TASMANIAN

AIR QUALITY STRATEGY

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Tasmania

Prepared by the Department of Tourism, Arts and the Environment

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A message from the Minister…

It gives me great pleasure to publish the Tasmanian Air Quality Strategy, which provides a clear blueprint for managing air quality in Tasmania for the next five years. It follows the release of the Environment Protection Policy (Air Quality) in July last year.

The Strategy's primary focus is the achievement of the National Environment Protection Goals for air quality, especially those relating to the fine particle pollution that impacts on many of our urban population centres during the winter months. There are also a number of other important initiatives included within the Strategy that are both national and uniquely Tasmanian programs, including Tasmania *Together* and the Environment Challenge. These reflect a strong emphasis on environment, health and lifestyle, and a sensitivity to the social, physical and amenity needs of the Tasmanian community.

Wide-ranging education and awareness programs are important elements of the Strategy, in addition to the more traditional regulatory activities that will be strengthened and improved through application of the Policy and development of new Regulations. The Strategy recognises that we need to take a holistic view of air quality and our environment generally, and in doing so acknowledge the contributions that we as a community - individuals as well as the big players - can all make to improve air quality. Collectively we can reduce the risks to our own health, the impact on Tasmania's unique natural heritage and our use of energy resources.

This Strategy is a living, breathing document, and must be seen as flexible in the face of changing environmental, social and economic needs over the next five years

The Tasmanian Air Quality Strategy is part of a number of initiatives that the Tasmanian Government is developing that will ensure that our State's clean, green image is maintained and enhanced for the future.

Paula Wriedt
Minister for Tourism, Arts and the Environment

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1 SUMMARY OF THE TASMANIAN AIR QUALITY STRATEGY

1.1 Introduction

The Tasmanian Air Quality Strategy has been established under the *Environment Protection Policy (Air Quality) 2004* to guide the management of air quality in Tasmania over the next five years.

Its drafting was a collaborative effort between representatives of various Government Departments, the Local Government Association of Tasmania and local government, with input from a range of other organisations both within and outside government, including industry groups, community organisations and many individual council officers. A draft was released for public consultation in October 2005 and the Strategy has been modified where appropriate from the comments received.

A summary of the Strategy appears in the following pages, comprising a statement of the *overall objective*s, a brief discussion of *scope* and structure, followed by a set of *objective statements* with associated *programme statements,* describing the means by which the objectives will be achieved. *Objective statements* are grouped under a series of headers, covering the broad aspects of or influences on air quality in Tasmania. These are:

- Information and Data Gaps
- Residential Sector (woodheaters and backyard burning)
- Industrial Sector
- Planned Burning
- Transport Sector
- Integration of Planning.

Section 2 comprises the Explanatory Document and offers descriptions of each of the *objective statements* and *programme statements* and provides an indication of the rationale upon which each has been based.

The order of objective and programme statements reflects a general order of priority. For example, in many areas of the State, residential sources are the greater influences on air quality and have therefore received the greater degree of attention to date. However, there are many programmes already in place, and others that are foreshadowed in the Strategy that operate in parallel with residential pollution programmes to address industrial sources, planned burning and transport.

Note that in this Strategy and the Explanatory Document, a programme is taken to include either a suite of projects, or single project designed to assist with achieving a specific objective.

1.2 Objective

The primary objective of the Tasmanian Air Quality Strategy is to achieve compliance with the National Environment Protection (Ambient Air Quality) Measure Standard and Goal for PM_{10} particles, in line with the stated requirements of the Environment Protection Policy (Air Quality);
within the context of:

- Tasmania *Together* Targets and other relevant Tasmanian programmes and objectives;
- national programmes to develop $PM_{2.5}$ Standards and Air Quality Standards for Air Toxics; and
- other relevant national policies and measures, such as National Environment Protection (Diesel Vehicle Emissions) Measure, National Woodheater Action Plan.

1.3 Scope

At times, Tasmania experiences the country's best air quality, as measured at the Cape Grim baseline station on the north west Coast. However, there are some areas that suffer from poor ambient air quality during some periods of the year. The problem of poor air quality in Launceston relates to elevated concentrations of particulate matter, PM_{10} (particulate matter with an aerodynamic diameter of less than 10 μm). It is believed that other areas, such as some suburbs of Hobart, may also experience elevated levels of particulate matter during winter. Whilst the issues around poor air quality have been largely driven by the problem in Launceston, this Strategy focuses on Tasmania as a whole.

The key air quality issue in Tasmania relates to particulate matter and this issue forms the main focus for management actions within this Strategy. It is also acknowledged that there may be other pollutants of concern such as air toxics, nitrogen oxides and sulfur oxides. Further data is needed to assess potential impacts from these pollutants, and new data collection programmes are included in Section 2.2 Information and Data Gaps.

PM_{10} and $PM_{2.5}$

The very specific objective of meeting the PM_{10} Standard reflects the fact that it is the only existing *National Environment Protection Standard* for airborne particles at present, for which a compliance goal (by 2008) has been made by the National Environment Protection Council.

Two *Advisory Reporting Standards* have been set for $PM_{2.5}$, with a goal to gather sufficient data for a review due to commence in 2005. Thus it is likely that *National Environment Protection Standards* for $PM_{2.5}$ and goals requiring compliance, will be made within the lifetime of this Strategy. Therefore it is prudent that the Strategy be developed with an awareness of this probability, in order to:

- acknowledge the even stronger correlation between adverse health effects and $PM_{2.5}$ than that shown for PM_{10}, and
- ensure that costs to industry are minimised, when requirements to install control equipment for particulate emissions are included in permit conditions.

What the Strategy does not include

There is a range of environmental issues at both a National and State level that are either well served by existing programmes or are not at this time the subject of relevant legislation, and so are not included within the scope of this document. These include greenhouse gases and ozone-depleting substances programmes. The Strategy does not include consideration of indoor air quality, except peripherally, where it impinges on alternative energy sources in the domestic environment. The issues of odour and tobacco smoke are also not included.

1.4 Lifetime and Review Period

The projected lifetime of this Strategy is five years from its date of commencement. Evaluation of the progress of Strategy implementation is the responsibility of the Steering Committee, which consists of officers from relevant State Government Authorities and Local Government bodies. Its brief includes a requirement to consult with reference groups and other stakeholders where appropriate, particularly where significant changes of direction are envisaged. The Steering Committee will receive annual reports on progress of Strategy implementation and request further reports as necessary. It is recognised that the Strategy needs to be flexible and adaptable to prevailing conditions. To ensure this, the Steering Committee will, where necessary, review and adjust programmes to accommodate changing circumstances, within the objectives of the Strategy.

1.5 Objectives and Programmes

The Strategy appears below as a series of objectives followed by associated programme statements. Each objective defines targets that need to be achieved through implementation of the Strategy, while the programme statements define the means by which those targets will be achieved.

Many of the programmes have well-defined targets that require the development of hardware, physical systems or management systems for implementation. These include such activities as regulation of industry or monitoring of air quality. Others involve educating groups, or promoting or facilitating actions by others. These relate to those areas over which the government may not have direct control, but has a strong role in providing resources and influencing outcomes towards reducing impacts or improving environmental performance.

Information and Data Gaps

Air Quality Monitoring and Forecasting

Objective 1

Improve information available to evaluate air quality and monitor trends within the State by:

a) Upgrading the existing monitoring system in accordance with the protocol of the National Environment Protection (Ambient Air Quality) Measure through:
   - upgrading of PM_{10} monitoring equipment and capability;
   - establishing a new $PM_{2.5}$ monitoring system in Launceston and Hobart;
   - relocating and upgrading the monitoring station in Hobart in a more appropriate location;
   - establishing a new PM_{10} monitoring station in Devonport; and
   - establishing a carbon monoxide monitoring station in the Hobart CBD;
b) Investigating the need for further air quality monitoring in population areas covered under Tasmania *Together* Benchmark 24.3.1;
c) Investigating the need for a mobile monitoring capability for campaign monitoring and to respond to specific pollution events or complaints;
d) Establishing a broad-based airborne particle monitoring programme in Greater Hobart;
e) Facilitating the development of a joint industry-funded monitoring station at George Town;
f) Identifying areas of potential high population exposure to air toxics and conducting monitoring programmes where necessary, in accordance with the National Environment Protection (Air Toxics) Measure;
g) Reviewing and if possible, improving the accuracy of air quality forecasts in Launceston;
h) Developing an Air Pollution Potential Atlas for the State identifying areas likely to have poor air dispersion to facilitate better air quality management;
i) Improving the quality of dispersion modelling for Development Proposals and Environmental Management Plans; and
j) Developing and implementing a smoke monitoring plan for planned burning in accordance with the *Environment Protection Policy (Air Quality) 2004*.

Sources of Particulate Matter and the Trends in Domestic Heating

Objective 2

Gather data on the main sources of air pollutants and the trends in the type of home heating used around Tasmania by:

a) Estimating emissions of PM_{10} and $PM_{2.5}$ from domestic and small industrial sources for the entire State;
b) Conducting annual market research in Launceston to monitor trends towards less polluting alternatives and barriers to conversion to alternative forms of domestic heating; and
c) Promote the uptake of externally flued gas heaters in preference to unflued gas heaters.

Public Accessibility to Air Quality Information

Objective 3

Provide better access to air quality monitoring data by:

a) Reducing the lag time in obtaining results from air monitoring programmes;
b) Regularly updating air quality monitoring information *via* the Environment Division's web site; and
c) Investigating the feasibility of providing real-time data on the web site.

Residential Sector

Existing Woodheaters

Objective 4

Facilitate reductions in the existing number and impact of woodheaters in areas with compromised air quality by:

a) Researching and implementing mechanisms for removing barriers to changing heating sources;
b) Monitoring trends in the reduction of the number of woodheaters across the State;
c) Investigating the appropriateness of a redeveloped woodheater buy-back scheme;
d) Promoting the use of alternative forms of heating; and
e) Developing *Air Quality Regulations* to reduce emissions from domestic woodheaters.

Managing Installations of Additional Woodheaters

Objective 5

Consider options for reducing the number of additional woodheaters installed in sensitive areas by:

a) Investigating the efficacy and practicality of placing restrictions on installation of wood-fuelled heating in new and renovated homes;
b) Developing *Air Quality Regulations* to require all woodheaters comply with the current Australian Standard;

Woodheater Technology, Design and Installation

Objective 6

Promote improvements in technology, design and installation of new woodheaters by:

a) Improving woodheater installation practices;
b) Developing *Air Quality Regulations* to require that new woodheaters meet the emission limits in AS/NZS 4013;
c) Promoting improvements in AS/NZS 4013 for woodheater emissions;
d) Promoting cleaner technology woodheaters and fuels derived from wood waste;
e) Actively supporting implementation of the *National Woodheater Action Plan* and promoting the adoption of improved woodheater technology; and
f) Conducting an assessment programme of the compliance of new woodheaters with Australian Standards.

Woodheater Fuel Quality

Objective 7

Increase the quality of wood fuel by:

a) Supporting the establishment and implementation of an effective certification programme for firewood suppliers in Tasmania and monitoring its effectiveness.

Community Education

Objective 8

Increase general community awareness of the health impacts of domestic burning, how to operate woodheaters efficiently and alternative forms of heating by:

a) Developing guidelines for woodheater operation and storage of wood (using existing educational materials);
b) Developing a holistic communications strategy including schools, Local Government, local communities and the broader public which includes an evaluation system;
c) Establishing an air quality educational programme for schools;
d) Supporting existing smoke patrol programmes and promoting their adoption in other areas of the State with compromised air quality;
e) Adopting and promoting the use of home energy audit packages to assist householders to use energy efficiently whilst minimising their contribution to air pollution;
f) Evaluating the effectiveness of air quality forecasting in Launceston on behavioural change in the community, and improving, where appropriate; and
g) Expanding air quality forecasts to other areas of the State.

Equity in Home Heating

Objective 9

Promote equity in the community relating to home heating by:

a) Investigating an appropriate strategy for the replacement of woodheaters within houses owned by Housing Tasmania that are located in areas with poor air quality; and
b) Investigating the feasibility of subsidising fuel costs for alternative heating methods and costs for retrofitting insulation for low-income households.

Emissions from Backyard Burning

Objective 10

Reduce emissions from backyard burning by:

a) Developing *Air Quality Regulations* to prohibit backyard burning on properties less than 2,000 square metres;
b) Developing awareness programmes on the new restrictions relating to backyard burning;
c) Enforcing bans on backyard burning; and
d) Developing alternative green waste management programmes.

Industrial Sector

Effective Regulation of Industrial Emissions

Objective 11

Ensure effective regulatory control of industrial emissions by:

a) Integrating airshed capacity as part of the assessment of development applications for proposed new industrial activities and major upgrades of existing activities;
b) Training Local Government and industry on the use of the Tasmanian Air Pollution Potential Atlas and to evaluate proposals for new or upgraded point sources;
c) Regulating industry emissions consistently; and
d) Taking appropriate enforcement action against industries that consistently fail to meet regulatory requirements in regard to emissions to air.

Cleaner Production Programmes

Objective 12

Facilitate improved environmental performance of industrial emission sources by:

a) Promoting cleaner production programmes to assist industry minimise emissions and energy use; and
b) Establishing economic incentives to encourage industry to convert to cleaner fuels.

Planned Burning

Smoke Management From Planned Burns

Objective 13

Improve the management of smoke from planned burning in accordance with the *Environmental Protection Policy (Air Quality) 2004* by:

a) Establishing smoke management procedures for planned burning;
b) Incorporating smoke management procedures into the Forest Practices Code;
c) Improving the co-ordination of planned burning to minimise smoke impacts; and
d) Investigating the most appropriate way to manage and respond to complaints relating to planned burning.

Transport Sector

Emissions from Vehicles

Objective 14

Reduce emissions from vehicles by:

a) Promoting improvements in vehicle fuel quality through national programs, including the NEPM (Diesel Vehicle Emissions) educational programmes;
b) Investigating the feasibility of introducing a Smoky Vehicle Programme and regular vehicle tests;
c) Promoting the inclusion of air quality impacts into the charging system for heavy vehicles;
d) Promoting the conversion of heavy vehicles to LPG or CNG;
e) Promoting alternative fuels;
f) Promoting the uptake of fuel efficient vehicles including hybrid cars;
g) Investigating the means through which the age of Tasmania's bus fleet can be reduced;
h) Investigating means to optimise the use of rail for the transport of freight;
i) Promoting environmental considerations in government fleet purchasing policies;
j) Promoting increased utilisation of public transport; and
k) Promoting the use of non-motorised forms of travel.
l) Supporting and promoting healthy lifestyle initiatives in relation to transport and associated infrastructure.

Integration of Planning

Environmental Considerations in Planning

Objective 15

To promote the better integration of environmental impacts, in particular air quality issues, within planning processes by:

a) Promoting and providing training on the use of the Tasmanian Air Pollution Potential Atlas within Local Government planning processes;
b) Preparing guidance material to assist in integrating air quality considerations into the development and implementation of planning schemes;
c) Supporting and promoting the establishment of an environmentally sustainable housing demonstration project; and
d) Promoting ways to integrate transport issues within Local Government planning schemes.

2 EXPLANATORY DOCUMENT

2.1 INTRODUCTION

2.1.1 Background to the Strategy

The Environment Protection Policy (Air Quality) 2004, or Air Quality Policy, requires that a strategy be developed to achieve the National Environment Protection (Ambient Air Quality) Measure (Air NEPM) standards in Tasmania, as stated below:

Achieving Air NEPM Standards

(1) Within 12 months of the making of this Policy, the Minister will publish an Air Quality Strategy that:

(a) assesses compliance with the Air NEPM standards in Tasmania; and

(b) where the Air NEPM standards are not being met, specifies strategies for achieving compliance with the standards by 2008.

Notably, clause 7 of the Air Quality Policy defines Air NEPM *standards* to include standards cited in Schedule 2 of the National Environment Protection (Ambient Air Quality) Measure, referred to as the Air NEPM, and any *National Environment Protection Standards* for ambient air which are adopted in substitution for or in addition to those standards.

The Air NEPM

The Air NEPM was enacted in June 1998. Current *National Environment Protection Standards and Goals* are shown in Table 3. Monitoring stations are required within regions with populations of 25,000 people or more, or in regions with lower populations where local characteristics may contribute to high pollution levels.

Table 3: National Environment Protection Standards and Goals for Air Quality

Pollutant	Averaging period	Maximum (ambient) concentration	Goal within 10 years (maximum allowable exceedences)
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour	0.12 ppm	1 day a year
	1 year	0.03 ppm	No exceedences
Photochemical oxidants (as ozone)	1 hour	0.10 ppm	1 day a year
	4 hours	0.08 ppm	1 day a year
Sulfur dioxide	1 hour	0.20 ppm	1 day a year
	1 day	0.08 ppm	1 day a year
	1 year	0.02 ppm	No exceedences
Lead	1 year	0.50 µg/m^3	No exceedences
Particles as PM_{10}	1 day	50 µg/m^3	5 days a year

Previous studies have shown that of the six Air NEPM indicators, the pollutant of concern within Tasmania is particulate material. Smaller particles have been shown to be more harmful to human health, therefore, only fractions of the particulate matter are measured: PM_{10} and $PM_{2.5}$. Of these, only PM_{10} currently has a *National Environment Protection Standard* and an associated *National Environment Protection Goal* that requires jurisdictions to comply within a set period (by 2008).

In May 2003, two *Advisory Reporting Standards* were made for $PM_{2.5}$ (Table 4), requiring jurisdictions to monitor and report on ambient concentrations of $PM_{2.5}$, including exceedences and attributed causes. Although these have the status of *National Environment Protection Standards*, there is no timeframe for compliance. Rather, the associated National Environment Protection Goal requires jurisdictions to accumulate data that will be used to inform a review of the Air NEPM, due to commence in 2005. This review will include a full assessment of whether health risks justify new $PM_{2.5}$ *National Environment Protection Standard(s)* and *Goal(s)* to protect the Australian population. If the review demonstrates the need, any new standards are likely to be made sometime around 2008.

Table 4: *Advisory Reporting Standards* and *Goal* for particles as $PM_{2.5}$ in the variation to the Air NEPM

Pollutant	Averaging period	Maximum (ambient) concentration	Goal
Particles as $PM_{2.5}$	1 day 1 year	25 µg/m^3 8 µg/m^3	Gather sufficient data nationally to facilitate a review of the standard as part of the review of this Measure scheduled to commence in 2005.

In Tasmania, assessments of most other indicators cited in Schedule 2 of the Air NEPM, have shown their concentrations to be low or insignificant against their respective *National Environment Protection Standards*. Of these, only carbon monoxide has been measured routinely at Prince of Wales Bay since 2001, although monitoring ceased in late 2004, due to low levels recorded. A carbon monoxide monitoring station is being established within Hobart CBD to assess emissions from vehicles.

A full discussion of the applicability of the Air NEPM indicators within Tasmania is given in the Amended Monitoring Plan for Tasmanian (DPIWE, 2005).

The Air Toxics NEPM

The National Environment Protection Council (NEPC) made the National Environment Protection Measure (Air Toxics), on 16 April 2004. The Air Toxics NEPM established monitoring investigation levels, requiring jurisdictions to undertake certain investigations to provide data to inform a risk-based review in 2008, but do not require compliance. If the review demonstrates the need, it is likely to lead to the ultimate adoption of further *National Environmental Protection Standards* that fall within the purview of the Air Quality Policy and hence this Strategy.

The NEPM (Diesel Vehicle Emissions)

The National Environment Protection (Diesel Vehicle Emissions) Measure, Diesel Vehicle NEPM was made on 29 June 2001. The NEPM (Diesel Vehicle Emissions) requires the reduction of exhaust emissions from in-service diesel vehicles. Diesel vehicles make up a

disproportionately high contribution to nitrogen oxides and particulate matter from the transport sector.

Tasmania Together Target

Tasmania *Together* is a long-term strategic plan for the State. Indicator 24.3.1 relates to the number of breaches of National Environment Protection Measure air standards. The targets that have been set are:

- less than 25 breaches of the Air NEPM Standards in Launceston by 2005; and
- 100% of monitored communities meet Air NEPM standards by 2010.

It is recommended that monitoring be required at every town with a population over 10,000 and other areas of known high pollution.

Environment Protection Policy (Air Quality) 2004

The Air Quality Policy is a statutory instrument under sections 96C to 96K of Tasmania's *Environmental Management and Pollution Control Act 1994* (EMPCA) and supersedes the already rescinded *Environment Protection (Atmospheric Pollution) Regulations 1974*.

In its original draft form, the Air Quality Policy also included provisions that would replace the *Environment Protection (Domestic Solid Fuel Burning Appliances) Regulations 1993* and further provisions to cover backyard burning (EPPRP 2002). For technical reasons, these provisions will now be incorporated into Regulations under EMPCA, which are likely to be made around the end of 2005. As these Regulations also form part of the mechanism for achieving compliance with the National Environment Protection Standard for PM_{10}, they fall clearly within the scope of this Strategy.

The Air Quality Policy aims to further the objectives of EMPCA as they apply to the air environment in Tasmania. Environmental values to be protected include the life, health and well being of humans and other forms of life, at present and in the future (including systems and ecological processes); visual amenity, and the useful life and aesthetic appearance of buildings, structures, property and materials.

Under Part 4 of the Air Quality Policy, point sources of air contaminants are to be managed by regulatory authorities. This includes:

- managing and regulating sources that have the potential to cause material or serious environmental harm or nuisance;
- establishing regulatory limits of concentrations or emission rates of pollutants from new or significantly upgraded point sources;
- setting regulatory controls and monitoring requirements proportionate to the level of environmental risk;
- taking all reasonable and practical measures for avoiding production of wastes that might be emitted to the atmosphere;
- applying Accepted Modern Technology to reduce emissions to atmosphere to the greatest extent practical;
- considering airshed capacity in determining permitted emissions from a point source, and specifically where emissions would prejudice compliance with the Air NEPM;
- providing for improved performance of existing point sources;
- providing for modelling of ground-level concentrations at or beyond the boundary of an activity to asses the potential for environmental harm or reduction of environmental impacts, or to assess air quality against set Design Criteria (Schedule 2), Air NEPM Standards or other appropriate criteria;

- allowing flexibility in emissions for a limited time, under certain very restricted conditions, where Design Criteria cannot be met, even with best practice; and
- requiring monitoring of emissions where appropriate.

Part 5 requires Regulatory Authorities to manage diffuse sources of air pollution that have the potential to cause environmental harm. These include sources such as motor vehicles and various forms of planned open burning. As noted previously, it is proposed that domestic combustion sources will be addressed through Regulations, projected to be made in the latter half of 2006.

Proposed Air Quality Regulations

It is proposed that the *Air Quality Regulations* will incorporate provisions for controlling emissions from domestic solid fuel burning appliances and backyard burning.

In Tasmania, this applies most widely to wood fired space heaters. It is proposed that the Regulations will cover wholesale, retail and private sales, and installation of heaters that fall within the scope of AS/NZS 4013. Where the Standard is invoked in the proposed Regulations, it is generally defined to mean the version of AS/NZS 4013 that is current at the time of manufacture or importation. Otherwise it is cited as the most recent version of AS/NZS 4013, where this is appropriate.

It is intended that the proposed Regulations will:

- require new heaters to be certified for compliance with AS/NZS 4013 and include design, labelling and emission requirements;
- require heaters to have a compliance plate attached, showing that the type or model meets the requirements of the most recent version of AS/NZS 4013;
- prohibit the sale or installation of non-complying second-hand heaters;
- prohibit modifications to a heater that are reasonably likely to increase emissions beyond the limit specified in the Standard. This also applies to installation or sale of heaters that have been modified or altered in this way;
- require heaters to be operated in a manner that minimises smoke emissions;
- define the emission of excess smoke from a domestic heater or fireplace as an environmental nuisance; and
- prohibit the burning of wastes on properties less than 2000 square metres in size, with provisions for a Council by-law to prevail where there is an inconsistency. This is intended to eliminate open burning in the normal urban residential property, while allowing for appropriate fuel reduction and regeneration burning.

2.1.2 Overall Focus of the Strategy

The key air quality issue in Tasmania relates to particulate matter (both PM_{10} and $PM_{2.5}$) and forms the main focus for management actions within this Strategy. It is also acknowledged that there may be other pollutants of concern such as air toxics, nitrogen oxides and sulfur dioxides. Further data is needed to assess potential impacts from these pollutants, and new data collection programmes are included in Section 2.2.1 (Air Quality Monitoring and Forecasting).

This Strategy focuses on the requirements of the Air Quality Policy in achieving compliance with the current PM_{10} *National Environment Protection Standard* and *Goal*, while acknowledging that a $PM_{2.5}$ Standard is likely to be made in the next few years, and could be

even more restrictive. How restrictive it will be for Tasmania is not well defined, partly because there is only limited information on the contributions of $PM_{2.5}$ to PM_{10} or other aspects of particle composition in Launceston, and no data for Hobart or other centres.

Other programmes

The Air Quality Policy is also part of a broader programme to achieve improvements in air quality within Tasmania, thereby reducing human and economic costs of air pollution on the Tasmanian community.

This Strategy was developed within the context provided by a range of broader programmes, either in place or under development. These programmes have components that will serve to enhance air quality and improve awareness of air quality issues and clarify the responsibilities of State and Local Government, industry and the community. They include:

- Tasmania *Together ;*
- Natural Resource Management (NRM) ; and
- Local Government Partnership Agreements.

All of these programmes impinge on air quality management within this State to some degree.

Councils are required use "its best endeavours to prevent or control acts or omissions which cause or are capable of causing pollution" for non-prescribed activities, ie not Level 2 or 3 activities. Councils also have an interest in the outcomes of assessment and regulation of Level 2 and 3 activities within their jurisdictions. Likewise, DPIWE has an interest in council regulation of non-prescribed activities. Therefore, it is especially important to maintain effective working relationships between the two levels of government. Further, it is important that industry is provided with a consistent base from which to carry out sustainable economic activities, while meeting or exceeding the statutory requirements placed upon it. Therefore it is essential to adopt an integrated strategic approach towards managing air quality within Tasmania in order to bring these programmes and interests together.

2.1.3 Rationale for the Strategy

Why the concern?

Over the last decade or so, considerable data has been gathered by researchers implicating tiny airborne particles in human mortality and morbidity resulting from a range of respiratory and heart diseases. In a sense, airborne particles have superseded many other air quality indicators such as photochemical oxidants in their perceived importance for public health in Australia.

What are particles?

Particles are tiny complex bits of material with a wide range of chemical and physical properties, leading to a similarly broad range of health impacts. Particles arising from combustion processes are particularly complex, consisting of a mixture of solid particles and liquid droplets, with many adsorbed chemical species, resulting from the incomplete combustion of fuels such as coal, oil and wood.

Collectively, airborne particles are known as *particulate material* (PM). The two main divisions or fractions of airborne particles that are of concern are PM_{10} and $PM_{2.5}$. The

numbers refer to the maximum size of the particles in micrometres (millionths of a metre) within each fraction. The $PM_{2.5}$ size fraction forms a subset of the PM_{10} size fraction. Particle sizes are stated in terms of *aerodynamic diameters*, because this measure reflects the behaviour of the particles in air, rather than their actual physical size or shape.

Size is important, because it affects the ability of these particles to enter the human respiratory system. The larger sized airborne particles tend to be trapped in the nose and throat, so are expelled or swallowed before reaching the lungs. A proportion of particles within the PM_{10} fraction can be drawn into the deep areas of the lungs, where they may lodge and transfer their loads of adsorbed chemicals into the small air sacs (alveoli). From there these chemicals can be transferred readily into the bloodstream. This is even more the case within the $PM_{2.5}$ fraction.

Health based studies

Epidemiological studies have demonstrated dose-response relationships between measured concentrations of PM_{10} and various indicators of health status. Since wood-smoke is comprised of fine particles and is known to be a significant source in urban areas where firewood is used for domestic heating, the concern about PM_{10} has focussed attention on this source of pollution.

Increased levels of PM_{10} are associated with increased levels of human morbidity (illness) and mortality (US EPA, 1996b). As the Final Impact Assessment for the Air NEPM notes (NEPC 1998, p. 120): *Over the past decade, evidence that human exposure to inhalable particles can result in significant increases in both morbidity and mortality has become overwhelming...*

The range of adverse health effects associated with increased PM_{10} is broad and includes various respiratory, cardiopulmonary, and cardiovascular diseases and mortality from a variety of causes (Lewtas, 1993; US EPA, 1996a, b). Specifically, elevated particulate concentrations have been associated with:

- increased total mortality;
- increased respiratory deaths;
- increased cardiovascular deaths;
- increased cancer deaths;
- increased risk of premature births and infant mortality;
- increased risk of pneumonia;
- increased risk of postneonatal mortality from respiratory disease and sudden infant death syndrome;
- increased hospital admissions and emergency room visits;
- increased hospital admissions, emergency room visits and surgery for respiratory and cardiovascular conditions;
- exacerbation of asthma attacks, increased bronchodilator use and increased hospital admissions associated with asthma attacks;
- increased pneumonia, bronchitis and chronic obstructive pulmonary disease;
- increased respiratory symptoms in both the lower and upper respiratory tract;
- decreased lung function;
- increased incidences of rhinitis;
- increased absenteeism; and
- increased number of days of restricted activity.

There is currently no evidence of a threshold level at which particulate pollution is not associated with adverse health effects. Low concentrations of particulate pollution have been linked to mortality and morbidity from a range of causes (DEH, 2002).

Fine particles (those with a diameter of less than 2.5 μm) may be more harmful than coarse particles (those with diameters between 2.5 and 10 μm), possibly due to the tendency for fine particles to be deposited over a greater surface area of the lung than larger particles and to be retained for longer periods of time in pulmonary tissue (US EPA 1996a, b).

In the Harvard Six Cities Study, Dockery *et al* (1993) showed that city-specific mortality rates among a sample of over 8,000 adults were linearly associated with fine particle concentrations ($PM_{2.5}$). Similarly, a Sydney study by Morgan et al (1998) showed that a 2.6% increase in daily mortality was associated with an increase in PM_{10} of approximately 25 $\mu g/m^3$. In Seattle, emergency room visits for asthma were observed to begin increasing at PM_{10} concentrations between 20 and 30 $\mu g/m^3$, at an estimated rate of 3.4% for each 10 $\mu g/m^3$ (Schwartz et al, 1993). In Sydney, increases in hospital admissions of 3% for COPD (chronic obstructive pulmonary disease) and 2.5% for heart disease have been found for an increase of PM_{10} levels of approximately 25 $\mu g/m^3$ (Morgan et al, 1996).

Tables 5 to 8 summarise the various dose response relationships between PM_{10} increases and health outcomes.

Table 5: The association between PM_{10} and daily mortality

Location and time	PM_{10} mean µg/m^3 (range)	% change in mortality for each 10 µg/m^3 increase in PM_{10} (95%CI*)	Reference
St. Louis, US (1985-86)	28 (1-97)	1.5% (0.1, 2.9)	Dockery et al, 1992
Kingston, US (1985-86)	30 (4-67)	1.6% (-1.3, 4.6)	Dockery et al, 1992
Utah Valley, US (1985-89)	47 (1-365)	1.5% (0.9, 2.1) total 3.7% (0.7, 6.7) respiratory 1.8% (0.4, 3.3) cardiac	Pope et al, 1992

Source: Vedal (1995)
* 95% CI – 95% confidence interval

Table 6: The association between PM_{10} and daily hospitalisation rates

Location	PM_{10} mean µg/m^3 (range)	% change in hospitalisation for each 10 µg/m^3 increase in PM_{10} (95%CI)	Reference
Toronto, Canada	33 (N/A-96)	2.1% (-0.85, 5.1) asthma 3.4% (0.4, 6.4) total respiratory	Thurston et al, 1994
Minneapolis, US	36 (18-58**)	4.5% (1.8, 7.5) COPD 1.6% (0.2, 2.9) pneumonia	Schwartz, 1994c
Birmingham, US	45 (19-77)	2.4% (0.8, 4.1) COPD 1.8% (0.7, 2.8) pneumonia	Schwartz, 1994b

Source: Vedal (1995)
** 10th and 90th percentiles

Table 7: The association between PM_{10} and respiratory symptoms

Location and time	PM_{10} mean $\mu g/m^3$ (range)	Population Group	% change in daily symptoms for each 10 $\mu g/m^3$ increase in PM_{10} (95% confidence interval)	Reference
6 US Cities (1984-88)	30 (N/A-117)	Children	LRI* 15.2% (6.3, 24.9) URI** 6.9% (-0.7, 15.0) Cough 8.6% (2.2, 15.4)	Neas et al, 1992
Utah Valley, US (1989-90)	46 (11-195)	Children Asthmatics	LRI 5.1% (1.1, 9.3) URI 3.7% (0.7, 6.8) LRI 0.2% (-4.2, 4.8) URI -0.2% (-4.2, 4.0)	Pope, 1991
Utah Valley, US (1990-91)	76 (7-251)	Symptomatic children Asymptomatic children	LRI 4.8% (1.5, 8.3) URI 3.7% (0.6, 6.9) Cough 2.4% (-1.8, 6.8) LRI 5.2% (2.3, 8.2) URI -0.2% (4.9, 4.7) Cough 3.4% (-0.1, 7.0)	Pope et al, 1992
Wageningen, Netherlands (1990-91)	N/A (10-175)	Children	Cough 0.7% (-0.2, 1.6)	Roemer et al, 1993

Source: Vedal (1995)
*LRI = lower respiratory illness
**URI = upper respiratory illness

Table 8: Short-term exposure-response relationships of PM_{10} with various health indicators

Health effect indicators	Percentage change in health indicator per 10 μg/m^3 increase in daily mean PM_{10}
Mortality	
Daily mortality (all cause)	1.0[(a)]
Respiratory deaths	3.4[(a)]
Cardiovascular deaths	1.4[(a)]
Hospital admissions	
Respiratory Disease	1.96[(b)]
COPD[(d)]	3.26[(b)]
Pneumonia	1.42[(b)]
Heart disease	0.4[(c)]
Exacerbation of asthma	3.0[(a)]
Increase in respiratory symptoms	
Lower Respiratory	3.0[(a)]
Upper Respiratory	0.7[(a)]
Cough	1.2(a)

(a) Dockery and Pope (1994); (b) Abt. Associates (1996); (c) Schwartz and Morris (1995). Source: NEPC (1998b); (d) Chronic Obstructive Pulmonary Disease

Costs of particulate pollution in Tasmania

The health costs associated with particulate pollution are difficult to quantify, despite the many studies conducted in the past. Most recently, the Commonwealth Department of the Environment and Heritage commissioned research into the costs of urban air pollution in Australia (Syneca Consulting, 2004). The draft report refers to a value of $2.5 million per death related to the health effects of air pollution. For the capital city airsheds in New South Wales, Victoria, Western Australia and Queensland, there are an estimated 2,185 premature deaths per year due to PM_{10} at a value, using this figure, of approximately $5.5 billion.

Based on Launceston PM_{10} monitoring data from 2002, the average PM_{10} concentration was 18 μg/m^3. The population in Launceston is approximately 70,000 and the death rate is approximately 460 per year (based on the average Australian death rate of 6.6 deaths per year per 1,000 people). Assuming that the mortality rate increased by 1% per 10 μg/m^3, there were approximately 8 deaths per year in Launceston attributable to PM_{10}. Using the $2.5 million value per death, the health costs in Launceston due to PM_{10} are estimated to be $20 million per year.

2.1.4 Development of the Strategy

The development of the Strategy was overseen by a Steering Committee consisting of representative/s from:

- Department of Health and Human Services (DHHS);
- Department of Infrastructure, Energy and Resources (DIER);
- Department of Primary Industries, Water and Environment (DPIWE), *now Department of Tourism, Arts and the Environment (DTAE)*;
- Local Government Association of Tasmania (LGAT); and
- Tasmania Fire Service (TFS).

A project team was established to prepare the Strategy. The project team consisted of representatives from

- DHHS;
- DPIWE, now DTAE; and
- Local Government.

Several stakeholders provided input during the development of the Draft Strategy.

2.1.5 Current Status of Air Quality in Tasmania

Currently, the Department of Tourism, Arts and Environment (DTAE) operates two Air NEPM monitoring stations in Tasmania at:

- New Town in Hobart, monitoring carbon monoxide and PM_{10}; and
- Ti Tree Bend in Launceston, monitoring PM_{10}.

An injection of $816,000 of capital works funding has been committed by the State Government over the four years to 2008, to upgrade PM_{10} monitoring and also establish a capability for $PM_{2.5}$ monitoring as required under the amendment to the Air NEPM made in May 2003.

A temporary monitoring station was also established in Devonport in the second half of 2003 to evaluate the need for a permanent station. The results of this campaign confirmed the need for a station, which is due for establishment by the second quarter of 2006, under the above funding programme.

Tasmania's performance towards meeting the *National Environment Protection Standards* and *Goals*, as reported to the National Environment Protection Council in July 2004, is summarised in Table 9.

Table 9: Compliance with Air NEPM requirements for the 2003 measurement year

Location	Parameter	Number of exceedences in 2003	Compliance with Air NEPM
Hobart	Carbon monoxide	0	Yes
Hobart	PM_{10}	3	Yes
Launceston	PM_{10}	26	No
Devonport	Total suspended particulates	2 (limited monitoring period)	Undetermined

Hobart Air Quality

Results for Hobart show that air quality, as measured at Prince of Wales Bay, is well within compliance with the *National Environment Protection Standards* and *Goals* for carbon monoxide and PM_{10}. Two of the exceedences for PM_{10} were attributed to woodsmoke trapped in a local temperature inversion during the winter season. The other exceedence occurred in January and was attributed to the Broadmarsh bushfires. There were no exceedences at Prince of Wales Bay in 2004.

However, it has become clear that the Prince of Wales Bay station is not representative of population exposure in the lower Derwent Valley. Further monitoring also commenced in 2005 to evaluate patterns of particulate pollution around the Derwent Valley. The difficulty is that, because of the topography and drainage patterns around Hobart, air quality is not consistent across the region, as initial studies showed to be the case in the Launceston. It is likely that exposure to elevated particle concentrations will occur in areas where "ponding" of cold air occurs, and smoke from woodheaters tends to feed in and collect during still conditions. Unfortunately, the Prince of Wales Bay station was not located correctly to intercept the smoke draining down the valley and collecting in these areas, which incidentally coincide with residential areas. Therefore in response, the main NEPM station has been moved to New Town, some 2.5km away (see also "Information and Data Gaps").

Launceston Air Quality

Results for Launceston's Ti Tree Bend measurement site show that air quality has improved over the last eight years. However, winter air quality does not comply with the *National Environment Protection Standard* and *Goal* for PM_{10} (see Table 9). In 2003 there were 19 exceedences of the 50 $\mu g/m^3$ due to wood smoke and 7 exceedences due to bushfires and local vegetation burning. There were 10 exceedences in 2004. These exceedences were all attributed to the accumulation of woodsmoke particles in the Tamar Valley due to increased use of woodheaters, associated with low ambient temperatures, and strong temperature inversion conditions trapping smoke.

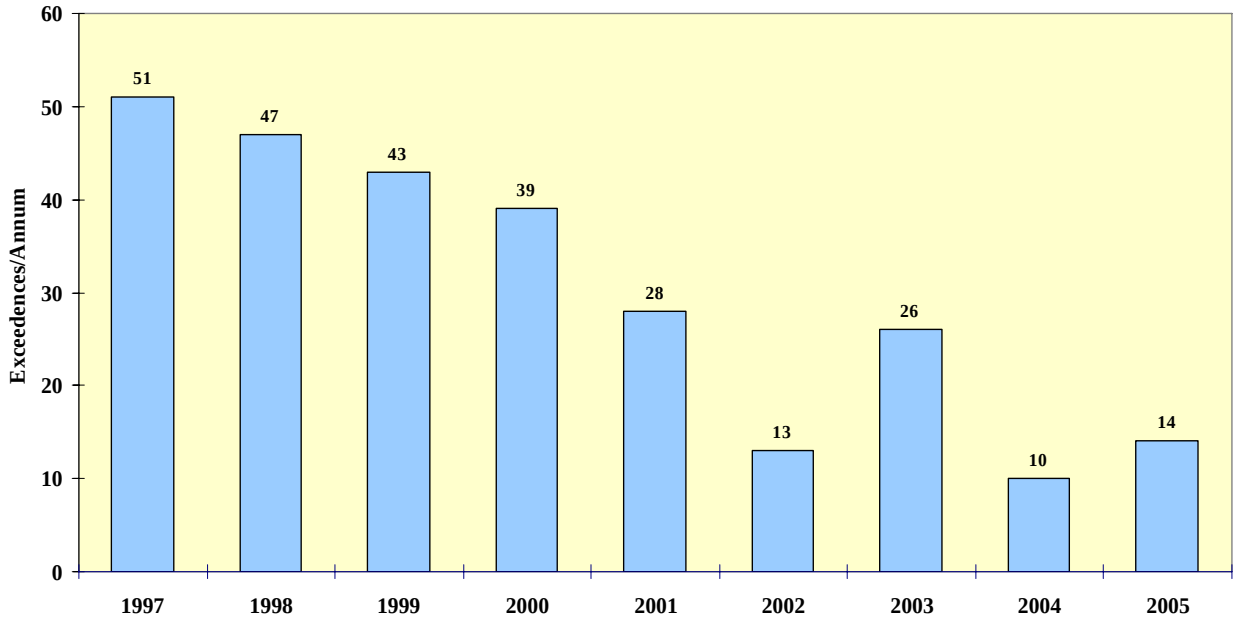

Figure 1: Annual exceedences of the PM_{10} National Environment Protection Standard at Ti Tree Bend, Launceston, 1997 to 2005

Devonport air quality

A temporary monitoring station for total suspended particulates was established in Devonport in the second half of 2003, to evaluate the need for a permanent station. There were two occasions identified when the PM_{10} concentration may have exceeded 50 $\mu g/m^3$. This demonstrated the need for long term monitoring, and a permanent monitoring station for PM_{10} will be established in 2006 to gather further information on air quality in Devonport.

George Town air quality

There have been some air quality issues in George Town, relating to emissions of fluoride, sulfur dioxide and particles from the Bell Bay industrial estate. There are several significant industrial facilities located at Bell Bay, five kilometres south-east of George Town. The industrial facilities include an aluminium smelter (Comalco), ferro-alloy producer (TEMCO), fibre-board operation (Pinepanels Bell Bay*)* and a thermal power station (Bell Bay Power). The industrial facilities have made significant progress in reducing emissions to air. For example, Comalco installed dry scrubbers in 1997 and 2001 at a cost of about $56M which has reduced fluoride emissions significantly. TEMCO has also spent significant amounts on reducing its process emissions. The Bell Bay power station has converted from oil to natural gas.

2.1.6 Sources of PM_{10}

What are the sources of particles?

Poorly operated woodheaters emit excessive quantities of particles, carbon monoxide and a wide range of volatile and semi-volatile chemicals. These include aldehydes and other oxygenated products of partial combustion, which are responsible for the odour and irritation caused by smoke; and polycyclic organic material (POM), also known as polycyclic aromatic hydrocarbons (PAH). These smoke particles tend to be very much towards the smaller end of the $PM_{2.5}$ size range, in the sub-micron or "nano-particle" range (Todd, 2004).

Particles are generally the pollutant of greatest health concern from woodheaters, but the odour and irritation caused by woodsmoke is also a common source of complaint within urban communities. There are several programmes in place to address the nuisance aspects of woodsmoke such as seeking to improve people's awareness of correct principles of woodheater operation. This Strategy advocates the adoption of alternative forms of heating, such as electricity and gas where possible (see Section 2.3.1: Existing Woodheaters). However, care must also be taken to ensure that in solving one problem, we do not create another. For example, the use of gas appliances that do not vent to the outside atmosphere may increase indoor levels of nitrogen oxides, carbon monoxide, other trace pollutants and humidity, which may also cause health problems for some people.

Vehicles can also emit a similar range of materials, including very small particles. Diesel-fuelled vehicles are particularly known to emit particles with associated semi-volatiles such as PAHs, and have been addressed in a separate NEPM (Diesel Vehicle Emissions) discussed in Section 2.1.1. In the past, lead emissions were a problem from petrol-fuelled vehicles, but the removal of leaded petrol from the market has not only eliminated a wide-spread source of airborne lead, but has permitted the use of catalyst technology to remove pollution, including carbonaceous particles, from their exhaust emissions. Analogously, reduction of sulfur content of diesel fuels should enable engine and control technology that will reduce particle emissions (see Section 2.6.1: Emissions from Vehicles).

Industrial sources vary considerably according to the fuel utilised and the nature of the processes undertaken. Boilers utilising coal, oil or wood have the potential to emit fine carbonaceous particles similar to those from woodheaters. Gas firing eliminates a large proportion of particulate emissions from boilers and other industrial heating processes, but may emit greater quantities of gaseous pollutants such as nitrogen oxides. Such emissions are the subject of the permitting system under EMPCA, and are discussed in more detail later (see Section 2.4.1 Effective Regulation of Industrial Emissions).

Open burning may also be a significant contributor to particle loadings in some areas. Backyard burning is heavily restricted or prohibited by some councils, but there is also an issue of the large quantities of domestic green waste accumulated by households and council landfills and waste transfer stations. In some cases, burning of greenwaste at municipal depots has become a problem. Effectively, collection of green waste by councils has transferred responsibility for the problem from the domestic arena to Local Government, often without adequate facilities for handling the quantities of waste involved. This points to a need for an integrated green waste strategy for Local Government in the various regions of Tasmania.

Planned burning (by the forestry industry, farmers and others) is a contentious issue for many people, and is known to contribute to some exceedences of the PM_{10} *National Environment Protection Standard*. In 2003, there were four exceedences of the PM_{10} Standard due to local vegetation burning. This Strategy seeks to promote the best possible management practices in the area of regeneration and fuel reduction burning, as discussed in Section 2.5: Planned Burning.

What is the relative importance of these sources?

The National Pollutant Inventory (NPI) provides an estimate of the relative sources of PM_{10}, however the data must be used with care. Data in the NPI are based on estimated emissions and the accuracy of the data will vary depending on the technique used. Industrial emissions are re-estimated and submitted annually. Emissions for other sources (aggregated emissions) were estimated in 1998-1999 and have not since been updated. It is noted that aggregated emission data includes PM_{10} emissions from the Tamar Valley and Hobart airsheds and not the entire State. However, these two airsheds would include the majority of the State's population.

Sources of PM_{10} in Tasmania

Figure 2 shows the breakdown in the sources of PM_{10} for the whole of Tasmania for the financial year 2003 – 2004 using NPI data. The total quantity of PM_{10} emitted in that year is reported to be 8,000,000 kilograms.

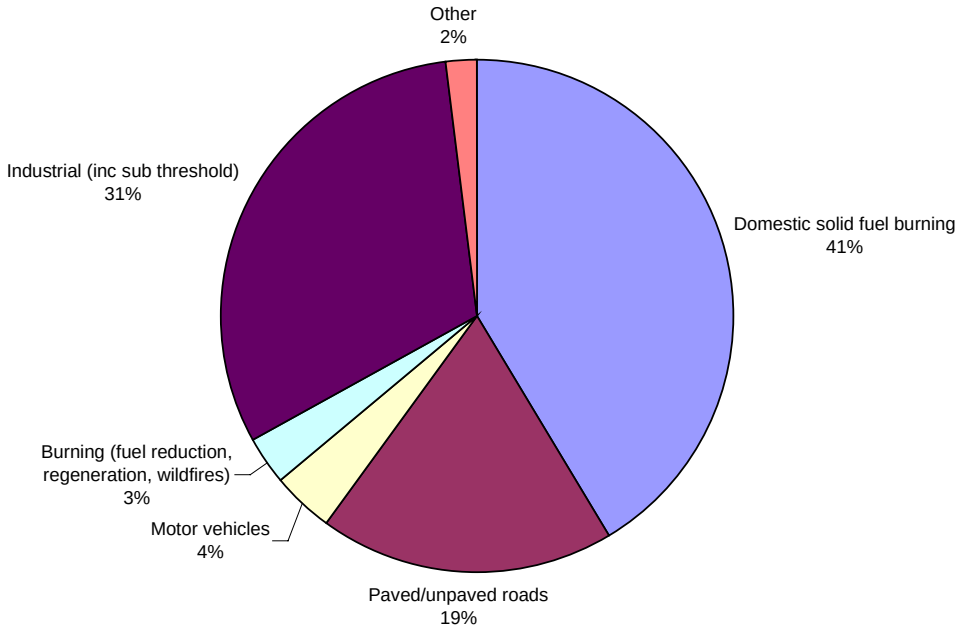

Figure 2: Estimated sources of PM_{10} across Tasmania (NPI 2003 – 2004)

Figure 2 indicates that the largest source of PM_{10} is from domestic woodheaters followed closely by industrial sources. However, this does not take into account the geographic distribution of sources and populations within the State. The industrial category includes facilities that are above the reporting threshold and are required to report annually to the NPI. It also includes the estimated aggregated emissions from fuel combustion processes at facilities that are below the reporting threshold.

Of the 31% of the emissions from industrial sources, approximately one third of these sources are located outside the main urban centres (Hobart, Launceston, Devonport, Burnie, Ulverstone and George Town) and where there are few competing sources of PM_{10} and lower population densities. In general, this means that there is a low risk of population exposure to elevated particle concentrations.

The largest State-wide contributor to PM_{10} is from domestic solid fuel burning. The domestic solid fuel-burning category includes heaters and stoves that use wood, coal and briquettes.

The contribution from paved and unpaved roads to PM10 loading is estimated to be 19%. This source is mainly from particulate matter on the road surface being suspended when a vehicle travels on the paved road. Particulate matter may be deposited onto the road surface through the falling of dust particles, litter, dirt carried from unpaved lots or sites, erosion from adjacent areas and spillage. There are a number of processes that remove these particles including re-entrainment, wind, rainfall and street sweeping. It is acknowledged that the emissions from paved roads are estimates only based on empirical factors, road surface silt loading, average mass of vehicles and the number of kilometres travelled.

Emissions of PM_{10} from fuel reduction, regeneration and agricultural burns and wildfires are estimated to contribute approximately 3% of the total State-wide PM_{10} loading. Emissions from planned burning tend to be sporadic (see Section 2.5). Motor vehicles are estimated to contribute 4%. The "other" category includes emissions from a number of relatively minor sources such as lawn mowing and the burning of domestic liquid and gas fuels.

Sources of PM_{10} within the Launceston City Council boundary

Focussing on the relative contributions from sources of PM_{10} within the main urban areas paints a different picture, as shown in Figure 3, which illustrates the sources of PM_{10} within the Launceston City Council area for the year 2003-2004. NPI data relating to domestic solid fuel burning has been reduced to take into account the approximate reduction in the proportion of households with woodheaters from 46% to 30%. Also the NPI data relating to industrial facilities has been increased following a recent review of emissions from non-reporting Level 1 and 2 industry by the Launceston City Council and DTAE. Figure 3 shows that domestic solid fuel burning is still the major source. The contribution from industrial facilities is only 7%. The second largest source of PM_{10} is from paved and unpaved roads.

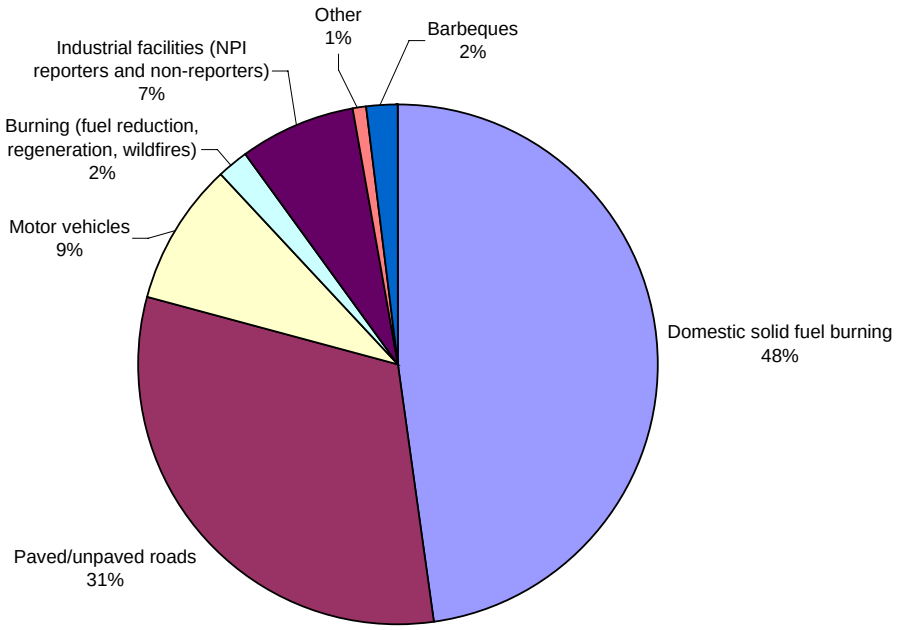

Figure 3: Estimated sources of PM_{10} within Launceston City Council Boundary averaged over the year (NPI 2003 – 2004, updated domestic solid fuel burning 2004, updated non-reporting industrial facilities 2004)

The majority of PM_{10} exceedences in Launceston occur in winter, and are generally associated with emissions from domestic solid fuel burning during the coolest months of the year. Figure 4 shows the relative contributions from sources of PM_{10} during the coolest six months of the year, which is when exceedences of the *National Environment Protection Standard* are more likely to occur.

The data is based on the assumption that in the coolest six months of the year:

- 50% of emissions from industry, motor vehicles and the other category occur;
- 100% of emissions from domestic solid fuel burning occur; and
- 25% of emissions from burning (fuel reduction, regeneration, agricultural and wildfires) and paved/unpaved roads occur.

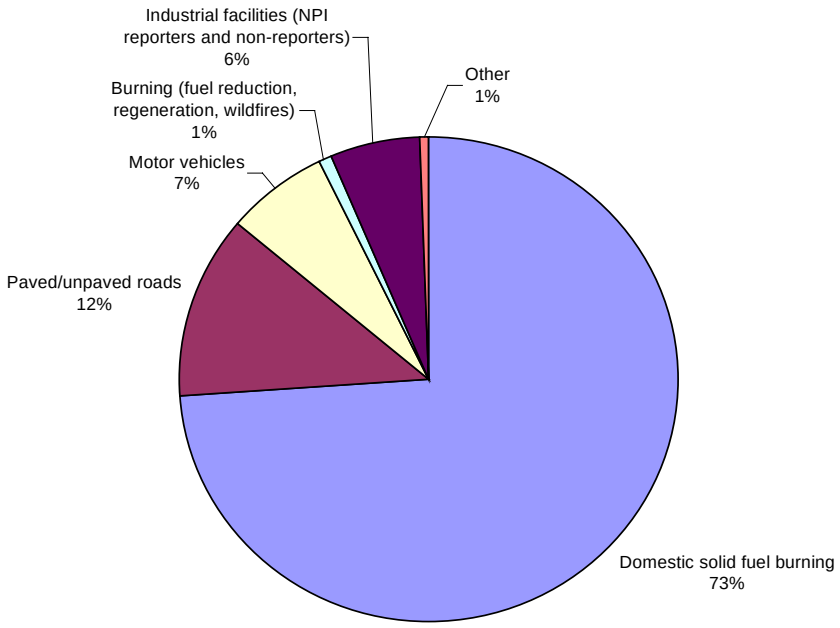

Figure 4: Estimated sources of PM_{10} within Launceston City Council Boundary during the coolest 6 months (NPI 2003 – 2004, updated domestic solid fuel burning 2004, updated non-reporting industrial facilities 2004)

Figure 4 suggests that despite the reduction in the number of woodheaters in Launceston, domestic solid fuel burning is still the main source of PM_{10} emissions. Emissions from paved and unpaved roads and motor vehicles are the next largest contributors. Industrial emissions contribute approximately 6% to PM_{10} emissions in Launceston during the coolest six months of the year.

Figure 4 does not include the contribution of PM_{10} sources outside the Launceston City Council area. The proportion of PM_{10} from domestic wood burning that migrates from the Tamar Valley into Launceston is estimated to be 4% (Power, 2001). It is possible that other particulate sources such as fuel reduction and regeneration burns outside the Launceston City Council area may also contribute to PM_{10} levels in Launceston.

A University of Tasmania research project was recently completed that analysed particulate samples taken from Launceston (Jordan, 2004). Carbon 14 dating was used to determine the proportion of particulate matter from fossil fuels, such as vehicle emissions, and the proportion from biomass such as domestic and industrial burning of wood. Results show that "woodsmoke contributed on average about 80% ± 20% of wintertime pollution in Launceston." This includes domestic and industrial sources of woodsmoke. Based on data from Figure 4 combined emissions from industrial (which includes non-woodsmoke sources)

and domestic sources of woodsmoke are approximately 79% which is similar to the proportion obtained from the research project.

2.1.7 Projecting air quality trends into the future

Can the PM_{10} National Air Quality Goal be met by 2008?

It is a requirement of the Air NEPM that the *Standards* and *Goals* be met by the year 2008. For Tasmania, this equates to meeting the PM_{10} *Standard* and *Goal*. The question is: *What is the likely trend in annual exceedences over the coming years?*

Predicting air quality trends is a challenge. There are many variables influencing the concentrations of pollutants, with weather conditions being a primary determinant. Weather patterns change from year to year and even if the quantity of PM_{10} emitted into the atmosphere remains the same, the concentrations in ambient air will vary considerably between years.

The air quality in Launceston has been improving over time. This has been due to a clear trend towards replacing domestic woodheaters with alternative forms of heating and improved operation of woodheaters. The trend in households using wood for space heating is as follows:

- 60% in 1996 or about 17,170 households (surveyed by Launceston City Council);
- 44% in 2000 or about 12,600 households (surveyed by DPIWE);
- 30% in 2004 or about 8,600 households (surveyed by Energy Consult, 2004).

The number of woodheaters that can be sustained in Launceston whilst meeting the PM_{10} standard has been estimated to be around 5,000 (Power, 2001). Further work in this area is currently underway. If the trend away from woodheaters continues at the current rate, the number of woodheaters in Launceston will fall to 5,000 in approximately 2008. However it is possible that the rate of removal of woodheaters may begin to decline, due to market resistance. Those people who have access to cheap or free wood or who prefer the type of heat and ambience generated from woodheaters may be less likely to change over to other forms of heating.

Since there is no high quality trend data for Hobart or other centres at this stage, an assessment against compliance with the Air NEPM cannot be made.

Will the Advisory Reporting Standards for $PM_{2.5}$ be met?

It is difficult to confirm whether the $PM_{2.5}$ *Advisory Reporting Standards* will be met since there is limited data relating to measured $PM_{2.5}$ concentrations. *Advisory Reporting Standards* for $PM_{2.5}$ have been set for daily and calendar year averages.

Limited sampling in 1997 at Ti Tree Bend indicated that 78% of the winter PM_{10} fraction fell within the $PM_{2.5}$ fraction (Keywood, 2000). This compares with estimates in the US of $PM_{2.5}/PM_{10}$ ratios ranging from 60 to 80%. However, mass concentrations ratios of $PM_{2.5}/PM_{10}$ appear to be much lower in Melbourne, Sydney, Brisbane and Adelaide, as evidenced by a recent study (EPA Victoria, et al, 2004). This study showed a consistent $PM_{2.5}/PM_{10}$ ratio of approximately 40% for all mainland sites.

So clearly, Launceston has a high proportion of $PM_{2.5}$ compared with mainland capital city sites. Launceston has several features that are different from the mainland centres included in

this study that may account for the difference. It would be of interest to have data on other Australian cities where woodsmoke pollution is a recognised problem.

Routine $PM_{2.5}$ monitoring has commenced in Launceston and Hobart in 2005. Therefore, more robust $PM_{2.5}/PM_{10}$ data is now becoming available and the proportion of $PM_{2.5}$ is being investigated.

Assuming a $PM_{2.5}/PM_{10}$ ratio of 78% during winter and spring and a ratio of 35% during summer and autumn, there were 35 breaches of the $PM_{2.5}$ daily *Advisory Reporting Standard* during 2004 in Launceston. Assuming a more conservative $PM_{2.5}/PM_{10}$ ratio of 60%, the number of breaches of the *Advisory Reporting Standard* in 2004 was 16. It is noted that there are no defined allowable exceedences of the $PM_{2.5}$ *Advisory Reporting Standard*. As noted previously, the A*dvisory Reporting Standard* is a health-based standard to assess the results of monitoring. Further work is currently underway to project emissions into the future, taking into account the current trends away from wood heating in Launceston.

As mentioned previously, an assessment of $PM_{2.5}$ cannot be made in Hobart or other areas of the State due to a lack of high quality data.

2.1.8 National Programmes

The National Woodheater Audit Programme

In 2003, the Commonwealth Department of Environment and Heritage and the manufacturers, on behalf of all participating jurisdictions, undertook a national audit of a sample of woodheaters from retail shop floors, against the requirements of AS/NZS 4013-2001. AS/NZS 4013-2001 defines a range of specifications for all locally manufactured and imported woodheaters that are to be accredited for sale into the Australian market. Under the Standard, heaters are allowed to emit no more than 4 grams of particles per kilogram of wood burnt, and are tested in NATA accredited laboratories *under strictly controlled standardised firing conditions.*

Of the heaters sampled, some 58% showed non-compliances with the Standard, either against labelling, design or particle emissions requirements. The implication was that those that could not meet the emission limit under these *ideal* conditions would be unable to meet them during normal domestic operation. Given the likelihood that the results were representative of the performance across the range of models available, jurisdictions and community organisations widely regarded this as an untenable situation.

In consequence, a Jurisdictional working group was established under the chairmanship of the Commonwealth Department of Environment and Heritage, to develop, in conjunction with the industry body, a program to improve manufacturing design and quality, and to evaluate accreditation processes. The Commonwealth Minister of Environment and Heritage, Dr Kemp, released the resulting National Woodheater Action Plan, on behalf of all participating jurisdictions, in April 2004. The Plan establishes a continuing audit programme for woodheaters and tightens accreditation requirements.

Various jurisdictions, including Tasmania, also referred several consumer issues to their respective fair-trading authorities, and the Australian Competition and Consumer Commission also decided to investigate some aspects of performance of manufacturers.

Code of Practice for Firewood Merchants

A similar Commonwealth-State programme was established to develop a voluntary National Code of Practice for firewood quality, providing firewood merchants with a set of guidelines for the supply of fuel to the domestic market. This is discussed in more detail in Section 2.3.4 (Woodheater Fuel Quality).

2.1.9 Practicality

Throughout the development of the Strategy, consideration was given to ensuring that it is based on practical programmes to achieve the objectives. Issues relating to socio-economic factors such as affordability of home heating for low-income earners, have also been considered.

2.2 Information and Data Gaps

2.2.1 Air Quality Monitoring and Forecasting

Objective 1

Improve information available to evaluate air quality and monitor trends within the State by:

a) Upgrading the existing monitoring system in accordance with the protocol of the National Environment Protection (Ambient Air Quality) Measure through:
- **upgrading of PM_{10} monitoring equipment and capability;**
- **establishing a new $PM_{2.5}$ monitoring system in Launceston and Hobart;**
- **establishing a new monitoring station in Hobart in a more appropriate location;**
- **monitoring PM_{10} in Devonport;**
- **monitoring of carbon monoxide in the Hobart CBD;**

b) Investigating the need for further air quality monitoring in population areas covered under Tasmania *Together* Benchmark 24.3.1;

c) Investigating the need for a mobile monitoring capability for campaign monitoring and to respond to specific pollution events or complaints;

d) Establishing a broad-based airborne particle monitoring programme in Greater Hobart;

e) Facilitating the development of a joint industry-funded monitoring station at George Town;

f) Identifying areas of potential high population exposure to air toxics and conducting monitoring programmes where necessary, in accordance with the National Environment Protection (Air Toxics) Measure;

g) Reviewing and if possible, improving the accuracy of air quality forecasts in Launceston;

h) Developing an Air Pollution Potential Atlas for the State identifying areas likely to have poor air dispersion to facilitate better air quality management; and

i) Improving the quality of dispersion modelling for Development Proposals and Environmental Management Plans

j) Developing and implementing a smoke monitoring plan for planned burning in accordance with the *Environment Protection Policy (Air Quality) 2004*.

Air quality monitoring

Monitoring of daily concentrations of PM_{10} as required by the National Environment Protection (Ambient Air Quality) Measure, referred to as the Ambient Air Quality NEPM, has been undertaken since 2001 in Launceston and since 2000 in Hobart. Prior to that, monitoring in Launceston was conducted on a six-day or two-day cycle. Further, results of a short-term total suspended particulate (TSP) monitoring programme undertaken in Devonport in the winter of 2003 showed that the PM_{10} standard and goal was likely to be exceeded, indicating the need for a PM_{10} monitoring station in Devonport.

The original monitoring equipment has reached the end of its practical useful life, so in 2004, the DPIWE identified a need to upgrade the PM_{10} high volume air sampling equipment at both sites. In addition, the introduction of the $PM_{2.5}$ *Advisory Reporting Standards* in 2003 has necessitated the establishment of new facilities to monitor $PM_{2.5}$ in Launceston and Hobart.

As a result, the State Government made $816,000 available in mid-2004 to establish a NATA accredited particle monitoring system in Tasmania, over the four years to 2008, to produce high-quality data in accordance with the Ambient Air Quality NEPM protocol, as below:

- PM_{10} and $PM_{2.5}$ at Launceston and Hobart, commenced 2005; and
- PM_{10} monitoring Devonport, commencing in 2006.

Note that the programme to monitor air quality at these locations is identified in the *National Environment Protection Measure for Ambient Air Quality: Tasmanian Monitoring Plan* (DPIWE, 2005).

The Tasmania *Together* indicator 24.3.1 invokes the Ambient Air Quality NEPM Standards, but recommends a much tighter population criterion of 10,000 (refer to Section 2.1.1). This implies the need to investigate some of the smaller Tasmanian towns that do not fall within the purview of the Ambient Air Quality NEPM. As part of the program to upgrade the monitoring system (see below), a $PM_{10}/PM_{2.5}$ monitor will be purchased in 2007. This will enable the DTAE to initiate a program of campaign monitoring in these smaller towns to evaluate air quality and exposure of populations.

This section of the Strategy also identifies the possibility of establishing a "mobile monitoring" capability to allow DTAE to respond to specific pollution events or complaints of significance, within a short time. The need for this type of capability will be assessed by DTAE.

Review of the Hobart Monitoring Station

The location of the Hobart Princes of Wales monitoring station was reviewed in 2004 because of concerns about its ability to represent population exposure within greater Hobart. Several short-term studies measuring PM_{10} concentrations were conducted around Hobart during 2003 and 2004, using portable DustTrak™ monitors. These studies identified some areas in Hobart which experience significantly elevated winter PM_{10} concentrations. The studies confirmed that air quality at the Prince of Wales Bay monitoring station was not truly representative of exposure of the population in Hobart.

The site chosen as most likely to represent the exposure of the population to particulates in Hobart is a low-lying area in New Town. A new station was completed in May 2006, incorporating the original TEOM from Prince of Wales Bay station, a new PM_{10} and $PM_{2.5}$ low volume sampler, and a nephelometer. However, a high volume air sampler is being

maintained at the Prince of Wales Bay site for at least 12 months to provide a comparison between data from the new station and the data from the old site.

Over the past four years, carbon monoxide monitoring equipment located at Prince of Wales Bay has measured very low concentrations of carbon monoxide. Since vehicles are the major source of carbon monoxide in the greater Hobart area, DTAE decided to establish a peak monitoring station in the central business district by the end of 2007.

An extended nephelometry survey of fine particles in Greater Hobart commenced in 2005. The aim of the study is to provide medium to long term data on spatial distributions and transport of woodsmoke through population centres in the Derwent Valley. Nephelometers are included in the instrumentation at both the new and old sites, to provide a comparison between current and historical monitoring data. Overall, nephelometer stations are located in an array from north to south at the following sites:

- New Town;
- Glenorchy;
- Montagu Bay; and
- Prince of Wales Bay.

If sufficient resources become available, further nephelometer stations are planned for Rosny, Warrane, Mornington and a more elevated location in New Town. These stations will provide information in areas that are likely to have less compromised air quality.

This programme has been established because, unlike the Tamar Valley, the complexity of the Derwent Valley does not readily allow selection of a "representative site" for air quality across the airshed. Low-lying areas that encourage "ponding" of cold air tend to accumulate smoke, while areas of higher ground are less likely to experience degraded air quality. The nephelometry data will provide further data that will facilitate understanding of population exposures within the Hobart area.

Air quality monitoring at Bell Bay

There are several significant industrial facilities located at Bell Bay, five kilometres south east of George Town. Over the years, there have been a significant number of complaints in George Town about fallout of particles, which the complainants believed are generated from industrial sources. As part of this Strategy, a joint industry-funded monitoring station will be established in George Town. Its purpose will be to evaluate overall air quality in the area and to quantify industrial contributions to air contaminant loadings, in the context of other sources along the Tamar Valley. This programme will also assist DTAE to determine airshed capacities for various pollutants in the Bell Bay area.

Air toxics

As discussed in Section 2.1.1 (Background to the Strategy), the National Environment Protection (Air Toxics) Measure, referred to as the Air Toxics NEPM was introduced in April 2004. The Air Toxics NEPM requires a desktop study to identify sites where significantly elevated concentrations of one or more air toxics are expected to occur (Stage 1). The next step is to identify which sites identified in Stage 1 have the potential for significant population exposure to air toxics (Stage 2). Monitoring equipment is to be established at Stage 2 sites in order of priority.

Air quality forecasts

Assuming consistent emissions within an airshed, the primary determinant of actual air quality on any given day is the weather. For example, an accurate forecast of the next day's weather conditions in Launceston will be a good predictor for the air pollution levels to which the population will be exposed on that day.

The Bureau of Meteorology issues daily air quality forecasts for Launceston from mid-April to the beginning of October each year. The forecasts are based on observed and predicted weather conditions. Currently the forecasts are included in the 5pm weather forecast and forecast air quality as good, moderate or poor for the following day.

These air quality forecasts indicate the *potential* for elevated levels of contaminants, based on the ability of the atmosphere to disperse pollutants. If a large additional source of particulate matter, such as a wildfire, pumps further smoke into the airshed, actual PM_{10} or $PM_{2.5}$ concentrations may become high, even on a day of moderate dispersion.

The historical air quality forecasts are to be compared against the actual particulate concentrations measured in Launceston to determine their usefulness and degree of accuracy. This review may then be used to review and/or improve the prediction methods. Further discussion of air quality forecasts is included in Section 2.3.5 (Community Education) and Section 2.5 (Planned Burning).

Air pollution potential

At the time of writing, the Bureau of Meteorology Launceston Observations Programme was in a state of transition, with considerable uncertainty as to whether the data required to run the model would be available in future years. This has created the opportunity to replace it with an improved model.

For the past few years the *Australian Air Quality Forecasting System* has been piloted in Melbourne and Sydney (http://www.dar.csiro.au/information/aaqfs.html). The system selects appropriate numerical prognoses from the Bureau's weather forecasting models, which cover the entire country at a coarse scale, and utilises them to initialise more detailed local atmospheric modelling. The result is a set of highly detailed meteorological fields, forecast for the day in question. These can be used to produce generalised maps of predicted Air Pollution Potential (APP). Air Pollution Potential is simply a measure of the ability of the atmosphere to disperse any pollution that is emitted into it. In this sense an APP forecast becomes a warning system, letting land managers, industry, regulators and those undertaking planned burning.

Tasmania is small enough for detailed modelling to cover the entire State at high resolution. A state-of-the-art atmospheric dispersion model, developed by CSIRO Atmospheric Research, called TAPM (http://www.dar.csiro.au/tapm/) can be used to produce a Tasmanian Air Pollution Potential Atlas for the State. Typically TAPM is used to produce meteorological fields for all 8760 hours in a year. These are analysed to derive maps of climatological statistics for different seasons or times of day. Maps can be produced at both a coarse and fine scale. These maps should be of wide benefit to regulators at both State and Local Government level when planning where to locate industries that emit air pollution. This is especially important at Local Government level as very little atmospheric dispersion modelling is conducted prior to siting Level 1 premises.

Before new industries can commence development at a site, or existing industries can dramatically change or expand operations, they must prove to the regulator that atmospheric emissions will not cause an air pollution problem. The proponents of new industries do this by engaging environmental consultants to conduct atmospheric dispersion modelling showing the likely effect of the proposal. This is often a cyclical process as models are used to design the most appropriate air pollution mitigation measures. A typical example of this is running the model repeatedly using different stack heights, thereby allowing the most suitable height to be determined. The Tasmanian Air Pollution Potential Atlas will assist with the evaluation of whether a new or upgraded point source will impact on the air quality. The development of the Tasmanian Air Pollution Potential Atlas commenced in November 2004.

Modelling the dispersion of industrial emissions

The common tool used for modelling the dispersion of industrial emissions is called Ausplume. This model is simple to use, cheap to run and produces fairly conservative results.

Ausplume uses special files, called *input meteorological files* to provide for the effects of the weather and local topography on dispersion. DTAE owns three *input meteorological files*, which it makes freely available to consultants. In addition, various environmental consultants have generated more meteorological files, but these are not publicly available. So most of the modelling undertaken in Tasmania uses meteorological data from the nearest available meteorology station, which could be 100 kilometres away from the site of the proposed development and could be within a different wind regime.

TAPM, discussed above, can be used to create a large number of Ausplume *input meteorological* files for representative locations throughout the State. The files, along with the appropriate terrain files, can be made available to consultants, thereby levelling the playing field, and ensuring a higher standard of air quality modelling and better decision-making. This approach has been used successfully in other States. Production of these input files commenced in late 2004, in conjunction with the programme to develop the Tasmanian Air Pollution Potential Atlas.

The airshed approach and the Ambient Air Quality NEPM

In general, dispersion modelling is performed on emissions from a single source, often ignoring the contribution from other sources in the area or within the airshed as a whole. This makes it difficult to determine the combined effect of all of the sources in the region, and subsequently, to determine the extent to which further industrial development may safely occur.

With the advent of the Ambient Air Quality NEPM and the Air Quality Policy, and with the increasing knowledge of the effects of air pollution on human health, this approach must be seen as inadequate. Management of emissions from each point source becomes a facet of management of an airshed.

Under an airshed approach, decisions on whether to allow a new point source into an airshed, or conditions to be placed on the operators, are made in the context of the capacity of the airshed to receive the emissions. Proponents of proposals for new or modified plants are then required to recognise that the plants are not isolated from the environment within which they sit. The proposals must therefore incorporate emissions from other sources into their modelling programmes in order to determine, and if necessary modify, their impact on air quality (see also Section 2.4.1: Effective Regulation of Industrial Emissions).

Smoke Monitoring Plan – Planned Burning

The Air Quality Policy contains a specific clause related to planned burning. One of the requirements is to "adopt efficient and effective air quality monitoring programmes". The purpose of the monitoring is to assess the impact of smoke from planned burning on townships. Discussions are currently underway to progress this issue.

2.2.2 Sources of Particulate Matter and Trends in Domestic Heating

Objective 2

Gather data on the main sources of air pollutants and the trends in the type of home heating used around Tasmania by:

a) Estimating emissions of PM_{10} and $PM_{2.5}$ from domestic and small industrial sources for the entire State;

b) Conducting annual market research in Launceston to monitor trends towards less polluting alternatives and barriers to conversion to alternative forms of domestic heating; and

c) Promote the uptake of externally flued gas heaters in preference to unflued gas heaters.

PM_{10} emission data

Accurate information on the relative contributions of different sources of PM_{10} emissions is difficult to obtain. In Tasmania, the primary tool is the National Pollutant Inventory (NPI) which provides estimations of the relative PM_{10} source strengths throughout the State.

Larger industrial facilities are required to report their emissions to the NPI annually. Emissions data may be based on actual stack test results, but is more often estimated using one of a range of methodologies developed for the NPI programme.

Contributions from other sources of PM_{10}, such as:

- domestic sources (e.g. heating, cooking, other burning activities, lawn mowers);
- smaller industrial facilities whose emissions fall below the reporting threshold; and
- vehicles

are estimated by each jurisdiction, and reported as aggregated emissions.

Aggregated emission data was estimated in 1999 for the Hobart airshed and in 2000 for the Launceston airshed (including the Tamar Valley). It is likely that the majority of the impacts of anthropogenic PM_{10} emissions in Tasmania arise in these areas. In September 2004, DPIWE commenced a project to estimate the aggregated emission data for all other areas of Tasmania.

Trends in different types of home heating

It is essential that the trends in the use of woodheaters, particularly in Launceston, be monitored on an annual basis. This will be one of the key performance indicators measuring the success of the Strategy in relation to emissions from domestic sources. In addition to quantifying the use of woodheaters, information on barriers to converting to alternative forms of heating will also be collected.

As part of this research, trends in the use of unflued gas heaters in homes will also be monitored. Unflued gas heaters can negatively impact on indoor air quality and lead to health problems. The Department of Health and Human Services (DHHS) is interested in air quality issues. Input on the design of the market research programme will be sought from DHHS.

It is notable that the primary gas supplier in Tasmania has based its offer of subsidies for installation of gas heating exclusively on gas heaters with external flues. This is a welcome promotion of good health in the domestic environment.

2.2.3 Public Accessibility to Air Quality Information

Objective 3

Provide better access to air quality monitoring data by:

a) Reducing the lag time in obtaining results from air monitoring programmes;

b) Regularly updating air quality monitoring information *via* the Environment Division's web site; and

c) Investigating the feasibility of providing real-time data on the web site.

Timing of air monitoring results

Currently there are high volume air samplers monitoring PM_{10} concentrations in Hobart and Launceston. The quantity of particulate matter collected in a 24 hour period is calculated by weighing filters before and after exposure to the ambient air. The turnaround time for results is up to two months.

As part of its programme to upgrade monitoring systems, DTAE has constructed a dedicated weighing room that will facilitate the production and public dissemination of both PM_{10} and $PM_{2.5}$ data, with a turnaround time of less than two weeks.

Access to air monitoring data

An important aspect of the monitoring upgrade programme has been the development of the Tasmanian Air Quality Database to manage and disseminate both current information from the monitoring stations and to store and process historical data. Following the upgrade of the monitoring system, the Environment Division's web site will be updated on a fortnightly basis, providing a useful educational tool for schools and the general community.

Access to air quality monitoring data on a more frequent basis may be a useful tool to facilitate decisions about airshed management. As an example, this will provide tools to determine whether particulate concentrations are approaching the airshed capacity (i.e. exceeding the PM_{10} Standard) during activities such as hazard reduction burns. Air quality information is updated on an hourly basis on the Victorian Environment Protection Authority's web site (**www.epa.vic.gov.au)**. Access to real-time data would require changes in the current methods of downloading and manipulating data. DTAE will investigate the feasibility of providing real-time data to the web site.

2.3 Residential Sector

2.3.1 Existing Woodheaters

Objective 4

Facilitate reductions in the existing number and impact of woodheaters in areas with compromised air quality by:

a) Researching and implementing mechanisms for removing barriers to changing heating sources;
b) Monitoring trends in the reduction of the number of woodheaters across the State;
c) Investigating the appropriateness of a redeveloped woodheater buy-back scheme;
d) Promoting the use of alternative forms of heating; and
e) Developing *Air Quality Regulations* to reduce emissions from domestic woodheaters.

Background

As discussed in the Introduction, residential solid fuel burning is a significant contributor to PM_{10} concentrations in ambient air. In particular, the use of woodheaters during the cooler months generates particulate emissions (PM_{10} and $PM_{2.5}$) and a mixture of air toxic compounds. In an isolated situation, the smoke from one heater will have little impact. However, the collective output of many heaters constitutes a large source of air contaminants, which has the potential to degrade ambient air quality, and thus compromise human health. The realisation of that potential for poor air quality in an airshed is the result of a range of factors, from poor heater design and operation to housing design, and social and cultural influences.

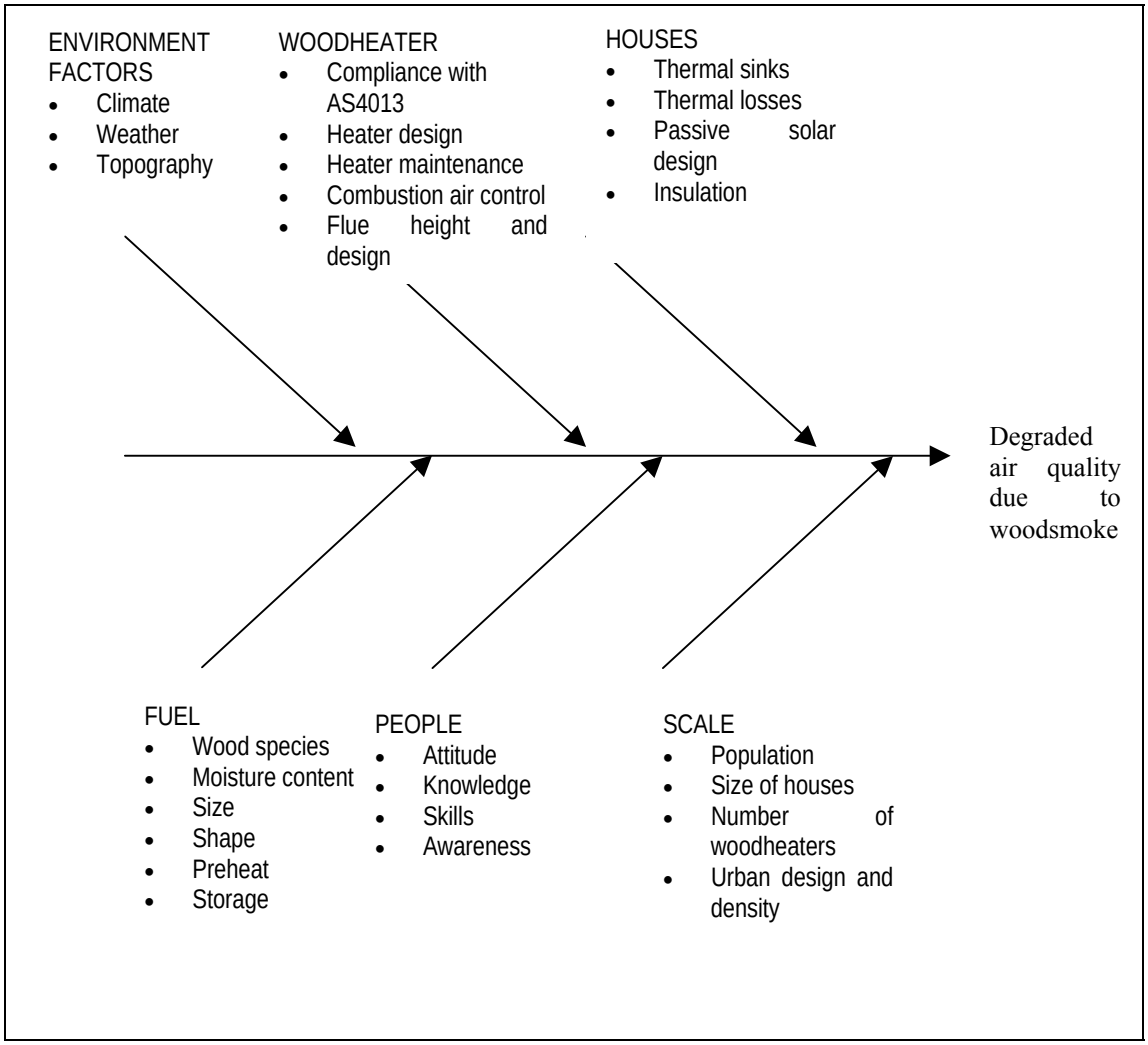

Figure 5 summarises many of the key factors that lead to poor air quality from domestic woodsmoke.

In Launceston there has been a continuing trend away from the use of woodheaters in homes. Modelling has suggested that if the current trend continues, the reduced number of woodheaters will allow compliance with the PM_{10} standard around 2008 (Power, 2001). In 2004, the Tamar Valley Air Quality Strategy was drafted to support and further progress Launceston's improvement in air quality.

The achievement of satisfactory $PM_{2.5}$ levels is another issue, but as $PM_{2.5}$ is the dominant contributor to winter particulates, levels will clearly mirror the downward trend in PM_{10}. Like the Tamar Valley Air Quality Strategy, this Strategy has several programmes, that are either under way or being considered, which are aimed to support and encourage the trend away from woodheaters, and are discussed under the following headings:

Barriers to alternatives to woodheaters

Several clear barriers have been identified in previous surveys. For example the Birkett & Associates Report (November 2002) identified that the barriers to change are:

- 61% of respondents identified cost as the barrier;
- 14% said that they prefer the cosy feel of a woodheater;
- 4% commented that firewood is cheap or free; and
- 10% prefer woodheaters.

A programme of further market research to identify any changes in this data since 2002 is incorporated into this Strategy. The study would also aim to firm up figures for the number and distribution of woodheaters still in use in Launceston.

Through a better understanding of the barriers to change, informed actions to promote the use of other fuels will be developed.

Woodheater buy-back scheme

The Launceston Woodheater Replacement Programme was established in 2000 under a grant from the National Heritage Trust, and was administered as a collaborative programme between the Australian Government, Launceston City Council and DPIWE. Rebates of $500 were offered for replacing a woodheater with a gas, electric or oil heater. Rebates of $250 were offered for replacing a woodheater with a low emission woodheater or pellet heater. The total dollar cost of the programme was approximately $2 million.

The programme supported the removal of 2,239 woodheaters from Launceston, when the rebate scheme ceased in June 2004. Survey results suggest that approximately 700 of the owners who took up these rebates were directly influenced to do so by the financial incentive (EnergyConsult, 2004). The remainder claimed to have planned to replace their heaters already, although the timing may have been influenced by the offer of a rebate. However, the consultant's report acknowledges that the entire Launceston programme will have reinforced the existing trend away from woodheating and contributed to the increased awareness of woodsmoke issues.

There is some debate as to whether an extended woodheater buy-back programme funded by the Tasmanian Government would be useful in removing further woodheaters from the Launceston area, and if so, at what level the rebate should be set. The trend in three-yearly data for the percentage of dwellings with woodheaters is downward and linear from 1996 to 2004 (Energy Consult, 2004), and does not show any slowdown. This indicates that the predicted number of woodheaters that would allow compliance with the PM_{10} Standard will be reached around 2008. This assumes that the linear trend away from woodheaters will continue, however it may begin to flatten out since the remaining households with woodheaters may be less willing to use alternative forms of heating.

So the question remains as to whether a further buy-back scheme with a higher rebate would facilitate the continued reduction in woodheater numbers, or whether continuing and future programmes should focus on community education towards behavioural change. Given that

many of recipients of the financial incentive to remove their woodheater would have changed anyway, a buy-back scheme could be means-tested to assist households on lower-incomes to convert their woodheater. These households are less likely to be able to afford to replace a woodheater without financial assistance. An investigation into the appropriateness of a revised rebate scheme will be conducted.

The following initiative was announced in the May 2005 Commonwealth Government budget:
"$1.0 million over three years to fund financial incentives for industries in the Tamar Valley area to replace wood-fired technologies with cleaner burning alternatives".
Further discussion of the incentive is included in Section 2.4.2 (Cleaner Production Programmes).

Alternative forms of heating

The Environment Division of DTAE commissioned an independent review of the running costs for various types of heaters as part of a programme to update the brochure "*Home Heating – Considering Your Options*". Table 11 summarises the running costs per cool evening for an averaged sized living area (a heat output of 22 kWh).

Table 11: Running Costs of Different Heating Types

Heater Type	Running cost per cool evening	Notes
Woodheater	$0.60	$80/tonne wood cost 65% efficiency
Heat pump	$0.65	Hydroheat tariff 280% efficiency
Natural gas	$1.50	Estimated cost only 85% efficiency
Pellet heater	$1.75	$7.50 per 20 kg bag 85% efficiency
Heating oil	$2.45	75% efficiency
Electric heater (e.g._convection panels)	$1.80	Hydroheat tariff 100% efficiency
Bottled gas	$3.15	85% efficiency
Open fireplace	$3.95	10% efficiency

Table 11 shows indicative running costs for various fuel types (obtained from Independent Energy Advisory Service). These suggest that costs for woodheater and heat pump are similar, given the assumption of $80/tonne for firewood. It is acknowledged that many people source their own firewood and hence the running costs are zero (excluding costs associated with collecting wood such as transport). The most expensive form of heating is an open fireplace, due to the poor efficiency of ten percent, since the majority of the heat is lost through the chimney. Based on the above estimates of residential natural gas prices, the running cost for natural gas heaters could be up to double that for heat pumps.

The capital costs for various heaters vary considerably. The costs to buy and install a woodheater are around $2,300, whereas the costs for a heat pump could be up to $4,000, particularly if the electrical mains needs to be upgraded. The recovery periods for these costs may vary and would be a consideration for prospective purchasers.

The provision of comparative information to householders is discussed later in Section 2.3.5 (Community Education). The issue of the affordability of heating for low-income earners is covered in Section 2.3.6 (Equity in the Home Heating).

Unflued gas heaters can lead to elevated concentrations of nitrogen dioxide and carbon monoxide within the home. Hence it is important that improvements to ambient air quality do not lead to poor indoor air quality, that is if a woodheater is replaced with an unflued gas heater. The number of unflued gas heaters will be monitored (see Section 2.2.2: Sources of Particulate Matter and Trends in Domestic Heating) and the uptake of these heaters will be monitored.

Proposed Air Quality Regulations

It is intended that the proposed *Air Quality Regulations* will incorporate provisions for controlling emissions from domestic solid fuel burning appliances and backyard burning. The proposed Regulations include a definition of environmental nuisance, as it relates to excessive smoke from a woodheater. The content of the proposed Regulations is discussed further in Section 2.1.1: Background to the Strategy.

2.3.2 Managing Installations of Additional Woodheaters

Objective 5

Consider options for reducing the number of additional woodheaters installed in sensitive areas by:

a) Investigating the efficacy and practicality of placing restrictions on installation of wood-fuelled heating in new and renovated homes;

b) Developing *Air Quality Regulations* to require that all woodheaters comply with the current Australian Standard.

Reducing Additional Woodheaters

As noted above, if the current trend away from woodheaters continues in Launceston, it is likely that compliance with the PM_{10} goal will be achieved (see Section 2.1.5). Further study into the likelihood of meeting the $PM_{2.5}$ advisory reporting standard is currently underway. This cannot be seen as a reason for complacency about woodheaters, but rather that the trend away from woodheaters needs to be supported and monitored.

One option for reducing the number of woodheaters is to place restrictions on the installation of woodheaters into new houses and extensions in sensitive areas. Councils have no power to refuse an installation of a woodheater, only to ensure that it has been installed correctly (see the following Section 2.3.3 Woodheater Technology, Design and Installation).

Second-hand Woodheaters

Although it is generally acknowledged that poor operation of a woodheater is the most significant factor in generating excessive smoke, poor design of the woodheater itself can also increase smoke emissions. Therefore, older woodheaters (including second-hand woodheaters) have been identified as an issue in regards to emissions from wood-fuelled heating due to the increased likely hood that they are of poor design. Newer woodheaters have a number of design features to reduce smoke emissions, such as:

- Secondary air supply to ensure that there is sufficient air to burn the gases;
- High level of preheating of the combustion air to maintain the temperature inside the firebox;
- Better insulation of the combustion chamber to maintain the firebox temperature; and
- Firebox design to achieve maximum turbulence to mix gases.

There is a range of information available on actual PM_{10} emission rates from woodheaters (rather than the certified emission factor based on laboratory conditions). The emission rates are measured as grams of PM_{10} per kilogram of wood burnt. Estimates of emission rates for woodheaters are shown in Table 10. "Non-compliant woodheaters" refers to older woodheaters (generally pre 1993 models), manufactured before AS/NZS 4013 was introduced. The data indicates that older woodheaters generally produce twice the emissions of those from newer appliances. This suggests that restricting the sale of second-hand woodheaters and thereby encouraging the purchase of new woodheaters would lead to an overall reduction in the average emissions from woodheaters.

Table 10: Emission rates for compliant and non-compliant woodheaters (Environment Australia, 1999)

Flow condition	**Emission rate PM_{10} g/kg**
Compliant woodheater	5.5
Non compliant woodheater	12
Open fireplace	17.3

The size of the second-hand woodheater market is currently unknown. Anecdotal evidence suggests that a significant number of second-hand woodheaters are sold and/or installed in homes around the State. Part of the problem is that a proportion of second-hand woodheaters is likely to be installed by unlicensed installers, including in many cases the homeowners themselves. Although the *Building Code of Australia* requires that Councils approve

installation of woodheaters, it is understood that only a small proportion of installations are notified and inspected. Therefore, the contribution of second-hand woodheaters to degrade air quality is unknown and would be very difficult, if not impossible, to assess accurately.

Restrictions on sales and installations of any non-compliant woodheaters are addressed in the proposed *Air Quality Regulations*. These do not distinguish between new and second-hand woodheaters, as the primary intent is that only woodheaters, which comply with the current Australian Standard, may be sold or installed. Therefore, unless a second-hand woodheater can be shown to meet the requirements, which can be a very expensive process, then they can not be legally sold or installed.

2.3.3 Woodheater Technology, Design and Installation

Objective 6

Promote improvements in technology, design and installation of new woodheaters by:

a) Improving woodheater installation practices;
b) Developing *Air Quality Regulations* to require new woodheaters meet the emission limits in AS/NZS 4013;
c) Promoting improvements in AS/NZS 4013 for woodheater emissions;
d) Promoting cleaner technology woodheaters and fuels derived from wood waste;
e) Supporting implementation of the *National Woodheater Action Plan* and promoting the adoption of improved woodheater technology; and
f) Conducting an assessment programme of the compliance of new woodheaters with Australian Standards.

Installation of woodheaters

The Australian Building Code requires that domestic solid fuel burning appliances be installed in accordance with AS/NZS 2918 *Domestic solid fuel burning appliances – installation*. There is no licensing system in place for installers of solid fuel burning appliances. TAFE Tasmania previously ran a training course on the installation of woodheaters, but such courses are no longer offered within Tasmania, because of lack of demand. The Plumbers and Gas Fitters Board retains a list of people who have completed the course.

Anecdotal evidence suggests that some woodheaters are installed by people who have not undertaken formal training in the Australian Standard. Incorrect installation could lead to increased risks of fire and exacerbated smoke emissions. In particular, modifications to the minimum air flow setting are common, allowing the user to completely shut off the air flow. Under these conditions, the fire will simply smoulder overnight and produce copious quantities of smoke. The proposed *Air Quality Regulations* prohibit the modification of a woodheater in a way that is likely to increase the level of emissions.

In order to improve installation practices for woodheaters, the development of an accredited training course run by a registered training organisation will be investigated. The benefits of the use of trained woodheater installers would need to be promoted to the purchasers of woodheaters. Retail outlets could play a role in promoting local trained installers.

The *Building Regulations 2004* require a person to notify the Council of his or her intention to install a stove or woodheater. The installer must then notify the Council that the installation has been carried out in accordance with the Building Code of Australia. The Regulations also state that the Council may inspect the installation, however anecdotal evidence suggests that this is often not undertaken because of constraints on resources. Where a Council officer investigates a smoky flue complaint, a basic check of the installation of the woodheater (such as flue height and tampering with the minimum air flow setting) should be undertaken. Where modification of the air flow setting is identified, a notice or fine should be issued. As part of this Strategy, guidelines will be developed to assist council officers to detect incorrect installation practices.

Emissions from woodheaters

At the time of writing, it is proposed that the *Air Quality Regulations* will require that all new heaters that are manufactured or imported for sale must comply with the version of AS/NZS 4013 *Domestic solid fuel burning appliances – Method for determination of flue gas emission* which is current at that time. This standard was introduced in 1992 and was revised in 1999. The current maximum allowable emission factor is 4.0 grams of total particulate matter per kilogram of dry fuel for appliances without a catalytic combustor.

Environment Canterbury, a New Zealand regional Council, has prepared a draft Natural Resource Regional Plan that proposes a number of restrictions on the installation of woodheaters. One of the restrictions is requiring that only woodheaters with an emission factor of less than 1 gram per kilogram can be installed in some areas. There are about fifty woodheater models on sale in New Zealand (including pellet heaters) that meet this emission factor.

Promoting improvements to Australian Standards

DPIWE will promote improvements to AS/NZS 4013 in order to minimise emissions from woodheaters. This will require that the woodheater manufacturers undertake further steps to minimise particulate emissions.

It is noted that a proposed revision to AS/NZS 4013 includes the requirement to state the average particulate emission factor on the appliance label. This information will allow consumers to compare the performance of different models.

Promoting Cleaner Technology

The design of woodheaters has improved significantly over time. The promotion of further design improvements will be undertaken by DTAE as well as the promotion of low emission pellet fuel heaters.

Compliance of new woodheaters

The National Woodheater Audit Programme is discussed in Section 2.1.8 (National Programmes). DTAE is committed to supporting the ongoing audit programme to ensure that new woodheaters meet the emission and labelling requirements of AS/NZS 4013. DTAE and Consumer Affairs and Fair Trading have conducted a proactive assessment of new woodheaters at retail outlets. An ongoing compliance programme will be established.

2.3.4 Woodheater Fuel Quality

Objective 7

Increase the quality of wood fuel by:

a) Supporting the establishment and implementation of an effective certification programme for firewood suppliers in Tasmania and monitoring its effectiveness.

Description of the wood burning process

The process of burning wood is not as simple as merely using a match to light the newspaper. An external heat source (match, newspaper and kindling) is needed to start the process of drying and thermal decomposition of wood. Once the fire has begun, the combustion process becomes self-sustaining. The three stages of wood burning are described below (adapted from Todd, 2003).

Stage 1 – During the stage, moisture in the wood is evaporated. This process absorbs energy. As well as drying, the wood begins to undergo a chemical change and gas is released. If there is a vigorous flame, then most of the gases are burnt. Some gases will escape unburnt and these gases will condense when discharged out of the flue and will be visible as smoke.

Stage 2 – The next stage is the main burning process. New wood is added and gases are released and ignited. The fastest release of gas occurs during the first twenty minutes after refuelling a hot heater. Thus it is essential that there is plenty of air to mix with the gases and ensure that they burn as completely as possible.

Stage 3 – The third stage is the burning of charcoal. Once most of the gas from the wood has been released, a residue of charcoal remains. Charcoal burns with very little release of smoke, hence the air flow can be reduced at this stage without producing excessive levels of smoke.

The quality of firewood impacts on the emissions from woodheaters. Different species of wood have different combustion properties and can generate different levels of smoke. The moisture content of wood is believed to increase the generation of particulates because heat is required to evaporate the moisture, which reduces the temperature causing less complete combustion. However there is little scientific evidence to support this claim or quantify the effect (Todd, 2003). It is believed that burning wood with a moisture content up to 20% will not impact on particulate emissions. Wood with moisture content of 35 – 40% is likely to generate large quantities of particulates. Freshly cut wood from living trees has moisture content of approximately 50%. It takes around a year for the moisture content to drop to 20%. Clearly, there is a significant difference between the desired 20% moisture content and the 50% moisture content of freshly cut wood. One commentator suggested it would be useful to provide guidance to consumers on typical moisture contents of firewood after 3 months, 6 months and 9 months to assist them in making informed choices about purchasing fuel.

Such information might also form the basis of a practical approach to regulation and improvement, which only allows for the sale of freshly cut wood (or that with a moisture content over 25%) between 1st October and 31st December, and enforced by spot sampling/audits. The feasibility of this concept will be investigated as part of the implementation of this Strategy.

Firewood Code of Practice and certification scheme

In 2002, the Natural Resource Management Ministerial Council endorsed a Voluntary Code of Practice for Retail Firewood Merchants. The Code of Practice aims to reduce the environmental impacts from collecting and burning firewood. A revised version of the Code has been prepared (see following text).

The draft Code is reproduced here:

Draft Voluntary Code of Practice for Firewood Merchants

As firewood retailers, signed to this code, we agree that:

We will not knowingly sell firewood that is sourced in contravention of any statutory codes of practice or other mechanisms that control forest management and vegetation clearance and relevant laws relating to firewood that apply in the relevant State or Territory.

Firewood will be sourced in accordance with sustainable management principles to protect biodiversity and ecosystem processes, including:

- Firewood will not be collected from areas where collection may have a significant impact on listed threatened species or listed threatened ecological communities
- Firewood will be collected in a manner that conforms to regional vegetation and catchment management/Natural Resource Management plans and other relevant plans.

Information on all types of firewood offered for sale will be provided to consumers – including species (eg river red gum, yellow box, pine), locality (eg Western NSW, private property) and source (eg native forest and woodland, plantation).

Information on correct storage and burning practices will be provided to consumers.

Where practicable, seasoned firewood (ie. that with an internal moisture content of less than 25% (dry weight)) will be sold. Where unseasoned wood is sold it will be accompanied by advice on the time at which the wood will be sufficiently dry to burn.
Sale of firewood will be in such a manner as to ensure that consumers receive what they pay for. Sale of firewood will comply with the requirements of relevant trade measurement regulations in each state and territory.

Firewood will preferably be sourced from harvesting operations in plantations and sustainably managed native forests that are regenerated and regrown, or from residue from manufacturing processes or salvage operations.

Wood that is painted, coated with plastic or chemically treated will not be sold as firewood.

Data on firewood supply, including species, locality, land tenure and the nature of the harvest operations, as well as sales will be provided to the certification body.

Information about this Code and the certification system will be freely disseminated to firewood suppliers, contractors and consumers.

The Resource Management and Conservation Division of DPIW is currently preparing a draft Action Plan for Firewood Collection and Use in Tasmania. As part of the development of the action plan, the establishment of a certification system for firewood retailers is under consideration. The certification system would seek to minimise the impacts from firewood collection and the subsequent burning of the firewood.

2.3.5 Community Education

Objective 8

Increase general community awareness of the health impacts of domestic burning, how to operate woodheaters efficiently and alternative forms of heating by:

a) Developing guidelines for woodheater operation and storage of wood (using existing educational materials);
b) Developing a holistic communications strategy including schools, Local Government, local communities and the broader public which includes an evaluation system;
c) Establishing an air quality educational programme for schools;
d) Supporting existing smoke patrol programmes and promoting their adoption in other areas of the State with compromised air quality;
e) Adopting and promoting the use of home energy audit packages to assist householders to use energy efficiently whilst minimising their contribution to air pollution;
f) Evaluating the effectiveness of air quality forecasting in Launceston on behavioural change in the community, and improving, where appropriate; and
g) Expanding air quality forecasts to other areas of the State.

Holistic Communications Strategy

Education is an important tool for increasing the awareness of woodsmoke issues. Significant resources are available to assist householders on the proper operation of woodheaters. The material needs to be condensed and written in a simple way for householders to understand. The brochure *"Home Heating – Considering Your Options"* has been updated recently and provides useful information on home heating options, insulation and operating costs. A small print run was undertaken in September 2004 and brochures are being distributed through Service Tasmania outlets and Councils in the southern areas of the State.

A successful education campaign has been operating in Launceston for many years, and is continuing. This has included a targeted education programme, where smoke patrol officers identify smoky flues and offer hands-on assistance to householders to minimise smoke emissions. It has also included a more general communications campaign, such as advertisements in the media.

A communications strategy based on the experience of the Launceston programmes is proposed to more effectively spread the message about efficient use of woodheaters and alternative forms of heating. It would consider the financial, social and cultural barriers to the use of alternative forms of heating, and would ultimately include various components relating to schools, Local Government, local communities and the general public. Its focus should be targeted towards areas with compromised air quality, and it will include an implementation plan and an evaluation system.

Woodheaters pose a fire risk in the home, as well as contributing to air quality problems. Of the 4,762 structural fires reported between 1 July 1998 and 30 June 2004, 721 were associated with woodheaters and open fireplaces. In response, the Tasmania Fire Service funded advertisements warning householders of the dangers associated with woodheaters. Collaborative programmes with the Tasmania Fire Service to promote dual messages about the proper use of woodheaters may add value to the communications strategy.

Rental housing market

Within the rental market, it is likely that the key reason for changing to another form of heating would be due to the existing heater reaching the end of its life. Capital cost of different heating options is likely to be the major consideration for owners of rental properties. The running costs of heaters are unlikely to be a significant factor, since the tenants will be responsible for paying the fuel costs.

However, as the general community's awareness of the environmental impacts of different fuels increase, rental properties with the most efficient and least polluting heating may become more sought after. The community education campaign will consider ways to influence the selection of heater type by owners of rental properties.

AirWatch Schools programme

AirWatch has been a very successful national programme that focused on integrating air quality issues into primary and secondary school curriculum. Approximately 65 schools across Tasmania were involved in the programme, which established AirWatch weather stations and pollution monitoring equipment on some campuses, giving students "hands-on" experience with air quality measurement. Commonwealth funding for the programme ceased in September 2003, and the programme was discontinued in Tasmania.

The AirWatch programme showed the value of communicating air quality issues to school children. It has established a strong foundation on which to build continuing support to schools that participated in the programme and to extend the programme to other schools across Tasmania. Elements of the AirWatch programme have been incorporated into some of the current community education programmes, particularly the pilot schools programme funded from the Health and Wellbeing Cluster Group. This programme involves setting up particle monitoring equipment at three schools around Hobart and providing support to teachers in developing air quality related curriculum. It is proposed that a comprehensive school program be implemented, based on AirWatch resources and lessons from the pilot program.

In keeping with the philosophy for an integrated approach to air quality management that underpins this Strategy, the communications strategy aims to identify opportunities for working with other organisations with similar or related objectives.

Smoke Patrols

As part of the Launceston Woodheater Replacement Programme, Launceston City Council has developed a successful targeted community education campaign which involves the use of smoke patrol officers. The process of identifying and responding to smoky flues is summarised in Table 12.

Table 12: Summary of Results of Smoke Patrol Programme conducted by Launceston City Council (Gliddon, 2004)

Step	Action	Number (at Dec 2003)
1st observation	Record address	> 4,000
2nd observation (usually 30-60 minutes after 1st)	Leave a card in the mail box. This card states the dates and times of the observation and offers advice through phone contact numbers	868
3rd observation (usually 30 days after 2nd)	Letter to the occupier clearly stating the problem and Council's enforcement alternatives	95
Further observation	Final warning letter	5

The smoke patrol has been effective at reducing the number of occurrences of smoky flues. Although the Replacement programme has now finished, Launceston City Council is continuing with the targeted education programme.

A similar programme is also underway within the Brighton and Hobart City Council areas.

Under this Strategy, it is projected that such programmes will be extended into other areas of the State with compromised air quality.

Energy Audit Packages

Finding information on alternative forms of home heating and minimising heat loss can be a daunting and confusing task. There are a number of consultants who can assist with energy audits of homes. These services will be promoted to those people interested in paying for an

energy audit. Some materials already exist to help householders conduct a basic energy audit for their home by themselves. A simple home energy audit kit, building on existing resources, will be developed and promoted to the general public.

Daily Air Quality Bulletins

Air quality bulletins may take the form of an air quality forecast, where air quality is predicted for a future time. Air quality bulletins may also report current air quality based on air monitoring data.

Air quality bulletins are a useful educational tool to reinforce the messages about air quality problems and also provide an opportunity for people to change behaviours and reduce the particulate loading on particular days. It can also warn people with respiratory and cardiac disorders to take appropriate action to manage their condition.

In NSW, the Regional Pollution Index is reported twice daily. The reports are based on measured concentrations of ozone, nitrogen dioxide and a measure of visibility. The index is reported as low, medium or high. During winter, "Don't Light Tonight" warnings are also issued when dispersion is likely to be low. On these occasions, people with open fireplaces and older woodheaters are encouraged to use alternative forms of heating, if possible. The warnings are advertised on radio, TV and in the print media.

The Victorian Environment Protection Authority calculates the Air Quality Index on a daily basis for each monitoring station location. The index is based on the maximum individual index for the parameters measured at each monitoring station. The Air Quality Index is reported as very good, good, fair, poor and very poor. Smog Alert Days are also declared on days when dispersion is likely to be low. Smog alerts are issued on the day before the potential episode. On declared Smog Alert Days the public is asked to refrain from using cars unnecessarily, not to burn off or light incinerators and to use an alternative source of home heating rather than woodheaters. People with respiratory or cardiac disorders are advised to take their medication and minimise strenuous outdoor activity on Smog Alert Days. Smog alerts are usually included in the weather segment on television and the front page of daily newspapers.

The Victorian EPA is currently piloting a new air quality forecast method using the *Australian Air Quality Forecasting System*. This is a sophisticated computer-based programme that can accurately forecast air quality on an hour-by-hour basis.

The Bureau of Meteorology issues daily air quality forecasts for Launceston during winter. The concentration of particulates is forecast for the following day and the air quality is ranked as good, moderate or poor. The forecasts are included in the 5pm weather forecast on the radio. In previous years the forecasts were also included in the newspaper weather section, along with the weekly summary of PM_{10} concentrations and a short discussion of the results.

The air quality forecast system in Tasmania will be reviewed. This review will include the following:

- accuracy of the air quality forecasts for Launceston against actual measured particulate concentrations (see Section 2.2.1: Air Quality Monitoring and Forecasting);
- reviewing behavioural change resulting from air quality forecasts;
- the most effective methods of informing the public of the air quality; and
- whether the system should be expanded to other areas in the State.

2.3.6 Equity in Home Heating

Objective 11

Promote equity in the community relating to home heating by:

a) Investigating an appropriate strategy for the replacement of woodheaters within houses owned by Housing Tasmania that are located in areas with poor air quality; and

b) Investigating the feasibility of subsidising fuel costs for alternative heating methods and costs for retrofitting insulation for low-income households.

Equity issues for low-income earners

According to the Affordable Housing Strategy (Housing Tasmania, 2003), there are currently 20,000 households in Tasmania which are on low incomes and which are in housing stress. Housing stress is defined as a household where more than 30% of the total income is spent on housing costs. This number of households does not include households living in the 12,000 houses within Housing Tasmania's property portfolio.

This Strategy acknowledges that low-income earners may be unable to afford the capital costs and/or running costs for converting away from woodheaters. In some cases households collect their own wood and hence have very low home heating costs. Converting a woodheater to the most efficient heat pump may not be an affordable option for these households.

As discussed in 2.3.1 Existing Woodheaters, a woodheater buy-back scheme will be investigated. One option is to apply a means-test to limit the financial incentive to those households with low incomes. These households are less likely to be able to afford to replace a woodheater without financial assistance. The amount of the financial incentive offered would need to be carefully considered.

Government housing

Housing Tasmania aims to ensure that people on low incomes have access to affordable and appropriate housing through a range of programmes such as providing rental accommodation and assistance for home ownership. The *Affordable Housing Strategy* was released in 2003. The Strategy aims to increase the supply of affordable housing to low income earners and it is partly funded from the increased revenue in real estate stamp duty. The Strategy includes the acquisition of about 400 new public housing dwellings (including the purchase of existing houses and the construction of new houses), among other strategies.

Housing Tasmania has had an active policy to reduce the number of woodheaters in its property portfolio. Currently Housing Tasmania owns about 12,000 homes across the State. Woodheaters have not been installed in new dwellings constructed for Housing Tasmania since the late 1980s. Housing Tasmania has implemented a woodheater replacement programme since the mid-1990s. There are approximately 4,500 homes owned by Housing Tasmania that have woodheaters (about 38%). There are approximately 740 homes with woodheaters in the Tamar Valley, including about 500 homes in Launceston.

In the past woodheaters have been replaced with electrical space heaters (not heat pumps). Some of the tenants have faced difficulties in affording the operating costs of these heaters. Many tenants continue to prefer wood heating due to the cheaper fuel source. A contract for supplying new woodheaters has recently been called. Housing Tasmania set a maximum emission factor of 0.9 grams per kilogram of wood (which goes beyond the current Australian Standard factor of 4 grams per kilogram) and awarded the contract to a New Zealand brand called Woodsman Matai.

More recently, a limited number of heat pumps have been installed in new constructions, however the key barrier to heat pumps becoming the Housing Tasmania standard is the higher capital cost. The total cost to replace a woodheater with a large heat pump is around $4,000. In addition to the purchase price, the cost of removal and proper disposal of the old woodheater and flue, associated building repair work and, in many cases, costs to upgrade

existing electrical mains is also incurred. The cost of running a heat pump is equivalent to the cost of running a woodheater, assuming the cost of the wood to be $80 per tonne.

Another option for home heating is natural gas. Based on indicative costs, natural gas heaters are cheaper to purchase and the associated building repair work is significantly less than that for a heat pump. However, the estimated running costs are significantly higher than for an equivalent heat pump.

Under the *Affordable Housing Strategy*, approximately 400 dwellings will be acquired, half of which will be new housing constructions. In the previous construction programme, house designs have exceeded the minimum energy efficiency standards set in *the Building Code of Australia*. The new dwellings to be built will be a mixture of homes designed to meet the minimum standards and those aimed to exceed the minimum standard.

Housing Tasmania has implemented insulation retrofit programmes, so that all properties should now have ceiling insulation. The retrofitting of wall and under-floor insulation has been investigated as part of developing the housing upgrade programme under Stage 1 of the Affordable Housing Strategy. The cost was found to be prohibitive under current budget capacity and this programme will be reviewed as part of funding priorities under Stage 2.

In partnership with the University of Tasmania and cb&m Design Solutions Pty Ltd, Housing Tasmania will contribute towards the construction of an environmentally sustainable housing demonstration project, called the "No Bills House". This project will showcase energy efficient practices and its environmental performance will be formally evaluated.

Housing Tasmania has taken action to minimise the number of woodheaters in its houses and to improve the energy efficiency of both existing and new homes. However, Housing Tasmania has to balance the need to acquire more houses for the significant number of low income earners requiring affordable accommodation with the desire to provide energy efficient homes with less polluting heating. Usually the ability of the tenants to pay heating costs is restricted and has led to a strong preference towards woodheaters rather than convective electric or alternative heaters. The running costs of heat pumps are comparable with woodheaters (assuming that wood is purchased at $80 per tonne), although the capital and replacement costs are high. Strategies for replacing woodheaters in areas with poor air quality and the feasibility of retrofitting wall and floor insulation in homes where a woodheater is replaced will be fully investigated.

Subsidising fuel costs for low-income households

Some Housing Tasmania tenants may need financial assistance with meeting fuel costs for alternative forms of heating. Wood heating can be a low cost form of heating, particularly where the individual collects their own wood. If woodheaters are replaced with other forms of heating, there may be a need to offer low-income earners on-going subsidies. The feasibility and appropriateness of the provision of subsidies for fuel costs for low-income earners will be investigated.

2.3.7 Emissions From Backyard Burning

Objective 10

Reduce emissions from backyard burning by:

a) Develop *Air Quality Regulations* to prohibit backyard burning on properties less than 2,000 square metres;

b) Developing awareness programmes on the new restrictions relating to backyard burning;

c) Enforcing bans on backyard burning; and

d) Developing alternative green waste management programmes.

Restrictions on backyard burning

The following Councils have by-laws in place banning or restricting backyard burning:

- Glenorchy City Council and Hobart City Council have by-laws that ban backyard burning without a permit.
- Break O'Day Council, Kingborough Council and Launceston City Council restrict burning to particular days. For example, Launceston City Council allows backyard burning on the first and third Saturday of the month.

An analysis of Launceston data examined whether PM_{10} concentrations on Saturdays showed any differences between "burning days" and "non-burning days". On average it was found that PM_{10} concentrations on the "burning" days were about ten percent higher than on "non-burning days".

It is proposed that the *Air Quality Regulations* will prohibit backyard burning on properties less than 2,000 square metres, unless a Council by-law is in place, in which case the by-law will prevail. There have been some discussions around the appropriateness of the 2,000 square metre property size cut-off. Comments on this provision will be sought through the process of developing the *Air Quality Regulations.*

A promotional campaign will be implemented when the Regulations commence alerting the community to the new restriction.

Support to Local Government

The restriction on backyard burning is likely to increase the quantity of green waste dropped of at Council waste disposal sites. In the past, many Councils allowed green waste to accumulate and would then burn the material. This practice is being phased out and alternatives to burning green waste are needed. There are a number of commercial composting operations in Tasmania which use a range of organic materials, such as fish waste, chicken waste, sawdust and green waste.

There are a number of options for green waste including:

- Chipping of green waste for garden "mulch".

Since the material is not heat treated, there is a risk of spreading pathogens and weeds. Use of the material is often restricted to on-site rehabilitation. It is also possible to partially compost mulch for a short period in windrows to minimise the risk of pathogens and weeds.

- Composting of green waste.

Composting carries a much lower risk to end users, because the high temperatures developed in the process kill off weed seeds and pathogenic organisms. However, the process requires considerable space and infrastructure, and may not be a viable proposition for smaller Councils, given limited resources and markets.

It is acknowledged by DTAE that alternatives to burning green waste may be difficult for rural Councils. DTAE has commenced a project with the Southern Waste Strategy Authority to review options for managing green waste by rural Councils.

2.4 INDUSTRIAL SECTOR

2.4.1 Effective Regulation of Industrial Emissions

Objective 11

Ensure effective regulatory control of industrial emissions by:

a) Integrating airshed capacity as part of the assessment of development applications for proposed new industrial activities and major upgrades of existing activities;

b) Training Local Government and industry on the use of the Tasmanian Air Pollution Potential Atlas and to evaluate proposals for new or upgraded point sources;

c) Regulating industry emissions consistently; and

d) Taking appropriate enforcement action against industries that consistently fail to meet regulatory requirements in regard to emissions to air.

Current industry regulation system

Large point source emitters of particulate air pollutants have historically been subject to greater degrees of regulation than diffuse sources such as domestic wood burning. State and Local Government controls the air emissions of industrial activities through permits and environment protection notices. Currently, emissions from industries, otherwise known as point-source emissions, are regulated under the general provisions of the *Environmental Management and Pollution Control Act 1994* (EMPCA) and the *Land Use Planning and Approvals Act 1993*. Responsibility for the regulation of industry is divided between Local and State Government according to the level of environmental risk and scale of the activity.

There are three levels of activity as defined by EMPCA:

- **Level 1:**
  Regulated by Local Government and are generally smaller sized, or low environmental risk activities.
- **Level 2:**
  Defined in Schedule 2 of EMPCA and are regulated by State Government.
- **Level 3:**
  Defined as activities of State significance and are assessed by the Resource Planning and Development Commission and then regulated as for Level 2 activities.

Both the *Environmental Management and Pollution Control Act 1994* (EMPCA) and the *Environment Protection Policy (Air Quality)*, referred to as the Air Quality Policy, include powers and guidelines for Environmental Impact Assessment (EIA) of proposed new activities with the goal of achieving sustainable development. Similarly, the Act and the Policy provide mechanisms to allow State and Local Governments to require existing industries to make improvements in accordance with the concept of Best Practice Environmental Management (BPEM), where such improvements are practical and economically reasonable requirements given the degree of environmental risks involved. Difficulties can arise in making such value-laden judgments, particularly when assessing proposed and existing activities in isolation from one another. The Air Quality Policy also provides for the use of the concept of "reserve capacity for airsheds" in making regulatory and assessment decisions. (Airshed reserve capacity means how much room a particular airshed has to accept further loadings of air pollutants without compromising accepted air quality criteria).

As part of this Strategy, a project commenced in August 2004 to develop a comprehensive Tasmanian Air Pollution Potential Atlas (TAPPA). This project aims to combine sophisticated modelling using TAPM software (developed by CSIRO Atmospheric Research) with results of air quality monitoring and inventory estimates across Tasmania (see Section 2.2.1: Air Quality Monitoring and Forecasting).

Furthermore, the Air Quality Policy establishes a waste avoidance philosophy towards wastes emitted to the atmosphere. This requires that all practical measures be taken to avoid the emission in the first instance. Where an emission is unavoidable, Accepted Modern Technology (AMT) should be applied to reduce emissions. For example, those industries regulated by State Government that employ combustion processes are generally required to conform to an in-stack particulate emission guideline of 100 mg/m^3. The in-stack guideline is arguably set at an appropriate level given achievable performance from modern technology. The testing required to measure compliance against this standard is costly and not trivial to

conduct. Whilst stack testing provides only a very short snapshot of the operation examined, it provides a useful indication of emissions to atmosphere.

Airshed management

The Air Quality Policy defines a clear principle for retaining reserve capacity within airshed by limiting point source emissions that would prejudice compliance with the National Environment Protection Measure (Ambient Air Quality) [*Clause 11(1)(b)*], with some exceptions [*Clause 11(1)(c)*]. This provides authorities with the ability to address the quality of the air in the whole airshed, rather than dealing with each industry proposal on an individual basis.

For example, a new proposal for a wood-fired boiler or other combustion process that could emit significant quantities of PM_{10} into an already compromised airshed such as the Tamar Valley, would require authorities to place stringent conditions on any permit issued to the proponent.

In an area such as Launceston, where the air quality is seriously compromised by particulate pollution, several options are possible:

- a blanket ban on new particulate sources within the Valley;
- careful assessment of proposals within the context of existing air quality, which may result in:
- very tight emissions specifications, beyond those set out in Schedules 1 and 2;
- insistence on alternative energy sources, such as gas or electricity;
- refusal to allow a new source into the area;
- economic disincentives for solid fuel combustion and incentives for adoption of gas or electricity; and
- adopting a cleaner production approach, investigating ways to minimise energy consumption or other production of particles through process changes and efficiencies (see the following Section 2.4.2 Cleaner Production Programmes).

Under the airshed approach, proponents would have to demonstrate that a point source would not add an unacceptable increment to the pollution loading of the airshed. As noted above, the Policy defines a clear test for acceptability as the likelihood of air pollution levels exceeding the relevant *National Environment Protection Standards* and *Goals*. The Tasmanian Air Pollution Potential Atlas is seen as providing useful background information to regulators and consultants when assessing whether compliance with the *National Environment Protection Standards* is likely to be prejudiced by a new point source within an airshed. One approach to this problem is to use such an atlas to define zones where airshed capacity is already seriously compromised, so that further reductions in air quality can be avoided. However, careful consideration needs to be given to the potential for equity or economic issues that may arise from such a system, where zones acquire "labels" that may affect house prices, tourism and other socio-economic aspects.

It must be recognised that it is not normally sufficient for proponents to demonstrate that they meet in-stack emissions concentrations cited in Schedule 1. The Air Quality Policy [*Clause 11(1)(a)*] makes it clear that the stack concentrations are *guidelines*, expected to be achievable with Accepted Modern Technology. As such, they are to be used as default values where no other information is available. Furthermore, as they define in-stack concentrations, they can only be used in conjunction with other data, such as volume flow rates, to estimate mass emission rates. However, these mass emission rates are important when considering incremental impacts on air quality within an airshed.

In terms of direct impact, more emphasis is placed on Schedule 2 *Design Criteria*, so-called because they are usually invoked in the design stages for new plant. Under the Air Quality Policy, proponents are required to demonstrate that they can meet these criteria before a permit can be issued.

Regulating emissions consistently

As discussed in the beginning of this section, industrial emissions are regulated *via* permits or environmental protection notices. Large point-source emitters of particulate air pollutants have historically been subject to greater degrees of regulation than diffuse-sources such as domestic waste and wood burning. Industrial point sources regulated by the State Government are also subject to provisions of EMPCA requiring use of Best Practice Environmental Management.

The Tasmanian Air Pollution Potential Atlas discussed above, will become a tool that will assist State Government Regulators of Level 2 activities to ensure that regulatory requirements for point sources are both consistent and appropriate for various airsheds. It should also assist local government in its land use planning to minimise the air quality impacts of developments within the airsheds as well. The Environment Division will provide training and support to local governments in utilising the Atlas during the implementation of this Strategy.

The DTAE is currently upgrading its database of Level 2 activities towards developing an integrated, computer based, environmental permit management system. One of the benefits of this will be an improved ability to coordinate permitting processes in a way that will allow effects of proposed new point sources to be evaluated for their impact on the air quality in an airshed. The system is being designed to facilitate ready comparisons of environmental permit conditions and ensure consistency across the State, within industry groups, geographical regions or specific airsheds.

Taking appropriate enforcement action

Ultimately, good policies need to be backed-up by enforcement action to have full effect. The *Environmental Management and Pollution Control Act 1994* (EMPCA) provides for offences and penalties for enforcement actions. Such offences include causing environmental harm, and causing unlawful environmental nuisance. Proving environmental harm or nuisance under EPMPCA can often be quite difficult, and a full discussion of the issues of law and precedence is beyond the scope of this explanatory document. However, in order to address the increasing demands of regulation, DTAE has set up a compliance investigation and enforcement group and has instituted a training programme for its officers in legal procedures and investigation methods. Also DTAE is upgrading its management systems and structures to enhance the Division's enforcement capabilities. There is arguably a need for enforcement action for nuisance in regard to air pollution to be tested in the Court processes, and legislation modified if needed.

2.4.2 Cleaner Production Programmes

Objective 12

Facilitate improved environmental performance of industrial emission sources by:

a) Promoting cleaner production programmes to assist industry minimise emissions and energy use; and

b) Establishing economic incentives to encourage industry to convert to cleaner fuels.

Cleaner production programmes

Cleaner production programmes have been in existence in several Australian jurisdictions for many years.

The premise behind cleaner production is that more efficient conversion of raw materials into a final product (ie cleaner processes) will result in reduced overall costs and environmental impacts. Benefits both to the environment and in operating costs may accrue in terms of:

- reduced energy use;
- reduced emissions to the environment;
- reduced use of water;
- more efficient use of raw materials; and
- use of "waste" materials as feedstocks into other processes within a plant, or even as a saleable commodity to other manufacturers.

Take the example of a company operating a coal-fired boiler:

- From an end-of-pipe viewpoint, the industry would focus on how to operate the boiler to meet the in-stack concentrations.
- However from a cleaner production perspective, the use of energy would be reviewed for the entire operation and opportunities to reduce energy use would be identified, such as process optimisation. The operation of the boiler would be reviewed to find ways to improve the boiler performance and reduce the costs of coal purchased. In the medium term, the boiler may be able to be replaced with a more efficient gas fired boiler with a smaller capacity, due to reduced energy demands.

Thus cleaner production approaches tend to look at a process as a whole, from a *life-cycle analysis* ("cradle to grave") perspective, rather than focussing on end-of-pipe solutions. Note that international standards such as ISO 14001, require that *Environmental Management Systems* (EMS) view impacts of their processes as a whole. This includes both the impacts of internally generated wastes and those generated by their suppliers and customers. The traditional approach would view these as externalities to the business, whereas they should be seen as part of the context in which a business operates.

Many large industries in Tasmania have achieved accreditation with ISO 14001, both because of their concern for the environment and because many of their customers and suppliers require accreditation under their own *Environmental Management Systems*. Promotion of the benefits of accreditation against ISO14001, where possible, forms a part of this Strategy. However, this option can be very expensive and may simply not be economically feasible for many small-to-medium industries. A Cleaner Production programme would help to fill the gap by providing industry with assistance in evaluating their environmental performance and facilitating the adoption of improved practices.

There are many instances of successful cleaner production programmes that have made significant reductions in costs for industry. For example, 166 cleaner production case studies from Australian experiences are detailed on the Department of Environment and Heritage web site.

Other States and the Federal Government have promoted cleaner production principles in several ways, such as through:

- provision of loans or grants;
- development of guidance documents; and
- programmes aimed at providing hands-on assistance to companies and operators.

In Tasmania, regulators currently consider opportunities for cleaner production when reviewing Environmental Management Plans and updating individual permit conditions for industry. However an opportunity exists to establish a pro-active programme for promoting cleaner production principles to Tasmanian industry. Since cleaner production programmes most often result in cost savings for industry, provision of hands-on assistance to small to medium industry to assist with identifying cleaner production opportunities would be the most economical option for government, rather than simply offering financial assistance.

Some existing Level 1 industries burn coal, oil or wood as an energy source. Often smaller industries do not have the expertise or resources to fully optimise their combustion processes and thus minimise air emissions. Consideration will be given to the provision of hands-on assistance to smaller industry to identify other fuel options or to optimise their combustion processes.

It should be noted that cleaner production programmes include all process inputs such as water, energy and raw materials. Hence cleaner production programmes are likely to have a positive impact on a range of issues such as minimising solid and liquid wastes, as well as gaseous emissions and PM_{10}. Although not explicitly referred to in the Air Quality Policy, cleaner production principles are implied throughout the provisions of the document. This is specifically so in the Waste Avoidance requirements under clause 10. However, clearly, cleaner production concepts have much broader application than just to air emissions, so this aspect of both the Air Quality Policy and the Strategy may be seen as part of a broader scheme to improve the environmental performance of industry in Tasmania.

Notwithstanding the above, industries should be encouraged to adopt cleaner production philosophies, and be recognised for achievements in this area. This could include recognition in the form of an award under the Annual Environment Minister's Awards programme.

Economic Incentives

The concept of load-based licensing has been recently examined by the Environment Division of DTAE, as part of the EMPCA Legislative Review Programme, and was not found to offer realistic and practicable benefits to Tasmania. Other forms of financial instruments available include penalties, covered above, and subsidies, which are discussed below. The recent review of EMPCA has highlighted a proposal to introduce a two-part fee structure for annual permit fees, with a fixed administrative fee plus a variable fee that depends on the level of commitment to best practice environmental management.

Conversion to alternative fuels

Natural gas reticulation infrastructure is currently being rolled out across Tasmania. Stage 1 of the project includes the installation of 100 kilometres of gas pipe in urban areas of Hobart, Launceston, Devonport, Burnie and Bell Bay. At the time of writing, several industrial facilities had already signed agreements to purchase natural gas.

Conversion of combustion processes from solid fuels (and to a lesser extent, from liquid fuels) to natural gas or electricity will result in reduced emissions of particulates but can require considerable capital cost. This may be a significant barrier to such conversions for many small-to-medium companies. Options for assisting companies to surmount this barrier include financial incentive programmes aimed at assisting industries in compromised airsheds to convert away from polluting energy sources, such as coal and wood, to natural gas or electricity. The following initiative was announced in the May 2005 Commonwealth Government budget:

- "$1.0 million over three years to fund financial incentives for industries in the Tamar Valley area to replace wood-fired technologies with cleaner burning alternatives".

There are, of course, other considerations, such as equity and economic issues, and whether conversion to another energy source is the optimum solution for all industries when other environmental impacts such as transport are taken into account.

In other words, all options should be evaluated using a *life-cycle analysis* approach, discussed above, where the impacts of all inputs and outputs are assessed from their origins in the environment to their ultimate end-use and disposal to the environment. Factors such as costs and energy use to a facility for transporting materials are naturally part of the *life-cycle analysis* process. However, other aspects such as economic costs to the community should also be part of a full environmental impact assessment. In the past, such aspects have often been regarded as *externalities* to a business and hence not the responsibility of the operators. Increasingly, their consideration is being mandated for accreditation under Standards for *Environmental Management Systems*, such as ISO 14001.

In some cases, a full systematic evaluation may suggest solutions that may not be immediately obvious to the operators of a plant. A possible example might apply to a wood processing activity, where an analysis may show that:

- it is preferable to burn wood wastes to produce heat or power than to transport it to another location for disposal; *or*
- by adopting cleaner production principles, other uses for wood waste might be found, such as utilising it as the raw material for fuels such as pellets for use in clean-burning new technology domestic woodheaters.

2.5 Planned Burning

2.5.1 Smoke Management From Planned Burns

Objective 13

Improve the management of smoke from planned burning *in accordance with the Environmental Protection Policy (Air Quality)* by:

a) Establishing smoke management procedures for planned burning;
b) Incorporating these procedures into the Forest Practices Code;
c) Improving the co-ordination of planned burning to minimise smoke impacts; and
d) Investigating the most appropriate way to manage and respond to complaints relating to planned burning.

Background

Both planned burns and wildfires can impact on air quality and the visual amenity of an airshed. However, due to the unplanned nature of wildfire, management strategies to minimise their smoke impacts are outside the scope of this Strategy. There are many different types of planned burning:

Forest regeneration burns

Forest regeneration burns are conducted to regenerate eucalypt forests (usually wet forests) and to assist in the re-establishment of plantations. These burns aim to clear away residue woody materials and provide an ash bed for new seedlings. They are also called *high intensity burns*, due to the large fuel loading and are designed to generate high temperatures, creating intense convection currents. This ensures that smoke forms a tall column or plume which travels into the upper atmosphere and then disperses. They are usually conducted during autumn months, on days with little or no wind. As a result, such events often have a high visual impact, sometimes resulting in numerous complaints from the community. However, if they are well designed and implemented, they do not normally affect ground level air quality.

Fuel reduction burns

Fuel reduction burns and other vegetation management burns are used to reduce the risk and severity of wildfires with the aim of improving public safety from wildfires. Fuel reduction burns also provide protection for both native and plantation forests and private property located near parks and reserves. Fuel reduction burns are low intensity burns, so their smoke tends to remain near ground. Therefore they may impact on ground level air quality, depending on wind direction.

Although fuel reduction burns may impact on air quality, it is recognised that this practice reduces the likelihood of wildfires that could have more significant impacts such as property destruction.

Fuel reduction burns are undertaken by Forestry Tasmania, the forestry industry, Parks and Wildlife Service, Tasmania Fire Service, Councils and owners of private property.

Agricultural burns

Agricultural burns are undertaken as a land and crop management tool. Following harvest of some crops, remaining stubble is sometimes burnt. Stubble burning is quick, inexpensive and can improve the control of weeds, insects and disease.

Green waste burns

In the past, many Councils would separate green waste from materials deposited into landfills. Once a significant quantity of green waste had accumulated, the Council would then burn the material. This practice is being phased out and alternative management strategies are being implemented. Further discussion of this issue is included in Section 2.3.7 (Emissions from Backyard Burning).

Impacts of smoke from planned burning

Smoke from planned burning has the potential to impact on air quality and visibility. The impacts from planned burning, particularly fuel reduction burns, need to be considered within the context of the potentially more significant impact from uncontrolled wildfires.

In May 2003, multiple planned burns were conducted around Launceston and this resulted in exceedences in the daily PM_{10} Standard for four consecutive days. The visual impact of smoke, particularly the tall column plume from high intensity burns, is also a significant impact.

Current methods for minimising smoke impacts

Plume trajectory forecasts

The Bureau of Meteorology has developed tools to predict the dispersion of smoke from planned burns. The smoke plume trajectory model predicts the direction and concentration of smoke drift in the atmosphere (see Figure 6). The atmospheric profile model produces a chart showing the profile of wind temperature and dewpoint against the height above the ground. It also calculates a quantity called the *ventilation index*, a measure of the ability of the atmosphere to disperse smoke. The *ventilation index* was under evaluation at the time of writing. However, retrospective testing of the *ventilation index* on data for March to April 2004 demonstrated its ability to predict days suitable for high intensity burning with reasonable accuracy. If further testing proves fruitful, it will be another useful tool for scheduling planned burns.

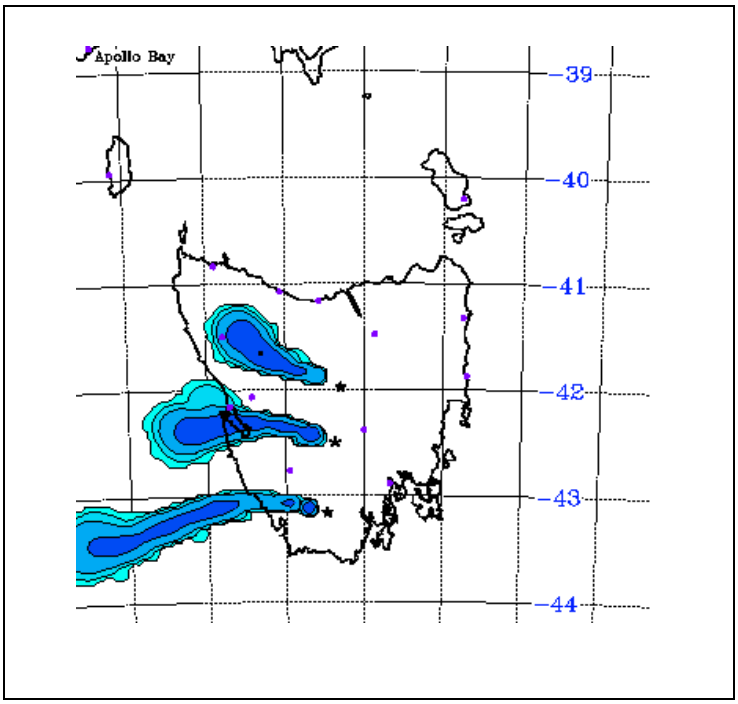

Figure 6: Example smoke plume trajectory forecast from Bureau of Meteorology

Tourism and Forestry Protocol Agreement

In order to minimise the potential impact of smoke on significant tourism events, a *Tourism and Forestry Protocol Agreement* was signed in 2003 by Forestry Tasmania, Forest Industries Association of Tasmania, Private Forests Tasmania and the Tourism Council of Tasmania.

The location of planned burns undertaken in autumn by Forestry Tasmania and members of the Forest Industry Association of Tasmania have been identified on the internet. This alerts the community to the timing and location of planned burns.

A forest industry group has been established to review the effectiveness of the procedures developed out of the *Tourism and Forestry Protocol Agreement.* It is anticipated that these procedures will be referred to in the Forest Practices Code.

Fire permit system

The *Fire Service Act 1979* requires that a permit to light a fire be obtained during the fire permit period. The fire permit period is determined each year depending on seasonal conditions, but typically operates between November and March each year. The fire permit requires that the person in charge of a fire notifies the Tasmania Fire Service prior to lighting of the fire. The fire permit will usually specify appropriate weather conditions for conducting the burning. Outside of the fire permit period, a fire permit is not required.

The *Fire Service (Miscellaneous) Regulations 1996* requires permit holders notify owners or occupiers of any adjoining land prior to lighting a fire during the fire permit period.

Section 66 of the *Fire Service Act* states that "a person who lights and controls a fire in accordance with the conditions of a permit granted to that person under this section is exempt from the *Environmental Management and Pollution Control Act 1994.*"

Improving the management of smoke from planned burning

Environment Protection Policy (Air Quality)

In the *Environment Protection Policy (Air Quality)*, referred to as the Air Quality Policy, section 17 relates to planned burning. The greatest number of comments on the Draft Air Quality Policy was received in relation to planned burning. The majority of submitters argued that the Draft Air Quality Policy did not go far enough in its treatment of planned burns. The Environment Protection Policy Review Panel proposed some changes to the draft document to strengthen the provisions.

The Air Quality Policy requires that persons undertaking planned burning should use best practice environmental management to minimise the effects of smoke pollution on individuals and the community. The Air Quality Policy also requires that:

Those "…agencies, companies or organisations undertaking burning on a regular basis or on a large scale should:

- *adopt efficient and effective air quality monitoring programmes;*
- *adopt a uniform approach to recording and assessing complaints;*
- *focus upon minimising the impact of smoke on the community in terms of health, amenity and safety;*
- *encourage the planning and execution of planned burning in a way that minimises the generation of smoke and improves the management of the effects of smoke; and*
- *require a responsible person involved in planned burning for land management to be competent in relevant burning procedures.*"

The Air Quality Policy also states that the State Fire Management Council should review its guidelines for high and low intensity burning to ensure that they are consistent with best practice environmental management.

Co-ordination of planned burning

There is scope for improved co-ordination of planned burning operations. This would potentially prevent the situation that arose in Launceston where multiple planned burns were conducted in May 2003, outside the fire permit period, leading to four consecutive days where the PM_{10} concentration exceeded the Standard. The type of information that would assist with better co-ordination includes the number and location of planned burning, volume of material to be burnt, weather conditions and predicted smoke plume trajectories. In addition, access to real-time air quality monitoring data could mean that the lighting of fires would be restricted in areas likely to impact on an already compromised airshed. Access to real-time data from air monitoring stations is discussed in Section 2.2.3 (Public Accessibility to Air Quality Information).

Consideration needs to be given to who should have the overall decision-making authority about the priority of fuel reduction, regeneration or plantation establishment burning. One difficulty under present arrangements is that co-ordination by the Tasmania Fire Service is only possible during the fire permit period. There would be advantages to having this type of co-ordination throughout the year.

The possibility of improving co-ordination of planned burning from a smoke management perspective will be investigated as part of this Strategy.

There is a need to impress upon holders of a fire permit that they act responsibly when lighting a fire, to minimise the impacts of their operations on the environment. A possible mechanism for increasing awareness of environmental smoke issues would be the inclusion of a requirement on the Fire Permit to take all reasonable precautions to avoid causing offence.

Response to complaints

Complaints can provide a useful indicator of the effectiveness of planning burning practices to minimise effects on local communities. Currently complaints relating to planned burning are received by a number of organisations, including DTAE, Councils, Tasmania Fire Service and Forestry Tasmania.

The Air Quality Policy requires that a uniform approach to recording and assessing complaints be developed. The Environment Protection Policy Review Panel (EPPRP, 2002) also recommended the establishment of an independent complaints system.

Appropriate responses to complaints will also reassure complainants that their concerns have been investigated and, where appropriate, action has been taken. Further discussion is required to determine the most efficient and effective way to respond to complaints. The Australian Standard, *AS4269 Complaints Handling* sets out a framework for management of complaints which could be used as the basis of common procedures for the receivers of complaints. Co-operation between the various organisations undertaking planned burning will be critical to assist with the investigation of complaints.

Notification System

The *Fire Service (Miscellaneous) Regulations 1996* requires permit holders notify owners or occupiers of any adjoining land prior to lighting a fire during the fire permit period. The Environment Protection Policy Review Panel (EPPRP, 2002) recommended that improved notification provisions be included in these Regulations and that the notification provision applies all year round, not limited to the fire permit period. The EPP Review Panel determined that "smoke from planned burns is usually the first sign that burning is under way" and that "an improved notification process may alleviate some submitters concerns regarding planned burning". In order to extend the notification requirements, the *Fire Service (Miscellaneous) Regulations 1996* would need to be amended.

Following implementation of the more efficient and effective complaints handling system referred to above, the complaints will be analysed to determine whether there are actions that could be taken to minimise the impact on individuals, such as an extended notification system beyond the fire permit period.

2.6 TRANSPORT SECTOR

2.6.1 Emissions from Vehicles

Objective 14

Reduce emissions from vehicles by:

a) Promoting improvements in vehicle fuel quality through national programs, including the NEPM (Diesel Vehicle Emissions) education programmes;
b) Investigating the feasibility of introducing a Smoky Vehicle Programme and regular vehicle tests;
c) Promoting the inclusion of air quality impacts into the charging system for heavy vehicles;
d) Promoting the conversion of heavy vehicles to LPG or CNG;
e) Promoting alternative fuels;
f) Promoting the uptake of fuel efficient vehicles including hybrid vehicles;
g) Investigating the means through which the age of Tasmania's bus fleet can be reduced;
h) Investigating means to optimise the use of rail for the transport of freight.
i) Promoting environmental considerations in government fleet purchasing policies;
j) Promoting increased utilisation of public transport;
k) Promoting the use of non-motorised forms of travel; and
l) Supporting and promoting healthy lifestyle initiatives in relation to transport and associated infrastructure.

Background – transport emissions

The National Pollutant Inventory shows that about 4% of PM_{10} emissions in Tasmania is from motor vehicles and 19% is from paved and unpaved roads (see *Introduction* Figure 2). The category of paved and unpaved roads mainly consists of particulate matter being suspended when a vehicle travels on the surface. The particulate matter can be deposited onto the road surface through the falling of dust particles, litter, dirt carried from unpaved lots or sites, erosion from adjacent areas and spillage. Actions to minimise particulate emissions from paved roads could include vacuum sweeping and the paving of access areas to unpaved lots or sites. Given the uncertainty in the accuracy of the data, measures to specifically reduce emissions from this source are not considered directly. However it is noted that actions to reduce the use of vehicles will indirectly reduce emissions from roads.

In Launceston it is estimated that, during the 6 coolest months of the year, approximately 7% of PM_{10} emissions is from motor vehicles and approximately 12% of PM_{10} emissions is from paved and unpaved roads. Hence approximately 19% of PM_{10} emissions originate from the transport sector.

In Tasmania, approximately 25% of the total fuel consumed is diesel. Petrol and LPG make up the remainder. By nature, burning of diesel fuel generates considerably more PM_{10} emissions than combustion of petrol fuel. Emission rates, measured as grams of PM_{10} per kilometre travelled, depend on the size of diesel vehicle, so that:

- diesel powered passenger cars and light vehicles emit about 16 times more PM_{10} than petrol powered vehicles, and
- diesel powered trucks emit about 5 times more PM_{10} than petrol powered vehicles.

Of the PM_{10} emissions from motor vehicles, it is estimated that 90% originates from diesel fuelled vehicles.

Table 13 indicates the projected *vehicle kilometres travelled* (VKT) in Tasmania in 2020 compared to those in 2000, based on a "business as usual" scenario. Overall it is anticipated that total vehicle kilometres travelled will increase by 12% in 2020 compared to the year 2000. The biggest relative change is for light commercial vehicles, with almost a doubling in the vehicle kilometres travelled in 2020.

Table 13: Projections of Vehicle Kilometres Travelled in 2020 (BTRE, 2003)

Type	Billions of VKT in 2000	Billions of VKT in 2020	% change in 2020
Cars	3.506	3.702	+ 5.6%
Light commercial	0.735	1.091	+ 48%
Articulated truck	0.121	0.167	+ 38%
Rigid & other trucks	0.217	0.199	- 8.3%
Buses	0.044	0.043	- 2.3%
Motor cycles	0.036	0.031	-13.9%
Total	4.658	5.232	+ 12%

Vehicle emissions and fuel quality

Emissions from vehicles are dependent upon both the quality of fuels and the performance of engine and exhaust gas treatment systems.

Australian fuel quality standards have been set for petrol and diesel under the *Fuel Quality Standards Act 2000*. The standards relate to several components and properties of the fuel, such as sulphur content, benzene content and research octane number (RON).

Vehicle emission standards are controlled through *Australian Design Rules* (*ADRs*) under the *Commonwealth Motor Vehicles Standards Act 1989*. New vehicles sold in Australia must comply with the ADRs.

The ADRs relating to vehicle emissions are based on standards set by the *United Nations Economic Commission for Europe*, also called *Euro* standards. Currently the ADRs mandate the staged adoption of –

- *Euro* 2 and *Euro* 3 standards for petrol vehicles by 2006, and
- *Euro* 2, *Euro* 3 and *Euro* 4 standards for diesel vehicles by 2007.

The adoption of these standards will result in a significant decrease in emissions. It is estimated that in the year 2020, PM_{10} emissions from vehicles in Australia will fall to 80% of the year 2000 levels. This is despite an estimated 46% increase in *vehicle kilometres travelled* in Australia (*Vehicle Emissions and Fuel Standards Review Working Group*, 2003) over this period. As noted above, the projected increase in *vehicle kilometres travelled* for Tasmania is 12% during this time.

The *Land Transport Environment Committee* (LTEC - previously the *Motor Vehicle and Environment Committee*) is investigating options for the adoption of more stringent standards for vehicle emissions and fuel quality. The following changes are proposed:

- *Euro 4* emission standards for light vehicles in 2008 for new models and 2010 for all models being manufactured;
- maximum sulphur content in petrol of 50 ppm in 2008;
- maximum sulphur content in petrol of 10 ppm in 2010 (timing pending review of demand and availability); and
- maximum sulphur content in diesel of 10 ppm in 2009.

Further consultation on the adoption of the *Euro 5* for heavy vehicles will be undertaken. The implementation of these changes will not directly mandate a further reduction in particulates (beyond the 80% reduction by the year 2020 that will be achieved through the current ADRs). There is emerging evidence that reducing sulphur in diesel will reduce the number and mass of ultrafine particulates; ie. those smaller than 0.1 μm (Vehicle Emissions and Fuel Standards Review Working Group, 2003). The reduction of sulphur in diesel should improve the effectiveness and durability of emission control systems.

Tasmania takes an active role in promoting improvements to fuel quality and emissions standards both through its membership of the Fuel Standards Consultative Committee established under the *Fuel Quality Standards Act 2000*, and its input to the *EPHC Air Quality Working Group*.

The NEPM (Diesel Vehicle Emissions)

The National Environment Protection (Diesel Vehicle Emissions) Measure, referred to as the NEPM (Diesel Vehicle Emissions), was finalised in June 2001. The goal of the NEPM (Diesel Vehicle Emissions) is to "reduce exhaust emissions from diesel vehicles, by facilitating compliance with in-service emissions standards for diesel vehicles".

A detailed funding submission was submitted to the Commonwealth Department of Environment and Heritage from DTAE. The objectives of the proposed programme are to:

- evaluate the condition of diesel fuel vehicles and repair the most polluting vehicles;
- raise awareness of relevant State Government agencies, industry and diesel vehicle operators, owners and the public to the in-service standards;
- develop support infrastructure for the training of emissions testing facility personnel and diesel mechanics;
- support the evaluation of the need to manage diesel emissions as required under the NEPM (Diesel Vehicle Emissions); and
- develop recommendations regarding future emissions programmes and emissions enforcement programmes.

The Commonwealth Government has allocated funding for the programme during 2006 and 2007. The training courses for emissions testing facility personnel and diesel mechanics are currently under way, and are run by TAFE Tasmania.

Reporting of smoky vehicles

The *Vehicle and Traffic (Vehicle Standards) Regulations 2001* prohibit a vehicle from emitting visible emissions for a continuous period of at least ten seconds (note, this does not include the emissions of steam). The Department of Infrastructure, Energy and Resources (DIER) has a defect management system and vehicle call in system that allows non-compliant vehicles to be reported, inspected and issued with a defect notice if warranted.

There is an opportunity to raise the awareness of the general public about the issue of smoky vehicles. As part of this Strategy the feasibility of establishing a comprehensive Smoky Vehicle programme will be investigated. In addition, a comment has suggested that there should also be a system of annual roadworthiness and environmental inspections. However, careful consideration will need to be given as to the resources required to establish this, when weighed against the relative benefit of such programmes to air quality compared with contributions from other sources.

Green vehicle guide

The Australian Greenhouse Office and the Commonwealth Department of Transport and Regional Services have launched the Green Vehicle Guide (www.greenvehicleguide.gov.au). The guide allows consumers to compare overall green rating, air pollution rating, greenhouse rating and fuel consumption rating of approximately 400 new cars.

Fuel excise and credits scheme

The Commonwealth Government's new energy policy, titled "Securing Australia's Energy Future", released in June 2004, establishes an integrated framework for a broad range of areas including improving air quality and lowering greenhouse emissions.

From 1 July 2006, fuel excise credits will be provided to petrol and other taxable fuels used for business purposes in heavy vehicles (more than 4.5 tonnes). To be eligible for the energy credits, users of diesel heavy vehicles must meet one of the following criteria to qualify:

- all vehicles manufactured since 1 January 1996;
- vehicles that are part of an accredited audited maintenance programme;
- vehicles that pass the in-service emission standard;
- vehicles which comply with a government-endorsed maintenance schedule that includes an emissions component; and
- vehicles owned by primary producers that are used in their owner's primary production business activity.

The first four criteria are designed to reduce the emissions from diesel vehicles.

Heavy Vehicle Road Pricing

The National Transport Commission (NTC) has an ongoing responsibility to ensure that heavy vehicle charges reflect their share of road costs. These charges relate to all vehicles over 4.5 tonnes. The charges are based on a two-part system, including a fuel charge (part of the fuel excise) collected by the Commonwealth and a fixed annual registration charge collected by State and Territory Governments. The charges are set through a process of estimating the share of road-related expenditure attributable to heavy vehicles and allocating them between different vehicle types on the basis of average vehicle and load characteristics.

The Road Use Pricing Principles endorsed by the Australian Transport Council, which guide the NTC's future development in heavy vehicle pricing, allow for externality charging relating to noise and air emissions where there are clear net economic gains, the extent of effort is recognised and transparency and more accurate pricing is ensured. In the future, it is hoped that pricing will be used as a means of managing environmental impacts of road use.

The NTC is currently working on the third heavy vehicle road pricing determination, with the aim of improving pricing signals from heavy vehicle charges and moving towards a system of more variable pricing. It was earlier intended that pricing for environmental externalities such as noise and air emissions would be considered in the work of the third determination, if an individual pricing model was incorporated in that determination. However, due to the timetable for the third determination and ongoing measurement problems, this is not considered feasible at this stage. The Department of Infrastructure, Energy and Resources is encouraging the NTC to collect relevant air quality data so that environmental issues can be considered in the fourth determination for heavy vehicle pricing.

Promotion of the conversion to cleaner fuels

The use of alternative fuels in Tasmania is limited, although there are programs in place to increase the use of alternative fuels. The use of liquid natural gas has increased from less than 1% in 1990 to 3% in 1998.

Hydro Tasmania is actively involved in developing the use of hydrogen as a fuel source. It is proposed that hydrogen will be sourced by using hydro power to split water molecules into hydrogen and oxygen. Hydro Tasmania has sponsored a dedicated Hydrogen Laboratory at the University of Tasmania, unique in Australia. Hydro Tasmania and the University are working together to develop demonstration projects to promote the use of hydrogen. The following projects are at various stages of completion:

- hydrogen powered Australia Post Motor Bike;
- diesel generator conversion to diesel-hydrogen fuel mix;

- conversion of 600cc motor bike engine for SAE formula race car;
- hydrogen powered Go-Kart;
- modelling of hydrogen assisted Remote Area Power Supplies; and
- development of proposal for a vehicle trial in Tasmania.

Three hydrogen fuel cell buses are currently being tested in Perth, Western Australia.

With the current rollout of natural gas in Tasmania, there may be opportunities to promote the conversion of diesel-fuelled vehicles to compressed natural gas (CNG). Metro Buses and Compair are currently considering a trial to convert some Metro buses from diesel to CNG. The Hobart City Council has expressed its strong support for this programme. However, it would like the State Government to contribute to the establishment of a refuelling station. This will need further investigation.

Age of the Tasmanian Bus Fleet

The introduction of more onerous vehicle emissions standards over time makes the introduction of newer vehicles an obvious path to reducing particulate emissions. While Tasmania's bus fleet has an excellent safety record, the Tasmanian Government is aware of community concern regarding the ageing profile of the Tasmanian non-metropolitan school bus fleet.

The Government allocated funding in the 2004-05 Budget for the Review of Core Passenger Services and asked the Review to consider how the age of the Tasmanian bus fleet might be addressed.

Rail transport

Rail transport is generally viewed as a more energy efficient and environmental friendly mode compared to road transport. Whilst diesel powered locomotives produce a number of emissions including PM_{10}, road outweighs rail in total emissions of particulate matter.

Table 14: Emissions of PM_{10} from Australian Transport 2001/02 (Apelbaum Consulting Group, 2004)

Mode	PM_{10} emissions (kilograms)
Rail	1,660,000
All road	17,850,000

The movement of Tasmania's freight is dominated by road transport. With the total freight movement anticipated to double in the next 20 years, there is a need to ensure that all transport modes are in a position to grow. However, the expected continuing dominance of road transport will present significant challenges, including transport's contribution to air emissions and related health issues.

The Department of Infrastructure, Energy and Resources is actively identifying the potential role for rail in the context of the current and future freight task and the scope for transferring freight from road to rail in Tasmania. If this modal shift can be realised, this may result in benefits to air quality because a locomotive is capable of transporting large amounts of freight compared with a heavy truck. Both the Energy White Paper "Securing Australia's Energy Future" (Commonwealth, 2004) and the AusLink White Paper titled *Building our National Transport Future* (Commonwealth, 2004a) anticipate a significant role for rail in achieving a reduction of emissions.

Government fleet cars

There is the opportunity to support new technology through the uptake of alternative fuelled cars within government owned fleets. A number of State Government departments and agencies opted to lease the Toyota Prius, a hydrid petrol and electric engine. The consideration of less polluting vehicles will be promoted within State Government purchasing departments.

Public transport

Tasmania's dispersed settlement pattern and low-density urban areas reinforce reliance on private vehicles for transport, presenting significant challenges to the greater use of public and non-motorised transport.

Responsibility for the transport sector is shared between all three levels of government. It is important that each level of government are working together to minimise the environmental impacts of transport activities.

Consequently, Tasmanian Government spending on public transport has been characterised more as an instrument of social policy, designed to improve mobility and access for transport disadvantaged Tasmanians, than a means of reducing the use of private vehicles.

Recent patterns of urban expansion and economic growth in Tasmania mean that other benefits traditionally associated with the greater uptake of public transport may become more important over time. These benefits include:

- reduced levels of road congestion;
- savings in terms of reduced need for the provision of car parking; and
- better health outcomes.

The main form of transport used by Tasmanians to travel to work or study is detailed in Table 15. The most popular mode of transport is private vehicle use, with over 90% of people using a car or motorbike. The use of public transport has varied from 6.3% in 1996 down to 2.4% in 2000. In 2003, approximately 4.5% or 7,700 people use public transport as the main form of transport to work or study.

Table 15: Main form of transport used to travel to work or study (ABS, 2003)

Form of Transport	2003	2000	1996
Private vehicle (including motorbike)	90.3%	88.7%	80.4%
Public transport	4.5%	2.4%	6.3%
Walk/cycle	4.9%	7.8%	9.1%
Other	0.3%	1.1%	4.1%

The increased use of public transport depends primarily on the provision of services that are well aligned with peoples' transport needs. Other factors include the frequency and reliability of the service, safety and cost of the service.

Recent Tasmanian customer research provides insight into the views of potential bus users about how services could be improved and an understanding of what discourages use, which would form the basis of a marketing strategy for encouraging the greater use of public transport in metropolitan Tasmania.

The overwhelming majority of potential customers most valued an increase in service frequency throughout week and particularly in weekends (46%). Of the remaining improvements, on and off bus security was mentioned by 10% and better bus shelters by 7%. Other items mentioned include more polite drivers 4%, better access 3% and reduced fares by 3%.

In terms of reasons stated which prevented greater bus use, the attractiveness of the car dominated, with 75% of passengers stating a preference to using a car. Other reasons included infrequent or poor bus service 23% and a perception that travelling on buses takes too long 13% (note multiple reasons allowed). Other often quoted impediments to bus use such as lack of information, inability to afford fare and security were mentioned as reasons by only 1% of bus users.

In summary, improved bus service frequency at all times is the one thing that will encourage increased usage. Increased frequency will counteract negative perceptions that the service is poor and will neutralise to some extent the concern that bus journeys take too long. Security is important as are better bus shelters but as long as perceived security levels are maintained and buses are frequent these are not major obstacles. There is little evidence to support the concept that information is lacking or that fares are too high.

Given that the Tasmanian Government already spends over $53 million per annum to support public bus services in Tasmania, it must be acknowledged that the capacity to fund more frequent services is likely to be limited.

Any promotional campaign must accept there is strong competition from the car. The benefits of public transport vis a vis the car should be promoted such as the lower costs, positive impacts on health when combined with walking, relative convenience (eliminates the need for parking a car), relaxation on board and environmental benefits.

Given both the relatively small contribution made by cars to air quality problems in Tasmania, and the challenges involved in achieving modal shift to public transport, it is likely that improving the emissions profile of the public transport fleet will be a more effective means of improving air quality than reducing the use of private petrol vehicles.

Non motorised forms of travel

By far the best and most effective way to reduce emissions from transport is to reduce the number of vehicles being used. The use of non-motorised transport is one such option to assist in reducing the amount of vehicles used. Table 15 indicates that the proportion of people walking or cycling to work or study has steadily declined from over 9% in 1996 to 4.9% in 2003. Some of the reasons given for not walking or cycling include:

- the distance being too far (61%);
- the need for a vehicle before, during or after hours (18%);
- lack of time (17%);
- do not own a bicycle (17%);
- concerned about personal safety (7%); and
- traffic/road problems (6%).

Note, more than one answer may be specified, hence the sum of the percentages exceeds 100%.

Existing transportation and land use patterns create significant barriers to the use of non-motorised transport such as walking and cycling. Therefore, improved planning is required to

enhance non-motorised transport linkages between key destinations. The construction of safe and accessible bicycle and pedestrian pathways along key routes is one strategy to encourage the use of non motorised transport and should be a consideration in land use planning (see section 2.7 Integration of Planning).

Healthy Lifestyle Initiatives

The use of non-motorised transport is also encouraged through other State and National initiatives. Under goal 5 of *Tasmania Together:* "Develop an approach to health and wellbeing that focuses on preventing poor health and encouraging healthy lifestyles.", several plans, strategies and programmes have been established to promote and encourage the community to become more physically active. Not only do these initiatives benefit human health directly but there are also social economic and environmental benefits to be gained as well.

The Premier's Physical Activity Council (PPAC) developed the state wide Tasmanian Physical Activity Plan in early 2005. The Plan sets out the direction for the State in achieving a more active Tasmania and provides a framework to coordinate the way in which physical activity is implemented and resourced. One of the main goals of the Plan is to form a supportive built environment that encourages active communities through improved access to open space and recreation facilities, good pedestrian facilities, urban design that provides connecting paths for pedestrians and cyclists, and proximity to walkways and parks (PPAC 2005).

The National Action Plan, *Be Active Australia,* has developed a national framework which provides a strategic focus to increase access to physical and social environments that support people to be active and to strengthen the capacity for communities to take part in physical activity (National Public Health Partnership 2005).

2.7 Integration of Planning

2.7.1 Environmental Considerations in Planning

Objective 15

To promote the better integration of environmental impacts, in particular air quality issues, within planning processes by:

a) Promoting and providing training on the use of the Tasmanian Air Pollution Potential Atlas within Local Government planning processes;

b) Preparing guidance material to assist in integrating air quality considerations into the development and implementation of planning schemes;

c) Supporting and promoting the establishment of an environmentally sustainable housing demonstration project; and

d) Promoting ways to integrate transport issues within Local Government planning schemes.

Overview of the planning system in Tasmania

The Resource Management and Planning System in Tasmania consists of an integrated system of laws, policies and procedures. The principal Act relating to planning is the *Land Use Planning and Approvals Act* 1993 (LUPAA). The objectives of the Resource Management and Planning System are defined in the LUPAA. The objectives are to:

- promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity;
- provide for the fair, orderly and sustainable use and development of air, land and water;
- encourage public involvement in resource management and planning;
- facilitate economic development in accordance with the objectives stated above; and
- promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.

The *Land Use Planning and Approvals Act 1993* establishes Local Government planning schemes which provide the basic rules for proposed new developments. Each Council is responsible for preparing and administering its own planning scheme. A planning scheme defines land use categories and development standards for each land use category. The planning scheme is linked to relevant legislation. The State Government is embarking on a project to set up a uniform approach to planning schemes that will take a regional view of "sustainable development" including impacts on regional airsheds, as required under the EPP(Air Quality) 2004.

The responsibility for assessing development applications depends on the type of activity. Schedule 2 of EMPCA defines Level 2 activities. Level 1 activities are those activities that may cause environmental harm but are not Level 2 or 3 activities. In most cases, the relevant Council is responsible for assessing applications relating to Level 1 activities. The assessment of Level 2 activities is undertaken by the Board of Environmental Management and Pollution Control. It should be noted that there are exceptions to these rules.

The Resource Planning and Development Commission is the body responsible for assessing and approving planning schemes, as well as assessing large-scale Projects of State Significance (Level 3 activities).

Tasmanian Air Pollution Potential Atlas

The development of the Tasmanian Air Pollution Potential Atlas was discussed previously (see Section 2.2.1: Air Quality Monitoring and Forecasting). The Air Pollution Potential Atlas will identify which areas of the State have the potential for poor air dispersion. This tool will enable developers, private planners, Local and State Government planners and the broader community to better consider the impact of proposed new sources of air pollution on air quality. When completed, the Tasmanian Air Pollution Potential Atlas could be referenced by Local Government planning schemes. Training on the development and implementation of the atlas will be offered to Local Government.

Planning schemes

The extent of integration of air quality issues into planning schemes varies from Council to Council. The review of a planning scheme provides an opportunity to update the provisions relating to air emissions. Guidance material will be prepared to assist Councils to address air quality issues within planning schemes. The guidance material will cover:

- including emissions to air as a strategic objective within the planning scheme;
- the regulatory requirements relating to air quality;
- information on air emissions to be submitted in development applications; and
- how to assess the potential impact on air quality resulting from new developments.

The Environment Protection Policy (Air Quality), Air Quality Policy, will be an important tool for addressing air quality issues within the planning process. For example, the assessment of new industrial point sources will consider the additional pollutant loading in the context of the entire airshed, rather than the individual location.

Dispersion modelling is used when assessing the impact of new air pollution sources. The Department of Primary Industries, Water and Environment (DPIWE) owns three meteorological files, which are used for dispersion modelling. A project is underway at DPIWE to generate meteorological data files for many areas around the State. These meteorological data files will be created which will then be used to more accurately model the emissions from new air pollution sources.

Demonstration project

Under Housing Tasmania's Affordable Housing Strategy, the construction of an environmentally sustainable housing demonstration project is identified. It is proposed that the environmental performance of the homes will be formally monitored. The results of the demonstration project will be useful in encouraging the integration of environmental considerations into new developments.

Transport issues

There is a number of planning issues around transport that can impact on local air quality. For example, integrated land use and transport planning could reduce the dependence on the use of private vehicles, allow more efficient and customer responsive public transport systems and promote the use of non-motorised transport. In 2003, the Transport Minsters and the Council of Local Government and Planning Minsters endorsed the National Charter of Integrated Land Use and Transport Planning. The Charter is designed to support existing and future planning mechanisms by providing a national commitment to a framework for responsive planning, consistent decision making, and good design and management (PIA Tasmanian Division 2005).

The Department of Infrastructure, Energy and Resources (DIER) also promote the National Charter and works with Local Government on transport issues within planning schemes. One such example is the Southern Integrated Transport Plan. This is being developed co-operatively under the Southern Regional Partnership Agreement, by the DIER, the Department of Economic Development, and the twelve local councils in the region. The plan addresses issues such as: air quality and the impact of transport emissions, including the NEPM (Diesel Vehicle Emissions); design routes and distances travelled; age of vehicle fleet and technological improvements; and changing the modal shift from cars to public or non-motorised transport.

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4 GLOSSARY

Accepted modern technology	Technology which has a demonstrated capacity to achieve the desired emission concentration in a cost-effective manner, takes account of cost-effective engineering and scientific developments and pursues opportunities for waste minimisation
Airshed	An area that is defined by natural or topographic features affecting air quality.
Best practice environmental management	Management of an activity to achieve an ongoing minimisation of the activity's environmental harm through cost-effective measures assessed against the current international and national standards applicable to the activity
Environmental Management System	A business tool for systematically measuring and improving environmental performance
Life cycle analysis	Methodology to determine the environmental impacts of products, processes or services, through production, usage, and disposal.
$PM_{2.5}$	Particulate matter with an equivalent aerodynamic diameter of 2.5 microns or less
PM_{10}	Particulate matter with an equivalent aerodynamic diameter of 10 microns or less

5 ACRONYMS

ADR	Australian Design Rule
AHHA	Australian Home Heating Association
AMT	Accepted Modern Technology
ATC	Australian Transport Council
BOM	Bureau of Meteorology
BPEM	Best Practice Environmental Management
CNG	Compressed Natural Gas
DEH	Department of Environment and Heritage
DHHS	Department of Health and Human Services
DIER	Department of Infrastructure, Energy and Resources
DPIW	Department of Primary Industry and Water (as of May 2006)
DPIWE	Department of Primary Industries, Water and Environment (defunct as of May 2006)
DTAE	Department of Tourism, Arts and Environment (as of May 2006)
DTPHA	Department of Tourism, Parks, Heritage and the Arts (defunct as of May 2006)
EIA	Environment Impact Assessment
EMPCA	Environmental Management and Pollution Control Act
EPA	Environment Protection Authority
EPHC	Environment Protection and Heritage Council
EPPRP	Environment Protection Policy Review Panel
FIAT	Forest Industries Association of Tasmania
FT	Forestry Tasmania

GRUB	Generally Representative Upper Bound
HT	Housing Tasmania
LGAT	Local Government Association of Tasmania
LUPAA	Land Use Planning and Approvals Act
NEPM	National Environment Protection Measure
NPI	National Pollutant Inventory
NRM	Natural Resource Management
NTC	National Transport Commission
PAH	Polycyclic aromatic hydrocarbons
POM	Polycyclic organic material
PPAC	Premier's Physical Activity Council
PWS	Parks and Wildlife Service
RON	Research Octane Number
TAPPA	Tasmanian Air Pollution Potential Atlas
TFS	Tasmania Fire Service
TSP	Total Suspended Particulate
VKT	Vehicle Kilometres Travelled

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