealand Fire Service Commission

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New Zealand Fire Service Commission

Managing Non-Operational Environmental Impacts of Fire Service Activity

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Executive Summary

Introduction, objectives and methodology

MWH New Zealand Ltd was commissioned by the New Zealand Fire Service Commission to conduct a research project on the Impact of Fire Service Activity on the Environment as part of the Commission's 2004/2005 Contestable Research Fund. The purpose was to identify environmental impacts of the NZFS, other than fire-fighting and emergency response, and provide recommendations for the management of these impacts while not compromising the essential safety functions of the Service.

The research identified the extent to which the Service has adopted `green' measures (e.g. waste minimisation, energy conservation and green procurement) to manage its environmental impacts within a sustainable framework. The greening theme is increasingly being adopted in public and private sector organisations and is topical in New Zealand given the current debate on the country's energy strategy and response to climate change.

The methodology comprised an initial review of international best practice adopted by overseas fire services and related agencies in greening their operations at office or station level. A review of the NZFS's infrastructure and support activities was then completed to identify how environmental aspects are currently managed in-house. This stage included a review of the Service obligations in respect of government environmental policy, interviews with senior Headquarters staff and environmental audits of selected fire station and training centres to examine existing green practice and environmental awareness.

Overseas best practice review

The literature survey identified that environmental (impacts resulting from running a fire service may be significant, and comparable in many ways to a large company. These relate to the energy and water a fire service uses, the waste it produces, the travel and work patterns it encourages amongst its staff and the products it buys. Overseas best practice therefore targets the organisation's procurement, transport, property management and training functions, and is underpinned by a robust environmental management system that links into the business operations. While rapid uptake of greening operations is occurring in the public sector, adoption of such practice is an emerging development for fire services. Nevertheless, a number of fire services (e.g. London Fire and Emergency Planning Authority, Victorian CFA) have made significant progress in greening their operations, including development of an environmental policy, action plans and initiatives for procurement, waste and energy savings. Communication of green concepts was found to be essential to motivate staff, gain their support and encourage culture change.

Greening topics considered are i) environmental management systems ii) transport (e.g. emissions reduction, travel plans) iii) procurement of green products/services iv) property management (e.g. green design, energy and water conservation, waste/recycling) and v) staff awareness training and communications of the greening concept. Many of these topics are inter-linked. The report provides case studies of measures adopted by fire services to `green' their operations that provide both good environmental outcomes and cost savings.

Non-fire environmental impacts of NZFS and their significance

The main non-fire environmental impacts are associated with the Service's support centres (e.g. NHQ, regional offices/training facilities and fire stations). These are mainly office orientated, and the impacts of their operation are typically in respect of utility use, waste, paper, procurement, and transport. Thus the significant environmental impacts of the Service reflect the cumulative effects of the organisation's activities that:

- Generate waste (that is not reused or recycled)
- Use resources (e.g. water, materials, fuel)
- Result in poor air quality (e.g. vehicle emissions); and
- Contribute to greenhouse gas emissions and global warming (e.g. fuel consumption)

False alarms are also considered to be a significant impact in terms of air quality and greenhouse gas emissions that the Service is taking active steps to reduce. In most cases it was not possible to quantify the impacts as baseline data on environmental statistics are not available, or could not easily be generated e.g. lack of aggregated electricity and gas consumption data precludes estimation of the carbon footprint of the Service's property.

NZFS environmental performance

In terms of mechanisms for identifying, monitoring and managing its non-fire environmental impacts (i.e. `green' performance), the review identified that the Service is at an early stage in development. The focus to date has been on avoiding, remedying or mitigating the adverse effects of fire-fighting activities on the environment. Although there is a degree of awareness amongst senior Fire Service staff about the potential for adverse environmental effects from non fire-fighting activities, the Commission has taken only limited steps to address such issues.

While there been recent adoption of green design principles (e.g. Rotorua national training facility), there is no recognition of strategic environmental impacts of the organisation as a whole (e.g. associated with energy usage, water conservation, waste management or resource efficiency), that are central to promoting corporate social responsibility and sustainable development. Based on overseas experience, there is scope for significant cost savings in the NZFS by adoption of energy and resource conservation measures across the 436 stations and 8 regional office facilities.

As a Crown agent, the NZFSC (and hence the NZFS) is required to conduct its business in a manner which is consistent with Government policy. A number of key Government policy instruments exist which are relevant to the NZFS's non-fire fighting activities. These cover *inter alia* climate change, energy efficiency and conservation, waste and sustainable transport and are underpinned by the 2003 Sustainable Development Programme of Action. The 5-year Strategic Plan has little regard for key Government environmental policies, in particular for the policy of promoting sustainable development. The Plan makes no reference to specific Government environmental management policies or strategies. Neither the NZFS vision nor its values statement makes any reference to contributing to sustainable development.

The Service has no environmental policy or strategy with environmental aspects being handled on an *ad hoc* basis by different departments. In respect of the five key functional areas reviewed in this research project (viz environmental management, procurement, fleet management, property management, and training), the findings of this review indicate that, while significant progress has been achieved in some areas (e.g. fleet and property management), the NZFS generally has some distance to go in greening its operations.

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The findings of the audit of selected operational facilities (fire stations and training facilities) reflect the lack of national policies, operational standards and guidance in the areas referred to above. A common point expressed by station staff was that fire stations are generally wasteful of resources, reflecting the fact that public services are traditionally not operated along the same commercial lines as businesses in the private sector. Apart from limited paper recycling by NHQ, waste recycling and energy savings measures are not practised.

Interviews with facility support staff identified that introduction of a more sustainable mode of operation will require an attitudinal change in the Service in order to counter the general culture of waste that is prevalent in public services. The nature of the NZFS as a command and control organisation would ensure that any environmental requirements (e.g. energy saving) that are built into standing procedures would be followed. Station staff generally expressed a keen interest in learning more and taking part in any initiatives for greening operations.

Conclusions and recommendations

The report provides detailed and specific recommendations that the NZFSC may consider in terms of mitigating the environmental impacts and `greening' Service support functions. Improvement opportunities are identified for environmental management, green procurement, energy, water and waste management, staff training and communications. These are based on measures adopted overseas with resultant cost savings/enhanced environmental performance.

The reports sets out a framework for environmental management and provides recommendations to the Commission on how it could be taken forward within the NZFS in terms of environmental policy, objectives, targets, performance indicators and actions plans that comprise the environmental strategy. A data collection system for establishing an environmental baseline will be essential to assist defining targets and monitoring performance. Environmental improvement targets in the report are given as guidance only on what may be considered based on overseas experience. Any actual greening targets adopted would need to be considered against the baseline environmental performance of the Service, Government policy, priorities in the 5-year Strategic Plan and available funding and resources.

Environmental improvement measures need to be linked into existing mechanisms for strategic review (business planning, policy and procedures review, 5-year strategic plan). A suitable platform would be the Business Excellence initiative where `greening' and a move towards sustainable practice would comprise a component of governance and social responsibility

The proposed framework is intended as a guide on what could be considered rather than a blueprint for what should be adopted by the NZFSC. In developing its own approach, reference should be made to the international best practice review for examples of what has been successfully introduced by overseas fire services. However, adoption of the principles and elements of an environmental management system will assist the Service secure improved environmental outcomes and provide a mechanism for monitoring the environmental performance of its activities.

The challenge for fire and emergency services is how to improve environmental practice while at the same time maintaining an efficient and responsive service delivery. Overseas best practice documented in this report demonstrates that the two objectives are mutually compatible and that enhanced environmental performance can be effectively integrated into fire service support activities and deliver significant cost savings.

1. Introduction

MWH New Zealand Ltd (MWH) was commissioned by the New Zealand Fire Service Commission (NZFSC) to conduct a research project under the topic "Impact of Fire Service Activity on the Environment" as part of the Commission's 2004/2005 Contestable Research Fund.

The purpose was to identify aspects of the New Zealand Fire Service (NZFS) operations - other than fire-fighting and emergency response - which may cause adverse effects on the environment. The research was intended to develop guidance on measures that can be taken to identify, monitor and mitigate these environmental impacts while not compromising the essential safety functions of the Service. In essence the research is concerned with identifying steps that the NZFSC may consider in terms of `greening' of the Service support functions.

The project comprised three stages:

Stage 1 - Literature survey of international best practice
Stage 2 - Identification and assessment of environmental impacts of non-fire Service operations
Stage 3 - Develop guidance and recommendations for management of identified environmental impacts

The findings from this research are contained in this report entitled "*Managing Non-Operational Environmental Impacts of Fire Service Activity*".

1.1 Background and Objectives

A considerable body of research has been conducted world-wide into the environmental impacts of fire-fighting activities, both in urban and rural areas (where natural resources are most at risk). The impacts principally centre on the effects of contaminated firewater runoff from areas affected by the fire zone.

Conversely, there has been comparatively little study on environmental effects of non-fire service activities. These refer to the day-to-day operations of running a fire service organisation and its main infrastructure components i.e. Headquarters, fire stations, training facilities and related plant, equipment and vehicle fleet. Environmental impacts of this part of the business cover such topics as:

- Management systems (adequacy of environmental policy, guidelines for minimising impacts, good practice and staff training);
- Climate change and air emissions (e.g. minimising non-essential service/white fleet operations, clean fuel use, alternative fuels and vehicle maintenance to reduce the carbon footprint);
- Energy conservation (office plant and equipment but also including fleet operations)
- Waste management (waste minimisation, recycling, hazardous waste disposal, materials procurement); and
- Training (provision and effectiveness of existing environmental controls in fire training facilities and staff environmental awareness training).

The project therefore seeks to understand the macro environmental risks of the Service outside the conventional focus on impacts from fire-related activities. These aspects embody the `greening' concept –

identifying environmental impacts of a business and introducing measures to manage these impacts within a sustainable framework. T

The greening theme is increasingly being adopted in public and private sector organisations and is topical in New Zealand given the current debate on the country's energy strategy and response to climate change. It also supports the Government's goal to drive more sustainable practice in the public sector in terms of protecting and enhancing the environment and reducing waste and energy consumption.

1.2 Scope of Work

The research scope considered environmental impacts that occur in the course of non-operational business activities at Service facilities e.g. regional offices, fire stations and training centres. These activities are referred to in this report as `support' services.

The project excluded the environmental impacts of incident response (e.g. fire-fighting and emergency rescue), and referred to in this report as `operations'. An exception was the aspect of `false alarms'. Although falling within the operational area, these were included as they have a direct impact on the environment that is potentially avoidable.

The scope was limited to urban fire service operations in New Zealand and specifically excluded activities of the National Rural Fire Authority, which covers rural fire station operations.

Stage 1

Stage 1 comprised the following tasks:

- An internet search and review of current international practice and case studies relevant to environmental management by overseas fire services (e.g. UK and Australia), including contact with fire research agencies and other relevant bodies (e.g. Australasian Fire Authority Council).
- Identification of key areas of environmental management and operational practice that merit further assessment under this project in the context of New Zealand's Fire Service.
- Preparation of a report summarising the findings from the desktop study, including case study material of best industry practice taken overseas for improving environmental performance.

Stage 2

The research examines environmental policies, procedures and guidelines adopted by the NZFSC, and the extent to which these are put into practice within NZFS operations. The latter has been assessed by way of environmental audits of selected representative fire service facilities such as fire stations and training centres. Mechanisms by which environmental impacts occur, and may be prevented, have been explored.

Stage 2 comprised the following tasks:

- Review and identify FS activities that have a potential strategic environmental impact

- Review existing NZFS environmental policies, procedures and guidelines (including the effectiveness of mechanisms for managing environmental impact)
- Conduct selected environmental audits of FS activities that are indicated as having potential for environmental impact (included NHQ, two stations and a training centre)
- Preparation of a report summarising the findings

Stage 3

The scope of Stage 3 comprised the following tasks:

- Identify the main sources of environmental impact and measures that can be taken to manage these risks
- Prepare recommendations for managing environmental impacts (Environmental Management Plan)
- Identify performance indicators to assist the Service measure its impact on the environment
- Prepare a report summarising the research findings.

Stage 3 draws on findings from the literature review of international best practice and the assessment of risks to the environment from the audit of Service policy, guidelines and operational practice in the support service units. The report provides conclusions and recommendations for the management of the organisation's non-fire related environmental impacts, and related guidance on measures to strengthen `green' activities within the Service.

1.3 Report Structure

This report is divided into nine sections:

1. Introduction
2. Methodology
3. Findings from the International Greening Practice Review
4. The NZFS and its Operating Context
5. Review of Greening Activity in the NZFS
6. Integrating Green Practice into Fire Service Support Activities
7. Framework for Environmental Management in the NZFS
8. Conclusions and Recommendations
9. References

Two appendices provide supporting technical information. Appendix A contains the `green' questionnaires that were used during the audit of Service facilities. Appendix B contains guidance on the elements of an Environmental Management System.

2. Methodology

2.1 International Literature Review

The methodology for the literature review comprised three elements:

i) Internet search of the research topic
ii) Review of websites for selected fire agencies and related research organisations
iii) Direct contact with individuals in fire agencies.

The Internet search enabled a `first cut' of possible sources of information and topic areas on the greening of fire service operations. Information was supplemented by correspondence with individuals in some of these organisations who had expressed an interest in the research topic.

The initial overseas literature search for `green' fire service operations returned very few hits (apart from notable exceptions such as LFEPA – see below). The search was therefore widened to look at public service organisations as most fire services are funded by government agencies. In addition, the greening attributes being sought apply to any public sector body irrespective of the organisation's operational activities such as fire-fighting.

Overseas organisations were contacted by email with an attached letter of introduction from NZFS explaining the background to the request. Table 2.1 lists the organisations and individuals that were contacted.

Within New Zealand, the National Rural Fire Authority is responsible for co-ordinating rural fire management activities. Rural fire services are supported by the Forest and Rural Fire Research Programme, particularly in the management of wildfires. The scope of this project specifically excluded rural fire station operations and hence these organisations were not contacted.

Table 2.1 Fire organisations contacted as part of the literature review

Country/Organisation	Web address (http://)	Contact
Australia		
Australasian Fire Authorities Council (AFAC)	www.afac.com.au	Dr Leon Collett, Program Coordinator
Bushfire Co-operative Research Centre (BCRC)	www.bushfirecrc.com	Richard Thornton
Country Fire Authority of Victoria (CFA)	www.cfa.vic.gov.au	Helen Bull, Environmental Manager
New South Wales Rural Fire Service	www.bushfire.nsw.gov.au	-
Queensland Fire and Rescue Service (QFRS)	www.fire.qld.gov.au	Derek McCormack
South Australian Country Fire Service (CFS)	www.cfs.org.au	Roger Weal, Project Officer
Victoria Department of Sustainability and Environment (DSE)	www.nre.vic.gov.au/fires	-
United Kingdom		
London Fire & Emergency Planning Authority (LFEPA)	www.london.gov.uk/gla/gla-group/lfepa.jsp	-

London Fire Brigade (LFB)	www.london-fire.gov.uk	Bill Skeates
Oxfordshire Fire Brigade	www.oxfordshire.gov.uk/fire_service	David Hanlon
Greater Manchester County FS	www.manchesterfire.gov.uk	-
Lothian & Borders Fire Brigade	www.lothian.fire-uk.org	-
Cornwall County Fire Brigade	www.cornwall.gov.uk/fire	-
Environment Agency	www.environment-agency.gov.uk	Bruce McGlashan, Technical Advisor [a]
Office of the Deputy Prime Minister	www.safety.odpm.gov.uk/fire	-
Fire Research Station	www.bre.co.uk/frs	-
USA		
New York Fire Department	www.nyc.gov/fdny	-

a) Technical Advisor - Fire Service and Major Stakeholder Liaison

2.2 Review of Greening Activities within NZFS

The international literature review identified a number of functional areas and key topics under which greening operations are being developed and implemented to reduce the environmental impacts of non-fire service activities (see Table 2.2). The environmental review was focused on these topic areas.

Table 2.2 Main functional areas and topics for `green' fire service operations

Functional Area	Key Topics
Environmental Management (as an element of Sustainable Development)	Environmental strategy and policies (e.g. waste, energy, water etc); environmental management systems (EMS); environmental targets and objectives; operational procedures and guidelines; performance indicators; audit and review
Procurement	Green procurement policy; contracts (e.g. waste recycling; fleet maintenance etc)
Transport	Travel plans; emissions control (white fleet use, vehicle maintenance, fuel quality); energy efficiency; waste recycling; fleet disposal; noise
Property	Green building design (new facilities); retrofitting existing buildings; energy and water conservation; waste minimisation/recycling; chemical storage/disposal
Training	Environmental awareness; promote good environmental practice; adherence to government policy

The methodology comprised four elements:

i) A meeting to review the NZFS organisation and functional areas with a bearing on `greening' issues.
ii) Selection of relevant National HQ (NHQ) staff to interview and finalise meeting arrangements
iii) Development of a checklist/questionnaire for selected green topics (see Appendix A)
iv) Conducting interviews with HQ staff.

A series of interviews were held with relevant Fire Service staff that hold responsibilities for the functional areas and topics listed in Table 2.2. NHQ staff who were interviewed, their area of responsibility and the aspects of operations that were discussed under each of the functional areas or "greening topics" identified from Stage 1 are listed in Table 2.3. Findings from the interviews are summarised in Section 5.

Table 2.3 NHQ staff interviewed on `greening' topics

Greening Topic	NHQ Group	Name	Title	Discussion Areas
Environmental management	EIR & SA *	Paula Beever	National Director, Fire Risk Management	Research need, Baldridge business excellence and environmental policy
	Operations & Training	Brian Davey	National Manager Operational Standards	Environmental policy, guidance and standards; training
Procurement	Finance	Peter Kiernan	National Procurement Manager	Green procurement
Transport	Operations & Training	Graham Bidois	Manager Fleet	Appliances, white fleet and workshop maintenance
Property	Operations & Training	Kevin Stacey	National Manager Strategic Assets	Asset management, property maintenance
	Operations & Training	Stephanie Campbell	Property Portfolio Manager	Green building design, Rotorua Training Centre
Training	Operations & Training	David Guard	National Manager Professional Development Unit	Training policy and manual content (environmental aspects)
NZFS Statistics	EIR & SA	Neil Challands	Information Analyst	Environmental data on non-fire Service activities
External	Finance	Peter Clemerson	Manager IT Strategy	AFAC EMWG representative

*Engineering Information Research & Strategic Analysis

2.3 Environmental Audit of Fire Service Activities

The NZFS operational facilities selected for environmental/green audits are listed in Table 2.4 together with the individuals who were interviewed.

Table 2.4 NZFS facilities subject to environmental (`green') audits

Facility	Name	Title
Fire Stations		
Wellington City	Brent Hudson & Mike Thomason	Station Officers
Karori	Kevin Morrison	Station Officer
Training Centres		
Kilbirnie	Roger White	Training Officer
Trentham, Upper Hutt	David Keys	Training Officer

Arrangements to audit these facilities were made through Bill Butzbach, Fire Region Manager / Commander, and Jon Graham, Wellington Chief Fire Officer. Findings from the audits are summarised in Section 5.6.

3. International Greening Practice Review

3.1 Response from Organisations Contacted

A number of fire service organisations that are actively researching the topic of greening of fire service operations provided an insight into their findings (e.g. AFAC and CFA Victoria). Not all of the contacted organisations provided a response. However, sufficient information was gathered to enable an overview of the current status of greening operations in overseas fire services. A summary of the main sources of information is given below.

Australia

Australasian Fire Authorities Council

The Australasian Fire Authorities Council (AFAC) is the main co-ordinating body for the different agencies concerned with fire control. Dr Leon Collett, Program Coordinator, provided a number of useful contacts in related fire organisations in Australia.

Dr Collett reported that the Water Services Association of Australia is reviewing the sustainability of water supply for all capital cities in Australia. The Association is to commence work with AFAC on what the fire services can do to conserve water, with the current focus on use of Class A recycled water. He noted that fuel reduction burning was being examined by the Bushfire Cooperative Research Centre (BCRC) from a 'sustainability' perspective. Dr Collet also noted that AFA has established a new strategy committee to deal with 'natural environment' issues. The NZFS had not, at the time, nominated a member for this committee.

AFAC has also formed an Environmental Management Work Group (EMWG) with the objective of promoting sustainable practice in fire agencies. This is currently chaired by Russell Rees (CEO of CFA). The Group has identified the need to develop guidance, tools and training related to sustainable support services. At the time of contact, this Group had not yet been convened. However, it was suggested that the NZFS might wish to consider nominating a representative to EMWG to keep abreast of their work.

Country Fire Authority (CFA) Victoria

CFA has a dedicated environment programme aimed at improving sustainability across all aspects of their business (operational and support activities). The CFA's Environmental Manager is Helen Bull who provided a copy of the CFA's Environment Strategy (including the environmental policy). It was reported that substantial progress had been made in implementing the strategy. Aspects of CFA's Environment Strategy are discussed in Section 3.3.

United Kingdom

In the UK, there is no umbrella `clearing house' organisation for fire services similar to AFAC for Australia. Contact was therefore made directly with a number of individual Fire Brigades. Information was also obtained from the websites e.g. Hampshire FRS (best value procurement) and Cornwall County FB (procurement review).

London Fire Brigade / London Fire & Emergency Planning Authority (LFB/LFEPA)

The initial internet search identified the London Fire Brigade (LFB) and its controlling organisation – the London Fire & Emergency Planning Authority (LFEPA) - as two of the best sources of information on greening operations, procurement and environmental management in the fire services sector. Details are given in Section 3 of this report. Inquiries with the LFB and LFEPA coincided with a number of terrorist attacks in London and it was not possible to follow up on progress with individuals on topics published on their website.

UK Environment Agency

It was considered a worthwhile exercise to seek comment from an international regulatory agency (i.e. one involved in environmental compliance) on the current philosophy and strategies being adopted to deal with the issues associated with the environmental impacts of the non-operational activities of the fire service. Furthermore, information was sought on the feasibility of implementing these environmental strategies in accordance with international directions.

The Environment Agency (EA), which is responsible for protecting and improving the environment in England and Wales, was contacted for relevant information. A conference call was held with Bruce McGlashan (Technical Advisor - Fire Service and Major Stakeholder Liaison for the Environment Agency) to find out issues under discussion in the UK with regard to `greening' of the Fire Service.

The main topic areas included:

- Work being carried out by the Office of the Deputy Prime Minister (ODPM) relating to the reform and modernisation of the framework within which the UK Fire Service operates, particularly the implementation of Integrated Risk Management Plans (IRMPs).
- The extent of implementation of IRMPs nationally and their relevance to this project.
- The type of risk assessment methodologies developed and whether these have been focused on the risk to the environment from non-operational fire fighting activities.
- Methods used by the EA and Fire Services to measure impacts of their activities on the environment.
- Relevant reports or publications on `greening' of Fire Services that may have considered activities such as, energy consumption, eco-efficiency, waste, procurement etc.
- Useful contacts in the UK Fire Services, ODPM or others that may be relevant to this project.

The IRMPs being implemented in the UK primarily consider response to incidents/risk and the impact this has on fire service resources etc. Implementation is still in the initial phase and take-up varies throughout the country. The plans are mostly high level, but liaison between the EA and local fire services is expected to improve as they become more focused on individual risk activities.

A serving Fire Officer (Dave Hanlon) is currently under secondment to the ODPM to work on the production of an Environmental Manual for the UK Fire Service. The Manual will cover environmental risk, but it will largely be

applied to incident response. It will also include sections on Fire Service Incident Reporting to the EA and the role of Environmental Management Systems.

3.2 Overview of Green Issues for Fire Services

The literature review identified a number of functional areas and key topics under which greening activities are being developed and implemented to reduce the environmental impacts of non-core fire service operations. These are summarised in Table 3.1. Data collection was focused on these topic areas.

Table 3.1 Main functional areas and topics for `green' fire service activities

Functional Area	Topics
Management (focus on Environmental Management as an element of Sustainable Development)	Building sustainability into public sector organisations; environmental management systems (EMS); environmental policies (e.g. waste, energy, water etc); environmental targets and objectives; operational procedures and guidelines; performance indicators; audit and review; communications
Procurement	Green procurement policy; contracts (e.g. waste recycling; fleet maintenance etc)
Transport	Travel plans; emissions control (white fleet use, vehicle maintenance, fuel quality); energy efficiency; waste recycling; fleet disposal; noise
Property	Green building design (new facilities); retrofitting existing buildings; energy and water conservation; waste minimisation/recycling; chemical storage/disposal
Training & Communications	Environmental awareness; promote good environmental practice; Adherence to government policy; green image; staff consultation & communications; community relations

Topic areas listed above overlap to some extent, for example an Environmental Management System (EMS) is a management tool used to consider a range of environmental impacts; energy consumption is relevant to building maintenance and fleet operations (e.g. fuel efficiency). Many of the issues are linked to an organisation's procurement strategy e.g. waste recycling at fire stations may be addressed by a change in procurement policy; reducing emissions from the fleet can be accommodated by adoption of a green fleet procurement strategy.

A number of other topics were identified but these have lesser importance in the context of non-fire Service activities covered in this project. One of these, which is of major importance to fire authorities, is the protection and enhancement of biodiversity and is reflected in many cases in government policy. Biodiversity is largely addressed by operational procedures (i.e. planning and training arrangements) that protect green spaces, habitats and their species from the threats posed by fire and other incidents. In addition, the NZFS estate does not include land requiring active conservation. Biodiversity is therefore not considered further in this report.

A number of organisations (led by local and national government policy) have implemented, or are in the process of implementing, policies and strategies that incorporate many of, if not all, of the aspects discussed above. These policies are loosely referred to as 'greening operations'.

Examples of initiatives and best practice that have been, or are being, implemented by fire service and other public sector organisations, as identified from the literature review, are discussed below under the functional areas given in Table 3.1. Examples particularly worthy of note along with individual case studies are highlighted in text boxes.

The extent to which the NZFS is adopting best practice is discussed in Section 5.

3.3 Environmental Management and Sustainable Development

Measures to manage environmental impacts and promote sustainable development are increasingly becoming a focus of public and private sector organisations in terms of their business activities. The drivers are varied and include tighter legislation, government policy, higher community expectations and a greater awareness of corporate social responsibility.

For fire service organisations, most effort has been directed at minimising the risk of environmental impacts from fires themselves (e.g. bushfires destroying natural habitat) or of the aftermath of firefighting activity e.g. risk of chemical spillage and pollution of waterways.

While a number of fire services have formal environmental programmes, the concept of managing environmental risk is relatively new to emergency services. This is particularly so for environmental impacts of the business support function (e.g. energy and water conservation, waste recycling) which traditionally have not been formally reported.

The means by which environmental aspects have been incorporated into the business support function of fire services and other public sector organisations is considered below in terms of three developments:

- Environmental strategies adopted by fire services
- Greening schemes for public sector organisations (which may operate a fire service)
- Integrated risk management plans

Examples are given below of overseas practice under each of these areas.

Environmental strategies for fire services

London Fire and Emergency Planning Authority (LFEPA, 2004)

The LFEPA has committed to reducing its environmental impact on London and to work towards sustainable development in its operations. In terms of sustainable development, the focus is on prevention of pollution and reducing the Authority's vehicle and plant emissions, waste and energy consumption in buildings.

The Authority has six areas of focus for its environmental strategies, one of which is environmental management. (Note: the other areas are operational response, property, procurement, transport, training and biodiversity).

The Authority has developed an Environmental Management System (EMS) to assist with monitoring and reviewing their environmental impacts. This includes the setting of objectives and targets, and periodically auditing their activities. An Environment Team is responsible for implementing the EMS. The Team has

developed environmental performance indicators as part of the EMS and helps departments to collect quantitative baseline data that can be used as a benchmark to assess performance. The Team also tracks legislative and technological developments and measures progress against an agreed action plan.

Country Fire Authority, Victoria

The State of Victoria's Country Fire Authority (CFA) has adopted an Environmental Policy and developed an Environmental Strategy for their operations (CFA, 2003). The objective of the Strategy is to guide the CFA in dealing with environmental issues in all aspects of their business, from administration through to service delivery, while maintaining operational safety, effectiveness and efficiency of their emergency services.

The Strategy outlines six Environmental Action Plans that list actions to be taken over the next 5 years to improve environmental performance:

- Structural fire
- Dangerous goods
- Wildfire prevention
- Infrastructure and support
- Managing improvement
- People & partnerships

The last three topics listed above are central to the greening of fire service operations that is the subject of this research project.

Actions listed under `infrastructure and support' to promote improved environmental performance include i) ensuring new facilities meet government environmental design guidelines ii) examining existing facilities for environmental improvement opportunities iii) fleet management initiatives and iv) measures to reduce resource use and waste generation, including procurement policy, tools and training.

Case Study 1 examines CFA's environmental performance under `infrastructure and support' and examples of good practice to identify environmental effects and set targets for environmental improvement.

Greening schemes for public sector organisations

Framework for the Sustainable Development on the UK Government Estate (ODPM 2002)

The UK's ODPM (Office of the Deputy Prime Minister) has responsibilities in the areas of fire as well as housing, planning and urban/local government. Amongst the properties owned and managed by the ODPM is the Fire Service College in Gloucestershire where practical fire training in undertaken. The majority of their other sites are office-based.

The ODPM has developed a Framework which sets targets for government estates to ensure their sustainable development and operation. The ODPM has made a commitment to implement Environmental Management Systems (EMS) in line with the Framework requirements that are to cover 99% of their staff by March 2006. The EMS is to be based on a recognised standard such as ISO 14001.

Case Study 1 CFA Environmental Performance: Infrastructure and Support
(Source: CFA Environment Strategy - CFA, 2003)

CFA operates a fleet of 2659 vehicles and has 7 training facilities for emergency simulation. CFA buildings include 1275 fire stations and 23 offices. CFA HQ has approximately 200 staff.

Environmental effects:
Waste – identified that only 4% of a regional office waste stream is not recyclable (so now implementing waste minimisation strategies)
Paper – high annual paper consumption at CFA HQ (45 reams per person vs 19 for national average)
Water – water consumption is not widely measured for offices and other non-operational uses
Energy – CFA HQ annual energy consumption is about 1,477 MWh at a cost of A$134,000, equivalent to about 2000 tonnes of CO_2 (or approximately 10 tonnes CO_2 per employee)

Specific environmental goals/targets:
- Reduce waste at all office locations by 20% by 2008
- Reduce HQ paper use to the national average (19 reams per person per year) by 2008
- Reduce water use by 10% in all office locations by 2008
- Reduce energy use by 15% and obtain 5% of energy from sustainable sources by 2005
- Support the government's voluntary electricity demand management programme where possible

Achievements to date (2003):
- Recycling of paper and old rural firefighting helmets
- Baseline data collected on environmental performance
- Information kit for offices to assess waste and energy issues
- Reduced energy use in CFA HQ by modifications to air conditioning and lighting systems
- Development of CFA Design Guide for Fire Stations (in preparation)

The first stage of this process was to identify the significant environmental effects of each site. For office-based properties the significant impacts relate to:

- Utility use (energy, water)
- Waste & recycling
- Procurement
- Travel

The Framework sets specific targets for impacts such as travel and water consumption. Data collection, monitoring and reporting is essential to establish a baseline and to ensure that the targets set by the Framework are being met.

Examples of targets are as follows:

- Reduce road vehicle carbon dioxide emissions by at least 10%, to be achieved through any combination of:

- Reducing total business vehicle mileage
- Improving the average fuel efficiency of vehicles
- Reducing total fuel consumed

- Reduce water consumption in office buildings to an average of 7.7 m^3 per person per year

DTLR Greening Operations Annual Report 2001-2002 (DTLR 2001)

This report was prepared by the UK Government Department for Transport, Land and the Regions (DTLR) and outlined progress made in respect of 'greening' its operations in the period 2001-2002. It is the fifth annual report in a series generated under the Greening Government Initiative that began in 1998. The DTLR estate comprises a Central Department and 10 Executive Agencies, in total employing about 19,600 full time staff. The survey was completed using a Greening Operations Questionnaire and the results were subject to verification assurance. The report focused on two main aspects: management systems and operational environmental impacts (Table 3.2).

Table 3.2 Topics assessed by DTLR's Greening Operations Annual Report

Management Systems	Operational Environmental Impacts
• Environmental management • Procurement • Estates management • Communications	• Energy consumption • Transport • Waste & recycling • Water • Paper • Biodiversity

The DTLR report identified key developments and achievements made during 2001-2002 in each of the topic areas listed in Table 3.2. The findings are summarised in Table 3.3.

Integrated Risk Management Plans

A number of overseas fire services have adopted risk management principles and have organised their operations under the umbrella of an Integrated Risk Management Plan (IRMP). Under this concept, risks are categorised into main types (e.g. individual, society, property and environment), and considered in a holistic way. Environmental aspects become part of the overall risk management structure and therefore have a better chance of being implemented, managed and monitored as part of day-to-day operations.

An example is given below of a government policy initiative in this area and the extent to which environmental aspects have been incorporated onto these plans.

Integrated Risk Management Planning - Office of the UK Deputy Prime Minister (ODPM 2006)

On 16 December 2002, the Deputy Prime Minister introduced a programme of reform and modernisation of the framework within which the UK Fire Service operates. A key element of the programme would be the production

Table 3.3 Key greening achievements made by DTLR (2001-2002 Annual Report)

Operational Area	Significant Developments	Specific Examples
Management Systems		
Environmental Management	▪ Updated Greening Operations Policy Statement ● ISO 14001 certified, web-based EMS developed	
Procurement	▪ Environmental clauses in contracts ▪ Suppliers subject to annual environmental audit	▪ Desk manufacturers are required to supply certified information regarding the source and sustainability of timber products ▪ Policy to buy 100% recycled paper (except for specialised print jobs)
Estates Management	▪ 46% of staff located in buildings assessed under the Building Research Establishment Environmental Assessment Method (BREEAM) as 'good' or higher	▪ New buildings designed to high energy efficiency and sustainability standards; and have good public transport links
Communication	▪ Staff informed of progress through - Bulletins - Advice Notes - Electronic News Service messages - Greening operations intranet	▪ DVLA communicates greening messages to staff by: - Circulars - Articles in weekly newsletter - Email - Continual rolling poster campaign - Environmental leaflet with return section for improvements. These have included more recycling – including plastics, carrier bags and cans
Operational Environmental Impacts		
Energy	▪ 40% of energy from renewable resources ▪ 3% reduction in CO_2 emissions ▪ 8% reduction in CO_2 emissions per person	▪ Energy reduction initiatives: - office equipment "Switch off" campaign - energy efficient lighting - altered lighting controls
Transport	▪ Green travel message – raise staff awareness	▪ Single mileage rate for all vehicles

Operational Area	Significant Developments	Specific Examples
		▪ Covey staff to training venues ▪ Buy/lease vehicles using alternative fuels (LPG etc) ▪ 11 FSC vehicles are diesel fuelled ▪ Season ticket loans (interest free) ▪ Loans interest free) to purchase bicycles ▪ Improved facilities for bike users ▪
Waste & Recycling	▪ Corporate recycling rate of 52%	▪ Recycling streams operated across the department; (includes paper, cardboard, glass, cans, toner cartridges, fluorescent tubes, batteries, plastic cups, mobile phones) ▪ DVLA Swansea building won an award for the Recycling Target Success category in 2001
Water	▪ Water consumption rate in officer-based estate is 10.5 m^3 per person	• 83% of sites operate water monitoring – used to identify and target high usage sites, and validate and query water usage
Paper	▪ Reduced paper purchased by 18% ▪ Increased percentage of paper bought to 95% (from 83%)	▪ Arranged for all new printers to be able to print double-sided ▪ Reduced reams of paper purchased per person from 16 to 14
Biodiversity	▪ Advice note issued: `Urban Biodiversity – 12 low cost measures' (Note: Fire Service College with 180ha is only significant land holding facility)	▪ Fire Service College producing a biodiversity action plan ▪ All slow renewables (e.g. peat) substituted with organic wastes (compost, leaf mould, bark etc) ▪ Native species used in planting schemes

of an Integrated Risk Management Plan (IRMP) for each fire authority that allocated resources to manage risk to the public in a modern way. The IRMP is to be implemented using an action plan with periodic monitoring and review to ensure the appropriate actions are achieved. Plans were to be implemented by April 2004 after a four-month consultation period.

The IRMP approach is geared to *prevention* rather than *intervention*. It is a holistic approach intended to make fire and rescue services more responsive to locally identified needs and better able to prevent incidents and protect the public. The IRMP concept should enable environmental management considerations to be adopted in mainstream fire service operations.

A review of plans produced to date in the UK as a result of this policy indicates that they are focussed on risk management of incidents affecting the community. The plans do not appear to cover (as yet) the environmental impacts of fire service operations. However, it is intended that in the longer term the IRMP will integrate to the plans of agencies involved with protecting the environment e.g. Environment Agency.

The plans also do not address risk to the environment from non-fire related activities (e.g. energy, water, waste, emissions) but there is no reason why the concept of integrated risk management should not be extended to this area.

3.4 Procurement

There has been a significant move overseas by public sector organisations to incorporate sustainable development considerations into procurement. The new emphasis on environmental standards represents a significant shift in public sector purchasing practice. The potential benefits are as follows:

- Long-term efficiency savings
- More efficient and effective use of natural resources
- Reducing the harmful impact of pollution and waste
- Reducing the impact of hazardous substances on human health and the environment
- Encouraging innovation
- Providing strong signals to the sustainable products market
- Practical expression of government's commitment to sustainable development

Government departments are significant players in procurement with a large goods and services purchasing budget. The procurement policies and practices of these departments therefore send a strong signal to both industry and markets and can help to serve as a benchmark for sustainable procurement expectations and performance, as well as stimulate the market in environmental technologies. Table 3.4 gives examples of products and services that can be targeted under a green procurement strategy.

Many overseas fire services (e.g. CFA Victoria and brigades throughout the UK) are in the process of adopting procurement strategies and policies that include consideration of the environmental impacts of purchasing decisions. A selection of these green procurement initiatives is given below. These include a government policy framework and targets for procurement and steps taken at the fire brigade level to incorporate environmental considerations into procurement practice.

Table 3.4 Green procurement – examples of products and services

Product or Service	Considerations	Suggested target / aims
Training courses	Location accessibility	Minimise travel involved / car pool / use public transport
Facilities	Consumption of energy and water Reduce travel between offices/meetings	• Power providers that utilise renewable energy sources • Energy efficient whiteware/heating/lighting • Insulation • Water saving devices • Investigate use of photovoltaic panels • Video-conferencing
Cleaning materials	Release of contaminants to the environment	'Environmentally-friendly' products
Printing/Stationery	Reduce quantities used Waste reduction	• Water based inks/recycled toners/recycled paper • Printers that operate double-sided printing
Furniture	Sustainability	Wood sourced from sustainable forestries
Batteries	Ability to recycle	Use of alkaline batteries rather than zinc
Vehicles	Lower emissions Fuel consumption	• Select hybrid vehicles (fleet cars) • Fit particulate traps • Routine fleet maintenance
General	Sustainability	• Buy locally sourced products – less transport • Support SMEs • Select products that are efficient in their overall use of resources, i.e. `from cradle to grave' • Select suppliers that offer a buy back recycling scheme

UK Government - Sustainable Procurement Policy

In November 2001, an interdepartmental Sustainable Procurement Group (SPG) was established to consider how Government departments can carry out the procurement of goods and services in a manner that supports the Government's policy and objectives for sustainable development. The SPG subsequently identified a number of 'Quick Wins' which could help Government Departments meet these standards [1].

The SPG's report and recommendations on environmental issues in purchasing was published in October 2003. The report states that a risk based approach is essential, both at whole of Government and at departmental level. It emphasises that risk assessment (impact, likelihood, etc.) is the key tool to decision making in incorporating sustainability criteria into any individual procurement. It concludes that within the policy and legal framework, and within the context of achieving value for money, scope and opportunities exist for relevant sustainable development considerations to be taken into account in public procurement.

A Joint Note on Environmental Issues in Purchasing was published in 2003 to provide practical guidance to buyers in government departments showing how environmental issues can be integrated into each stage of the procurement process. Each government department has to set the specification in the context of their overall objectives, and subject to the normal public expenditure tests of need, affordability and cost-effectiveness. The

[1] www.ogcbuyingsolutions.gov.uk/environmental/products/environmental_quickwins.asp

report notes that the earlier stages of procurement (identifying need and specification) rather than the award stage are seen as having most scope to consider environmental issues.

From 1 November 2003, all central Government Departments were required to apply minimum environmental standards in new contracts when purchasing certain types of product, which cover aspects such as energy efficiency, recycled content and biodegradability. The Department of Trade and Industry (DTI) incorporated a number of the 'Quick Wins' into its estates and accommodation activities, and extended these to its service providers. These included energy saving specifications for IT equipment, use of recycled paper, toner recycling, recycled toilet paper and hand towels, long life bulbs where appropriate; environmentally friendly paints, peat free soils in foliage and recycling of foliage stock.

Case Study 2 illustrates targets set under the UK Government's Sustainable Procurement Strategy.

Case Study 2 UK Government Sustainable Procurement Strategy: Targets

The principal target requires each Department to draw up and implement a Sustainable Procurement Strategy by 1 December 2005 (or review any existing strategy). This must cover:

- An environmental purchasing policy;
- Mechanisms for integrating the environmental purchasing policy, and other relevant sustainable development policy requirements into procurement activities;
- A commitment to undertake environmental risk assessments of contracting activity;
- Mechanisms to work with suppliers and develop and implement an environmental supply chain management programme;
- Systems to take account of Government-wide initiatives and guidance;
- Mechanisms for measuring and reporting on progress;
- An Action Plan for taking the Strategy forward, identifying key milestones and stakeholders, also specifying how the Department will meet the objectives of the strategy; and,
- Identification of management structure and resources (staff and budget) required.

Australian Government - Sustainable Procurement Policy

The Commonwealth Procurement Guidelines and Best Practice Guidance (see DEH 2005) dictate how Australian government departments and agencies are expected to conduct their purchasing operations. The guidance states that "officials should be aware of any relevant environmental legislation and targets set by the Commonwealth, and ensure they take into account matters affecting the environment.....when formulating requirements. They should include relevant environmental criteria in specifications and requests for tender".

The Department of the Environment and Heritage (DEH 2005) has compiled a number of success stories to encourage uptake of green purchasing by Australian government agencies. These generally include a quantification of the benefits flowing from particular environmental purchasing initiatives. In some cases these benefits can be expressed in dollar terms, while in others the benefits are measured in terms of environmental outcomes e.g. reduction in tonnes of CO_2 emitted. Also available is a set of procurement checklists that suggest which environmental criteria be considered alongside other purchasing criteria (e.g. price, quality

fitness for purpose etc) for specific items such as paper and cardboard, office consumables and waste disposal services.

Draft UK National Procurement Strategy for the Fire and Rescue Service (ODPM 2004)

The Office of the Deputy Prime Minister (ODPM) published a Draft National Procurement Strategy for the Fire and Rescue Service in September 2004. A key objective of the Fire and Rescue Service (FRS) under their sustainability objective is to ensure that procurement activity minimises any adverse impact on the environment. The Strategy states that one of the main objectives for the FRS must be to develop national and regional contracts while also ensuring that suppliers understand the key objectives of the Service and tailor their products accordingly; that Small-to-Medium Enterprises (SMEs) are able to bid for business; and that the market for environmentally friendly products is developed.

Case Study 3 illustrates targets set by the UK Government's Draft FRS Procurement Strategy.

Case Study 3 UK Government Draft Fire & Rescue Service Procurement Strategy: Targets

Targets related to environmental performance have been set to:

- Develop standard contract clauses by March 2006 to encourage suppliers to develop a pro-active approach to environmental issues;
- Develop indicators by March 2006 to measure the % of environmentally friendly products purchased and % of business undertaken with SMEs;
- Develop "how to do business" guides for SMEs wishing to work with the Fire and Rescue Service and promote this work on e-fire web site by December 2005;
- Undertake an environmental risk/impact analysis of products procured by the Fire and Rescue Service by Sept 2005;
- Provide environmental procurement training to procurement staff by April 2006 onwards;
- Develop a sustainable procurement strategy by March 2006.

Cornwall (UK) County Fire Brigade Procurement Review Report (March 2002)

The report identifies that green issues can be incorporated into a procurement strategy/policy, including whole life costs of products/services (e.g. emissions and disposal). This approach is in line with Cornwall County Council's key objectives that identify sustainability as one of its "core values". The Council advocates that procurement of capital projects must, where practicable, take account of issues such as:

- Designing tenders to encourage suppliers to adopt good environmental practices and where reasonable insist that contractors have environmental management systems.

- Design schemes to promote the use of local goods and services wherever possible in order to support the local economy and minimise transport impacts to the environment.

- Considering the possible impacts of climate change.

- Considering demands for energy and water, contribute to their efficient use (use of low energy vehicles, energy management of property), and create opportunities for using renewable energy.

- The use of energy efficient products, (for example, vehicles, heating boilers and buildings, etc).

- The use of products that create little or no pollution and products that have minimal "embodied energy" (i.e. products that require little energy to produce and transport to the point of usage).

- Products that are efficient in their overall use of resources, i.e. "from the cradle to the grave"

The Council maintains that using "whole life costs" in option appraisals can show that greater initial expense for environmentally friendly options often can be justified in the long term as greater savings are made through reduced running costs such as energy consumption. The Cornwall County Council Fire Brigade's report recognised that, in general, fire brigades have not yet begun to use procurement as a tool to help meet their obligations in relation to sustainability.

London Fire Brigade (LFB) Best Practice in Green Procurement

The LFB is one of the few fire services to have made substantial progress in greening their operations. The procurement team at LFB has successfully reshaped its approach to purchasing to achieve good environmental outcomes, as shown in Case Study 4 (Bull, 2004).

Case Study 4 London Fire Brigade Green Procurement: Best Practice

Achievements made to improve environmental performance:

- Environmental outcomes are built into all purchase contracts as they are renewed;
- Meetings are held with existing and prospective suppliers to communicate where LFB is headed with environmental care as well as other issues;
- Rather than being prescriptive in tender specifications, LFB asks suppliers to show how they will deal with environmental issues such as packaging, recycling and sustainable materials and practices (LFB has dome this recently with batteries);
- Recycling of used products by the supplier is specified, where appropriate;
- Cost savings offsets are identified for more expensive initiatives - for example, LFB negotiated the cost of waste paper collection down by 50% to offset the increased cost of using recycled office paper;
- `Whole of life' costing is considered - for example, while the cost of alkaline batteries is 33% higher, the batteries last longer;
- Basic research on product options is carried out to support business cases and negotiation with suppliers where needed;
- LFB has been working on `quick wins' (see above);
- LFB participates in joint purchasing with the Local Government Authority to realise cost savings as well as the potential to negotiate environmental savings.

3.5 Transport

Transport issues affect quality of life in many ways. As well as the social and economic benefits, travel can also have significant negative environmental and social impacts:

- Emission of greenhouse gases, in particular carbon dioxide;
- Health impacts from other exhaust emissions (e.g. hydrocarbons, nitrogen oxides, particulates);
- Local impacts such as congestion, noise and poor air quality;
- Spills of hazardous substances during accidents;
- Hazardous substances used in the maintenance of fleets;
- Waste (e.g. end of life vehicles, used oils, tyres, packaging);
- Impacts from commuting and business travel on work/life balance.

Transport-related impacts of public and private sector organisations arise from commuting, business travel, and fleet management. With large vehicle fleets and staff employment, public sector agencies have recognised that they have an important role in helping to meet government objectives for sustainable transport. Many overseas government agencies are taking steps to reduce fleet emissions by outsourcing fleet maintenance and reducing the need for staff travel by developing travel plans. For example, a key commitment in the UK (DETR 1998) was for government departments to take the lead in introducing "green transport plans" to help cut down on car use. As a result, most departments in the UK now have travel plans in place covering more than 70% of their staff, and some are now approaching 100% coverage.

Variations in the size and location of government buildings and the nature of business carried out at each site means that there is no single cross-government solution to reducing transport-related impacts. Some departments (such as fire services) will also have specialised vehicles and transportation needs. In this case, while steps may be taken to reduce impacts from the white fleet, there may be limitations on reducing transport impacts from operational appliances (i.e. red fleet).

Examples are given below on how one overseas fire service has responded to the Government's need for reducing fleet emissions in order to achieve air quality targets in a highly urbanised environment.

London Fire and Emergency Planning Authority – consideration of low emission vehicles (LFEPA 2003)

The London Assembly Environment Committee considered the implementation of a low emission zone (LEZ) in London. LFEPA made the following comments upon this proposal, which may be relevant to other fire services:

- It is not clear whether the recommendations outlined in the Study include emergency vehicles although it is assumed that such vehicles would come under the definition of `lorries'. The operational vehicles have a life expectancy of 12 -15 years before total replacement.

- The cost of retrofitting appliances is not a cheap option. Particulate traps are approximately £4,000 each (about NZ$11,400).

- Fire appliances are not used in continuous duty cycles – this results in the retrofit treatments clogging up more quickly, reducing performance and hindering the effectiveness of the trap equipment.

- The Authority will have to modify 48% of the pumping appliances (104 vehicles). The total cost could be in excess of £750,000 (about NZ$2.1m).

- The Authority's leased fleet has new vehicles and these should comply with any future emission zone scheme involving cars.

London Fire and Emergency Planning Authority – response to LEZ implementation (LFEPA 2004)

In response to the implementation of a LEZ (see above), LFEPA agreed a number of steps to reduce the environmental impacts of transport in the organisation. These included reducing emissions from the fleet, options for bio-diesel and more use of conference calls (see Case Study 5). This programme were intended to ensure that the Authority's entire fleet of appliances would comply with the proposed LEZ when it took effect in August 2006:

Case Study 5 London Fire and Emergency Planning Authority: Transport Best Practice

Steps taken by LFEPA to reduce transport impacts and comply with London's Low Emission Zone:

- The Authority will partially accelerate the replacement of 69 older pumping appliances and retrofit 40 Euro II appliances with particulate traps to comply with the proposed LEZ.

- The Authority is to take delivery of 107 new fire appliances by early 2006. These pumping appliances will comply fully with Euro III, representing 61% of the current front-line pumping fleet.

- Major participants in the LFEPA supply chain (for example, chassis manufacturers) comply with the voluntary European Eco Management and Audit Scheme.

- Provision of a fleet of 81 cars for use as pool vehicles and by temporary station commanders. Of these, 72 are dual-fuel (powered by LPG and unleaded petrol). The Authority has also procured six new hybrid Honda IMA Civics following the successful trial of a hybrid vehicle.

- To further reduce emissions from the LFEPA vehicle fleet, a bio-diesel trial has been conducted since early 2003 in appliances at E23 East Greenwich. It was found that there were no ill effects to engine output. Research is being undertaken to locate a local supplier of bio-diesel.

- The Authority transferred control of the three major vehicle and equipment workshops at Barking, Lambeth and Ruislip. The asset management company is working towards compliance with the the environmental management standard ISO 14001.

- The Authority is researching video conferencing for future regional/national fire service meetings. Initial findings show that this is cost effective with benefits that include reduction in travel time, business mileage claims and associated air pollution, along with reduced out of office time.

3.6 Property

Many overseas public sector organisations have adopted or are in the process of developing green building design guidelines together with energy and resource conservation policies (water, electricity, waste recycling) to improve environmental performance of their estates.

New buildings and major refurbishment schemes are designed to incorporate energy conservation technology and environmental design considerations with the aid of assessment tools e.g. LEED in the USA, BREEAM in the UK and Green Star in Australia. In the case of a national fire service, this would include assets such as the HQ building, regional fire stations and training and workshop facilities.

Property management provides a range of opportunities for public sector organisations to incorporate sustainable development into operational practice, including:

- Energy efficiency
- Water conservation
- Waste minimisation/recycling

This section looks at the above three topics with examples given, where available, in the context of best practice adopted by overseas fire services.

3.6.1 Energy

Energy is essential to all business, from heating and lighting to transport and communications. However, there is growing evidence that man-made greenhouse gas emissions are having a noticeable effect on the earth's climate. Following the Kyoto Protocol, many governments have recognised that there is a global responsibility to tackle climate change by cutting their greenhouse gas inventory, with the focus on carbon dioxide emissions.

Potential benefits of more sustainable energy use include the following:

- Lower energy bills and better value for money;
- Reduced carbon dioxide emissions;
- More sustainable building design, which in turn can benefit users through good ventilation, maximum use of natural light, improved air quality; and
- More efficient use of natural resources.

In terms of sustainable property management, this is about implementing energy conservation policies. Factors that affect the carbon footprint of an organisation's estate include:

- The overall energy efficiency of buildings, including appliances and air conditioning;
- Purchasing of energy from low/zero carbon sources e.g. CHP and/or renewable energy; and
- Changes to the estate or activities.

It is important to note that energy conservation is also applicable to other business functions such as transport.

London Fire and Emergency Planning Authority (LFEPA 2004)

The Authority has an energy conservation policy, which includes the following aims:

- Ensuring that best practice for energy management is applied throughout the LFEPA estate;
- Designing new buildings and major refurbishment schemes to incorporate relevant energy conservation technology and environmental design considerations;
- Promoting internal energy awareness campaigns.

A performance indicator was introduced in 2003-4, which includes a target of a 2% year-on-year decrease for three years in energy and water usage for Authority buildings. The London Fire Brigade's Richmond Fire Station is pioneering the use of solar power in the service (Case Study 6).

Case Study 6 UK's First Solar Powered Fire Station at Richmond, London

Richmond Fire Station piloted a scheme to use photovoltaic panels and become the first totally solar powered fire station in the UK.

The LFEPA won a government grant of £70,000 (about NZ$200,000) towards a scheme costing £118,000 (~NZ$336,000) to install a rooftop solar powered system in the appliance bay. It is anticipated that the solar cells will generate around 23 kilowatts of electricity per year and avoid the generation of more than 7 tonnes of CO_2 a year.

The scheme is designed to meet all the station's needs for electricity and allow some surplus power to be sold back to the national grid for a nominal sum.

London Fire and Emergency Planning Authority (LFEPA 2004a)

The following comments were made concerning energy conservation in the Authority's best value review for fire fighting, fire stations & emergency cover:

- An energy conservation project is currently being undertaken following recommendations made in the Carbon Trust report;

- There is always scope for energy efficiency on fire stations by using common sense methods of reducing the amount of heat escaping, turning off lights and reducing water consumption;

- The use of, and sustainability of, fire service stations and buildings is important in ensuring that the most effective and efficient use is made of the facilities that are provided. This applies to energy usage and impact on local community (noise / fumes etc);

- A current advice note on energy conservation in buildings, and a report prepared in 2004 by the Carbon Trust on efficient use of energy in buildings, have highlighted areas that will have a direct impact on sustainable development within the LFEPA.

It is expected that similar guidance available in New Zealand (e.g. via EECA) will be applicable to the New Zealand Fire Service.

3.6.2 Water

Water is an essential natural resource. Although renewable, there are limits to its availability, both on a regional and national basis. Safeguarding water resources is therefore an important contributor to sustainable development and reducing water consumption and wastage are priority issues for many government estates.

While fire services are given unhindered access to water for operational use, they have traditionally not been subject to water restrictions for support (non-fire fighting) services. This position is set to change, particularly in countries with arid climates (e.g. parts of Australia) where drought conditions are placing an increasing premium on scarce water resources for urban consumption. It is of noteworthy that AFAC is working with the Water Services Association of Australia to examine steps that the fire services can do to conserve water.

Examples of water saving policies and practice adopted by overseas fire services are given below.

London Fire and Emergency Planning Authority (LFEPA 2004)

The environmental return contains a number of water saving strategies that are already being employed by the Authority. These include:

- Urinal flush controls with time-out draw-off points
- 500 water-saving HIPPO and HOG bags installed at all stations (these reduce the capacity of toilet cisterns, meaning that less water is used per toilet flush)
- Liasing with the water authorities to ensure hydrants are maintained and to minimise unauthorised use of hydrants. (For example, the Authority is working in partnership with Thames Water to fit lockable hydrant caps to approximately 1000 fire hydrants in the London Borough of Newham).

In addition to the above, the London Fire Brigade has changed the type of water coolers supplied at their premises to improve their environmental performance (Case Study 7).

Case Study 7 Plumbed-in Fire Station Drinking Water Supply (London Fire Brigade)

The LFB introduced changes to the type of water coolers supplied at their premises in the summer of 2003. This involved replacement of stand-alone water coolers with plumbed-in systems at station premises. The exercise was reported to produce positive results in both environmental and financial terms:

- Reducing the cost of supplying drinking water to fire stations (about £50,000 per year)
- Removing the onus on local managers to organise water deliveries and invoicing;
- Saving of storage space;
- Removing the need for manual handling of full containers and potential risk of injury to staff;
- Reducing road transport emissions by eliminating the need for re-supply of bottled water;
- Reducing landfill waste by eliminating plastic water bottles (about 250,000 per year)

3.6.3 Waste minimisation / waste recycling

Waste management is increasingly becoming a mainstream issue with many organisations seeking to reduce their environmental impact and realise cost savings by minimising the quantity of waste going to landfill.

Best practice for waste management requires adoption of the following principles:

- Reduce waste at source (eliminate waste arisings where possible)
- Increase the quantity of waste that is re-used and recycled
- Recover value from waste, where the above options are not possible
- As a last resort, dispose of waste that cannot be re-used or recycled.

Many opportunities for waste minimisation and recycling require implementation at the procurement stage e.g. purchasing recycled or sustainable products (see Section 3.4).

London Fire and Emergency Planning Authority – recycling Initiatives in 2003

The London Fire Brigade (LFB) which is run by the London Fire and Emergency Planning Authority (LFEPA) has implemented a number of recycling initiatives both in the procurement process and at fire stations. Across all fire stations in London this could lead to a saving of about £58,000 (~NZ$165,000) per annum.

LFB has moved over to using recycled paper for their entire printing and copying needs. Paper waste from their HQ buildings (around 32 tonnes in 2003/04) is collected and recycled through a local paper mill. Recycling schemes have also been introduced at fire stations in all 32 London boroughs as well as the City of London. The relevant local authority provides approximately 80% of these schemes free of charge. The schemes vary from small initiatives (e.g. paper only) through to large schemes where stations are recycling up to 33% of fire station waste.

Examples of waste reduction and recycling initiatives taken at Lewisham Fire Station are given in Case Study 8.

Case Study 8 Waste Reduction and Recycling Initiatives at Lewisham Fire Station

- A pilot scheme for recycling printer toner and inkjet cartridges has been implemented;
- A 12-week pilot scheme has been undertaken for the recycling of all paper, plastics, cans and cardboard;
- Over a two-month period Lewisham Fire Station successfully recycled the following waste: glass (36 kg); cardboard (135 kg), paper (460 kg) and cans (51 kg);
- The amount of waste being disposed of by conventional means has been reduced by 33%. This equates to a saving of £10 (~NZ$28) per week.

The latest draft budget submission by LFEPA reported that dry-cell battery recycling commenced in January 2004. The supplier to LFB is now operating a take-back/recycling scheme for all batteries supplied (see Case Study 9).

3.7 Training and Communication

Training and good communication are essential to help staff understand the need for reducing environmental impacts in their workplace and for delivery of the greening message. This requires organisations to educate, train and motivate staff (office based, station and operational) to work in an environmentally responsible manner and to ensure they play a full part in developing new ideas and initiatives.

Case Study 9 Battery Recycling Initiative by London Fire Brigade (LFB 2005)

- LFB conducted an environmental assessment to identify products in use that cause greatest damage to the environment. Batteries were one product in this category.
- A comparison was made in terms of price and product life cycle between types of batteries traditionally used and commercially available alternatives. This resulted in LFB moving from zinc chloride to alkaline batteries, with the switch achieving a reduction in cost and waste in their total battery purchasing.
- As a result, LFB let a three-year battery supply contract In December 2003 that included a battery take back/recycling scheme as part of the contract conditions. The contract was awarded on cost, and included product life cycle and the inclusion of a recycling facility.
- By including a battery take back/recycling clause, LFB have so far successfully diverted over 200 kg of battery waste from entering the traditional landfill waste stream.
- The scheme has proved successful with staff at stations and headquarters buildings, and staff often bring in their own batteries from home to add to the recycling initiative.

Examples are given below on how greening policies and best practice are communicated in a large public sector organisation and how one fire service adopted a staff awareness and training programme to successfully deliver on energy conservation.

UK Department of Transport, Local Government and the Regions Annual Greening Report (DTLR 2001)

The UK's former Department of Transport, Local Government and the Regions (DTLR) policy statement included a commitment to `educating, training and motivating our staff to work in an environmentally responsible manner and to play a full part in developing new ideas and initiatives', and `communicating with staff about environmental policies and best practice'.

Prior to being split between the Department of Transport and the ODPM, the DTLR produced an annual report on the Department's greening activities. The annual `greening reports' were published and posted on the DTLR's Green Operations Intranet site. The practice continues under the ODPM.

The main way that staff are kept informed is through an Intranet site which contains guidance on greening operations, policies, performance and good practice. The site also covers specific topics such as waste recycling, energy conservation, travel plans and progress in meeting targets.

Other examples of good practice in raising staff awareness of greening operations include:

- Articles in the DTLR weekly staff *Bulletin* and the monthly in-house magazine *Grassroutes*
- Use of the DTLR HQ electronic news system (ENS) which provides immediate links with staff
- Representatives from the property centres attending greening forums and receiving regular information notes from the environmental management team
- A rolling poster campaign that includes environmental issues such as green travel, waste and energy
- Issue of an environmental leaflet to all staff with a return section for suggestions of ideas
- All new staff receive advice on green issues as part of their induction training.

A new initiative has display panels placed in the entrances to all three DTLT HQ buildings showing environmental performance for energy, water and paper consumption, waste and recycling, business mileage and videoconference use. This panel is updated monthly.

City of Calgary Fire Department Energy Challenge (City of Calgary 2006)

The City of Calgary Fire Department (CCFD) began a capital improvement programme in 1999 to renew and upgrade its buildings. The programme objectives were to improve the work environment for fire staff while at the same conserving energy, providing cost savings and reducing the impact of fire stations on the environment.

It was recognised that the success of the programme would depend on achieving a behavioural change in all staff and gaining active participation from all fire fighters. For this reason a staff awareness programme on energy conservation was considered essential in order to meet these objectives.

The Energy Challenge completed its first year in November 2001 and included 30 fire stations and approximately 1100 fire fighters, Chief Officers and department staff. The CCFD set a target of 7% reduction in energy consumption for all 30 fire stations.

A workshop was held for Station Administrators to explain the programme objectives, the need for energy conservation and to gain their active support in the challenge. An `Energy Kit' provided the Administrators with the means to get the process started and a list of on-going energy saving actions for staff to take in the course of their daily duties.

The programme took the form of a competition with quarterly prizes for the fire station that achieved the best percentage reduction in energy consumption. The results were posted each quarter in all fire stations so that fire fighters could see their performance in terms of rank (percentage change) and total energy savings in dollars and kilowatt hours. Motivation was provided in the form of energy saving tips.

The success of the programme was seen in the results. The highest performing fire station was able to realise energy savings of 58% in the year. Overall, the CCFD was able to achieve a 6.8% reduction in energy

consumption across the 30 fire stations. This resulted in savings of approximately 1.2 million KWh, equivalent to about 300 tonnes of CO_2 emissions.

The project showed that it was possible to achieve a level of commitment that created an energy conscious culture within a fire service.

3.8 Conclusions on Best Practice Review

The energy and water a fire service uses, the waste it produces, and the travel and work patterns it encourages amongst its staff and the products it buys have direct environmental and social impacts. They also say a great deal about the service's overall commitment to sustainable development.

As well as tackling environmental impacts, public sector organisations increasingly recognise that they have a significant opportunity to contribute to the social and economic strands of sustainable development in their role as employers. Economic issues, including financial considerations such as value for money and whole life costing, are key drivers in decision making.

The social, economic and environmental impacts resulting from running a fire service and carrying out the business are therefore significant, and comparable in many ways to a large company.

General conclusions on greening of fire service operations that have emerged from the web search and discussion with individuals from fire services are summarised below.

- **Sustainable development in fire services is an emerging topic - few services have `greened' their operations.**

  Sustainable development and environmental management (for non-firefighting activities) are relatively new concepts for fire services. The low number of `hits' from an Internet search of `greening' of fire service operations is evidence that the topic has generally not being addressed or is at an early stage of development at the fire service level. Notable exceptions were, however, identified (see below).

- **Overseas focus on `greening' of public sector organisations**

  Evidence was found that many overseas public sector organisations are greening their operations in line with central government policy on environmental and related sustainable development initiatives. This may be an alternative reason for the low response on the Internet search as fire services are generally part of a broader governmental entity (e.g. attached to a local authority), and the greening process may be driven at a higher level within the public sector.

- **Notable examples of `green' fire services**

  While the greening process is not yet mainstream, a number of overseas fire services have made significant progress in this area, including development of an environmental policy, preparation of environmental action plans and inclusion of green considerations in their procurement procedures. In particular, the London Fire and Emergency Planning Authority (LFEPA) has initiated a number of environmental strategies that address the environmental impacts of fire service activities in London. In

Australia, the Victoria CFA has developed an environmental policy and strategy. Examples of their initiatives appear in this report, and many may also be directly applicable to the NZFS.

- **Key greening topics**

  The main greening topics to consider are i) environmental management systems ii) transport (e.g. emissions reduction, travel plans) iii) procurement of green products/services iv) property management (e.g. green design, energy and water conservation, waste/recycling) and v) staff awareness training and communications of the greening concept. Many of these topics are inter-linked. Examples are presented from overseas fire services of best practice initiatives and case studies for greening non-fire related support services that can be considered in a local context by the NZFS.

- **Communication of strategies and concepts to staff is essential to raise awareness**

  An ongoing theme throughout the examples gathered from overseas is that communication of concepts and strategies to staff members is essential to motivate staff, gain their support and participation, and encourage culture change in terms of the greening concept. This process has been successfully used to prompt individuals to propose ideas or practical measures that can be fed back into the overall corporate strategy or operations.

- **Integrated Risk Management Framework - placing environmental management within context**

  A number of overseas fire services have adopted risk management principles and have organised their operations under the umbrella of an Integrated Risk Management Plan (IRMP). Under this concept, risks are categorised into main types (e.g. individual, society, property and environment), and considered in a holistic way. This means that environmental aspects become part of the overall risk management structure and are implemented, managed and monitored as part of day-to-day operations. At present, these plans do not address risk to the environment from non-fire related activities but there is no reason why the concept of integrated risk management should not be extended to this area.

4. The New Zealand Fire Service and its Operating Context

4.1 Introduction

This section briefly describes the resources and facilities which constitute the NZFS, the legislation which establishes its functions and duties, the Government policies and guidelines which affect the way that it conducts its business and the various strategies, plans and criteria which the NZFSC has adopted to guide its daily activities.

Figure 4.1 indicates the relationship between the various drivers and management instruments.

This `operational context' provides a background against which the Service's environmental management performance can be assessed. In particular, it places into perspective the `greening' aspects (discussed in Section 5) that relate to effects of the Service's non fire-fighting activities on the environment - the focus of this research project.

4.2 NZFS Resources and Facilities

The major facilities and resources of the NZFS are (NZFSC, 2004):

- 1680 career fire-fighter positions and 8,000 volunteer fire-fighter positions
- 426 management and support staff
- 436 fire stations organised into 345 gazetted fire districts; each fire district has an appointed chief fire officer as its operational head
- National Headquarters (NHQ) in Wellington and eight regional offices throughout the country to provide management and support services
- A "red" fleet of about 800 fire appliances and related vehicles, a "white" fleet of more than 300 vehicles, specialist clothing and operational response equipment for dealing with fires and other emergencies

Three communication centres are located in Auckland, Wellington and Christchurch that act as call centres for '111' calls, fire alarm monitoring and for dispatching resources to emergencies. The communication centres have a staff establishment of 77.

4.3 NZFSC Statutory Responsibilities

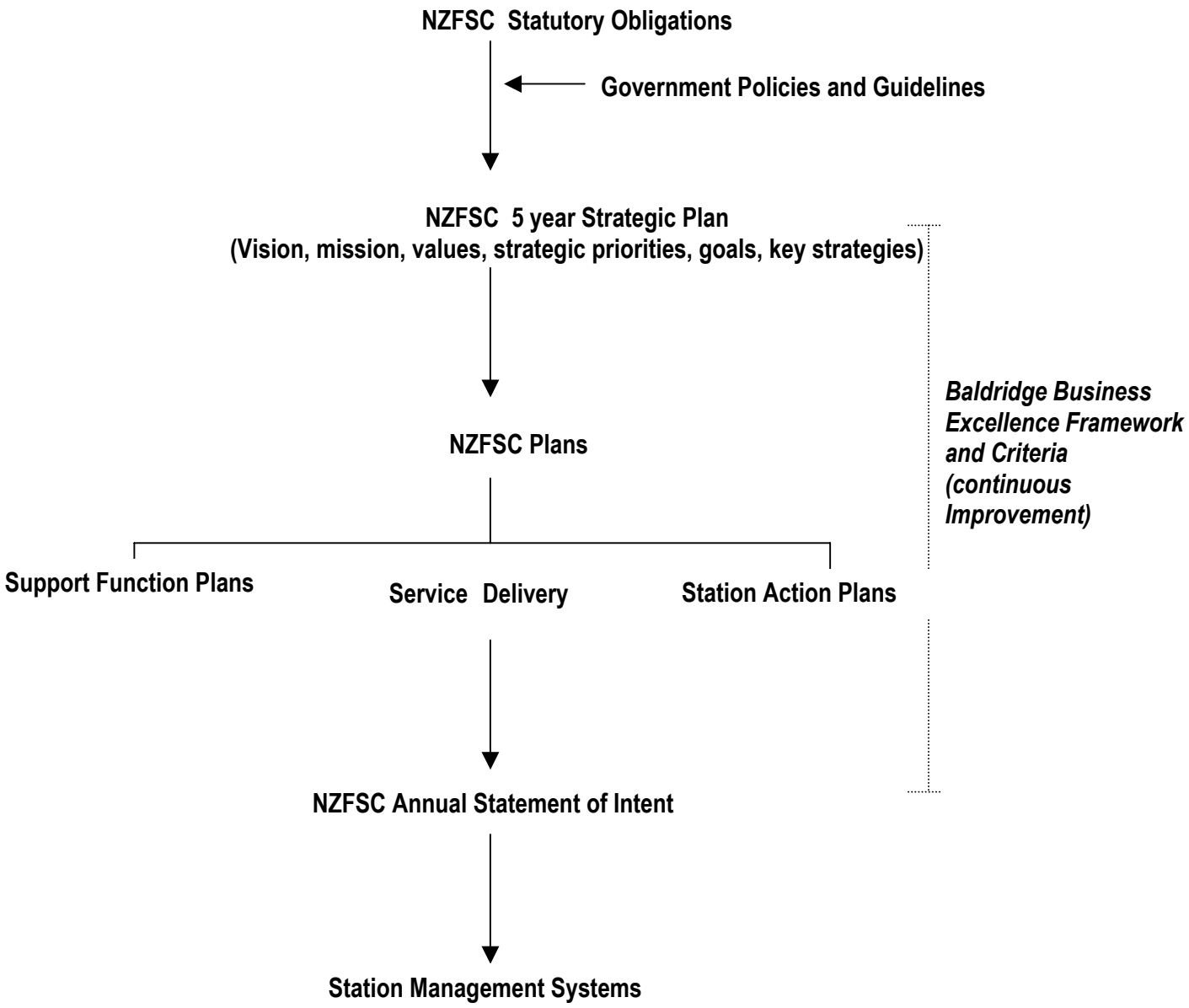
The NZFSC is the Crown's principal manager of fire risk and is responsible for operation of the New Zealand Fire Service. Under the provisions of the Fire Services Act 1975, the Building Act 2004 and the Forest and Rural Fires Act 1977, the Commission has four main statutory functions:

- Co-ordination of fire safety throughout New Zealand
- Governance of the New Zealand Fire Service[2]

[2] The New Zealand Fire Service is a "service" constituted under Section 3 of the Fire Services Act 1975.

- Exercise of the functions of the National Rural Fire Authority
- Receipt and audit of the proceeds of the Fire Service Levy

Figure 4.1 Operational context of the NZFS Commission and Fire Service



The NZFSC also has significant responsibilities under the Civil Defence and Emergency Management Act 2002.

The Commission is a Crown agent under the Crown Entities Act 2004, reporting to the Minister of Internal Affairs.

Both the Crown Entities Act 2004 and the Public Finance Act 1989 impact on the way the NZFSC manages the planning, reporting and financial aspects of the organisation.

4.4 Government Policy Context

As a Crown agent, the NZFSC (and hence the NZFS) is required to implement Government policy, or at least conduct its business in a manner which is consistent with Government policy.

The key Government policy instruments and their relevance to the NZFS's non-fire activities and support service functions are summarised in Table 4.1 and elaborated on below.

For the present purpose, environmental management statutes such as the Resource Management Act 1991 and the Local Government Act 2002 can be treated as an extension of Government policy.

Government goals to guide the public sector in achieving sustainable development

In recent times, `sustainable development' has become an over-arching Government policy goal aimed at guiding public authority activities.

The six goals articulated by the Government are:

1. Strengthen national identity and uphold the principles of the Treaty of Waitangi
2. Grow an inclusive, innovative economy for the benefit of all
3. Maintain trust in Government and provide strong social services
4. Improve New Zealander's skills
5. Reduce inequality in health, education, employment and housing
6. Protect and enhance the environment

Government's Sustainable Development Programme of Action

The Sustainable Development Programme of Action (SDPOA) has been developed to ensure that sustainable development concepts underpin all government activity, and that government decisions ensure the well-being of current and future generations. The Programme of Action establishes a set of expert operating principles for policy development that require government agencies to take account of the economic, social, environmental, and cultural consequences of their decisions.

Resource Management Act 1991 (RMA)

The purpose of the RMA is to promote the "sustainable management" of natural and physical resources. The latter include soil, water, air and energy. Activities with the potential of adversely effecting the environment generally require resource consents under regional or district resource management plans.

Table 4.1 Key Government policy instruments and their relevance to non-fire NZFS activity

Policy Instrument	Focus	Relevance
Statement of key Government goals to achieve sustainable development (SD)	Promotion of sustainable development (sets the agenda and guides the public sector)	Relevant to all functional areas – environmental management, procurement, travel management, property management, training, communication
Govt SD Programme of Action 2003	Promotion of SD, freshwater management, energy, sustainable cities, etc	Relevant to all functional areas (see above)
Govt[3]	Encourages central Government agencies to improve the sustainability of their activities	Environmental management, procurement, travel management, property management, recycling and waste minimisation, training
Resource Management Act 1991	Promotes "sustainable management" of natural and physical resources (subset of SD)	Relevant to all functional areas
Local Government Act 2002	Promotion of sustainable development (communities)	Indirectly relevant as NZFSC "works in partnership with communities" and "helps to build safe communities"
Building Act 2004	Applies principles of sustainable development to buildings, energy efficiency	Property management
Hazardous Substances & New Organisms Act 1996	Protection of environment and health/safety of people and communities; preventing & managing adverse effects of hazardous substances	Directly or indirectly relevant to environmental management, procurement, property management, and training
Government Procurement Guidelines	Guidelines to Government agencies re procurement	Procurement
Climate change programme	Energy efficiency, renewables	Procurement, transport management, and property management
NZ Transport Strategy	Sustainable transport, energy efficiency, reduced greenhouse gas emissions	Transport management, property management (location and stations)
National energy, efficiency and conservation strategy	Formation of energy efficiency and use of renewables	Procurement, transport management, property management
NZ Waste Strategy	Provides waste minimisation and improved waste management	Environmental management, procurement, transport and property management
Triple Bottom Line Reporting	Whole of Government programme to promote organisational reporting on economic, social and environmental performance	Relevant to all functional areas

Section 17 of the Act places a general duty on all persons to avoid, remedy or mitigate adverse effects on the environment.

Local Government Act 2002

The Local Government Act (S14) requires local authorities, in performing their roles, to take a "sustainable development" approach and in doing so take into account the social, economic and cultural well-being of people and communities, the need to maintain and enhance the quality of the environment, and the reasonably foreseeable needs of future generations.

Building Act 2004

The Building Act 2004 requires that future building follows the principles of sustainable development including the pursuit of energy efficiency.

Hazardous Substances and New Organisms Act 1996

The purpose of the HSNO Act is to protect the environment and the health and safety of people and communities by preventing and managing the adverse effects of hazardous substances.

Govt^3

Govt^3 is a voluntary programme aimed at helping government agencies improve the environmental sustainability of their activities, including the eco-efficiency of their buying practices. Govt^3 stands for the three pillars of sustainability: environment, social and economic.

Ninety percent of core government agencies have now committed to actively engage in the Govt^3 programme. Twenty-four of the agencies that signed up have provided detailed Sustainable Practice Action Plans. These plans illustrate the actions the agencies will take to achieve results in sustainable practice, such as energy use and waste minimisation.

Govt^3 is facilitated by the Ministry for the Environment, and focuses on key areas where sustainability improvements can be made:

- Sustainable buildings
- Recycling and waste minimisation
- Sustainable transport e.g. fuel efficient vehicles and greater use of public transport, cycling and walking
- Office consumables and equipment including publishing, paper, cleaning services and environmentally friendly products

Climate Change Programme

The Climate Change Programme sets out Government's policies for meeting New Zealand's greenhouse gas reduction target under the Kyoto Protocol. Policies and strategies are being developed to minimise the adverse effects of climate change by encouraging people to take early action to reduce the effects, and where possible, promote opportunities to develop and market new technologies and services related to climate change. Such

strategies include the National Energy and Efficiency and Conservation Strategy, however, policies continue to be developed.

New Zealand Transport Strategy

The New Zealand Transport Strategy defines the Government's vision of an affordable, integrated, safe, responsive and sustainable transport system by 2010. One of its aims is to ensure environmental sustainability – policies encourage usage of more energy efficient modes of transport and contribute to reducing greenhouse gas emissions from the transport sector.

National Energy Efficiency and Conservation Strategy

The National Energy Efficiency and Conservation Strategy is a Government strategy aimed at promoting energy efficiency, energy conservation and transition to more renewable energy use, and hence to move New Zealand towards a more sustainable energy future.

New Zealand Waste Strategy

The New Zealand Waste Strategy, released in 2002, is a comprehensive statement of Government vision, principles, objectives (national targets) and policies covering `green' purchasing, cleaner production, waste minimisation, reuse and recycling and waste disposal.

Triple Bottom Line

Triple bottom line reporting is part of a whole of government programme to find better ways of measuring and reporting on progress towards sustainability at several levels, ranging from national to local organisations. The Sustainable Business Network and the Ministry for the Environment have developed the "Enterprise 3 – Your business and the Triple Bottom Line: Economic, environmental, social performance" guide in partnership. It identifies ways that businesses can adopt better practices to make a contribution to sustainable development, while at the same time improving their overall business performance.

4.5 Strategies, Policies, Plans and Criteria adopted by NZFSC

As indicated in Figure 4.1, the NZFSC has developed a number of strategies and plans, and adopted a range of policies and criteria aimed at the cost-effective implementation of its functions. This section briefly reviews the key documents and their primary purposes.

4.5.1 The New Zealand Fire Service Commission Strategic Plan 2005-2010

This five year Strategic Plan sets out the NZFSC's vision, mission and values and identifies "challenges and opportunities". Six "strategic priorities" are set for the period 2005-2010 with "national goals" established from each priority.

The Strategy identifies the following Government goal[3] as being most relevant to its activities, viz:

[3] This is one of 6 "Key Government goals to guide the public sector in achieving sustainable development".

"Maintain trust in government by working in partnerships with communities, providing strong social services for all, building safe communities and promoting community development, keeping faith with the electorate, working constructively in Parliament and promoting a strong and effective public service".

and goes on to say that the Commission links to this goal by:

"building safe communities" and *"working in partnerships with communities"*

The stated vision is:

"Working with communities to protect what they value"

The stated NZFSC mission is:

"*Reducing the incidence and consequences of fire and to provide a professional response to other emergencies".*

4.5.2 NZFSC Plans

NZFSC has developed a number of plans, including support function plans (e.g. fleet strategy, property strategy plans) and service delivery plans (e.g. national rural fire, regional and district, and station plans) for the purpose of implementing the 5-year Strategic Plan.

4.5.3 Statement of Intent

A statement of intent (SOI) is submitted annually to the responsible Minister and sets out the Commission's plans and financial information for the year in question.

At the end of the year, an Annual Report sets out actual achievements against the SOI. The SOI and Annual Report are tabled in Parliament and are the principal accountability documents for the Commission.

4.5.4 NZFSC adoption of `Business Excellence' Model

In 2001/02 the NZFSC adopted the Baldridge Criteria for Performance Excellence (NZBEF, 2005), being an internationally recognised vehicle for organisational assessment and continuous improvement.

A self-assessment of the Commission's activities and performance against the criteria was completed in 2002/03, action plans were developed to address improvement opportunities and a second self-assessment was conducted in 2003/04. The Commission submitted an application in 2005 for a Business Excellence Award, and subsequently received a "Commendation Award", following an audit by the New Zealand Business Excellence Foundation.

The Baldridge Criteria are built on a number of interrelated core values and concepts, including visionary leadership, customer-driven excellence, organisational and personal learning, managing for innovation, social responsibility and a systems perspective. The criteria place considerable emphasis on leadership and social responsibility:

> "*An organisation's leaders should stress responsibilities to the public, ethical behaviour, and the need to practice good citizenship. Leaders should be role models for your organisation in focusing on business ethics and protection of public health, safety, and the environment includes your organisation's operations, as well as the life cycles of your products and services. Also, organisations should emphasise resource conservation and waste reduction at the source. Planning should anticipate adverse impacts from the production, distribution, transportation, use, and disposal of your products. Effective planning should prevent problems, provide for a fortnight response if problems occur, and make available information and support needed to maintain public awareness, safety, and confidence."*

Under Governance and Social Responsibility, the Baldridge Criteria state that:

> *"Key results such as environmental improvements through use of "green" technology or other means should be reported as Leadership and Social Responsibility Results"* [p 14, footnote in NZ Business Excellence Foundation (2005)].

5. Review of Greening Activity in the NZFS

5.1 Review of NZFSC Strategies, Plans, Policies, Systems and Standards

Note: refer to Section 4.5 for a description of the relevant NZFSC planning and management documents.

5.1.1 Strategic Plan

The 5-year NZFC Strategic Plan has little regard for key Government environmental policies, in particular for the overarching policy of promoting sustainable development.

Whilst the Strategic Plan makes reference to one of Government's "guideline goals for the achievement of sustainable development" (see Section 4.5) it does not refer to another key goal, viz *protect and enhance the environment.*

The Strategic Plan makes no reference to specific Government environmental management policies or strategies such as those referred to in Section 4.4.

Neither the NZFS vision nor its values statement make any reference to contributing to sustainable development.

NZFSC's current mission statement appears to be an appropriate reflection of the Commission's primary responsibilities, namely a reduction in the incidence and consequence of fire.

The "challenges and opportunities" identified in the Strategic Plan make no direct reference to environmental outcomes (other than maintenance of a safe and healthy working environment) or to making a contribution to the Government policy goal of sustainable development.

The only "challenge and opportunity" of (indirect) relevance to sustainable development is "integrating new technology to improve operational performance."

Of the six "strategic priorities" identified in the Strategic Plan, only Number 6 – "Improved service performance, accountability and resource utilisation" – has any relevance to non-fire environmental outcomes or to sustainable development.

At present, only officials from the Department of Internal Affairs and Treasury review the Strategic Plan for consistency with Government policy. The Ministry for the Environment is not involved.

5.1.2 NZFSC Plans and Statement of Intent

The NZFSC support function plans and service delivery plans, like the Strategic Plan, contain only minor references to environmental outcomes or sustainable development issues.

The NZFSC Statement of Intent, likewise, contains little reference to non fire-related environmental outcomes or impacts, sustainable development, or to environmental management initiatives.

5.1.3 Baldridge Business Excellence Framework

In respect of the Baldridge Business Excellence Framework, strategic priority No 6 in the Strategic Plan (above) is linked to the "national goal" of "achieving a business excellence score in the 500 point range" (p14) and the "key strategy" (6.2) of "Using the Business Excellence Framework throughout the organisation to improve business performance".

Although the Baldridge criteria place considerable emphasis on leadership and social responsibility, and there is an expectation that environmental improvements should be reported (see Section 4.5.4 above), the content of the NZFSC 2005 Application for a Business Excellence Award indicates that the Commission views its non fire-fighting activities as having very few adverse effects on society or the environment.

The focus of the Commission's response to Question 1.2b(1) concerning management of adverse impacts from services and operations (p6 of Application) is on the environmental impact of its emergency response activities. For example, reference is made to controls on run-off water (e.g. use of approved foams) and limiting noise impacts from fire stations (e.g. by community consultation). While there been recent adoption of green design principles (e.g. at the Rotorua national training facility), there is no recognition of strategic environmental impacts of the organisation as a whole (e.g. associated with energy usage, water conservation, waste management or resource efficiency), that are central to promoting corporate social responsibility.

5.1.4 Operational Standards

Operational Instructions within the NZFS can be categorised into the following subsets:

1. Operational Instructions:
   - Operational Management
   - National Commanders Instructions (equivalent to SOPs)
2. Fire Safety Manual
3. Endorsed National Training Standards

Service operations are subject to heath and safety policy and guidelines. In addition, there are a number of policies governing non-operational activities e.g. property, fleet; procurement, office and training.

The Operational Instructions are periodically reviewed and updated. The Instructions set Operational Standards regarding measures to control environmental impacts from emergency response activities e.g. specifying the use of a particular fire suppressant foam.

Environmental aspects in Operational Standards deal with fire-fighting and other emergency response measures, and include the impact of different fire extinguishers, pollution prevention during hazardous materials incidents and awareness of environmental protection during fire fighting. Examples include the use of fire-fighting foam (which must comply with US EPA requirements), and chemical storage (which must meet HSNO requirements).

There are no Operational Standards for office or station support services and therefore no procedures for managing environmental aspects (e.g. water and energy use, lighting, ventilation, waste, hazardous materials, noise). Apart from some cross-cutting policies and functional areas (e.g. procurement), the various "Directorates" were reported to adopt their own procedures at the local level.

Although there is uncertainty in terms of whom would be responsible for developing environmental policies associated with water, waste and energy, there was general support from staff interviewed that the organisation would benefit from including these in operational instructions to office-based staff.

5.1.5 Environmental Policy and Management System

The NZFS currently does not have an Environmental Policy or Environmental Strategy, nor is there a formal Environmental Management System (or EMS). Accordingly, no staff have been appointed with environmental management responsibilities. Likewise, no specific policies have been developed to cover aspects such as waste management, recycling, energy conservation or reducing the impact of the Service's fleet emissions on the environment.

Environmental matters that would normally form part of an environmental management system are handled by different departments according to the nature of the issue and its functional area. For example, environmental matters concerning property (e.g. green building design or energy conservation) are handled by the National Manager – Strategic Assets, or the Property Portfolio Manager. The Fleet Manager deals with issues concerning environmental aspects of transport. Station officers are responsible for aspects of environmental management at their premises.

5.1.6 External Influences

The Australasian Fire Authorities Council (AFAC) is the main co-ordinating body for the different agencies concerned with fire control in Australasia. There are at least two areas where AFAC has formed working groups that deal with environmental concerns, as described below.

Environmental Management Work Group

AFAC has formed an Environmental Management Work Group (EMWG) with the objective of promoting sustainable practice in fire agencies. This is chaired by Russell Rees (CEO of CFA).

The EMWG has identified the need to develop guidance, tools and training related to sustainable support services. At the time of contact, this Group had not yet been convened. However, it was suggested by AFAC that NZFS may wish to consider nominating a representative to EMWG to keep abreast of their work. Nomination of a representative on this Working Group would enable the NZFS to share knowledge and gain first hand experience of green initiatives being developed within fire and emergency services. It is not known whether NZFS has a representative on this Group.

Strategic Information Management Strategy Group

AFAC has a Strategic Information Management Strategy Group (SIMSG) which examines strategic issues of importance that may affect fire service operations. The NZFS representative on this Group is Peter Clemerson, Manager IT Strategy.

The SIMSG conducted a strategic review in November 2004 of external issues facing the fire services, one of which included the natural environment. Two aspects were considered. The first looked at the "Impact of the Fire Service on the Natural Environment". The theme was mainly directed at fire fighting operations (e.g. impacts from fuel reduction burning and other incident management issues. The second aspect considered the

"Impact of Changes in the Natural Environment on the Fire Services" and examined issues such as global warming. Both aspects are important in their own right but fall outside the remit of this research project.

However, fire services, in common with other large organisations, have an impact on climate change and global warming from their own carbon footprint. Tools to assess this impact are expected to be available from the EMWG referred to above.

5.2 Procurement

This section summarises the procurement function and the extent to which `green' considerations are taken into account by the NZFS. The information is derived primarily from discussion with the National Procurement Manager and reference to the NZFS Procurement Manual.

5.2.1 Background Information

The National Procurement Manager is responsible for managing procurement within the NZFS at the National level. This includes procurement of capital items and major consumable goods, and covers identifying Service needs, developing tender documents and specifications, tender evaluation, award and management. Liaison takes place with other Departments such as fleet management and asset/property management. Day-to-day procurement of consumables and minor purchases is undertaken at the station level.

NZFS operates under Government procurement guidelines. NZFS contracting arrangements include open tenders with awards for volume purchase using a national supplier contract that typically runs for 3 years.

Examples of major procurement contracts handled by NZFS are summarised in Table 5.1.

Table 5.1 Major procurement contracts handled by NZFS

Contract/Goods	Supplier
White fleet (lease)	LeasePlan
Office supplies	Boise
Uniforms	Yasil
Fuel	Government-approved supplier (Cardlink / Fleetsmart)
Batteries	Established hardware supplier

5.2.2 Green Procurement Policy

Government procurement guidelines do not specifically include green considerations although they do require consideration of `whole of life' costs. Tender weightings do not consider environmental benefits - if these benefits accrue then this is considered a bonus. The practice is to look for `win-win' gains in the short term.

The NZFS Procurement Manual (version 3 - 23rd June 2005) requires a Procurement Plan to be prepared for goods or services exceeding $25,000. Clause 14f of the Plan also has a requirement to consider environmental aspects where there are complex purchases, or where the value exceeds $50,000:

14) For purchases exceeding $25,000 the Procurement Plan must be approved by the Commercial Support section at NHQ. For complex purchases and all purchases over $50,000, a documented Procurement Plan must be prepared and approved by Commercial Support, and must address the following areas:

.....

f) Environmental Issues

i) What impact will this procurement have on the environment?

ii) Will it increase, reduce or neutrally impact the NZFS environmental footprint?

A `complex' purchase is any procurement over $50,000. Thus, any procurement over $50,000 requires completion of a Procurement Plan, and within the Plan is the discussion about environmental issues. No examples were available of Procurement Plans where environmental issues have been assessed.

5.2.3 Green Procurement Practice

Clause 14f (see above) has been in existence since the Procurement Manual was first issued in April 2004 and was introduced by the current National Procurement Manager who wrote the Manual. However, it was reported that no specific environmental aspects have been identified within these contract activities. While it has been included in Procurement Plans, Clause 14f has not been applied in practice, largely because of a lack of technical guidance to the Procurement Group on how to assess environment impacts of purchasing decisions.

For example, NZFS has approximately 300-400 leased vehicles nationally with LeasePlan. At the time of the award, LeasePlan had recently launched GreenPlan, a product aimed at improving the vehicle and fuel efficiencies of the fleet. Although GreenPlan was not a consideration in the decision to award the contract, it was viewed as a bonus.

The NZFS procurement group does not currently have any plans for developing green procurement practices other than the existing requirement to assess environmental impacts of major purchases. The National Procurement Manager expressed a need for the establishment of an "expert" resource to provide comment on each Procurement Plan.

The NZFS procurement group does not review the environmental credentials of their supply chain e.g. whether or not the supplier adheres to an environmental management system compliant with ISO14001. No green procurement targets are envisaged.

5.3 Fleet Management

This section summarises the transport function and `green' considerations that are currently adopted by the NZFS in fleet management, including the procurement of transport items (mainly vehicles and fuel).

The information is derived primarily from discussion with the Fleet Manager and covered specific topics on a green fleet management questionnaire prepared ahead of the meeting (see Appendix A).

5.3.1 Background Information

The Fleet Manager is responsible for managing the red and white fleets at the National level. This includes aspects associated with new vehicle purchase, vehicle maintenance (schedule and type of service), and disposal of redundant units. Day-to-day management of individual fleets is undertaken at the regional level.

White fleet

The national white fleet (non-operational) comprises 334 units, made up of utility vehicles (60%), hatchback/sedans (30%) and vans (10%). Utility vehicles and vans are diesel powered while all hatchback/sedans run on petrol. The petrol/diesel split by number is therefore approximately 30:70. Of the 334 units, approximately 303 (91%) are leased from the lease management provider (LeasePlan). The remaining 31 vehicles are owned by NZFS.

Red fleet

The national red fleet comprises 681 pumping engines, 23 aerial appliances (ladders but no pump) and 82 special appliances (e.g. for Command use or dealing with hazardous materials). The optimum lifetime of an appliance is between 20 and 25 years but, in practice, budgetary constraints dictate that units will typically be in service for up to 30 years. The average age of the current red fleet is 14 years (the age of appliances ranges from 6 months to 30 years).

The size of the red fleet is determined by the size of the organisation i.e. a fixed complement based on the number of stations. The NZFS has approximately 23 new appliances on order (suppliers include European Scania, Mitsubishi and Iveco). The majority (over 90%) of the white fleet is leased (see below) and hence these vehicles are not purchased.

Vehicle maintenance

NZFS has outsourced day-to-day management activities of its white fleet to LeasePlan, a fleet management company. The current 5-year contract started in 2003 and has a further 2 years to run. LeasePlan offers a range of support services including maintenance, fuel, purchasing and selling of vehicles, accident management, infringement management, vehicle replacement and insurance cover. It is understood that LeasePlan only provides the NZFS with maintenance and vehicle replacement services.

The red fleet is maintained under contract at a central workshop facility in Upper Hutt.

5.3.2 Environmental Aspects of Fleet Management

The Fleet Manager noted a number of instances where environmental aspects are considered in fleet management. These occur primarily during procurement of new vehicles (e.g. engine performance specification) and in the white fleet leasing arrangements (e.g. fuel efficiency). Details are given below.

An example cited of good environmental practice in fleet management has been the move away from exhaust braking to use of hydraulic transmission retarders. The Service has also set a specific power output rating for operational vehicles (20 HP or 15.2 KW per metric tonne) to ensure engines are not overworking, with benefits

of reduced maintenance, improved fuel efficiency and less strain on the crew. All post-1991 vehicles meet this requirement (i.e. 27% of the red fleet).

Appliances redundant to the NZFS needs are offered to the Rural Fire Service or the Industrial Fire Brigade (12 in New Zealand). If not required by these organisations they are sold by tender or go to auction.

Appliance tyres are replaced when the tread reaches 3mm depth (although the legal minimum is 1.5mm, the tread depth specified by the NZFS is twice the legal requirement for safety reasons). Old tyres are sold on to a tyre company for resale with a credit provided to NZFS.

The red fleet uses 24 volt batteries and these are replaced on appliances every 3 years. The Service currently uses Century to dispose of used batteries, which are returned to the manufacturer for refurbishment/reuse.

In terms of additional measures planned for the future, it was reported that these would include specification of Euro 4 emission standards for appliances (in place of Euro 3). Mention was also made of driver training as a possible measure for reducing white fleet fuel consumption. At present, all white fleet drivers are required for safety reasons to attend an Advanced Driver's Course. This training does not cover fuel efficiency.

5.3.3 Baseline Environmental Data and Targets for Fleet Performance

Statistics on red and white fleet travel are maintained but aggregate data for both fleets could not be readily provided for this study as the data collected is not in a suitable form. However, the white fleet was reported to consume approximately 1.4 million litres of fuel (petrol and diesel) per year. Furthermore, it is understood that a recent reduction in the red fleet's annual VKT has led to a drop in overall diesel consumption.

The annual carbon footprint (tonnes CO_2 emissions) for both the white and red fleets has not been determined.

No specific targets have been set for white fleet performance in terms of annual reduction in VKT or fuel consumption. It is understood that there are currently no plans to set such targets.

5.3.4 Green Procurement in Fleet Management

The lease contract for the white fleet (awarded in 2003) was put out to tender and evaluated by a procurement committee of the Commercial Department, which included the Fleet Manager. Environmental aspects were not taken into account in awarding this contract, although it was stated that any environmental benefits that do accrue are viewed as a bonus.

Environmental aspects are reportedly considered in major capital purchases e.g. new red fleet appliances. A Procurement Plan is developed ahead of such purchases with the Fleet Manager assisting with preparation of technical specifications. For example, the specification for appliances in the last 2 years has required engines to meet Euro 3 emission standards (Note: engines that meet Euro 4 standards are not yet available in New Zealand although these will be specified when available to the local market).

Fuel efficiency is also a consideration in vehicle purchase and selection of vehicles from the leasing company. Under LeasePlan, NZFS require fleet vehicles offered to the Service to be substituted with another vehicle if they do not meet the Green Plan fuel efficiency criterion (see below).

5.3.5 Low Emission / Alternative Fuels

It was reported that the Service is participating in trials with fuel additives that are aimed at reducing NOx and hydrocarbon emissions, as well as exploring the use of low sulphur fuels (for SOx reduction).

Currently there are no plans to use biofuels (e.g. biodiesel or ethanol that generate less harmful emissions than fossil fuel-derived fuels), that may become commercially available in New Zealand in the short to medium term.

The Fleet Manager has in the past considered hybrid, LPG and other alternative fuel options but at the time these were not considered viable.

5.3.6 Vehicle Emissions Control

Since 2003, the Service has outsourced the majority (over 90%) of its white fleet. As leased vehicles are typically less than 2-3 years old, this will have reduced the average age of the white fleet and thereby increased the proportion of vehicles with modern emission control technology, resulting in a cleaner, more fuel efficient fleet.

In terms of the red fleet, the Service has a large number of older appliances that are not fuel-efficient. Most in-service appliances are pre-1990 and therefore have no emission controls. However, the Fleet Manager stated that it is not cost-effective to retrofit these appliances with emission control technology e.g. low NOX engines or particulate traps, and such measures may also adversely affect fuel efficiency. Engine upgrades that could generate fuel savings are not considered viable. For example, the cost of retrofitting a common rail diesel fuel injection system to an appliance (about $12,000) could not be recovered in the vehicle lifetime.

The size of the red fleet is reportedly determined by the size of the organisation i.e. a fixed complement based on the number of stations. It is understood from the Fleet Manager that there is scope to rationalise the red fleet (up to 25% reduction in number of units nationwide) without compromising the ability to provide an effective service. Reducing the total number of operational units would be an alternative means to retrofitting for reducing the effective age of the red fleet, and therefore reduce harmful emissions/improve fuel efficiency for the average vehicle.

5.3.7 Travel Plans

It is understood that Travel Plans for the white fleet are not yet under consideration. Users of white fleet vehicles are required to travel to their destinations by the shortest possible route. The number of vehicles that is provided for full private use by staff is reported to be low, although no limit is set on the mileage.

5.3.8 Use of `Green' Transport Service Providers

LeasePlan offers a `Green Plan' aimed at organisations wishing to take greater responsibility for the effects of their vehicle fleet on the environment. Under Green Plan, members have the support of LeasePlan's fleet management expertise to improve vehicle and fuel efficiencies through vehicle and fuel selection, regular servicing and maintenance, driver education and travel planning. Green Plan also help organisations offset the effects of their vehicle emissions by planting native trees. Green Plan costs are calculated as a monthly fee of $1 per vehicle (excluding GST).

It was reported that NSFS has signed up to Green Plan but currently does not derive any benefits as no services have been taken up under the Plan. In practice, as a large customer of Lease Plan, NZFS is not charged any fees for being a member of Green Plan.

GreenFleet [4] is a sustainable transport programme run by the Sustainable Business Network. It is a programme developed to enable New Zealand businesses take steps towards reducing the impacts of their vehicle fleet on the environment and community. It offers members practical advice on transport efficiency measures (e.g. fuel-efficient driving, vehicle maintenance and business travel planning) and alternative/cleaner fuels and vehicles. Corporate membership (>50 employees) costs $2,000 per annum. NZFS is not a member of GreenFleet.

5.4 Property Management

This section summarises the property management function and the extent to which `green' considerations are taken into account by the NZFS. The information is derived primarily from discussion with the National Manager Strategic Assets and the Property Portfolio Manager. Reference is also made to extracts from internal documents provided by these individuals describing examples of green design practice adopted by the Service.

5.4.1 Background Information

The main NZFS assets comprise property, plant & equipment, and the fleet (red and white). Asset management is the overall responsibility of the National Manager Strategic Assets (based in NHQ) with subordinate Managers responsible for Plant & Equipment, Fleet (see Section 5.3) and Property.

The property portfolio comprises:

- Fire stations (436, distributed across 348 urban fire districts)
- Regional Training Centres (3, Mt Wellington, Auckland; Kilbernie, Wellington and Christchurch)
- Regional Offices (8)
- National Headquarters (NHQ – in Wellington)

A new National Training Facility has recently opened in Rotorua.

The NHQ building is leased. Approximately half of the regional offices are leased and about 95% of the stations are owned. The Fire Service owns about 90% of its property portfolio. Regions manage their buildings on a day-to-day basis.

5.4.2 Energy Management

The NZFS does not have a specific policy or procedures for energy savings, although other policies (e.g. False Alarms Reduction Policy) will assist in reducing fuel consumption and therefore energy use.

The Service's carbon footprint (annual CO_2 emissions) has not been determined as the required data to estimate this is not readily available. For example, it was reported that there is no ready means for estimating power (kWh) consumption across the Service's 432 fire stations. The largest carbon dioxide source is electricity

[4] See www.greenfleet.org.nz

consumption by stations – few have reticulated gas supply. The Training Centres are the largest consumers of gas (LPG). Fuel bills that are submitted by the Regions are paid by NHQ without scrutiny to consumption.

It was reported that the Property Group intends to set up procedures to enable monitoring of energy consumption on a national basis. They have held discussions with EECA in connection with energy saving measures to reduce overall electricity costs.

5.4.3 Waste Management

The NZFS does not have a waste management policy or associated procedures.

Limited waste recycling is practised by NHQ where the main waste paper stream is taken by a contractor for shredding off-site. It is not known whether this is subsequently recycled. It was noted that the lack of an office manager in the current organisational structure makes it difficult to implement waste management procedures.

Outside NGQ, waste management is reported to be the responsibility of the Regional Manager who has authority over a number of fire stations and Chief Fire Officers. No evidence of waste recycling was evident at the fire station or training centres that were audited (Section 5.6).

5.4.4 Green Building Design

The NZFS does not have a policy on green building design. However, the Property Group is aware of green building design concepts and benchmarks (e.g. Australian Green Star standard), and actively seeks to include these principles in both refurbishments and new buildings. The architect's brief will typically include the requirement to consider `green' features within the available budget. The Group is following current developments for a NZ Green Star equivalent and intends to adopt procedures once they become available.

In terms of refurbishments, green design principles have recently been incorporated into two fire station upgrades (Mt Roskill and Mount Tauranga). Particular considerations in the refurbishment programme were lighting and insulation for greater energy efficiency.

A recent application of green design principles to new buildings is the Avalon Fire Station. One of the key design considerations for the architect was environmental sustainability. The building complies with principles set out in the MfE's Urban Design Protocol. The station's energy efficiency features include passive solar heating, concrete block walls to re-radiate heat, thermally insulated underfloor heating and double glazing. EECA reviewed the design from an energy efficiency perspective as a free service. The design also incorporates the use of recycled materials e.g. wool insulation in timber framed structures. Design features have also been taken to minimise the effect of noise and other nuisance on adjoining neighbours.

Environmental considerations were taken into account in the recently completed multi-purpose National Training Centre in Rotorua. The $10 million facility incorporates a 4-bay appliance and has provision for live fire training with underground tunnel system. The building includes green design features such as passive ventilation and cooling. Strict environmental controls are contained in the resource consent conditions given the Centre's location in a business park. These include a thermal oxidiser (afterburner) to reduce air emissions, the storage and recycling of a proportion of water used for fire fighting and the capture and discharge of contaminated firewater (e.g. from foam training) as trade effluent.

5.4.5 Other Environmental Issues

Asbestos in buildings is a recognised hazard and is managed by the Property Group using licensed contractors. It was reported that asbestos is not a common issue but could arise, for example, during refurbishment of older buildings. The Group is aware of which buildings in the portfolio are likely to contain asbestos and takes appropriate precautions.

In terms of land contamination, the main issue concerns underground fuel storage tanks, although there were reported to be few fuel storage tanks on Service property as many of the tanks have been removed. Very little oil is supplied to FS premises. Most historical tanks had been removed and few stations continued to use heating oil. Procedures are in place to prevent the risk of diesel spillage from mini-tankers (440 litre capacity) that are used to top up appliances.

Cultural heritage matters (e.g. alterations to historic buildings at City Station in Wellington) may occasionally arise and are dealt with as part of the resource consent process. Biodiversity is not considered to be a management issue as the estate is mainly comprised of buildings and hardstanding. The soft estate is essentially land comprising fire station and training centre property.

5.5 Training

5.5.1 Background Information

This section summarises the training function and the extent to which environmental aspects are included in training resources. The information is derived primarily from discussion with the National Manager PDU.

The Professional Development Unit (PDU) is responsible for development of all NZFS fire training programmes. The PDU is a Government Training Establishment and is audited by the New Zealand Qualifications Authority (NZQA).

The NZFS has a number of training policies, one of which was prepared as part of the application for Business Excellence. The National Manager (PDU) is the NZFS representative on the AFAC Education and Training Sub-Group which meets twice a year. Representatives are nominated from each fire agency.

5.5.2 Training Facilities

The NZFS national training centre is in Rotorua. The Service operates three main regional training centres located in Auckland, Wellington and Christchurch. All other districts conduct training at stations (e.g. Hamilton, Palmerston North, Porirua).

NZFS also uses the South Australian CFA custom-built Brisbane facility for Officer training and incident management. The facility has a hot fire training pad. All water used during training is recovered in holding tanks and subsequently filtered and recycled as the facility lies adjacent to sensitive mangrove habitat. No such facility exists in New Zealand. At the time it was considered more cost effective to fly NZFS staff to Brisbane than to develop such a facility in-country.

5.5.3 Training Courses

NZFS training is organised under two broad tiers. At the National level, training programmes are developed by the PDU for the range of career service ranks e.g. Recruit, Qualified Fire Fighter, Station Officer, as well as for Executive staff. At the Regional level, training programmes are developed for the Volunteer Fire Fighters and paid specialists.

Education and training needs for the varying ranks is accomplished by role-mapping, which takes account of technological and organisational changes introduced into the Service. Formal education is supplemented by informal station or work-based mentoring.

All new recruits undergo induction training. Volunteers receive training at the station (e.g. PPE, action awareness) and this is supplemented by 7 days training over 2-day blocks at the local Training Centre. Career (fully paid) staff carry out full time training over a 13-week period by PDU staff.

Topics covered in induction include core equipment skills, hoses/ladders and breathing apparatus. Controls for minimising environmental risk include salvage and recovery e.g. blocking off stormwater drains to potentially hazardous discharges. Refresher courses are the same for career staff and volunteers, and include BA (once a year), first aid (every 2 years) and emergency response driver training (every 5 years).

5.5.4 Environmental Training

There are no specific courses dealing with environmental issues. However, some parts of training courses may include environmental aspects such as the officer training course, which includes a module on 'Hazardous Substances and Incidents'. The environmental impacts of using foam are also covered.

Environmental issues covered during training are generally restricted to operations such as pollution control and hazardous chemical spills. No officers are trained as environmental specialists to advise on pollution control. Experts are brought in as needed e.g. from the Regional Council. The NZFS has an in-house specialist on HSNO (based in Auckland).

Training is focussed on the needs of Fire Fighters and Officers. There is no environmental awareness training for non-operational personnel e.g. office staff. Interviewees felt there was merit in providing such training for all employees, possibly as a stand-alone module within existing in-service training. The module could be included in the induction course for all non-operational staff (i.e. Regional HQ, administration, accounts, NHQ) and within Recruit Training for all operational staff. The module could be developed by the PDU and provided by Regional Training Centres.

5.6 Audit Findings – Operational Facilities

A number of fire stations and training centres within the Wellington Region were visited to determine the extent to which environmental issues were managed during day-to-day operations. The visits comprised an interview with the Station Officer and a brief walk through inspection of the premises.

The audit considered five main elements:

1. Environmental management

2. Procurement practice
3. Transport aspects
4. Property management (including waste, energy, water, emissions and effluents)
5. Training (used to promote good environmental practices).

The audit was not directed at compliance aspects. The purpose was to obtain an understanding of typical environmental issues at operational facilities and how these are currently managed. It also allowed feedback from operational staff on what they understand on the `greening' concept and how it may be developed and better integrated with mainstream operational activities.

5.6.1 Wellington Station

Environmental Management

Station staff confirmed that there is no specific system or documentation covering environmental management. Within fire service policies, references are made to the environment and to the Hazardous Substances and New Organisms Act 1996 (HSNO), particularly in reference to the onsite storage on chemicals. (In emergency situations however, the Fire Service Act supersedes HSNO). Employees are also made aware of containment issues at incidents.

The operational management of incidents is outlined in the *"National Commanders Instructions"* with local procedures being given in the "*ARAPAWA Recommended Best Practice Manual."* The method for following appropriate procedures is detailed via flow diagrams. Section 17 deals with Environmental Aspects in relation to incident response.

In terms of fire service activities outside of incidents, no environmental performance targets have been set and subsequently no monitoring is carried out on environmental performance.

It was acknowledged that staff are generally unaware of good environmental practice in the office and observed station procedures bear this out. Thus electrical appliances (e.g. lights, computers and monitors) are frequently left on during and between shifts while windows may be left open to ventilate a heated room. There is no recycling of paper as all waste is skipped. The station does however have low flush toilets.

It was noted that, in keeping with the organisation's command and control system, unless environmental instructions are laid out in operational procedures they would not be followed. Conversely, if they were included then procedures would be rigorously followed.

Procurement

Procurement of goods follows standing instructions with station consumables being obtained from preferred suppliers. There is a central store for promotional material that is located at Trentham Station. It was not known whether environmental considerations are taken into account in purchasing decisions e.g. recycled paper. The station's white fleet is leased through NHQ.

Transport

The Wellington Station has a fleet of four diesel utes, two petrol cars (used by the Chief Fire Officer and Department Chief Fire Officer), a van and a fire safety vehicle. The three fire fighting appliances were formerly

serviced locally by the fire department (in workshops on the Kilbirnie Training Centre premises). However, all maintenance is now contracted externally in Upper Hutt, which was noted as being not very practical when only minor fixes are required.

As is common practice at other stations, the appliances are fitted with an exhaust filter to remove engine fumes from the station interior during an incident response. The extractor is mounted on the unit in the bay and automatically releases when the vehicle exits the building.

In terms of employees commuting to work, some space for personal vehicles is provided during shift work when parking allows. There is no green transport scheme in place although some informal car-pooling was recognised as occurring from time to time. Storage, showers and lockers are available for staff wishing to use bicycles although this mode of transport is not generally popular. One interviewee noted that in Canada, fire service employees in the city have free public transport to discourage staff taking cars to work.

Property Management

In terms of waste management, all waste/rubbish is placed in a skip and taken weekly to the landfill. No formal recycling is undertaken although toner cartridges are re-cycled as a cheaper price is offered on this basis by the toner supply company. Although station operations rely heavily on an electronic based system a large quantity of printed paper was seen at the facility. The station does have contract cleaners, however, most firemen clean up after themselves.

All refuelling takes place off the premises hence there are no underground diesel tanks onsite. Some fuel is stored on-site, though its use is unknown. The station has a hazardous goods store in which fire extinguishers are stored, as are cleaning fluids and degreasers. Waste material from any spills is taken away by contractors. The station has a contractor to fill dry power extinguishers. Fire fighting suits are sent to Auckland for laundering if they have been exposed to chemicals from incidents.

No energy performance targets have been set and, apart from a low flush toilet, there are no energy saving devices. Extractor fans in the bathroom once had timers but do not any more.

No renewable (recycled) water is used and no rainwater is collected for pump testing. No limit is put on the fire service in terms of water use. All grey water is discharged into the local stormwater system.

While the station is surrounded by residential property, no noise complaints had been reported.

Training

Green awareness issues are not highlighted during training, the exception being when environmental issues are raised as part of operational requirements, for example use of certain classes of foam. During burning exercises, clean wood pallets are now used to reduce smoke in conformance with legal requirements.

Staff interviewed expressed a keen interest in learning more and taking part in any initiatives for greening station operations.

5.6.2 Karori Station

The station is a typical small single-bay appliance facility. Similar environmental issues were identified to those found at Wellington Fire Station (see above). In general, it was noted there was little in the way of environmental initiatives. Drinking water is delivered to the station due to the poor quality of tap water. Noise is kept to a minimum, as the station is located in a built-up area.

5.6.3 Kilbirnie Training Centres

Kilbirnie is the Regional Training Centre for the Arapawa region and one of three regional facilities in the country. The interview conducted with Kilbirnie staff was largely focused on their training programme.

Interviewees indicated that there are no environmental aspects to training with environmental considerations not being a factor. It was acknowledged there are aspects of the officer training programming for the fire service (not volunteers) that deal with pollution control relating to hazardous substance incidents. Experts are bought in to advise on the environment such as Tony Haggety in Auckland (who was previously associated with the ERMA authority)

The Kilbirnie Training Centre uses RFTBEs (`Riftbees') – Realistic Fire Training Buildings as required by national policy. This includes provision of controlled heat and humidity with smoke, either real or simulated, for BA and other training. The closed circuit controlled environment uses a gas-fired hot air system to ensure constant temperature and relative humidity. It is frequently in use by volunteers. Kilbirnie also has a Fire Tower which is now only used for flood and building access training (fires are no longer permitted in this built-up area – this now takes place at Trentham which has the necessary resource consent).

No foam training takes place at this facility. Such training only takes place at special sites e.g. PDU have a pad at Wellington airport.

All fleet maintenance used to take place at Kilbirnie until the workshops were closed about 3 years ago – all maintenance is now done under contract in Upper Hutt. Flammable liquids are therefore no longer stored at the workshop.

Interviewees stated that the Kilbirnie site has little environmental impact in terms of training activities. The site inspection generally confirmed this point. However, one environmental issue at the facility is the large quantity of water used during Fire Tower exercises. The water comes directly off the mains hydrant and is not metered. None of the water is recycled – it is all discharged to the drainage system.

Trentham training facility

This facility is situated at the rear of the fire station in Trentham, Upper Hutt.

Realistic fire training buildings (RIFTBs) are no longer in use at the Kilbirnie site, having being relocated to the Trentham training facility. This comprises a concrete fire tower for specialised training (e.g. wearing Breathing Apparatus in heat and dark) and refresher training. Clean pallets are burned under controlled conditions during training exercises and were observed to produce very little smoke emissions (as required by national policy).

Immediately adjacent to the Upper Hutt site is an air monitoring station used by the regional council to monitor emissions.

Good drainage for run off during burning exercises was noted, however, water is not collected.

Interviewees believed that there is scope to fit environmental awareness training into courses both for career fire fighters and volunteers in the National Rural Fire Authority. A good place to start at implementing awareness training would be at the training college, however, if senior fire fighters were well trained, the recruits and juniors follow by example.

5.7 Conclusions on NZFS Greening Status

The findings above indicate that although there is a degree of awareness amongst senior NZFSC and Fire Service staff about the potential for adverse environmental effects to arise as a result of non fire-fighting activities, the Commission has taken only limited steps to address such issues.

The focus to date has been on avoiding, remedying or mitigating the adverse effects of fire-fighting activities on the environment. This is understandable because the effects of water runoff and associated fire suppressant chemicals on receiving environments are readily apparent and sometimes dramatic. However, as indicated by the international literature review (Section 3), there is a growing awareness in overseas fire services that some non fire-fighting activities (e.g. procurement, fleet management, property management) do have cumulative adverse environmental effects and some are taking steps to minimise such effects.

The Commission has previously conducted research into the environmental impacts of fire fighting but no similar work has to date looked at non-fire fighting activities. The NZFS is at an early stage in understanding the environmental impact of its support services as is evident in the way in which environmental issues are managed within the organisation.

There are several consequences of not having an Environmental Policy Statement (and associated strategies) and an EMS. First, there is a lack of environmental leadership. Second, no staff have been appointed with environmental management responsibilities. Third, the actual or potential environmental effects of fire service activities are not comprehensively addressed; no specific policies have been developed to cover issues such as waste management, recycling, energy conservation or reducing the impact of fleet emissions on the environment. Fourth, Fire Service policies and procedures do not adequately reflect the Government's environmental management objectives, including the over-arching policy objective of sustainable development. Fifth, there is no process for achieving continuous improvement in environmental performance[5].

The preparation of an Environmental Policy would present an opportunity to better align Fire Service activities with key Government environmental policies and guidelines (see Section 3.4). Environmental considerations would then "cascade" down through the hierarchy of management documents (Figure 3.1) with adjustments being made, as appropriate, to current statements of vision, values, challenges and opportunities, strategic priorities, national goals and key strategies.

Having regard to the broad trust of Government's environmental management goals and policies, and the NZFSC's aim of contributing to Government's goals, there is arguably a case for NZFSC to consider adjusting

[5] The essence of an EMS is that it is a formal process for putting in place objectives, management procedures, performance indicators, monitoring and reporting procedures, with feedback for management action.

its current vision statement to read "Working with communities to protect what they value *and to help promote sustainable development"* (words in italics added).

Similarly there is a case for NZFSC establishing a seventh "strategic priority" – *Contribute to achieving the goal of sustainable development* - together with appropriately framed national goals and key strategies.

There is an argument for the Ministry for the Environment being involved in review of the NZFSC's Strategic Plan, in addition to the Department of Internal Affairs and Treasury (see finding in Section 5.1).

The NZFSC's Statement of Intent 2005/2006 arguably needs to be adjusted to include reference to non-fire related outputs (see p5, 15, 18), environmental outcomes (see p4, 3rd paragraph), to non-fire related environmental impacts (bottom of p12, p13, bottom p14, p41) and to the goal of sustainable development.

In respect of the five key functional areas reviewed in this research project (viz environmental management, procurement, fleet management, property management, and training), the findings of this review indicate that the NZFSC has some distance to go in the development of policies and management systems aimed at avoiding or minimising the adverse effects of non-fire fighting activities on the environment.

The findings of the audit of selected operational facilities (fire stations and training facilities) reflect the lack of national policies, operational standards and guidance in the areas referred to above. A common point expressed by station staff was that fire stations are generally wasteful of resources, reflecting the fact that public services are traditionally not operated along the same commercial lines as businesses in the private sector. Water usage in training facilities is a case in point - there is no limit on consumption (the Service is exempt from charges where water main connections are taken off before the meter). Apart from limited paper recycling by NHQ, waste recycling and energy savings measures are not practised.

There is scope for significant cost savings by adoption of energy and resource conservation measures nationwide across the 436 stations and 8 regional office facilities. It was noted that a cultural change would be required at station operations to implement such initiatives e.g. energy conservation.

The preparation of an Environmental Policy and EMS, and the types of adjustments to NZFSC strategies and plans suggested above (with consequential adjustments to station plans and procedures) would be consistent with the philosophy behind, and criteria associated with, the Baldridge Criteria for business excellence.

6. Integrating Green Practice into NZFS Support Activities

This section summarises the main environmental risks and their significance arising from activities of the Service support units. This is followed by a discussion of the current status of adoption of `green' principles and improvement opportunities that the NZFS could adopt in meeting best practice.

Consistent with the approach adopted in Sections 3 and 5, the discussion is centred on the main Service `functional areas' that influence environmental outcomes i.e. procurement, transport, property (green building design, energy, waste, water) and training. Environmental management aspects, including performance indicators, are considered in Section 7.

6.1 Environmental Impacts of Non-Fire Support Services

Table 6.1 provides a summary of the main environmental impacts of the Service's support activities. Impacts are grouped under broad topics e.g. energy and waste. The table gives examples of the type of activity where impacts occur and which parts of the Service are most affected. The effectiveness of any current mitigation measures are assessed, as is the potential for improvement opportunities and cost savings. The table is, of necessity, a simplification but provides a broad overview of the current status of greening activity in the Service.

The support centres (NHQ, regional offices/training facilities and fire stations) are mainly office orientated, and the impacts of their operation are typically in respect of utility use, waste, paper, procurement, and transport. Thus the significant environmental impacts of the Service's support facilities are the cumulative effects of the organisation's individual activities that:

- Generate waste (that is not reused or recycled)
- Use resources (e.g. water, materials, fuel)
- Result in poor air quality (e.g. vehicle emissions); and
- Contribute to greenhouse gas emissions (GHG) and global warming (fossil fuel consumption)

Lack of environmental awareness may also be considered a significant cause of poor environmental performance, for example, where environmental policies have been developed but may not be effectively implemented (e.g. through lack of knowledge or training).

While local environmental impacts from Service activities may potentially arise in some circumstances (e.g. release of smoke emissions from fire training exercises; discharge of vehicle washings to stormwater at fire stations; community noise from stations/vehicle sirens), adequate control measures are generally in place (under resource consent requirements) to limit environmental impacts and community nuisance in such circumstances.

Table 6.1 Main environmental impacts of non-operational Fire Service activities including mitigation and potential for improvement

Green Topic	Environmental Impact / Benefit	Main Activities	Responsible Groups	Current Mitigation or Control Measures	Potential for Improvement	Potential for Cost Saving
Resource use						
- Water consumption	Pressure on water storage/resources	Training Centres – fire drills with hydrants	NHQ Ops and TC	None – uncontrolled use	High – water conservation policy	No – not charged
- Water consumption	Pressure on water storage/resources	All facilities (mains supply)	NHQ, RO, FS, TC	None – uncontrolled use	High – water conservation policy	Yes - if on metered tariff
- Energy (electricity)	GHG/climate change	All facilities – stations are largest consumer	NHQ, RO, FS, TC	None – but high impact	Mod to High – energy policy; renewable energy	Yes
- Energy (gas)	GHG/climate change	Training Centres	TC	None – but small impact	Unknown	Limited
- Paper	Resource consumption	All offices, NHQ, stations	NHQ, RO, St	None	High – set target allocation per person	Yes
Waste generation	Pressure on landfill capacity; resource consumption; potential land contamination	All offices and fire stations - paper, plastic, garbage disposed to landfill	NHQ, RO, FS, TC	Some paper/toner recycling by NHQ otherwise virtually none – all station waste landfilled	High – by waste policy and recycling initiatives	Yes
Vehicle emissions						
- air pollutants/GHG	Air quality and human health; GHG/climate change	Daily usage red fleet	Ops/ Fleet and FS	Difficult due to age of fleet and operational demands	Low – operational needs; modernise in long term	No – but see false alarms
- air pollutants/GHG	Air quality and human health; GHG/climate change	Daily usage white fleet	Ops/Fleet, RO, TC and FS	Vehicle maintenance (Leaseplan); no control on km travelled	Mod to High – set km or fuel targets; use Travel Plans and driver training	Yes – fuel savings
- air pollutants/GHG	Air quality and human health; GHG/climate change	False alarm call outs	NHQ Ops	Committee looking at reducing incidence	Low to mod – ongoing education of enterprise management	No – unless raise call out levy
Green building design	Energy savings, resource efficiency; improved workplace	New building and property refurbishments	NHQ – Finance Commercial	Incorporating best practice for green design	Low – consider NZGBC building standard	Yes
Green procurement	Resource efficiency; avoiding harmful materials	NHQ purchasing contracts	NHQ – Finance Commercial	Limited – environmental assessment policy not used	Mod to High – target supply chain	Yes
Training	Staff environmental awareness, participation and buy in	PDU and training centres	Ops & training, PDU	Focus on pollution control - no `greening' aspects	Mod to High – target office/support staff	Yes – staff adopting policies
Environmental management	Framework for implementing policies, targets, & staff roles	All facilities – offices, training and stations	Not defined	No envt policy or EMS; ad hoc by department	High – implement envt policy and action plans	Yes – by meeting targets

NHQ – National Headquarters; Ops – Department of Operations & Training; RO – Regional Offices; FS – Fire Stations; TC – Training Centres

6.2 Significance of Environmental Impacts

In most cases it is not possible to quantify the magnitude of impacts in Table 6.1 as baseline data on environmental statistics are not available, or could not easily be generated. For example, the annual carbon footprint (tonnes CO_2 emissions) for both the white and red fleets has not been determined as aggregate data for both fleets is not collected in a suitable form. Likewise, lack of aggregated electricity/gas consumption data across the Service precludes estimation of the carbon footprint from this source. In terms of number of facilities, the 436 fire stations would account for the majority of Service-wide electricity consumption.

The significance of the impacts may only be assessed following collection of baseline environmental data (see Section 7.4). However, two aspects where some data are available (white fleet fuel consumption and incidence of false alarms), allow an estimate of comparative magnitude of impacts to be determined, as discussed below.

White fleet fuel consumption

Data provided by the Fleet Manager indicates that the Service's national white fleet (approximately 334 vehicles) was reported to consume approximately 1.4 million litres of fuel (petrol and diesel) per year. With an estimated average fuel consumption of 10 litres per 100 km and an estimated CO2 emissions factor of approximately 150 gC as CO2/vehicle-km, the annual 14 million vehicle-km (average 42,000 veh-km per vehicle) result in approximately 2,100 tonnes of carbon dioxide emissions per year. Assuming a 10% reduction in annual veh-km is possible, the savings would amount to 140,000 litres of fuel (approximately $238,000 at retail pump prices) or 210 tonnes of carbon dioxide.

False Alarms

False alarms are an issue facing fire services worldwide. They represent an inefficient use of emergency services where there is little or no risk to life or property and major effort is underway to reduce their incidence. The NZFS has a False Alarms Reduction policy and a Committee to address this issue, and performance in reducing the incidence is monitored annually. It is noted that the Fire Service levies a charge of $1000 plus GST for attending avoidable false alarms.

Apart from the costs to the Fire Service and community, the statistics show that false alarms result in significant environmental impact for the Service. From an environmental perspective, the abortive call-outs to an incident cause unnecessary vehicle travel resulting in adverse effect on air quality in the urban environment (from vehicle emissions). They also result in wastage of fuel and increase in carbon dioxide emissions.

Information from the SMS Incidents Database (NZFS, 2003/4) indicates that in 2003/04, the Service responded to 21,833 false alarms (including good intent calls) in the urban environment out of a total of 52,003 calls i.e. approximately 38% of all calls are false alarms.

A rough estimate of the magnitude of the environmental impact of false alarms can be made on the basis of some broad assumptions (Fire Service statistics were requested but were not available). It is assumed that each false alarm results, on average, in a round trip of 20km in the urban environment and 1.5 appliances per call.

Assuming an average fuel consumption of 60 litres per 100 km per appliance (at an assumed average speed of 40 km/hr), the 21,833 false alarms amount to 655,000 vehicle-km or approximately 394,000 litres of fuel

wastage per year. Assuming a CO_2 emissions factor of 900gC as CO_2/veh-km at this average speed, the annual false alarms result in approximately 590 tonnes of unnecessary carbon dioxide emissions per year. If a 10% reduction in false alarms is possible, the savings would amount to 39,400 litres of fuel (approximately $67,000 at retail pump prices) or 59 tonnes of carbon dioxide.

This illustration is order of magnitude and ignores fuel consumption and emissions from other support vehicles that may be called out. (The true cost of false alarms would need to consider other factors including the operational costs to the Service, external environmental costs (impacts on noise, air quality and climate change), and effects of business disruption to the economy). However, the illustration shows that a 10% reduction in annual white fleet travel would secure between 3 and 4 times the benefit (fuel saved or tonnes carbon dioxide reduced) compared with a 10% reduction in false alarms.

The following sections discuss measures that can be taken by the NZFS to mitigate the risk of the environmental impacts in each of the main areas identified in Table 6.1. In each case, the summary assessment on the current NZFS status and aspects identified from the literature survey is followed by suggestions for improvement opportunities. Monitoring of impacts using performance indicators is considered in Section 7.6 while general guidance on greening resources is provided in Section 7.7.

6.3 Green Procurement

The NZFS has made a significant step in including the requirement to assess environmental impacts of major purchases (i.e. those exceeding $50,000), however the policy has not been implemented because of lack of technical guidance. The Procurement Group does not review the environmental credentials of their supply chain and has no plans for green procurement targets. For all practical purposes, therefore, the NZFS is not implementing any green procurement measures.

The literature survey identified a number of practical measures taken by overseas governments to develop sustainable procurement strategies in public sector organisations. These include adoption of national measures by the Fire and Rescue Services (Section 3, Case Study 3). Examples of green procurement best practice from overseas fire services (e.g. London Fire Brigade – see Section 3, Case Study 4) offer practical initiatives that can be taken in the procurement function that provide good environmental outcomes and cost savings.

Improvement opportunities

For the reasons noted above, overseas best practice on green procurement offers significant improvement opportunities and should be given serious consideration by the NZFS. Other aspects that could be considered are as follows:

- NZFSC commit to implement a sustainable (green) procurement policy to help minimise the effects their activities have on the environment. Environmental considerations should include the effects on the environment the product and/or service has over its whole lifecycle, from production to disposal.

- A Sustainable Procurement Risk Register is prepared that focuses on what is bought, why it is bought, and how the product or service procured may affect the environment in terms of its production or use.

- New contracts should preferably include minimum environmental standards when purchasing certain types of product, which cover aspects such as energy efficiency and recycled content.

A considerable body of advice is available in New Zealand on green procurement practice in the public sector as demonstrated by the papers and workshops provided at the Sustainable Procurement Conference in Wellington, organised by the Ministry for the Environment in July 2006. Further guidance is given on the Ministry's Govt[3] website.

6.4 Transport

Transport is one of the main sources of greenhouse gas emissions and also has more localised negative impacts such as congestion, noise and poor air quality. With 334 fleet cars and 786 appliances, the NZFS has an important role to play in achieving the Government's policy for sustainable transport and climate change.

Like all organisations, the NZFS vehicle fleet (red and white) will inevitable contribute to global warming through emissions of carbon dioxide. Fleet operations will also affect air quality through emissions of other gaseous pollutants (e.g. carbon monoxide, nitrogen dioxide, hydrocarbons). The challenge is to minimise the environmental impact of fleet operations without affecting the ability of the Service to operate effectively.

The vehicle emissions footprint of the NZFS fleet is determined by the total number of vehicle-kilometres travelled (VKT) per year and the vehicle emissions factor for each pollutant. More modern appliances have tighter emission control standards and lower emission factors, hence are both more fuel-efficient and less polluting. For the red fleet, emergency considerations will override `greening' considerations at the incident response level.

The fleet management aspect of Fire Service operations is well researched and supported internally. Many of the best practice measures identified by the international literature review have already been considered or are being initiated by the NZFS (or have not been taken up on cost considerations).

The Fleet Manager noted a number of instances where environmental aspects are considered in fleet management. These occur primarily during procurement of new vehicles (e.g. engine performance specification) and in the white fleet leasing arrangements (e.g. fuel efficiency). Consideration has been given to the use of hybrid and other alternative fuels in the past as well as retrofitting the red fleet but these were been rejected on cost considerations.

While the NZFS has adopted a number of measures to improve the environmental performance of the fleet, there is scope for further greening measures that will translate into both cost savings (e.g. from fuel reduction) and environmental benefits. The main aspects are listed below:

- There is a lack of aggregated statistical data on fleet environmental performance e.g. VKT and fuel consumption. Information collected is not in a readily available form to determine macro impacts e.g. annual carbon footprint (tonnes CO_2 emissions) for both the white and red fleets. No targets have been set for fleet performance in terms of annual reduction in VKT or fuel consumption. The lack of data prevents an assessment of the baseline condition and setting of realistic targets for improvement.

- Green procurement measures include specifying red fleet engine emission standards but the NZFS procurement policy requirement for assessment of environment benefits does not appear to be put into practice e.g. lease contract for white fleet. Environmental benefits that do accrue are viewed as a bonus.

- The Service does not have a formal vehicle emissions reduction programme for the white or red fleets (within the constraint of meeting operational needs) and none is planned. Information on the emissions inventory of the fleets is not collated. However, steps taken in fleet procurement/management over the last few years are expected to have contributed to reducing the emissions footprint.

- Outsourcing of the white fleet has provided environmental benefits from routine preventative maintenance, adoption of recent models with improved emissions controls and greater focus on fuel efficiency. This step is likely to have significantly reduced emissions per vehicle compared with the pre-lease situation. (Whether or not this has resulted in an overall reduction in annual white fleet emissions depends on the total kilometres travelled by the fleet).

- Scope for upgrading emission controls for the existing red fleet is limited, as potential retrofit measures are not considered to be cost-effective. The fleet is expected to becoming `cleaner' and more fuel-efficient (i.e. less vehicle emissions per VKT) as a result of gradual upgrading with modern appliances. This benefit will only accrue over the longer term given the long service life (25+ years) and current low rate of turnover.

- Scope to rationalise the red fleet (up to 25% reduction nationwide) without compromising the Service offers a means to reduce the environmental impact of the fleet. While this, in itself, will not affect the overall red fleet VKT (as this is determined by operational needs), it will hasten removal of the older, more polluting appliances from the fleet and generate cost savings per VKT from greater fuel efficiency.

- Ongoing measures are being taken by the Service to reduce the frequency of false alarms (spurious call outs). As these account for a comparatively large fraction of incidents, a significant reduction in the annual red fleet VKT (with less emissions and greater fuel savings) would accompany a small percentage improvement.

- Although signed up to Green Plan, no aspects of the Plan have been taken up by the NZFS despite not paying Plan fees as a large customer.

Improvement opportunities

The following improvement opportunities are made in respect of reducing the environmental impact of NZFS activities and promoting greening measures for fleet management and transport:

- Review the feasibility of rationalising the red fleet so as to accelerate the removal of older more polluting and less fuel-efficient units.

- Review the cost/benefits of Green Plan services with a view to further reducing the environmental impact of white fleet operations. This could, for example, target reducing the average age of the fleet, improved fuel selection, adoption of travel plans and `fuel saver' driver training for fleet users.

- Re-evaluate the cost/benefits of fuel saving measures in light of recent (and anticipated) large increases in fuel costs.

- Quantify the environmental benefits of a realistic reduction in operational false alarms on red fleet travel and associated emissions and fuel consumption to determine a more realistic commercial levy for such incidents.

Other measures that are worth considering in the wider transport arena are:

- The merits of Travel Behaviour Change (TBC) packages being developed by GreenFleet that are appropriate to the business sector and which would be more aligned to NZFS needs.
- Introduction of driver training to promote fuel efficiency
- The benefits of introducing Travel Plans for support staff

Examples of targets that could be considered for staff/business travel are as follows:

- Reduce white fleet carbon dioxide emissions by at least 10% against a baseline year of 2006-07, to be achieved through any combination of:

  - reducing total business vehicle mileage;
  - improving the average fuel efficiency of vehicles;
  - reducing total fuel consumed.

- Require at least 10% of all fleet cars to be alternatively fuelled by 2010
- Move towards reducing single occupancy car commuting by 5%
- Considering travel plans for headquarters and other support staff

6.5 Green Building Design

The NZFS does not have a policy on green building design. However, their Commercial/Property Group is aware of green building design concepts and benchmarks (e.g. Australian Green Star standard), and actively seeks to include these principles in both refurbishments and new buildings.

The architect's brief will typically include the requirement to consider `green' features within the available budget. The Group is following current developments for a NZ Green Star equivalent and intends to adopt procedures once they become available.

Improvement opportunities

The Commercial Group reported that they are already incorporating best practice in respect of green building design in the day-to-day management of the property portfolio. However, two opportunities that could be considered are to join the NZ Green Building Council (NZGBC) and, if appropriate, put forward the new Rotorua Training Centre as a candidate for an award under the NZGBC building assessment standard.

6.6 Energy Management

The NZFS does not have a specific policy or procedures for energy savings. The Service's carbon footprint (annual CO_2 emissions) has not been determined and the required data to estimate this is not readily available.

It was reported that the Property Group intends to set up procedures to enable monitoring of energy consumption on a national basis. The Group has held discussions with EECA in connection with energy saving measures to reduce overall electricity costs.

Energy conservation is a key element in the sustainable practice of overseas fire services. The City of Calgary Fire Department Energy Challenge (Section 3.7) provides an excellent example of how a medium sized fire service (30 stations) was able to achieve an overall 6.8% reduction in energy consumption for the year with savings of 1.2 million KWh (300 tonnes of carbon dioxide emissions).

The CFA reported that their HQ in 2003 consumed about 1,480 MWh of electricity at a cost of more than A$134,000. This equated to around 2,000 tonnes of carbon dioxide, equivalent to about 10 tonnes of CO_2 per employee (CFA, 2003). Energy use at the HQ building was mainly accounted for by air conditioning (56%) and lighting (26%), with the balance (18%) from communications equipment (including computers and photocopiers). These figures were reported to demonstrate substantial opportunities for reduced energy use.

Improvement opportunities

The following recommendations are made in respect of energy management within the NZFS:

- Develop and implement an energy management policy
- Ensure that best practice for energy management is applied throughout the NZFS estate
- Review new government policy for energy conservation in buildings and take steps to meet guidelines
- Promote energy awareness campaigns in office and fire stations

A major achievement under a greening programme would be to determine the carbon footprint of buildings in the Service (NHQ, regional offices, fire stations and training centres). The carbon footprint is measured as electricity consumed + fossil fuels consumed (both in carbon equivalent in tonnes), with any allowance made for renewable energy sources. The metric is defined in tonnes of carbon per year and the target should be set in line with emerging Government policy on energy efficiency of buildings and commitments to reduce greenhouse gases. A short term target should be to achieve a year-on-year reduction of 2% in carbon emissions.

Guidance on energy audits, carbon footprinting and energy conservation practice is available from EECA.

6.7 Waste Management

The NZFS does not have a waste management policy or associated procedures. Limited waste recycling is practised by NHQ where the main waste paper stream is taken by a contractor for shredding off-site. It is not known whether this is subsequently recycled. Outside NHQ, waste management is reported to be the responsibility of the Regional Manager who has authority over a number of fire stations and Chief Fire Officers. No evidence of waste recycling was evident at the fire station or training centres that were audited.

For all practical purposes, therefore, the NZFS is not implementing any significant waste recycling measures with the resultant environmental burden falling directly on the landfill. No statistics are available on waste arisings.

The literature survey identified several waste minimisation and recycling initiatives successfully implemented by fire services with consequent cost savings (see Section 3, Case Studies 8 and 9). CFA noted in its environmental Strategy that the organisation generates significant amounts of office was which could be avoided. A survey by one of their regional offices found that 60% of their waste was recyclable paper, 24% was recyclable glass and plastics and 4% was not recyclable (CFA, 2003). As a result the office introduced a waste minimisation strategy.

Improvement opportunities

The following improvement opportunities are made in respect of waste management:

- Develop and implement a waste minimisation policy
- Ensure that best practice for waste management is applied throughout the NZFS estate
- Conduct a survey of waste arisings by quantity and type from selected offices and stations
- Collect annual statistics on waste arisings and volumes (number of skip loads) sent to landfill
- Set appropriate targets for waste reduction and recycling
- Arrange for fire stations to join local Council led multi-material recycling and green compost schemes.

Suggested targets are as follows:

- Reduce waste volumes from offices and stations by at least 1% per year, relative to 2006/7 levels
- Achieve a waste recycling target of 5% per year for offices and stations, relative to 2006/7 levels

(Note that the recycling % is calculated as the % of total waste in tonnes that is reused, recycled, or composted divided by the total waste arisings).

6.8 Water Management

The Fire Service routinely ensures that adequate water is available for fire-fighting purposes by discussion with the fire protection industry, water industry representatives and territorial authorities. However, outside the operational arena, the Service does not have a water management policy and no conservation measures are practiced. Large quantities of water are consumed at training centres and, apart from the National Training Centre in Rotorua, these facilities do not recycle water. There was little evidence of water saving devices in office or station buildings. No statistics on office or station water consumption are available.

In the UK, the 182ha Fire Service College (FSC) in Gloucestershire (an Executive Agency of the government's OPDM estate) uses significant amounts of water reflecting its function as a residential fire service training facility. Water consumption at the FSC (97,539 m^3 in 2001-02) is more than half of the total ODPM office estate and reflects usage from some 650 residential training staff and delegates per day. Separate metering of office and accommodation blocks, and catering, is being considered in order to identify where savings could be achieved. Some water reduction measures have already been undertaken and refurbishment schemes offer additional scope. Measures include flow restrictors, flush control systems and waterless urinals.

Improvement opportunities

The following improvement opportunities are identified for water management in the Fire Service:

- Consider developing a water conservation programme (this could be similar to the Watermark project in the UK for public sector governmental organisations)
- Set up a data collection system for recording water use across the Service to assist the development of benchmarking and management information on water consumption.
- Reduce water consumption in office buildings (where billed for water service charges); a possible target could be to achieve an average of 8.0m^3 per person per year (based on overseas practice)
- Introduce water conservation measures in training facilities where no controls are currently in place (e.g. Kilbirnie training centre fire hydrants)
- Review practices for non-operational hydrant use to minimise water wastage (e.g. when testing street hydrants against performance standards)

6.9 Training

Environmental issues covered during training are generally restricted to operations such as pollution control and hazardous chemical spills. There are no specific courses dealing with green/environmental issues. However, some parts of training courses may include environmental aspects such as 'Hazardous Substances and Incidents'. Training is focussed on the needs of Fire Fighters and Officers. There is no environmental awareness training for non-operational personnel e.g. office staff.

Service staff interviewed during the project expressed the view that a greater emphasis could be given to the social and environmental aspects of the NZFS Vision: `working with communities to protect what they value'. Also it was noted on several occasions that there is a general culture of waste (e.g. lights left on, no energy efficiency initiatives and no waste recycling). Much of the historical lack of attention to greening initiatives was put down to attitude and a cultural change would be needed. For example it would be crucial to obtain a crew's buy-in to turn lights/heaters off as it was not a personal cost. Likewise, waste recycling was stated to be a difficult area to introduce as its success depending on motivating staff as much as providing infrastructure. Nevertheless, the nature of the NZFS as a command and control organisation would ensure that any environmental requirements that are built into standing procedures would be followed. The challenge will be how to deliver these within the existing programme.

Station staff generally expressed a keen interest in learning more and taking part in any initiatives for greening station operations. They supported the view that there was merit in providing such training for all employees, possibly as a stand-alone module within existing in-service training. The module could be included in the induction course for all non-operational staff (i.e. Regional HQ, administration, accounts, NHQ) and within Recruit Training for all operational staff. The module could be developed by the PDU and provided by Regional Training Centres.

Improvement opportunities

The following improvement opportunities are made in respect of environmental awareness/training on greening activities:

- Introduce a basic green awareness training module at stations and for office staff (either stand-alone or part of existing in-service training) under a trial scheme and evaluate for its effectiveness.
- Develop training resources (guidance and procedures) for specific environmental aspects e.g. green procurement, energy efficiency, water conservation)
- Encourage promotion of greening initiatives (e.g. energy saving or waste recycling at station level) to foster adoption of good practice, report on achievements and reward progress.
- Encourage staff to practice good housekeeping (e.g. switch off equipment when not required; recycle waste paper etc). Publish good practice guidance and `lessons learnt' through articles in the internal newsletter, Intranet and other in-house media.
- Work with external organisations (e.g. AFAC, Govt[3]) to promote and share environmental/greening best practice.

7. Framework for Environmental Management in the NZFS

This section discusses the elements of a framework for environmental management and provides recommendations on how it could be taken forward within the NZFS. Adoption of the principles and elements of the environmental management system (EMS) will assist the Service secure improved environmental outcomes and provide a mechanism for monitoring the environmental performance of its activities.

The framework is intended as a guide on what could be considered rather than a blueprint for what should be adopted by the NZFS. In developing its own approach, reference should be made to the international best practice review for examples of what has been successfully adopted by overseas fire services. The focus in on greening support rather than operational (fire and emergency response) activities. It should be noted that an EMS developed within the Service would need to address all environmental aspects of its functional activities to be fully effective.

7.1 Elements of an Environmental Management System

An environmental management system (EMS) provides a way of systematically identifying, recording, controlling and monitoring environmental issues. It can help to improve existing management systems and efficiency, reduce costs and ensure compliance with environmental regulations and internal procedures. The main steps in developing an EMS are shown in Figure 7.1.

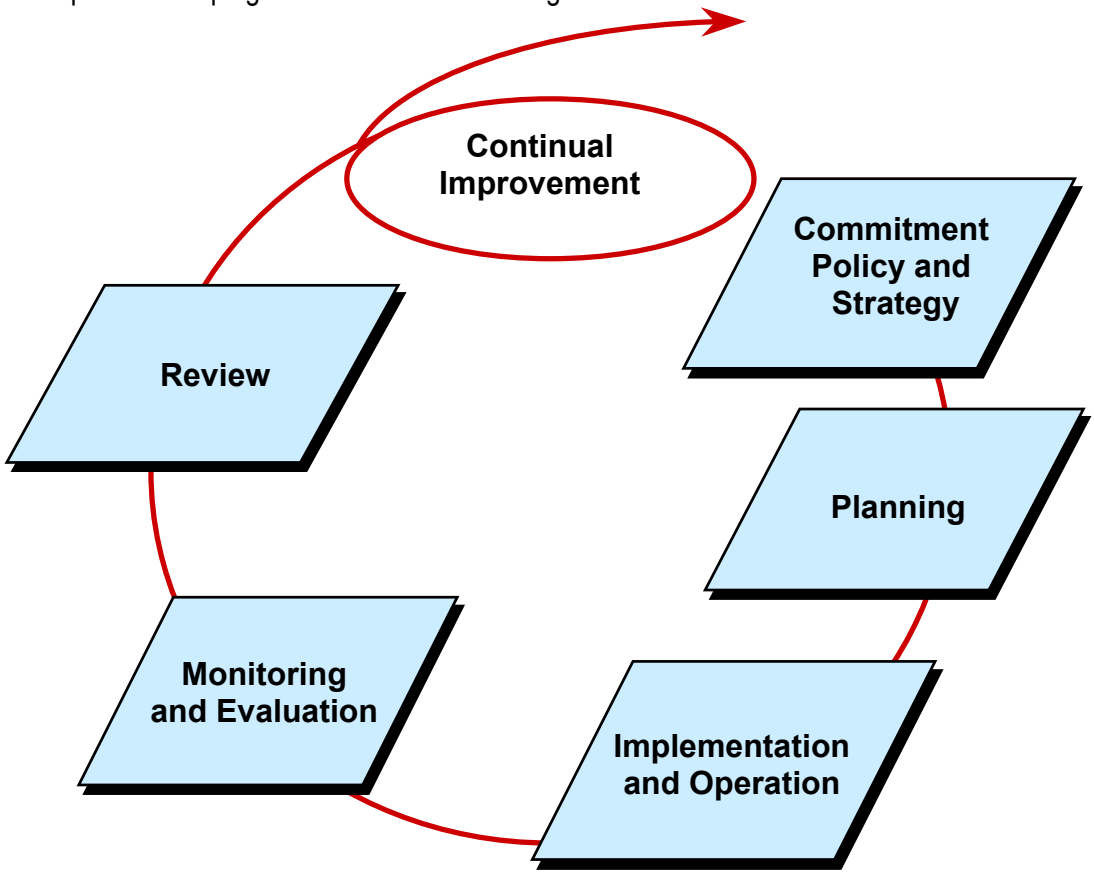


Figure 7.1 Principal building blocks of an Environmental Management System

An EMS follows a Plan-Do-Check-Review cycle. The diagram shows the process of first developing an environmental policy, planning the EMS, and then implementing it. The process also includes monitoring and reviewing the system through a process of continual improvement.

Several independent, accredited EMS standards have been set up such as ISO 14001:2004. Certification of the EMS under ISO 14001 is undertaken by an independent and accredited certification organisation and requires a further audit for certification purposes (and then ongoing audits). Many organisations choose not to have their EMS certified to ISO 14001, but maintain a compliant EMS in either case. This is an approach that the Fire Service may wish to adopt if a decision is taken to introduce an EMS.

Under the ISO 14001 standard, the five principal building blocks have 17 required elements. Guidance on these is given in Appendix A. Selected elements are discussed below within the specific context of NZFS non-fire operations.

7.2 Environmental Strategy and Policy

The Environmental Strategy is a high level document prepared by an organisation that sets out their approach to managing environmental issues across all aspects of the business. It typically covers the following:

- Environmental risks faced by the organisation
- A policy for management of environmental issues
- Environmental action plans for achieving the policy.

The environmental policy statement is a summary of the organisation's aspirations for environmental stewardship and sits at the centre of the environmental strategy. An environmental policy will typically include a commitment to develop an environmental strategy (to implement the policy) and an EMS to manage the process.

A number of overseas fire services have developed environmental strategies and policies that are adapted to their own circumstances. The environmental strategies of two organisations (CFA Victoria and the London Fire and Emergency Planning Authority) are described in the international best practice review (Section 3.3). Environmental policies of these organisations are described in Table 7.1.

Table 7.1 Example Environmental Policy Statements from Overseas Fire Services

CFA, Victoria (CFA, 2003) - CFA's Environmental Strategy includes the following policy statement:

- *"CFA is committed to protection of life, property and the environment through the delivery of cost-effective fire and emergency services for the people of Victoria. CFA aims to deliver its services in a safe, efficient and effective manner while protecting the environment wherever possible for current and future generations."*

The policy statement is supported by a number of guiding principles covering environmental, social, economic and management aspects. A specific principle in terms of greening support services is:

"Energy and resource use are minimised through reduction, reuse and recycling".

London Fire and Emergency Planning Authority (LFEPA, 2004)

LFEPA's stated principal aim is to "make London a safer city by minimising the risk and social and economic costs of fire and other hazards". In support of this aim, the Authority "is committed to reducing its environmental impact on London and to work towards sustainable development in its operations". This policy statement is supported by commitments to identify and reduce impacts on the environment that include in the context of this report:

- *"prevention of pollution and the key area of sustainable development including reducing our use of energy in buildings, emissions from our vehicles and machinery and the waste produced by our activities".*

Development of an environmental policy and strategy is a critical stage in the EMS process and requires full commitment from senior management. Formulation of the policy and the strategy (that implements the policy) requires the involvement of persons in the organisation who are motivated and have an interest in environmental aspects. It is also essential that development of the strategy is undertaken in a way that links into existing processes, tools and reporting procedures so that it is seen as an integral part of the business.

This stage is normally undertaken in a series of workshop sessions by a Working Group which takes a strategic view of the organisation's operations and the main environmental effects. The output is a draft policy and strategy that comprises a set of Environmental Action Plans to deliver improved environmental performance in the medium term (say 3-5 years). Each plan has a set of environmental objectives with targets to meet and a list of actions/tasks to achieve. The plan sets out the timeframe and responsible party for completing the actions, with progress monitored periodically.

The draft policy and strategy are circulated for comment from stakeholders before being revised and put forward for approval by the Board. The adopted strategy is then rolled out internally and published.

There are a number of important drivers and benefits for organisations that develop an environmental strategy:

- Keeping abreast of changing legislation
- Meeting government policy on sustainable development (e.g. energy, waste, transport)
- Helping to improve the quality of the environment
- Meeting community expectations
- Raising their profile in terms of corporate social responsibility and good governance

For these reasons it is recommended that the Commission should consider implementing an environmental policy and strategy within the NZFS under the framework of an environmental management system. The most comprehensive document identified from this research project that deals with this topic in the context of a fire service is the CFA Environment Strategy (CFA, 2003). It is recommended that the NZFS uses this as a key guidance document in shaping their own environmental policy and strategy.

7.3 Environmental Objectives and Targets

Objectives (goals) are specific statements of environmental performance that the organisation intends to meet within a specified timeframe. Targets are generally expressed in terms of measurable indicators and are used to track performance in meeting objectives.

Objectives may be directed at the policy level (e.g. development of a waste policy; meeting government guidelines on sustainable development) or may be specific and targeted to operational activities. Case Study 1 (First Progress Report) provides an example of specific environmental objectives (e.g. waste and resource use) adopted by a fire service in their Environment Action Plan covering Infrastructure and Support.

Table 7.2 lists some examples of environmental policy objectives/goals that the NZFS may consider in terms of greening the business support functions.

Table 7.2 Example environmental policy objectives for greening NZFS support functions

Area	Environmental Objective / Goal
Environmental management	Develop an environmental strategy and policy to reduce the environmental impact of Service operations and move towards sustainable practice; set up an Environmental Management System as a framework for implementing the strategy.
Travel/transport	Develop an emission reduction programme to reduce the carbon footprint of the white fleet; implement a Travel Plan policy to reduce the environmental impacts of business travel and employees' commuting journeys.
Water conservation	Implement a water conservation policy for reducing water consumption, with a focus on training centres and hydrant testing.
Waste management	Implement a waste minimisation policy for stations and offices to reduce waste generation and encourage recycling.
Energy reduction	Implement an energy policy to reduce the organisation's overall carbon footprint; focus on reducing fleet emissions (see above), improving energy efficiency of plant and equipment, and use of renewable energy in the medium term.
Procurement	Incorporate sustainable development considerations into procurement strategies, for example by purchasing recycled paper from sustainable sources.
Estates management	Increase current uptake of green building design standards in new building and refurbishment projects to promote resource conservation and energy efficiency.
Training	Raise environmental awareness of office and station staff on greening and sustainability aspects of the business to assist deliver waste/energy/water policies.

Environmental objectives need to have targets that represent incremental improvements in environmental performance that the organisation is able to achieve. Targets are generally expressed in terms of a required improvement in the *status quo* (environmental baseline in a given year) and should generally be quantifiable. They are used track performance in meeting goals and to demonstrate continuous improvement.

Case Study 1 (Section 3.3) provides an example of specific environmental targets covering waste generation, and paper, water and energy use for a fire service. The targets are expressed in terms of a % reduction in use by a future deadline, and should generally include reference to a baseline year.

A similar process in the planning stage may be followed by the NZFS although in this instance the procedure will need to be informed by a comprehensive baseline assessment of current environmental performance (see Section 7.4 on Baseline Environmental Data).

7.4 Baseline Environmental Data

A key requirement to assess the significance of impacts and to assist in setting realistic targets for improvement is an up-to-date set of baseline environmental data for activities that have an impact on the environment.

The NZFS currently does not collect any basic information on non-fire related environmental impacts (e.g. water, waste, energy consumption). Efforts to secure basic environmental data by the NHQ Information Analyst from the existing database (e.g. relating to national fuel consumption or fleet mileage) were frustrated by the data either not being collected at the office or station level or not being in form suitable to allow aggregation.

However, the NZFS has a sophisticated mechanism for collection and integration of daily operational information from fire stations through the Station Management System (SMS), I/CAD (for emergency operations) and related support software (e.g. SMART and FWS). Within NHQ, the Engineering, Information, Research & Strategic Analysis Department is able to process this information for use by the Senior Management Team to align priorities, support decision making and report on Service performance measures.

Collection, dissemination and reporting of `green' data from office, training centre and station activities would be relatively straightforward to implement using the hardware and data management systems that already exist but which are currently almost entirely operations focussed.

Table 7.3 provides an example of information that could be collected routinely to establish an environmental baseline for NZFS support services (non-fire or incident related). The table includes inputs for energy, transport, paper, water and waste. The list is not comprehensive but serves to illustrate the type of data needed to establish a `green' baseline.

7.5 Environmental Action Plans

An Environmental Action Plan (EAP) is a set of documented actions prepared by an organisation to implement their environmental objectives or goals over a given timeframe (e.g. 5 years). The actions are task-orientated and set with due dates for review/completion and responsibility assigned to a particular individual/department.

Examples of EAPs prepared by overseas fire services are discussed in the literature review. Three of the six EAPs contained in CFA's Environmental Strategy deal with aspects relevant to greening operations (CFA, 2003):

- Infrastructure & Support
- Managing Improvement
- People & Partnerships

Table 7.4 provides an example Environmental Action Plan with suggested targets that the NZFS may consider in terms of greening the business support functions.

Table 7.3 Example information required to establish an environmental baseline for NZFS support services (non-fire or incident related)

PROPERTY / ASSET	SITES	STAFF		ENERGY						TRANSPORT (a)		
		Full time	Volunteer	Electricity		Gas	Oil	Total	Total CO_2	Vehicles owned	Vehicles leased	Car park spaces
	No	No	No	kWh	% green	kWh	kWh	kWh	kg			
NHQ	1											
Region A (e.g. Arapawa)												
Training Centre	2											
No 1 etc												
Station	7											
No 1 etc												
Workshop	1											
Region B etc												
TOTAL												

PROPERTY / ASSET	BUSINESS TRAVEL (a)			PAPER			WATER CONSUMPTION		WASTE			
	Owned vehicles	Leased vehicles	Total	Reams bought	Reams per person	Fraction Recycled	Water Used	Usage per person	Total waste arisings	Total recycled	Fraction recycled	Recycling initiatives
	km	km	km	No	No	%	m3	m3	Tonnes	Tonnes	%	Type (b)
NHQ	1											
Region A (e.g. Arapawa)												
Training Centre	2											
No 1 etc												
Station	7											
No 1 etc												
Workshop	1											
Region B etc												
TOTAL												

Notes: a) white fleet only b) Recycling initiatives: B Batteries; C Cardboard; D Drink cans; F Fluorescent tubes; G Glass; O Other; P Paper; PL Plastic; T Toner cartridges

Table 7.4 Example Environmental Action Plan for `greening' NZFS support services

Action Plan / Targets	Due Date	Dept. (a)	Status
Procurement			
• Develop guidance for `green' procurement and train procurement staff • Require tenders to give information on their environmental performance (via questionnaire at time of bid) • Ensure all purchases >$50k include an assessment of environmental effects (as per Procurement Plan). • Review products purchased to identify those with a high environmental impact. • Prepare baseline data on number of recyclable products purchased by NZFS.			
Transport			
• Develop and maintain a travel plan for NHQ/Regional offices • Review feasibility of rationalising red fleet to accelerate removal of older vehicles. • Reduce amount of fuel purchased by 1% each year. • Reduce number of veh-km (white fleet) by 5% in first year and 1% in subsequent years. • Introduce environmental awareness module in driving training (fuel efficiency)			
Property (including energy, water and waste)			
• Reduce energy consumption in buildings by 2% each year (gas, electricity, oil) • Reduce water consumption in buildings by 2% each year • Incorporate NZGBC green design guidelines for all new/retrofit building activity • Identify amount of waste generated and % recyclables (NHQ, offices, stations). • Introduce a pilot recycling scheme at a fire station			
Training & Awareness			
• Baseline review of how environmental awareness can be incorporated into staff training • Publish slot on Intranet/news covering green initiatives developed by NZFS			

a) Person or department responsible for action

Developing EAPs is normally undertaken by an internal Working Group at the planning stage of the EMS at the same time as environmental objectives and targets are set. The EAPs should include targets and performance measures, and be reviewed periodically to track progress with the intended programme.

7.6 Monitoring the Plan

Environmental Indicators are used to monitor performance against targets defined in the Environmental Action Plan. Effective performance indicators should be simple and understandable, objective, and relevant to the EMS objectives and targets. Indicators should be selected that will provide senior management with the information necessary to support decisions about the effectiveness of the EMS during the review process.

Table 7.5 provides an example of the type of environmental performance indicators (and their metrics) that the NZFS could consider in monitoring performance in greening their operations.

Table 7.5 Example green performance indicators for NZFS support activities

Environmental Performance Indicator	Metric
Transport (incl. fleet emissions reduction) - energy/climate change mitigation	
Carbon footprint of fleets	Tonnes of carbon dioxide/yr by fleet
Average fuel efficiency of red/white fleets	Av. litres/100km by fleet
Reduction in total fuel consumption by fleet	Litres/year by fleet
Average age of red/white fleets	Years in given year
Reduction in business vehicle mileage	Veh-km/yr for white fleet
Uptake of hybrid fuel vehicles	Number in operation
Adoption of travel plans (NHQ/regions/stations)	Number in given year
Reduction in single occupancy car commuting	% of trips
Uptake of biofuels	% white fleet using biofuels
Uptake of videoconferencing	No/year (substituting face-to-face meeting)
Reduction in false alarm call outs	No avoidable false alarms per year
Energy efficiency	
Carbon footprint of offices	Tonnes of carbon dioxide/yr
Office energy efficiency	kWh per m^2 floor area
Renewable energy uptake	% electricity from renewable sources
Water conservation	
Reduction in total metered water consumption	m^3 per year
Reduction in office/station water consumption	m^3 per person per year
Buildings with water savings measures	% of buildings containing these devices
Waste management	
Reduction in total waste arisings	Tonnes per year by type (reuse, recycle, landfill)
Recycled waste	% waste recycled per year
Uptake of recycling waste by facility	% of offices/stations with recycling schemes
Procurement	
Environmental effects assessed on contracts	% of contracts (>$50k value) per year
Staff trained in green purchasing	No attending external course per year

7.7 New Zealand Guidance on Greening Operations

A number of government-related and private sector industry schemes have been formed to promote awareness and best practice for organisations wishing to `green' their operations or raise their environmental profile. Table 7.6 lists the main New Zealand organisations and a brief summary is given below.

Table 7.6: Selected New Zealand organisations providing green guidance

Governmental Schemes	Contact Details	Comments
Energy Efficiency and Conservation Authority (EECA)	http://www.eeca.govt.nz/	Energy efficiency grants may be available.
Govt3 (run by MfE)	http://www.mfe.govt.nz/issues/sustainable-industry/govt3	Contains extensive advice for greening operations and links with other bodies
MED	http://www.med.govt.nz/templates	Advice on procurement
SSC	http://www.e.govt.nz/services/procurement	Gateway website
NGOs		
NZ Business Council for Sustainable Development	www.nzbcsd.org.nz	High level perspective of sustainability issues affecting business in NZ
NZ Green Building Council	www.nzgbc.org.nz	All aspects concerning green buildings (new or refurbishment)
Green Fleet	www.greenfleet.org.nz	All aspects concerning fleet efficiency and business travel planning
New Zealand Ecolabelling Trust	www.enviro-choice.org.nz	Environmental Choice brand

Govt^3 – this programme is run by the Ministry for the Environment and is primarily aimed at encouraging central government agencies improve the sustainability of their activities. It focuses on key areas such as:

- green building design;
- recycling/waste minimisation;
- fuel efficient vehicles;
- office consumables (e.g. paper, cleaning services and environmentally-friendly products.

Over ninety percent of core government agencies have committed to actively engage in the Govt3 programme. Twenty-four of the agencies that signed up have provided detailed Sustainable Practice Action Plans. These plans illustrate the actions the agencies will take to achieve results in sustainable practice, such as energy use and waste minimisation.

The Govt^3 website contains extensive `greening' advice and resources that will be directly applicable to Fire Service activities, as well as links to other government organisations e.g. EECA. The website quotes two examples of achievements under Govt3:

- Transit NZ in one year reduced waste output by 51% over 7 regional offices and the national office
- The National Library gained cost savings of more than $400,000 p.a. through energy management

Environmental Choice - this is a voluntary environmental labelling programme that is endorsed by the New Zealand Government and run by The New Zealand Ecolabelling Trust.

"Eco-labelling" is a method of environmental performance certification and labelling that is practised around the world. An "ecolabel" is a label which identifies overall environmental preference of a product or service within a

specific category based on life cycle considerations. In contrast to "green" symbols or claims developed by manufacturers and service providers, an ecolabel is awarded by an impartial third-party in relation to certain products or services that are independently determined to meet environmental leadership specifications.

The brand in this country is called `Environmental Choice New Zealand'. Certain products have been licensed in New Zealand to carry this brand. Products that carry the Environmental Choice label carry independently verified environmental benefits and should be considered in any green purchasing programme operated by the Fire Service.

New Zealand Business Council for Sustainable Development (NZBCSD) – this is incorporated society made up of about 40 member businesses. Its mission is "to provide business leadership as a catalyst for change toward sustainable development, and to promote eco-efficiency, innovation and responsible entrepreneurship". The Council provides the `bigger picture' on events in New Zealand covering policy, legislation and best practice across a wide range of sectors. While members tend to be larger private sector NZ companies, their website contains many examples of businesses adopting green practice and in the process achieving cost savings and raising their competitiveness and public relations credentials, and therefore could be of benefit to the Fire Service.

NZ Green Building Council – this is a non-government industry organization formed to lead the country's effort on promoting `green' building best practice. They have recently developed and introduced a building environmental rating tool to determine the extent to which buildings incorporate sustainable design features – topics such as energy efficiency, waste, ventilation, lighting etc. NZGBC launched a pilot version of the tool on their website in December 2006, based on the successful Green Star Building Rating System that was introduced by the Australian Green Building Council in 2003. (It is understood that NZFS has already established links with NZGBC and is incorporating these design principles into design briefs for refurbishments and new buildings).

Green Fleet – this is run by the Sustainable Business Network to assist New Zealand businesses take steps to reduce the impacts of their vehicle fleet on the environment and community. Its practical 3-step sustainable transport programme offers members advice on transport efficiency measures (e.g. fuel-efficient driving, vehicle maintenance and business travel planning) and alternative/cleaner fuels and vehicles. (It is understood that NZFS has considered the benefits but has not taken up membership).

8. Conclusions and Recommendations

The main conclusions and recommendations (in bold) from this research project are set out below. The scope of this project (restricted to non-fire fighting activities of the urban Fire Service) means that in some instances the recommendations could have broader implications. For example, development on an environmental policy and supporting action plans for the Service as a whole would need to consider all aspects of environmental performance, including pollution/spill control measures for protection of air, land and water.

Corporate Social Responsibility and Governance Issues

As a Crown agent, the NZFSC (and hence the NZFS) is required to implement Government policy, or at least conduct its business in a manner which is consistent with Government policy. A number of key Government policy instruments exist which are relevant to the NZFS's non-fire fighting activities. These cover *inter alia* climate change, energy efficiency and conservation, waste and sustainable transport and are underpinned by the 2003 Sustainable Development Programme of Action.

The 5-year NZFC Strategic Plan has little regard for key Government environmental policies, in particular for the overarching policy of promoting sustainable development. The Strategic Plan makes no reference to specific Government environmental management policies or strategies. Neither the NZFS vision nor its values statement makes any reference to contributing to sustainable development.

Having regard to the broad trust of Government's environmental management goals and policies, and the NZFSC's aim of contributing to Government's goals, it is recommended that:

- **NZFSC considers adjusting its current vision statement to read "Working with communities to protect what they value *and to help promote sustainable development"* (words in italics added).**
- **NZFSC establish a seventh "strategic priority" – *Contribute to achieving the goal of sustainable development* - together with appropriately framed national goals and key strategies.**

Environmental Management

The NZFS does not have an environmental policy or environmental strategy, nor is there a formal environmental management system or persons appointed with specific environmental management responsibilities. Environmental impacts concerning energy, waste and resource consumption cannot be quantified because baseline data is not routinely collected.

It is recommended that the Commission consider development of an environmental policy and strategy within the framework of an environmental management system. The strategy should include an environmental action plan and targets to reduce the environmental impact of non-operational support services.

Environmental improvement measures need to be linked into existing mechanisms for strategic review (business planning, policy and procedures review, 5-year strategic plan). A suitable platform would be the Business Excellence initiative where `greening' and a move towards sustainable practice would comprise a

component of governance and social responsibility (under Leadership Category 1 of the Baldridge Criteria for Performance Excellence).

It is therefore recommended that the environmental strategy is integrated with business operations under the Business Excellence model (corporate social responsibility).

If a decision to implement an environmental strategy for the NZFS is adopted, it is further recommended that:

- **An Environmental Working Group drawn from NHQ and operational staff is appointed to develop the strategy and provide direction on its implementation**.
- **Consideration is given to implementing an environmental management system (EMS), based on a recognised standard such as ISO14001 or similar.**
- **A mechanism is introduced to collect, analyse, and report on environmental data to assist the establishment of a baseline and targets, and to measure ongoing performance against objectives and targets across Service operations.**
- **In support of the above tasks, NZFS consider nominating a representative to the Australasian Fire Authorities Council (AFAC) Environmental Management Work Group that is intended to develop and share best practice amongst fire services on building environmental care into business operations.**

Green Procurement

While the NZFS procurement policy has a requirement for considering environmental impacts for purchases over $50,000, this has not been applied in practice due to a lack of technical guidance on environmental evaluation criteria. No other green procurement initiatives are in the pipeline. However there is an increasing onus on NZ Government agencies to adopt Central Government guidance on developing a sustainable framework for their procurement activity.

It is recommended that the Commission considers the following proposals:

- **Develop a sustainable procurement strategy with advice sought from the Government's Govt[3] initiative (dealing with sustainable procurement practice).**
- **As part of the strategy, prepare guidelines for application of `green' procurement practice for each stage of the procurement process (i.e. identifying need, specification, selection, tender evaluation and contract management) that links into the current whole-life costing approach. Alternatively, the NZFS could consider provision of an `expert' resource to provide comment on environmental consequences for each Procurement Plan (where the purchase value exceeds $50,000).**
- **Prepare standard contract clauses to encourage suppliers to develop a pro-active approach to environmental issues.**
- **Introduce procedures to review the environmental credentials of major suppliers e.g. whether or not the supplier adheres to an environmental management system compliant with ISO14001.**
- **Undertake an environmental risk/impact analysis of products/goods procured by the NZFS**
- **Provide green procurement training and guidance to key procurement staff.**

Transport / Fleet Management

The NZFS has successfully adopted a number of measures to improve the environmental performance of the fleet. These principally relate to engine performance specification (red fleet) and outsourcing the white fleet (cleaner vehicles and improved fuel efficiency). However, no specific targets have been set for white fleet performance in terms of annual reduction in VKT or fuel consumption and there are currently no plans to set such targets. Travel Plans for the white fleet are not yet under consideration. There is scope for further greening measures that will translate into both cost savings (e.g. from fuel reduction) and environmental benefits

Management strategy for reducing transport impacts (i.e. reducing the emissions `footprint') should focus on reducing the age of the fleet and the amount of vehicles-kilometres travelled per year. Measures to reduce the need for business travel (e.g. video conference calls) and the promotion of alternatives travel modes to the car should be an integral part of a sustainable transport strategy for the Service. Recent developments in government energy/climate change policy will see the introduction of biofuels in 2008 under the proposed Biofuels Sales Obligation legislation, and this aspect should feature as an integral part of any fleet management emissions reduction programme introduced within the Service.

Key recommendations in the transport area are:

- **Introduce a fleet emissions reduction programme in line with emerging Government policy**
- **Review the feasibility of rationalising the red fleet so as to accelerate the removal of older more polluting and less fuel-efficient units.**
- **Review the cost/benefits of service providers (e.g. Green Plan) with a view to further reducing the environmental impact of white fleet operations.**
- **Consider the feasibility and benefits of introducing staff travel plans**

Energy Management

Energy and cost savings for support activities are feasible based on the experience of overseas fire services and the Service is seeking advice from EECA on areas where improvements can be made. However, the Service has no energy policy and data on energy consumption to determine the carbon footprint of the Service is lacking. The recent release (December 2006) of the Government's draft Energy Strategy highlights the importance of this aspect in central government policy on actions to combat climate change and underscores the need for the NZFS to manage energy consumption through setting targets and implementing energy conservation practices across all business operations.

In line with Government policy on sustainable development, it is recommended that NZFS develops and implements an energy management strategy in accordance with Government energy policy, including provision for future use of renewable energy and biofuels. Short term aspects that should be considered are:

- **Completing an energy audit of operations and infrastructure (with input from EECA)**
- **Establishing baseline data on energy consumption and a carbon footprint for the organisation**
- **Setting targets for reducing carbon emissions and energy consumption (e.g. kWh per person or KWh/m^2)**
- **Developing and implementing awareness training on energy conservation measures for staff in offices and fire stations**

Waste Management

The NZFS does not have a waste management policy or associated procedures. Most of the office and station waste is sent directly to landfill. Only minimal waste recycling is practised (e.g. waste paper by NHQ). No statistics are available on waste arisings and no targets have been set for environmental performance. The Service is therefore not responding effectively to the Government's Waste Strategy that requires organisations to implement waste minimisation and other efficient waste management practices. The literature survey identified a number of examples of overseas fire services such practices had been successfully implemented with consequent cost savings.

It is therefore recommended that the NZFSC:

- **Develops and implements a waste management policy in line with Government strategy**
- **Collects annual statistics on waste arisings from offices and stations**
- **Sets appropriate targets for waste reduction and recycling**
- **Develops internal waste management procedures with input from overseas best practice**
- **Provide awareness training on waste minimisation to office and station staff**

Water Conservation

The Service does not have a water management policy for non-operational activities and no water conservation measures are practiced. Large quantities of water are consumed at training centres and, apart from the National Training Centre in Rotorua, these facilities do not recycle water. There was little evidence of water saving devices in office or station buildings although new build and refurbishment building projects are reported to include green design principles. No statistics on office or station water consumption are available.

In keeping with the need for resource efficiency under the Government's programme of sustainable development, it is recommended that the NZFSC:

- **Considers developing a water conservation programme for support services**
- **Sets up a data collection system for recording water use across the Service to assist the development of benchmarking and management information on water consumption.**
- **Reduces water consumption in office buildings to achieve an average of 4m^3 per person per year (based on overseas practice)**
- **Introduces water conservation measures in appropriate areas (e.g. training facilities and hydrant testing)**

Training & Communications

Green issues such as resource conservation and waste avoidance do not feature in current FS training programmes where the emphasis on environmental issues is geared to operational aspects such as pollution prevention. There is no environmental awareness training for non-operational personnel e.g. office staff, although there was strong support for introduction of a stand-alone greening module within existing in-service training.

Interviews with facility support staff identified that introduction of a more sustainable mode of operation will require an attitudinal change in the Service in order to counter the general culture of waste that is prevalent in public services. The nature of the NZFS as a command and control organisation would ensure that any environmental requirements that are built into standing procedures would be followed. Station staff generally expressed a keen interest in learning more and taking part in any initiatives for greening operations.

The following recommendations are made in respect of training/communications of greening activities:

- **Introduce a basic green awareness training module at stations and for office staff (either stand-alone or part of existing in-service training) under a trial scheme**
- **Develop training resources (guidance and procedures) for specific environmental aspects e.g. green procurement, energy efficiency, water conservation)**
- **Encourage promotion of greening initiatives (e.g. energy saving or waste recycling at station level) to foster adoption of good practice, report on achievements and reward progress.**
- **Publish good practice green guidance and `lessons learnt' through articles in the internal newsletter, Intranet and other in-house media.**
- **Work with external organisations (e.g. AFAC, Govt[3]) to promote and share environmental/greening best practice.**

In terms of external communications, the Commission may wish to consider the merits of a policy commitment to report publicly in respect of greening operations activity and performance. The findings could initially be summarised in the annual report and further details provided on the website.

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APPENDIX A – Green Questionnaires

APPENDIX B – Elements of an Environmental Management System

An Environment Management System (EMS) is a tool for managing the impacts of an organisation's activities on the environment. It provides a structured approach to planning and implementing environment protection measures.

The five principal building blocks of an EMS are:

- Environmental Policy and Strategy
- Planning
- Implementation and Operation
- Monitoring and Corrective Action
- Review

To develop an EMS, an organisation has to assess its environmental impacts, set targets to reduce these impacts, and plan how to achieve the targets. The EMS is subject to ongoing monitoring and review. For an effective EMS to be developed and implemented, commitment is required from the top of the organisation, as well as all staff.

Like a financial management system monitors expenditure and income, an EMS monitors environmental performance. An EMS integrates environmental management into a company's daily operations, long term planning and other quality management systems.

The International Environmental Standard - ISO14001

The ISO 14000 series is a collection of voluntary standards that assists organisations to achieve environmental and financial gains through the implementation of effective environmental management. The standards provide both a model for streamlining environmental management, and guidelines to ensure environmental issues are considered within decision making practices. ISO 14001:2004 is the standard for Environment Management Systems. Many large businesses, particularly overseas, have obtained certification under the standard.

The ISO 14001:2004 standard has 17 required elements:

- **Environmental policy** - Develop a statement of your organization's commitment to the environment. Use this policy as a framework for planning and action.
- **Environmental aspects** - Identify environmental attributes of your products, activities, and services. Determine those that could have significant impacts on the environment.
- **Legal and other requirements** - Identify and ensure access to relevant laws and regulations, as well as other requirements to which your organization adheres.

- **Objectives and targets** - Establish environmental goals for your organization, in line with your policy, environmental impacts, the views of interested parties, and other factors.
- **Environmental management program** - Plan actions necessary to achieve your objectives and targets.
- **Structure and responsibility** - Establish roles and responsibilities for environmental management and provide appropriate resources.
- **Training, awareness, and competence** - Ensure that your employees are trained and capable of carrying out their environmental responsibilities.
- **Communication** - Establish processes for internal and external communications on environmental management issues.
- **EMS documentation** - Maintain information on your EMS and related documents.
- **Document control** - Ensure effective management of procedures and other system documents.
- **Operational control** - Identify, plan, and manage your operations and activities in line with your policy, objectives, and targets.
- **Emergency preparedness and response** - Identify potential emergencies and develop procedures for preventing and responding to them.
- **Monitoring and measurement** - Monitor key activities and track performance. Conduct periodic assessments of compliance with legal requirements.
- **Nonconformance and corrective and preventive action -** Identify and correct problems and prevent their recurrence.
- **Records** - Maintain and manage records of EMS performance.
- **EMS audit** - Periodically verify that your EMS is operating as intended.
- **Management review** - Periodically review your EMS with an eye to continual improvement.

The elements of an EMS listed above are grouped under the headings of their respective principal building blocks and described in more detail below.

Elements of an EMS

Environmental policy

Senior leadership is responsible for creating, and committing to, an environmental policy that is appropriate to the environmental impacts of their organisation's activities, products or services. The policy should:

- Provide the vision or direction for the EMS. This vision should reflect the goals, as well as related organisational principles (e.g., quality, safety, occupational health).
- Indicate the organisation's commitment to continual improvement, prevention of pollution, and compliance with legal and other requirements,

- Provide a framework for setting and reviewing environmental objectives and targets,

Additionally, the leadership must see that the policy is communicated to **all** persons working for or on behalf of the organisation and (preferably) is made available to the public. The policy must be documented and maintained.

Planning

Environmental aspects register

A key element of EMS planning involves the identification of the environmental aspects and associated impacts of all activities, products, and services controlled by the organisation, including unregulated practices, within the defined scope of the EMS.

Every aspect of an organisation's operations, including strategic planning, procurement, waste reduction, waste management, water and energy usage, responses to existing environmental problems, and land management, must be addressed. Planned or new developments and new or modified activities, products and services within the EMS scope also must be addressed through the aspects process.

For each aspect, related impacts are identified and prioritised to provide a basis for the development of environmental objectives and targets consistent with the environmental policy statement. Those aspects that have, or can have, significant impacts on the environment (i.e. significant environmental aspects) must be considered in establishing, implementing and maintaining the EMS

Documentation of the aspects identification and significance determination processes, as well as up-to-date lists of aspects and significant aspects must be available.

Legal and Other Requirements

This EMS planning element requires the organisation to establish, implement and maintain procedures to:

- Identify and have access to the applicable legal requirements and other requirements to which the organisation subscribes as related to its environmental aspects,
- Determine how these requirements apply to the organisation's environmental aspects, and
- Ensure that the environmental legal and other requirements are considered during development, implementation and maintenance of the full EMS.

It is the responsibility of each facility to identify all the applicable legal and other requirements that impact any environmental aspect of any activity, operation, service, or process included in the EMS scope.

A searchable master list or database of EMS legal and other requirements that impact the organisation is often very helpful. Such a list, routinely reviewed and updated by appropriate persons within the organisation, may help to ensure that staff can easily access legal and other requirements.

Objectives, Targets and Programme(s)

The last EMS planning element addresses establishing, implementing and maintaining environmental objectives and targets, and the development of environmental action plans. The organisation's objectives and targets must link back to, and be consistent with the commitments established in the environmental policy statement: prevention of pollution, compliance with applicable legal and other requirements and continual improvement.

The purpose of objectives and targets is to help the organisation translate its environmental goals into specific actions that are measurable, where practicable. Objectives and targets should be realistic and should reflect what an organisation does, how well it currently is performing, and what it wants to achieve.

This element also requires the organisation to establish, implement and maintain written action plans that define how they will achieve the stated objectives and targets. To ensure the effectiveness of these action plans (also called environmental management plans), each one should define:

- The responsibilities for achieving goals (who will do it?)
- The means for achieving goals (how will they do it?)
- The timeframe for achieving those goals (when?)

An environmental action plan does not have to be compiled into a single document. A "road map" to several different plans is an acceptable alternative, as long as the key responsibilities, tactical steps, resource needs and schedules are defined adequately in these other documents.

These programs should be coordinated or integrated with other organisational plans, strategies, and budgets. Successful environmental action plans:

- Build on existing plans and programmes for pollution prevention, compliance, green procurement, sustainable development and other environmental issues,
- Involve all personnel in establishing and carrying out the program, and
- Communicate the expectations and responsibilities defined in the plan to everyone who is involved in the implementation and maintenance of the EMS.

Implementation and Operation

Resources, Roles, Responsibility and Authority

The organisation's senior leadership should ensure the availability of essential resources to establish, implement, maintain and improve the EMS. These include human resources, particularly specialized skills, organisational infrastructure, technology and funding.

For an EMS to be effective, roles, responsibilities, and authorities must to be clearly defined, established and communicated. This element requires senior management to appoint a specific management representative(s) who, irrespective of other responsibilities, shall have defined roles, responsibilities and authority for:

- Ensuring that an EMS is established, implemented, and maintained in accordance with the requirements (e.g. to meet the ISO 14001 standard),
- Reporting to senior management on the performance of the EMS for review, including recommendations for improvement

Competence, Training and Awareness

Everyone working for or on behalf of the organisation, not just employees, must be competent to perform tasks associated with the organisation's significant environmental impacts. Competence is typically based on a

combination of education, training, and experience. The necessary knowledge, skills and abilities (competencies) and training needs associated with the organisation's environmental aspects and EMS must be identified. Also, appropriate training or other action to meet these needs must be provided and documented.

In addition, everyone working for or on behalf of the organisation also must receive appropriate EMS training that enables them to be aware of:

- The environmental policy,
- The significant environmental impacts of their work activities,
- Key EMS roles and responsibilities,
- Procedures that apply to their work,
- The importance of conforming with EMS requirements, and
- The potential environmental consequences of departure from specified procedures.

Two sound reasons for training employees about environmental management and their part in the EMS of their facility are:

- Every employee can potentially impact the environment, and
- Any employee can suggest how to improve environmental management efforts.

Mechanisms for documenting that employees have received the type and level of environmental training appropriate for their jobs must be established and training records maintained.

Communication

An effective EMS requires effective communication, both internally and externally. Simple, clear, precise, and accurate communication is necessary to motivate and direct employees and to build confidence in and acceptance of the EMS process.

This EMS element specifically requires the organisation to establish, implement and maintain procedures for internal communication among the various levels and functions of the organisation and for receiving, documenting and responding to relevant communication from external interested parties.

This element also requires the organisation to decide whether or not to communicate externally about its significant aspects. This decision must be documented. If the organisation decides to communicate externally, it must establish and implement methods for external communication about its significant aspects.

Communication can include a wide variety of techniques and venues such as written directives, electronic messages/bulletin boards/reports, regular employee meetings, ad hoc work groups, press releases, internal and external websites, periodic reports, newsletters, etc.

Documentation

This EMS Element provides specific criteria for documentation of the EMS. Required documentation includes:

- The environmental policy, objectives and targets,
- Description of the scope of the EMS,

- Descriptions of the elements of the EMS, including their interaction and references to related documents,
- Documents, including records, needed to manage processes associated with significant aspects.

Organisations generally create an EMS Manual or web-based platform that includes or references the requirements of this element and others. This manual summarises how the pieces of the EMS fit together and serves as a "road map". It basically defines the procedures and processes the facility uses to conform to the EMS criteria.

Control of Documents

To ensure that environmental documents are maintained and that everyone in the organisation is working with the proper documents, this EMS element addresses the need for control of all of the documents required by the EMS and by the ISO standard. The organisation must establish, implement and maintain a procedure(s) to:

- Approve documents for adequacy prior to issue,
- Review and update as necessary and re-approve documents,
- Ensure that changes and the current revision status of documents are identified,
- Ensure that relevant versions of applicable documents are available at points of use,
- Ensure that documents remain legible and readily identifiable,
- Ensure that documents of external origin (e.g. consents) needed for the planning and operation of the EMS are identified and their distribution controlled, and
- Prevent the unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

It should be noted that the ISO standard specifically states that `records' (a document that states results achieved or provides evidence of activities performed) are a special type of document and shall be controlled in accordance with the requirements given in EMS Element 4.5.4: Control of Records.

Operational Control

An organisation must identify and plan those operations that are associated with the identified significant environmental aspects to ensure that they are carried out under specified conditions consistent with its environmental policy, objectives and targets by:

- Establishing, implementing and maintaining a documented procedure(s) to control situations where their absence could lead to deviation from the environmental policy, objectives and targets,
- Stipulating the operating criteria in the procedure(s),
- Establishing, implementing and maintaining procedures related to the identified significant environmental aspects of goods and services used by the organisation and communicating applicable procedures and requirements to suppliers, including contractors.

Operational controls include Environmental Standard Operating Procedures (SOPs) and Standing Instructions. All activities or practices associated with significant environmental impacts should be addressed by appropriate operational controls.

Emergency Preparedness and Response

This EMS element stipulates that the organisation shall establish, implement and maintain a procedure to identify potential emergency situations and accidents that can have environmental impacts and how it will respond to them. Emergency plans and procedures should be site-specific, addressing the unique hazards of the organisation and its location.
In addition, the organisation shall respond to actual emergency situations and accidents and prevent or mitigate associated adverse environmental impacts. The organization must periodically review and, where necessary, revise its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations. The organisation also shall periodically test such procedures, where practicable.

Monitoring and Corrective Action

Monitoring and Measurement

To ensure continual improvement in environmental management, an EMS must have procedures to monitor and measure key environmental performance indicators and progress toward achieving the organization's objectives and targets. Basically, if a process or practice cannot be monitored and measured, it cannot be managed.

To meet the requirements for this EMS element, the organisation must establish, implement and maintain procedures to monitor and measure, on a regular basis, the key characteristics of its operations that can have significant environmental impacts. The procedures must document information to monitor performance, applicable operational controls, and conformity with the organisation's environmental objectives and targets.

This element also requires the organisation to ensure that calibrated or verified monitoring and measurement equipment is used and maintained and to retain associated records.

Monitoring and measurement enable an organisation to:

- Evaluate environmental performance,
- Analyse root causes of problems,
- Assess compliance with legal requirements,
- Identify areas requiring corrective action, and
- Improve performance and increase efficiency.

Performance indicators, or metrics, will require to be established as an integral part of the existing environmental action plan and incorporated into the EMS. Meaningful metrics are one tool for determining how well an EMS is working.

Evaluation of Compliance

To comply with the requirements for this element, organisations must establish, implement, and maintain procedures for periodically evaluating their compliance with respect to both applicable legal requirements and any other requirements to which they subscribe. In addition, organisations must keep records of these evaluation(s).

The primary purpose of an EMS is to provide a framework - a roadmap - that enables an organization to support a sustainable mission by controlling the environmental impacts of its activities, products and services and continually improving its environmental performance. To conform to the ISO 14001 Standard, an organisation must apply the principle of continual improvement to compliance during the planning, implementation, and maintenance of its EMS.

Nonconformity, Corrective Action and Preventive Action

This important element requires the organisation to establish, implement and maintain procedures for dealing with actual and potential environmental nonconformities and for taking corrective and preventive action. The procedure(s) must define requirements for:

- Identifying and correcting nonconformities and taking actions to mitigate their environmental impacts,
- Investigating nonconformities, determining their causes and taking actions in order to avoid their recurrence,
- Evaluating the need for actions to prevent nonconformities and implementing appropriate actions designed to avoid their occurrence,
- Recording the results of corrective actions and preventive actions taken, and
- Reviewing the effectiveness of corrective and preventive actions taken.

The review of the effectiveness of corrective and/or preventive action also can address whether the actions taken were appropriate to the magnitude of the problems and the environmental impacts encountered. The organisation also must ensure that any necessary changes are made to the EMS documentation.

Control of Records

Records are special documents that state results achieved or provide evidence of activities performed. This element requires the organisation to establish and maintain records as necessary to demonstrate conformity to the requirements of its EMS and of the ISO standard, and the results achieved (e.g. results of corrective action, programmes to achieve targets etc.).

In addition, the organisation must establish, implement and maintain procedures for the identification, storage, protection, retrieval, retention and disposal of records. All records must be and remain legible, identifiable and traceable.

Internal Audit

Internal audits are critical to the effectiveness of an EMS and to the continual improvement cycle. Systematic identification, documentation, and reporting of EMS strengths and deficiencies to management provide an opportunity to:

- Maintain management focus on the environment,
- Improve the EMS and its performance, and
- Ensure the system's cost-effectiveness.

For this EMS element, the ISO 14001-2004 Standard places emphasis on planning the criteria, scope, frequency and methods of the audit, including schedule and procedures for conducting the audit and reporting and record keeping. Each organisation must ensure that internal audits of their EMS are conducted at planned intervals to determine whether the EMS: 1) conforms to planned arrangements for environmental management including the requirements of the ISO Standard, and 2) has been properly implemented and is maintained.

The results of the internal audit must be presented to senior leadership. Selection of auditors and conduct of audits must ensure objectivity and the impartiality of the audit process.

Review

Management reviews are essential for continual improvement, and they close the continual improvement cycle upon which the EMS model is based. When there is review of the EMS by senior management, the following questions should be addressed:

- Is the EMS working?
- Is it suitable, adequate and effective for the needs of the organisation?
- Are opportunities for improvement being fully assessed?
- Is there a need for changes to the EMS, including the environmental policy, objectives and targets?

Management reviews must be done at planned intervals, but there are no set requirements for their frequency and extent. These will vary according to the directives and policies of each organisation and the size and nature of the facilities.

The ISO 14401-2004 Standard specifies **inputs** to the management review process must include:

1. Results of internal audits and evaluations of compliance with legal requirements and with other requirements to which the organisation subscribes,
2. Communication(s) from external interested parties, including complaints,
3. The environmental performance of the organisation,
4. The extent to which objectives and targets have been met,
5. The status of corrective and preventive actions,
6. Follow-up actions from previous management reviews,
7. Changing circumstances, including developments in legal and other requirements related to its environmental aspects, and
8. Recommendations for improvement.

The ISO 14401-2004 Standard also specifies **outputs** of the management review must include decisions and actions, consistent with the commitment to continual improvement, that relate to possible changes to:

1. The environmental policy
2. Objectives

3. Targets
4. Other elements of the EMS

Records of the management reviews must be retained. All decisions and corrective actions must be documented and communicated to the appropriate employees. Progress in implementing the action items should be tracked and evaluated.

Benefits of an EMS

An EMS can assist an organisation in the following ways:

- Minimise environmental liabilities;
- Maximise the efficient use of resources;
- Reduce waste;
- Demonstrate a good corporate image;
- Build awareness of environmental concern among employees;
- Gain a better understanding of the environmental impacts of business activities; and
- Provide cost savings and improved environmental performance through more efficient operations.

An EMS can be a powerful tool for organisations to both improve their environmental performance, and enhance their business efficiency. An EMS is not prescriptive; rather, it requires organisations to take an active role in examining their practices, and then determining how their impacts should best be managed. This approach encourages creative and relevant solutions from the organisation itself.

Although the implementation of an EMS is essentially a voluntary initiative, it can also become an effective tool for governments to protect the environment as it can assist regulation. For example, regulatory systems can encourage organisations to use EMS to meet standards, by providing incentives for strong environmental performance. Likewise, organisations can use EMS to ensure that their performance is within regulatory requirements, and to keep ahead of more stringent regulations which might be introduced in the future.

Larger organisations may find certification valuable when considering the potential trade and market advantages of an internationally recognised and certified EMS. This was a significant factor for companies seeking certification under the ISO 9000 quality assurance standards, and is likely to be a factor in decisions regarding ISO 14001 certification.