Fuel Tax Inquiry Report

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FUEL TAXATION INQUIRY COMMITTEE

28 March 2002

The Hon Peter Costello, MP
Treasurer
Parliament House
CANBERRA ACT 2600

Dear Treasurer

We are pleased to present the Report of the Inquiry into Fuel Taxation, in accordance with the terms of reference announced by the Government on 8 July 2001.

Yours sincerely

David Trebeck (Chairman) John Landels, AC Kevin Hughes

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APPENDICES

ABBREVIATIONS AND ACRONYMS

ABRD	Australian Bicentennial Road Development
AFCP	Alternative Fuels Conversion Programme
ANTS	A New Tax System
CNG	Compressed natural gas(a)
CO	Carbon monoxide
CO_2	Carbon dioxide
cpl	Cents per litre
CPI	Consumer Price Index
DAFGS	Diesel and Alternative Fuels Grants Scheme
DFRS	Diesel Fuel Rebate Scheme
DME	Dimethyl ether(a)
EGCS	Energy Grants (Credits) Scheme
FSGS	Fuel Sales Grants Scheme
GDP	Gross Domestic Product
Gj	Gigajoule
GGAP	Greenhouse Gas Abatement Programme
GPS	Global Positioning System
GST	Goods and Services Tax
GTL	Gas-to-liquids(a)
kPa	kiloPascals
LNG	Liquefied natural gas(a)
LPG	Liquefied petroleum gas(a)
MBE	Measures for a Better Environment
NO_2	Nitrogen dioxide
PM_{10}	Particular matter size less than or equal to 10 microns in diameter
PPFSS	Petroleum Products Freight Subsidy Scheme
PSOS	Product Stewardship (Oil) Scheme
RRPGP	Remote Renewable Power Generation Programme
SO_2	Sulphur dioxide
ULP	Unleaded petrol
ULSD	Ultra low sulphur diesel
USGS	United States Geological Survey
VOC	Volatile organic compounds

(a) More details provided in Appendix G.

MEMBERS OF THE INQUIRY

Mr David Trebeck, Inquiry Chairman

Mr Trebeck is Managing Director of ACIL Consulting Pty Ltd, an economic and policy consulting company. Mr Trebeck also holds a number of company directorships.

Mr John Landels, AC

Mr Landels was Chairman and Chief Executive of Caltex Australia Limited between 1977 and 1991 and has held a number of senior company positions both within and outside Australia.

Mr Kevin Hughes

Mr Hughes is Chief Executive Officer of the Service Station Association Ltd and has had an extensive career in various aspects of the petroleum products industry.

INTRODUCTION

Background to the Inquiry

On 1 March 2001, the Prime Minister announced an inquiry into the total structure of fuel taxation in Australia. This was one of a number of Government decisions related to fuel, including a 1.5 cents per litre cut in fuel excise, abolition of indexation of fuel excise rates and asking the Australian Competition and Consumer Commission (ACCC) to examine the feasibility of placing limitations on petrol and diesel retail price fluctuations.

Following consultations, the Treasurer and the Minister for Industry, Science and Resources announced on 8 July 2001 the terms of reference and Inquiry membership.

The Inquiry was asked to report by March 2002.

While there have been many previous reports — both Commonwealth and State — into petroleum products, most have focussed on the structure of the petroleum products industry, particularly around issues of competition, marketing and pricing, or the pricing of specific petroleum products.

Few of these reports have specifically addressed the principles and practice of the **taxation** of fuel in Australia.

This Inquiry therefore provided a timely opportunity to examine the underlying principles, objectives and application of fuel taxation arrangements in Australia. This is particularly appropriate in view of future policy developments affecting the production, supply and use of fuel, which will have long term implications for the structure and design of fuel taxation arrangements.

Terms of reference – scope

The Inquiry terms of reference are shown on the inside front cover of the report.

In accordance with the terms of reference, the Inquiry has confined its attention to issues of fuel taxation within the overall budget neutrality constraint imposed on it. The Inquiry has not made recommendations on

general fuel pricing issues, except for those which have a direct relationship to fuel taxation.

The report does not address income tax issues affecting producers and distributors, excise on the production of crude oil, fuel used in commercial electricity generation, or alternative taxation imposts which might substitute for fuel taxation.

The Inquiry's approach: information, transparency, consultation

The Inquiry's first task on being appointed was to establish a process for undertaking the requirements of the terms of reference.

Central to these considerations were the considerable information needs of the Inquiry to fulfil its role. Information was sought not only from policy makers and administrators, but also from the wide range of individuals, business and community groups affected by the taxation of fuel through fuel purchases or having to comply with fuel taxation administration.

The Inquiry sought an open and transparent approach to encourage the sharing of information between the Inquiry and interested parties. It informed the public about the Inquiry processes and fuel taxation issues generally and consulted face-to-face with many of those who made submissions.

Information

The Inquiry released a number of background papers to inform the public about the Inquiry and provide information on the details of fuel tax arrangements both in Australia and overseas. These publications were:

- an Issues Paper released on 18 August 2001, which explained the Inquiry terms of reference, and requested submissions from the public
  - the Issues Paper was sent to a range of individuals, industry and community organisations, and Members of Parliament, including the Leader of the Opposition and Leader of the Australian Democrats; and
- three background papers covering
  - the history of Australia's fuel tax arrangements

- a summary of previous reports into fuel in Australia
- fuel tax arrangements in other countries.

A number of media releases were issued, drawing attention to the Inquiry's activities, the Issues Paper and the call for submissions. Advertisements were placed in metropolitan and regional newspapers and industry specific journals, calling for submissions from the public.

Submissions and consultations

Prior to the request for submissions, the Inquiry held informal meetings with a number of organisations to gain an early understanding of issues likely to be raised in submissions. These meetings occurred during August and September 2001.

In response to its request, the Inquiry received 341 submissions from individuals, businesses, community groups and governments and their agencies. All submissions (with the exception of those identified as commercial-in-confidence) were posted on the Inquiry website and are listed at Appendix A.

The submissions encompassed an extremely wide range of viewpoints and opinions. Virtually all sectors of the economy and community interests were represented. There is such a diversity of opinion on the issues covered by the terms of reference that, even if it wanted to, the Inquiry could not please everyone. What the Inquiry can say is that it has reached conclusions and made recommendations having heard and thought about all points of view submitted to it.

Following the closing date for submissions, formal consultation hearings were held with 75 organisations and individuals that made submissions to the Inquiry. Consultation hearings were held from the middle of October 2001 to February 2002 in Brisbane, Sydney, Melbourne, Canberra and Perth. A number of groups from, or representing interests located in, regional and rural Australia attended these consultations.

Other Inquiry activities

Members of the Secretariat travelled to Japan, North America, Europe and New Zealand to gain an understanding of overseas fuel tax regimes. Additional meetings were held within Australia with other individuals and organisations involved in fuel taxation issues.

Structure of the Report

The Overview outlines the two major themes that underlie the structure of the report and the development of the Inquiry's recommendations:

- identification of the **objectives** of fuel taxation and the need to specify clearly how these objectives apply to Australia's arrangements; and

- the implications of **future policy** and **technological developments** — both domestically and internationally — on fuel taxation.

Part 1 establishes the **context** which forms the basis of the detailed examination later. It provides an outlook for the policy developments which will impact on fuel production, supply and use both in Australia and internationally over the next two decades.

This part also establishes what the **objectives of fuel taxation** should be by analysing the wide range of objectives identified by the Australian community and their relationship to the current and future fuel taxation policy environment.

Part 2 fulfils the **reporting functions** of the terms of reference. It takes the objectives identified in Part 1 and recommends changes to current arrangements to achieve those objectives, including the design of the Energy Grants (Credits) Scheme. The impact of these changes is also assessed.

Part 3 examines **specific policy measures** that the Inquiry has been asked to report on, covering incentives to encourage early production of ultra low sulphur diesel and other programmes announced in the Commonwealth Government's May 1999 *Measures for a Better Environment* statement.

Acknowledgments

Members of the Inquiry wish to thank the large number of individuals, organisations and government agencies that contributed to the Inquiry, through submissions, consultations and direct contact with the Secretariat.

In particular, the Inquiry expresses its thanks to those who participated in consultations or who undertook additional research at the Inquiry's request. These efforts are very much appreciated.

The Inquiry is grateful for administrative support from many areas of the Department of the Treasury and particularly wishes to thank the Information Technology, Training and Publications Unit, Travel Services, the Accommodation Team and the Contract Management Team.

Finally, the Inquiry wishes to thank the members of the Secretariat, under the capable leadership of Nigel Bailey, for their diligent and insightful work over the nine months of the Inquiry's life. This included heightened uncertainties when some Secretariat members travelled overseas in October and November 2001. It has been a pleasure for the Inquiry to work with the Secretariat officers and we are grateful for the effort they have devoted to the Inquiry. The members of the Secretariat were:

Grant Battersby	David Crawford	Anthony Cussen
David Ellis	Graeme Fawns	Grazia Garrard
Kerrie Hepworth	Susan Johnston	Tony Moleta
Vicki Ratliff		

Overview

WHY TAX FUEL? A TRANSPARENT APPROACH TO FUEL TAXATION IN AUSTRALIA

Introduction

A foundation of modern democratic societies is that the laws introduced by governments should be clearly defined and understood by the community which must abide by them. Taxation laws are no different.

Governments have an obligation to articulate not only a taxpayer's obligations under the law but also why taxation has been imposed.

Underlying the legal and administrative processes of the law itself should be an understanding of the policy objectives the law has been imposed to achieve.

Articulating and clarifying the objectives of fuel taxation in Australia is the basis of the Inquiry's report and recommendations.

A number of recent developments have made this focus imperative:

- a changing policy environment both domestically and internationally, concerning production, supply and use of fuel, particularly in relation to fuel quality standards and engine technologies;
- decisions by both Commonwealth and State Governments; and
- reflecting the above, a wide difference of opinion and significant confusion within the Australian community regarding particular fuel taxation objectives and how they might be best achieved.

Based on the submissions received and consultations held, the Inquiry stresses this last point. It is accentuated by the fact that, to most people, buying fuel is something of a 'grudge purchase'. It is not relished, in the way that expenditure on new clothes or a visit to a restaurant may be. For the most part, the tax component on fuel is resented. These views are reinforced when governments are not clear in explaining why fuel is taxed.

Only by first clarifying what fuel taxation arrangements are supposed to achieve could the Inquiry identify their adverse effects on resource allocation, pricing and marketing arrangements, and administration.

The global fuel taxation policy context

Fuel use and fuel taxation: early policy objectives

Modern economies rely on a number of energy sources for different activities. Stationary energy needs (such as heating, cooking and lighting) rely predominantly on gas and electricity. Mobile energy needs (transportation) rely primarily on liquid petroleum products (such as petrol and diesel) derived from crude oil.

The use of different types of energy for different purposes reflects cost and convenience. In the case of transport, the combination of the internal combustion engine and petroleum products has provided a low cost and convenient source of energy that has revolutionised patterns of living throughout the 20th century and into the 21st century.

This difference in energy use is reflected in its tax treatment. Stationary energy sources have been subject to considerable change over time, given the ready substitutes available. For example, where once coal, wood and oil were major sources of energy for heating, this is now largely provided by gas and electricity. Internationally and in Australia these fuel sources are generally subject to low or zero fuel taxes.

By contrast, many countries, including Australia, impose high tax rates on petroleum products. This reflects not only their widespread use as transport fuel, but the lack of readily accessible and cost effective substitutes.

Petroleum substitutes such as liquefied petroleum gas (LPG), compressed natural gas (CNG) and ethanol have become more widely available over the past 20 years. However, compared to petroleum products, these fuels typically involve higher capital costs, are less convenient in terms of availability and storage (LPG and CNG), and are relatively less energy efficient. They have had some environmental benefits relative to petrol and diesel, but even these are lessening with improved technology.

The **convenience**, **accessibility** and **efficiency** of petroleum products in transport applications has allowed governments to rely heavily on taxing them for revenue purposes, despite the existence of broad-based consumption taxes

(such as the GST) in most countries. Ever increasing demands for government expenditure have resulted in alternative revenue sources being at a premium.

Fuel use and fuel taxation: pressures for change

While revenue has been the predominant policy focus of fuel taxation, other objectives were introduced in the second half of the 20th century.

Some of these new objectives seek to change behaviour by providing active encouragement for the production and use of petroleum product substitutes through low or zero tax rates. Indeed they may **conflict** with the traditional revenue objective which is predicated on minimal consumption changes.

Table 1 summarises these global policy developments, the associated fuel taxation objective and the fuel taxation instrument used to target the objective.

Table 1: Global policy developments in fuel taxation

Time	Policy development	Fuel tax objective	Fuel tax instrument
Since early 1900s	Costs imposed on road infrastructure from transport fuel users	Funding road infrastructure costs	Taxation of petroleum products used in transport
1900s	Economic development	General revenue raising	Taxation of petroleum products used in transport
1970s	Response to crude oil price shocks of mid to late 1970s	Energy security or fuel diversity, via encouragement of substitute products	Low or zero fuel tax rates on petroleum substitute products
1980s	Increased awareness of the effects of fuel use on the environment and human health	Reducing the costs of some fuel use	Low or zero fuel tax rates on petroleum substitute products
Early 2000s	Effects of change in regional and rural communities, especially primary production	Regional development and industry assistance	Low or zero fuel tax rates on petroleum substitute products produced from agricultural products

Despite active encouragement for the production and use of petroleum product substitutes since the mid-1970s, **petroleum products continue to provide the dominant source of energy for mobile energy needs and will continue to do so for the foreseeable future**.

The relatively minor inroads that petroleum substitute products have made into fuel use was of specific interest to the Inquiry. In particular, the Inquiry was required to consider whether the costs of fuel taxation concessions continue to be justified, in relation to:

- resources being allocated to the production of petroleum substitutes; and
- administrative arrangements which tax substitute fuels at varying rates.

Fuel taxation in Australia

These global fuel taxation developments are also reflected in Australia.

- The highest rates of fuel taxation in Australia are on petroleum products used in transport, principally for the purpose of revenue raising.
- Australia does not tax some petroleum product substitutes (such as ethanol), while others such as natural gas and other biofuels are not within the excise regime.

In its consultations with the Australian community, the Inquiry was confronted with a wide interpretation of fuel taxation objectives.

In relation to revenue raising:

- only a small number of submissions saw a continuing role for fuel taxation as a **general** revenue source; more thought this objective redundant now that Australia has a broad-based indirect tax (the GST); and
- some submissions, especially from individuals, considered the **only** objective of fuel taxation should be as a **specific** revenue source to fund road infrastructure, even though this has not been a significant objective for over 40 years.

In relation to concessional taxation of petroleum substitute products, there was general agreement in submissions that the objective was to encourage greater use of these products.

In the Inquiry's view, the use of petroleum substitutes in themselves should not be an objective, without an underlying rationale. There was again a diversity of opinion as to what this underlying rationale might be. Opinions ranged from seeking:

- **reduced reliance on imported petroleum products;**
- an environmental objective of **improving air quality** through the use of petroleum substitutes which are less polluting or 'cleaner';
- an environmental objective of **reducing greenhouse gas emissions**;
- supporting **development in regional and rural areas** through the production of petroleum substitutes using agricultural products (such as ethanol made from wheat or sugar); and
- **supporting industries**, such as manufacturers of equipment required to use petroleum product substitutes (such as LPG conversion kits).

A similar range of community opinions was apparent regarding the objectives of the various fuel rebate and grant arrangements in Australia.

- The **Diesel Fuel Rebate Scheme**, which provides a rebate of fuel excise for some business sectors, was seen by its recipients as simply the return of tax which should not have been paid in the first place; others perceived it as an industry assistance programme (mainly for primary production and mining), which is not justified.
- The **Diesel and Alternative Fuels Grants Scheme**, which provides fuel grants for certain heavy vehicles, was seen variously as a mechanism for charging heavy vehicles for the damage they impose on the road network and an environmental programme to improve air quality in urban areas.
- The **Fuel Sales Grants Scheme** was introduced to ensure the differential between city and country petrol prices 'need not increase' with the GST
  - yet in the eyes of some the objective of the scheme was to reduce or eliminate this differential, when it has never been the stated intention — either implicitly or explicitly — to do so.

In the Inquiry's opinion, the widely differing views on fuel taxation that exist in the community can be attributed to:

- changing objectives over time;
- a lack of clear explanation by governments when and why objectives changed; and
- reflecting these two points, no clear statement from governments regarding **current** objectives of fuel taxation.

If the Inquiry's judgement is correct, action to clarify the situation is needed. Taxation laws based on unclear objectives impose costs on the community, specifically those costs on which the Inquiry was asked to report.

- The taxation instrument will be less effective than it could be.
- High compliance costs will also be a consequence.

Establishing the objectives

From the wealth of information gathered via the Inquiry's consultations and independent research, the Inquiry distilled three groups of objectives attributed to current fuel taxation arrangements:

- addressing **costs associated with fuel use** (such as environmental costs, and costs imposed from damage to the road network by fuel users);
- **revenue raising** to fund **general** government services; and
- **broader industry and social objectives**, such as regional development, industry assistance and energy security / fuel diversity.

Cost of fuel use

The use of fuel generates a range of costs which are not usually incorporated in the fuel price. It is possible to devise taxation arrangements which can internalise these external costs.

If they are ignored, an inefficient allocation of resources within the economy can result. For example, there may be an imbalance between rail and road transport, or private and public transport, or distortions may be introduced in terms of commitments to restrict greenhouse gas emissions.

Some of the external costs are:

- road maintenance costs;
- effects on urban air quality from emissions of particulate matter and other pollutants;
- congestion of roads;
- noise effects from vehicle use;

- costs of road vehicle accidents; and
- effects on global warming from emission of greenhouse gases.

As well as being the basis for a fuel taxation structure, the external cost logic was often put to the Inquiry as one of the justifications for the current differential taxation treatment of fuel.

However, the nature of these costs and their relationship to fuel use can vary considerably:

- the costs of noise and accidents are only indirectly related to fuel use, whereas they are significantly influenced by other factors
  - motor vehicle accidents tend to be attributable to road conditions, vehicle maintenance and driver competence, rather than the consumption of fuel *per se*
  - noise effects vary by location and type of application (a new vehicle as opposed to a poorly maintained old vehicle) than use of fuel as such;
- the costs of road damage depend on the type of vehicle used (road damage increases exponentially with vehicle mass and axle configuration) and the type of road, as well as the amount of fuel used;
- the cost of pollutants impairing air quality depends on the location of the fuel use
  - importantly, it also depends on the type of application in which a fuel is used — new vehicle technologies and improvements in fuel quality standards are changing accepted notions of what is a 'clean fuel'; and
- traffic congestion depends on location, the time of day or day of the week.

So, even if the cost of the externality can be accurately determined (a significant issue itself in practice) imposing a fuel tax on all users may not be the best way to internalise it.

It is often poorly targeted, inefficient and in some circumstances may even be counter-productive.

Taking account of the future – fuel and engine standards

Since the use of fuel taxation to encourage petroleum substitutes in the early 1970s, governments world-wide have imposed regulatory measures to address some of the costs of fuel use.

These non-tax measures have changed previously accepted relationships between fuel use and the costs of fuel use. In relation to air quality for example:

- government imposed standards have improved the quality of fuels
  - in Australia the lead content of fuels has been eliminated (through mandatory standards) and the sulphur content is being reduced now (with the mandating of ultra low sulphur diesel from 2006)
  - these regulatory changes have considerably narrowed the relative air quality performance of petroleum and petroleum substitutes; and
- improvements in motor vehicle engine technology are similarly improving emissions performance.

In relation to air quality, it is now generally accepted that the most important determining factor is not the type of fuel used, but the combination of fuel and engine type, including the quality of regular engine maintenance.

However, government imposed regulations also come at a cost (often unrecognised, such as increased motor vehicle prices associated with enhanced engine technology or increased costs of producing cleaner fuels) which amount to at least partial internalising of the external cost involved.

Taking account of the future – measurement technology

The difficulties which fuel taxation has in capturing variables such as time, location and type of vehicle can now be addressed through technology which tracks the location of vehicles electronically. Electronic recording devices in some urban tollways, the use of global positioning (satellite) systems (GPS), or measuring the mass and axle configuration of trucks, are examples.

This technology creates the opportunity to measure the actual costs of fuel use as it occurs:

- congestion (by time of day and precise location);
- air quality (by location); and
- damage to roads (by location, including type of road and weight of vehicle).

Similar technology is already in use in Australia. For example, CityLink in Melbourne uses electronic tolling to charge vehicles for the use of a private road network. Electronic tolling mechanisms are also used in Sydney. A

number of large bus and truck operators use GPS generated data for normal fleet maintenance purposes.

Conclusions on the cost of fuel use

The Inquiry has concluded that the changing relationship between fuels, the nature of external fuel costs and the technology to measure them mean that **fuel taxation is not an appropriate instrument to address these costs**.

The exception would be an externality closely related to the use of a fuel and not distorted by other variables. Greenhouse gas emissions fall into this category. However, the Inquiry considers that the use of the fuel taxation system to address greenhouse objectives should not be canvassed until negotiations on international agreements are finalised and only then as part of a broader Australian response covering all sources of greenhouse gas emissions. These wider issues are beyond the Inquiry's terms of reference.

An important consideration for the Inquiry has been to ensure that fuel tax arrangements do not impede or distort future development of innovative technological solutions which can address fuel policy objectives.

The Inquiry has been concerned to ensure that where a range of policy instruments (both within and outside the taxation system) exist to address objectives associated with fuel use, each instrument is assessed on its merits.

Revenue raising

If targeting the external costs of fuel use is not considered to be appropriately achieved through fuel taxation, consideration must then be given to whether there is any residual role for fuel taxation as a general source of revenue.

Not surprisingly, only a small number of submissions to the Inquiry explicitly supported the proposition that revenue raising remained appropriate.

A number of other submissions argued that, following the introduction of a GST, there was no future role for a specific fuel tax in Australia.

The logic is that a GST is predicated on raising revenue efficiently and uniformly from goods and services across the board. On this basis, it is suggested there is no ongoing role for fuel taxation.

While general principles of taxation policy provide support for this proposition — indeed the Inquiry itself has sympathy with these views — the abolition of fuel taxation and its replacement with other revenue sources is

outside the Inquiry terms of reference. In addition, the political compromises necessary to secure passage of the GST legislation involved departures from the principle of universality as far as the GST is concerned.

The Inquiry's terms of reference specifically asked it to examine the structure of **fuel taxation**.

The Inquiry concludes that, in the absence of a major new review of general tax reform, efficient revenue raising remains the predominant objective of fuel taxation.

In this context the Inquiry examined **adverse effects** of fuel taxation as a source of revenue.

The Inquiry was presented with extensive evidence from the community of such adverse effects, largely deriving from unclear fuel taxation objectives and differential rates of fuel taxation on closely substitutable fuels or closely related end uses:

- consumption and investment distortions arising from:
  - incentives to use or not use particular types of fuel on the basis of indiscriminate tax effects
  - the imposition of fuel taxation on production inputs for business; and
- administration and compliance costs created by:
  - differential tax rates encouraging tax minimisation practices by substituting lower taxed fuels for higher taxed alternatives
  - the blending of fuels with different tax rates
  - even a lack of clear definitions as to what constitutes a taxable fuel.

Other fuel taxation objectives

Energy security, industry assistance and regional development

Other objectives identified for fuel taxation, fell into the following categories:

- energy security or diversity of fuel supplies;

- development of Australian industries, both in direct fuel production and the manufacture of associated technology (such as engine modifications for use of petroleum substitutes); and

- associated with the previous point, regional development and employment through industry assistance.

A number of submissions to the Inquiry, from both government agencies and the private sector, pointed to the important role of excise exemptions for petroleum product substitutes to addressing these objectives.

However, the Inquiry concludes that significant adverse effects arise from the tax system attempting to achieve these objectives. The Inquiry was doubtful about the cost-effectiveness of using untargeted fuel taxation concessions to this end.

For example, the total value of excise exemptions for petroleum product substitutes over the period 1994-95 to 2004-05 is estimated at approximately $8.7 billion (in 2000-01 prices) and is estimated to cost $1.2 billion per year by 2004-05.[1]

Other factors add to the Inquiry's doubts:

- despite taxation concessions for petroleum product substitutes since the 1970s, their contribution to transport fuel use world-wide remains low and is expected to decline slightly over the next 20 years

  – while part of the justification is to encourage production of domestic fuel sources and reduce reliance on imported fuel, taxation concessions are equally available to imports;

  – the argument is also made that encouragement of petroleum substitutes is necessary because of the non-renewable nature of petroleum products — yet some petroleum substitutes such as LPG, CNG and other gas derived fuels are also non-renewable; and

- no analysis has been undertaken to establish the benefits to rural and regional areas of the tax concessions and whether they could be achieved at lower cost by other means.

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1 Fuel Taxation Inquiry estimates based on The Treasury, *2001 Tax Expenditures Statement*, Commonwealth of Australia, Canberra, 2001; prior year Tax Expenditures Statements and ABS Cat. No. 5206-41. Excise exemptions for petroleum product substitutes were first classified as tax expenditures by the Commonwealth Government in 1994-95.

The Inquiry's firm view is that if the objectives outlined above are considered important priorities for government, they should be funded through direct budget allocations, and not through non-transparent fuel taxation concessions.

Pricing issues

A number of submissions to the Inquiry suggested that fuel taxation arrangements should be invoked simply to reduce the cost of fuel. While there is obviously a link between fuel taxation and fuel prices, the Inquiry concludes that fuel taxation is an ineffective instrument to manipulate overall prices.

Attempts by government to reduce fuel prices by discretionary reductions in fuel taxes may have some short term effect, but will be overtaken by normal pricing movements over time.

A consistent approach to fuel taxation

The Inquiry's task, after analysing objectives and consistent with the terms of reference, has been to identify options for addressing the adverse effects of fuel taxation as a source of revenue.

These adverse effects derive from the differential taxation of fuel that has evolved over time. As a revenue raising instrument, fuel taxation:

- should not discriminate in the application of the tax burden between fuels; and
- should attempt to minimise the application of fuel taxation to intermediate inputs into production (business inputs).

The Inquiry's recommendations focus on these principles.

A comprehensive and neutral fuel tax base

To remove the current distortions in the consumption and production of fuel types, the Inquiry recommends that the fuel tax base be extended and the taxation of fuels be placed on a neutral basis:

- all liquid fuels should be included in the fuel tax system, including ethanol, biodiesel, LPG, liquefied natural gas (LNG) and CNG; and

- fuel tax rates should be based on relative energy content of fuels, with the rate of diesel excise remaining unchanged at the time of implementation.

Taxation of fuels by energy content, which maintains the current rate of excise on diesel, will allow for a reduction in the excise on petrol of around four cents per litre.

The Inquiry also recommends the reintroduction of twice yearly fuel excise indexation to preserve the real value of fuel taxation revenue. If fuel taxation is to continue as a source of revenue for government, it should be not be eroded by inflation over time.

Some petroleum products (such as bitumen and waxes) which are not readily useable as fuels should not be subject to excise. Current cost recovery arrangements for lubricants and greases under the Product Stewardship (Oil) Scheme and for aviation fuel should remain unchanged.

A **Residential Fuel Credit Scheme** should also be introduced to offset the excise component of diesel, heating oil and LPG used for domestic heating, cooking and electricity generation (see below).

The Inquiry's approach will have the following advantages relative to current arrangements:

- reduced distortions in resource allocation: by taxing fuels according to their relative energy content, all fuels will have the same tax burden — fuels with a higher energy content will be taxed at a higher rate; and

- greater certainty by having a clearly understood framework for the taxation of both current and prospective fuels.

The Inquiry recommends that taxation of fuels be imposed at an early point in the production and distribution chain, with justified offsets being delivered through fuel credit arrangements (described under the Energy Grants (Credits) Scheme below).

Energy Grants (Credits) Scheme — Business Fuel Credit Scheme

The comprehensive taxation of all liquid fuels allows for a reduction in the burden of fuel taxation on intermediate inputs to production.

The Government's commitment to introduce an Energy Grants (Credits) Scheme, incorporating the current Diesel Fuel Rebate Scheme and the Diesel

and Alternative Fuels Grants Scheme provides an appropriate mechanism for this to happen.

The Inquiry recommends that a component of the Energy Grants (Credits) Scheme should be implemented as a **Business Fuel Credit Scheme**, with the sole objective of **lowering the effective level of fuel taxes for business**.

- Fuel credits for fuel used off-road should be extended to all businesses and to all taxed fuels, except petrol or petrol blends.
- Fuel credits for fuel used on-road should be extended to all businesses using any taxed fuel on-road in vehicles over 4.5 tonnes, except for petrol or petrol blends.
  - The on-road business fuel credits should be determined by the relative energy content of the fuel and will be indexed on the same basis as fuel excise.

The Business Fuel Credit Scheme will for the first time provide neutral taxation and credit treatment for excisable fuels, to the greatest extent possible. With the exception of petrol or petrol blends, all excisable fuels will be entitled to a credit on the same basis.

As well as reducing fuel costs for business, the Business Fuel Credit Scheme will have the following benefits:

- eliminating the current end-use provision for some fuels (such as solvents)
  - the Australian Taxation Office will consult with businesses to assess compliance and cash flow implications; and
- reducing complexities surrounding eligibility for the Diesel Fuel Rebate Scheme and the Diesel and Alternative Fuels Grants Scheme.

Energy Grants (Credits) Scheme – environment component

The stated intent of the Energy Grants (Credits) Scheme, to provide encouragement to clean fuels, serves the environmental objective of improving urban air quality.

Development of the Energy Grants (Credits) Scheme presents an opportunity to assess, against first principles, the most effective measures to address the air

quality objective. The Inquiry therefore recommends undertaking studies to assess:

- whether national ambient air quality standards will be achieved using current air quality management policies; and

- what additional air quality management measures will be required and can be cost effectively implemented to ensure national ambient air quality standards are attained and complied with into the future.

These studies offer the benefit of determining the most effective means of addressing the air quality objective. They should carefully consider incentives for vehicles and fuels with superior emissions performance.

The Inquiry's recommendations on fuel excise will increase the tax burden on fuels previously excise exempt. The Energy Grants (Credits) Scheme provides a mechanism for recognition of the environmental benefits of these fuels where they can be demonstrated and cost effectively obtained.

Outcomes of the studies should form the environment component of the Energy Grants (Credits) Scheme to commence on 1 July 2004.

Implementation

The Inquiry's recommendations to introduce new fuel credits will have impacts on businesses, consumers and the government. The Inquiry is concerned that sufficient time is allowed for consultation with affected parties and communication of specific implementation logistics.

For this reason, the Inquiry recommends that the energy content regime and the Energy Grants (Credits) Scheme should commence on 1 July 2004.

While introducing fuel excise indexation on the same date would have been preferred by the Inquiry, the budget neutrality constraint in its terms of reference does not allow this to occur, which is why indexation is recommended to resume on 1 August 2003.

Assessing the impacts

The economy

Economic modelling undertaken for the Inquiry suggests the overall impact of the recommendations on the economy will be minor, with some small positive changes in exports and some areas of investment.

Fuel suppliers and downstream industries

The Inquiry acknowledges that its recommendations may have a significant impact on some sectors of the economy, particularly industries involved in the production, distribution and supply of petroleum product substitutes.

The extent of these impacts is difficult to assess. For some sectors, such as ethanol and biodiesel, where the industries are at an early stage of development, the imposition of excise will affect their future viability, even though it was based on an artificial tax advantage. However, the extent of investment in the industry is relatively small.

In the case of LPG, the level of investment already committed is significant (around $3 billion) and the industry is well established. The impact on the future supply and use of LPG of the imposition of excise is unclear. The automotive market is the most important segment of LPG supply and there is evidence (from Queensland) that consumption of LPG can be sustained even with a lower differential between the prices of petrol and LPG.

Under the Inquiry's framework, where all fuels are treated neutrally, including for environmental performance, it is likely that at least some petroleum product substitutes may not be competitive. If this were to occur, the Government must decide whether the production and supply of petroleum product substitutes warrants direct subsidisation for other reasons and if so, at what level.

In that event, the Inquiry urges that a comprehensive assessment be undertaken against a consistent set of policy principles that apply to all fuels, otherwise new distortions of the type the Inquiry is trying to terminate may arise. This includes taking into account new technological developments and fuel types.

Regional, rural and remote communities

Residential Fuel Credit Scheme

The Inquiry recommends that a Residential Fuel Credit Scheme should be introduced for the excise component of diesel, LPG and heating oil used for domestic cooking, heating and electricity generation.

This will maintain taxation parity with reticulated gas and mains electricity, which are not, and have never been, subject to excise.

The Residential Fuel Credit Scheme will be of benefit to those in rural and remote communities which do not have access to reticulated gas or mains electricity and must rely on other sources of fuel.

Fuel Sales Grants Scheme and Petroleum Products Freight Subsidy Scheme

The Commonwealth Government currently provides $230 million per year for the Fuel Sales Grants Scheme and $3.5 million per year for the Petroleum Products Freight Subsidy Scheme. The intent of both these schemes is to reduce the cost of fuel in regional, rural and remote communities.

The Inquiry was provided with evidence that there is little recognition of either scheme and uncertainty as to whether the benefits they are supposed to provide fully accrue to consumers.

The Inquiry recommends that both schemes should be terminated from 1 July 2004 when the new taxing and fuel credit arrangements commence.

Regional, rural and remote communities will benefit from the reduction in transport costs from the extension of fuel credit arrangements and the four cents per litre cut in petrol excise.

Administration

The Inquiry was presented with considerable evidence of administration and compliance costs of current fuel excise arrangements. Many of these concerns reflected the unclear policy principles underlying fuel tax laws, particularly the

concessional taxation treatment of some fuels and the eligibility for rebate, subsidy and grant schemes.

These concerns are addressed in recommendations relating to the fuel tax regime and the Energy Grants (Credits) Scheme.

However, other issues of administrative practice were raised with the Inquiry, particularly in relation to the current joint administrative arrangements between the Australian Taxation Office and Australian Customs Service.

The Inquiry considers that the administration of all taxation issues relating to the importation of fuel products should be transferred to the Australian Taxation Office, after consultation with the Australian Customs Service to ensure that border integrity functions are not compromised.

Specific issues on which the Inquiry has been asked to report

Early introduction of ultra low sulphur diesel

In 1999 the Government announced that it would introduce an excise differential to encourage the early introduction of ultra low sulphur diesel (ULSD).

The measure would result in regular diesel being excised at a rate of one cent per litre above that for ULSD between 1 January 2003 and 1 January 2004 and two cents per litre from 1 January 2004 to 31 December 2005. As from 1 January 2006, ULSD will become the mandated standard.

Similar incentives have been successful in other countries. The specifics of how the differential should be implemented was referred to the Inquiry.

Instead of the specific measure announced by the Government, the Inquiry recommends a subsidy be paid to ULSD producers and importers at the one and two cents per litre rates of ULSD. The subsidy should be funded by an offsetting increase in the excise rate applying to both standards of diesel fuel sold during the period 2003 to 2006.

Other programmes in *Measures for a Better Environment*

The Inquiry was asked to examine programmes announced under the *Measures for a Better Environment* Statement in May 1999. The Inquiry concludes that

while these programmes are consistent with its general approach, there may be a case for reviewing the objectives of these programmes against the Inquiry's recommendations and to ensure cost effectiveness of the expenditure against the relevant objective.

Budget impact

Table 2 shows the estimated impact of the recommendations on the budget over the period covered by the budget forward estimates. The recommendations are slightly revenue positive. However, the following should be borne in mind when interpreting the table:

- no allowance is made for the air quality initiatives under the Energy Grants (Credits) Scheme; and

- the actual budget impact is likely to be less than outlined in the table, as it makes no allowance for a reduction in overall fuel consumption from the taxation of petroleum product substitutes, nor for an increase in Business Fuel Credit Scheme claims resulting from simpler administration and compliance procedures.

Finally, Table 3 provides an overview of the implementation timing of the Inquiry's recommendations.

Table 2: Budget impact of Inquiry recommendations[a]

	2002-03 $m	2003-04 $m	2004-05 $m	2005-06 $m
REVENUE MEASURES				
Additional revenue				
Twice yearly indexation from 1 August 2003	0	215	560	910
Excise rates based on energy content from 1 July 2004	0	0	490	520
Reduction in revenue				
Reduction in revenue from removal of ULSD excise differential	-30	-65	-70	-35
Revenue from ULSD excise supplement(b)	20	65	130	90
Total change in revenue	**-10**	**215**	**1 115**	**1 490**
EXPENSE MEASURES				
Additional expenses				
Off-road fuel credits from 1 July 2004	0	-30(c)	-435	-585
Full credit for off-road business use of other fuels (excluding LPG)	0	0	-135	-165
Full credit for off-road business and residential use of LPG	0	0	-350	-435
Residential fuel credit — diesel and heating oil	0	0	-15	-15
Removal of DAFGS boundaries	0	-10(c)	-195	-240
Ultra low sulphur diesel subsidy(b)	-20	-65	-130	-90
Studies (road pricing and externalities)(d)	-1	-1	0	0
Improving air quality	-1	0	(e)	(e)
Reduction in expenses				
Abolish Fuel Sales Grants Scheme	0	0	230	230
Abolish Petroleum Product Freight Subsidy Scheme	0	0	5	5
Total change in expenses	**-20**	**-105**	**-1 030**	**-1 300**
NET IMPACT ON BUDGET	-30	110	90	190

(a) Totals may not add due to rounding.
(b) These two components represent additional revenue and expenditure in relation to the ULSD subsidy, which will be overall budget neutral — the excise supplement collected will be offset by payments to ULSD producers and importers.
(c) The increase in expenditure in 2003-04 is due to the effect of the re-introduction of indexation on DFRS and DAFGS claims.
(d) Externality study undertaken in 2002-03 and road pricing study in 2003-04.
(e) Funding to be determined in 2003-04 Budget context.

Table 3: Proposed implementation timeframes

<table>
<tr><th>Excise/Credit</th><th>2002-03</th><th>2003-04</th><th>2004-05</th></tr>
<tr><td>FUEL EXCISE</td><td></td><td></td><td></td></tr>
<tr><td>Diesel</td><td>38cpl plus ULSD supplement</td><td>Indexed plus ULSD supplement</td><td>Indexed plus ULSD supplement</td></tr>
<tr><td>Petrol</td><td>38cpl</td><td rowspan="4">Indexed from 1 August 2003</td><td rowspan="13">Taxed on energy content

Indexed</td></tr>
<tr><td>Kerosene</td><td>7.5cpl</td></tr>
<tr><td>Heating Oil</td><td>7.5cpl</td></tr>
<tr><td>Fuel Oil</td><td>7.5cpl</td></tr>
<tr><td>All other fuels currently within the excise system</td><td>Retain current rates</td></tr>
<tr><td>Solvents</td><td rowspan="8">Unchanged</td><td rowspan="8">Unchanged</td></tr>
<tr><td>Methanol</td></tr>
<tr><td>LPG</td></tr>
<tr><td>Ethanol</td></tr>
<tr><td>Biodiesel</td></tr>
<tr><td>CNG</td></tr>
<tr><td>LNG</td></tr>
<tr><td>Any other liquid fuel</td></tr>
<tr><td>Aviation fuel</td><td>2.8cpl</td><td>Indexed</td><td>Indexed</td></tr>
<tr><td>INDEXATION</td><td>Commences 1 August 2003</td><td>1 August 2003
1 February 2004</td><td>1 August 2004
1 February 2005</td></tr>
</table>

Table 3: Proposed implementation timeframes (continued)

Excise/Credit	2002-03	2003-04	2004-05
FUEL CREDITS			
Diesel Fuel Rebate Scheme	Full rebate for certain uses within certain industries	No change	Abolish
Diesel and Alternative Fuels Grants Scheme	Grant for certain on-road transport operators	No change	Abolish
Fuel Sales Grants Scheme	1cpl and 2cpl grant to regional and remote Australia	No change	Abolish
Petroleum Product Freight Subsidy Scheme	Subsidy to remote fuel transporters	No change	Abolish
Product Stewardship (Oil) Scheme	5cpl levy on lubricants and greases / benefit for oil recyclers	No change	No change
ENERGY GRANTS (CREDITS) SCHEME			Commences 1 July 2004
Business Fuel Credit Scheme			Full credit for off-road fuel use. Partial credit for on-road fuel use.
Residential Fuel Credit Scheme			Full credit for certain residential fuel use.
Improving air quality			Commences 1 July 2004
ULTRA LOW SULPHUR DIESEL SUBSIDY	Subsidy commences 1 January 2003 (1cpl)	2cpl subsidy from 1 January 2004	2cpl subsidy

SUMMARY OF RECOMMENDATIONS

Recommendation 1: Fuel taxation design principles

The Australian Taxation Office, in consultation with relevant parties, should design new arrangements for the application of Commonwealth fuel excise and customs duty to apply from 1 July 2004 incorporating the following features.

- Excise and customs duty should apply to all liquid fuels, irrespective of their derivation and liquefied and/or compressed natural and petroleum gases.

- The rates to apply should be based on the relative energy content of each fuel, except for aviation fuels and lubricants and greases. In determining relative rates, the rate of excise applying to diesel at the time of implementation will not change.

- Aviation fuels and lubricants and greases should retain their current excise and customs duty status — that is, in relation to cost recovery for airline service provision and the Product Stewardship (Oil) Scheme respectively.

- The full rate of excise and customs duty applying to fuels under the new arrangements should be imposed and collected at an early point in the production and distribution chain, with offsets to the excise burden being delivered through the Business Fuel Credit Scheme as part of the Energy Grants (Credits) Scheme and the Residential Fuel Credit Scheme.

Twice yearly Consumer Price Index indexation of all fuel excise and customs duty rates should be reintroduced from 1 August 2003.

Recommendation 2: Energy Grants (Credits) Scheme design principles

That the Government's Energy Grants (Credits) Scheme commitment should be implemented through:

- the introduction of a Business Fuel Credit Scheme with the sole purpose of lowering the effective level of fuel excise for business; and

- Commonwealth support for programmes aimed specifically at improving urban air quality.

Recommendation 3: Business Fuel Credit Scheme

That the Business Fuel Credit Scheme should:

- commence on 1 July 2004;
- cover both on-road and off-road fuel use and therefore replace the Diesel Fuel Rebate Scheme, the Diesel and Alternative Fuels Grants Scheme as well as the current concession and remission systems within the excise system; and
- be administered by the Australian Taxation Office.

Recommendation 4: Off-road fuel credits to be extended to all businesses

That off-road fuel credits should be paid to all businesses using any excised fuels, except petrol or petrol blends.

- The magnitude of these fuel credits to be equal to a full rebate of the fuel excise levied on these fuels.

Recommendation 5: On-road fuel credits to be extended to all heavy vehicles

That on-road fuel credits should be paid to all businesses using any excised fuel on-road in vehicles over 4.5 tonnes.

- Fuel credits should be paid to businesses using any excised fuel, except petrol or petrol blends.

Recommendation 6: On-road fuel credits based on the current diesel grant rate

That the on-road credit for diesel should be based on the current rate under the Diesel and Alternative Fuels Grants Scheme. On-road credits for other eligible excised fuels should be based solely on the current level of diesel credit adjusted for differences in energy content:

- with no adjustment for environmental impacts; and
- all credit rates indexed on the same basis as fuel excise.

Recommendation 7: Cost effective administration procedures

That the administration of the Business Fuel Credit Scheme should seek to minimise compliance costs for businesses and the Australian Taxation Office by:

- minimising differences in claiming on-road and off-road credits; and
- utilising cost effective processing techniques.

Recommendation 8: Air quality assessment

That Environment Australia should undertake a study to determine whether national ambient air quality standards will be achieved in all States and Territories by 2008 using current air quality management policies.

Recommendation 9: Energy Grants (Credits) Scheme — environment component

That the environmental component of the Energy Grants (Credits) Scheme should be developed as follows:

- Environment Australia, in consultation with relevant Commonwealth and State and Territory agencies, conduct studies to determine what additional air quality management measures, if any, will be required and can be cost effectively implemented to ensure attainment of, and ongoing compliance, with national ambient air quality standards
  - the studies should include consideration of those measures suggested to the Inquiry, such as grants which differ by fuel and vehicle type;
- Environment Australia report to Government in early 2003 to provide a funding outline of likely necessary and effective air quality measures. The Government make provision in the 2003-04 Budget for the commencement of an environmental component of the Energy Grants (Credits) Scheme on 1 July 2004; and
- Environment Australia propose to Government by end 2003 final proposals for additional air quality measures deemed under the processes above to be cost effective in improving air quality and to form the environmental component of the Energy Grants (Credits) Scheme to be implemented on 1 July 2004.

Recommendation 10: Mandated fuel standards — early introduction

That by the end of 2005, Environment Australia should assess:

- the success and cost effectiveness of the ultra low sulphur diesel subsidy; and
- the costs and benefits of implementing incentives for the early introduction of fuels complying with fuel standards that may be introduced after 2006.

Recommendation 11: Fuels policy

If direct government subsidies are considered justified for alternative fuel production in Australia, this should occur under a comprehensive policy framework that applies equally to all fuels.

Recommendation 12: Fuel Sales Grants Scheme

The Fuel Sales Grants Scheme should be discontinued from 1 July 2004.

Recommendation 13: Petroleum Products Freight Subsidy Scheme

The Petroleum Products Freight Subsidy Scheme should be discontinued from 1 July 2004.

Recommendation 14: Residential Fuel Credit Scheme

A full credit of fuel excise should be provided for residential use of diesel, heating oil and LPG used for residential heating, cooking and domestic electricity generation from 1 July 2004.

Recommendation 15: Single fuel tax administration

There should be a single administrating organisation for fuel tax collection:

- the administration of customs duty collection on all imported fuel products should be transferred to the ATO; and
- there should be full consultation with Customs to ensure Customs' objective of border integrity is maintained.

Recommendation 16: Supply subsidy for early introduction of ultra low sulphur (50 ppm) diesel

The Commonwealth Government should agree to implement its proposal for the early introduction of ultra low sulphur diesel (ULSD) in the form of a supply subsidy to fuel producers and importers.

The ATO, in consultation with relevant parties, should finalise implementation details according to the following principles.

- From 1 January 2003, a supply subsidy of one cent per litre — and from 1 January 2004, a subsidy of two cents per litre — should be provided to offset the additional cost (capital and production cost) of ULSD.
- The subsidy should be funded by an increase in the excise on diesel determined by the ATO for both regular diesel and ULSD.
- Diesel Fuel Rebate Scheme recipients should continue to receive a full or partial rebate on the same basis under the higher excise rates.
- Rates of Diesel and Alternative Fuels Grants Scheme grants should remain unchanged.

Recommendation 17: Externality study

Environment Australia should conduct a study to determine the external costs of fuel use in Australia using methodologies that are agreed and accepted by Commonwealth and State Governments.

Recommendation 18: Electronic road pricing benefits assessment

A detailed cost benefit analysis should be undertaken of the use of electronic road pricing for the following purposes:

- reducing congestion and air pollution in major urban areas; and
- charging for the costs of road maintenance and infrastructure.

Recommendation 19: Road pricing trial

A trial of an advanced electronic road pricing application, deemed to be the most cost beneficial by the study proposed in Recommendation 18 be undertaken, funded by Commonwealth and State Governments, with a view to promoting and assessing public acceptance of the application.

Part 1

CHAPTER 1: THE FUEL POLICY ENVIRONMENT

1.1 Fuel types and fuel taxation

1.1.1 Petroleum products — the revenue objective

Different sectors of the economy rely on different types of fuel for energy, reflecting cost and convenience in particular applications. For example, people prefer to use electricity or gas for home lighting and heating, though a range of less convenient substitutes is available.

In the transport sector, liquid fuels derived from crude oil (petroleum products such as petrol and diesel) were the dominant sources of energy throughout the 20th century and will remain so for the foreseeable future.

Appendix F and Table 1.1 provide a summary of the taxation treatment of fuel in Australia. They show that:

- the only fuels taxed in Australia are petroleum products, with the highest rate of tax (around 38 cents per litre) being for those fuels used mainly in transport applications (petrol and diesel); and

- certain petroleum substitutes, including liquefied petroleum gas (LPG) and ethanol are excise free.

Despite the attention sometimes given to petroleum substitutes and their future potential, it can be easy to overlook the dominant role played by petroleum products in supplying energy for mobility. The dominance reflects the characteristics of petroleum fuels:

- there are currently few economic substitutes for petroleum products in an internal combustion engine; and

- petrol and diesel provide a reliable source of high quality energy in a relatively cheap, easily distributed and compact form.

In the OECD as a whole, petrol provides 69 per cent of the fuel for road transport, diesel provides 30 per cent, and LPG provides one per cent. The proportions are similar in Australia, except that LPG provides eight per cent of road transport energy.

Table 1.1: Australian taxation of petroleum and substitute products

Fuels	Fuel excise (Yes or No)	Renewable (Yes or No)
STATIONARY ENERGY FORMS		
Petroleum products		
Diesel, fuel oils and kerosene	Y	N
Oil – topped and stabilised crude	Y	N
Petroleum substitutes		
Liquefied petroleum gas (LPG)	N	N
Coal	N	N
Natural gas	N	N
Wood and other biomass	N	Y
Electricity	N	Y and N
Water (including tidal)	N	Y
Solar	N	Y
Wind	N	Y
MOBILE ENERGY FORMS		
Petroleum products		
Petrol, diesel, aviation fuels, fuel oils, kerosene	Y	N
Petroleum substitutes		
LPG	N	N
Natural gas – compressed or liquefied	N	N
Biodiesel(a)	N	Y
Methanol – from natural gas(a)	N	N
Methanol – from biomass(a)	N	Y
Ethanol – from gas or petroleum	N	N
Ethanol – from biomass	N	Y
Gas-to-liquids fuels	n/a(b)	N
Hydrogen	n/a(b)	Y and N
Dimethyl ether	n/a(b)	N

(a) When blended with excisable products, these products do attract excise (at the rate of the excisable product they are blended with).
(b) These products are not yet commercially available and therefore their excise status is undetermined.
Source: Fuel Taxation Inquiry.

The domination of petroleum fuels used for mobility makes it a reliable source of taxation revenue.

- There is limited opportunity for substitution and the distribution channels are few.

- Revenue from taxes on energy use provided about seven per cent of all tax revenue for 21 OECD countries surveyed, and taxation of mobility services provided the greatest share of this.[1]

1.1.2 Petroleum substitutes – other objectives

The petroleum substitute products examined by the Inquiry include:

- other petroleum based products, including LPG, natural gas in compressed or liquefied form (CNG and LNG), and could in future include fuels derived from natural gas such as methanol, dimethyl ether (DME) and gas-to-liquids (GTL) diesel, or ethanol derived from petroleum gases; and

- renewable fuels such as ethanol, methanol and biodiesel derived from plant or animal material sources.

Table 1.1 shows many petroleum substitutes are not renewable and hydrogen, a possible long-term petroleum substitute fuel, can be derived from both renewable and non-renewable sources.

Specific detail on the characteristics of petroleum substitutes is outlined in Appendix G.

Over the past 20 years, governments around the world have used the tax system to provide subsidies to encourage the production and use of petroleum substitutes for a variety of policy objectives, including:

- reducing external costs associated with fuel use, particularly the cost on the environment (through the use of fuels that have less damaging emissions than petroleum products);

- fuel security, through the production of substitutes from 'indigenous' sources, such as agricultural crops (for example, ethanol can be produced from sugar cane or wheat); and

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1 OECD, *Environmentally Related Taxes Database*, Paris, 2001, p. 6, available at: http://www1.oecd.org/env/policies/taxes.

- regional development and industry assistance through the production of fuel from agricultural sources (such as biodiesel from tallow or canola).

Pursuing these objectives through the taxation system is generally reflected in either lower or zero rates of taxation on petroleum substitutes, compared to petroleum products.

To illustrate this point, a brief outline of government subsidies to ethanol in Brazil and the United States appears in Box 1.1.

Box 1.1: Government subsidies to ethanol

Brazil

Brazil, the world's second largest producer of sugar cane, began subsidising production of fuel ethanol to reduce dependence on imported oil after the oil price shocks of 1973. Farmers were given subsidies to switch from sugar to alcohol production. By 1985, pure ethanol car sales represented 96 per cent of the market. However, by 1997 low international oil prices and the gradual elimination of subsidies for alcohol cars had reduced the artificial profitability of ethanol production, and sales of pure ethanol cars dropped almost to zero. Today, petrol in Brazil is required to be blended with 24 per cent ethanol, but sales of pure ethanol cars have virtually ceased.[2]

United States

In the United States, production of fuel ethanol was similarly subsidised from the mid-1970s. Production of ethanol receives a partial exemption from the motor fuels excise tax, equivalent to Australian 28 cents per litre. This led to the production of around 400 million litres of fuel ethanol in 2000, equivalent to 1.2 per cent of United States petrol consumption. The fuel ethanol programme is estimated to increase sales revenues for corn farmers by A$4.75 billion each year, but the share of petrol consumption, in the absence of further regulatory or tax changes, is expected to remain below 1.5 per cent for the next 20 years.[3]

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2 International Energy Agency (IEA), *World Energy Outlook: Insights 2001: Assessing Today's Supplies to Fuel Tomorrow's Growth*, Paris, 2001, p. 324.

3 Yacobucci, B., *Fuel Ethanol: Background and Public Policy Issues*, Congressional Research Service, Washington, 2001, p. 6.

1.2 Identifying fuel taxation objectives

The use of broad based taxation instruments, such as excise concessions, to achieve specific policy objectives was of direct interest to the Inquiry. This was particularly in relation to its tasks under the terms of reference to examine the effects of current taxation arrangements on resource allocation and costs of administration.

- Large differences in taxation rates between readily substitutable fuels (as occurs in Australia) reflect deliberate decisions by government to encourage the allocation of resources to the production of particular types of fuel.
  - The Inquiry's interest was to ensure that this reallocation of resources was accurately targeted to achieving its objectives at least cost to the economy.
- Differential taxation rates can also create administration costs where access to the concessional tax rate is restricted to certain uses. Costs are imposed on government in having to determine if the correct tax rate applies to the correct use.

In assessing the extent of these effects, the Inquiry put considerable effort into identifying the objectives of fuel taxation arrangements from submissions and consultation with the community, as well as from official sources such as Parliamentary debates.

The main conclusion to emerge from this analysis was the extent of change in fuel taxation objectives over time in Australia. There were two steps to this change:

- a move away from the taxation of petroleum products for general revenue raising as the main objective of fuel taxation, through the introduction of concessional taxation rates for petroleum substitutes in the 1970s to encourage their use for fuel security objectives; and
- from the 1980s and into the 21st century, a change in focus of the original objective of taxation concessions, away from encouraging the use of petroleum substitutes *per se*, to a range of specific objectives covering the environment, regional development and general industry assistance.

These objectives in turn require clarification.

There are two environmental objectives now attributed to petroleum substitute fuel taxation concessions: improving air quality and reducing greenhouse gas

emissions. While these objectives are often discussed interchangeably, they refer to distinctly different environmental effects.

- Air quality refers to the emission of particulate matter and other pollutants from the use of fuel. Air quality is an issue primarily in urban areas, rather than regional or rural areas.

- Greenhouse gas emissions are specifically linked to the carbon content of fuels and have the same environmental effect regardless of location.

  – Compared to diesel, for example, it is quite possible for a petroleum substitute to have a lesser impact on air quality but a worse impact on greenhouse gas emissions.

A summary of these developments in Australia appears in Appendix H.

During the late 1970s and 1980s the Commonwealth Government provided excise concessions for LPG and ethanol for fuel security objectives. As outlined in Appendix H, a number of other objectives are now attributed to these taxation concessions, even though they were not mentioned in parliamentary debates at the time the concessions were introduced.

- The Inquiry has been unable to determine precisely when the objective changed from fuel security to the other objectives and what analysis if any was undertaken to determine that an excise concession was the most appropriate instrument to achieve the new objective.[4]

- Determining whether a tax concession is the most effective instrument to achieve a completely different objective 20 years later is crucial in assessing if the resultant re-allocation of resources is justified.

The Inquiry's conclusion is that the use of fuel taxation concessions to encourage the production and use of alternative fuels has significant resource allocation effects that can no longer be justified.

This conclusion is based on three considerations.

- The emergence of specific policy objectives for fuel taxation concessions (such as air quality in urban areas) means that the use of broad based fuel taxation instruments, originally intended to encourage the use of petroleum

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4 The changing nature of the LPG concession is discussed in Blewett, N., *A Cabinet Diary*, 1999, Wakefield Press, Adelaide, p. 261.

substitutes *per se*, irrespective of where, when or how they are used, is no longer valid.

  – This is discussed further in Chapter 2.

- Despite the use of taxation concessions to encourage the use of petroleum substitutes over the past 20 years, the energy inefficiency, inconvenience and lack of access to these fuels has restricted their use to a small proportion of transport fuel. This is not expected to change over the next 20 years, by which time a new generation of engine technology, replacing both petroleum products and their substitutes, may have emerged.

- Regulatory requirements which are ensuring improved standards in both the quality of petroleum products and engine design, mean the traditional relationships between petroleum products and substitutes on environmental performance are changing.

  – These latter two issues are discussed in the following sections.

1.3 Costs of fuel use – emissions

1.3.1 Changes in fuel standards

There have been major changes in fuel quality in recent decades, not only reducing the direct combustion impact of fuels, but also improving the operation of catalysts used to improve emissions quality.

- For example, lowering the sulphur content of fuel contributes directly to reducing vehicle emissions of sulphur oxides, particulate matter, nitrous oxides (NOx), carbon monoxide and hydrocarbons.

- It also enables enhanced and continuing efficiency of catalytic converters that further improve emissions quality.[5]

Lead was removed from petrol for similar reasons. In 1994, Australia introduced an excise differential of one cent per litre, later rising to 2.4 cents per litre, to increase the cost of leaded petrol compared to unleaded petrol.

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5 European Conference of Ministers of Transport (ECMT), *Vehicle Emission Reductions*, OECD, Paris, 2001, p. 103.

This was intended to encourage motorists whose engines could use either fuel to use unleaded, and a faster transition to vehicles using unleaded fuel only. Finally, legislation banning the production and sale of leaded petrol came into force on 1 January 2002.

Some other environmental problems associated with fuel use are being addressed under the *Fuel Quality Standards Act 2000.*

Under current non-binding Australian standards for diesel, the permitted level of sulphur in diesel is 5 000 parts per million (ppm), but the average (in 1998) was 1 300 ppm, with a range of 100 ppm to 5 500 ppm.

The new standards mandate maximum **diesel** sulphur levels of 500 ppm from 2003 and 50 ppm from 2006. These standards are expected to reduce particulate emissions in Australia by the order of 32 per cent over the period 2000-2020.[6]

Fuel standards for **petrol** will reduce the sulphur level to a maximum of 150 ppm this year and a limit of 50 ppm by 2005. Other components of petrol which pose dangers to health, such as aromatics and olefines, will be reduced by 2005, and benzene by 2006.

1.3.2 Engine technology

Air quality can be improved and greenhouse emissions reduced if fuel is used in more efficient technologies. Greater efficiency can reduce fuel use per unit of output. Some specific measures to improve greenhouse performance can, however, conflict with objectives of better air quality.

- For example, diesel engines are more efficient than petrol engines, leading to reduced greenhouse emissions per kilometre travelled, but diesel fuel use in current engines is associated with higher levels of emissions of particulates and NOx than for petrol engines.

Further improvements in emissions from standard vehicles are in the pipeline. The European Union has adopted stricter emissions limits that will be introduced progressively over the next four to five years. European car makers have agreed to voluntary targets to improve fuel efficiency for cars sold in

6 Environment Australia, *Setting National Fuel Quality Standards*, Paper 1, Canberra, May 2000, p. 40 and p. 59.

Europe by 25 per cent on 1995 levels by 2008.[7] Japanese and Korean car makers have given similar undertakings.[8]

Most analysts conclude that over 90 per cent of new cars entering the market in 2010 will still be powered by standard engines and fuels. For example, the Ministry of Economy, Trade and Industry in Japan has a target of 3.48 million alternative fuel vehicles by 2010 (50 000 fuel cell, 110 000 electric, 260 000 LPG, 1 million natural gas, and 2.06 million hybrid electric, such as the Toyota Prius and Honda Insight). This would still be less than five per cent of Japan's fleet of 70 million vehicles.[9]

The United States Department of Energy expects natural gas, propane, and electric vehicles to provide only three to five per cent of new vehicles after 2008.[10]

Improved standard engines

Improvements to standard engines could improve fuel economy by 20 to 40 per cent, though some changes would come at a significantly higher cost.[11] An outline of some developments in prospect appears at Table 1.2.

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7 IEA, *World Energy Outlook 2000*, Paris, 2000, p. 254.
8 European Community, *Official Journal*, L 100, Brussels, 20 April 2000, pp. 55-58.
9 Discussions with Ministry of Economy, Trade and Industry, Tokyo, 30 October 2001.
10 Discussions with Department of Energy, Washington, 9 November 2001.
11 National Research Council (NRC), *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards*, National Academy Press, Washington, July 2001, p. ES-8.

Table 1.2: Prospective engine technology improvements

Technology	Fuel efficiency (percentage reduction against base)
Reduction of engine friction	1 - 5
Multi-valve overhead camshaft valve trains (compared to 2 valve)	2 - 5
Variable valve timing under different load conditions	2 - 3
Variable valve lift and timing	1 - 2
Cylinder de-activation by closing valves of some cylinders	3 - 6
Engine accessory improvement (such as 42 volt electrical systems)	1 - 2
Engine size reduction and supercharging	5 - 7
Intake valve throttling to eliminate losses across normal butterfly throttle plate	3 - 6
Electromechanical, camless valve operation	15
Variable compression rate	2 - 6
Direct injection, lean burn petrol engines	> 10
Continuously variable transmission	4 - 8
Direct injection diesel engines using high-pressure, common-rail fuel injection, variable geometry turbochargers, lean-burn combustion and low sulphur fuels	30 - 40
Vehicle weight reduction: increased use of plastic, light metals and composite materials	Variable — could exceed savings from improved technology

Note: The base assumes double overhead cams, 4-valve, and fixed valve timing.
Source: National Research Council, Technology and Economic Analysis in the Prepublication Version of the Report Effectiveness and Impact of Corporate Average Fuel Economy Standards, Washington, 2001, available at: http://www.nap.edu/openbook/N1000377/html/2.html.

Some of the technologies listed in Table 1.2 are already in use in some imported cars in Australia, but the figures in the table show improvements against a baseline of a 2000 year model passenger car.

In practical terms, the extent of improvement can be seen in a recent model change for a light passenger vehicle in Australia. The new model uses variable valve timing and lift under different load conditions for optimum combustion, which allows a 2.4 litre engine to provide more power and better fuel consumption under test conditions (nine litres per 100 kilometres city cycle, 7.6 litres per 100 kilometres country) compared with the previous 2.0 litre

model (10 litres per 100 kilometres city, 7.8 litres per 100 kilometres country) despite a six per cent increase in vehicle mass.[12]

New engine technologies

The Inquiry's research covered the possible impact of new engine technologies. It discovered that these technologies have the potential to increase efficiency and reduce emissions by significant amounts, as outlined in Box 1.2.

Given the high cost of fuel cell vehicles, it is not presently expected that they will displace a significant number of conventionally powered vehicles in the next two decades, in the absence of drastic and currently unanticipated changes in the regulatory environment.[13]

As only around seven per cent of vehicles are replaced each year in Australia, the impact of these new technologies will be minor when they first appear in the market.[14]

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12 Honda Australia and *The Sydney Morning Herald*, 18 January 2002, 'Drive', p. 6.

13 Morita, Y. and Sugiyama, K., *Development and Diffusion of Fuel Cell Powered Automotive Vehicles and its Impact*, The Institute of Energy Economics, Japan, Tokyo, July 2000, pp.16-17, available at: http://eneken.ieej.or.jp/e_index.html. At the time the new US Government programme was announced, the Secretary for Energy acknowledged that the programme could involve several decades to develop cost effective hydrogen fuel cells (Spencer Abraham, 9 January 2002, available at: http://www.energy.gov/HQDocs/speeches/2002/janss/FreedomCar_v.html.). See also NRC, *Effectiveness and Impact of CAFE*, 2001, pp. 3-15.

14 Australian Bureau of Statistics (ABS), *Motor Vehicle Census, Australia*, Cat. No. 9309.0, Canberra, 2000, p. 3 and *New Motor Vehicle Registrations*, Cat. No. 9301.0, Canberra, October 2000, p. 4.

Box 1.2: New engine technologies

Hybrid electric vehicles

Various types are in initial commercial introduction, in advanced stages of development, or are the focus of extensive research by nearly all major automotive manufacturers.

Hybrid vehicles currently on the world market include 'mild hybrids' which use standard size internal combustion engines, have regenerative braking, integrated starter/generator, battery assisted acceleration and minimal battery storage. This technology can improve fuel consumption by about 15 per cent. Other models use a larger battery storage and a small, high efficiency internal combustion engine powering either or both a mechanical drivetrain and an electric motor/generator. The motor/generator can provide additional propulsion or recharge the battery during braking.

In conjunction with other advanced technologies, such as continuously variable transmission, Toyota's hybrid electric Prius achieves a 37 per cent improvement in fuel economy over current, similar sized Corolla models.[15] Sales of some models of hybrid are already significant, with 57 000 of the Toyota Prius sold globally to the end of 2000.[16]

Fuel cell vehicles

Prototypes under development by many manufacturers and experimental vehicles are in use in several countries. Fuel cells use hydrogen to generate electricity, which can be used to power a motor. Hydrogen can be stored directly in the vehicle or obtained from on-board reforming of another fuel such as petrol, methanol or natural gas.

Several manufacturers have announced intentions to market fuel cell vehicles by 2005. In January 2002, the United States announced a new government and industry programme to research advanced, efficient fuel cell technology to power automobiles.[17]

There are a range of technical problems associated with the handling, distribution and storage of hydrogen and high costs for production of fuel cells (most models of fuel cell require platinum catalysts). Costs for internal combustion engines range from US$40 to US$60 per kilowatt of output, whereas costs for fuels cells are currently around one hundred times higher.[18]

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15 Toyota Motor Corporation site, available at: http://toyota.irweb.jp/IRweb/corp_info/hybrid_tech_2001_/3.html.

16 Toyota site, available at: http://toyota.irweb.jp/IRweb/corp_info/datacenter/2001/2001databook.pdf.

17 US Department of Energy, Press Release, 9 January 2002, available at: www.energy.gov/HQPress/releases02/janpr/pr02001_v.htm.

18 'The turning point', *The Economist*, London, 10 January 2002, p. 76.

1.4 Impact of improved fuel standards and engine technologies

Comprehensive figures on the changes to emissions because of improved fuel standards and more efficient engines are not readily available, but it is clear that major improvements have already been achieved.

- From 1980 to 1995, Germany achieved a 40 per cent reduction in emissions of NOx, a 55 per cent reduction in hydrocarbons and a 60 per cent reduction in carbon monoxide for passenger cars through use of improved engines and exhaust catalysts.[19]

- At the same time, the total distance travelled increased by 50 per cent.

Importantly, these improvements were mostly achieved **before** the introduction of the current European fuel standards.[20]

Further improvements in fuel standards and engine technology will allow emissions to continue to decline, reducing the need to use taxation to encourage fuels which provide some environmental benefits over current standards of petrol and diesel used in current engine technologies.

However, improvements in fuel efficiency reduce the cost of vehicle usage and encourage greater use. An International Energy Agency (IEA) study found that total fuel consumption in most IEA countries increased between 1980 and 2000, because growth in travel by light duty vehicles was greater than the improvement in the fuel efficiency of the stock of vehicles.[21]

Similarly, customers can offset fuel savings by choosing vehicles with greater power, automatic transmission or air conditioning, all of which involve additional fuel consumption.[22] In the United States, fuel economy for light duty

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19 ECMT, *Vehicle Emission Reductions*, p. 32.

20 In Europe, pollution emission limits to automotive combustion engines have been in force since the early 1970s. Directive 70/220/EEC and subsequent amendments reduced emissions of regulated pollutants from new passenger cars by 90 per cent as compared to the standards that prevailed in the early 1970s. More stringent measures are being implemented through Euro standards for fuels and engines which require, for example, a 97 per cent reduction in particulate emissions from heavy diesel engines between 1992 (Euro 1) and 2006 (Euro 4), available at: http://europa.eu.int/comm/energy_transport/atlas/htmlu/tomarall.html.

21 IEA, *Saving Oil and Reducing CO_2 Emissions in Transport*, Paris, 2001, p. 23.

22 IEA, *Saving Oil*, p. 23.

vehicles improved by 62 per cent between 1975 and 1984, without any loss in performance. However, from 1985, fuel economy has remained unchanged while vehicles became 20 per cent heavier and acceleration times 20 per cent faster.[23]

Accordingly, although there will be continuing improvements in fuel efficiency and emissions reductions, they might be offset by increased travel or shifts in customer preference toward heavier, more powerful or better equipped vehicles.[24]

The IEA notes that potential benefits for local air quality, which have motivated government subsidies for alternative fuels over the past two decades, are diminishing as emissions performance improves for conventional engines and fuels. Many alternative fuels, including those derived from natural gas or LPG, do not offer significant greenhouse gas reductions over conventional fuels used in engines produced to meet modern standards. Life-cycle emissions reductions for the alternative fuels do not exceed 25 per cent compared with modern conventional fuels, and this gain cannot by itself justify the costly introduction and conversion of infrastructure and vehicles. Some fuels derived from renewable organic sources, such as biodiesel, that do offer significant greenhouse gas reductions, have very high production costs, and also carry other environmental disadvantages, including in terms of NOx emissions.[25]

In the longer term, however, the IEA considers that renewable fuels derived from cellulosic feedstocks (ethanol or methanol produced in advanced biological conversion processes) could bring life-cycle greenhouse gas emissions reductions of more than 80 per cent compared with fossil fuels.[26] Still, the value of using scarce biomass resources for transportation is questionable.[27] A study of alternative fuels by the IEA found that production of sufficient ethanol from sugar beet, for example, to replace 10 per cent of

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23 NRC, p. ES-5.

24 In Australia, average fuel consumption for cars improved by 19 per cent from 1981 to 2001, despite a 15 per cent increase in weight and a 64 per cent increase in power. Bureau of Transport Economics study, unpublished.

25 IEA, *WEO 2000,* p. 265.

26 Cellulosic feedstock from woody material (ligno-cellulose) includes forestry waste, cotton or grain stubble or straw, waste paper, or purpose grown grasses, trees or shrubs.

27 IEA, *WEO 2000,* p. 265.

petroleum demand for transportation would require around three per cent of total world cropland.[28]

As engines continue to improve, often in response to environmental standards imposed in the major engine designing countries, there should be a reassessment of the benefit to be gained by encouraging use of particular fuels through the taxation system. If measures to encourage particular engine types, such as hybrids or fuel cells, are adopted to meet environmental objectives, they are more appropriately addressed through targeted mechanisms such as vehicle registration costs or grants.

Given the possibilities created by the new technologies, the Inquiry strongly concludes that fuel taxation should not be allowed to act as a barrier to future developments in fuels or technologies, but rather provide a transparent and logical basis for the non-discriminatory treatment of all fuels.

1.5 Fuel security

In response to the oil price shocks of the mid to late 1970s, many countries adopted fuel security and diversity policies aimed at insulating their economies from the impact of fuel pricing and supply changes.

These fuel security and diversity objectives took three forms:

- continued long term access to readily available supplies of fuel;
- national self-sufficiency in fuel production; and
- addressing short term risks to fuel supply.

An initial policy response to pursue these objectives was the introduction of taxation concessions to encourage the production and use of petroleum substitute products. Many of these concessions remain although, as mentioned earlier, their rationale has changed.

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28 IEA, *Automotive Fuels for the Future: The Search for Alternatives*, Paris, 1999, p. 76. Other fuels, such as methanol from cellulose would require around four per cent, ethanol from starch or cellulose would require seven per cent of total cropland, and biodiesel would require eight per cent. The study notes that this raises questions as to availability of irrigation water, soil degradation, competition between crops for different fuels and the opportunity cost of higher value agricultural production.

Nevertheless, fuel security is still mentioned as one of the objectives of taxation concessions for petroleum substitutes. This objective was mentioned in many submissions to the Inquiry.[29]

Accordingly, this section examines trends in the supply and use of petroleum products and substitutes and the outlook for future consumption of these fuels.

1.5.1 Long term supplies of petroleum products

There is considerable debate about the long term physical availability of petroleum resources. While some people focus on the inevitable limits of fossil fuels, leading resource analysts have discarded the paradigm of 'exhaustible resources' in favour of one that recognises the key roles of technology and social institutions in defining, expanding, or abandoning energy resources. Indeed, they consider that the amount of energy that can be produced economically for purposes such as transport, are defined technologically.[30]

Some submissions noted the reference in the Inquiry's Issues Paper to estimates by the IEA of possible peaking of conventional oil production between 2010 and 2020, and also referred to other analysts' predictions that oil supply will peak before 2010.[31]

The IEA's latest study on world energy supply, for both transport and stationary energy, reached a less constrained outcome. It concluded that:

> The world has abundant reserves of energy. Proven energy reserves are adequate to meet demand until 2020 and well beyond. Oil will be available throughout the period, although unconventional oil is likely to play a growing role. ... Renewable energy sources are plentiful and will be more widely used. Beyond 2020, new technologies, such as hydrogen-based fuel cells and carbon

29 See for example, Submissions 192 (Australian Biofuels Association), 215 (Wesfarmers Kleenheat Gas Pty Ltd), 224 and 325 (Australian Liquefied Petroleum Gas Association Ltd) and 225 and 327 (Australasian Natural Gas Vehicles Council).

30 Greene, D.L., and DeCicco, J.M., *Energy and Transportation Beyond 2000*, National Academies Transportation Research Board, Washington, January 2000, available at: http://www/nationalacademies.org/trb/publications/millennium/00032.pdf.

31 Submissions 153 (Greenpeace Australia Pacific Ltd) and 212 (Conservation Council of Western Australia).

> sequestration, hold out the prospect of plentiful, clean energy supplies in a carbon-constrained world.[32]

The IEA based its latest assessment of global oil resources on the United States' Geological Survey's (USGS) *World Petroleum Assessment 2000*.[33] The USGS' updated figures included the results of a geologically based assessment of the world's undiscovered conventional petroleum resources that could be added to reserves in the 30 years from 1995 to 2025.

The USGS estimated that ultimate recoverable resources for oil and natural gas liquids are 3 345 billion barrels.[34] These include cumulative production to date (717 billion barrels), identified remaining reserves (919 billion barrels), undiscovered recoverable resources (939 billion barrels) and estimates of 'reserve growth' in existing fields (730 billion barrels).

When considering these data, one should keep in mind that the activities needed to produce a confident increase in the assessment of world reserves involve additional expense for the oil producing organisations. If proven reserves are sufficient for commercial activity over the relevant time span, expenditure to identify additional reserves may be deferred because net present value calculations will not justify the expenditure.[35]

There are also large volumes of economically recoverable unconventional petroleum resources (tar sands, oil shale and heavy oil).[36]

The world has ample supplies of natural gas, and processes to convert gas to liquid fuels are well known. Gas-to-liquids (GTL) fuels have many environmental advantages compared to oil based fuels, and though more expensive, are becoming competitive.[37]

Although running out of oil is not an immediate problem, some factors could cause short to medium term disruptions to the market, with wide fluctuations in price. For example, conventional oil sources will increasingly be

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32 IEA, *World Energy Outlook: Insights 2001*, 2001, p. 13.
33 United States Geological Survey (USGS), *World Petroleum Assessment 2000*, Washington, 2000, available at: http://greenwood.cr.usgs.gov/pub/fact-sheets/fs-0070-00.
34 One barrel of oil is equivalent to 159 litres.
35 IEA, *World Energy Outlook: Insights 2001*, p. 48.
36 IEA, *World Energy Outlook: Insights 2001*, p. 52. The National Energy Board of Canada estimates that about 300 billion barrels of the 2 500 billion barrels of crude bitumen in Canada could be recoverable. Venezuela estimates that 270 billion barrels of the 1 200 billion barrels of bitumen in that country are economically recoverable with current technology.
37 Greene and DeCicco, 2000.

concentrated in the Middle East despite some recent large discoveries around the Caspian Sea, with greater potential for political events or accidents to disrupt supply. Events since 1998 have shown the potential for an organised cartel to influence market price, at least for a limited period.[38]

While the IEA is optimistic about the availability of oil, it notes the need for large amounts of new investment to add oil production capacity to replace production lost through natural decline in ageing production areas, as well as to increase supply in line with demand growth projections of 1.9 per cent per year to 2020.

Other analysts are less optimistic that sufficient oil will be available to the market. They have questioned whether OPEC will increase output as fast as the IEA assumes. Slower output growth would lead to higher prices, unless non-OPEC output and demand are price responsive.[39] It has also been argued that competition among oil resource owners will bring about the necessary investment in increased production, but not always at the right time, thus leading to price variability to the extent that economic and investment cycles are out of step.[40]

Having reviewed a considerable volume of research on the subject, the Inquiry concludes that the global supply of oil is not likely to be constrained by physical factors for at least the next 20 years. However, short term supply could be:

- limited by economic and political choices of the major producers;
- subject to price variability as these factors play out in the market place; and
- subject to higher prices reflecting the rising cost of finding and extracting oil.

Of course, concern with the imminent exhaustion of energy sources is not a new phenomenon. The shortage of wood in seventeenth century England was expected to cripple the navy and make home heating unaffordable. There were

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38 Most recent data from the United States Geological Survey shows identified reserves for the Middle East of 545 billion barrels, with the next largest region, the former Soviet Union, 129 billion barrels, available at: http://energy.er.usgs.gov/products/papers/World_oil/oil/.htm.

39 Gately, D., 'How Plausible is the consensus projection of oil below $25 and Persian Gulf Oil Capacity and Output Doubling by 2020?', *The Energy Journal*, 2001, Vol 22, No 4, p. 26.

40 Mitchell, J., Morita, K., Selley, N., and Stern, J., *The New Economy of Oil-Impacts on Business, Geopolitics and Society*, The Royal Institute of International Affairs, London, 2001, p. 276.

respected predictions in 1865 that Britain was about to run out of coal and in 1914 the United States Bureau of Mines predicted that American oil reserves would last only ten years. The 1972 Club of Rome Report was a more recent purveyor of gloom.[41] As *The Economist* argued in a 1997 article:

> … predictions of ecological doom, including recent ones, have such a terrible track record that people should take them with pinches of salt instead of lapping them up with relish.[42]

1.5.2 Australia's oil production

The world oil market is relevant to Australia and determines the general level of fuel prices we pay. The world market also supplies a significant and growing, proportion of our fuel needs.

- Although Australia exported around 150 million barrels of crude oil in 2000-01, Australian refiners imported nearly 165 million barrels that year.

- This is because different types of crude oil are needed to produce the range of petroleum products needed by Australian consumers. Australian crude oils tend to be light, which makes them less suitable to produce some heavier refined products, such as diesel and jet fuel. In recent years, around 60 per cent of the crude oil used in Australian refineries has been sourced from imports.

As well as crude oil, Australia also exports and imports refined petroleum products such as petrol, aviation fuels and diesel.

- In 2000-01, 26 million barrels of refined products were imported, mostly from Singapore and Saudi Arabia, and 43 million barrels were exported, mostly to Pacific Islands and New Zealand.

A number of submissions to the Inquiry, mainly from individuals, were either unclear why Australian crude oil and refined petroleum prices were aligned with world prices, or were strongly opposed to the link. While the issue of crude oil pricing is outside its terms of reference, the Inquiry considers that

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41 Roger Kerr, 'Business, Trade and the Environment', Speech to Export Institute, Wellington, 12 February 2002, available at: http://www.nzbr.org.nz/documents/speeches/speeches-2002/business_trade_environment.doc.htm.

42 *The Economist*, London, 20 December 1997, p. 19.

better and more consistent communication from governments is needed to explain the basis of policy.

The trade in petroleum products and crude oil means that Australian wholesale prices are inextricably linked to world market prices. If Australian governments assumed powers to set prices for fuels and set them at less than world prices, as advocated in some submissions, the companies producing these fuels would sell the product on the world market where the returns were greater. Australian customers would then be forced to import replacement fuels, obviously at world prices. If an Australian government sought to control exports of fuel, oil companies would divert their investment elsewhere and expenditure on exploration and development of Australian petroleum resources would decline, leading inevitably to a greater need for imports, again at world prices, to replace domestic production.

These are not merely theoretical arguments. Following the decision in 1979 to lift export restrictions on Australian oil and gas, expenditure on exploration and development of Australian petroleum resources increased by 350 per cent over the next five years compared with the average for the preceding five years.

Australia is expected to become increasingly dependent on imported oil. Australia's production of crude oil and naturally occurring LPG is forecast to increase at an average rate of 1 per cent from 1998-99 to 2019-20, which is slower than expected growth in transport energy demand of 2.3 per cent over the same period. Accordingly, by 2019-20 the share of imported oil in primary consumption is expected to rise to 52 per cent from 37 per cent in 1998-99, in the absence of any significant new discoveries of domestic resources.[43]

Australia's imports of crude oil are less than one per cent of world production, so any greater Australian reliance on imports would have no observable impact on world market trends.

The Inquiry concludes that concern about physical availability of oil supplies does not need to be addressed through the fuel taxation system. Taxation arrangements that could affect the level of exploration and development for oil, including the excise on production of crude oil, are outside the terms of reference for the Inquiry.

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43 Dickson, A., Donaldson, K., Harman, S., Tedesco, L., and Thorpe, S., *Australian Energy: Projections to 2019-20*, Australian Bureau of Agricultural and Resource Economics Research Report 01.11, Canberra, 2001, p. 61.

1.5.3 Fuel self-sufficiency

Several submissions advocated self-sufficiency in liquid fuels for transport as an important policy objective. They saw self-sufficiency as a necessary basis for fuel security.

Fuel security has several aspects. The most commonly identified are secure supply of crude oil and petroleum products during war, avoidance of economic damage from short term disruptions to supply and availability of reasonably priced sources of energy.

Self-sufficiency would provide security of supply if domestic sources could satisfy all demand for all types of fuels at world market prices. As discussed above, Australia imports and exports petroleum products to obtain the necessary mix of types of fuels we require. Self-sufficiency based on domestic production alone would require higher prices and restructuring of domestic refining industries to produce the different types of fuel required.

Fuel security, in terms of insulation from severe fluctuations in prices, is not a function of how much fuel a nation produces. Even net exporters cannot isolate themselves from world prices without causing major distortions.[44]

For example, Indonesia, a significant oil exporter, has subsidised domestic petroleum prices for many years, which has led to a major burden on the budget. In Indonesia's 2001 Budget, expenditure on fuel subsidies was 3.7 per cent of Gross Domestic Product (GDP), whereas budgetary revenue from oil production was only marginally higher at 3.9 per cent of GDP. The budget burden is exacerbated by illegal transfers of subsidised fuel to other markets where it is sold at higher world prices.[45]

Some submissions to the Inquiry advocated domestically produced renewable fuels as a measure to increase fuel security. As these renewable fuels would be derived mainly from purpose grown agricultural crops or waste products, the inevitable variations in weather patterns affecting agricultural output and market conditions will reduce the certainty of supply from such sources.

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44 Nivola, P., 'Energy Independence is not Desirable or Doable', *Los Angeles Times*, 11 February, 2001.

45 Megawati Sukarnoputri, *Introduction of State Budget 2002*, October 2000, available at: www.thejarkartapost.com.

In any case, substitutes for petroleum fuels cannot be developed at short notice. For example, use of ethanol as a complete substitute for petrol, rather than as a blending supplement replacing perhaps 10 per cent of petrol, would require widespread investment in engines and distribution channels capable of dealing with this more corrosive fuel and raw material processing facilities.

1.5.4 Short term supply shocks

Other methods of ensuring fuel security in the short term include emergency reserves and other emergency response measures.

As a member of the IEA, Australia is required to maintain a petroleum product demand restraint programme which can be readily activated and to hold reserve oil stocks equivalent to 90 days' net oil import consumption. Compliance with these requirements enables Australia to participate in the IEA Emergency Oil Sharing System thereby entitling us to an equitable share of oil supplies with other IEA countries during an IEA declared fuel emergency.

Australia's approach to managing oil supply disruptions relies on our domestic supply capability, demand restraint measures and the use of oil stocks. However, in the event of a severe shortage, a national liquid fuels supply emergency may be declared under the Commonwealth *Liquid Fuel Emergency Act 1984*.

Emergency measures include demand restraint, usually implemented at the State or Territory level through voluntary and/or compulsory measures (similar to responses during past industrial disruptions to supply), lower speed limits, surge production, increased imports of crude oil or products, increased domestic refinery yields of critical products and fuel switching.

Oil price increases are generally allowed to flow through to consumers during a supply disruption. This approach delivers economic incentives to reduce short term demand and recognises that overseas suppliers would not sell to a market where prices were kept artificially low.

1.6 Taxing fuel to change behaviour

Relatively high rates of fuel taxation on petroleum products, compared to substitutes, is seen to serve a number of objectives:

- revenue raising, given the stability and widespread use of petroleum products;
- ensuring that petroleum fuel users pay a contribution to cover costs associated with the use of those fuels (for example environmental costs, the cost of congestion in cities, or the cost of damage to roads); and
- influencing fuel use behaviour, by providing an incentive to reduce fuel demand or to use petroleum substitutes.

The use of the taxation system to change fuel consumption behaviour, particularly in relation to petroleum products, raises a conflict with the taxation of petroleum products for revenue raising purposes.

Revenue raising from fuel taxation presupposes minimal changes in fuel consumption in response to price changes, but use of fuel taxation as an instrument of change assumes that price increases caused by fuel taxes will lead to significant changes in levels of fuel use.

To the extent that increases in fuel taxes do not change behaviour, the benefits from changes in consumption (such as a better environment) will not occur. Consequently, costs will be imposed on consumers and the economy generally from higher taxes than are necessary. To the extent that they do change behaviour, the revenue target will be jeopardised.

As the National Institute of Economic and Industry Research warned:

> Though fuel taxation … has a role to play in environmental control and the recouping of external costs, the relevant price elasticities are low. If fuel taxes alone are used to counter negative externalities, there may be large unintended distributional and wealth effects.[46]

The Inquiry's interest in these issues is to ensure that where fuel taxation has been specified for a particular objective, it is meeting that objective in a way that minimises costs to the economy and the community generally.

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46 Submission 99, p. 5.

1.7 Influencing private transport demand

Many submissions saw fuel taxation as the preferred instrument to influence demand for transport fuels for private travel. In this way it was considered fuel taxation could reduce the amount of travel, reduce congestion and encourage moves to public transport.

Of course, demand for transportation reflects people's desire for ever more convenient and rapid access to goods and services. For most people, private transportation is the preferred form of transport. Accordingly, demand for private transportation is related most closely to levels of income. Total demand for transport is relatively insensitive to the price of fuel in the short to medium term. The costs of transport will, however, influence the form in which the service is delivered.

For example, motor vehicle numbers in Europe are growing at a faster rate than in the United States, despite higher vehicle taxes and post tax fuel prices three to four times as high.[47] This reflects the increasing demand for cars in Europe in line with rising income and the relatively saturated market for personal transportation in the United States. However, the types of private cars used in Europe are different, reflecting the higher cost of fuel, due to tax levels, levels of congestion and road standards.

These differences are evident in the fuel efficiency of European versus United States vehicles.

- United States passenger cars had an average fuel economy of just over eight litres per 100 kilometres in 2000, a figure which has been relatively constant since 1995.

- Over the same period the average fuel economy for light duty vehicles in Germany and the United Kingdom (including cars and passenger vans) fell around five per cent, from around 7.2 to around 6.8 litres per 100 kilometres.

- Average weight of United States cars in 2000 were 1 500 kilograms, while cars in Germany and the United Kingdom were 1 300 and 1 200 kilograms respectively.[48]

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47 Greene and DeCicco, 2000.
48 IEA, *Saving Oil*, p. 24.

Other factors that influence demand for transport fuel are subject to slow rates of change. For example, changes in population density and public transport infrastructure take place over decades. Improvements in engine technology also require time to become widespread in vehicle fleets. The average age of the Australian vehicle fleet in 1999 was 10.6 years and new vehicle sales each year only represent about seven per cent of the total stock of vehicles.[49]

Computers and electronic communications technologies will have a profound influence on all aspects of transportation, including energy use. For example, information technologies have the potential to replace some travel by facilitating work at home.

The Inquiry concludes that fuel taxation will not substantially influence demand for private transportation in the short term.

1.8 Conclusion

The discussion of the origins and changing nature of fuel taxation objectives, developments in fuel production and use, and improvements in fuel standards and engine technology raises questions for the Inquiry as to the continued relevance of broad based taxation concessions designed to encourage the use of petroleum substitutes.

The general objective of encouraging petroleum substitutes via concessional fuel taxes is likely to result in a misallocation of resources because:

- the objective of the tax concessions is now directed at specific problems, such as air quality or greenhouse gas emissions, which require more targeted instruments to be effective;
- changes in fuel standards and engine technologies mean that traditional relationships between fuel use and environmental impacts are now changing; greater improvements in environmental outcomes can be achieved from these developments rather than use of petroleum substitutes

49 ABS, *Motor Vehicle Census*, 2000, p. 5.

  - the Inquiry seeks to ensure that fuel taxation arrangements treat both existing and new developments in fuel production and use on a neutral basis, according to their actual measured impacts on the environment; and

- the relatively minor impact petroleum substitutes are estimated to have on overall fuel use over the next two decades.

CHAPTER 2: THE EXTERNAL COSTS OF FUEL USE

As a source of energy, fuel plays an integral role in the economy. Its use confers benefits to both business and individuals in the forms of mobility, heating, lighting, and as the source of energy for domestic appliances and industrial processes. However, fuel use also comes at a cost.

When people use fuel they incur private costs (also called 'internal' costs) associated with the fuel and the way in which it is used. These include the purchase price of the fuel, ownership and operation of a vehicle or machinery, the cost of the users' own time and other costs such as personal accidents and insurance.

In addition, fuel users generate costs to society — such as air pollution — referred to as 'external' or 'spillover' costs. An external cost arises when a consumption or production activity has an adverse and uncompensated effect on others not directly involved in the production or consumption of the relevant goods.

An external cost can be internalised through various mechanisms. Instruments which act to change the price of goods and services — such as taxes or other charges — can serve to reflect the external cost in the price of the good or service.

External costs may also be internalised through the use of regulation, which reduces the cost of the externality through direct mechanisms, for example by imposing emission standards on motor vehicles.

Current practice overseas is to use a combination of pricing and regulatory instruments to internalise external costs of fuel use. To date, Australia has relied predominantly on regulatory instruments, although increasing consideration is being given to pricing mechanisms. This chapter examines the role of the **fuel tax system** in internalising external costs. Chapter 10 examines other pricing mechanisms that can be used to internalise external costs.

2.1 Internalising externalities

Options for internalising external costs include:

- **regulatory instruments**, such as mandatory standards and equipment specifications;

- **suasive measures**, such as public information or education campaigns designed to change attitudes and behaviour; and

- **economic instruments**, such as taxes, user-charges, clean-up or remediation levies, subsidies, tradeable permits and performance bonds.[1]

Many of these instruments have already been used in Australia to address the external costs of fuel use. For example, mandatory vehicle and fuel standards reduce the externalities associated with fuel use. Suasive measures adopted in Australia include fuel consumption labelling for new cars. Examples of economic instruments are grants for conversion of motor vehicles to liquefied petroleum gas in Western Australia and proposed stamp duty concessions for 'cleaner' vehicles in New South Wales.

It is therefore important, when considering **new** instruments to internalise external costs, to understand the extent to which such externalities have already been internalised by **existing** policy instruments. In Australia, the risks of miscalculating recovery of external costs are greater because there are three levels of government — Commonwealth, State/Territory and local — all seeking to play a role in targeting the same objectives.

2.1.1 Regulation versus economic instruments

Internationally, regulatory measures have been the focus of policy to address the effects of fuel use, but there is a recognition that economic instruments may complement regulation in promoting desired behaviour beyond minimum acceptable standards.

In Australia, the Industry Commission, in its 1994 report on urban transport, noted that regulated emissions standards have the advantages of certainty and administrative ease in achieving desired emission levels.[2] However, it also found that it is difficult to target regulated standards when the problem is, for example, urban air pollution, because the same regulations would impose significant costs in regional areas where the pollution problem is significantly less.

The Industry Commission's 1994 report on petroleum products, when considering mechanisms to reduce emissions, stated that '… other things being

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1 Industry Commission, *The Role of Economic Instruments in Managing the Environment*, Staff Research Paper, Australian Government Publishing Service, Canberra, 1997.

2 Industry Commission, *Urban Transport*, Report No 37, Australian Government Publishing Service, Melbourne, 1994.

equal, market based mechanisms are preferable to command and control instruments'.[3]

The advantages of economic instruments over non-economic ones in ensuring that fuel users are confronted with the full consequences of their actions are that:

- well targeted economic instruments are able to be applied to all fuel users in proportion to their external cost;
- economic instruments are likely to be more cost effective because they allow fuel users to rely on a variety of response channels to reduce their external cost; and
- economic instruments provide an incentive for continuous improvement or sustained changes in behaviour.

The Industry Commission noted that, for those reasons, there is increasing focus on the use of economic instruments to complement other measures.[4]

A recent Swedish analysis of the effectiveness of command and control versus economic instruments in addressing transport externalities concluded that different externalities may require different approaches.[5] Specifically, it found that:

- economic instruments are the most efficient in dealing with some external costs, particularly congestion and greenhouse gas emissions;
- some externalities, such as air pollution, would benefit from the application of both command and control and economic instruments; and
- command and control measures may be the most effective in dealing with the external costs of road crashes and noise.

Economic instruments besides fuel taxation are available for addressing the costs of fuel use. Fixed charges may also be used, however they are limited by not being able to reflect the variable nature of some costs and therefore some behaviour. The Industry Commission said of fixed charges, such as registration fees:

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3 Industry Commission, *Petroleum Products*, Report No 40, Australian Government Publishing Service, Melbourne, 1994, p. 207.

4 Industry Commission, 1997, p. 8.

5 Johansson-Stenman, O., 'Regulating Road Transport Externalities: Pricing versus Command and Control' in *The Market and the Environment — The Effectiveness of Market-Based Policy Instruments for Environmental Reform*, Edward Elgar Publishing Limited, 1999, pp. 134-57.

> …once paid, they do not impact on decisions such as how far to travel, what type of vehicle to use, what load to carry. Of course, the presence of a fixed charge will impact on the decision to consume.[6]

2.2 Views of submissions

Some submissions to the Inquiry proposed that fuel taxes should be used to charge for the external costs of fuel use.

The Chamber of Commerce and Industry of Western Australia stated that '… to the extent that these externalities are real and significant, they justify the imposition of a higher rate of tax on fuel than on other goods and services'.[7]

It went on to recommend that:

> … the tax on vehicle fuel should comprise two components — a general tax contributing towards the Government's overall revenue needs, and set at the same rate as the tax on other goods and services (GST), and an additional component explicitly linked to the costs which fuel use imposes on society.[8]

Environment Australia also proposed a base rate for revenue generation purposes, with a variable component added to reflect the relative environmental impact of different fuels.[9]

The Bus Industry Confederation Inc considered that '… a switch from excise to externalities as the basis for Commonwealth fuel charging, with some additional fixed charges and related measures, is desirable, even in a situation of budget neutrality'.[10]

As a transitional measure to what it regards as a more effective means of charging, incorporating electronic road charges, the Australian Automobile Association (AAA) also recommended a system of fuel taxation based on the external costs of fuel use. It said:

> A practical system at this point in time will have to rely more heavily on charges on fuel use as an indirect way of charging for road use, though not for

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6 Industry Commission, *Petroleum Products*, 1994, p. 265.
7 Submission 110, p. 6.
8 Submission 110, p. 6.
9 Submission 319.
10 Submission 234, p. 15.

> congestion. … These charges include components for air pollution, noise pollution, vehicle crashes and road use costs.[11]

Submissions to the Inquiry tended to focus on the costs of fuel use in transport applications (transport externalities), despite the fact that many other fuel use activities are also responsible for greenhouse gas emissions, urban pollution, noise and accidents. This reflects the transport sector's role as a major input to economic activity and its dominance in the use of petroleum products.

The Department of Transport and Regional Services said in its submission:

> The central nature of transport activity to the economy and society, and the dominance of certain modes of transport — especially road transport — inevitably leads to issues associated with its use. These include urban traffic congestion, inadequate access to transport compounding inadequate access to services, serious public health issues associated with vehicle emissions, transport's contribution to greenhouse emissions, and a range of built environment issues associated with transport planning which many blame for a lower sense of urban amenity.[12]

While acknowledging the range of externalities associated with fuel use, the Department concluded that '… in almost every case, the fuel tax regime is not an effective means to recover the costs of these externalities, or to affect the transport behaviour associated with them'.[13]

2.3 Fuel use costs assessment

In its recent Issues Paper, the New Zealand Tax Review established conditions for the application of taxes to environmental purposes, including externalities.[14] These include that the externality must be directly measurable or must have an effective measurable proxy. For example, the carbon content of fuel is an effective proxy for the measurement of carbon dioxide emissions. Without measurement of the cost of the externality, the Review said it is not possible to design an appropriate tax rate.

In Australia, there has been little comprehensive analysis to measure the external costs of fuel use, although the Inquiry did receive a range of estimates

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11 Submission 228, p. viii.
12 Submission 315, p. 3.
13 Submission 315, p. 14.
14 New Zealand Tax Review 2001, *Issues Paper*, pp. 65-67. This document and the Review's final report are available at: http://www.treasury.govt.nz/taxreview2001.

in submissions based on a variety of methodologies.[15] There is inevitable uncertainty involved in all estimations of external costs.

The Inquiry has focused its analysis on those claimed externalities for which some measurement data exist, being air pollutant emissions, greenhouse gas emissions, noise, accidents, congestion and road infrastructure and maintenance.

Assessing whether fuel taxation is an appropriate instrument to charge for the costs of fuel use requires an analysis of the underlying cause and nature of the costs.

The most effective policy instrument to charge for the cost will be the one which most accurately reflects the underlying reasons for that cost arising. As stated by the Chamber of Commerce and Industry of Western Australia:

> The existence of a clearly identifiable negative externality associated with the use of a good or service may imply that a tax or similar surcharge is the appropriate response, but not in every case.
>
> Taxing for externalities only improves welfare when the tax narrows the gap between the private costs faced by users and the social cost of their activities. Taxing all motorists all the time because some motorists sometimes contribute to traffic congestion, for example, will not improve social welfare significantly.[16]

The European Conference of Ministers of Transport stipulated as a condition for charging for external costs that there be a reasonable cause and effect relationship between the cost and fuel use.[17] The New Zealand Tax Review said that the impact of the external cost being taxed must be the same across the geographic area to which the tax applies.[18] If the effect is not uniform, some fuel users will be either under charged or over charged for the relevant cost.

The requirement that an instrument addressing externalities should target the cause of the cost underpins the Inquiry's analysis.

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15 Available estimates include Bureau of Transport Economics (BTE), *Traffic Congestion and Road User Charges in Australian Capital Cities*, Report 92, Australian Government Publishing Service, Canberra, 1996 and Victorian Environment Protection Authority (VEPA), *Victorian Transport Externalities Study*, Publication No 415, Melbourne, 1994. Estimates of costs were received in submissions from the Australian Automobile Association (Submission 228) and the Bus Industry Confederation Inc (Submission 234). The Inquiry is aware of two studies undergoing peer review at the time of writing and therefore not available.

16 Submission 110, p. 10.

17 European Conference of Ministers of Transport (ECMT), *Efficient Transport for Europe: Policies for Internalisation of External Costs*, 1998.

18 New Zealand Tax Review 2001, 2001.

2.4 Air pollutant emissions

2.4.1 Description of the cost

Air pollution is an external cost of fuel use. By international standards, Australia has relatively good air quality. However, Australia's ambient air quality standards for ozone (photochemical smog) in particular have been exceeded in recent years. In Sydney, for example, the national smog standard[19] was exceeded on 16 days in 1999.[20] Emissions of nitrous oxides are of concern as a pre-cursor to the formation of smog, although the nitrogen dioxide standard has only been exceeded in Sydney recently. The national standard for particulate emissions has been exceeded in Adelaide and south east Queensland recently.[21]

Fuel combustion is the single largest contributor to urban air pollution. The major sources of air pollution vary by pollutant as shown in Chart 2.1.

The contribution of different industry sectors to pollution may vary in different cities. For example, in Sydney in 1998 the contribution of motor vehicles to volatile organic compounds and nitrous oxides was 52 per cent and 70 per cent respectively.[22]

Two submissions to the Inquiry have estimated the cost of pollutant emissions from motor vehicles in Australia to be between $1 billion and $4 billion *per annum*.[23] These estimates are based on application to Australian data of health costs derived from European studies.

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19 Ozone is here refers to tropospheric ozone or photochemical smog. The smog standard referred to is the 'four hour ozone' standard, one of the indicators specified under the National Environment Protection Measure for Ambient Air Quality.

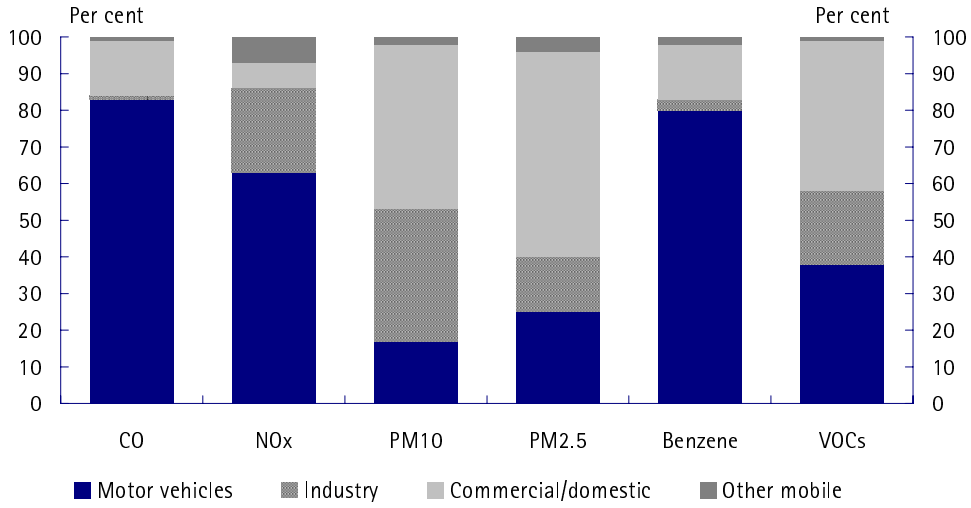
20 Australian State of the Environment Committee, *Australia State of the Environment 2001*, CSIRO, 2001, available at: http://www.ea.gov.au/soe/2001/atmosphere/index.html.

21 Australian State of the Environment Committee, 2001.

22 Environment Protection Authority, NSW, *State of the Environment Report*, Environment Protection Authority, NSW, 2000, Figures 3.10 and 3.11, available at: http://www.epa.nsw.gov.au/soe/soe2000/ca/ca_fig_3.10.htm (and fig_3.11.htm).

23 Submissions 234 (Bus Industry Confederation Inc) and 228 (Australian Automobile Association).

Chart 2.1: Sources of air pollution for Port Phillip region, 1995-96[a]



(a) CO — carbon monoxide, NOx — nitrous oxides, VOCs — volatile organic compounds, PM 10 and PM2.5 are particulate matter of size less than or equal to 10 and 2.5 microns in diameter respectively. In summer, vehicle emissions are the main contributor to particulate emissions, while in winter the main contributor in most cities is domestic solid fuel heaters.

Source: Environment Protection Authority, Victoria, *Air Emission Inventory*, 1998.

The Inquiry considers that, given the divergence of the estimates provided, a thorough analysis of the magnitude of pollutant emissions would need to be undertaken to inform any future policy designed to charge for externalities such as urban air pollution.

2.4.2 Determinants of the cost

The cost of air pollutant emissions varies according to the type and amount of fuel used, as well as the location of fuel use, vehicle technology, time of day, and weather conditions. The physical properties of some fuels make them less polluting than others.[24]

24 Anyon, P., Beer, T., Edwards, J., Grant, T., Lapszewicz, J., Morgan, G., Nelson, P., Watson, H., and Williams, D., *Comparison of Transport Fuels: Life-cycle Emissions Analysis of Alternative Fuels for Heavy Vehicles*, CSIRO, Melbourne, 2001, available at: http://www.greenhouse.gov.au/transport/pdfs/lifecycle.pdf.

Newer (meeting more stringent emissions standards), more efficient, and better maintained engines produce less emissions than older, less efficient or poorly maintained engines.[25]

Air pollution is predominantly a problem in densely populated cities. Levels of urban air pollution also vary by the geographic setting and climatic conditions of the city. Pollutants are emitted at a similar rate every day in cities, but air pollution is a particular concern under appropriate weather conditions such as temperature and subsidence inversions.[26]

2.4.3 Policy instrument

Fuel taxation is a limited proxy instrument for charging for the costs of air pollution:

- fuel taxation can incorporate differences in air pollution attributable to fuel type and the amount of fuel consumed; but
- it cannot account for air pollution attributable to differences in engine technology or maintenance, or the location of fuel use.

It is not administratively feasible to vary fuel excise based on the engine or machinery in which the fuel is used. More efficient instruments than fuel taxes are available to internalise the costs of air pollutant emissions. These issues are addressed in Chapter 10.

2.5 Greenhouse gas emissions

2.5.1 Description of the cost

Greenhouse gas emissions are an external cost of fuel use. Burning fossil fuel is the greatest contributor from human activity to the continuing increase in atmospheric carbon dioxide. According to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), there is new evidence

25 Federal Office of Road Safety, *Motor Vehicle Pollution in Australia*, 1996; National Environment Protection Council, *Proposed Diesel Vehicle Emission National Environment Protection Measure: Preparatory Work In-Service Emissions Testing — Pilot Study, Fault Identification and Effect of Maintenance*, 2001.

26 Australian State of the Environment Committee, 2001.

that most of the warming observed over the past 50 years is attributable to human activities.[27]

The 1999 National Greenhouse Gas Inventory calculated emissions from various sectors. Stationary energy contributed 56.7 per cent of national emissions, with a majority of that — 37.5 per cent — emitted through electricity generation.[28] Stationary energy emissions in 1999 were 24.6 per cent higher than those in 1990. Transport contributed 16 per cent of national emissions with 1999 transport emissions being 20 per cent above those recorded in 1990. It is important to note that the 1999 inventory did not include emissions from land clearing, which are also significant. Land clearing emissions were of a similar magnitude to transport in 1999, however a high level of uncertainty is associated with quantifying land clearing emissions.

Should it ratify the Kyoto Protocol, Australia's commitment would be to limit growth in its greenhouse gas emissions to not more than 8 per cent above its 1990 base year levels during 2008-2012. In addition to domestic abatement policies and measures (covering both emission reductions and sequestration of greenhouse gases through eligible greenhouse sinks activities), Australia could also seek to achieve this target by trading in credits generated under the Kyoto flexibility mechanisms. Australia currently does not have robust emissions projections across all sectors. The main gap relates to land clearing during 1990, which is being addressed through the National Carbon Accounting System. An assessment of how well Australia is travelling in relation to its potential Kyoto commitment can only be made when a robust estimate of 1990 land clearing emissions and sinks is available.

The CSIRO has predicted that, under the impacts of climate change associated with greenhouse gases most of Australia will become warmer and drier.[29] These impacts may affect the distribution of plants and animals; the frequency of storms and floods; and the spread of weeds, pests and diseases that may influence agriculture and human health. The Intergovernmental Panel on Climate Change Third Assessment Report said '… an increasing body of

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27 Intergovernmental Panel on Climate Change (IPCC), *Summary for Policymakers — A Report of Working Group 1 of the Intergovernmental Panel on Climate Change*, World Meteorological Organisation, 2001, available at: http://www.ipcc.ch/pub/spm22-01.pdf.

28 Australian Greenhouse Office (AGO), *National Greenhouse Gas Inventory 1999*, AGO, Canberra, 2001.

29 CSIRO *Climate Change Impacts and Projections for Australia*, 2001 available at: http://www.dar.csiro.au/publications/projections2001.pdf, and http://www.marine.csiro.au/iawg/impacts2001.pdf.

observations gives a collective picture of a warming world and other changes in the climate system'.[30]

Uncertainty about the size of the impact of climate change makes it very difficult to estimate the costs of greenhouse gases emitted from fuel use. The Australian Bureau of Agricultural and Resource Economics has estimated the cost per tonne of carbon dioxide to meet international emissions targets agreed under the Kyoto Protocol to be $26 per tonne in 2010.[31] However, this does not reflect the estimated costs of the impacts of greenhouse gas emissions.

2.5.2 Determinants of the cost

The enhanced greenhouse effect is caused by emissions of a number of gases including carbon dioxide, methane, and nitrous oxides. Carbon dioxide is the dominant human induced greenhouse gas, being 68 per cent of the effect in Australia.[32]

The amount of carbon dioxide emitted is generally related to the type and amount of fuel burned though it may vary depending on the different extraction, production and distribution methodologies used by fuel producers.

Location has no impact on the effect of the emissions but technology will affect the quantity of fuel used to achieve the same task. Carbon dioxide emissions per vehicle depend on vehicle type, distance driven, loading, speed and driving style.

2.5.3 Policy instrument

As greenhouse gas emissions have the same impact wherever they occur, it is appropriate to address them through a national instrument. The strong relationship between fuel consumption and greenhouse gas emissions makes fuel tax an appropriate instrument for charging for the costs of climate change attributable to fuel use. The Inquiry considers that use of fuel taxation would be dependent on developing a degree of certainty about the cost estimates and all emitters facing the same cost per unit of emissions.

Market-based mechanisms, such as a carbon tax or an emissions trading scheme, have been recognised as having potential to achieve greenhouse

30 IPCC, 2001.

31 The figure of A$26 per tonne of carbon dioxide equivalent is based on US$48 per tonne of carbon equivalent. ABARE Conference Paper 2001.28, 'The Kyoto Protocol', p.14.

32 AGO, discussion with Inquiry.

objectives. The Commonwealth Minister for the Environment and Heritage said 'This government does not believe more taxes are the answer to reducing Australia's greenhouse emissions'.[33] In its 2001 election policy statement, *A Better Environment*, the Government stated that it will '… continue to develop market-based instruments to support maximum greenhouse gas reductions at least cost'.[34]

The Australian Greenhouse Office is examining the feasibility of, and possible design options associated with, establishing an emissions trading scheme in Australia. In late 2000, the Government stated that it '… will only implement a mandatory domestic emissions trading scheme if the Kyoto Protocol is ratified by Australia, has entered into force and there is an established international emissions trading regime'.[35] More recently, it stated that '… it will continue to develop and invest funding in domestic programmes to meet the target agreed to at Kyoto, whether or not the Kyoto Protocol comes into force internationally'.[36]

A number of submissions to the Inquiry strongly argued that any instruments to charge users for the costs of greenhouse emissions generated by fuel use should not be implemented before Australia agrees to ratify the Kyoto Protocol.[37] While not stipulating that restriction, the Australian Chamber of Commerce and Industry effectively summarised preferred methods for dealing with greenhouse gas emissions and industry concerns about the issue:

> The introduction of some form of carbon taxation system, in which those who cause greenhouse emissions to occur are taxed for the carbon gases they cause to be created, will be the most efficient approach. There should be little if any use of prescriptive measures. … There should instead be the judicious use of market-based mechanisms in which licenses to release specified gases into the air are granted and a market for such licences is created. Using this latter approach will ensure that the full ingenuity of industry is focused on ways to

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33 Senator the Hon Robert Hill, 'Australia Balances Environment with Expanding Economy', Press Release, 8 August 2001, available at: http://www.ea.gov.au/minister/env/2001/mr08aug201.html.

34 Note also the statement by the Prime Minister, the Hon John Howard MP that, 'The Government is seeking realistic, cost effective reductions in key sectors where emissions are high or growing strongly while also fairly spreading the burden of action across our economy' in 'Safeguarding the Future — The Prime Minister's Statement on Climate Change', Australia, House of Representatives, 20 November 1997, *Debates*, Vol HoR 217, p. 10921.

35 Senator the Hon Nick Minchin, 'Government Provides Greater Greenhouse Certainty for Industry', Press Release, 23 August 2000.

36 The Liberal Party of Australia, *The Howard Government Putting Australia's Interests First, Election 2001*, 'Our Future Action Plan: A Better Environment', 2001.

37 See for example, Submissions 138 (Australian Petroleum Production and Exploration Association Ltd) and 230 (Minerals Council of Australia).

> solve this pollution problem and which will encourage novel and innovative means of reducing the level of greenhouse gas emissions.
>
> The dangers of pulling such large amounts of liquidity from the economy will need to be recognised in any approach adopted that employs taxes to change carbon usage.[38]

The Inquiry considers that the use of the fuel taxation system to address greenhouse objectives should not be canvassed until negotiations on international agreements are finalised, and only then as part of a broader Australian response covering all sources of greenhouse gas emissions as well as greenhouse sinks. These wider issues are beyond the Inquiry terms of reference.

2.6 Road maintenance and infrastructure

2.6.1 Description of the cost

Road maintenance and infrastructure costs are not generally regarded as external costs in the sense of other costs such as air pollution.[39] However, relating road pricing more closely to the infrastructure costs attributable to specific vehicles will increase the efficiency of infrastructure provision and use. Badly priced road maintenance and infrastructure costs can distort intermodal competition, for example between road and rail, and can have a bearing on the effectiveness of any charges introduced for the internalisation of environmental and accident costs.[40]

There are a number of costs involved in road maintenance and infrastructure. They are:

- costs of wear and tear attributable to vehicle use;
- costs of wear and tear such as those attributable to weather and soil subsidence;
- fixed costs of capital investment in asset extension and improvement; and
- annual costs of interest on capital investment.

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38 Submission 272, p. 6.
39 The cost of damage to roads is regarded as being largely internalised to road users as a group.
40 ECMT, 1998.

The costs of wear and tear are those involved in maintaining road pavements and shoulders, bridge maintenance and road rehabilitation. The costs of asset extension and improvements include costs for pavement components, bridges, land acquisition and earthworks and other costs.[41]

Total government expenditure on roads in Australia in 1997-98 was $7.0 billion.[42] This comprised expenditure of $1.6 billion by the Commonwealth Government, $3.4 billion by State Governments and $2.0 billion by local governments.

2.6.2 Determinants of the cost

The principal factors affecting road maintenance costs are the mass and axle loads of vehicles, the distance travelled and the structural quality of the road pavement.

Fuel taxation has been regarded as a proxy for road user charges because road damage varies with distance travelled which is reflected in fuel consumption. However, it is a limited proxy. Two vehicles using exactly the same amount or type of fuel may impose substantially different costs on the road, according to the type of vehicle. Similarly, two identical vehicles using different roads will incur different costs according to the type of road. Whereas there is a roughly **linear** relationship between fuel use and vehicle mass, there is an **exponential** relationship between vehicle mass and road damage.

To illustrate, the measure of relative road wear of different axle loads on vehicles is determined by dividing the load of the axle group by a reference load and taking that ratio to the power of 4. The reference load varies by the number and configuration of axles. The power to which the ratio is taken will vary according to road type.

It is not administratively feasible to vary fuel excise by vehicle type, vehicle load or road type.

The 1986 Industries Assistance Commission report *Certain Petroleum Products — Taxation Measures* concluded that fuel-based charges provided poor

41 National Road Transport Commission, *Updating Heavy Vehicle Charges: Regulatory Impact Statement*, Melbourne, 1999.

42 More recent figures for State and local government expenditure are not available. Commonwealth spending on roads in 1998-99 was $1.7 billion. Source: BTE, *Public Road-related expenditure and revenue in Australia 1999*, Information Sheet 13, BTE, 1999.

signals for the use and supply of roads.[43] In particular, under charging of heavy vehicles encourages distortions throughout the economy, including the possibility of inaccurate relative pricing signals between road and rail freight. The Inquiry agrees with that assessment.

2.6.3 Policy instrument

Unlike the other costs considered in this chapter, there is a charging mechanism in place in Australia for road maintenance and infrastructure costs for heavy vehicles.

The National Road Transport Commission (NRTC) determines road user charges for diesel vehicles over 4.5 tonnes gross vehicle mass, with the objective of full cost recovery. Under the *National Road Transport Commission Act 1994*, road user charges are determined according to vehicle mass and the average distance travelled by vehicle mass category. These costs are then assigned to users through two instruments: heavy vehicle registration charges and a notional fuel excise charge.[44]

With respect to the notional fuel excise charge, Part V, clause nine of the Heavy Vehicle Agreement specified under the NRTC Act states that:

> The Commonwealth shall take all reasonable steps to ensure that there is levied and collected a tax on diesel, being a fuel tax at no less a rate than that of the Road Use Charge recommended by the National Road Transport Commission and not disapproved by a simple majority of all the members of the Ministerial Council within two months after that recommendation.

In its submission to the Inquiry and in consultations, the NRTC said that while its charging methodology was regarded as relatively sophisticated, it had several deficiencies, such as:

- with respect to the fixed registration charges, the lightest category of heavy vehicles is being overcharged in order to maintain registration levels that are consistent with the heaviest category of light vehicles;

- while the current system seeks to ensure equity between light and heavy vehicles, it involves an imbalance in charges within vehicle classes

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43 Industries Assistance Commission, *Certain Petroleum Products — Taxation Measures*, Report No 397, Australian Government Publishing Service, Canberra, 1986.

44 A notional fuel excise charge is calculated such that, when combined with registration charges, would result in the recovery of road expenditure attributable to heavy vehicles, both as a group and for particular vehicle categories. The notional fuel excise charge is currently approximately 20 cents per litre.

  - within a vehicle class those vehicles that weigh less and travel fewer kilometres are over charged compared to those which weigh and travel more;

- it does not account for environmental externalities;

- alternative fuel vehicles are generally undercharged as alternative fuels are generally excise free; and

- light vehicles — that is, vehicles less than 4.5 tonnes gross vehicle mass — are not addressed in the NRTC charging regime.

As part of its work on its Third Charges Determination, to be completed in late 2003, the NRTC intends to investigate charges that are more responsive to the mass and distance travelled of individual vehicles, which it regards as a fairer and more efficient system.

The Inquiry considers that fuel excise, combined with variable registration charges, is a limited proxy method of charging for road use in that it can reflect distance travelled. However, the Inquiry does not regard these charges as the most appropriate because they do not reflect differences in vehicle mass and road type.

The Inquiry supports the NRTC's intention to investigate charges that are more responsive to the mass and distance travelled of individual vehicles, and considers that this investigation could include examination of charges implemented through instruments besides vehicle registration fees and fuel excise.

There are more effective instruments than fuel taxation available to charge for the costs of road maintenance and infrastructure, including road user charges that vary with the mass of the vehicle and distance travelled. This is discussed in Chapter 10.

The current NRTC system of charging evolved partly as a replacement for State specific registration charges. The current NRTC determined registration charges are collected by State and Territory governments as part of their revenue. The Inquiry considers that a new regime that replaced the fixed charge with a variable charge flowing to State and Territory governments should be considered by the NRTC.

2.7 Congestion

2.7.1 Description of the cost

Congestion results in economic losses in two ways: because people value time and because energy use increases with delays.

In most circumstances on congested roads, when an additional vehicle enters the road system it will cause delays to the existing vehicles on the network. This additional cost to other vehicles is known as the marginal cost of congestion.

According to the Bureau of Transport Economics (BTE), roads in Australian cities are becoming increasingly crowded. Over the next 20 years, traffic volumes are estimated to grow by close to 30 percent. BTE modelling compared traffic levels achieved through optimum pricing with congested morning peak hour traffic. It found that congested morning peak hour traffic moves at approximately one third the speed and consumes approximately one third more fuel.[45]

The BTE estimated the marginal costs of congestion in 1999 (both private and external costs) to be $12.8 billion per year, including $6 billion in Sydney, $2.7 billion in Melbourne, and $2.6 billion in Brisbane.[46]

The BTE has calculated the optimal charges to reflect the costs of congestion in Australia's major cities.[47] The charges vary, for example, in Melbourne from an average charge of 17 cents per kilometre to $1.26 per kilometre in the most congested areas, and in Perth from 4 cents per kilometre on average to 28 cents per kilometre in the most congested areas. It is important to note that estimates of these charges would change over time with changes in traffic levels and road infrastructure developments.

2.7.2 Determinants of the cost

Congestion varies by location and time of day.

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45 BTE, 1996.

46 BTE, *Urban Congestion — The Implications for Greenhouse Gas Emissions*, Information Sheet 6, Australian Government Publishing Service, Canberra, 2000. (These estimates are in 1995 dollars).

47 BTE, 1996.

2.7.3 Policy instrument

The Inquiry agrees with the conclusion of the Industry Commission that fuel-based charges are not efficient at allocating road space and that it is not possible to design fuel taxes that vary by location and time.[48] Furthermore, given the large areas of rural and regional Australia in which congestion is not a problem, it would be inappropriate to utilise fuel taxation as a proxy. More effective instruments could be implemented to charge for the costs of congestion, particularly electronic road pricing that can vary user charges by time and location, as discussed in Chapter 10.

2.8 Noise

2.8.1 Description of the cost

Noise can have a negative impact on human health and cause nuisance to individuals. Some of the adverse effects of noise that have been reported in the literature include temporary and permanent hearing loss, interference with sleep, tension, irritability, fatigue, headaches, contributions to cardiovascular and digestive disorders and interference with social and business communications.[49] Other consequences of noise include reduced property values in noisy areas or lower perceived attractiveness of recreational areas affected by noise.

With respect to traffic noise, in Sydney alone 1.5 million residents are reported to be exposed to noise levels at some time of the day considered undesirable by the OECD and 350 000 residents experience noise levels that affect behaviour and health.[50] Submissions to the Inquiry have estimated the external costs of noise from motor vehicles to be between $0.5 billion to $1.2 billion per year.[51]

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48 Industry Commission, *Petroleum Products*, 1994.

49 VEPA, 1994.

50 Environment Protection Authority, NSW, 1997, cited in NRTC and Alross Pty Ltd, *External Noise of Motor Vehicles*, Regulatory Impact Statement, 2002, p. 3.

51 Submissions 228 (Australian Automobile Association) and 234 (Bus Industry Confederation Inc).

2.8.2 Determinants of the cost

Noise levels and their costs vary by:

- type of engine or technology used and the way in which vehicles are maintained (for example, faulty mufflers);
- type of fuel used, for example compressed natural gas combusts more quietly than diesel;
- location, as the impact of noise is greater in more densely populated areas, for example the cost of noise in an area of industrial activity is likely to be less than in a residential area; and
- time of day.

Noise levels caused by transport will also vary according to vehicle speed, driver behaviour, road type and construction, traffic flow and intensity.

2.8.3 Policy instrument

While noise may vary according to some fuel types as mentioned above, it is not possible for the design of fuel taxation to reflect differences in many of the determinants of noise such as time of day, driver behaviour, speed, and vehicle maintenance.

More appropriate instruments for reducing noise generated by fuel use include:

- directing traffic away from residential areas;
- constructing noise reduction barriers;
- imposing time and place restrictions on the use of loud machinery; and
- enforcing noise emission standards for vehicles and machinery.

Charging users with the cost of noise from fuel use would require an instrument that can charge according to the determinants of noise, for example charging for access to areas by location and time, such as urban areas at night, making fuel taxation an inappropriate means of internalising the costs of noise.

2.9 Road crashes

2.9.1 Description of the cost

There is an external component to road crash costs in that not all costs are met privately by motorists through third party, vehicle or health insurance premiums. Vehicle damage costs are generally covered by insurance; medical costs are partly covered by insurance; and accident prevention costs, such as improved roads, are paid for by the vehicle owner or the government as part of infrastructure costs. Remaining medical and other costs are external, as the road user does not pay for them.

In its submission to the Inquiry, the AAA presented analysis indicating that, in 1996, after deducting all paid insurance and the costs internalised to private motorists (lost labour in households and pain and suffering), 39 per cent of crash costs remained unfunded. It argued that 15 per cent should be charged to drunk and speeding drivers through charges on alcohol and speeding fines, leaving 24 per cent of accident costs as unallocated external costs.[52]

Previous analysis of the external costs of transport in Australia concluded that the external costs of road crashes were unknown.[53]

The prevalence of road crashes in Australia has fallen significantly, from 30.4 deaths per 100 000 people in 1970 to 9.3 in 1999. Australia's road safety performance has improved from being 25 per cent worse than the median of OECD countries in 1970 to slightly better than the median in 2000. However, improvements have recently stalled.[54]

2.9.2 Determinants of the cost

The BTE deliberately describes road accidents as 'crashes'.[55] This is to indicate that, rather than being a matter of chance, each crash has causes. Driver speed, alcohol, lack of driver experience, mechanical failure, error of judgement and other reasons may cause road crashes. Roadside hazards are a factor in 40 per cent of car occupant fatalities.[56] These causes are all unrelated to the amount and type of fuel used.

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52 Submission 228, pp. 57-58.
53 VEPA, 1994.
54 Australian Transport Council, *The National Road Safety Strategy 2001 – 2010*, 2000.
55 BTE, *Road Crash Costs in Australia*, Report 102, 2000.
56 BTE, 2000 p. 7.

2.9.3 Policy instrument

To date in Australia, major improvements in road safety have been achieved by improved road infrastructure investment, education and deterrent campaigns, and other regulatory measures. In 2000, the Australian Transport Council launched the National Road Safety Strategy 2000–2010. It seeks to reduce road crashes by:

- improving road user behaviour through community education, driver training and enforcement programmes;
- improving the safety of roads;
- improving vehicle compatibility and occupant protection by improving vehicle safety standards and vehicle protection;
- using new technology (intelligent transport systems) to reduce human error (for example, to ensure seatbelts are used);
- implementing targeted programmes to address those most at risk of accidents such as the young; and
- improving trauma, medical and retrieval services.

Some groups have canvassed the use of fuel based charges to internalise some of the costs associated with accidents. In its submission to the Inquiry, the AAA argued that direct regulation and enforcement was likely to be a more appropriate policy measure to address vehicle crashes than fuel taxation. Nonetheless, the AAA did not dismiss charging road users a levy to reflect some external crash costs and suggested that fuel-based, vehicle-based and other charges could be considered.[57]

The Inquiry's conclusion is that there is not a sufficiently strong link between fuel taxation and the causes of crashes to warrant the implementation of a fuel-based charge for the costs of road crashes.

2.10 Assessment

The above analysis shows fuel taxation to be an appropriate instrument for charging for the externalities of fuel use for which there is a strong correlation

57 Submission 228.

between the external cost and the type or amount of fuel used. Climate change is an example of such a cost. However, there are wider considerations involved before fuel taxation should be used for this purpose.

For some other externalities, while there maybe some relationship between the external cost and fuel use as the amount of fuel use can be a proxy for distance travelled. However, other variables are more significant in determining the extent of that cost which make fuel taxation an inappropriate instrument to address these costs.

There is a weak link between fuel use and externalities such as congestion, noise and crashes. Fuel taxation is therefore not an appropriate instrument for addressing these costs.

Whereas regulatory instruments promote compliance with minimum acceptable standards, economic instruments are likely to be more effective in influencing behaviour towards optimal outcomes. This is pursued in Chapter 10.

CHAPTER 3: REVENUE RAISING

Following the general conclusion in the previous chapter that fuel taxation is not an appropriate mechanism to improve resource allocation when targeting external costs of fuel use, this chapter examines the role of fuel taxation as a general source of government revenue.

3.1 Revenue from fuel excise

Fuel taxation revenue (or petroleum products excise) is a large source of Commonwealth Government revenue, estimated to be $12.2 billion in 2001-02 (Table 3.1). Rebates, subsidies and grants for fuels offset this by approximately $2.9 billion.[1] The net revenue to the Commonwealth is therefore $9.3 billion.

Table 3.1: Commonwealth sources of revenue in 2001-02[(a)]

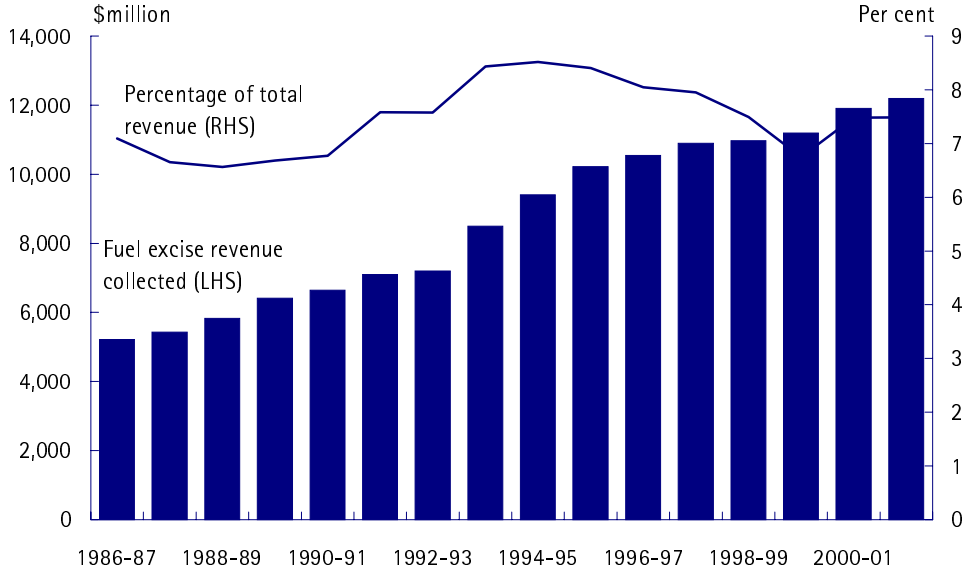
Source of Revenue	$m	Per cent of total
Individual income tax	83 310	51.0
Company tax	27 850	17.0
Superannuation funds	4 730	2.9
Other withholding taxes	1 980	1.2
Petroleum resource rent tax	1 450	0.9
Petroleum products excise	**12 190**	**7.5**
Crude oil excise	400	0.2
Other excise	6 460	4.0
Customs duty	4 680	2.9
Other indirect taxes	760	0.5
Fringe benefits tax	3 440	2.1
Agricultural levies	528	0.3
Other taxes	929	0.6
Non-tax revenue	14 677	9.0
Total revenue	163 384	100.0

(a) Totals may not add due to rounding.
Source: Cash estimates taken from Commonwealth of Australia 2001, *Mid-Year Economic and Fiscal Outlook 2001-02*, p. 98, and Commonwealth of Australia 2001, *Budget Paper No.1 2001-02*, p. 5-15.

1 Australian Taxation Office and AusIndustry.

Fuel excise is the largest source of Commonwealth Government indirect tax revenue and accounts for approximately 7.5 per cent of total revenue, making it the third largest source of tax revenue after personal income tax and company tax.[2] The contribution of fuel excise to total revenue over the past 15 years has remained relatively constant at around seven to eight per cent, as shown in Chart 3.1.

Chart 3.1: Commonwealth fuel excise revenue collections and contribution to total revenue, 1986-87 to 2001-02



Note: These figures do not include excise collections on behalf of State Governments as a replacement for business franchise fees and are for fuel excise only, not for GST collected from fuel sales.
Source: Cash estimates taken from Commonwealth of Australia 2001, *Mid-Year Economic and Fiscal Outlook 2001-02*, p. 98, Commonwealth of Australia 2001, *Budget Paper No.1 2001-02*, p. 5-35; and Commonwealth of Australia 1997, *Budget Paper No. 1 1997-98*, p. 5-22.

The revenue raising function of fuel excise has been recognised by the Government on various occasions. For example, the Minister for Transport and Regional Services has stated:

> … the Federal Government does not consider diesel fuel excise to be a road user charge. Fuel taxes and the revenue they generate have no correlation to the

2 As all GST revenue is provided to the States and Territories, it is regarded as a State tax.

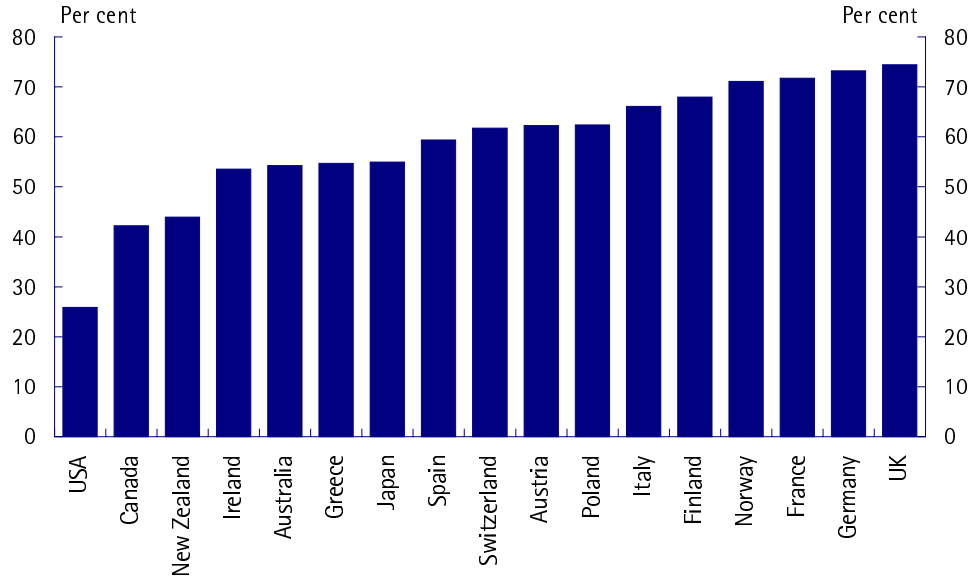
amount of funds provided whether to the states or nationally for roads. Fuel excise today is a source of general revenue just like income and other taxes.[3]

3.1.1 International comparisons

Australia is not unique in its reliance on fuel excise as a major source of revenue. Despite the prevalence of broad based value added taxes (such as the GST), all OECD countries continue to raise significant amounts of revenue from petrol and diesel excises.[4]

In Australia, the percentage of the retail petrol price which consists of tax is one of the lowest in the OECD, as shown in Chart 3.2.

Chart 3.2: International comparisons of taxes as a percentage of the retail price of petrol, September Quarter 2001



Source: Department of Industry, Tourism and Resources, *Australian Petroleum Statistics*, Issue No. 65, December 2001.

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3 The Hon John Anderson MP, Deputy Prime Minister and Minister for Transport and Regional Services, 'Transport Beyond 2000', Address to the Road Transport Forum Annual Convention, 1 May 1999. The Commonwealth has also recognised that, in the absence of specific charges on heavy vehicles that reflects their total road supply infrastructure costs, it would be desirable if diesel excise did not fall below 20 cents per litre.

4 Organisation for Economic Cooperation and Development (OECD), *Consumption Tax Trends*, OECD, Paris, 2001.

3.2 Fuel tax design issues raised in submissions

3.2.1 Tax mix

A number of submissions to the Inquiry argued that fuel excise should not be part of the general revenue raising tax mix, especially in the post-GST environment.

For example, the Australian Automobile Association stated:

> With the GST and its systems to support it now in place, there is no longer any justification on revenue raising grounds to tax fuel any differently from the tax treatment of other goods and services. … Fuel charges should not be about raising revenue, but should be designed to cover appropriate costs of road use and related externalities.[5]

The NRMA submitted:

> … the Commonwealth Government has undertaken no analysis to prove that the costs to economic efficiency and competitiveness of heavily taxing petrol are not higher than generating revenue from more broadly-based and fairer methods of taxation such as the GST, income tax or business tax.
>
> Unless the Commonwealth can demonstrate that the petroleum excise (at current punitive levels) is a more efficient method of revenue raising than alternative taxes, the level of petroleum excise should be reduced in order to lower the price of petrol.[6]

The National Farmers' Federation submitted:

> The NFF argues that it is inappropriate to place a specific revenue raising tax on fuel.[7]

The thrust of these submissions is that the overall efficiency of the tax system and the economy could be improved by ensuring that taxation revenue is collected through the most efficient means, and ensuring that the costs of fuel use are directly charged to fuel users.

The various tax reforms in recent years have improved the overall efficiency of the taxation system and may have reduced reliance on fuel excise as a source of general revenue in future years.

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5 Submission 228, pp. 21-22.
6 Submission 246, p. 6.
7 Submission 257, p. 4.

The Inquiry acknowledges these developments raise broader issues as to the relative efficiency of fuel taxation as a source of revenue. Indeed, the Inquiry itself has sympathy with submissions that questioned the ongoing role for fuel excise following the introduction of a broad based GST.

However, examination of these propositions is beyond the Inquiry's terms of reference which requested only an examination of the **structure of the fuel taxation system** and its impact on the efficient allocation of resources.

Implicit in the terms of reference is the assumption that fuel taxation will remain a source of general revenue. In particular, paragraph six of the terms of reference stated that: 'The inquiry should take into account the government's wish to achieve overall budget neutrality **in relation to petroleum products** in its recommendations' [emphasis added].

This makes it clear that abolition of, or a major reduction in, fuel excise and its replacement with other taxes is not envisaged in the terms of reference.

The proposition that other forms of taxation are able to raise revenue more efficiently than fuel excise raises issues of overall tax system design. Assessing the relative merits of one type of tax over another would require examination of the entire taxation system to assess where the greatest efficiency gains would be made from restructuring the tax system. This effectively constitutes a new examination of tax reform. The Inquiry acknowledges that this may be worthwhile, but it is clearly beyond the Inquiry's somewhat constrained terms of reference.

Moreover, submissions that suggested abolition of fuel taxation for revenue raising usually advocated direct charging mechanisms to improve overall resource allocation in the economy. Chapter 2 concluded that direct charging mechanisms may be appropriate to address some of the external costs of fuel use, but fuel excise rarely would be.

To reiterate, the terms of reference only ask the Inquiry to look at the resource allocation effects of the **structure** of fuel taxation. This is examined in the following sections.

3.2.2 Interaction of the GST and fuel excise

A number of submissions, mainly from the general public, were critical of the imposition of the GST on top of the price of fuel, which includes the excise

component.[8] Echoing these concerns, the NRMA, in its submission, recommended that:

> … the Government recognises the concerns about the dangers of double taxation through the effect of the GST, for example, where the GST is levied on a road user charge, which results in a tax on a tax (as currently occurs where the GST is levied on the approximately half the price of petrol which is made up by excise tax).[9]

While the Inquiry understands these concerns, it does not share them.

Where a tax (such as payroll tax, land tax, or fuel excise), fee or charge is levied on a business, rather than directly on a consumer, it becomes an operating cost of the business which can either be absorbed by the business or passed on to the consumer. Where a business chooses to pass on any costs to the consumer, GST is payable on the whole price of the good or service being supplied.

The imposition of an *ad valorem* tax (the GST) on goods and services which have other taxes embedded into their cost structures is relatively widespread. Removing the embedded value of taxes, such as fuel excise, from the price on which GST is calculated would impose a significant compliance burden on business as there are many taxes, fees and charges that would need to be separately accounted for across the Commonwealth, State and local government levels. This would significantly raise administration and compliance burdens.

Ultimately, it is the final price (or relative prices between different goods and services), which matters to consumers, not the interaction of taxes contained within that price.

3.3 Tax design for efficient resource allocation

There are two design features of a revenue raising consumption tax which will minimise adverse impacts on resource allocation. These are:

- promoting taxation neutrality between producer and consumer choices of goods and services; and

8 See for example, Submissions 10 (Laurie Mewburn), 11 (Suzette Arendtsz) and 12 (John Evans).
9 Submission 246, p. 20.

- removing taxation from goods and services used as inputs in production processes (business inputs).

3.3.1 Taxation neutrality

A major objective of taxation design for revenue raising is for taxation to leave economic choices (purchasing and investment decisions) as unaffected as possible. To the extent that the tax system affects incentives, it modifies behaviour. This may have an adverse impact on the efficient allocation of resources, as choices will not be made on economic grounds, but because of the structure of the tax system.[10]

In designing revenue raising indirect taxes, the objective should be to make the tax system as neutral as possible. That is, the design should minimise the impact of taxation on particular economic choices.[11] This is achieved when the tax is as broadly based as possible, with minimal exemptions.

When it comes to fuel taxation, neutrality means that the structure of the fuel taxation system should influence the choice of fuel used by businesses or private consumers as little as possible.

Neutrality between fuels

The current fuel tax system does not ensure neutrality because substitute fuels are not uniformly excised. Petrol and diesel are currently excised at 38.143 cents per litre, while a number of substitutes are effectively excise free, for example, liquefied petroleum gas (LPG), ethanol, biodiesel, compressed natural gas (CNG) and liquefied natural gas (LNG).

The excise exemptions have the effect of making petrol and diesel relatively more expensive than they otherwise would be. While some would say this is appropriate — that is, an intended consequence of the exemption — the Inquiry does not see it this way given the conclusions of Chapter 2 and the conclusion in this chapter that revenue remains the principal objective of fuel taxation.

The same concern was raised in several submissions to the Inquiry.

The Australian Chamber of Commerce and Industry considered that the tax system is distorting fuel use decisions:

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10 Heady, C., and van den Nood, P., 'Surveillance of tax policies: A synthesis of findings in Economic Surveys', *OECD Economic Department Working Papers No 303*, OECD, Paris, 2001.

11 Heady, C., and van den Nood, P., 2001.

> A glaring example of distortions is the absence of any tax on either LPG or ethanol. There is no obvious reason such fuels are tax free for use in engines while there is a tax of between 38.143 cents and 40.156 cents on petrol usage in engines. This is a market distortion in which petrol use is reduced while LPG is enhanced. …
>
> Taxes on all forms of fuels should be equalised between all types of transport. There should be no advantage provided to one form of fuel relative to another unless there are specific additional public policy considerations that need to be addressed and these are clearly articulated.[12]

The Australian Livestock Transporters Association and the Australian Trucking Association submitted:

> Currently, Commonwealth Government policy is fuel specific: there is an attempt to pick winners and losers based on a range of authorial and environmental arguments. As a matter of principle, and as a matter obviously with important practical implications, we would recommend that the Inquiry suggest that all fuels be treated equivalently. So
>
> - all fuels should be taxed equivalently, and
> - all fuels should be subject to the same kind of environmental scrutiny.
>
> In particular, an approach of this sort offers the opportunity to generate significant revenue while simultaneously removing market distortions that artificially promote the use of one fuel over another.[13]

Sasol Chevron considered that the current structure of fuel taxation is creating distortions in the fuels market:

> The current Australian tax regime is inequitable in the treatment of alternative transport fuels. The zero excise treatment of LPG and CNG distorts the market by influencing the value of fuel at the pump and encouraging fuel inefficiency. For the Commonwealth, it also means a growing problem with forgone excise revenue. …
>
> Fuels qualifying for alternative fuels status are awarded special tax treatment on the basis of environmental performance. Two such fuels, LPG and CNG, attract no excise. The zero excise treatment of natural gas fuels creates an enormous distortion in the fuels market, not only for conventional fuels, but also for other alternative fuels that have to compete with LPG and CNG.[14]

The Australian Institute of Petroleum made similar comments:

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12 Submission 272, p. 8 and p. 10.
13 Submission 2, p. 2 and Submission 4, p. 2.
14 Submission 198, p.1 and pp. 20-22.

> We do not believe that permanent excise differences between fuels are appropriate as this puts the Government in the game of picking environmental winners.[15]

The Inquiry agrees that the current structure of Australia's fuel taxation system has resulted in resources being invested into certain fuels based not on the intrinsic nature of the fuel, in terms of its cost effectiveness or environmental performance, but because of its taxation status.

Indeed, the Australian Liquefied Petroleum Gas Association Ltd, representing the interests of businesses advantaged by the current structure, acknowledged:

> … that the excise incentive available for users of automotive LP Gas since 1981 has been a significant factor in allowing the industry to achieve [its] critical mass.[16]

Where the fuel taxation system is only considered to have a revenue raising objective, the absence of a uniform neutral fuel taxation system imposes an adverse effect on the efficient allocation of resources. To promote efficiency in revenue raising from fuel excise, the fuel taxation system should be designed in a manner which minimises its impact on producer and consumer choices of fuel.

3.3.2 Taxation of business inputs

Revenue raising indirect taxes should fall on final consumers only. When indirect taxes are paid by producers and not rebated, the tax cascades so that there is an uneven incidence of effective tax rates on different goods and services. This distorts relative prices and therefore consumption and production patterns.[17] The same concern was fundamental in explaining why businesses are given an input tax credit for the GST they pay when purchasing intermediate goods and services (business inputs).

Unless fuel excise is fully rebated for business, commodities which use fuel more intensively in their production, will bear higher rates of effective tax than commodities which do not use fuel as intensively. For example, products which have to be transported long distances via road will bear higher rates of effective tax than products which do not.

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15 Submission 213, p. 2.

16 Submission 224, p. 14.

17 Dwyer, T. and Larkin, J., 'Cascading of Indirect Taxes: Problems and Policy Issues' and Freebairn, J., 'Microeconomic Reform and Tax Simplification' in *Australian Tax Simplification* Vol. 10, No. 4, 1993. Stern, N., 'Optimum Taxation and Tax Policy' in *International Monetary Fund Staff Papers*, Vol. 31, No. 2, 1984.

As the Commonwealth Treasury submission stated:

> Taxing intermediate inputs distorts the allocation of resources, unless the tax has an environmental purpose or is imposed to recover the costs associated with the fuel use. Excise increases the cost of petroleum products that businesses use as intermediate inputs, particularly in industries that use such fuels intensively. Consequently excise increases the price of outputs from relatively fuel intensive industries relative to the price of outputs for other industries that are not so fuel intensive. The increase in price lowers demand resulting in resources to leave them.[18]

Taxation of fuel in intermediate uses

The current fuel taxation system rebates some, but not all, intermediate uses of fuel by business. Some business use of fuel is rebated under the Diesel Fuel Rebate Scheme (DFRS) and the Diesel and Alternative Fuels Grants Scheme (DAFGS) that the forthcoming Energy Grants (Credits) Scheme (EGCS) will replace. Some businesses qualify for the remission system, meaning that they can buy fuel excise free. However, rebates or exemptions only apply for certain industries using certain fuels in certain applications; it is a very partial business input rebate system.

Exempting business users from having to pay fuel excise will promote taxation neutrality both in relation to producer choice of fuel and in relation to consumer choices between commodities which use fuel as a production input.

A number of submissions raised the issue of taxation of intermediate goods.

The Minerals Council of Australia stated:

> … in an efficient system of taxation, **taxes would not fall on business inputs**. Taxes that distort decision-making by firms do so by encouraging them to adopt less efficient production methods. Such distortions create **deadweight losses** to national welfare. Business input taxes do indeed raise government revenue but at considerable cost to efficiency, output and national saving.[19] [emphasis included]

The Local Government Association of Queensland Inc submitted:

> In their current form, the [fuel tax concession] schemes work contrary to the three objectives of taxation and have resulted in … economic inefficiency — broad commercial and business user groups continue to bear excise/customs duty on intermediate use of diesel fuel.

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18 Submission 326, p. 15.
19 Submission 230, p. 4 .

> Achievement of production efficiency requires that all producers face the same prices. This condition is violated if intermediate inputs are taxed. It is also violated if factors of production or other inputs to production are taxed differently in some uses than in others.
>
> If an intermediate input is taxed, the costs of using it in production of other goods and services will rise. Users of that input will face a lower price than producers of that input. The higher tax-inclusive price faced by the user encourages that enterprise to economise on the use of that input to a greater extent than the full economic costs of producing it would indicate. As a result, intermediate inputs and factors of production are converted into final products in ways that are less efficient than otherwise preferred methods and therefore, aggregate output in the economy will fall.[20]

And the Australian Chamber of Commerce and Industry submitted:

> Placing excessive taxes on business inputs, particularly one so central to the production process, will have a negative effect on output and therefore on the growth in real incomes.
>
> Energy is a major cost of production. Taxation of energy therefore has the potential to discourage the development of potentially profitable industries within Australia. No taxes should be applied to non-transport uses such as power generation as there ought to be no taxation of business inputs.[21]

As far back as 1986, in its report *Certain Petroleum Products — Taxation Measures* the (then) Industries Assistance Commission (IAC) made the following statements about the incidence of fuel excise on intermediate stages of production:

> A high proportion of fuel is used as an intermediate input to production of other goods and services …
>
> It is a general principle of taxation that taxation of intermediate goods has costs that can be avoided. …
>
> Heavy taxation of intermediate inputs would, over the economy as a whole, be likely to produce an industry structure less efficient than it otherwise would have been. …
>
> An objective of the tax system should be to minimise the distortions in production and consumption arising from the need to raise tax revenue. This is normally pursued by minimising differences in tax rates. Taxation of intermediates has effects which are not consistent with this objective. …

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20 Submission 162, p. 5 and Attachment A, p. 2.
21 Submission 272, p. 3 and p. 10.

> The excises have significant economic costs, particularly given the extensive use of petroleum products as intermediate inputs to production of other goods and services and the substantial difference in excise rates between petroleum products.[22]

The IAC came to the conclusion that petroleum product excises have significant economic costs, particularly because they are levied on intermediate uses. However, in light of the high levels of revenue collected by petroleum products excise, the IAC considered that it would not be feasible to implement a general intermediate use exemption.

In its original tax reform proposals, the Government said that its proposed reforms:

> … will significantly reduce the cost of fuel to all businesses, but particularly heavy transport, marine transport and rail.
>
> … the Government will introduce a new comprehensive diesel fuel credit for **registered** businesses…This credit will reduce the effective excise payable on diesel fuel used in heavy transport (vehicles with a gross vehicle mass over 3.5 tonnes) and rail from around 43 cents per litre to 18 cents per litre. All other off-road business use of diesel and like fuels (including diesel, bunker fuel and light fuel oil for marine business use) will qualify for a full credit of excise.[23]

The cost of exempting all business users from fuel excise is estimated to be $4.5 billion per year in addition to the amounts already provided under DFRS and DAFGS.[24] This would be a significant cost to the budget. Given the budget neutrality constraint in the Inquiry's terms of reference, the Inquiry will not be putting forward a recommendation that all business users of all fuel be exempt from paying fuel excise, despite agreeing with the in-principle justification. However, the Inquiry will be recommending extending the existing exemptions, through the rebate system, as discussed in Chapter 4.

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22 Industries Assistance Commission, *Certain Petroleum Products — Taxation Measures,* Report No. 397, Australian Government Publishing Service, Canberra, 1986, pp. xxvi and 124.

23 Commonwealth of Australia, *Tax reform: not a new tax, a new tax system*, Australian Government Publishing Service, Canberra, 1998, p. 86.

24 Fuel Taxation Inquiry estimates.

Part 2

CHAPTER 4: DESIGNING A MORE EFFICIENT FUEL TAXATION SYSTEM

This chapter develops recommendations to reduce the adverse effects of fuel taxation on the efficient allocation of resources. First, it establishes which fuels should be included within the fuel excise base. Next, it discusses how excise rates should be determined. Finally, the mechanisms for delivering fuel tax concessions are assessed.

4.1 The fuel excise base

4.1.1 The current base

The terms of reference require the Inquiry to examine the taxation, rebate, subsidy and grant arrangements of '... petroleum products, and petroleum substitute products, particularly for transport and off-road use (but not for commercial electricity generation)'.

The current fuel excise base incorporates fuels which are refined **liquid petroleum products**, and some specific substitutes, such as coal tar and coke oven distillates, as shown in Table 4.1.

Table 4.1: Fuel excise rates as at 1 February 2002 (cents per litre)

Product	Engine Use	Burner Use	Other(a)
Petrol	38.143	38.143	Aircraft fuel 2.808
Diesel	38.143	38.143	(a)
Kerosene	38.143	7.557	Aircraft fuel 2.845
Heating oil	38.143	7.557	(a)
Fuel oil	7.557	7.557	7.557
Condensate	38.143	7.557	(a)
Stabilised crude and topped crude	38.143	7.557	(a)
Other refined products	38.143	7.557	(a)
Coal tar and coke oven distillates	38.143	38.143	38.143
Ethanol	0	0	0

(a) A number of 'other uses' are prescribed in excise legislation for most products.
Source: Australian Taxation Office information drawn from *Excise Tariff Act 1921, The Schedule*.

Under the blending provisions of the legislation, where a non-excisable product (such as biodiesel) is blended with an excisable product (such as diesel), the blended product must pay excise at the rate of the excisable product. Similarly, if a lower excised product (such as heating oil) is blended with a higher excised product (such as diesel), the higher rate applies to the whole blended product.[1]

There are two problems with the current fuel excise base. First, the base is incomplete as a number of fuels are either not in the excise base at all, or are excised at a zero rate. Second, the legislation causes ambiguity as to the excise status of some new fuels and blended products.

4.1.2 'Excise exempt' fuels

For different reasons, there are currently a number of fuels that are not subject to excise, referred to in this report as 'excise exempt' fuels. Like the varying objectives, the legislative mechanisms that provide for these exemptions are also quite different**.** For example:

- ethanol, whilst included in the fuel excise base, has **a zero rate** of excise;
- liquefied petroleum gas (LPG) and bitumen are both **specifically excluded** in legislation from the excise regime; and
- compressed natural gas (CNG) and biodiesel are **excluded by default** from the excise base because they do not meet the 'liquid petroleum product' criteria (that is, CNG is not a liquid, while biodiesel is not a petroleum based product).

These various excise exemptions result in substantial revenue forgone. The *2001 Tax Expenditures Statement* estimates that excise exemptions for LPG, ethanol and CNG amount to $900 million in 2001-02, rising to $1 200 million in 2004-05.[2]

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1 However, there are some exceptions to this general rule via the 'exempt blend' provisions of the current excise system. For example, if petrol is blended with ethanol (a specifically exempt fuel), then excise duty is only payable for the petrol component of the blend.

2 The Treasury, *2001 Tax Expenditures Statement*, Commonwealth of Australia, Canberra, 2001. The estimates are calculated on an equivalent unit of energy basis, which adjusts for the different energy content of alternative fuels compared to the energy content of unleaded petrol.

The issue of forgone revenue was raised in a number of submissions. For example, the Australian Chamber of Commerce and Industry recommended that the fuel excise base should be extended:

> … the simplest scenario for fuel tax would be where it was levied universally on all forms of petrol, which would then allow the application of the fuel tax on a wider base permitting the tax to be levied at a lower rate. Tax applied at a lower rate will serve to redress the equity issues of choice distortions amongst the fuel categories, and the consumption distortions currently created by fuel taxation.
>
> Taxes should be broadly based so as to allow lower taxes on each taxed item, rather than applying large distorting taxes to fewer items.[3]

Mr Ian Farrow submitted:

> Because of the taxpayer subsidies available for alternative fuel use, the longer-term financial impact of significant switching from diesel to alternative fuels would be considerable pressure on revenue. It is doubtful over the longer term whether successive governments would continue to support a system that promoted increasing losses to revenue through exemptions from both fuel excise and/or road user charges in addition to direct taxpayer subsidies.[4]

BP Australia Ltd argued:

> Government depends on existing fuel taxes as a key component of consolidated revenue.
>
> This revenue is currently distorted by losses on account of rorting of the tariff structure.
>
> Moves to encourage tax free alternative fuels will clearly come at a cost to the revenue. Any attempts to recover the revenue lost to tax free alternative fuels by increasing the tax on motor spirit and/or diesel would only exacerbate the problem.
>
> It therefore seems to us that government must tax all automotive fuels to the degree necessary to prevent wholesale shift to tax free product with the consequent loss of revenue.[5]

In contrast, the Australian Liquefied Petroleum Gas Association Ltd submitted that the excise exemption for LPG should be continued:

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3 Submission 272, p. 9 and p. 10.
4 Submission 177, p. 5.
5 Submission 231, p. 56.

> Investment in the automotive LP Gas industry has created a strategic alternative fuel asset for Australia. To fully exploit the potential economic and environmental benefits of this pre-eminent alternative fuel, it is critical that government establishes policy settings which provide long term certitude for the automotive LPG Gas Industry. Specifically, the industry is seeking a ten year commitment on fuel taxation policy settings. The policy settings need to provide as a minimum, the current differential effect accorded to LP Gas through excise exemption.[6]

Mobil Oil Australia Pty Ltd, which is a significant LPG producer itself, also submitted:

> Following the introduction of the GST, LPG now attracts the same level of direct taxation as most other goods and services in the Australian economy. Mobil believes this is the appropriate basis for the taxation of LPG.
>
> Over the past thirty years the Australian oil and gas industry has made significant investments in the development of a world leading auto LPG supply and distribution network.
>
> Around $1 billion is invested in seaboard and regional terminals, tankers and dispensing facilities at service stations. This investment has lead to the development of one of the most comprehensive alternative automotive fuel networks in the world. There are currently some 680 000 private and business LPG fuel vehicles, representing a further $1 billion investment by their owners.
>
> It is important that any changes to the taxation system not undermine these very significant investments, made in good faith in the context of Government policy commitments to LPG utilisation.[7]

If the current excise exempt fuels retain their status, excise revenue will decline as a percentage of total revenue if consumers switch from taxed to non-taxed fuels. If this occurs, higher rates of excise may be required to maintain overall fuel excise revenue. However, this will not be sustainable as the greater the tax disparity between excise exempt and excised fuels, the greater will be the incentive to consume the former.

Given a revenue raising objective of fuel taxation, all fuels should make a contribution to the revenue task. The Inquiry therefore concludes that the fuel excise base should be broadened to include the current excise exempt fuels.

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6 Submission 224, p. v.
7 Submission 214, p. 18.

4.1.3 Administrative uncertainty regarding new products

A number of new fuels are being developed or investigated in Australia. For example, Sasol Chevron is proposing to build a gas-to-liquid (GTL) plant in the Pilbara region of Western Australia using natural gas from the Carnarvon Basin. This project involves total investment of around $9 billion. Sasol Chevron expects total production of 200 000 barrels per day to supply both the domestic and Asia Pacific markets.[8]

In addition, the Inquiry received several submissions outlining plans for biodiesel and methanol production facilities.[9]

One factor claimed to be an impediment to these investments is uncertainty as to whether the fuel will be taxed and, if so, at what rate. Sasol Chevron submitted that: 'It is essential there is an understanding of how this new, ultra-clean alternative fuel will be treated in Australia before it arrives in the market'.[10]

The current excise tariff specifies that **liquid petroleum products** are to be excised. However, there is no clear definition as to what constitutes a liquid petroleum product. This is clearly unacceptable.

The Inquiry understands that, over the past two years, the ATO has received many requests for advice on the tax treatment of new fuels. Detailed analysis may be required to determine if the product is a 'petroleum product'. This can involve costly and time consuming chemical analysis.

Complexities with the current excise base can in turn be linked to the style of the legislation.[11] It is a relic from the 1920s, when petroleum excise was first applied. Because there were few known substitutes then, the legislation was written in an **exclusive** style — specifying the products that would be subject to excise.

Over the years, as substitutes have emerged, the base has been broadened in an *ad hoc* fashion. This has enabled loopholes to be identified and exploited.

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8 Submission 198.

9 Submissions 97 (Mr Steven Hobbs), 137 (Biodiesel North Queensland Pty Ltd), 150 (Ozdiesel), 172 (Australian Renewable Fuels Pty Ltd), 174 (Collex Pty Ltd), 176 (South Australian Farmers Fuel), 191 (P. J. and A. D. Hill Pty Ltd), 243 (Stanwell Corporation Ltd) and 163 (Coogee Energy Pty Ltd).

10 Submission 198, p. 1.

11 Appendix F lists relevant legislation pertaining to the fuel taxation system, including fuel payment schemes.

The result is an inflexible system that struggles to tax fuels sourced from other feedstocks as they come on to the market.

Legislation was further complicated in the mid-1990s when blended products began to be used, initially as a way of avoiding excise. Provisions were included to ensure that blended products were taxed at the full rate. These provisions were written in an **inclusive** style — that is, everything would be taxed unless specifically exempt. The result has been messy, confusing and inhibiting to technologically driven commercial innovation.

4.1.4 Broadening the excise base

The Inquiry considers that the scope of the excise base should be broadened from 'liquid **petroleum products**' to 'liquid **fuels** (irrespective of derivation) and liquefied and/or compressed natural and petroleum gases'.[12] Therefore, the broadest fuel excise base within the terms of reference would include the currently excised petroleum based fuels (see Table 4.1) while incorporating petroleum substitute fuels such as ethanol, GTL, biodiesel, LPG, methanol and CNG.

In addition, the Inquiry considers that the legislation describing the new excise system should be made simple and flexible so that new fuels which come on to the market will automatically be included. This streamlining will ensure greater certainty, while significantly reducing future compliance and administrative costs for both industry and the ATO.

4.2 Fuel excise rates

Under the current rate structure, the excise rates can vary between zero and 38 cents per litre. Moreover, rates applying to particular fuels can vary depending on how the fuels are used.

Three broad options are available for setting fuel excise rates:

- increasing the GST rate on fuels;

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12 Bitumen and waxes are specifically excluded because they are generally not sold in a liquid form and are not suitable for use as a fuel. Excluding these two products will not result in revenue leakage — or compromise the principle that substitute fuels should be taxed on a uniform basis to ensure neutrality — as they are not suitable for use in engines. In addition, bitumen and waxes are largely used as business inputs, so not excising these fuels is consistent with the principle of exempting businesses from paying revenue raising consumption taxes.

- excising all fuels at the same rate per litre; or
- excising all fuels according to their energy content.

4.2.1 Increasing the GST rate on fuels

This option would involve removing the volumetric fuel excise and increasing the GST rate for fuels. It could be implemented through the existing GST system, provided fuels could be readily defined for GST purposes.

The advantage of this option is that, because it would operate through the GST system, all business use of fuel would be effectively tax free.[13] The corresponding disadvantage is that, in order to achieve budget neutrality the GST rate on fuel would need to be increased to well over 100 per cent. This is because the tax paid by final consumers would have to increase to offset the loss of revenue from businesses that currently receive no rebates (or partial rebates) of fuel excise.

This would breach the requirement in the terms of reference that '… the Inquiry will not consider options that involve long-term real increases in the effective level of petrol or diesel taxes paid by business or **private consumers**' (emphasis added). Therefore, the Inquiry has rejected this option.

4.2.2 Excising all fuels at the same rate per litre

Under this option, all relevant fuels would be excised at the same rate in cents per litre.[14]

This option is attractive in terms of administrative simplicity, as there is no requirement to calculate different rates of excise for different fuels. Blends of different fuels would be taxed at the same rate as fuels in their pure forms.

The disadvantage is that it would not promote taxation neutrality between fuels because the energy content of fuels is different. For example, LPG produces approximately 77 per cent, and ethanol produces approximately 68 per cent, of the energy of petrol when combusted.[15] That is, one litre of

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13 Businesses receive an input tax credit for the GST they pay on goods and services which are used to produce other goods and services.

14 Gaseous fuels would be converted from a cubic metre basis to a litre equivalent basis to obtain the appropriate rate of excise.

15 Bush, S., Dickson, A., Harman, J. and Anderson, J., *Australian Energy: Market Developments and Projections to 2014-15*, Australian Bureau of Agricultural and Resource Economics, Research Report 99.4, Commonwealth of Australia, Canberra, 1999.

petrol will deliver a greater energy output, and hence more kilometres travelled, than one litre of LPG or one litre of ethanol.

Excising all liquid fuels at the same rate per litre would therefore give an artificial advantage to those fuels with higher energy contents. This will induce a consumption switch towards higher energy content fuels, distorting fuel consumption and production decisions.

The Inquiry does not endorse a uniform cents per litre excise rate.

4.2.3 Excising all fuels according to their energy content

Under this option, the cents per litre excise rate on fuels would be determined according to their energy content. Fuels with a higher energy content would have a higher excise applied to them. It would promote taxation neutrality as fuels would be taxed on their ability to deliver a given energy output.

This option was supported by several submissions to the Inquiry. For example, Sasol Chevron stated that:

> The current tax treatment of transport fuels is distorted because a volume based production tax (excise) is passed directly on to the consumer. It takes no account of the fact that fuels are not equal in performance they deliver for each litre of consumption.
>
> To level the playing field and address these problems two steps need to be taken. The most important is to rate fuels uniformly according to combustion efficiency (distance delivered per volume of fuel). This can be done so as to create a revenue neutral base that treats all fuels equally. It also opens up a range of policy options available to the Government.
>
> Once the playing field has been levelled, Government can fairly reward environmental efficiency (emissions per volume) as well as fuel efficiency (distance per volume) while maintaining revenue neutrality.[16]

While there is merit in the principle expressed by Sasol Chevron, the number of kilometres gained from a litre of fuel is more dependent on the type of engine or vehicle, than the type of fuel. For example, a Holden Commodore

16 Submission 198, p. 19 and p. 24.

consumes 11.5 litres of petrol per 100 kilometres while a Toyota Echo consumes 6.2 litres of petrol per 100 kilometres (city driving).[17]

Coogee Energy Pty Ltd, a methanol producer, submitted:

> … our aim to introduce methanol as a viable fuel in its own right is restrained because of the high level of excise on an energy basis when compared with other fuels.
>
> Methanol's energy value is roughly half that of conventional petroleum fuels. … for higher concentration blends and neat methanol fuel this means that roughly twice as much methanol is required to travel the same distance in a conventional vehicle. As excise is paid on a per litre basis, this places methanol at a significant disadvantage to petroleum based fuels. While methanol can be very competitive with ULP [unleaded petrol] and diesel on a total energy basis, it can't compete if it essentially pays twice as much excise as these fuels.
>
> Coogee believes that lowering the excise level on methanol will facilitate its introduction as an alternative fuel in its own right. A reduction in excise by one-half would allow methanol to compete on an equal basis with conventional fuels.[18]

Caltex Australia Ltd submitted:

> Theoretically, all fuels should be taxed equally based on energy content, all other things being equal. This is because consumers do not buy litres of fuel — they buy service (kilometres travelled), which is closely related to energy content. Energy content, expressed as Gj/litre, varies widely between fuels, for example, ethanol has only 69 per cent of the energy content of petrol on a volumetric basis.[19]

The advantage of the energy content approach is that the fuel taxation system would be as neutral as possible — minimising the influence of taxation on the choice between fuels.

Energy content is not the only differentiating factor between fuels. However, it is closely correlated to performance and is the most distinguishing feature between fuels. The energy content approach provides a rational base for determining the excise rate for each fuel.

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17 Figures are for an automatic Holden VX Commodore Executive Sedan and a manual Toyota Echo (10 Series) — obtained from the Australian Greenhouse Office Fuel Consumption Database website, available at: http://www.greenhouse.gov.au/.

18 Submission 163, p. 3.

19 Submission 229, p. 6.

The Inquiry stresses that energy content is not the same as the carbon content. Levying excise according to energy content is not intended to be, and should not be considered as, a proxy for a carbon tax.

The Inquiry recommends as the best option available to promote efficiency, setting excise rates for all fuels (except aviation fuels and lubricants and greases — see below) according to energy content.

4.2.4 Aviation fuels and lubricants and greases

There are sound reasons for not calculating excise rates for aviation fuels and lubricants and greases according to their respective energy contents.

Aviation gasoline (Avgas) and aviation turbine fuel (Avtur) are excised at 2.808 and 2.845 cents per litre respectively. These amounts have been calculated in order to raise revenue required to fund the Civil Aviation Safety Authority (CASA) and Airservices Australia for the provision of aviation services such as traffic control, navigation and air safety regulation.[20]

However, Qantas Airways Ltd submitted that it is being overcharged for these services:

> The current structure of the Avtur Fuel Levy used to fund CASA's surveillance activities and airport control towers, is not transparent and does not allocate costs fairly across the entire industry.
>
> A change from the existing arrangements to a 'user pays' principle would ensure that a future structure would be more equitable than the present arrangements.[21]

The Inquiry agrees in principle that the fuel taxation system should not be used for generalised cost recovery of this type. However, the Inquiry notes that elimination of the cross subsidies would require careful consideration of the role of the cross subsidies and cost recovery in the aviation industry, particularly how they affect regional, rural and remote communities.

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20 Excise on Avgas and Avtur has primarily been linked to funding for the aviation sector. The excise rates have varied over the years according to the charging mechanisms of relevant aviation bodies, as these charges also contributed to funding the aviation industry. For example, in 1983 the then Government increased excise on aviation fuel by two cents per litre (to around 6.2 cents per litre for Avtur and 6.5 cents per litre for Avgas) '… to reduce the deterioration in the rate of recovery of costs of aviation services …', (Hon P. J. Keating, Treasurer, *Economic Statement*, May 1983, p. 56).

21 Submission 235, p. 4.

These issues are beyond the scope of the Inquiry. The Inquiry is also mindful of the recent significant disruption to the Australian aviation sector and considers that it would be desirable for these issues to be examined in a more settled environment. As such, the Inquiry will not be making any recommendations regarding the adequacy of cost recovery arrangements in the aviation industry.

Since 1 January 2001, lubricants and greases have been excised at around five cents per litre and the revenue raised is used to fund the Product Stewardship (Oil) Scheme.[22] This scheme is intended to encourage the reuse of waste oils by providing a payment to oil recyclers for the treatment of waste oil products.[23] This scheme is discussed further in Chapter 9.

The excise rates for aviation fuels and lubricants and greases are not designed to raise general revenue but reflect specific programmes. Given that they are largely consumed by businesses, removing any revenue raising component from these items is consistent with the principle of exempting businesses from paying broad based consumption taxes.

The Inquiry recommends that the excise status of aviation fuels and lubricants and greases should remain unchanged.

4.2.5 Calculating excise rates on an energy content basis

Table 4.2 shows indicative excise rates for certain fuels when calculated on an energy content basis.

Exact excise rates would need to be determined following consultation between the ATO and interested parties, using a recognised and authoritative source.

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22 This scheme was introduced as part of the Government's *Measures for a Better Environment* statement. Prior to the introduction of this scheme, lubricant oils and greases were specifically excluded from the fuel excise system.

23 Submissions to the Inquiry argued that the scheme discriminates against lubricating oil users who consume all or part of the oil during the operating process of machinery, especially the shipping industry. See for example, Submission 216 (Australian Shipowners Association).

Calculating excise rates based on energy content would ensure that only those products with an energy content are taxed. For example, the water component of diesel water emulsions will not be taxed.[24]

Table 4.2: Indicative relative energy contents and excise rates for certain fuels

Fuel	Energy content as a ratio to the energy content of diesel(a)	Energy content based excise rate in cents per litre(b)
Diesel	1.00	38.1
Petrol	0.89	33.8
Heating oil	0.96	36.9
Fuel oil	1.04	39.8
Kerosene	0.96	36.6
LPG	0.68	25.9
Solvents	0.89	34.0
Ethanol	0.61	23.1
CNG	(c)	(c)
Biodiesel	(d)	(d)

(a) Rounded to two decimal places.
(b) Based on the current excise rate for diesel. Rounded to one decimal place.
(c) The energy content of CNG, and hence the appropriate tax rate, will depend on the level of compression (kPa/cubic metre), which will have to be defined for tax purposes.
(d) The energy content of biodiesel, and hence the appropriate excise rate, will depend on its feedstock.
Source: Bush, S., et al, 1999.

The Inquiry recognises that for administrative simplicity, like fuels could be taxed at the same rate where energy contents are similar. For example, diesel, kerosene, heating and fuel oils could all be taxed at the same rate. This would ensure simplicity on the payments side of the excise system because one credit rate can be applied for like fuels and blends of like fuels. The Inquiry considers that this is an issue to be dealt with in the future by the ATO once the energy content rates for various fuels have been defined for tax purposes.

Where the energy content for different fuels used in blends varies significantly, excise liability would need to be calculated using a **weighted average formula**. For example, if a petrol/ethanol blend contained 10 per cent ethanol, the ethanol rate would apply to 10 per cent of the blended fuel and the petrol rate

24 The Government has recently tabled a proposal to exempt the water component of emulsified blends of diesel and water from excise — Tariff Proposal No. 1 (2002).

would apply to the remaining 90 per cent. This would ensure that such blended fuel products are taxed according to their energy content.[25]

4.3 Indexation

Between August 1983 and February 2001, excise rates were automatically indexed every six months in line with changes in the Consumer Price Index (CPI).

Indexation was introduced in order to maintain the real value of excise collections and to provide more stability for businesses and consumers by removing the need for discretionary changes to excise rates (larger amounts, made less frequently). The second reading speech in 1983 gave the following justification for indexation:

> … past increases in nominal rates of excises have not been sufficiently frequent or, in aggregate, large enough to counteract the eroding effects of inflation on real rates of excise.
>
> Between 1973-74 and 1982-83, annual revenue from the traditional excises, measured in constant 1982-83 dollar terms, fell from $4.3 billion to $3.3 billion.
>
> Over the same period, the share of traditional excise collections in total budget receipts fell from 13 per cent to a little over 7 per cent.
>
> Despite this trend, some of the past discretionary increases have occasionally proved disruptive, destabilising the sales patterns of the industries concerned and imposing sudden and large price increases on consumers.
>
> The indexation arrangements contained in this Bill are designed to effectively eliminate these problems and will maintain the real vale of excise collections.
>
> The Government considers that this new system will afford a greater degree of stability for consumers and industry alike. The excises will rise gradually in line with inflation as wages and other incomes increase.[26]

On 1 March 2001, the Government abolished the six monthly indexation of petroleum products excise rates.

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25 A mechanism for determining the duty of blended products with different excise rates exists already in excise legislation.

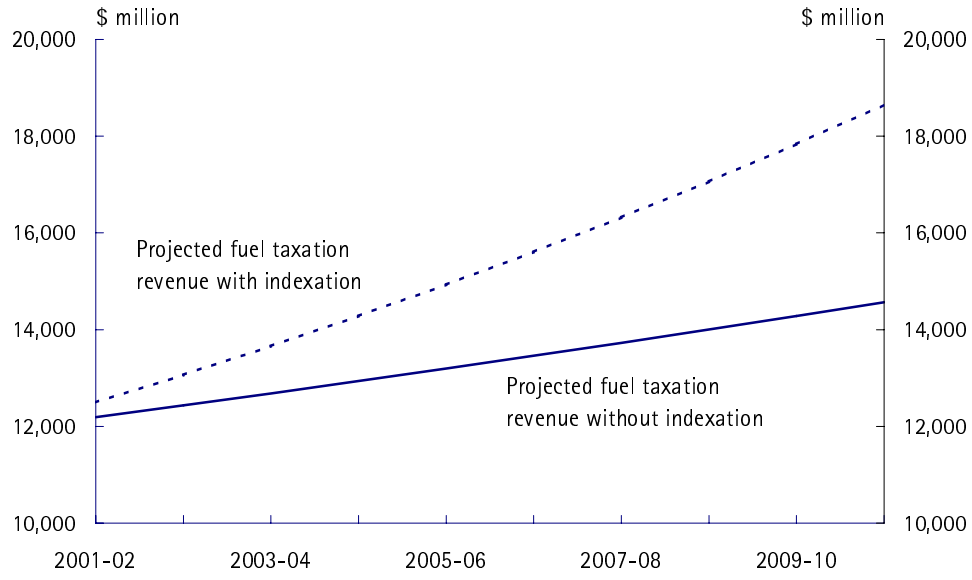
26 Australia, Senate, *Debates*, Vol. S. 100, 16 November 1983, pp. 2706-07.

As implied in the second reading speech, excise revenue collected per litre of fuel will decline in real terms in the absence of indexation. Fuel excise is the only element of the Commonwealth Government's consumption tax base in this position.

The absence of indexation will have a significant impact on the Budget over time. Estimates of revenue forgone are $425 million in 2002-03, rising to $1 100 million in 2004-05.[27] This cost will continue to escalate as inflation erodes the real value of revenue collected from fuel excise.

The loss in revenue, in real terms, from the absence of indexation is demonstrated in Chart 4.1 which assumes a growth rate in petroleum products consumption of two per cent a year and inflation of 2.5 per cent a year. Based on these assumptions, the absence of indexation will result in forgone revenue of around $20 billion over 10 years.

Chart 4.1: Hypothetical loss in real fuel taxation revenue in the absence of indexation over the next ten years



Source: Fuel Taxation Inquiry estimates.

The absence of indexation effectively provides fuel consumers with a continuous tax cut as prices rise.

27 Commonwealth of Australia, *Budget Paper No 2*, Commonwealth of Australia, Canberra, 22 May 2001, p. 40.

The Inquiry has given careful thought to the question of whether the reintroduction of indexation should be recommended. The Inquiry is obviously aware of the circumstances which led the Government to terminate indexation last year. Conversely, reintroducing indexation is not only consistent with the constraint that '… the inquiry will not consider options that involve long-term real increases in the effective level of petrol or diesel taxes',[28] but more positively, is a core component of a revenue based justification of fuel taxation.

In addition, the reintroduction of indexation gives the Inquiry more room for other recommendations which, while consistent with the policy framework developed in the report, would otherwise be ruled out by the budget neutrality constraint.

Weighing up all these considerations — including the fact that basing excise rates on energy content would result in an initial cut in petrol excise of approximately four cents per litre — the Inquiry recommends the reintroduction of twice yearly indexation of Commonwealth fuel excise rates.

4.4 Timing of implementation

There is a substantial amount of work to be done by the ATO and the fuel industry before a fuel excise system incorporating an expanded base with energy content based excise rates, can be implemented (such as consultation with relevant parties for legislative and administrative design, development of IT systems and staff training).

As such, the Inquiry considers that 1 July 2004 would be the earliest date that the new system could commence. Indexation could be reintroduced earlier and the Inquiry proposes that 1 August 2003 is an appropriate time which is reasonably close to the 1 July 2004 start date for other measures, while being consistent with the budget neutrality constraint.

28 The reintroduction of indexation will not breach this constraint, even when GST is applied on top of the price of petrol and diesel, which is partly made up of excise.

4.5 Administration of fuel tax concessions

A consequential matter to the Inquiry's proposed neutral excise regime is how concessions to eligible users — principally for business inputs — should be delivered: through lower fuel tax rates or rebating fuel excise after payment.

There are two main administrative issues with the current system of delivering concessions:

- inconsistencies in delivery mechanisms (excise rates that vary according to end use and also through the system of rebates, subsidies and grants to eligible end users); and
- excise evasion practices, such as fuel substitution, that arise from differential excise levels.

4.5.1 Inconsistency — two delivery mechanisms

Currently there are excise concessions to certain end users under two different mechanisms. The rebate, subsidy and grant schemes effectively reduce the rate of tax paid for certain users, but after the tax has been paid. Other users pay no tax or pay lower tax rates according to the three tiered excise rate structure based on end use.

Inequities and complexities have resulted from the two mechanisms operating under different legislation and administrative arrangements. This is further complicated in the context of the remission, refund and drawback mechanisms of the *Excise Act 1901*.

The two different mechanisms were originally designed to provide the same benefit. At the same time that the DFRS was introduced to provide a rebate of duty back to certain off-road users of diesel, a separate mechanism for delivering fuel tax exemptions was introduced for fuel oil, heating oil and kerosene through a concessional excise rate.

The reason why a concessional rate was introduced rather than administering the benefit through a rebate system is unclear. It is likely to have resulted from the lobbying by users of heating oil and kerosene to obtain the benefit 'up front' via a reduced excise rate.

Over time the different systems have diverged, resulting in the current situation where concessional rate payers are still paying a portion of excise (around 7.5 cents per litre) while the recipients of the DFRS remain eligible for

a full rebate of excise paid (Table 4.3). This highlights the inefficiencies of two different mechanisms designed to deliver essentially the same outcome.

Table 4.3: Comparison of benefit via concessional tax rates versus rebates

Date	Diesel excise rate (cpl)	Net diesel excise paid by agriculture sector after DFRS (cpl)	Net excide paid for fuel oil, heating oil, and kerosene via concessional rates (cpl)
August 1983	9.027	1.872	1.872
August 1985	10.007	2.388	2.076
February 1986	10.437	0	2.165
Current	38.143	0	7.557

Source: James, D., 'Beer and Cigs Up!: A recent history of excise in Australia', *Background Paper 5 1995-96*, Department of the Parliamentary Library, Canberra, 1995-96.

4.5.2 End use provisions and excise evasion

The current excise structure is complicated by varying excise rates for each product calculated according to its intended end use. For example, a full excise rate when used as a transport fuel, a concessional rate when used as a non-transport fuel, and a zero excise when not used as a fuel. This creates administrative costs for oil refiners among others. Excise is payable on 'entry into home consumption' which is generally when the product leaves the refinery, meaning that the oil company or manufacturer is required to determine, and be accountable for, the end use of a product before the product is actually used.

Excise exemptions or concessional rates provide opportunities for excise evasion. This can impact on the competitive position of businesses and on the revenue received by the government. The substantial difference in rates for the same product according to end use provides an incentive to evade excise by paying the lower rate of excise and then using the product in a higher taxed application. There have been a number of measures to reduce such practices over the years by both Customs and the ATO. The ATO outlined some of these measures in its submission to the Inquiry:

- legislation to ensure that when an excisable petroleum product is blended with another product, the whole blend is subject to excise at the appropriate rate (1994);

- increase in the excise rate for topped crude from the concessional rate to the rate applying to diesel (1995);[29]

- redefinition of fuel oil to exclude 'light fuel oil' from concessional treatment (1995);

- introduction of the 'marker regime' — which requires the addition of a chemical marker to concessional fuels sold in bulk — and the penalty surcharge legislation which imposes a penalty for the use or sale of marked fuel in an internal combustion engine or blended with unmarked fuel (effective 1998); and

- the imposition of conditions, such as limiting the production of concessional product per year (1999).[30]

Mobil Oil Australia Pty Ltd told the Inquiry that fuel substitution would best be addressed by a single rate of excise across fuels:

> Illegal blending is a significant problem that requires a systematic approach to prevention, rather than the 'ad hoc' measures adopted by Government in the past. We recommend this can best be achieved by the introduction of uniform excise rates on all products that can be blended into fully excisable petrol and diesel fuel.[31]

By abolishing the end use provisions of the current excise structure and providing any exemptions through rebates would mean a significant reduction in risk of excise evasion via fuel substitution activities. It would also mean that the marker regime, and the associated remission certificate system, would not be required. This would result in administrative savings for both Government and business.

4.5.3 Inquiry assessment

An obvious advantage of full payment plus rebate is that it is easier to target rebate or concessional recipients. As highlighted, lower fuel taxes in certain circumstances have led to considerable excise evasion from fuel substitution.

Conversely, the Inquiry is aware of some small business concerns about the administrative burden of claiming rebates rather than being exempted from

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29 Topped crude is an oil feedstock from which grease and lighter liquids such as propane, butane and some petrol have been removed by heat or pressure.
30 Submission 331.
31 Submission 329, p. 2.

excise up front.[32] The ATO estimates that the total number of businesses currently dealing in concessional products or claiming under the refund or remission arrangements (refer Appendix F) is approximately 500 to 600.[33] The Plastics and Chemicals Industries Association, representing major users of concessional fuels (such as paint manufacturers), expressed concern about the cash flow implications of requiring concessions to be claimed after purchase.[34] However, the Inquiry notes that this situation would be no different to that now faced by DFRS and DAFGS recipients, many of whom are also small businesses.

The Inquiry's conclusion is that collecting a uniform rate of excise for all excisable fuels, then rebating concessional use, is the best way to promote the efficiency of the excise system as a revenue raising instrument and to address excise evasion from fuel substitution. The Inquiry therefore recommends that offsets to the excise burden for final business users should be delivered through a Business Fuel Credit Scheme (discussed in Chapter 5).

4.6 Recommendations

Recommendation 1: Fuel taxation design principles

The Australian Taxation Office, in consultation with relevant parties, should design new arrangements for the application of Commonwealth fuel excise and customs duty to apply from 1 July 2004 incorporating the following features.

- Excise and customs duty should apply to all liquid fuels, irrespective of their derivation and liquefied and/or compressed natural and petroleum gases.
- The rates to apply should be based on the relative energy content of each fuel, except for aviation fuels and lubricants and greases. In determining relative rates, the rate of excise applying to diesel at the time of implementation will not change.
- Aviation fuels and lubricants and greases should retain their current excise and customs duty status — that is, in relation to cost recovery for airline service provision and the Product Stewardship (Oil) Scheme respectively.

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32 Submissions 196 (AgForce Queensland Industrial Union of Employers) and 226 (Association of Marine Park Tourism Operators).
33 Submission 331.
34 Submission 220.

- The full rate of excise and customs duty applying to fuels under the new arrangements should be imposed and collected at an early point in the production and distribution chain, with offsets to the excise burden being delivered through the Business Fuel Credit Scheme as part of the Energy Grants (Credits) Scheme and the Residential Fuel Credit Scheme.

Twice yearly Consumer Price Index indexation of all fuel excise and customs duty rates should be reintroduced from 1 August 2003.

CHAPTER 5: ENERGY GRANTS (CREDITS) SCHEME

5.1 Background

The Energy Grants (Credits) Scheme (EGCS) is intended to replace the Diesel and Alternative Fuels Grants Scheme (DAFGS) and the Diesel Fuel Rebate Scheme (DFRS).[1]

- The DAFGS provides grants to eligible business users of diesel and certain alternative fuels for road transport.[2]

- The DFRS provides a rebate of the excise and customs duty paid on diesel for specific off-road business uses — mining, primary production, rail and marine transport, hospitals, aged persons homes, nursing homes and other medical institutions.[3]

The grants and rebates provided by these schemes reduce, and in many cases eliminate, the impact of fuel taxes on the costs of diesel used by eligible businesses. In this regard, fuel grants and rebates can be considered equivalent to a cut in fuel taxes for these businesses — and, for simplicity, are referred to in this chapter as lowering their **effective** level of fuel tax.

The commitment to introduce an EGCS was included in the Government's *Measures for a Better Environment* (MBE) statement in May 1999.

The precise terms of the original MBE commitment were:

> The Energy Credit Scheme will provide price incentives and funding for conversion from the dirtiest fuels to the most appropriate and cleanest fuels.[4]

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1 These schemes are described in detail in Appendix F.
2 Road transport for the purposes of the DAFGS is limited to transport on a public road. Fuel used in transport on private roads, which is common in mining and forestry activities and to service remote areas, is not eligible under the DAFGS.
3 The DFRS also covers relatively low volumes of diesel used by consumers in certain forms of residential power generation.
4 The Hon John Howard MP, Prime Minister, 'Changes to the Goods and Services Tax', correspondence to Senator Meg Lees, 28 May 1999.

The objectives of the scheme were later refined and are set out in the *Diesel and Alternative Fuels Grants Scheme Act 1999* as:

> The purpose of the Energy Grants (Credits) Scheme will be to provide active encouragement for the move to the use of cleaner fuels by measures additional to those under this Act, while at the same time maintaining entitlements that are equivalent to those under this Act and the Diesel Fuel Rebate Scheme, including for the use of alternative fuels.

The EGCS was initially intended to be introduced by July 2002. In August 2001, the Government deferred the introduction date to 1 July 2003.[5]

Lowering the impact of diesel taxes on business costs was a key component of the Government's tax reform measures announced in *A New Tax System*. The DFRS and the DAFGS have been used primarily to achieve this purpose. However, two changes were made to the Government's original fuel taxation proposal in order to secure passage in the Senate of the wider *A New Tax System* reforms.

Eligibility for excise rebates for off-road diesel use was only extended to the rail and marine transport industries rather than to all businesses as was initially proposed under *A New Tax System*. Denying the diesel rebate to commercial electricity generators was seen by those concerned with the Government's diesel tax reductions as important in promoting the greater uptake of renewable energy.

Other significant diesel using industries that were denied access to the DFRS were the construction and quarrying industries.

The effective diesel tax reductions for road transport were also made less available in urban areas than was initially proposed, reflecting concerns that lower diesel costs may lead to increased urban air pollution. This resulted in the introduction of urban boundaries that deny effective tax reductions on diesel used in most of the 4.5 to 20 tonnes vehicles for trips within urban areas.

In addition, the Government agreed to subsidise the use of alternative fuels in road transport to offset the impact of the effective diesel tax reductions on their competitiveness.

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5 *Fuel Legislation Amendment (Grant and Rebate Schemes) Act 2001*.

5.2 Views from submissions

Industries and businesses currently eligible for the DAFGS and the DFRS were anxious to ensure that their fuel costs are not increased when these schemes are replaced by the EGCS. The schemes are seen as an important determinant of industry competitiveness, particularly in international markets.

The Government has stated many times that entitlements under the DFRS and the DAFGS will be maintained under the EGCS. It is also reflected in the Inquiry terms of reference. However, businesses remained concerned that their entitlements would be removed, either to fund any extension to currently ineligible activities, or from groups advocating higher fuel prices to address environmental objectives. During the course of the Inquiry, the road transport industry mounted a national campaign to 'Save the Diesel Grant'.

These concerns were understandable given that several groups called for the termination of these schemes, commonly referring to them as fuel subsidies. For example, Climate Action Network Australia (CANA) stated:

> CANA believes that this scheme [the DFRS] needs to be phased out over time, starting by removing the provision of this subsidy to highly profitable fossil fuel mining operations.[6]
>
> The energy credit scheme provides an opportunity to phase out these [the DAFGS] subsidies while providing support to industries that have become over dependent on road fuel subsidies.[7]

Industries that used diesel in activities that were not eligible under the DAFGS and the DFRS were anxious to ensure that these activities would be covered by the EGCS. It was generally felt that there was no case for the Government to use the fuel tax system to advantage some business activities over others and that the lines of demarcation were completely arbitrary.

5.2.1 Diesel Fuel Rebate Scheme eligibility

A wide range of off-road activities ineligible under the DFRS were brought to the Inquiry's attention. They include construction, manufacturing, quarrying, dredging,[8] local government road construction and maintenance,[9] extractive

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6 Submission 221, p. 4.
7 Submission 221, p. 5.
8 Submissions 149 (Extractive Industries Association Inc) and 183 (Civil Contractors Federation).

industries, cement,[10] commercial electricity generation for remote communities,[11] compost makers and organic farmers.[12]

Even some current DFRS recipients also highlighted that rebates were not provided for all of their diesel use. For example, while diesel used in a train is an eligible activity, diesel used to load or unload trains is not. Similarly, diesel powered on-farm distillation units used to undertake initial processing of agricultural products is sometimes not considered to be an agricultural activity.[13] Diesel used for transport on private roads, such as mining and tourist roads, is also not generally eligible under either the DFRS or the DAFGS.[14]

Inquiry participants could see no reason why only some off-road diesel uses should be eligible under the DFRS. Often, eligible and ineligible activities used very similar production processes and served very similar markets. It can be difficult in practice to distinguish some eligible mining activities from ineligible quarrying activities. For example, the Cement Industry Federation commented that:

> Some cement companies mine hard limestone to extract calcite (a form of calcium carbonate) and other minerals. None of the companies which mine limestone receive any rebate for diesel used in mining. On the other hand there are cement companies which obtain calcium carbonate from other resources, such as marble or shell sand, and, previously, dead coral deposits. These companies do receive rebate for diesel used in mining operations. Thus a clear inconsistency and inequity has arisen in relation to the entitlement of cement companies for rebate for diesel used in mining operations.[15]

5.2.2 Diesel and Alternative Fuels Grants Scheme eligibility

The major concern about the DAFGS centred on geographic boundaries that limit the eligibility of diesel used in 4.5 to 20 tonne vehicles in urban areas.

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9 Submissions 175 (Western Australian Municipal Association) and 208 (Australian Local Government Association).
10 Submissions 149 (Extractive Industries Association Inc) and 211 (Cement Industry Federation).
11 Submissions 122 (Eyre Highway Operators Association) and 189 (Motor Trade Association of Western Australia Inc).
12 Submissions 124 (Enviro-Mulch) 139 (Compost Australia) and 197 (Australian Mushroom Growers' Association).
13 North Queensland Essential Oils Co-op Ltd, Submission 100.
14 Association of Mining Related Councils Inc, Submission 44.
15 Supplementary Submission 328, p. 1.

The Australian Trucking Association considered that the boundaries should be removed. It argued that operators in urban areas who are denied access to the DAFGS by the boundaries make an important contribution to the freight task and should have the opportunity to receive the grant for '... the same sound economic reasons that the grant was introduced'.[16]

The Department of Transport and Regional Services highlighted perverse effects from the boundaries that actually work against the environmental objectives they were intended to achieve.

> Against these potential environmental benefits are the perverse incentives to purchase larger vehicles to get over the 20 tonne barrier and qualify for the maximum rebate (at a fuel efficiency penalty), and to set up freight operations just outside the metropolitan zone to qualify for the maximum rebate (at an average journey length penalty).[17]

The Truck Industry Council also suggested that the urban boundaries were having an adverse impact on urban air quality.

> Vehicles over 20.0 tonnes GVM, frequently prime movers, spend their first five or so years on long distance routes, either inter-city or interstate. When they are no longer suitable for this task, and having done over 1,000,000 Kms, they are used in the cities for shorter journeys carrying smaller loads. From ABS data we calculated that some 78,000 old prime movers were operating in urban areas. These vehicles, up to 20 years old are:
>
> - heavy pollutants due to old technology and worn engines;
> - noisy — due to, in most cases, after market exhaust systems;
> - lacking in road friendly suspensions; and
> - fitted with old technology braking system.
>
> The DAFGS is an incentive for these older types of vehicles to remain in service in cities longer than would otherwise be the case. From an environmental perspective the DAFGS provides a negative response.[18]

There was also concern about the effective exclusion of most urban bus operators from the DAFGS given that diesel is their preferred fuel and that buses generally weigh less than 20 tonnes. Again, their exclusion from the DAFGS due to the urban boundaries was seen as being perverse in that

16 Submission 254, p. 2.
17 Submission 315, p. 9.
18 Submission 262, p. 1.

increased use of public transport generally improves urban air quality and urban amenity.[19]

These examples seem to the Inquiry to fall squarely into the realm of 'unintended consequences' — an understandable, if unfortunate, outcome given the climate and speed with which the boundary approach was developed and used to gain political support for *A New Tax System* in 1999.

The Department of Transport and Regional Services considered that the removal of urban boundaries from the DAFGS would result in only a minor increase in transport emissions that would be outweighed by existing transport measures.[20] For example, the Government's programme of tighter emissions standards for new diesel vehicles and improved diesel quality is expected to result in urban particulate emissions from road transport in 2015 that are 26 per cent less than in 1997, despite a projected major increase in transport activity and assuming the boundaries are removed.

Transport is a integral element of business activity and businesses have few alternatives to the use of diesel trucks for the delivery of goods within urban areas. Consequently, higher diesel prices would be expected to be simply passed on to consumers. Nevertheless, the Inquiry sought further details from the Bureau of Transport and Regional Economics (BTRE) on this issue. The BTRE agreed that the use of diesel by businesses in 4.5 to 20 tonne vehicles was not significantly affected by diesel prices. It estimated that the increase in emissions from removal of the urban boundaries would be very small, approximately 0.1 per cent of road transport emissions.

Other eligibility concerns related to the definition of road transport. For example, diesel used to power a refrigerated transport container carried on a truck is not eligible under the DAFGS because the container is not considered to be a vehicle. In contrast, a refrigerated trailer — which performs the same function as a refrigerated container — is classed as a vehicle and may qualify for a grant under the DAFGS. This is another anomaly which defies rational explanation and should be terminated.

5.2.3 Administration and compliance costs

Many businesses complained of high compliance costs required to substantiate claims under the DAFGS and the DFRS. The above examples give some indication as to why this is so.

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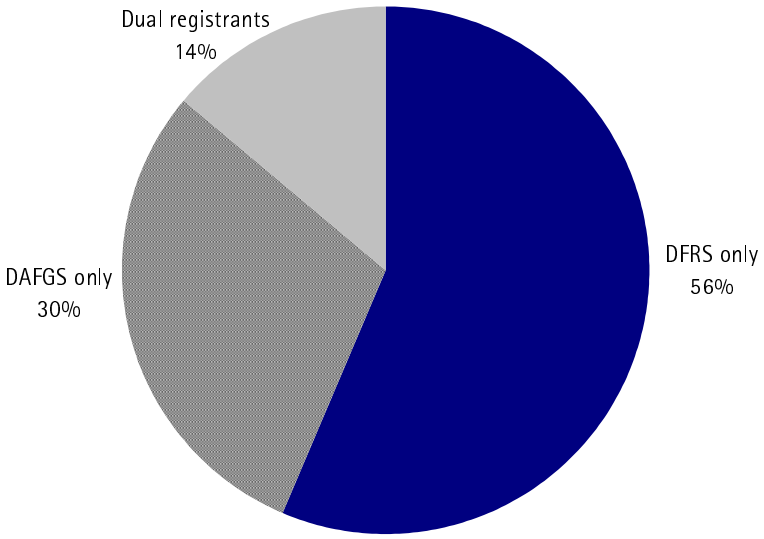
19 Submissions 157 (Passenger Transport Board) and 234 (Bus Industry Confederation Inc).
20 Submission 315.

About half the businesses claiming under either the DAFGS or the DFRS are able to claim all their diesel as being eligible.

Consequently, compliance costs are incurred by businesses to track, categorise and quantify their diesel use. This was considered to pose a major problem for businesses that use diesel in a variety of eligible and ineligible activities, as they are required to install additional compliance systems and in some cases fuel measuring devices.

The task of tracking fuel by end use is particularly difficult for those businesses that are eligible for benefits under both the DFRS and the DAFGS. Approximately 14 per cent of the over 180 000 businesses that have registered for either scheme are seeking to claim under both schemes (Chart 5.1). Over three quarters of these dual claimants are in agriculture. These businesses need to track their diesel use into up to four categories.

Chart 5.1: Number of businesses seeking to claim under the DFRS and the DAFGS, March 2002



Source: Based on Australian Taxation Office (ATO) data.

The difficulties involved can be highlighted by looking at a single refrigerated transport container as it makes its way from a supplier to the eventual customer (Box 5.1). While this may be an extreme example, the Inquiry finds it hard to conceive of a more cumbersome and arbitrary set of administrative rules.

Box 5.1: Claiming diesel fuel rebates on diesel used to power a refrigerated transport container

Diesel used to power the refrigeration unit of a refrigerated transport container is eligible for a rebate under the DFRS only while the container is being transported by rail or ship. Diesel used while the container is awaiting transportation or being transported by road is not eligible.

Estimating the amount of diesel that is eligible under the DFRS can be complex, as eligibility of the diesel used can change as the container makes its way from, say, Brisbane to Hobart. For example:

- diesel used by the refrigeration unit while in the yard after the container is loaded and awaiting pick up, being transported by road to the rail head in Brisbane and in the rail yard awaiting loading onto a train — ineligible;
- diesel used while being transported by rail to Melbourne — eligible;
- diesel used after being unloaded from the train, while being transported by road from rail head and while on the waterfront awaiting loading onto ship — ineligible;
- diesel used while being transported by ship to Hobart — eligible; and
- diesel used after being unloaded from the ship and while being transported by road to final destination — ineligible.

Source: Inquiry discussions with the ATO.

Businesses also raised concerns about compliance costs associated with the DAFGS. Road transport operators may be required to allocate their fuel use into three categories of vehicle: less than 4.5 tonnes, 4.5 to 20 tonnes, and more than 20 tonnes. In addition, the amount of fuel used in 4.5 to 20 tonne vehicles needs to be allocated between trips carrying non-agricultural products solely in defined urban areas and other trips.

The need to estimate the amount of fuel used in these urban trips has added considerably to the complexity of the DAFGS. This can be particularly difficult when the travel of a vehicle contains both urban and non-urban elements. The complexity involved is highlighted by a case study prepared by the ATO to assist the transport industry comply with this aspect of the DAFGS (Box 5.2).

Box 5.2: Complying with the urban boundaries used in the DAFGS using the actual kilometres method

Chris is a truck owner-operator who delivers garden accessories. On Monday, he loads his 15 tonne truck with garden furniture in Moss Vale and makes a delivery to a Bowral garden centre.

He then enters the Sydney metropolitan area and delivers the remaining furniture to another garden centre in Campbelltown. While unloading at Campbelltown, Chris picks up a load of birdbaths which he delivers to Liverpool and Camden. He then returns to Moss Vale.

To substantiate this trip using the actual kilometres method, Chris keeps detailed records of each pick-up and delivery point in his trip. Chris does not claim the grant for his trip between Campbelltown and Camden. This is because he picked up the load of birdbaths in the Sydney metropolitan area and delivered the load to suburbs in the same metropolitan area.

That is, Chris's trip is ineligible from the point he loads his truck in a metropolitan area with goods for delivery in the same metropolitan area to the last point of delivery before he leaves the metropolitan area.

Chris could have alternatively used the deeming method to claim his eligible kilometres …

Source: ATO, *On Road Diesel and Alternative Fuels Grants Scheme, Information for claimants*, p. 27.

The Australian Pre-mixed Concrete Association was also critical of the administrative complexity and unfairness of the DAFGS requirement to quantify the amount of diesel used when a vehicle is stationary, where this exceeds 20 per cent of the diesel used. Concrete vehicles may consume more than 20 per cent of fuel while unloading concrete at the delivery destination and while stopped in traffic in the course of their journey on a public road. The Association stated in their submission:

> The combined effect of not providing a grant for off-road transport and the need to reduce the grant claim for stationary fuel use where that exceeds the 20 per cent threshold delivers an extremely complex compliance regime. In fact the compliance requirements are so complex that more than 21 months after the introduction of the DAFGS neither the APMCA's largest members nor the Australian Taxation Office has been able to devise an accurate method of quantifying the fuel that is claimable under the existing legislation.[21]

21 Submission 279, p. 29.

There is extensive anecdotal evidence suggesting that many diesel users are not claiming their full entitlements, due to the effort needed to provide suitable estimates of the amount of diesel used in each of the categories of the DFRS and the DAFGS. The Civil Contractors Federation stated that:

> During CCF's investigation with a random cross section of members, it became apparent that many businesses are not claiming legitimate rebates for the simple reason that 'it's just too hard!'. One of the major reasons for this response is the difficulty associated with the necessary record keeping to differentiate between the various rebatable / non rebatable uses of fuel.[22]

Another consequence has been frequent litigation in the Administrative Appeals Tribunal by businesses challenging the ATO's interpretation of the law, particularly definitions used to identify eligible mining activities (Table 5.1). As a result, eligibility has been determined — at least at the margin — by judicial interpretation rather than a clear policy intent.

Table 5.1: Diesel Fuel Rebate Scheme litigation, 1998-99 to 2000-01

Issue in dispute	Number of Administrative Appeals Tribunal applications		
	1998-99	1999-2000	2000-01
Mining – businesses seeking to be considered as mining for minerals(a)	15	14	8
Mining – businesses seeking extension to eligible mining activities(b)	12	5	11
Agriculture eligibility	1	-	1
Forestry eligibility	3	1	-
Residential eligibility	1	-	2
Marine transport eligibility(c)	n/a	n/a	1
Administrative issues(d)	7	3	1

(a) For example, the quarrying industry that undertakes mining of limestone for cement production.
(b) For example, disputing what transport activities can be considered as being part of a mining process.
(c) Marine transport only came into the scheme in 2000-01.
(d) For example, disputes relating to claims over three years old and Freedom of Information requests.
Source: ATO.

22 Supplementary Submission 282, p. 1.

The different legislative arrangements used for the DFRS and the DAFGS have led to different business practices, processes and computer systems. This also causes unnecessary complexity and confusion for clients and the ATO alike. As noted by Caltex Australia Ltd:

> Each of these arrangements has its own rules and administrative requirements, which require separate company systems and records and other statutory information to be maintained and complied with. In addition, company systems have to accommodate the requirements of state fuel subsidy schemes.[23]

Each scheme has separate procedures for registration, claim period, entitlement point, calculating entitlements, debt recovery, penalty provisions and record keeping. Some key differences are outlined in Box 5.3.

Box 5.3: Administrative differences between the Diesel Fuel Rebate Scheme and the Diesel and Alternative Fuels Grants Scheme

The point of entitlement

The DFRS point of entitlement is prospective in that the entitlement to claim a rebate accrues from the **purchase** of the fuel for use in an eligible activity. The DAFGS point of entitlement is retrospective in that a claim can only be made for a grant once the fuel has been **used** in an eligible vehicle.

The different point of entitlement '… creates unnecessary complexities, particularly for bulk purchasers of fuel who claim under both schemes. An entity who purchases bulk fuel can claim a rebate at the time of purchase but cannot claim a grant until the fuel is used.'[24]

Registration

Registration for the DFRS is completed as part of a claimant's first claim. This includes providing proof of eligibility and identity. An Australian Business Number (ABN) is not required. The DAFGS registration is required prior to claiming. An ABN and vehicle details are the primary requirements.

Fuels covered

A DAFGS grant is payable for diesel and alternative fuels (such as ethanol, LPG, CNG, recycled diesel and canola oil) while a DFRS rebate is only available for diesel and 'like fuels' (heavy fuel oil, light fuel oil and fuels that attract the same rate of duty as diesel — except for petrol, coal tar and coke oven distillates).

Source: ATO.

23 Submission 229, p. 9.
24 ATO, Submission 331, p. 17.

5.3 Energy Grants (Credits) Scheme

The Inquiry's broad approach to the EGCS has been developed in line with the general principles that form the basis of all its recommendations:

- fuel taxes levied to raise revenue should cover all fuels, rather than just diesel and petrol and all fuels should be taxed on a common and transparent basis (Chapter 4);
- fuel used by business should not be subject to fuel taxes levied to raise revenue (Chapter 4);
- fuel taxes should be levied early in the production and distribution chain with taxation relief for business use provided through a fuel payments system rather than by mechanisms that eliminate or lower fuel tax for some fuel uses up front (Chapter 4); and
- fuel taxes are not an appropriate mechanism to address many of the costs of fuel use, such as the costs of air pollution, road congestion, noise, road infrastructure and accidents (Chapter 2).

In line with these principles, and the Government's announced intentions regarding the EGCS, the Inquiry recommends that a **Business Fuel Credit Scheme** should be introduced with the sole purpose of lowering the effective level of fuel taxes for business.

The scheme should be administered by the ATO and replace all existing schemes used to reduce the effective level of fuel tax for business. It would therefore replace the DFRS and the DAFGS.[25]

It would also replace **excise concessions and remissions** that eliminate or reduce excise payments on petroleum products that are to be used in specific off-road business activities such as in furnaces, boilers or when used as a solvent in manufacturing processes.

Taxing all fuels on a consistent basis early in the fuel production and distribution chain, and providing taxation relief to business through a single fuel payment scheme, is the best way to promote the efficiency of the excise system as a revenue raising instrument. Such a system would also address administrative issues, such as excise evasion through fuel substitution.

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25 The DFRS also covers relatively low volumes of diesel used by consumers in certain forms of residential power generation. This element of the DFRS would be incorporated in a separate Residential Fuel Credit Scheme outlined in Chapter 6.

While the Government has deferred introduction of the EGCS to 1 July 2003, the Inquiry reluctantly concludes that a further 12 month delay will be necessary. This will allow for detailed design issues to be settled and for businesses to be given as much warning as possible about future fuel taxation arrangements to assist in their investment planning.

Businesses that are to be eligible under the Business Fuel Credit Scheme and the levels of credits to be provided are considered in section 5.4.

The proposed scheme would bring the structure of fuel taxation more into line with the principles adopted by the Inquiry. However, some departures from these principles would still remain. In particular, the Inquiry is not recommending a rebate of taxes on petrol or petrol blends, used by businesses either in on-road or off-road applications. To do so would have major revenue implications, both in terms of the large volume of additional fuel use that would be eligible for credits, as well as the potential for lower taxed fuel to find its way into the general consumer market.

The Inquiry considers that the Government's EGCS commitment to provide active encouragement to clean fuels should not be met through fuel excise but through separate measures specifically aimed at improving urban air quality. These measures should have the flexibility to target the most cost effective ways to improve urban air quality.

There are already a range of Commonwealth and State Government programmes that address urban air quality. Commonwealth programmes were summarised for the Inquiry by Environment Australia.[26] A pre-requisite for any new measures should be an assessment of:

- whether existing programmes are sufficient to maintain urban air quality at acceptable levels;
- whether existing programmes could be made more effective, without necessarily increasing their cost; and
- what additional cost effective measures could be undertaken to improve urban air quality.

The Inquiry has not undertaken such an assessment. However, the Inquiry was presented with a range of views on how the environmental objectives of the EGCS commitments could be achieved and these are presented in section 5.5.

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26 Submission 319.

5.4 Business Fuel Credit Scheme

5.4.1 Fuel used off-road

The Inquiry recommends that off-road fuel credits should be extended to all businesses and to all taxed fuels — except petrol or petrol blends.

The fuel credits should be equal to the fuel excise levied on these fuels.

The Inquiry accepts that not providing fuel credits to off-road petrol use by business is inconsistent with its general approach. The Government may wish to reconsider providing fuel credits for off-road petrol use by business in the future if it can be demonstrated that a cost effective system can be developed to ensure that there would be no significant leakage of such credits into on-road activities.

Extending off-road fuel credits to all businesses will reduce biases in the current fuel tax arrangements that disadvantage industries currently ineligible under the DFRS, such as the construction and quarrying industries.

It will also significantly reduce administration and compliance costs for both business and the ATO, particularly by reducing the requirement to track fuel by end use.

5.4.2 Fuel used on-road

The Inquiry recommends that on-road fuel credits should be paid to all businesses using any taxed fuel on-road in vehicles over 4.5 tonnes, except for the use of petrol or petrol blends.

The on-road credit for diesel will be based on the current rate under the DAFGS, with credits for other fuels reflecting relative tax rates to diesel under the energy content taxing regime outlined in Chapter 4.

Extending currently available credits to all vehicles greater than 4.5 tonnes, including those operating in urban areas, will lower transport costs for business and significantly reduce administration and compliance costs.

As previously discussed, the Inquiry does not consider that this change will result in a significant increase in emissions.

As with off-road fuel, the Inquiry accepts that not providing credits to businesses using petrol vehicles over 4.5 tonnes is inconsistent with its general

approach. However, petrol vehicles account for a minimal share of these business vehicles.

The Inquiry also does not recommend providing credits for fuels (whether petrol or other) used in vehicles on-road less than 4.5 tonnes. Petrol vehicles account for a significant share of all vehicle categories below 4.5 tonnes. Given that credits would not be provided for petrol use, the Inquiry considered that extending credits to vehicles below 4.5 tonnes could lead to a significant tax induced shift away from petrol vehicles.

The current partial credit of tax for eligible on-road fuels used by businesses should continue for the present. However, in the longer term, extension of on-road fuel credits should be considered as part of broader examination of road pricing mechanisms (Box 5.4).

Box 5.4: Heavy vehicle road charges

National registration charges for heavy vehicles are currently developed by the National Road Transport Commission (NRTC) for consideration by Commonwealth, State and Territory Transport Ministers. These registration charges are designed to recover road expenditure attributable to heavy vehicles as a group, as well as for particular broad categories of vehicles, on the basis that heavy vehicles also pay a fuel charge — currently calculated at about 20 cents per litre of diesel.

This approach has significant weaknesses as a road supply charge. Some vehicle operators, such as long haul operators, tend to be significantly undercharged. Others, such as operators of vehicles less than 20 tonnes in urban areas that effectively pay about 38 cents of tax per litre of diesel, tend to be significantly overcharged.

Despite these weaknesses, the introduction of the NRTC developed charges for heavy vehicles has resulted in significant improvements in efficiency compared with what existed previously. Heavy vehicle registration charges have improved the extent to which vehicle charges reflect road costs attributable to various vehicle categories and essentially have put an end to the incentive for operators to shop around between States for the lowest possible registration charges.

While adhering to its conclusion that fuel taxes are not an appropriate mechanism to address costs attributable to fuel users, the Inquiry was concerned not to undermine the gains made by Transport Ministers in this area. In the longer term, however, Commonwealth, State and Territory Governments should consider the potential to provide a full rebate of taxes on fuel used by business in road transport together with comprehensive road user charges that more accurately capture the contribution of each vehicle to road costs. Such charges would need to cover a wider range of vehicle types than currently considered by the NRTC. Changes in this area will have significant revenue implications for the Commonwealth as well as State and Territory Governments. These implications would need to be settled before such a scheme took effect.

On-road credits for eligible taxed fuels (other than diesel) should be based solely on the current level of diesel credit adjusted for differences in their energy content compared with that of diesel, with no adjustment for environmental impacts.

All credit rates should be indexed on the same basis as fuel excise is indexed.

After taking fuel credits into account, the current effective level of taxes for operators of diesel vehicles will be at least maintained, and substantially lowered for the many operators of 4.5 to 20 tonnes diesel vehicles in urban areas.

While alternative fuels will also be eligible for on-road fuel credits, these fuels will now also be subject to excise. Consequently, the effective level of fuel taxes for operators of alternatively fuelled vehicles will increase substantially.

Overall, transport costs of operators of heavy vehicles will be significantly reduced as alternatively fuelled vehicles account for only a small share of the market. Indeed, alternative fuels account for less than 1 per cent of the fuel grants currently provided under the DAFGS.

The Government has indicated that it will maintain entitlements to alternative fuels. The Inquiry considers that any Government support to the alternative fuels industry should be provided by more targeted programmes rather than through the fuel taxation system. This is discussed in Chapter 6.

Administration

The Inquiry considers that administration of the Business Fuel Credit Scheme should minimise administrative and compliance costs for businesses and the ATO by:

- minimising differences in claiming on-road and off-road credits; and
- utilising cost effective processing techniques.

Eligibility for each scheme will be simplified by removing the urban boundaries used in the DAFGS and extending the off-road rebate to all off-road use. However, there will still be a requirement for businesses claiming both on-road and off-road credits to track fuel use. For example, fuel used in logging trucks and farm vehicles will still need to be apportioned into both on-road and off-road use.

The design of the scheme, including flexible record keeping and claiming arrangements for dual claimants, should be undertaken by the ATO in consultation with affected businesses or their representatives.

The ATO should foster opportunities to reduce the cash flow implications of providing the benefit by credits, rather than by a lower initial fuel tax rate, such as through electronic claiming and processing. Wider administration issues are addressed in Chapter 7.

5.5 Energy Grants (Credits) Scheme — environment component

5.5.1 Environmental objective of the Energy Grants (Credits) Scheme

The introduction to this chapter outlined the objective of the EGCS to promote the use of clean fuels while maintaining entitlements equivalent to those under the DFRS and the DAFGS.

The aim of the EGCS in promoting clean fuels was to serve a broader objective. Submissions to the Inquiry differed in their views as to this ultimate objective. Some considered it was improved air quality and others reduced greenhouse gas emissions.[27] The Australian Greenhouse Office argued that both objectives could be served through the EGCS.[28]

The Australian Democrats, in a discussion paper on the EGCS, emphasised the objective of addressing greenhouse gas emissions in the design of the scheme. As a principle of the scheme is to maintain existing entitlements of the DFRS and the DAFGS (which are primarily claimed by industries in rural and regional areas), the Democrats concluded that the intention of the scheme must be to address greenhouse gas emissions.

> There is also relatively little air pollution in rural areas, so the environmental benefits being sought apply mostly to GHG [greenhouse gas] savings.[29]

Grants for a number of fuels are available under the DAFGS. Given the objective of the EGCS to promote clean fuels, designing the environmental component of the EGCS should take into account the objectives of the DAFGS. The metropolitan boundaries implemented under the DAFGS are designed to limit vehicle travel in urban areas, which implies an urban air quality objective.

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27 For submissions related to air quality, see Submissions 177 (Mr Ian Farrow) and 230 (Minerals Council of Australia). For submissions relating to greenhouse issues, see Submissions 149 (Extractive Industries Association Inc) and 221 (Climate Action Network Australia).

28 Submission 310.

29 Senator Lyn Allison, Draft Discussion Paper for an Energy Credits Scheme, Australian Democrats, 2001, p. 4.

As noted in Chapter 2, the Inquiry considers that greenhouse objectives should only be canvassed as part of a broader Australian response. The Inquiry's conclusion is that the environmental objective of the EGCS is the improvement of air quality in urban areas.

5.5.2 Air quality management

Existing air quality measures

Pollutant emissions derive from both mobile and stationary sources. A range of air quality measures has already been implemented to deal with them. Commonwealth measures include national fuel quality and vehicle emissions standards, community education programmes, grants for conversion of vehicles to alternative fuels, wood heater emissions standards and a wood heater replacement programme.

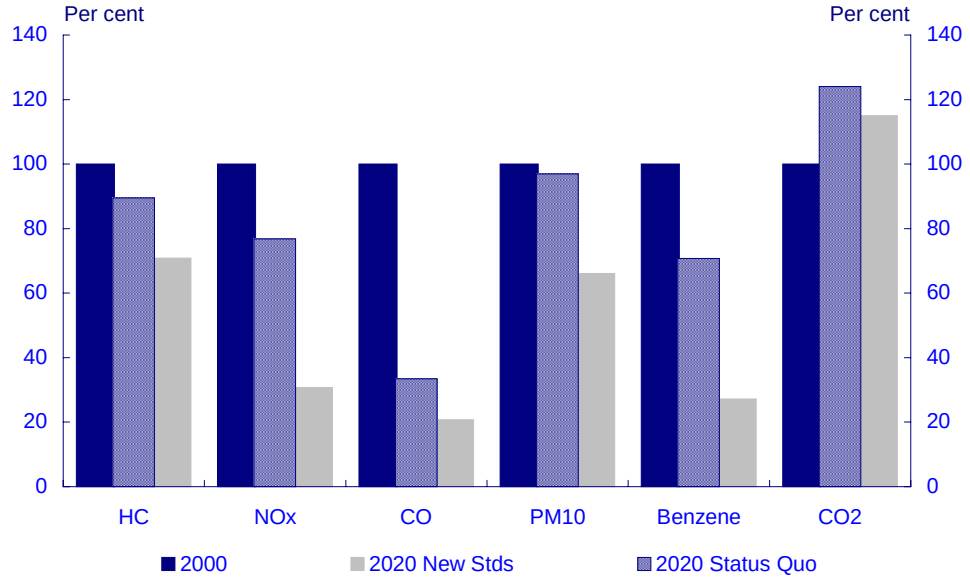
At the State and Territory level, stationary source emissions are managed through emissions licensing schemes and point source standards, cleaner industry programmes and numerous supporting measures such as community education programmes and prescribed burning measures. The States and Territories have also implemented measures for reducing mobile sources of pollution, such as smoky vehicle programmes, purchase of low emissions buses, travel demand management programmes, mechanic and driver information programmes and promotion of public transport.

Effectiveness

While improvements in technology are achieving significant emissions reductions, the Inquiry is unclear whether they will be sufficient to ensure compliance with ambient air quality standards into the future.

A review of fuel quality for Environment Australia analysed the effect of stricter vehicle emissions standards and fuel quality improvements being introduced from 2002. It showed that, compared with the *status quo*, they will lead to significant reductions of air pollutant emissions by 2020, despite increases in vehicle travel (Chart 5.2).

Chart 5.2: Fleet emission changes due to new vehicle and fuel standards (percentage change in tonnes emissions 2000-2020)



Source: Coffey Geosciences Pty Ltd, *Review of Fuel Quality Requirements for Australian Transport* Vol 2, March 2000, prepared for Environment Australia. The analysis assumes the rate of increase in vehicle travel continues unchanged and includes new fuel standards.

Increasing vehicle use can erode the air quality and greenhouse benefits of improved technology. The *per capita* number of vehicles in Australia (647 per thousand population in 1999)[30] and vehicle kilometres travelled are increasing. The assumed growth in vehicle kilometres travelled used in Chart 5.2 is 27 per cent, but a revised estimate of growth in vehicle kilometres between 2000 and 2020 of 33 per cent was provided to the Inquiry.[31]

In addition, the relatively slow rate of turnover of the Australian vehicle fleet (average age of the fleet is 10.6 years) creates a lag in the reduction in emissions levels through the uptake of cleaner vehicles.[32]

30 Australian Bureau of Statistics (ABS), *Motor Vehicle Census, Australia*, Cat. No. 9309.0, Canberra, 2000.

31 BTRE, discussion with Inquiry 19 March 2002.

32 ABS, 2000. This is a national average across classes of motor vehicles as at 31 October 1999. The average age of passenger vehicles was just over 10 years. For some classes of vehicle, however, the average age was considerably higher. Rigid trucks greater than 4.5 tonnes gross

Consumer choice of larger, heavier vehicles with additional features such as air conditioning can offset improvements in engine efficiency. Fuel consumption in most developed countries has shown little improvement in the past 10 years, except in European countries where there have been improvements in the late 1990s.[33] In Australia, national average fuel consumption for light vehicles has remained steady at around nine litres per 100 kms for the last ten years.[34]

Australia has set national ambient air quality standards to be attained by 2008.[35] There have been continuing exceedances of existing smog standards in Australian capital cities and infrequent exceedances of the nitrogen dioxide and particulate standards. Given uncertainty about whether current air quality management policies will be sufficient to ensure compliance with ambient air quality standards into the future, further research is required. The Inquiry will recommend accordingly.

5.5.3 Views of submissions — EGCS fuel measures

Submissions to the Inquiry on the environment component of the EGCS focused on two points. These were that the EGCS should promote the use of clean fuels, including clean petroleum products and petroleum product substitutes, and encourage the adoption of vehicles with improved emissions performance.

There was support from a number of submissions for grants or rebates for fuels with less environmental impact, with respect to both air quality and greenhouse gas emissions.[36]

While emphasising the unsuitability of excise to address air quality, the Department of Transport and Regional Services argued that:

> An effective incentive arrangement for alternative fuels is likely to require an excise rate component. This should be variable to reward performance, and time limited and reviewable to ensure changes in relative performance are reflected in arrangements. Zero rates and full rebates allow little scope for incentives for new technologies with better performance. The Government's proposal to have

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vehicle mass, for example, are on average 15.4 years old. Averages also vary considerably across jurisdictions.

33 International Energy Agency (IEA), *Saving Oil and Reducing CO2 Emissions in Transport — Options and Strategies*, Paris, 2001.

34 Bureau of Transport Economics estimates, Canberra, 2002

35 National Environment Protection Council, *National Environment Protection Measure for Ambient Air Quality*, 1998.

36 Submissions 270 (Premier of New South Wales), 319 (Environment Australia) and 310 (Australian Greenhouse Office).

> a short term excise differential from 2003 for lower sulphur diesel could be provided through this component of an Energy Grants (Credits) Scheme.[37]

The Premier of New South Wales regarded retention of measures to assist compressed natural gas (CNG) and liquefied petroleum gas (LPG) as essential from an environmental perspective, and also suggested that the Inquiry consider '… moving towards a performance-based approach that provides incentives for superior environmental outcomes, rather than picking individual fuels for preferential treatment'.[38]

The Commonwealth Treasury proposed development of a comprehensive index of life-cycle environmental impacts for petroleum and petroleum substitute products that would assist in assessing a fuel's relative performance. It argued that the level of support for fuels on environmental grounds should be determined with reference to this index.[39]

While not commenting on the EGCS specifically, Caltex and BP recommended that the concept of an incentive to accelerate production of cleaner fuels should be adopted as part of government environment policy.[40]

Proposed fuel measures – issues

The review of fuel quality for Environment Australia found that improvements in the emissions performance of future vehicle fleets will be due primarily to advances in vehicle pollution control technology. The major impact of cleaner petrol and diesel fuels will be in enabling these technologies to be implemented.[41]

While some fuels are by nature less polluting than others, the predominant impact of vehicle technology on emissions performance and the diverse nature of the existing vehicle fleet make it difficult to compare the environmental performance of fuels.

The Inquiry identified the following issues in implementing measures to encourage the use of different fuel types:

- comparative environmental performance of fuels utilising different vehicle technologies is difficult to assess

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37 Submission 315, p. 19.
38 Submission 270, p. 9.
39 Submission 326.
40 Submissions 229 (Caltex Australia Ltd) and 231 (BP Australia Ltd).
41 Coffey Geosciences Pty Ltd, *Review of Fuel Quality Requirements for Australian Transport* Vol. 2, March 2000, prepared for Environment Australia.

  - it is easy to compare the environmental performance of fuels in the same vehicle technology (for example, biodiesel and diesel can be compared in the same vehicle);

- relative emissions performance of fuels will change over time according to developments in vehicle emissions control technology and fuel quality;

- the life-cycle emissions performance of some fuels, particularly biofuels, may vary considerably depending on the fuel feedstock; and

- if incentives are based on emissions performance of a fuel in optimum vehicle technology, giving incentives to people using less than optimum technologies may not provide the environmental benefit intended

  - the emissions performance of ultra low sulphur diesel in an old diesel vehicle will not be as good as its performance in the Euro 4 vehicles for which it is intended

  - CSIRO has stated that '… the emissions performance of converted Australian CNG vehicles is known to be significantly worse than OEM [original equipment manufacture] vehicles'[42]

  - concerns about the emissions performance of converted vehicles compared to OEM vehicles should be less of an issue in future because the Department of Transport and Regional Services is developing emissions standards for LPG and CNG conversion kits which will provide a benchmark for converted vehicles.

Given the above issues, the Inquiry questioned the efficacy of an across-the-board 'clean fuel grant' under the EGCS.

However, there are potential benefits to be obtained from using different fuels in the same vehicle technology. For example, diesel vehicles could be fuelled using regular diesel, ultra low sulphur diesel, emulsified diesel, biodiesel or diesel produced from the gas-to-liquids process. Because these fuels can be used in the same engines, the difficulties outlined above in comparing relative performance do not arise.

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42 Anyon, P., Beer, T., Edwards, J., Grant, T., Lapszewicz, J., Morgan, G., Nelson, P., Watson, H., and Williams, D., *Comparison of Transport Fuels: Life-cycle Emissions Analysis of Alternative Fuels for Heavy Vehicles*, CSIRO, Melbourne, 2001, p. xx, available at: http://www.greenhouse.gov.au/transport/pdfs/lifecycle.pdf.

The United Kingdom estimated that a five per cent reduction in particulate emissions would be achieved between 2000 and 2004 from the switch to ultra low sulphur diesel.[43]

Therefore, in order not to lose potential environmental benefits that could be obtained from some fuels, the Inquiry considers that fuel grants be given further consideration. The Inquiry considers that, if fuel grants are deemed to be the most cost effective way of making additional improvements in air quality, implementation should be based on the following design principles:

- assessment of life-cycle fuel performance with tailpipe emissions determined under an independent, verifiable vehicle testing regime; and
- re-assessment of a fuel's eligibility for any incentive when new fuel and vehicle emissions standards are implemented, for example, in 2006.

With respect to the proposal by BP and Caltex of incentives for the earlier than mandated introduction of cleaner fuels, the Inquiry recommends that an assessment be made of the ultra low sulphur diesel subsidy, as proposed in Chapter 8, before committing to such a policy.

5.5.4 Views of submissions — EGCS vehicle measures

Submissions mainly argued that fuel grants should be used to encourage the adoption of vehicles meeting stringent emissions standards.

The Truck Industry Council submitted that '… the EGCS should have a strong environmental bias, and be simple to operate'. It further stated that:

> The objective of the EGCS should be to accelerate the rate of introduction of those vehicles that provide significant environmental, safety and productivity benefits.[44]

TransLog Consulting proposed that fuel rebates available under the EGCS be differentiated on the basis of the emissions performance of vehicles and adherence of vehicle operators to good environmental practice through membership of an environmental management scheme.[45]

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43 HM Customs and Excise, *Using the Tax System to Encourage Cleaner Fuels: The Experience of Ultra-Low Sulphur Diesel*, November 2000.
44 Submission 262, p. 2 and p. 4.
45 Submission 169.

Environment Australia stated that the extension of grants for diesel vehicles in metropolitan areas should be conditional on the level of vehicle technology that is represented in the claimant's fleet.[46] The Australian Greenhouse Office submitted that the EGCS should provide incentives for low emissions vehicles and fuel efficiency.[47]

The Department of Transport and Regional Services submitted that design of the EGCS could incorporate a package of measures, the environmental components of which could include tightening new vehicle emissions standards and evaluation of vehicle retrofit and conversion programmes.

The Department stated:

> The issue of whether the Scheme could be used to provide positive incentives to encourage the uptake of new technology diesel vehicles requires further consideration. There are administrative considerations, as well as competition impacts between larger operators who are better placed to purchase new vehicles, and smaller operators who may find the cost of vehicle purchase prohibitive. The analysis should also take account of vehicles sold into the second hand market, and whether these are likely to be running in urban or rural areas, which is pertinent to air quality outcomes in the cities.[48]

Proposed vehicle measures – issues

The Inquiry notes that implementation of some of the proposed measures is already under way.

A Commonwealth review is planned of the adoption of tighter vehicle emissions standards.[49] Given the success of this measure to date, the Inquiry supports continuation of the Government's commitment to harmonise Australian vehicle and fuel standards with international standards.[50]

The Diesel National Environment Protection Measure provides for retrofit of vehicles as one of the strategies States and Territories may employ to meet the in-service vehicle emissions standards that it has established.

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46 Submission 319.
47 Submission 310.
48 Submission 315, p. 19.
49 The Motor Vehicle Environment Committee will commence a review in early 2002 of a possible timetable for adoption of Euro 4 standards for petrol vehicles and Euro 5 standards for diesel vehicles. Parallel fuel standards will also be considered (Department of Transport and Regional Services, Submission 315).
50 The Hon John Howard MP, Prime Minister, 'Safeguarding the Future — The Prime Minister's Statement on Climate Change', Australia, House of Representatives, 20 November 1997, *Debates*, Vol 217, p. 10921.

Grants for the conversion of vehicles to LPG and CNG are already available under the Alternative Fuels Conversion Programme, discussed in Chapter 9.

The Inquiry notes the following issues with respect to providing incentives for the uptake of cleaner vehicles through fuel grants:

- tying a fuel grant rate to vehicle type is administratively complex[51]
  - it could involve multiple vehicle and fuel combinations (for example, potentially different grant rates for combinations of Euro 0, Euro 1, Euro 2, Euro 3 diesel vehicles and ultra low sulphur diesel, emulsified diesel and biodiesel fuels)
  - reducing the number of vehicle combinations by averaging or paying only one fuel grant rate may result in inequities;
- a policy of encouraging the uptake of better performing vehicles may have an adverse impact on competition in transport markets by advantaging those operators more able to upgrade their fleets
  - however, it may be possible to target those areas of the market where vehicle turnover is lowest, for example, in the rigid truck market; and
- in the light vehicle market, encouragement of vehicles with superior emissions performance could include imported luxury cars built to more stringent overseas emissions standards
  - although if this were regarded as a concern, it could be addressed by, for example, exempting from the incentive any car subject to the luxury car tax.

The issue of administrative complexity could be addressed by de-coupling measures for vehicles from fuel grants. Grants could be available for purchase of a vehicle with emissions performance superior to current emissions standards. The Motor Vehicle Environment Committee is developing a Green Guide for light duty vehicles, which could serve as a means of identifying

51 The ATO stated that payment of different rates of benefit to vehicles meeting different emissions standards would result in administrative complexities for the ATO. It would also involve compliance costs for claimants, particularly those with fleets, who would need to account for fuel used in individual vehicles of different emissions standards (Submission 331).

eligible vehicles.[52] Above-standard emissions performance could also be used to determine levels of grants in the heavy vehicle market.

Many countries have sought to encourage the introduction of low emissions vehicles through incentives. In an analysis of the effect of technology improvements on greenhouse gas emissions, the International Energy Agency (IEA) concluded that neither conventional nor next generation technologies (such as hybrids and fuel cells) are likely to be deployed to their full potential without policy intervention.[53] The IEA concluded that even a modest incentive would send strong signals to both consumers and vehicle producers in favour of the promoted vehicles.[54]

Possible instruments for the delivery of incentives include existing fixed vehicle charges such as stamp duty and registration fees, income tax rebates and grant programmes. For example, the New South Wales Government has recently announced its intention to differentiate vehicle stamp duty charges in favour of low emission vehicles.[55]

Under Germany's annual vehicle tax incentive scheme, commenced in 1997, the proportion of Euro 3 passenger cars in the fleet increased from less than 1 per cent to 70 per cent of new vehicle sales within one year, even though the Euro 3 standard was not mandatory until 2000.[56]

It was not clear to the Inquiry whether a grant programme or differentiation of existing vehicle taxes and charges would provide the most effective instrument for the encouragement of vehicles with superior emissions performance.

5.5.5 Conclusion

With an objective of addressing air quality, the Inquiry considers that the EGCS should incorporate those measures that are able to obtain the most effective and cost beneficial improvements in air quality. Measures to address both mobile and stationary sources should be considered. Determining the most appropriate measures would require an assessment of broad and detailed

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52 The proposal for this guide is available at: http://www.dot.gov.au/land/Environment/Green-Vehicles-Guide.htm. MVEC has proposed that the guide contain separate ratings for vehicles according to both air quality and greenhouse emissions criteria and a combined air quality/greenhouse gas emission rating.

53 IEA, *Saving Oil*, 2001.

54 IEA, *Saving Oil*, 2001.

55 Premier of New South Wales, 'Cleaner Vehicles Package', Press Release, 23 November 2001.

56 European Conference of Ministers of Transport, *Variabilisation and Differentiation Strategies in Road Transport Theoretical and Empirical Analysis Final Report*, Paris, 2000.

approaches to air quality management at both Commonwealth and State levels, which was considered to be outside the Inquiry terms of reference and unachievable within the timeframe of the Inquiry.[57]

The Inquiry therefore recommends that Environment Australia, in consultation with State and Territory governments, undertake such an assessment. It should consider, among possible measures, the types of proposals put to the Inquiry and issues associated with them as outlined above.

5.6 Recommendations

Recommendation 2: Energy Grants (Credits) Scheme design principles

That the Government's Energy Grants (Credits) Scheme commitment should be implemented through:

- the introduction of a Business Fuel Credit Scheme with the sole purpose of lowering the effective level of fuel excise for business; and
- Commonwealth support for programmes aimed specifically at improving urban air quality.

Recommendation 3: Business Fuel Credit Scheme

That the Business Fuel Credit Scheme should:

- commence on 1 July 2004;
- cover both on-road and off-road fuel use and therefore replace the Diesel Fuel Rebate Scheme, the Diesel and Alternative Fuels Grants Scheme as well as the current concession and remission systems within the excise system; and
- be administered by the Australian Taxation Office.

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57 Such a review was conducted by the Australian Academy of Technological Sciences and Engineering, resulting in the report on *Urban Air Pollution in Australia*, 1997. Recommendations from this report adopted by the Commonwealth Government have been implemented under the Air Pollution in Major Cities Programme, funded by the Natural Heritage Trust. The recommendations include the adoption of international standards for fuel quality and vehicle emissions.

Recommendation 4: Off-road fuel credits to be extended to all businesses

That off-road fuel credits should be paid to all businesses using any excised fuels, except petrol or petrol blends.

- The magnitude of these fuel credits to be equal to a full rebate of the fuel excise levied on these fuels.

Recommendation 5: On-road fuel credits to be extended to all heavy vehicles

That on-road fuel credits should be paid to all businesses using any excised fuel on-road in vehicles over 4.5 tonnes.

- Fuel credits should be paid to businesses using any excised fuel, except petrol or petrol blends.

Recommendation 6: On-road fuel credits based on the current diesel grant rate

That the on-road credit for diesel should be based on the current rate under the Diesel and Alternative Fuels Grants Scheme. On-road credits for other eligible excised fuels should be based solely on the current level of diesel credit adjusted for differences in energy content:

- with no adjustment for environmental impacts; and
- all credit rates indexed on the same basis as fuel excise.

Recommendation 7: Cost effective administration procedures

That the administration of the Business Fuel Credit Scheme should seek to minimise compliance costs for businesses and the Australian Taxation Office by:

- minimising differences in claiming on-road and off-road credits; and
- utilising cost effective processing techniques.

Recommendation 8: Air quality assessment

That Environment Australia should undertake a study to determine whether national ambient air quality standards will be achieved in all States and Territories by 2008 using current air quality management policies.

Recommendation 9: Energy Grants (Credits) Scheme — environment component

That the environmental component of the Energy Grants (Credits) Scheme should be developed as follows:

- Environment Australia, in consultation with relevant Commonwealth and State and Territory agencies, conduct studies to determine what additional air quality management measures, if any, will be required and can be cost effectively implemented to ensure attainment of, and ongoing compliance, with national ambient air quality standards

  - the studies should include consideration of those measures suggested to the Inquiry, such as grants which differ by fuel and vehicle type;

- Environment Australia report to Government in early 2003 to provide a funding outline of likely necessary and effective air quality measures. The Government make provision in the 2003-04 Budget for the commencement of an environmental component of the Energy Grants (Credits) Scheme on 1 July 2004; and

- Environment Australia propose to Government by end 2003 final proposals for additional air quality measures deemed under the processes above to be cost effective in improving air quality and to form the environmental component of the Energy Grants (Credits) Scheme to be implemented on 1 July 2004.

Recommendation 10: Mandated fuel standards — early introduction

That by the end of 2005, Environment Australia should assess:

- the success and cost effectiveness of the ultra low sulphur diesel subsidy; and

- the costs and benefits of implementing incentives for the early introduction of fuels complying with fuel standards that may be introduced after 2006.

CHAPTER 6: ASSESSING AND MANAGING THE IMPACTS OF CHANGE

This chapter summarises the Inquiry's consideration of the impact of its recommendations on the Australian economy, with a particular emphasis on changes to fuel excise arrangements on the liquefied petroleum gas (LPG), compressed natural gas (CNG), ethanol and biodiesel industries.

This chapter also contains recommendations on:

- the Fuel Sales Grants Scheme;
- the Petroleum Products Freight Subsidy Scheme; and
- the proposed Residential Fuel Credit Scheme.

6.1 Impact on Australian economy

6.1.1 Results of economic modelling

The Inquiry commissioned quantitative analysis of the impact of its primary recommendations:

- to bring all liquid fuels into the excise system, with rates set according to energy content,
  - with the taxation of LPG only modelled as applying to automotive uses;
- to extend the current Diesel Fuel Rebate Scheme to all off-road use of fuel by business; and
- to remove the Diesel and Alternative Fuels Grants Scheme boundaries.

The Inquiry commissioned Econtech Pty Ltd to undertake economy-wide modelling comparing the Inquiry's recommended excise and rebate structure against a baseline scenario reflecting current arrangements.

The economic model employed is a widely used and respected general equilibrium model of the Australian economy. Importantly for this Inquiry, the model includes detailed treatments of fuel taxation, fuel products and the transport industry.

The tax and rebate changes being modelled represent a small proportion of overall economic activity. Accordingly, the economic impacts, when measured against Gross Domestic Product (GDP) are small. Certain estimates about business and consumer behaviour are built into the model, including price elasticities of fuel demand. These elasticities are generally based on analysis of past behaviour. Actual outcomes will depend on how individuals respond to any tax changes in the future. As always in this type of analysis, the results are accompanied by margins of error which mean that specific model results should be interpreted as indicative rather than precise.

Nonetheless, the modelling exercise has been important in establishing that there are no significant macroeconomic impacts likely to result from the changes recommended by the Inquiry.

Economic impact

A summary of the results of comparing the Inquiry's recommendations against the existing fuel tax system is provided in Table 6.1. On an economy-wide basis, the results show positive — although small — changes for major economic indicators.

Table 6.1: Economic impact of Inquiry recommendations

Macroeconomic indicators	Percentage change
General effects	
Real after-tax wage	0.05
Exchange rate	0.20
Consumer Price Index	-0.20
National accounts	
Private consumption	0.07
Housing investment	0.0
Business investment	0.2
Net exports	0.1
GDP at market prices	0.09
GDP at basic prices	0.05

Source: Econtech Pty Ltd, *Fuel Taxation Inquiry Economic Modelling*, March 2002.

Industry and regional impacts

Overall, the impact on production and employment is fairly neutral. Minor gains (less than half of one per cent) are recorded for service industries,

manufacturing and utilities. The most significant negative impact is on the mining sector (-0.3 per cent production and -0.3 per cent employment) reflecting modelling estimates of a significant decline in LPG consumption. The modelling estimates that cheaper petrol and dearer LPG resulting from the primary recommendations will lead to broadly offsetting changes in petrol and LPG consumption measured in terms of energy value.

- However, as noted in section 6.2.2, the actual response of LPG producers to the imposition of excise and therefore changes in LPG prices is unclear and may not be as significant as implied by simply looking at the addition of excise to the current LPG price.

Overall, there is a nil regional impact. Small losses in production and employment (less than one per cent) are recorded for regions where LPG production and distribution is significant, such as Gippsland in Victoria and parts of South Australia and Western Australia. There are slight gains or a nil impact elsewhere.

Lower taxes for motorists

The Inquiry's fuel taxation recommendations would reduce the taxation burden on petrol for motorists by an estimated 4.8 cents per litre, taking into account the lower excise rate and lower GST on the reduced pump price of petrol. However, LPG may be more expensive. There is likely to be substitution out of LPG into petrol, especially for motorists with dual-fuelled vehicles.

6.2 LPG and CNG

6.2.1 Present situation

The main alternative to petrol and diesel for transport applications at present is LPG. An overview of the size of the LPG market is given in Box 6.1.

CNG has captured a small share of the market — with 2 200 vehicles[1] using less than half of one per cent of automotive fuels.[2] CNG has limited transport applications at present because there is not a widespread distribution network.

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1 Australasian Natural Gas Vehicles Council, Submission 225.

2 CNG accounts for less than 0.3 per cent of the market. ABARE, *Australian Energy: Projections to 2019-20*, Canberra, 2001, p. 28.

Box 6.1: Main features of the LPG industry in Australia

Automotive LPG accounts for eight per cent of the Australian automotive fuels market.

Around 37 per cent of Australian production of LPG is exported, with 11 per cent of requirements imported.

Automotive LPG accounts for 65 per cent of all LPG demand.

There are over half a million LPG vehicles in Australia, most of which are dual-fuelled. A 1999 report by the Bureau of Transport Economics indicated that three per cent of LPG vehicles are taxis, 19 per cent commercial vehicles and 78 per cent operated by private motorists or small businesses.[3]

LPG is also used to fuel machinery such as forklifts.

There are 1 250 000 household and commercial users of LPG.

The LPG industry infrastructure investment is $3.2 billion, including $1.2 billion for automotive LPG supply infrastructure.

There are 2 500 automotive LPG conversion/service and repair businesses and 65 automotive LPG component manufacturers and suppliers in Australia.

Source: Australian Liquefied Petroleum Gas Association Ltd (ALPGA), Submissions 224 and 301.

In 1998, the Government made a commitment to continue the five year rolling excise exemption for LPG.[4]

6.2.2 Future tax treatment

Given that the Inquiry is recommending against continued tax exemptions for petroleum substitutes, there is an obligation to assess the impact that adoption of such recommendations would have on existing fuel suppliers and downstream industries, especially on the LPG industry which has developed under a significantly different tax regime to that proposed.

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3 The Australian Liquefied Petroleum Gas Association Ltd (ALPGA) cites data on the composition of the LPG fleet from: Bureau of Transport Economics, *Analysis of the Impact of the Proposed Taxation Changes on Transport Fuel Use and the Alternative Fuels Market*, 1999.

4 Liberal Party of Australia, *Minerals to Market*, Resources and Energy Policy 1998. Reproduced in Submission 324 (Australian Greenhouse Office).

The Australian Liquefied Petroleum Gas Association Ltd (ALPGA) submitted that the industry was unlikely to be viable in the absence of existing tax concessions, arguing that:

> … the retention of existing pump price relativities is a fundamentally necessary outcome if automotive LP Gas is to continue to play its role as a major alternative fuel.[5]

The ALPGA further submitted that:

> Based on overseas experience and knowledge of the Australian market, the ALPGA believes that removal of incentives has the potential to:
>
> - significantly reduce automotive LPG consumption; …
> - destroy the automotive LP Gas conversion, equipment manufacture and supply industry; …
> - reduce the economic viability of the LP Gas industry's $3.2 billion investment and curtail future investment programmes …[6]

In addition to the current excise exemption for alternative fuels, the LPG industry recommended a range of additional subsidies to support the uptake of LPG, including:

- a ten year commitment to fuel excise exemptions;
- increasing fuel grants rates for LPG and extending these grants to smaller commercial vehicles under 4.5 tonnes;
- income tax concessions, including accelerated depreciation and premium rate income tax deductions for the purchase or conversion of vehicles to LPG; and
- expansion of the existing Alternative Fuels Conversion Programme.[7]

Similar propositions were put by the natural gas sector:

> … the need to maintain a zero excise imposition on natural gas is vital, in addition to maintaining and expanding other funding programmes and

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5 Submission 325, p. 26.

6 Submission 224, p. 9. The Inquiry also received a series of submissions to this effect containing almost identical wording from many businesses associated with LPG distribution, marketing and vehicle conversion. See for example, Parnell LP Gas Systems Pty Ltd, Submission 146.

7 ALPGA (Submission 224) and Wesfarmers Kleenheat Gas Pty Ltd (Submission 215).

> formulating other financial support mechanisms to appropriately support the development of natural gas infrastructure (including CNG, LNG and hydrogen at the appropriate time) and approved vehicle availability.[8]
>
> If the price of LPG or LNG is increased due to the imposition of excise, the payback period for conversion costs will be significantly extended to the extent it may not be financially viable.[9]

While it is clear that any increase in the price of LPG and CNG will make it uneconomic for some current users, it is difficult to forecast the precise impact of the Inquiry's recommendations on the LPG and CNG markets because the response from gas **producers** to the imposition of excise is not clear, nor is the consumer response. It is not certain, for example, that LPG prices will automatically rise by the full amount of any excise levied.

As well as naturally occurring LPG (some of which is exported),[10] LPG is a refinery by-product. Autogas is the most profitable market for refinery LPG and it is the largest market for the butane fraction of LPG. The automotive market for LPG is likely to remain important as natural gas pipelines are extended, supplanting domestic and commercial use of LPG. The future of the LPG market in Australia will depend, in part, on the decisions made by the major oil refiners and whether they pass through the entire amount of any proposed excise on LPG in higher prices.

Similarly, there is evidence that LPG **users** will absorb some price variations.

- In Queensland, the State Government subsidises petrol and diesel — but not LPG or CNG — for on-road use, by just over eight cents per litre, with the result that the pump price relativities of LPG and petrol are less than in most other parts of Australia.[11] Even with this reduced differential, the Inquiry received evidence from the Australian Taxi Industry Association that LPG was still an attractive proposition for taxis in Brisbane.[12]

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8 Australasian Natural Gas Vehicles Council, Submission 327, pp. 7-8.
9 Wesfarmers Kleenheat Gas Pty Ltd, Submission 215, p. 5.
10 LPG is expensive to ship as it requires special facilities and pressurised tankers. The main exporters include the North West Shelf venture partners, Exxon BHP, Wesfarmers and Santos.
11 State fuel subsidies are discussed in Chapter 7 of this report.
12 Australian Taxi Industry Association, Consultation in Canberra on 16 January 2002.

- The Inquiry received submissions indicating that LPG prices around Australia are volatile and vary by location.[13]

The Inquiry therefore considers there is some tolerance in the use of LPG to fluctuations in price.

The Inquiry could not draw firm conclusions on likely trends in the use of automotive LPG in the absence of changes to the tax system. There is some evidence of an industry already in decline, but other evidence consistent with strong consumer acceptance of LPG as a transport fuel.

- LPG vehicle conversions **declined** in Victoria and South Australia between 1994 and 1999 at a time when petrol prices were at their lowest real level for a sustained period since the late 1970s.

- However, conversions in Western Australia have **increased** since the introduction, in October 2000, of a $500 subsidy for private motorists towards the additional cost of purchasing a new LPG vehicle or converting to LPG.

- Overall, the attractiveness of LPG **declined** following the introduction of the GST on both LPG fuel and LPG conversions in July 2000.[14]

Dedicated LPG vehicles[15] now account for nearly 10 per cent of sales of passenger motor vehicles and 17 per cent of light commercial vehicles by one Australian motor vehicle manufacturer.[16]

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13 For example, LPG prices have been reported to almost double within a 24 hour period (Mr Michael Goodman, Submission 13), and motorists who converted their vehicles when LPG was 20 cents per litre two years ago now face much higher prices (Mr Max White, Submission 116). LPG prices also vary by location from just over 40 cents per litre in some centres to more than 60 cents per litre elsewhere, see for example Submission 28 (Mr G. Whelan).

14 Submissions 224 (ALPGA) and Department of the Treasury (Submission 326).

15 Dedicated LPG vehicles are engineered to run exclusively on LPG and would require conversion in order to use other fuels.

16 In 2001, Ford Australia sold 5 167 dedicated LPG sedans and wagons in total sales of 53 618 (9.6 per cent) and 2 902 dedicated LPG commercials (utes) in total sales of 16 955 (17 per cent). Sales of factory fitted dual-fuel passenger vehicles were 1 759 or 3.3 per cent of sales. Source: Ford Motor Company of Australia.

6.3 Biofuels — ethanol and biodiesel

6.3.1 Present situation

An overview of the size and structure of the biofuels sector in Australia is in Box 6.2. Biofuels (fuel ethanol and biodiesel) do not presently have a significant market share in their own right; ethanol is blended with petrol and biodiesel is used by the producers in their own applications or blended with diesel. Some biodiesel producers proposed to the Inquiry that biodiesel should be mandated as a lubricant in ultra low sulphur diesel, as has happened overseas in some countries, to guarantee them a share of the market.[17]

6.3.2 Future position

Manildra Group, the main producer of ethanol for automotive fuels, made the following comment in relation to the medium term outlook for ethanol:

> From an emerging industry perspective, fuel taxation exemption for biofuels represents the difference between failure and growth, and the opportunity to establish a platform for future economic self sufficiency. … Withdrawal of excise exemption for ethanol during the critical next ten year growth cycle would cause the collapse of biofuels production in Australia and cause the complete demise of independent Australian operators in the transport fuels sector.[18]

CSR Sugar, on behalf of its Distilleries Group, submitted that:

> Ethanol is currently excise exempt. In the absence of this exemption ethanol could not be supplied into the fuel industry at a competitive price.[19]

In the course of the Inquiry, the Government announced that it would provide a capital subsidy for new or expanded domestic production infrastructure of 16 cents per litre of biofuel, until total domestic production capacity reaches 350 million litres or by end 2006-07, whichever is sooner. The policy also maintains excise exemptions for ethanol and biodiesel.[20]

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17 Submissions 137 (Biodiesel North Queensland Pty Ltd), 174 (Collex Pty Ltd) and 176 (South Australian Farmers Fuel).

18 Manildra Group, Submission 247, p. 6.

19 CSR Sugar, Submission 167, p. 2.

20 National Party of Australia, *Biofuels for Cleaner Transport*, Coalition Policy Statement, 2001. Available at: http://www.nationalparty.org/policies/2001-10-31-biofuel.htm#twf.

Box 6.2: Main features of the biofuels industry in Australia

Ethanol

Australia uses at least 40 million litres of ethanol per year as an automotive fuel, most of which is sold on the east coast blended with petrol.

Pure ethanol is currently being trialed in dedicated ethanol buses in Victoria with financial support from the Commonwealth.[21]

Diesohol, a diesel/ethanol emulsion, was to be marketed commercially from the end of 2001.[22]

Existing ethanol producers include Manildra Park at Bomaderry in NSW — using wheat starch waste as a feedstock — and CSR Distilleries at Sarina in Queensland — using molasses. Both producers have plans to expand fuel ethanol production substantially.

The Commonwealth, through the Greenhouse Gas Abatement Programme, is funding an ethanol project at the Mossman Central Sugar Mill in Queensland and is also providing funding for BP to market an ethanol/petrol blend from its Bulwer Island refinery near Brisbane.[23]

Biodiesel

There has been limited marketing of biodiesel in Australia. Australian Petroleum Supplies has sold biodiesel in country Victoria and NSW.

There are a number of pilot plants in operation, including Collex Pty Ltd in NSW (using waste cooking oil), and many proposals for future production facilities.

Producers currently proposing to bring biodiesel production online in 2002 include Australian Renewable Fuels Pty Ltd in Perth (using tallow) and South Australian Farmers Fuel in Millicent, South Australia (canola).

Sources: Submissions 93 (Biodiesel Association of Australia Inc), 94 (Australian Edible Oils (Deniliquin)), 133 (Western Australian Renewable Fuels Association), 137 (Biodiesel North Queensland Pty Ltd), 150 & 251 (Ozdiesel), 167 (CSR Sugar), 172 (Australian Renewable Fuels Pty Ltd), 174 (Collex Pty Ltd), 176 (South Australian Farmers Fuel), 192 (Australian Biofuels Association), 243 (Stanwell Corporation Ltd), 247 (Manildra Group).

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21 Australian Greenhouse Office (AGO), Alternative Fuels Conversion Programme available at: http://www.greenhouse.gov.au/media/media_releases/2000/ethanol.html.

22 South Australian Farmers Fuel submitted that it would be the first company to commercialise diesohol which was to be marketed before the end of 2001 (Submission 176).

23 AGO, Greenhouse Gas Abatement Programme, Round One projects available at: http://www.greenhouse.gov.au/ggap/successfulprojects/index.html. BP has called for expressions of interest in supplying ethanol to Bulwer Island, available at: http://www.bp.com.au/news_information/press_releases/pr_ethanol.asp.

Submissions to the Inquiry indicated that biofuel production could easily exceed the Government's 350 million litre target if the taxation treatment of these fuels were to remain concessional.[24]

The risk will be that, if and when support is withdrawn, the intrinsic economics of biofuel production and distribution may not be such that the industry can survive without further and ever-increasing government subsidies.

It is relevant that biofuel feedstocks are likely to be more costly than crude oil into the foreseeable future. For example, CSR Sugar stated that:

> … ethanol is not competitive with petroleum-based fuels in the absence of continuing excise exemption or a similar form of taxation relief. This is primarily because of the high cost of feedstocks (in CSR Distilleries' case the feedstock is molasses) and the higher costs associated with lower scale production than is the case for the petroleum industry.[25]

Similarly, biodiesel proposals based on the use of crops such as canola for feedstock recognised that fuel production costs would be threatened by higher commodity prices for these crops at various times.[26]

If Government subsidies in the form of excise exemptions continue, the revenue forgone is likely to be increasingly significant if production expands. It has been estimated that, if ethanol were to capture 10 per cent of the market for petrol by 2010, the loss to revenue would be about $688 million per annum for ethanol alone.[27]

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24 CSR Sugar and Manildra Group, fuel ethanol producers, submitted that they planned to expand production significantly (Submissions 167 and 247 respectively). The outlook for biodiesel production is uncertain: several actual or potential producers made submissions to the Inquiry with the most ambitious estimate of production being 1 000 million litres per year by 2010 (Ozdiesel, Submission 150). The Inquiry is aware that there are plans for biodiesel production facilities other than those specifically brought to its attention in submissions.

25 Submission 167, p. 1.

26 For example, the Ozdiesel proposal (Submission 150) was predicated on the Government subsidising oilseed production for biodiesel feedstocks.

27 ABARE, *Viability of sugar cane based fuel ethanol*, Canberra, 2001.

6.3.3 Other petrol and diesel substitutes

A range of other potential petrol and diesel substitutes is under development. These include fuel made from waste plastics[28] and algae,[29] methanol made from natural gas,[30] and GTL exploiting stranded natural gas deposits.[31]

6.4 Fuels policy

The history of fuel tax exemptions, concessions and subsidies shows that the Commonwealth Government has long been concerned about security of fuel supplies. The tax treatment of LPG and biofuels is based, at least in part, on promoting substitute fuel sources to oil-based fuels.

The Inquiry is conscious that the Government has made commitments to continue excise exemptions for petroleum substitute fuels. The Inquiry also recognises the level of investment already made by consumers and businesses in these industry sectors.

Government encouragement of petroleum substitutes has, however, been largely *ad hoc*, with little apparent analysis of the relative costs and benefits of tax concessions.

Caltex Australia Ltd was critical of this approach, submitting:

> At present, alternative fuels [LPG, CNG, ethanol] are generally exempt from excise and may also attract a substantial subsidy through the Diesel and Alternative Fuels Grants Scheme (DAFGS). … **There seems no particular logic to this treatment of alternative fuels taxation**, apart from a general desire to stimulate alternative fuels production or consumption. There is no reason why the excise concession on alternative fuels should be 100 per cent of the excise on conventional fuels — it is an arbitrary amount, not based on any projected environmental or industry outcomes. …

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28 Ozmotech Pty Ltd, Submission 140. Ozmotech suggested its green fuel production could yield over 3000 tonnes per year of green fuel made from waste plastic.

29 SQC Pty Ltd, Submission 317.

30 Coogee Energy Pty Ltd, Submission 163, indicated it is currently producing 60 000 to 70 000 tonnes of methanol per year at Laverton in Victoria and is proposing to produce methanol from waste gas produced with offshore oil in the Timor Sea.

31 Sasol Chevron, Submission 198, proposed GTL production of 45 000 barrels per day (bpd) by 2006 with two planned expansions of 90 000 bpd to follow. Initial capacity would equal the diesel production of one Australian oil refinery.

> Excise exemptions are 'blank cheques' which may lead to substantial misallocation of resources.[32] [emphasis added]

In the course of the Inquiry, it became apparent that there are numerous options for domestic production of new automotive fuels in Australia. Some of these would be fuel extenders or enhancers and some have the potential to capture a large share of the automotive fuels market in their own right. For example, GTL projects could conceivably double Australian supplies of automotive diesel fuel in the foreseeable future.

These fuels should stand or fall on their merits under the neutral policy framework established by the Inquiry. Some fuels may have strategic significance. If there are broader strategic issues which justify government intervention, this should be assessed in a consistent policy environment, not on an *ad hoc* basis as has occurred previously.

Recommendation 11: Fuels policy

If direct government subsidies are considered justified for alternative fuel production in Australia, this should occur under a comprehensive policy framework that applies equally to all fuels.

6.5 Other rebate, subsidy and grant schemes

This section outlines the Inquiry's consideration of other rebate, subsidy and grant arrangements.

The Inquiry examined two fuel-related programmes available to regional, rural and remote Australia:

- the **Fuel Sales Grants Scheme**; and
- the **Petroleum Products Freight Subsidy Scheme**.

The Inquiry is proposing a new **Residential Fuel Credit Scheme** to offset the tax paid on diesel, heating oil and LPG for domestic heating, cooking and electricity generation.

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32 Submission 229, pp. 5-6.

6.6 Fuel Sales Grants Scheme

The Fuels Sales Grants Scheme (FSGS) provides registered retailers with grants of one cent per litre in non-metropolitan zones and two cents per litre in so-called remote zones; there is an additional grant of one cent per litre where the fuel price is consistently over $1.21. The scheme was introduced on 1 July 2000 as part of *A New Tax System*.

6.6.1 Problems identified

The Inquiry received considerable criticism of the scheme and comparatively little support of it. It appears that the best that can be said of the scheme is that it has had little noticeable impact.

For example, the National Farmers' Federation submitted:

> It is arguable whether this scheme has had the intended outcome and, further, unless this grant is indexed, as the price of fuel increases, the extent to which it offsets the GST is diminished. The NFF believes that the funding for the Fuel Sales Grants Scheme could be better channelled into providing more tangible returns of taxes to business.[33]

The Inquiry's attention was also drawn to a number of boundary anomalies in the application of the scheme, including instances where service stations on the fringes of capital cities were eligible for the grant, giving them an advantage over competitors in close proximity.

For example, the West Australian Small Business and Enterprise Association Inc. referred to the recent report of a State Parliamentary Committee that had pointed to problems with the geographic boundaries for eligibility.[34] The West Australian Government confirmed problems with FSGS boundaries and was concerned that they conflicted with the administration of the State's petroleum pricing laws.[35]

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33 Submission 257, p. 9.
34 Submission 119.
35 Submission 203.

The Premier of South Australia also identified geographic anomalies in his submission to the Inquiry.[36]

The Premier of Queensland supported the scheme but was not satisfied that it compensated for the impact of the GST in rural and remote communities when crude oil prices — and thus prices of refined product — were high. It also questioned the appropriateness of the use of the Accessibility/Remoteness Index of Australia that had been designed for service provision purposes, since it did not necessarily direct fuel grants to the areas experiencing the highest fuel prices.[37]

Another problem with the FSGS involves the eligibility of bulk end users such as mining companies located in non-metropolitan and remote areas. These bulk end users receive the FSGS grant even though they also receive input tax credits on their fuel purchases. As Treasury submitted:

> The grant is also paid to business (or bulk end users) for purchases of petrol and diesel even though the purchase price of petrol and diesel they face wasn't affected by the GST due to the availability of GST input tax credits for businesses.[38]

6.6.2 Assessment and recommendation

The Inquiry is concerned at the difficulty in identifying the benefits of the scheme to consumers in rural and remote regions.

The Inquiry notes continuing debate about whether the scheme results in lower prices to final consumers, but is also aware that the ACCC has found no evidence to substantiate claims that the grants have not been passed on to consumers. The ACCC announced the results of its investigations into the FSGS on 1 June 2001, including the following statements:

> The ACCC received several inquiries from Caltex franchisees alleging that Caltex had altered its price support system following the introduction of the FSG in such a way that they were unable to pass on the FSG without cutting their own margin. … The ACCC conducted an extensive investigation into these allegations. As a result of this investigation the ACCC did not establish a failure to pass on the FSG to customers. …

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36 Submission 264. Small townships on the Eyre Peninsula are only eligible for the one cent per litre regional grant whereas Port Lincoln, a large fuel distribution centre for these areas, is classified as remote and receives two cents per litre.

37 Submission 297.

38 Submission 326, p. 13.

> The ACCC also investigated alleged breaches by Shell, Mobil and BP in relation to their response to the introduction of the FSG. While the material supplied by some of the oil majors, and in particular by Shell, may have been open to an interpretation that the oil companies may have cut margins to their franchisees, and in effect appropriated the FSG, on the evidence available this could not be established.[39]

In any case, it is not clear that any benefits accruing to regional Australians are proportional to the level of public expenditure, estimated to be $210 million in 2001-02, nor that this programme is the best use of the funding.

Some interested parties were of the view that it would be preferable for the Commonwealth to address, directly, the causes of city-country price differentials. One option suggested to the Inquiry was the introduction of mandatory Terminal Gate Pricing that would ensure that the ex-refinery price was the same for all service stations and bulk purchasers.[40] The Inquiry was aware that Terminal Gate Pricing was an issue that had received attention in the ACCC inquiry into Fuel Price Variability.[41]

The Inquiry concludes that there are anomalies arising from the geographic boundaries determining eligibility for the lower and higher grant rates, and that these anomalies are likely to have an adverse effect on resource allocation and competition.

The Inquiry faced a difficult choice between:

- recommending amendments to the design of the FSGS to address identified problems such as boundary anomalies and bulk end users; or
- recommending the dismantling of the scheme, and spending the funds saved in other ways.

Recommendation 12: Fuel Sales Grants Scheme

The Fuel Sales Grants Scheme should be discontinued from 1 July 2004.

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39 ACCC, 'ACCC Finalises Fuel Investigation', 1 June 2001, available at http://www.accc.gov.au/media/mediar.htm.

40 Service Station Association Ltd, Submission 227.

41 The ACCC inquiry was conducted parallel to the Fuel Tax Inquiry, available at: http://www.accc.gov.au/fs-petrol.htm.

6.7 Petroleum Products Freight Subsidy Scheme

The Petroleum Products Freight Subsidy Scheme was introduced in 1965 with the purpose of reducing the prices of petroleum products in **regional** areas. The scheme was abolished in 1974, reintroduced in 1978 and amended in 1983 to target assistance at **remote** communities.

The scheme reimburses fuel freight costs above a 'Customer Pays Margin', presently 15.3 cents per litre. The margin increased over time from 0.44 cents per litre in 1981-82, increasingly limiting the application of the subsidy to more remote areas.

Subsidies are paid to fuel distributors who are required to sign undertakings that they will pass on the savings to their customers.

Subsidies are delivered through State schemes, with programme funding provided to the States by the Commonwealth. The scheme presently costs the Commonwealth around $3.5 million per annum, a fraction of its expenditure of $148 million in 1981-82.[42]

The majority of eligible locations are in Queensland, Western Australia and the Northern Territory; many are remote indigenous communities. There are no eligible communities in Victoria, Tasmania or the Australian Capital Territory and only one each in New South Wales (Lord Howe Island) and South Australia (Amata).

The value of the subsidy varies by location. Generally speaking, island communities receive substantial subsidies whereas remote coastal or inland subsidies may be worth just a few cents per litre or even less than one cent per litre. For example:

- the highest levels of subsidy are paid to Lord Howe Island (26.5 cents per litre for petrol and 29.7 cents per litre for avgas) and Badu Island in Queensland (up to 19.7 cents per litre for petrol and up to 37.6 cents per litre for avgas sent by seatainer);

- the lowest level of subsidy is paid to Arapunya in the Northern Territory which receives 0.1 cents per litre on avtur only, while Port Hedland in Western Australia receives 0.2 cents per litre on aviation fuels only; and

42 1981-82 figures taken from the report of the Industries Assistance Commission, *Certain Petroleum Products — Taxation Measures,* 5 November 1986, p. 177.

- Cape York, the northern extremity of the continent, is eligible for 4.7 cents per litre on petrol and diesel and 5.2 cents per litre on aviation fuels.

The Northern Territory and Queensland Governments supported continuation of the scheme.[43]

6.7.1 Identified problems

Low level of awareness

The Inquiry received no comments about the scheme in its consultations around Australia.

Since the subsidy is paid to oil distribution companies, it is not apparent that the ultimate beneficiaries — remote communities — are necessarily aware of its existence. This may not hold true for some remote island communities where the subsidy has a high value.

Economic impact

The design of the scheme is an inherent disincentive for the adoption of more efficient and less expensive modes of fuel transport to remote communities. Once freight rates exceed the Customer Pays Margin, the Commonwealth meets all freight costs.

The freight subsidy does not offset other high costs involved in supplying fuel to remote communities, such as reseller margins. However, even if the subsidies are not well targeted, it is hard to deny that they make remote fuel distribution cheaper than it would otherwise be.

Administration

In 1999, responsibility for administering the scheme was transferred from Customs to AusIndustry. This coincided with the transfer of responsibility for diesel rebates to the ATO. It is unclear to the Inquiry why the programme is not being administered by the ATO along with other fuel programmes.

- The programme is not primarily an industry assistance scheme, though fuel-using industries in remote areas may benefit incidentally from the subsidy.

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43 Submissions 293 and 297.

- AusIndustry does not have an auditing/enforcement capacity for a remote communities programme, whereas there may be economies of scale in administering the programme with other fuel programmes in the ATO.

Calculating subsidies

Until 1999, the petroleum products industry was regulated by the Prices Surveillance Authority and its successor, the ACCC. It was easy to obtain reliable data for calculating subsidies in this environment. Oil companies provided information to the ACCC on the freight costs of transporting eligible petroleum products from refining ports and seaboard terminals to various points of sale including remote locations.

Now that the ACCC's formal regulatory oversight has ceased, there is no longer a mechanism for establishing the freight differentials on which subsidy rates are based, and the scheme is currently operating using outdated information.

6.7.2 Assessment and recommendation

The Inquiry is concerned that there has not been a recent assessment of the effectiveness of the Petroleum Products Freight Subsidy Scheme.

In any case, the current justification for providing assistance of this type is questionable. Remote communities face a range of higher living costs, and the Inquiry cannot see why just one cost — fuel freight — should be the subject of a specific subsidy scheme. If Governments — State or Commonwealth — want to reduce the general costs of living, there are much better and more transparent ways of doing so.

Subsidising residents of, or visitors to, places like Lord Howe Island is even less justifiable. The data on which subsidies are determined are now of questionable accuracy. The total cost of the subsidy is small and its administrative costs are disproportionately high.

Recommendation 13: Petroleum Products Freight Subsidy Scheme

The Petroleum Products Freight Subsidy Scheme should be discontinued from 1 July 2004.

6.8 Residential Fuel Credit Scheme

Substitutes for diesel and heating fuel in domestic applications — notably electricity and natural gas, are not excised. Most consumers using diesel, heating fuel or LPG in domestic applications would be living in remote communities without access to natural gas pipelines or the electricity grid. The tax system should not discriminate among domestic energy sources.

Recommendation 14: Residential Fuel Credit Scheme

A full credit of fuel excise should be provided for residential use of diesel, heating oil and LPG used for residential heating, cooking and domestic electricity generation from 1 July 2004.

CHAPTER 7: ADMINISTRATION ISSUES

This chapter examines specific issues arising from the administration of the fuel taxation system in Australia, including administrative design issues. Administrative issues arising from interpreting and applying legislation based on unclear and complex policy principles have been discussed in Chapters 4 and 5.

The main issues raised with the Inquiry in submissions concerned the administrative and compliance costs arising from:

- having separate fuel taxation systems for domestic and imported products;
- the lack of alignment of fuel taxation administration with other taxation administration, such as the GST; and
- differences between Commonwealth and State administrations of the various rebate, subsidy and grant schemes.

The implications of petroleum products excise reform for the administration of other excisable commodities (tobacco and alcohol) was also raised.

7.1 Dual fuel tax administration

Two separate agencies are currently responsible for collecting fuel taxes.

The taxation of locally produced fuels (excise duty) is administered by the Australian Taxation Office (ATO). Responsibility for excise collection was transferred to the ATO from the Australian Customs Service (Customs) in October 1998.

Customs continues to administer the collection of fuel taxes (customs duty) on fuel imported in its final form. In 2000-01, about eight per cent of fuel tax on refined petroleum products was collected from imported products.[1] However,

1 Australian Customs Service (Customs) and Australian Taxation Office (ATO) data.

in practice the vast majority of imported fuel (95 per cent)[2] avoids customs duty by transferral into the excise system for further blending or manufacture.[3]

The main concerns raised with the Inquiry with a dual fuel tax system were:

- higher administration and compliance costs for both industry and administrators;[4] and
- the practicalities of centralising all fuel tax administration within a single agency, preferably the ATO.

7.1.1 Costs of dual administration

The Australian Institute of Petroleum commented on the administration and compliance costs associated with a dual tax system on behalf of its members:

> … Customs treats fuels on the basis of their composition while the ATO treats fuels based on the intended use for the fuel. In addition, Customs does not appear to give fuel substitution issues the same priority as the ATO.
>
> … The industry believes that excisable goods should be controlled by the one agency regardless of whether they are manufactured in Australia or imported into Australia. We believe that the ATO is the appropriate agency to undertake this role.[5]

The conceptual distinction between excise and customs duty is clear, but at a practical level is complicated by two administering agencies that have different corporate priorities, compliance strategies and different legislative bases.

All excisable fuels are defined in the *Excise Tariff Act 1921* (the Excise Tariff) with excise rates mirrored in the *Customs Tariff Act 1995* (the Customs Tariff) for imports of the same fuels.

Split legislative and administrative systems have impacted on the success of compliance strategies. For example, one of the recent compliance strategies implemented by the ATO has been to restrict the production of concessionally

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2 Australian Customs Service, Submission 291.
3 Under excise legislation, blending is constituted as part of the manufacturing process. Product imported for blending with domestic product therefore attracts an excise duty rather than a customs duty.
4 See for example, Submissions 231 (BP Australia Ltd), 229 (Caltex Australia Ltd), 214 (Mobil Oil Australia Pty Ltd) and 154 (Shell Australia).
5 Submission 213, pp. 6-7.

excised products to deter excise evasion via illegal blending of these products with petrol or diesel.

This strategy appears to have deterred fuel substitution within the excise system. However, an unintended consequence has been an increase in the **importation** of concessional products (as Customs is legally unable to restrict the amount of product that may be imported — including product entered at concessional or duty free rates).

7.1.2 Challenges in simplifying administration

The primary concern of Customs with any change to the current system is maintaining the integrity of the Australian border through effective and efficient controls that exist for revenue and community protection reasons. It told the Inquiry:

> Changes to the regime for dealing with imported goods may have unforeseen impacts on Customs capacity to deliver upon its community protection obligations and would run contrary to the spirit of the recent International Trade Modernisation Act 2001 which is designed to improve efficiency at the border for the international trading community, while strengthening controls for Customs and other border agencies.[6]

Customs also raised legal and constitutional barriers to moving the administration of duty collection on imported excise equivalent goods to the ATO. The Inquiry considers that these barriers could be overcome, noting that a similar system is already in place under the GST and the Wine Equalisation Tax systems.[7]

7.1.3 Inquiry assessment

The Inquiry considers that having one agency administer the fuel taxation system is sensible, especially as the practices of the two agencies are likely to diverge further in the future. Administration of all fuel taxes via the one system would reduce compliance costs and improve consistency, both within the fuel tax system and the tax system more generally.

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6 Submission 291, p. 2.

7 Customs collects these taxes on relevant imported goods (as part of the importation process) on behalf of the ATO who has overall carriage of legislative and administrative policy for them. Customs officers administer ATO legislation with delegations as ATO officers on behalf of the Commissioner of Taxation.

The ATO, under its excise modernisation project, is in the process of modernising and building a new system for excise collection which will further align excise administration and business processes with other ATO administration.[8] Meanwhile, Customs is moving to a new system of duty collection under its Cargo Management Re-engineering project.[9] This project includes an Accredited Client Programme for low-risk importers and exporters that could effectively separate the process of revenue collection from the border protection function. The Inquiry considers the separation will facilitate transferring the administration of fuel tax collection on imported products from Customs to the ATO.

7.2 Alignment of excise with other ATO administration

Concerns were raised with the Inquiry that inconsistencies remained between the administration of the excise system and other tax administration, for example:

- non-alignment of excise reporting with monthly reporting of tax obligations for the GST; and
- non-alignment of excise collection and payment schemes with general ATO administrative practices, such as the ATO rulings system.[10]

7.2.1 Consistent tax reporting timeframes

A number of submissions called for the alignment of fuel tax reporting and administrative arrangements with other tax arrangements, such as the GST.[11]

Unlike other taxes, fuel taxes are generally collected under a weekly collection system. All the petroleum manufacturers in Australia pay fuel excise under the weekly settlement scheme, whereby excise is paid each Monday.

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8 Submission 331.

9 Customs Fact Sheet, 'Cargo Management Re-engineering: at a Glance', February 2001, available at: http://www.customs.gov.au/.

10 Homestake Gold of Australia, Consultation in Perth on 19 November 2001.

11 See for example, Submissions 231 (BP Australia Ltd), 229 (Caltex Australia Ltd) and 214 (Mobil Oil Australia Pty Ltd).

Customs and excise duties are actually due when excisable goods and their imported equivalents are 'entered for home consumption'.[12] This normally means when they are removed from the licensed premises of the petroleum manufacturer or from the point of importation and are available for sale — this is generally known as the 'point of liability' for excise and customs duty. However, permission is generally granted to approved manufacturers to deliver goods into home consumption for a period of seven days without having to lodge a declaration of duty to Customs or pay the duty liable.[13]

This scheme thus allows the owners of the goods to receive up to a week's 'credit' by deferring the duty payment. A further administrative advantage is that a week's fuel deliveries can be summarised on a single document.

However, many businesses are now calling for monthly rather than weekly deferment in order to reduce administrative costs by streamlining with other tax reporting timeframes. For example, Caltex Australia Ltd stated that:

> A weekly cycle for excise payments creates an unnecessary administrative and compliance burden for the ATO and industry.[14]

BP Australia Ltd recommended changing the period of settlement of excise to a monthly basis to offset the cashflow implications of its broader proposal to move the point of liability for excise back to the refinery gate or point of import. Such a move would see the abolition of the underbond system that it considers to be costly to administer.[15]

7.2.2 The underbond movement system

Until excise is paid, goods remain under the control of the ATO — or in the case of imported goods, with Customs. Goods on which excise or customs duties have not been paid must be stored in licensed premises or in approved

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12 Excise is collected on the temperature-corrected value of the fuel using the international standard of 15 degrees Centigrade. The Inquiry is aware of concern that, when fuel is sold further down the distribution chain, there is presently no requirement for temperature correction, with the result that oil companies could be collecting more notional excise revenue than is remitted to the Commonwealth, at the expense of service stations. The Inquiry understands that the Ministerial Council for Consumer Affairs is examining options to address temperature compensation, available at: http://www.consumer.gov.au/html/ris.htm.

13 Excise duty is still currently paid to Customs using Customs documentation and accounting systems. Customs then transfers the duty to the ATO. The ATO is developing its own excise accounting and collection system that is due to be implemented in mid to late 2002.

14 Submission 229, p. 10.

15 Submission 231.

places. Permission must be obtained for any movement of goods in or out of such premises.

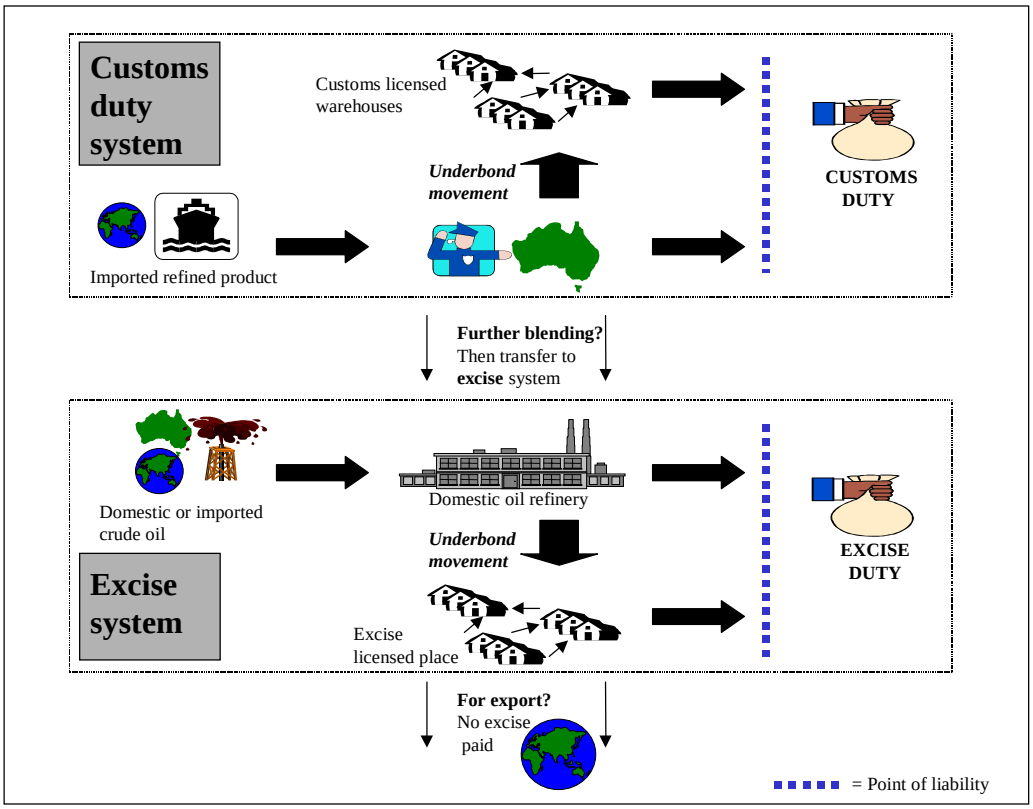
Bond systems have been historical features of the administration of import duties and excise taxes. To allow for faster clearance of imported goods and to assist local manufacturers of excisable products, both systems were designed to allow excisable goods and imports to be moved into licensed warehouses and the payment of duty deferred. These warehouses are known as 'bond warehouses' and hence the movement of goods to these places is known as 'underbond' movement.

The bond system therefore facilitates storage of goods by deferment of duty until the goods are delivered into the market. In the case of fuel products, however, the underbond system is utilised more to facilitate **distribution** of fuel products, rather than for storage.[16]

The underbond system is therefore closely linked to the point of liability of fuel taxation and with the payment period for these taxes. Chart 7.1 depicts the taxing points for excise and customs duty under the current system.

16 Industries Assistance Commission (IAC), *The Customs and Excise Bond Systems*, Report No. 408, Australian Government Publishing Service, Canberra, 19 November 1987.

Chart 7.1: Taxing points for excise and customs duty



Source: Fuel Taxation Inquiry.

The attachment of tax liability to physical movement requires careful tracking to ensure that the correct amount of tax is paid. This often means tracking goods after they have left the manufacturer's premises or the point of importation. Tracking is now underpinned by risk management techniques rather than the physical presence of Customs or ATO staff being required at all bonded sites.

The Industries Assistance Commission (IAC) undertook a review of the bond systems in 1987. In its report, the IAC analysed the effects of the bond systems and alternatives with a view to minimising losses of economic efficiency. It judged that the community would benefit from retention of licensed warehouses (or 'approved storage places') and a related underbond removal

system, and preferred to retain the main features of the arrangements in place at that time.[17]

7.2.3 Inquiry assessment

The Inquiry acknowledges that the underbond system may add complexity and costs to the administration of the fuel taxation system, along with risk to government revenue through the deferral of duty payment. The Inquiry sees merit in the related proposals to align the reporting timeframes of fuel taxation with other taxation arrangements to promote consistency and simplification of the tax system.

However, the Inquiry recognises that these issues are interwoven and that changes to the current system may be complex. The Inquiry therefore considers that further examination of the current system and its alternatives is required before any change is recommended. The Inquiry has not undertaken this analysis.

The Inquiry recognises that the ATO's current excise modernisation plans may encompass the investigation of changes to the point of liability, underbond system and settlement period provisions. The Inquiry concludes that the objectives of the ATO's modernisation project are consistent with the principles of designing a fuel tax system that is simple and flexible.

The Inquiry supports the ATO's approach to modernisation of fuel taxation legislation, processes and systems (including electronic processing) in consultation with industry. Aspects of this approach are likely to need to be reviewed in light of the Inquiry's broader recommendations.

7.2.4 ATO rulings system

Currently no excise or payment scheme legislation contains arrangements for provision of legally binding advice of the type that is provided for in most other ATO legislation. **Administratively** binding advice can be given for matters involving the extent of the liability of a taxpayer under excise law.[18] Yet there is no such arrangement in place for the fuel-related grant and rebate schemes. Interpretative Decision Summaries are available to provide guidance

17 IAC, 1987, p. 3.

18 This does not have the same assurance for the taxpayer as legally binding advice. However, it does provide assurance to taxpayers who wish to know where they stand before, for example, committing themselves to a long-term contract arrangement.

to taxpayers, including claimants for the fuel related grants and rebates schemes.

Further alignment of excise business processes with other tax administrative practice is supported by the Inquiry, including business processes such as rulings.

7.3 Commonwealth versus State administration

7.3.1 State fuel subsidies

All States and Territories, except the Australian Capital Territory, provide payments for on-road use of diesel and, in most cases, petrol.[19] The general objective of these schemes when introduced was to ensure that fuel users were not disadvantaged from the 1997 replacement of State business franchise fees to uniform Commonwealth fuel taxes. State subsidies are significant in Queensland (nearly 8.4 cents per litre), but relatively trivial elsewhere. These subsidies are generally claimed from State Revenue Offices by fuel distributors, retailers or bulk end users after sales have occurred.

The Western Australian Government also offers a grant of $500 for the conversion of motor vehicles from petrol to LPG.

A number of inconsistencies between Commonwealth and State rebate, subsidy and grant schemes and resulting administrative costs have been raised in submissions to the Inquiry.

In Victoria, petrol and diesel subsidies are less than one cent per litre, prompting the Royal Automobile Club of Victoria Ltd to observe that the subsidy had no noticeable impact on fuel prices and that the money would be better spent on road funding.[20]

While recipients of the Queensland Fuel Subsidy Scheme welcomed lower fuel prices, there was concern that administrative arrangements frustrated scheme objectives. In particular, there were complaints about the record keeping requirements to substantiate the subsidy and the auditing of claims.[21] The Inquiry was told that some bulk end users would fill up vehicles and drums of

19 Details of State schemes are set out in the Inquiry Issues Paper, p. 32.
20 Submission 237.
21 Submissions 166 (Brisbane City Council) and 196 (AgForce Queensland Industrial Union of Employers).

fuel at service stations, where the subsidy is included in the pump price, rather than claim the subsidy back for bulk deliveries to their properties.[22]

Some submissions called for the abolition of all State fuel subsidies. The Local Government Association of Queensland Inc considered that the Queensland Fuel Subsidy Scheme performed poorly in respect of equity and economic efficiency criteria and conflicted with the objectives of the DAFGS scheme by providing subsidies over and above the level of grant considered appropriate by the Commonwealth.[23]

The States themselves recognise that they are not primarily responsible for fuel taxation policy.[24] The then South Australian Premier submitted to the Inquiry that:

> … the explicit link between the excise surcharge and state government revenue flows was abandoned from 1 July 2000, and when the transitional funding arrangements cease there will no longer be any explicit revenue linkage to the pre-1997 petroleum fee arrangements.
>
> There are ongoing state subsidy arrangements for fuel, but these merely reflect a continuation of the arrangements that were designed not to disturb petrol prices at the time that the Commonwealth replaced differential franchise fees with a national uniform increase in petrol excise.[25]

7.3.2 Inquiry assessment

The Inquiry recognises the sovereign rights of State governments to adopt policies that promote economic growth and development in their respective jurisdictions, sometimes at each other's expense. Certainly, energy costs are of critical concern to businesses and consumers alike and influence decisions about where Australians wish to live and where businesses wish to locate.

Nonetheless, the Inquiry considers the State subsidies to be a cumbersome and costly mechanism for providing State incentives, especially given their small size in most cases. They are a legacy of the 1997 High Court decision that should be resolved.

In saying this, the Inquiry recognises that the Queensland Government attempted to substitute reduced motor vehicle registration costs for its subsidy

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22 AgForce Queensland Industrial Union of Employers, Consultation in Brisbane on 25 October 2001.
23 Submission 162.
24 Treasurer of Victoria, Submission 79.
25 Premier of South Australia, Submission 264, p. 1.

scheme, but was met by hostile public reaction. The Inquiry would encourage the Queensland Government to make a fresh attempt and would also encourage industry groups or other associations that agree to be active in their support of such a decision.

The Inquiry considers more formal communication channels between the administrators of the various State and Federal schemes is desirable to ensure simplification and consistency of processes and compliance regimes.

The Inquiry points to the United States and Canada where uniformity projects have been established to improve the consistency of administration and effectiveness of compliance regimes across Federal, State and international fuel tax systems.

7.4 Impact on other excisable products

The Inquiry has made recommendations for changes to the administration of the excise system for petroleum products. Given that the current legislation also applies to alcohol and tobacco products, the Inquiry has been asked by certain (non fuel) industry groups and the ATO to consider the consistency of the excise system across other excisable products and the impact of changes to fuel excise on the administration of these products.[26]

For example, the Inquiry has recommended that there be one administrative organisation for administering fuel tax collection and that the Government transfer duty collection on imported goods from Customs to the ATO. Given that the issue of dual administration is larger for other excisable commodities, where imports are much greater, the Inquiry agrees that the implications of its recommendations for the administration of other excisable products should also be considered by Government.

7.5 Integrated tax design

A number of organisations are involved in the overall administration of the fuel taxation system, including designing changes (summarised in Box 7.1). The number of agencies involved in the policy, legislative and administrative functions impedes effective design.

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26 Submission 236 (Distilled Spirits Industry Council of Australia Inc) and Submission 331 (ATO).

Box 7.1: Administrators of the Australian fuel taxation system

Australian Taxation Office

Day-to-day administration of excise collection and the DAFGS, DFRS, the Fuel Sales Grants Scheme and the Product Stewardship (Oil) Scheme.

Responsibility for making legislative changes for these systems.

Treasury

Responsibility for developing policy for excise collection and for the DAFGS, DFRS and Fuel Sales Grants Scheme.

Customs/Attorney-General's Office

Policy, legislative and administrative responsibility for customs duty collection.

Environment Australia

Policy carriage of the Product Stewardship (Oil) Scheme.

Policy and administration of *Measures for a Better Environment* fuel related programs (along with the Australian Greenhouse Office and the Department of Transport and Regional Services).

Department of Industry, Tourism and Resources (AusIndustry)

Policy coordination, legislation and administration of the Petroleum Products Freight Subsidy Scheme (in conjunction with State government agencies).

States

Various agencies at the State level are responsible for:

- policy development, legislation and day to day administration of the State rebate schemes; and
- assisting AusIndustry in the payment of Petroleum Products Freight Subsidies.

In its submission to the Inquiry, the ATO commented that:

> The difficulties of structuring a robust taxation regime in the absence of explicit policy principles was an issue considered comprehensively by the Review of Business Taxation in 1999. The Review recommended that agreed taxation objectives be the starting point for the design of taxation policy, legislation and administration.[27]

The ATO has since initiated a joint project with Treasury, the Office of Parliamentary Counsel and relevant users of the system to establish an integrated tax design process. The ATO has also recently developed a 'Listening to the Community' Initiative, a programme of community consultation and administrative co-design, with the aim of making the tax system easier, cheaper and more personalised.[28]

The Inquiry supports the application of integrated tax design and user co-design principles to fuel taxation, especially the principle that objectives should be clearly stated and incorporated into relevant legislation and administrative design.

7.6 Recommendation

Recommendation 15: Single fuel tax administration

There should be a single administrating organisation for fuel tax collection:

- the administration of customs duty collection on all imported fuel products should be transferred to the ATO; and
- there should be full consultation with Customs to ensure Customs' objective of border integrity is maintained.

27 Submission 331, p. 10.

28 Michael Carmody, Commissioner of Taxation, 'Listening to the Community: Easier, Cheaper, More Personalised', Address to the American Chamber of Commerce, 14 March 2002.

Part 3

CHAPTER 8: ULTRA LOW SULPHUR DIESEL

8.1 Sulphur in fuels

Sulphur is present to a greater or lesser degree in all crude oils. Much of it is removed during refining to produce commercial fuels. This chapter uses the term **ultra low sulphur diesel** (ULSD) to indicate diesel with less than 50 parts per million (ppm) sulphur. The term **regular** diesel is used to describe diesel with over 50 ppm sulphur.

Fuel sulphur affects the performance and durability of many exhaust treatment and on-board diagnostic systems in both petrol and diesel vehicles. Reducing sulphur cuts emissions of particulate matter, nitrogen oxides, hydrocarbons and carbon monoxide from all vehicles, though the major gains come from enabling the use of emission reduction technologies required in new vehicles. Emissions of ultra fine particles and especially benzene, which are the focus of health concerns, are particularly sensitive to fuel sulphur content.

This chapter outlines the Inquiry's consideration of the appropriate mechanism through which the Government's proposed excise differential — explained shortly — can be implemented. The Inquiry has taken into account the submissions made as well as consultations held with the domestic oil refiners and the import sector. The experience of other countries with the introduction of ULSD has also been used to assess the likely effect of the excise differential.

The Inquiry is approaching the implementation of the one and two cents per litre ULSD measure as a one-off initiative for a government decision already made. The Inquiry has not assessed the merits of the initiative in terms of the cost of a regulatory measure to achieve an environmental outcome.

8.2 The Government's commitment

Currently, sulphur standards for diesel are regulated in Queensland, South Australia and Western Australia. From 1 January 2003, these standards will be replaced by a national standard for sulphur content in diesel that is to be set at 500 ppm (up to now, it has been approximately 1300 ppm).

The Commonwealth Government's *Measures for a Better Environment* (MBE) statement, announced in May 1999, included a commitment to reduce further the sulphur content in diesel fuel through the early introduction of ULSD prior

to it being mandated on 1 January 2006. The Government announced an excise differential between ultra low sulphur and regular diesel to provide an incentive for consumers to switch demand and speed the introduction of new refinery capital investment over the period 2000 to 2005. The excise differential consisted of an additional excise on regular diesel of one cent per litre from 1 January 2003, rising to two cents per litre for 2004 and 2005. The revenue that would result from the implementation of this measure has already been factored into the Commonwealth Government's Budget forward estimates, and is therefore the starting point for the Inquiry's analysis.

There are higher costs associated with the production of ULSD compared with regular diesel. The Government's excise differential was therefore designed to make ULSD price competitive with regular diesel. However, the excise differential over the period leading to the mandating of ULSD in 2006 would result in two types of diesel on the market over the transition period.

The introduction of ULSD is designed to improve air quality in urban areas. It may also provide benefits in some more specific locations such as in underground mining operations.

8.3 Overseas experience

A number of overseas governments have introduced, or plan to introduce, tax measures to promote low sulphur fuels. The subsidies already introduced have been successful in accelerating the market penetration of low sulphur fuels.[1]

Sweden has led the way in offering incentives for sulphur free city diesel (10 ppm) since 1991. The Government introduced a tax incentive (around seven Australian cents per litre) applied through a differentiation of fuel category according to environmental characteristics, as part of a strategy to reduce urban air pollution and acid rain. The incentive was designed to cover the additional costs of producing sulphur free diesel.

Other Nordic countries employ smaller subsidies (around four Australian cents per litre) to promote the use of 50 ppm diesel. Finland introduced incentives in 1993 and Denmark followed in 1999. ULSD now accounts for 100 per cent of the diesel market in both countries.

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1 A more comprehensive listing of the incentive programmes in place or announced, can be found in European Conference of Ministers of Transport, Council of Ministers, *Sulphur-Free Fuels* (CEMT/CM/(2001)11/FINAL), 21 June 2001.

The United Kingdom introduced tax measures for 50 ppm sulphur diesel of around three Australian cents per litre in 1997. This was increased to around six Australian cents per litre in 1998 and around eight Australian cents per litre in 1999. The Government implemented the excise differential to accelerate the market conversion and in recognition of the environmental benefits and production costs associated with ULSD. The Government was also concerned that oil companies should make uniform progress towards ULSD production to avoid any market distortions and that diesel users in all parts of the country should be given the opportunity to use the cleaner fuel.

Prior to the final increase in the excise differential, most oil refiners were only supplying ULSD in bulk to their urban fleet operators. Very few service stations carried ULSD. However, the final excise increase saw the diesel market convert fully from regular diesel to ULSD. In the final analysis, two years after its introduction into the market, ULSD had achieved almost 100 per cent of the United Kingdom diesel market. Production of ULSD in the United Kingdom was to have become mandatory in 2005.

Outside Europe, Hong Kong introduced a large tax subsidy (around 22 Australian cents per litre) to promote ULSD. In the United States, the Environmental Protection Agency ruled in December 2000 that a diesel sulphur limit of 15 ppm would be introduced from 1 July 2006, replacing the current limit of 500 ppm. Twenty per cent of production will initially be exempt from the limit but 100 per cent compliance will be phased in by 2010. The Environmental Protection Agency expects that from mid-2006, more than 90 per cent of all diesel will meet the new limit. The main objective of the regulation is reducing particulate emissions.

8.4 Pricing, cost structures and marketing arrangements

8.4.1 Refinery investment

Australia consumed around 13 billion litres of diesel in 2000-01. Around one billion litres was imported and exported.

At the time of the MBE statement in 1999, the Government forecast that the earliest date at which any significant domestic production of ULSD would occur was in 2000, at which time the BP refinery in Brisbane would commence production following decisions taken earlier. In 1999, the estimate of the time taken for the design and construction of a desulphurisation plant was around

four years from the date of decision. This made it unlikely that significant domestic capacity to produce 50 ppm diesel could be available before 2003.

In submissions to the Inquiry and subsequent consultations, the oil refiners revealed their latest estimate of the lead time necessary to put in place the appropriate capital equipment has been reduced from four years to around 18 months from the time of announcement. The Inquiry understands that some minor adjustment to production can result in some ULSD being produced in advance of the major capital expenditure programme.

Based on this information, the Inquiry considers it is likely that there will be minimal refinery production of ULSD up to 2003. Production of ULSD will become noticeable during 2004, although the exact degree of market penetration is unclear. To ensure that ULSD is within specification from 1 January 2006, it is likely that oil refiners and importers will need to commence the process of 'flushing out' regular diesel from their storage facilities and tankers by the second quarter of 2005.[2] Therefore, production of ULSD is expected to increase significantly in the first half of 2005.

BP is investing in infrastructure at its refineries in the expectation of the Government's excise differential being implemented.[3] Shell has publicly announced plans to invest $30 million in its Clyde refinery in Sydney, expanding its sulphur removal plant to satisfy the new ULSD requirements.[4] At the time of this Report, Shell is yet to commence this investment. Mobil and Caltex are currently giving consideration to a forward investment programme for their refinery assets, based on the Commonwealth Government's policy framework for the introduction of cleaner fuels.[5]

The Inquiry recognises that the costs facing each refiner to upgrade its desulphurisation equipment will differ. The role that the excise differential plays in a refiner's investment decision should not be overemphasised. It will be one factor amongst several to be taken into account.

To be effective in switching consumer demand, the tax differential has to cover the extra cost of production of the ULSD less any price premium the supplier can obtain from the market. Brisbane City Council's submission to the Inquiry highlighted the arrangement BP made with Brisbane Transport for the supply of ULSD on a trial basis.[6] BP offered Brisbane Transport one million litres of

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2 Small amounts of regular diesel remaining in storage facilities after 1 January 2006 may contaminate ULSD by raising sulphur content levels above the 50 ppm standard.
3 Submission 231.
4 Shell media release, 11 July 2001.
5 Submissions 214 (Mobil) and 229 (Caltex).
6 Submission 166.

ULSD at the same price of regular diesel (representing a discount of three cents per litre on the production cost of ULSD).

Caltex argued that the excise differential would not be reflected in consumer prices but would flow at least partially to diesel producers and importers, offsetting the higher cost of ULSD. In other words, it would act as a supply side measure, not a demand side measure. This reflects consumers' general unwillingness to pay any more for ULSD compared with regular diesel because there is no perceived consumer benefit, despite reduced emissions being produced. While all vehicles would produce fewer emissions, consumers will not pay for this. The exceptions would be certain niche markets, such as some urban bus companies operated by State or local governments, or mining and construction operations.

Overall, the likely outcome of the excise differential for the marketing of ULSD is that it and regular diesel will largely sell at the same price. There is likely to be no incentive to market ULSD actively during the transition phase, unless it attracts a lower excise rate sufficient to cover the incremental cost of production compared with regular diesel.

8.4.2 Import sector

Presently, imports by independents (such as Liberty, Gull and Matilda) account for a relatively small share of Australian demand for regular diesel. Because of their small volume throughput, the independents are unlikely to be able to support two grades of diesel. Two types of diesel would require independents to have an additional storage tank and associated handling facilities. The independents' operations depend on purchase of a standard specification fuel and minimising shipping and handling costs by having single loading and unloading facilities.

8.4.3 Fuel seals

Other technical considerations may have an impact on the early marketing of ULSD. Recent fuel pump seal failures in Queensland and other locations have been associated with the introduction of low sulphur diesel (see Box 8.1). The process of hydro-treating to reduce sulphur levels also saturates some of the aromatics in the diesel that can cause some types of rubber seals in diesel fuel pumps to shrink and then leak. It is likely that the impact on seals will be a smaller problem by 2006 as seals have been gradually moving across to more resistant materials since 1993.

Box 8.1: Fuel seals

The most common type of high pressure rotary pump found in small diesel engines, the Bosch VE and Japanese equivalents, depends upon rubber seals and gaskets to retain the fuel within the pump body. They are made of a material which has a degree of elasticity and is resistant to the fuel. Modern fuel pump seals and gaskets are generally made of a fluoro elastomer such as 'Viton' but fuel pumps on equipment more than five to seven years old may contain seals and gaskets made of buta-n rubber and other materials. Aromatics react with buta-n rubber seal materials causing them to swell and change shape ensuring that they form a tight seal. This is a normal process and occurs all the time without affecting performance.

Fuel pump seals age and harden with use and need to be replaced as part of normal maintenance. However, as they age, they do not respond as quickly to changes in aromatic levels. The result is that when the aromatics content is reduced, the rubber loses elasticity and will not seal effectively and the pumps will start to leak. The reduction in aromatics content varies depending upon the type of process selected by the refiner to reduce sulphur content and the problems will be worse with some diesels than others.

Source: Department of Industry, Tourism and Resources.

The Inquiry is aware that the change in aromatics resulting from the refining process will only affect some diesel from some refineries — there will not be a universal effect. Importantly, the Inquiry has been informed that where this is an issue, oil refiners have identified the problem and are addressing possible solutions.

8.4.4 Distribution infrastructure

During the transition period up to 2006, ULSD will need to have separate tankage to regular diesel unless the diesel is blended. However, the extra tankage capacity needed to store ULSD may not be readily available because terminals and depots have reduced in number over the past decade and those remaining are at, or near, full utilisation.

Even if a terminal does have two diesel tanks, it is not necessarily a viable solution for refiners to provide one for ULSD and the other for regular diesel as this can reduce the flexibility of the supply. That is, with a 50 per cent reduction in stock capacity for each type of diesel due to the new storage arrangements, the risk of stock shortages occurring for either product increases.

Furthermore, the diesel capacity in most urban and rural service stations allows for only one set of tanks and pumps. In most cases, it would not be economically feasible to offer two diesel products at the one service station.

8.4.5 Blending

In its submission to the Inquiry, Caltex raised the issue of blending ULSD with regular diesel, once the ULSD has been measured for excise. Caltex argued that a mixture of ULSD and regular diesel in terminals, depots and service station tanks would still reduce overall emissions. Further, from an excise administration viewpoint, there should be no problem in mixing ULSD and regular diesel once it has been measured for excise.

The issue in relation to blending is where the appropriate point of liability for excise is calculated. Where this blending is undertaken is crucial in determining whether suppliers will actually be able to take advantage of the excise differential.

There are basically three possible scenarios where ULSD may be blended with regular diesel. The implications for the excise of such a product are illustrated.

- If both products are refined at the one refinery, then blending may occur within the refinery — which is before the point where excise is calculated. This means that when the blended product is delivered 'for home consumption', the sulphur content would be greater than 50 ppm and therefore would attract the higher rate of excise.

- Blending may also occur after the product has left the refinery, for example in a terminal owned by the oil refiner. Terminals are licensed as bonded warehouses which means excise is not payable until the product leaves the terminal. So again, any blending within the terminal would result in the whole product attracting the higher excise rate when it leaves the terminal.

- The other situation is that ULSD may leave the terminal as ULSD, but be blended with regular diesel at the distribution point (by distributors) or at the delivery point (bulk storage or service station). In this case the ULSD would leave the terminal (the taxing point) as product less than 50 ppm and be taxed at the lower ULSD rate. This is the only scenario where blended product would still receive the excise differential.

8.5 Options

The Inquiry has identified three options for implementing an incentive for the earlier production of ULSD.

8.5.1 Option 1 — the Government commitment

The first option is the implementation of the Government's MBE commitment, involving an additional excise on regular diesel of one cent per litre from 1 January 2003, rising to two cents per litre for 2004 and 2005. The excise on ULSD will remain at the current diesel excise rate. The DFRS will reflect the different excise rates for the two types of diesel consistent with the Government's desire that private users and urban transport be provided with an incentive to use ULSD. The DAFGS rate will be unchanged from its current value.

In the examples that follow in Table 8.1, some simplifying assumptions are made for illustrative purposes:

- the excise, DFRS and DAFGS rates assume no indexation and all figures are rounded to the nearest cent or 0.5 cent per litre;
- the refinery price is based on indicative information from Australian oil refiners that the additional cost of ULSD production is around two cents per litre
  - the 'refinery price' in this context is a general term that includes the actual refinery price (cost of production and capital cost) plus transport costs, margins and GST; and
- the increase in refinery price for the cost of production of ULSD is based on the two cents per litre excise differential contained in the MBE.

Table 8.1: MBE commitment

	Current	Regular 2003	Regular 2004	ULSD 2003	ULSD 2004
Excise	38.0	39.0	40.0	38.0	38.0
'Refinery price'	52.0	52.0	52.0	54.0	54.0
Pump price	90.0	91.0	92.0	92.0	92.0
DFRS	38.0	39.0	40.0	38.0	38.0
DAFGS	18.5	18.5	18.5	18.5	18.5
Net price paid by DFRS recipients	52.0	52.0	52.0	54.0	54.0
Net price by DAFGS recipients	71.5	72.5	73.5	73.5	73.5

Impact

The higher cost of producing ULSD shows up in the above table in the higher 'refinery price' (indicative cost of two cents per litre), which will then flow through to higher retail prices assuming the higher costs are fully passed on to consumers.

The additional excise on regular diesel is likely to flow through to consumers in the form of a higher retail price. When faced with the choice between the two types of diesel, it is unlikely that consumers will pay more for ULSD than regular diesel.

Recipients of the DFRS will not face an increase in the net price paid for regular diesel. However, Table 8.1 shows that the net price of ULSD for DFRS recipients will be higher than the net price for regular diesel. This will create the perverse incentive for DFRS recipients to purchase regular diesel in preference to ULSD during the transition period.

Other diesel consumers will face an increase in the pump price because of the increase in excise. There is also a possibility that consumers will be paying a higher tax on regular diesel with no guarantee that they will have ready access to ULSD.

The increase in excise on regular diesel will be a gain for the Government in the form of higher excise revenue. The source of this revenue is from users of regular diesel who are not eligible for DFRS.

From a market supply perspective, the increase in excise on regular diesel does not discriminate between domestic suppliers and imports of ULSD. The

phase-in of the excise differential over two years recognises the different position refiners are currently in with respect to their capital upgrades necessary to supply ULSD. Implementing a more generous first step may provide greater assistance to some refiners or importers than to their competitors, over the transition period. A staged phase-in of the excise differential provides a greater opportunity for all suppliers of ULSD to take advantage of the excise differential.

Administration Issues

The Australian Taxation Office (ATO) submitted to the Inquiry that **applying** differential excise rates for different types of diesel should not present any administrative difficulties. Like the current system, oil refiners would be required to self-assess the excise rate applicable for each quantity of product when released into the market place. This worked without issue when differential rates for unleaded and leaded petrol were introduced in 1994.

However, substantial administrative issues arise when differential DFRS rates are **implemented** to reflect an excise differential, as proposed under this option. The ATO's submission also goes on to say:

> If differential rates were contemplated for the same fuel type according to fuel standards, for example high and low sulphur diesel, this could cause significant administrative problems for the ATO unless the fuels are readily differentiated in the marketplace.[7]

As part of the rollout of ULSD into the market, oil companies have indicated that the product may not be made readily distinguishable in the retail market from regular diesel. For example, it is conceivable that ULSD may be blended with regular diesel after the point of liability for excise, resulting in a quantity of fuel for which two different excise rates have been paid. To then determine the rate of rebate that applied to this quantity of fuel would be extremely difficult for the parties involved — the fuel retailer, the DFRS claimant or the ATO (Box 8.2).

7 ATO, Submission 331, p. 19.

Box 8.2: Diesel Fuel Rebate Scheme and the MBE commitment

The setting of DFRS rates under the MBE commitment is the main determinant of how successful the commitment will be as it poses the greatest administrative challenge. The excise and rebate arrangements for diesel become complicated when two types of diesel are in the market place that are not easily distinguishable. With any rebate arrangement comes an administrative set-up that can be assessed on its consistency with the policy objective and how well it can ensure compliance with the legislative framework. Some of the problems surrounding the application of DFRS are outlined below.

Differential DFRS rates

Differential excise rates require differential rebate rates. Oil companies have indicated that ULSD may not be readily distinguishable in the retail market from regular diesel. The ATO and DFRS claimants would have to be certain of the product sold and the rebate to pay or claim (for self-assessment) which may be difficult.

Uniform DFRS rate set at the higher rate

A rebate above the level of tax paid is a windfall gain to consumers.

Uniform DFRS rate set at the lower excise rate

A rebate set at a uniform level at the lower rate of excise is possible but would breach the Inquiry's terms of reference that the benefits under DFRS be maintained. As one class of diesel would not be fully rebated, consumers of this diesel would be out of pocket by the size of the differential.

8.5.2 Option 2 — supply subsidy

The supply subsidy option differs from the MBE commitment in that the quantum of the excise differential would be paid directly to domestic producers and importers of ULSD. The subsidy would be paid to refiners at the refinery gate or to importers as product enters into Australia. The subsidy would not be available to exports of ULSD. This option is consistent with the MBE objectives outlined in section 8.2.

Under this option, the DFRS rates would be set equal to the excise on both types of diesel. The DAFGS rate would not change.

The subsidy would be set at one cent per litre from 1 January 2003, two cents per litre from 1 January 2004 and two cents per litre from 1 January 2005.

The subsidy would be funded by an increase in excise on all diesel (regular and ULSD). Indicative excise increases would be 0.5 cents per litre in 2003, one cent per litre in 2004 and two cents per litre in 2005.

Based on information from the Australian refiners and import sector, the supply of ULSD is likely to be relatively small in 2003. However, it is not clear how much ULSD will be supplied in 2004 and 2005.

The Inquiry considers that the ATO should consult all relevant parties prior to the beginning of each calender year during the transition period to determine the appropriate increase in excise to pay for the subsidy.

Impact

In 2003, the higher cost of producing ULSD is only partially offset by the one cent per litre subsidy. For DFRS recipients, ULSD will be more expensive compared with regular diesel because the costs of production are higher. It is not until the two cents per litre subsidy paid from 1 January 2004 applies that the price of ULSD paid by DFRS recipients becomes aligned with regular diesel.

In the Inquiry's opinion, a supply subsidy paid direct to suppliers of ULSD is a more direct and transparent mechanism to achieve the MBE objectives. The uniform movement in excise rates and DFRS rates eliminates the problems identified under the MBE initiative above.

The point of entitlement for the ULSD production subsidy would be set on the basis of self-assessment. This would be similar to the current self-assessment arrangements that require oil refiners to inform the ATO of the number of litres produced.

Those disadvantaged by the subsidy arrangement are those who are not eligible for the DFRS (such as construction, quarrying, dredging, extractive industries, cement and diesel-powered on-farm distillation units), and DAFGS recipients, who will face higher costs.

Compared to the MBE option above, the Commonwealth Government would incur a reduction in revenue in the order of $30 million in 2002-03, $65 million in 2003-04, and $70 million in 2004-05, relative to what is already built in to the forward estimates.

The indicative excise increases would subsidise significant levels of ULSD production in each calender year, but would not cover a full switch of the diesel market to ULSD during the transition period. Therefore, the Government may have to review the volume of ULSD production covered by

the subsidy each year. The Government could consider ceasing the subsidy in the first half of 2005.[8]

Administration Issues

From an administration perspective, the ATO considers that a production subsidy option would be preferred over the MBE option because of the substantial complexities associated with administering differential rebate rates.

The ATO would be best placed to administer the subsidy scheme given that the information required to process it is provided to the ATO already, and working relationships between the ATO and the oil refiners are well established.

8.5.3 Option 3 – cut in excise for ULSD

A third option is a direct cut in the excise on ULSD relative to regular diesel (Table 8.2). This is equivalent to the subsidies applied by various European countries. Importantly, the DFRS rate would remain at one rate to avoid the problems identified by the ATO in administering differential rebate rates for what is essentially the same product. Therefore, the rebate would be set equal to the excise on ULSD.

Impact

This option would impose a higher excise burden on regular diesel users who received the DFRS as well as other users of diesel who cannot use or access ULSD. The Inquiry considers that this higher burden is hard to justify and therefore is not recommended. It would also imply a much larger revenue forgone relative to the budget forward estimates.

8 As the ULSD standard will be mandatory by 1 January 2006, it is likely that diesel suppliers will need to switch to ULSD during the first half of 2005. At this point, the subsidy is no longer required to bring forward the introduction of ULSD.

Table 8.2: Cut in excise for ultra low sulphur diesel

	Current	Regular 2003	Regular 2004	ULSD 2003	ULSD 2004
Excise	38.0	38.0	38.0	37.0	36.0
'Refinery price'	52.0	52.0	52.0	54.0	54.0
Pump price	90.0	90.0	90.0	91.0	90.0
DFRS	38.0	37.0	36.0	37.0	36.0
DAFGS	18.5	18.5	18.5	18.5	18.5
Net price paid by DFRS recipients	52.0	53.0	54.0	54.0	54.0
Net price by DAFGS recipients	71.5	71.5	71.5	72.5	73.5

8.6 Conclusion

The Inquiry concludes that the precise shape of the Government's MBE commitment should not be implemented because of:

- the problems of differential rebate arrangements for two different types of diesel that may not be easily distinguishable in the market place
  - the operation of the DFRS would also create the perverse incentive of encouraging the purchase of regular diesel over ULSD;
- a uniform rebate for regular diesel and ULSD would result in either a 'windfall gain' or 'penalty' for certain DFRS recipients; and
- a supply subsidy as outlined in Option 2 would minimise regular diesel excise increases during the transitional period.

For these reasons, the Inquiry concludes that the Government's commitment should be implemented through a supply subsidy as outlined in Option 2.

Recommendation 16: Supply subsidy for early introduction of ultra low sulphur (50 ppm) diesel

The Commonwealth Government should agree to implement its proposal for the early introduction of ultra low sulphur diesel (ULSD) in the form of a supply subsidy to fuel producers and importers.

The ATO, in consultation with relevant parties, should finalise implementation details according to the following principles.

- From 1 January 2003, a supply subsidy of one cent per litre — and from 1 January 2004, a subsidy of two cents per litre — should be provided to offset the additional cost (capital and production cost) of ULSD.
- The subsidy should be funded by an increase in the excise on diesel determined by the ATO for both regular diesel and ULSD.
- Diesel Fuel Rebate Scheme recipients should continue to receive a full or partial rebate on the same basis under the higher excise rates.
- Rates of Diesel and Alternative Fuels Grants Scheme grants should remain unchanged.

CHAPTER 9: PROGRAMMES IN *MEASURES FOR A BETTER ENVIRONMENT* AND REMEDIATION OF SERVICE STATION SITES

In addition to the Energy Grants (Credits) Scheme considered in Chapter 5, the Inquiry is required to examine the other fuel related measures proposed as part of *Measures for a Better Environment* (MBE).

The Inquiry considered the evidence provided in submissions and consultations and assessed the effects of these measures against the Inquiry's task of examining effects of the structure of fuel taxation on resource allocation, pricing and administration arrangements.

The Inquiry has examined the MBE measures to assess their relationship to the Inquiry recommendations and whether a reassessment of the MBE measures is therefore required.

On the whole, the Inquiry concludes that the approach taken in the MBE measures — of targeted programmes outside the taxation system to address greenhouse and air quality objectives — is consistent with the Inquiry's approach.

However, the interplay between MBE measures and the Inquiry recommendations, and the cost effectiveness of the MBE measures should be further reviewed. On the face of it, some of the costs involved to achieve reductions in greenhouse gas emissions seem extraordinarily high.

The Inquiry also received a submission on environmental remediation of service station sites.

9.1 Greenhouse Gas Abatement Programme

9.1.1 Objectives and description

The Greenhouse Gas Abatement Programme (GGAP) aims to reduce Australia's net greenhouse gas emissions by supporting activities across the economy that will result in measurable reductions in greenhouse emissions particularly in the period 2008-12. Funding is provided at $100 million per year from 2000-01 to 2003-04.

Main features of the programme are:

- support for projects that are likely to deliver substantial abatement not expected to occur in the absence of programme funding;
- priority given to projects that will deliver abatement exceeding 250 000 tonnes of carbon dioxide equivalent per annum; and
- a competitive programme that seeks to maximise the effectiveness of Commonwealth funds by including high levels of private sector investment and by using performance based payment structures.

Greenhouse gas savings from approved projects are expected to achieved at an average cost to the Commonwealth of $6 per tonne of CO_2 saved per annum, with the total cost, including private funds of $44 per tonne.[1]

Two of the projects receiving funding promote the use of ethanol as a transport fuel.

- Funding of $7.35 million to assist the Douglas Shire Council and the Mossman Central Mill Company in Queensland with a $34 million project to produce fuel ethanol.
- BP will receive $8.8 million to replace petrol production at its Bulwer Island refinery near Brisbane with a fuel grade petrol/ethanol blend.

9.1.2 Assessment

By targeting large scale projects on a competitive basis, the GGAP is achieving reductions in greenhouse emissions at relatively low cost.

The use of non-taxation measures to address greenhouse emissions under the programme is consistent with the Commonwealth Government's position, stated in August 2001, that it does not consider more taxes are the answer to reducing Australia's greenhouse emissions.[2]

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1 Australian Greenhouse Office (AGO), available at: http://www.greenhouse.gov.au/ggap/internet/qa_2.htm.

2 Senator the Hon Robert Hill, 'Australia Balances Environment with Expanding Economy', Press Release, 8 August 2001, available at: http://www.ea.gov.au/minister/env/2001/mr08aug201.html.

9.2 Alternative Fuels Conversion Programme

9.2.1 Objectives and description

The objectives of the Alternative Fuels Conversion Programme (AFCP) are to reduce greenhouse gas emissions and improve urban air quality by encouraging heavier commercial vehicles and public transport buses to operate on either CNG or LPG rather than diesel.

Commonwealth Government measures support the use of CNG and LPG in the bus and heavy vehicle transport sectors on the basis that these gaseous fuels have the potential to reduce greenhouse gas emissions and significantly improve urban air quality.

- A CSIRO study comparing transport fuels found that, for the vehicles tested, CNG and LPG had significantly better air quality performance than low sulphur diesel fuels.[3] CNG showed significantly better greenhouse performance compared to diesel while LPG showed less but still evident improvement.

This programme has allocated funding of $75 million from 2000-01 to 2003-4 to fund:

- up to 50 per cent of the **additional** cost to purchase new CNG or LPG buses or other commercial vehicles over 3.5 tonnes compared with their conventionally fuelled equivalent; and

- up to 50 per cent of the cost to convert an existing conventionally fuelled heavy vehicle to CNG or LPG.

Funding under the programme is targeted at overcoming barriers to the take up of gas technology in vehicles, reflecting the industry's early stage of market development, such as:

- the limited availability of vehicles which, after conversion, meet the Australian emissions standards applicable at the time of their initial registration; and

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3 Anyon, P., Beer, T., Edwards, J., Grant, T., Lapszewicz, J., Morgan, G., Nelson, P., Watson, H., and Williams, D., *Comparison of Transport Fuels: Life-cycle Emissions Analysis of Alternative Fuels for Heavy Vehicles*, CSIRO, Melbourne, 2001, available at: http://www.greenhouse.gov.au/transport/pdfs/lifecycle.pdf. 'Low' sulphur diesel in this comparison was 500 ppm sulphur.

- limited CNG refuelling infrastructure and the small market for alternatively fuelled vehicles.

As of February 2002, the programme had funded, at a cost of around $15 million, the conversion, purchase or upgrade of:

- 554 buses;
- 26 trucks; and
- 195 road registered forklifts.

The Australian Greenhouse Office advised the Inquiry that vehicles funded under the programme showed significant reductions in emissions in comparison with the diesel vehicles being replaced. For example, emissions of particulates were reduced by 72 to 99 per cent.[4]

Some considerations in assessing the cost effectiveness of the programme are as follows:

- the conversions outlined above are estimated to result in greenhouse gas emission reductions of 15 000 tonnes per annum CO_2 equivalent on a 'well to wheel' basis (from production to use)[5]
  - reductions in greenhouse gas emissions over the life of converted equipment have been estimated at $70 per tonne,[6] which is significantly higher than for other programs such as GGAP; though
- savings in avoided health costs from improved air quality over the life of the converted vehicles should also be taken into account
  - one estimate is savings of $5.3 million would be made for each 300 CNG buses displacing diesel buses[7]
  - in comparison, the subsidy provided under the programme for this benefit was $5.1 million.

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4 AGO, discussion with Inquiry.

5 The savings in greenhouse emissions and air quality improvements should be considered over the lifetime of vehicles, which for trucks and buses of this size is around 14 and 10 years respectively. Australian Bureau of Statistics, *Motor Vehicle Census, Australia*, Cat. No. 9309.0, Canberra, August 2000, p. 5.

6 AGO, Submission 310, p. 43.

7 AGO, Submission 310.

The arguments for use of CNG and LPG in place of existing and improved diesel vehicles (using ULSD and more efficient engines) also need to consider the cost of the relative benefit gained.

The value of the benefits identified above, for example, do not take into account the cost of revenue forgone in replacing diesel with excise free gaseous fuels, and understate the costs significantly.

During the consultation process the Inquiry found general agreement on the objectives of this programme, but concern about its cost-effectiveness in achieving those objectives.

- Concern was expressed to the Inquiry that it is difficult to obtain timely advice and processing of applications to the point where opportunities for conversions to cleaner fuels had been abandoned.[8]

9.2.2 Assessment

The Inquiry considers that the cost-effectiveness of this programme in meeting its objectives requires a reassessment:

- the comparative cost of reduction in greenhouse gas emissions is high compared to the GGAP programme; and

- the cost-effectiveness of air quality improvements should be evaluated.

The overall approach of the programme, however, in being a targeted measure outside of the fuel tax system, is at least consistent with the Inquiry's approach to air quality and greenhouse gas emissions.

9.3 Renewable Remote Power Generation Programme

9.3.1 Objective and description

The Renewable Remote Power Generation Programme (RRPGP) supports increased use of renewable energy generation in remote parts of Australia that presently rely on diesel for electricity generation. The types of renewable

8 Refrigerated Warehouse and Transport Association of Australia Ltd, Submission 245, p. 4.

energy considered include photovoltaics, wind turbines, micro-hydro, wave, tidal and biomass generation.

The objectives of the programme are to:

- increase use of renewable energy technologies in remote areas of Australia;
- assist development of renewable energy technologies, including possible export;
- improve infrastructure for indigenous communities;
- improve electricity supply for remote users; and
- reduce greenhouse gas emissions.

Up to $264 million will be available over the life of the programme which is planned to run for four years from 2000-01.

- Funds are allocated to States and Territories through a formula which makes them proportionate to the amount of diesel fuel excise paid by public generators in each State or Territory from 2000-01 to 2003-04.
- That is, projects can be funded in a State or Territory up to an amount equivalent to the excise paid on diesel used by operators generating electricity for sale.

Examples of some of the projects approved to date are shown in Box 9.1.

Box 9.1: Renewable Remote Power Generation Programme projects

Sub-programmes which have been approved and publicly announced as of 9 November 2001 are set out below.

Indigenous Community Services Project

Managed by the Aboriginal and Torres Strait Islander Commission. It focuses on energy issues in remote indigenous communities, and seeks to increase industry capacity to service and build greater understanding of renewable energy issues within indigenous communities. This project has a budget of $8 million.

Renewable Remote Power Generation Programme in South Australia

This sub-programme has a budget of $7.6 million to provide rebates of 50 per cent of the initial capital cost of renewable energy installations in remote areas of South Australia.

Working Property Rebate Scheme

Provides rebates of up to 65 per cent of the capital cost of renewable energy installations to family owned working properties, in western and northern Queensland. This scheme has a budget of $8 million.

Renewable Energy Rebate Programme

This sub-programme has a budget of $38.2 million to provide rebates of 50 per cent of the initial capital cost of renewable energy installations in remote areas of the Northern Territory.

Remote Area Power Supply Programme

This sub-programme has a budget of $18 million to provide rebates of up to 55 per cent of the initial capital cost of renewable energy installations in remote areas of Western Australia.

Renewable Energy Diesel Replacement Scheme

This sub-programme has a budget of $22.3 million for rebates of up to 50 per cent of the initial capital cost of renewable energy installations in remote areas of Queensland.

Source: Australian Greenhouse Office.

The Australian Greenhouse Office expects that the programme will reduce Australia's diesel consumption for remote electricity generation by more than 50 million litres per annum.[9]

9 AGO, discussion with Inquiry.

- This is a small proportion of total sales of diesel of 13 billion litres, or even of the 700 million litres or so of diesel used for electricity generation each year.

Consultations during the Inquiry showed some misunderstanding of the objectives of the programme.

- The objective of the programme is to reduce reliance on diesel, rather than completely replacing diesel.

- However, some parties questioned the effectiveness of the programme on the basis that it is not practical for renewable energy sources such as tidal, wind or solar energy to replace diesel power generation in all remote communities. Many sites are geographically unsuited for wind, water or tidal power or they experience long periods of cloudy weather, unsuited for solar power generation.

The AGO advised that a number of studies have identified the use of photovoltaics and wind turbines as a cost-effective way to reduce diesel reliance in some remote areas, but for existing projects under this programme the cost of projects ranged from $5.76 to $19.25 per litre of diesel expected to be saved each year.[10]

9.3.2 Assessment

The Inquiry considers that questions on the cost-effectiveness of the programme and its relationship to other Inquiry recommendations justify reconsideration of the programme's objectives.

- The programme conflicts with other rebates, subsidies and grants. For example, it conflicts with the intent of the Petroleum Products Freight Subsidy Scheme to reduce the cost of diesel and other fuels in remote areas by covering the cost of freight above a specified limit for the transport to remote areas of diesel, petrol and aviation fuels. The Inquiry has recommended abolition of this Scheme.

  – In 2000-01, $1.2 million dollars subsidy was paid to transport 14 million litres of diesel to remote localities, some of which would have been used for generators.

10 AGO, discussion with Inquiry.

- The Inquiry's recommendations will provide fuel credits for diesel used in commercial electricity generation, which may impact on the effectiveness of the current programme in providing an incentive to switch to renewable energy sources in remote areas.

This programme is scheduled to be reviewed in 2003.

The Inquiry concludes that, as part of this review, the objectives of the programme should be assessed against the Inquiry's recommendations to provide fuel credits for excise paid on diesel used in electricity generation.

9.4 Product Stewardship (Oil) Scheme

9.4.1 Objectives and description

The Product Stewardship (Oil) Scheme is designed to encourage the re-use of waste oils by providing a payment to oil recyclers for the treatment of waste oil products.

- A five cent per litre levy is paid by manufacturers of virgin oil and lubricants to fund benefit payments to recyclers.

- Recyclers are able to claim benefits at various rates, depending on the final product and its end use.

Submissions to the Inquiry argued that the scheme discriminates against lubricating oil users who consume all or part of the oil during the operating process of the machinery, especially the shipping industry.[11] Unlike other oil users, who can sell their used oil at the higher price now provided by recyclers who receive a benefit for sales of recycled oil, these oil users have no oil left which can be recycled.

Other submissions argued that the system discriminated against those industries which used the specified oils as inputs to further products (such as paint and ink manufacturing).

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11 The shipping industry is concerned that, if the objective of the scheme is to eliminate waste oil as an environmental pollutant, then shipping - which consumes oil entirely with no waste products — should not pay the levy on oil designed to fund recycling operations (Australian Shipowners Association, Submission 216).

9.4.2 Assessment

The Inquiry understands that the issues raised in these submissions are being considered as part of a review of the operation of the Product Stewardship (Oil) Scheme by Environment Australia and the ATO.

The Inquiry considers it would be premature to make any recommendations in advance of the outcome of that review.

9.5 Service station remediation

The Victorian Automobile Chamber of Commerce proposed that a share of the revenue collected through fuel taxes should be dedicated to a fund to monitor service station sites and clean up sites contaminated by leaking underground fuel storage tanks.[12]

Some countries have highly developed programs to deal with leaking underground storage tanks. The United States, for example, dedicates a small portion (0.1 cent per gallon) of its federal fuel taxes to a fund which helps identify and clean up leaking tanks. However, it should be noted that the United States depends on ground water for over half its domestic water. Although some towns in Australia are dependent on ground water, the average level of dependency is only around six per cent.[13]

The Chamber noted that the number of service stations had declined in Australia from around 20 000 in 1970 to 8 370 in 2000. Some of the closed sites required remediation of soil contaminated by leaking underground fuel tanks. Problems arose when the transfer of ownership or re-use of sites for more valuable purposes was impeded by concerns for liability. This caused hardship for site owners, particularly in non-metropolitan areas where the value of sale for alternative uses would not cover remediation work. As a result, some sites had simply been abandoned by their owners.

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12 Victorian Automobile Chamber of Commerce, Submission 239, p. 4.

13 Agriculture and Resource Management Council of Australia and New Zealand, *Guidelines for Groundwater Protection in Australia*, 1995, p. 5.

9.5.1 Assessment

The problem of contaminated service station sites has been considered for some years. At present, policies on remediation of service station sites are determined by local, State and Territory governments under the terms of the 1997 Council of Australian Governments Heads of Agreement on Commonwealth and State Roles and Responsibilities for the Environment. The Inquiry considers that this remains the appropriate context for dealing with this issue.

Liability associated with the environmental impact of service stations is relevant when service stations are closed or ownership is transferred. Acceptance of the principle of public funding from fuel taxation for private liabilities would have wide ramifications in other areas, even if it is accepted that some of the problems which are now evident were not anticipated, and that standards applicable when the tanks were installed might not have been adequate to deal with the problems which have arisen.

The Inquiry could not find evidence to support the forecasts in the Chamber submission of up to 2 000 service station site closures over the next five years, which it saw as a pressing reason for a publicly funded adjustment mechanism. The number of service station sites in Australia appears to have stabilised. Indeed it has shown a slight rise from the end of 1998, when there were 8 233 service stations, to 8 370 two years later.[14] Further competitive pressure could force some closures, but it is unlikely that as many will close as suggested by the Chamber.

The Chamber suggested that 500 to 700 sites would be retired if major refiners '… act on their suggestion that they may withdraw from direct retailing'.[15] This seems to be a misunderstanding of evidence given by the oil companies to the Senate Committee on Rural and Regional Affairs and Transport in 1999. In their evidence the companies said they would reduce the number of sites they operated directly, and restructure their networks to multi-site franchises. This would not necessarily lead to a reduction in overall site numbers. Several companies said that the majority of planned site closures had already occurred, or that closures would continue in line with historic trends.

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14 Australian Institute of Petroleum, available at: http://www.aip.com.au. See also Senate Rural and Regional Affairs and Transport, *Report on the Provisions of the Petroleum Retail Legislation Repeal Bill 1998*, 1999, p. 20.

15 Submission 239, p. 2 of Attachment.

The Inquiry does not support the use of fuel taxation revenue for specific environmental or industry restructuring objectives such as those proposed by the Victorian Automobile Chamber of Commerce.

CHAPTER 10: INTERNALISING EXTERNALITIES: ELECTRONIC ROAD PRICING

Chapter 2 outlined reasons why the fuel tax system is not an appropriate mechanism to address some in most cases the external costs associated with fuel use. A number of other policy instruments can be used, including other pricing mechanisms (for example, emissions trading in relation to greenhouse emissions) or regulatory instruments (such as fuel quality and vehicle engine standards).

This chapter examines mechanisms to address external costs associated with transport, as referred to in the Inquiry terms of reference. To the extent that improving resource allocation by addressing external costs of fuel use is a policy objective, these costs in other industry sectors should also be considered.

Since the magnitude of transport externalities varies with fuel use, an instrument that reflects the degree of use and the cause of the costs is preferable for addressing these external costs. One economic instrument which has been adopted in other countries is road pricing, which can monitor the location and distance travelled by different vehicles. Road pricing is the focus of this chapter.

10.1 Australian consideration of electronic road pricing

The implementation of variable road pricing to address congestion and road maintenance and infrastructure costs has been recommended previously in Australia. There appear to be uncertainties regarding the costs and benefits of implementing such a regime and about public acceptance of it. The Inquiry considers that improvements in technology and relevant international experience warrant revisiting the issue.

10.1.1 Industry Commission

The 1994 Industry Commission (IC) report on urban transport recommended the progressive introduction of road pricing systems through the application of electronic technology, with the aim of reducing congestion. It recommended:

> … an incremental approach to the introduction of area-wide electronic road pricing. This could start in Sydney and Melbourne with tolls (preferably electronic) on certain new or upgraded urban arterial roads, bridges and tunnels so as to familiarise the public with electronic collection. In addition, wherever practicable, tolls should be extended to existing arterial roads and differentiated by time of travel so as to create controlled access to congested areas.[1]

The IC report noted that there are large economic gains from reducing congestion and that around 70 per cent of the existing cost was borne by the business sector.[2] It noted that congestion pricing systems could also be used to address the external costs of air pollution generated by road transport.

10.1.2 National Road Transport Commission

As part of its assessment of heavy vehicle charges in 1999, the National Road Transport Commission (NRTC) considered the use of electronic road pricing to charge for road maintenance and infrastructure costs. It concluded that the technology is sufficiently advanced to implement such systems but that administrative uncertainties did not make it possible to conduct a reliable cost benefit analysis.[3] The NRTC stated that '… these issues are expected to be advanced through the … Intelligent Access Project … This may mean that in future, electronic pricing systems may be more practicable'.[4]

In its submission to the Inquiry, the NRTC stated, that for its coming review and determination of charges to be implemented on 1 July 2004, it will consider mechanisms for road use charges which are more responsive to mass and distance and which are linked to environmental performance.[5]

10.1.3 Intelligent Access Project

Under the supervision of Austroads, the Intelligent Access Project, a national project is under way to develop an improved, nationally consistent means of monitoring permit condition compliance for heavy vehicles.[6]

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1 Industry Commission, *Urban Transport*, Report No 37, Australian Government Publishing Service, Melbourne, 1994, p. 232.
2 Industry Commission, 1994, p. 220.
3 National Road Transport Commission (NRTC), *Updating Heavy Vehicle Charges: Regulatory Impact Statement*, Melbourne, 1999.
4 NRTC, 1999, p. 23.
5 Submission 238.
6 Austroads is the Australian and New Zealand association of road transport and traffic authorities.

- The Intelligent Access Project provides a framework that accommodates applications such as driver fatigue monitoring and heavy vehicle mass, access and dimension management and road pricing.

As part of the project, the Tasmanian Government undertook an Intelligent Vehicle Trial in 1998 to investigate the feasibility of establishing a network-wide road use information system for heavy vehicles. It demonstrated that technologies mounted in the vehicle provided accurate location information on a network-wide basis. It also concluded that road pricing based on global positioning system (GPS) technology could be implemented in a way that offers both enhanced road network management capability to the government and additional fleet functionality for vehicle operators. The Department of Infrastructure and Energy Resources in Tasmania saw the trial as the foundation for a more equitable and efficient system of pricing for road use in Tasmania.[7]

10.1.4 Other studies

The 1997 inquiry into Urban Air Pollution in Australia, conducted by the Australian Academy of Technological Sciences and Engineering (AATSE), recommended that electronic road pricing systems for congestion be considered for Australian cities, with trials conducted in one or more cities.[8] The inquiry assessed the potential benefits in terms of achievable emissions savings over the 20 years from 1997 and concluded that, second to widespread dissemination of new vehicle technology, the implementation of travel demand management in the form of electronic road pricing would offer the most significant benefit (Table 10.1).[9]

Other bodies have made similar recommendations. The Institution of Engineers recommended to the Government that it encourage development of intelligent transport systems that will allow for effective congestion pricing in urban areas and mass-distance charging for heavy vehicles. It also recommended that the Government accelerate the introduction of transparent

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7 Anderson, E, *Meeting Industry Needs — The Intelligent Access Project, Proceedings from the Road Pricing Agenda — Progressing Electronic Road Pricing Conference, Brisbane* (Transport Roundtable Australasia: Queensland), cited in Austroads, *Recent Advances in Road Pricing Practice*, 2001.

8 Australian Academy of Technological Sciences and Engineering, *Urban Air Pollution in Australia*, 1997, p. 20.

9 Urban Air Inquiry Transport Logistics Supporting Group No 3, Task Group No 5, Chair Professor Michael Taylor, 1997.

user-pays pricing regimes that reflect the full environmental, health and economic costs of transport systems, fuels and choices.[10]

Table 10.1: Pollutant emissions reductions from transport solutions

Measure	Percentage emissions benefit
Widespread dissemination of new vehicle technology	20
Congestion reduction measures in traffic management and control	4
Incident management systems for urban expressways/arterial roads	2
Travel demand management, especially electronic road pricing	6-7
Modal switch to public transport	Negligible
Transit-oriented land use development	Negligible

Source: Urban Air Inquiry Transport Logistics Supporting Group No 3.

10.2 Australian experience

In Australia, some of the technologies that could be implemented in a charging regime are already being implemented for use in electronic tolling and vehicle information management systems.

The two main technological approaches to the implementation of variable road pricing are described in Box 10.1.

10 The Institution of Engineers, Australia, *Sustainable Transport Responding to the Challenges*, Sustainable Energy Transport Taskforce Report, 1999.

Box 10.1: Road user charging — main technological approaches

The vehicle detection approach

Microwave transmitters and receivers are positioned over or beside the road, on gantries or poles. This equipment identifies oncoming vehicles and broadcasts a signal, which is returned by a transponder unit on or in the vehicle. If the transponder does not respond, a camera enforcement system is triggered. Information from the roadside equipment is collated centrally to produce a charge, which could be varied by time, vehicle type and location. Refinements of this approach include the use of a smart card to enable direct debit of the charge.

The position sensing approach

The vehicle carries equipment to determine its position on the national road network. This may be done through satellite technology, FM radio, cellular telephony or other means. The equipment in the vehicle tracks its movement and compares it to a network map that is calibrated for charges for roads and sections of roads. The charges can also be varied by time, place and vehicle type. The on-board unit then calculates the charges. Accumulated charges are downloaded from the vehicle either automatically using wireless communication or manually by removing a smart card.

The Australian Transport Council's Electronic Toll Collection Working Party concluded that technology is not a barrier to the implementation of road user charging regimes. It stated that:

> The recent trials and projects involving both DSRC [microwave vehicle detection] and VPS [the vehicle positioning approach] have confirmed the reliability of such systems, affordability of the systems for both frequent driver and operator, ease of use of drivers, [and] the existence of a competitive market for supply …[11]

In Melbourne, Sydney and Brisbane, electronic tolling systems have been implemented using dedicated short range communication technology in conjunction with vehicle transponders or 'e-tags'. Under this system, users are charged as they pass under tolling gantries that recognise the vehicle's 'e-tag'. It allows the implementation of variable charges. For example, Melbourne CityLink currently charges according to the type of vehicle (passenger car, light commercial vehicle or heavy vehicle) and the section of the link road with price caps on continuous one way travel.

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11 Electronic Toll Collection Working Party, *Second Report to the Australian Transport Council*, 1999, available at: http://www.atcouncil.gov.au/etc/etc1.htm, p. 35.

GPS technology is currently used in some transport fleets in Australia, mainly as a productivity enhancement tool. It also assists in the management of driver fatigue, compliance with speed limits and improved security of loads. GPS technology is progressively being incorporated into new car prices and is now a standard feature in many average to high cost cars as part of their in-vehicle navigation systems.[12]

These developments point to an increasing use of and familiarity with the technology.

10.3 International experience of electronic road pricing

Implementation of electronic road pricing internationally has been well summarised by Austroads.[13] This section outlines some of the different approaches taken.

10.3.1 Europe

A time-limited road charge is operating in Germany, Belgium, the Netherlands, Luxembourg, Denmark and Sweden, called the eurovignette.

Under the eurovignette, trucks over 12 tonnes are required to purchase a daily, weekly, monthly or yearly pass for use of roads in the participating countries. Pass charges are determined according to the vehicle's number of axles and emissions standard.

While this system could be relatively simple to implement and administer, it has the disadvantage of not reflecting distance travelled. Two identical trucks travelling different distances in the same time frame would pay the same amount.

Germany has announced that it will withdraw from the eurovignette in 2003 and replace it with an electronic distance based road pricing system for vehicles over 12 tonnes. This will involve differential pricing for road users according to distance travelled, the number of axles and vehicle emissions standard.

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12 Austroads, *Recent Advances in Road Pricing Practice*, 2001.
13 Austroads, 2001.

Switzerland introduced a road pricing system in 2001 for all trucks over 3.5 tonnes, which varies according to distance travelled, vehicle mass and vehicle emissions standard. Swiss vehicles must be fitted with an electronic unit that uses microwave technology to switch the vehicle tracking system on or off when entering or leaving Switzerland. This unit also records all required data within Switzerland, which is crosschecked by GPS technology where necessary. The vehicle operator must transfer the data from the on-board unit to Swiss Customs every month via a smart card and pay the resultant charge.

The United Kingdom is considering the introduction of road pricing for heavy vehicles. It was proposed in 2000 and a consultation document was released in November 2001.[14] The objective of the charge would be to ensure that heavy vehicle users in the United Kingdom contribute in a fairer way to road costs in the United Kingdom, regardless of their nationality. The United Kingdom Government also intends that the scheme will not increase the tax burden on the United Kingdom haulage industry and that the charges would be offset by other tax reductions.[15]

The Commission for Integrated Transport (CfIT) released a study in February 2002 designed to encourage public discussion of the widespread introduction of congestion pricing in the United Kingdom. Local governments in the United Kingdom currently have the power to implement pricing mechanisms to address congestion, but this has not been widely implemented. The CfIT study modelled a revenue neutral introduction of congestion pricing and found that congestion could be reduced nationally by 44 percent.[16]

The Netherlands has announced its intention to introduce an electronically charged mileage levy for all private car users. It will become operational in the Randstad (the densely populated area between the Netherlands' four major cities) in 2004 and nationally in 2006. The intention is to replace fixed vehicle charges with variable ones that retain the 'greening' effects of the present Dutch system and incorporate additional environmental incentives.[17]

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14 HM Treasury, *Modernising the Taxation of the Haulage Industry: A consultation document*, November 2001.

15 The United Kingdom has one of the highest rates of fuel taxation in Europe. It has also undertaken an analysis of the external costs of transport indicating that, by some measurements, the overall level of taxation on transport approximates the external costs imposed. Sansom et al, *Surface Transport Costs and Charges Great Britain 1998*, commissioned by the Department of the Environment, Transport and the Regions, Institute for Transport Studies, University of Leeds, Leeds, 2001.

16 Commission for Integrated Transport, *Paying for Road Use*, 2002, available at: http://www.cfit.gov.uk/reports/pfru/index.htm.

17 Keus, A. and de Visser, P., *A New Approach to Road Pricing in the Netherlands*, 8th World Congress on Intelligent Transport Systems, Paper No 117, Sydney, 2001.

10.3.2 New Zealand

New Zealand has used a mass-distance based vehicle license system for heavy vehicles since 1978. Vehicle operators purchase paper licences in 1 000 kilometre units, with the cost varying according to the maximum gross mass elected by the operator. Each vehicle must be fitted with a mechanical hubodometer that logs mileage. The hubodometer readings are matched against the paper licences. Licenses can be purchased in a variety of ways, including on the road and are available in supplementary 50 kilometre units.

Transfund New Zealand, the New Zealand government body responsible for allocating road funding, commissioned a feasibility study into the replacement of the current charging system with an electronic system allowing charging on a road segment basis. The study recommended the implementation of an electronic road pricing system using in-vehicle units, GPS technology and dedicated short range communication to road side monitoring stations, allowing for initial voluntary take up of the system. The proposed system was found to be technologically feasible and economically justifiable.[18]

10.3.3 Singapore

Singapore implemented electronic road pricing in 1998, automating its long-standing, paper based area licensing system aimed at combating congestion. The old system contained no incentive to minimise travel once the license was purchased, as unlimited travel to and from the restricted city centre zone was permitted.

Under the electronic pricing system, all vehicles are fitted with on-board units and payment is effected through pre-paid smart cards as vehicles pass under gantries. The smart cards can be credited at automatic teller machines. Tolls are levied according to vehicle type (passenger cars, motorcycles, taxis, light, heavy and very heavy vehicles), location and time of day. On expressways and arterial roads, the system applies from 7.30 am until 9.30 am and in the city, from 7.30 am until 7.00 pm. Since the introduction of electronic road pricing, revenue from tolls has decreased by 40 per cent, predominantly due to a decrease in multiple entry trips, as well as the 1998 recession.[19]

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18 Beca Carter Hollings and Ferner Ltd et al, *Transport Information System Electronic Road User Charges: Report of a Feasibility Study*, Prepared for Transfund New Zealand, December 2000.

19 Luk, J.Y.K., *Electronic Road Pricing in Singapore*, Road and Transport Research, Vol 8, No 4, pp. 28-40, cited in Austroads, *Recent Advances in Road Pricing Practice*, 2001.

It is important to note that the technological basis of the Singapore system is dedicated short range communication, which is used in the Sydney, Melbourne and Brisbane electronic toll systems.

10.4 Submissions to the Inquiry

Submissions to the Inquiry generally focussed on fuel taxation mechanisms to internalise external costs. While some regarded variable road pricing as a preferable pricing mechanism, for the most part it was seen as a desirable long term outcome.[20]

The Department of Transport and Regional Services submitted that:

> … the most cost effective transport emission reductions, and more efficient outcomes for the transport sector, could be achieved by moving to a system of direct road user charging for all vehicles. …
>
> The theoretical case for road pricing is well established from an economic efficiency perspective. Electronic tolling technologies that enable efficient revenue collection taking account of location, time of day and even traffic levels are now available and are improving rapidly. The equity considerations surrounding such pricing for road use raises a number of critical issues, especially in the implementation of road use charging in such a way as to achieve the same level of access to destinations and services. These issues would need to be examined in far greater detail — and settled — before moving down any path towards more direct forms of road use charging.[21]

The NRTC stated:

> The tools to put in place more sophisticated pricing arrangements are now available, but it is important not to look for ways of using these tools without first identifying the aims which they are intended to achieve and then demonstrating that they provide a cost effective means of achieving these aims.[22]

The NRTC identified a number of barriers to the implementation of road pricing in Australia including:

- lack of information about the costs of road use;
- lack of demonstration to date of the net benefits of road pricing; and

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20 Submissions 238 (NRTC) and 234 (Bus Industry Confederation Inc).
21 Submission 315, p. 21.
22 Submission 337, p. 2.

- uncertainty about its public acceptance.

However, the NRTC went on to state that '… it is increasingly likely that more refined road pricing will be implemented in Australia'.[23] This is because pressure on existing road systems has grown, there is less acceptance of the view that building more roads is the solution to transport problems and because of increased use of price signals in other areas, such as power and water provision.

The issue of the differential between city and country fuel prices was raised with the Inquiry. The use of road user charging has the potential to address this concern. While the revenue relationship between any road user charging and fuel taxation would need to be determined, implementation of pricing mechanisms more directly related to vehicle use would allow for more accurate targeting of location specific external costs, such as air quality and congestion.

10.5 Design considerations

A number of significant issues would need to be considered in Australia prior to the introduction of a road pricing mechanism. Foremost amongst these is determination of the objective. The NRTC noted:

> The appropriate aims for road pricing in Australia have not yet been agreed. But without resolving this fundamental question, progress on road pricing will be difficult. This is because everything flows from the objectives of the pricing system — the mechanisms, the derivation of appropriate price levels and so on — each will be completely different for different objectives.[24]

Where road pricing has been introduced internationally, it has mainly been to address road maintenance and infrastructure costs and congestion, with consideration also being given to differentiating in favour of vehicles with lower air pollutant emissions.

Some other design considerations include:

- the extent to which the relevant costs are already recovered in other policy instruments, such as regulations or other taxes and charges;

- the relative responsibilities of the Commonwealth and the States

23 Submission 337, p. 6.
24 Submission 337, p. 2.

  - while congestion and air quality are location specific concerns, the Commonwealth may have a role in the national coordination of standards;

- privacy, including the collection and storage of personal information (such as bank account records) used in electronic tracking mechanisms;[25] and

- equity effects of road pricing on low income groups or those dependent on private transport (such as disabled people).

10.5.1 Objective of electronic road pricing

As the NRTC has stated, the objective of a road charging regime is critical in determining its overall design. Some of the objectives of road pricing include:

- recovering the costs of road use, especially from heavy vehicles;

- funding future transport investment or resource expenditure, for example road building and maintenance or public transport infrastructure;

- reducing congestion; and

- implementing, in general, an economically efficient charging regime where a user pays the full costs of fuel and road use.

The Inquiry considers that variable road user charging should be assessed against two objectives:

- reducing congestion and air pollution in major urban areas; and

- recovering the costs of road maintenance and infrastructure.

Having determined the objectives, a series of consequential questions arise, such as the coverage of the system (all road users or just urban road users), the amount users should pay, how fees should be differentiated (in different parts of the network, by different times) and whether all roads should be covered by the system.

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25 The Australian Transport Council's Electronic Toll Collection Working Group stated that: 'The privacy issues relating to the activities of electronic toll collection appear to be well recognised and adequately catered for under both existing and proposed legislation. The relevant Australian Standard provides detailed guidance to operators and, if followed, will ensure compliance with and meet the intentions of overriding legislation'. Electronic Toll Collection Working Party, 1999, p. 21.

10.6 A way forward

The Inquiry recognises that debate about some of the issues listed above would hinder implementation of a comprehensive road pricing regime.

Meanwhile, other countries are increasingly utilising the sophistication and accuracy that electronic technology offers.

Given the Inquiry's conclusion that the fuel tax system is not an appropriate mechanism for internalising most external costs of fuel use, this potential log jam needs to be broken. To do so, the Inquiry recommends the Government make it a priority to take the following steps:

- quantify the costs which a road pricing system will seek to address;
- determine the costs and benefits of implementing a road pricing system in Australia; and
- if road pricing is found to be cost beneficial, implement a trial to encourage public acceptance of the approach.

A road pricing system requires an assessment of the costs that pricing levels will seek to recover. This involves considerable uncertainty, especially as no recent **Australian based** study on the external costs of fuel use is available.

The Inquiry therefore recommends that the Government should commission a study to quantify the external costs of fuel use in Australia, using methodologies agreed and accepted by Commonwealth and State governments. Estimates of costs provided to the Inquiry have relied on extrapolation of European values. Given different population densities of Australian cities, different traffic densities and different meteorological impacts, an original Australian study to generate more accurate external cost estimates is clearly called for.

Public acceptance of any charging system will be dependent on an understanding of its benefits and likely impacts on individuals. In Australia, an analysis of these benefits has not yet been undertaken.

When referring to the fuel taxation system in its submission, the Australian Automobile Association stated:

> The inefficiencies in the current system are well known. They have been analysed and exposed in numerous official inquiries and gatherings of experts. Yet governments have shown little interest in reform. This is partly due to the divisions in responsibilities between Commonwealth and State governments. …

> Creating political will to reform means demonstrating to the community that there are benefits from change … It also means setting out a clear pathway to achieve the needed change.[26]

Governments themselves must be convinced of the benefits before they can communicate them to the community. An assessment of these benefits should therefore be undertaken as a matter of priority. With commitment, it would then be possible, if implementation of variable road pricing is found to be beneficial, to resolve the administrative and policy issues associated with its implementation.

Unless and until authoritative Australian studies are undertaken, the debate will continue to be about just a desirable long term outcome. The Inquiry considers this to be unsatisfactory; a circuit breaker is needed.

10.7 Recommendations

Recommendation 17: Externality study

Environment Australia should conduct a study to determine the external costs of fuel use in Australia using methodologies that are agreed and accepted by Commonwealth and State Governments.

Recommendation 18: Electronic road pricing benefits assessment

A detailed cost benefit analysis should be undertaken of the use of electronic road pricing for the following purposes:

- reducing congestion and air pollution in major urban areas; and
- charging for the costs of road maintenance and infrastructure.

Recommendation 19: Road pricing trial

A trial of an advanced electronic road pricing application, deemed to be the most cost beneficial by the study proposed in Recommendation 18 be undertaken, funded by Commonwealth and State Governments, with a view to promoting and assessing public acceptance of the application.

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26 Submission 228, p. x.

APPENDIX A: SUBMISSIONS

The Inquiry received 341 submissions, including a number of supplementary submissions, between August 2001 and March 2002. A list of all submissions received was posted on the Inquiry website, except for four submissions marked commercial-in-confidence. Copies of submissions provided to the Inquiry in electronic form were available on the website and those in hard copy form could be obtained by contacting the Secretariat.

	Submission No.
Abels, John and Lyn	64
Aboriginal Co-ordinating Council	217
ACT Chief Minister	87
Adams, W J	78
Addabbo, Don	306
AgForce Queensland Industrial Union of Employers	196, 266
Airod Autogas Systems	190
Alousis, Margaret	33
Amalg Resources NL	156
Anderson, Felicity	38
Arendtsz, Suzette	11
Armistead, Ray and Mary	69
Association of Marine Park Tourism Operators	226, 275
Association of Mining and Exploration Companies Inc	161, 302
Association of Mining Related Councils Inc	44
Association of Motoring Clubs Inc	126
Astridge, M and G	24
Australasian Fleet Managers Association	127
Australasian Natural Gas Vehicles Council	225, 327
Australasian Railway Association Inc	193, 298
Australian Automobile Association	228, 277, 300
Australian Automotive Gas Fitters Association	181
Australian Biofuels Association	192, 318
Australian Chamber of Commerce and Industry	272
Australian Council for Infrastructure Development Ltd	180
Australian Customs Service	291
Australian Edible Oils (Deniliquin)	94
Australian Gas Association	242

	Submission No.
Australian Greenhouse Office	310, 324
Australian Institute of Petroleum	213, 333
Australian Liquefied Petroleum Gas Association Ltd	224, 284, 301, 325
Australian Livestock Transporters Association	2, 248
Australian Local Government Association	208, 321
Australian Marine Industries Federation Ltd	244
Australian Mushroom Growers' Association	197
Australian Opal Industry	286
Australian Petroleum Production and Exploration Association Ltd	138
Australian Pre-mixed Concrete Association	279
Australian Renewable Fuels Pty Ltd	172
Australian Shipowners Association	216, 260
Australian Sugar Milling Council	340
Australian Taxation Office	331
Australian Taxi Industry Association	222
Australian Trucking Association	4, 254
Automotive Alternative Fuels Association Inc	141
Baron, Sandra; McLoughlan, John; and Wilson, Carmel	26
Bawden, Ron	16
Bean, Dr R A	114
Beck, Hans	143
Bendigo Mining N. L.	290
Biodiesel Association of Australia Inc	93
Biodiesel North Queensland Pty Ltd	137
Boating Western Australia Inc	170
Boemo Engineering Pty Ltd	204
Bond, G J	60
BP Australia Ltd	231, 268
Bradley Rural Property Specialist	90
Breen, C	65
Brisbane City Council	166
Broady Automotive Repairs	105
Burrows, Keith	30
Bus Industry Confederation Inc	234, 269
Caltex Australia Ltd	229
Campbell, Val	66

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Canegrowers Burdekin	278
Car Clinic	210
Cas Bak Holiday Flats	84
Cement Industry Federation Ltd	211, 328
Chamber of Commerce and Industry of Western Australia	110
Chamber of Minerals and Energy of Western Australia Inc	155
Chapman, G K	49
Chauffeured Vehicle Association of South Australia Inc	77
Cheah, David	117
Christmas Island Chamber of Commerce	165
Cislowski, Harold	89
Civil Contractors Federation	183, 282
Climate Action Network Australia	221
Colac Otway Ratepayers and Residents Association	86
Collex Pty Ltd	174
Collin, Brian	80
Compost Australia	139
Conservation Council of Western Australia	212
Coogee Energy Pty Ltd	163
Country Women's Association of Western Australia Inc	280
Cramer, Patrick	18
Croker, Ian	112
CSR Sugar	167
Day, Geoffrey	88
De Beers Australia Exploration Ltd	271
de Silva, J	194
Department of the Treasury	326
Department of Transport and Regional Services	315
Distilled Spirits Industry Council of Australia Inc	236
Dixon, Stephen	158
Dominion Mining Ltd	288
Drerup, Martin	52
Dunn, Sue	307
Duxbury, Brett	83
Edgar, L	23
Elgas Ltd	185

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Elko Autogas (Dandenong)	7
Elrington, Frank	82
Elso, John	223
Enviro-Mulch	124
Environment Australia	319, 336
Evans Consulting and Financial Services	206
Evans, John	12
Extractive Industries Association Inc	149, 285
Eyre Highway Operators Association	122
Farrow, Ian	177
Federal Chamber of Automotive Industries	256, 320
Fehsler, Colin	187
Fenwick's Bakery Pty Ltd	312
Fiorenza, Emilio	95
Fisher, Brad	109
Ford, W G and M F	47
G & P Watts Pty Ltd	118
Gardiner, The Hon Jenny, MLC	129
Gas Injection Technologies Pty Ltd	184
Golding, Robert	6
Goodman, Michael	13
Gordon, Iain	8
Gore Research Pty Ltd	188
Goulthorp, William	39
Graham, J L and M	92
Greenpeace Australia Pacific Ltd	153, 267
Greve, D	72
Habeck, George	15
Hamilton, Rob	115
Hassett, Terry	53
Hatcher, Robin	35
Hauptmann, Ally	5
Hawker, David, MP, Federal Member for Wannon	304
Heath-Caldwell, Michael	332
Heberle, Arthur	308
Hillis Ford Pty Ltd	145

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Hines, D W	61
Hinks, Ian	70
Hobbs, Steven	97
Hobday, Andrew Fraser	132
Holton, Cliff	96
Hopkins, Colin	305
Huntley, D V	142
Hunyadi, Joseph and Mary	48
Independent Australian Oil Recyclers Association Ltd	164
Institution of Engineers, Australia	121, 316
International Association of Public Transport (Australia/New Zealand)	152
InterPacific Resorts (Australia) Pty Ltd	218, 252
Japan DME Ltd	249
Jarrad Peter A	287
Jepson, Peter A	73
Jones, Hayden	171
Keedle, Jane	103
Kenos, A T	9
Keys, M S	68
Kirkwood, D	27
Klooster, Anthony J	54
Laird, Philip, Associate Professor	113, 338
Lambert, P	40
Lancy, Ernest	50
Liebelt, Kevin and Marion	314
Local Government Association of Queensland Inc	162, 273
Loschiavo, Frank	111
Lovato Autogas Wholesalers Pty Ltd	159
Love, Alan	31
Lubrizol	322
Madsen, Chris	168
Magnusson, N V and S A Pashallis	71, 250
Manchester Tank and Equipment Co	120
Manildra Group	247
Marriott, Evelyn	62
Martin, Roger	67

	Submission No.
Matson, Shane	19
McGibbon, Ivor and Judy	37
Metasource Pty Ltd	130
Mewburn, Laurie	10
Milano, Frank and Carol	32
Minerals Council of Australia	230
Minister for Consumer Affairs, Victorian Government	258
Ministry of the Premier and Cabinet of Western Australia	203, 292
Mobil Oil Australia Pty Ltd	214, 329
Moore, Jack	173
Motor Trades Association of Australia	339
Motor Trade Association of Western Australia Inc	189
Muir, Shane	22
Nabalco Pty Ltd	207
National Farmers' Federation	257, 330
National Institute of Economic and Industry Research	99
National Rail Corporation Ltd	253
National Road Transport Commission	238, 337
Nativo, Mary	98
Needham, K H and A J	106
Neill, Neville D and Marie	136
New Holland Mining Ltd	296
New Hope Coal Australia	294
Newby, Murray and Dawn	123
Noorda, C	209
North Queensland Essential Oils Coop Ltd	100
Northern Territory Treasury	293
NRMA Ltd	246
NSW Fishing Fleet	131
Ockley, Don	56
One Nation, Queensland Division, Beenleigh Branch	148
Origin Energy Ltd	241, 341
Ozdiesel	150, 251, 283
Ozmotech Pty Ltd	140
P J & A D Hill Pty Ltd	191
Parnell LP Gas Systems Pty Ltd	146

	Submission No.
Passenger Transport Board	157
Pastalatzis, Nick	200
Patriki, George	43
Peck, Neville	45
Picton, Margaret	179
Pitts, Peter A	20
Plastics and Chemicals Industries Association Inc	220, 335
Pointer, J W and J E	25
Polderman, A	147
Premier of New South Wales	270
Premier of Queensland	297
Premier of South Australia	264
Premier of Tasmania	261
PricewaterhouseCoopers	202
Providence Gold and Minerals Pty Ltd	289
Prowse, Trevor	34
Qantas Airways Ltd	235
Queensland Rail	219
Queensland Sapphire Producers Association	195
Railway Technical Society of Australasia	85
Refrigerated Warehouse and Transport Association of Australia Ltd	245
Rehn, M G	63
Reimert, Kathleen	91
Riedl, Arnie and Hermine	74
Riedy, Chris	276
Riley, Mark	104
Rodda, Glenn	102
Royal Automobile Association of South Australia Inc	259
Royal Automobile Club of Victoria Ltd	237
Sammut, Frank	108
Sasol Chevron	198
Saxton, W M	233
Scourfield, Pamela	199
Service Station Association Ltd	227
Shell Australia	154
Sherriff, Stewart J	107

	Submission No.
Shipping Australia Ltd	263
Skinner, Carol	182
Skye Park Rugs Pty Ltd	55
Smith, C D	46
Smith, David	128
Smith, Max	58
South Australian Farmers Fuel	176
SQC Pty Ltd	317
St Barbara Mines Ltd	274
Stanwell Corporation Ltd	243, 303
Stawell Gold Mines Pty Ltd	281
Stevens, Narelle	134
Stewart, Donald	41
Stubbings, T B	186
Sunderland, Doug	76
Surace, Ross	309
Sutton, Robert	125
Swansson, Bruce	311
Thales Underwater Systems Pty Ltd	323
Tooker, Craig	29
TransLog Consulting	169
Treasure, Lyn	81
Treasurer of Victoria	79
Treston Gas Pty Ltd	201
Truck Industry Council	262, 313
Tully Sugar Limited	334
Turner, Roy	57
Udy, Jason	51
Unigas	151
van Bakel, J N	101
Victorian Automobile Chamber of Commerce	239
Walker, Tom	14
Walsh's Floral Studio	21
Watkins, P	59
Watson, Stuart	144
Weatherald, Robin	240, 255, 265

	Submission No.
Wesfarmers Kleenheat Gas Pty Ltd	215
West Australian Small Business and Enterprise Association Inc	119
Westerbeek, B	1
Western Australian Local Government Association(a)	299
Western Australian Municipal Association(a)	175
Western Australian Renewable Fuels Association	133
Westonia Mines N L	295
Whelan, G	28
White, Max	116
Widdowson, A	3
Wildlife Preservation Society of Queensland	135
Wilkins, M	75
Williams, John and Helen	42
Woodley, G V	17

(a) In December 2001 the Western Australian Municipal Association changed its name to the Western Australian Local Government Association.

APPENDIX B: CONSULTATIONS

The Inquiry held a series of consultations with individuals and organisations that made submissions to the Inquiry, between the middle of October 2001 and February 2002 in Brisbane, Sydney, Melbourne, Canberra and Perth. The list of participants are listed below.

Canberra 17 October 2001	**Australian Institute of Petroleum** Mr Bryan Nye, Executive Director Mr Bruce Harrison, Assistant Director **Australian Local Government Association** Mr Richard Neves, Deputy National Policy Director **Australasian Railway Association Inc** Mr David Hill, Manager, Research **Sasol Chevron** Ms Tracey Winters, Manager, Government and External Affairs Dr William Higgs, Business Development, Australia **Mobil Oil Australia Pty Ltd** Mr Peter Buchan Mr Tony Cudmore
Brisbane 24 October 2001	**Brisbane City Council** Mr Mark Cridland, Principal, Urban Transport Ms Gail Davies, Principal Policy Officer, Urban Transport Mr Mark Piorkowski, Senior Transport Planner Mr Ian Logan, Corporate Tax Advisor **InterPacific Resorts (Australia) Pty Ltd** Mr Mike Gorrie, Financial Controller Mr Dennis Fountain, Director of Operations Mr Terry Murphy, Manager of Engineering Mr Jeff O'Connell, Consultant, PricewaterhouseCoopers **Aboriginal Co-ordinating Council** Mr Peter Opio-Otim, Executive Director Mr Jeff O'Connell, Consultant, PricewaterhouseCoopers **Wildlife Preservation Society of Queensland** Ms Janet Oliver, Director of the Society Mr John Hutt, Member of the Society

Brisbane
25 October 2001

Nabalco Pty Ltd
Mr David Salt, Managing Director, Alcan South Pacific Pty Ltd
Mr David Sutherland, Director, Nabalco Pty Ltd
Mr George Brownbill, Consultant, ACIL Consulting Pty Ltd

Extractive Industries Association Inc
Mr Brett Sargent, General Manager, Boral Quarries and Concrete
Mr Denis Wagner, Director, Wagners Concrete and Quarries
Mr Greg Miller, General Manager, CSR Construction Materials
Mr Noel Meagher, Executive Officer, Extractive Industries Association Inc
Mr Ken Willet, Consultant, Corporate and Economics Strategies

Queensland Rail
Mr Richard Price, Chief Management Accountant
Mr Rob Daley, Acting Manager, Taxation
Mr Jeff O'Connell, Consultant, PricewaterhouseCoopers

AgForce Queensland Industrial Union of Employers
Ms Teresa Allen, Councillor
Mr Jason Rae, Councillor

CSR Sugar Ltd
Mr Rob McGregor, General Manager, CSR Distilleries
Mr Ian Sampson

Association of Marine Park Tourism Operators Ltd
Mr David Windsor, Managing Director
Mr Rob Dalla-Costa, Consultant, Ernst and Young
Ms Jade Jones, Consultant, Ernst and Young

Local Government Association of Queensland Inc
Mr Greg Hoffman, Director, Policy and Research
Mr Richard Senescall, Manager, Economic and Public Policy
Ms Corrin Bischof, Research Assistant
Mr Jeff O'Connell, Consultant, PricewaterhouseCoopers

Sydney 26 October 2001	**Ozdiesel** Mr Sanjay Chatterjee **NSW Fishing Fleet** Mr Paul Bagnato, President Ms Linda Bagnato, Secretary Mr Mark Snyders, Consultant **Collex Pty Ltd** Mr Richard Berry, Director Mr Terry Schulz **Caltex Australia Ltd** Mr Frank Topham, Manager, Government Affairs Mr George Chenouda, Manager, Taxation **Greenpeace Australia Pacific Ltd** Dr Frances MacGuire, Climate Campaign Team Leader Mr Garth Walton **Australian Shipowners Association** Mr David Parmeter, Director, Human Resources **Australian Council of Infrastructure Development Ltd** Mr Dennis O'Neill, Chief Executive Officer Mr Matthew Crocker

Melbourne 7 November 2001	**Origin Energy Ltd** Mr Tony Wood, General Manager Mr David Calder, Senior Analyst, Regulatory Risk Mr Paul Williams, Manager, Transport Application Mr Stephen Wright, Senior Analyst, Regulatory Risk **Civil Contractors Federation** Mr Doug Huett, National Executive Director **Australasian Natural Gas Vehicles Council** Mr Brett Jarman Mr Sean Blythe **BP Australia Ltd** Mr Bill Frilay, Manager, Government Relations Mr Geoff Coghill, Tax Manager, Indirect Taxes Mr Frank Russell, Manager, Fuel Technology **Bus Industry Confederation Inc** Mr Stephen Lucas, Chairman Mr John Stanley, Executive Director, Bus Association of Victoria Mr Horst Koerner, Scania Australia Mr Robert Gunning **National Road Transport Commission** Mr Tony Wilson, Chief Executive Mr Barry Moore, Director, Strategy and Programming Ms Fiona Calvert, Manager, Corporate Strategy Mr Tim Eaton, Senior Project Manager Mr Dave Jones, Manager, Communications **Victorian Automobile Chamber of Commerce** Mr Terry Conroy, Manager, Service Station and Convenience Store Division Mr Fury Bortlotto, Chairman, Executive Committee Mr Tony La Rosa, Vice Chairman, Executive Committee Mr Robin Weatherald, Executive Committee member Ms Verena Engbarth, Research Officer **Plastics and Chemicals Industries Association Inc** Mr Martin Jones, Chief Executive Officer Mr Ashley Van Krieken, Manager, Commercial Affairs Dr David Dunne, Executive Manager, Coogee Chemicals Mr Ian Blandford, General Manager, Huntsman Chemical Company

Canberra
8 November 2001

Minerals Council of Australia
Mr Dick Wells, Executive Director
Mr Peter Morris, Director, Economics and Commerce

Australian Petroleum Production and Exploration Association Ltd
Mr Barry Jones, Executive Director
Mr Noel Mullen, Director, Commercial

Australian Gas Association
Mr Greg Evans, Policy Manager

Refrigerated Warehouse and Transport Association Ltd
Mr Rory Glass, Executive Officer
Mr Paul Campbell, Managing Director, Charter Freight Lines

NRMA Ltd
Ms Di Collins, General Manager, Corporate Affairs
Mr Marzi DeSanti, Manager, Mobility Infrastructure

Cement Industry Federation
Dr John Tilley, Chief Executive Officer
Mr David Cusack, Australian Cement Holdings
Mr Bob Mulvenna, Consultant, PricewaterhouseCoopers

Australian Automobile Association
Mr Lauchlan McIntosh, Executive Director
Mr John Metcalfe, Director, Research and Policy
Mr Greg Hunting, Director, Communications
Mr David Vincent, Centre for International Economics

Australian Liquefied Petroleum Gas Association Ltd
Mr Tony Wood, Past President
Mr Ian Kennedy, Director
Mr Mal Ralston, General Manager
Mr Warring Neilson, Chairman, Autogas Challenge
Mr Phil Westlake, Communications Manager
Mr Bill Hazel, National Autogas Manager, Westfarmers Kleenheat Gas

Perth 19 November 2001	**Western Australian Local Government Association** Mr Chris Thompson, Executive Manager, Transport and Roads Mr Andrew Blitz, Manager, Member Services Mr Joe Ripepi, Consultant, Acumen Enterprises **Australian Renewable Fuels Pty Ltd** Mr Darryl Butcher, Executive Director Mr Anthony Short, Director **Eyre Highway Operators Association** Mr Gary Prendiville, General Manager Mr Peter Fitzpatrick, Executive Director, Motor Trade Association of Western Australia **Chamber of Commerce and Industry of Western Australia** Ms Nicky Cusworth, Chief Economist Mr Daniel Engles, Analyst **Independent Australian Oil Recyclers Association Ltd** Mr Fred Wren, Chairman **Amalg Resources NL** Mr Graham McGarry, Managing Director **Homestake Gold of Australia** Mr Sean Jermy, Manager, Taxation Mr Ross Glossop, Homestake Gold Mr Lou Fornaro, KCGM Mr Darryl Daisley, Consultant, PricewaterhouseCoopers Mr Ross Thorpe, Consultant, PricewaterhouseCoopers

Perth 20 November 2001	**Chamber of Minerals and Energy of Western Australia Inc** Mr Charles Crouch, Executive Officer Mr Russell Maynard **Conservation Council of Western Australia** Mr Chris Tallentire, Acting Coordinator Mr Brain Fleay Mr David Wake **Western Australian Government** Mr David Smith, Deputy Premier and Treasurer's Office Ms Petrice Judge, Federal and Constitutional Affairs, Ministry of Premier and Cabinet Mr John Nicolau, WA Treasury Mr Michael McCleod, Ministry of Fair Trading **Association of Mining and Exploration Companies Inc** Mr Alan Layton, Executive Officer Mr Darryl Daisley, Consultant, PricewaterhouseCoopers **Wesfarmers Kleenheat Gas Pty Ltd** Mr Gary Ireson, General Manager Mr Bill Hazell, Manager, National Autogas Mr Tony Smith, Manager, LNG Operations Mr Tasso Papaelias, Consultant, Ernst and Young

Canberra 16 January 2002	**Australian Trucking Association, and Australian Livestock Transporters Association** Mr Michael Apps, Deputy Chief Executive Officer, ATA Mr David Anderson, Executive Director, NatRoad Mr Kim Hassall, Australia Post Mr Robert Gunning, Executive Director, ALTA Mr Neil Gow, Research and Policy Officer **Truck Industry Council** Mr Terry Pennington, Chief Executive Officer **National Farmers' Federation** Mr Michael Potter, Policy Manager, Economics Ms Su McCluskey, Policy Manager, Taxation **Australian Taxi Industry Association** Mr John McKeough, Assistant Secretary Mr Jack Evans, Advisor **Federal Chamber of Automotive Industries** Mr Peter Sturrock, Chief Executive Officer Mr Andrew McKellar, Executive Officer **Australia Chamber of Commerce and Industry** Mr Lyndon Rowe, A/g Chief Executive Officer Dr Steven Kates, Chief Economist Mr Andrew Firestone, Economist **Qantas Airways Ltd** Mr Peter Bysouth, Purchasing Manager, Aviation Charges Mr Barry Abrams, Senior Business Analyst Mr David Callaghan, Manager, Government Affairs **Shell Australia** Mr Ian McKenzie, Manager, Retail Strategy and Development Mr Glen Woodward Mr Peter Harris

Canberra 22 January 2002	**New South Wales State Government** Mr Frank Muller, Director, Greenhouse and Sustainable Development Unit **Queensland State Government** Mr Alex Beavers, Director, Fiscal Strategy Branch, Treasury **South Australian State Government** Mr David Incher, Principal Cabinet Officer, Department of Premier and Cabinet **Australian Capital Territory Government** Mr Wayne Perry, Commissioner, ACT Revenue Mr David Quinlan, Department of Urban Services **Northern Territory Government** Mr Rod McComskie, Senior Research Officer, NT Treasury **Australian Customs Service** Mr Phil Burns, National Director Commercial Mr Greg Little, Manager, National Compliance Operations Mr Tom Marshall, National Manager – Tariff **Railway Technical Society of Australasia** Associate Professor Phillip Laird Mr John Boshier, Chief Executive Officer, The Institution of Engineers of Australia **Australian Pre-Mixed Concrete Association** Mr John Turton, General Manager Mr Karl Watson Jr, Managing Director, CSR Mr Les Cadzow, Managing Director, Hanson Australia Mr Jerry Taylor, Consultant, KPMG Mr Warwick Ryan, Consultant, KPMG **Australian Greenhouse Office** Mr Gene McGlynn, Executive Manager, Sustainable Energy Group Mr Diana Wright, Senior Executive Manager, Sustainable Energy Group Mr Roger Coogan, Alternative Fuels Team Mr Brett Janissen, Manager, Market Development Team

Canberra
22 February 2002

Department of the Treasury
Mr Colin Brown, Manager, Costings and Quantitative Analysis Unit
Mr Frank Di Giorgiou, Manager, Environment Policy Unit
Mr Geoff Francis, Special Adviser, Environment Policy Unit
Ms Anthea Long, Analyst, Environment Policy Unit
Mr Shane Johnson, Analyst, Costings and Quantitative Analysis Unit

Environment Australia
Mr Graeme Marshall, Director, Clean Fuels and Vehicles Section
Ms Emma Campbell, Assistant Director, Clean Fuels and Vehicles Section
Ms Michelle Scoccimarro, Director, Economics Unit
Mr Koenraad VanLandegham, Assistant Director, Economics Unit

Australian National Audit Office
Mr Peter White, Executive Director, Performance Audit Services Group
Ms Medha Kelshiker, Senior Director, Performance Audit Services Group

Econtech Pty Ltd
Mr Chris Murphy, Director
Mr Anthony White, Industry Economist

Department of Transport and Regional Services
Mr Malcolm Thompson, Assistant Secretary, Policy Group
Mr Jon Real, Policy Group
Mr Robert Hogan, Assistant Secretary, Transport Regulations
Mr David Mitchell, Bureau of Transport and Regional Economics
Mr David Coonan, Transport Regulations

Australian Taxation Office
Mr Paul Duffus, Deputy Commissioner of Excise
Mr Patrick Colmer, Assistant Commissioner of Policy and Legislation
Mr Tony Free, Director of Revenue Policy
Mr Michael Harms, Director of Payment Policy

APPENDIX C: CONSULTANCIES

The Inquiry engaged the consultants listed below.

Econtech

The Inquiry engaged Econtech to model the impacts of the current and proposed fuel tax arrangements on the economy and the environment. The modelling results are discussed in Chapter 6 of the Report.

AEA Technology

AEA Technology was engaged by the Inquiry to provide information on externalities associated with fuel use, supplementing work it provided to the Bus Industry Confederation in its submission to the Inquiry.

APPENDIX D: OVERSEAS MEETINGS

The Committee and Secretariat met with a large number of organisations and individuals both in Australia and overseas. The Inquiry would like to thank the people and organisations listed below for their time in assisting the Inquiry.

Belgium	Automotive Industry European Commission – Automotive Industry European Commission – Directorate for Economic and Financial Affairs European Commission – Directorate General for Energy and Transport European Commission – Directorate General for Environment Ministry of Finance
Canada	Alberta Finance Alberta Revenue British Columbia Ministries of Finance and Corporate Relations, and Water, Land and Air Protection Canada Customs and Revenue Agency Canadian Fuel Tax Project Department of Finance, Tax Policy Branch National Round Table on Environment and the Economy Office of the Commissioner of the Environment and Sustainable Development, Office of the Auditor General Professor of Economics, Simon Fraser University Victoria Transport Policy Institute
France	European Conference of Ministers of Transport French Department of Energy and Raw Materials French Environment Department French Fiscal Department International Energy Agency OECD

Inquiry Overseas Meetings (continued)

Germany	Association of the German Automotive Industry Association of the German Petroleum Industry Deutsche BP AG Deutsche Shell Federal Ministry for the Environment, Nature Conservation and Nuclear Safety Federal Ministry of Economics and Technology Federal Ministry of Finance Financial Times Volkswagen AG
Japan	Institute of Energy Economics Japan Automobile Manufacturers' Association Ministry of Economy, Trade and Industry Ministry of Environment Ministry of Finance Ministry of Land, Infrastructure and Transport Nippon Mitsubishi Oil Corporation
New Zealand	Auckland City Council Ministry of Economic Development Ministry for the Environment Ministry of Transport New Zealand Automobile Association New Zealand Business Roundtable New Zealand Customs Service Resource Use Taxation Project (University of Waikato and Victoria University of Wellington) Treasury Transfund New Zealand
Sweden	Commission on Energy Tax Reduction Ministry of Finance Road Traffic Taxes Commission Swedish Environment Protection Agency Swedish National Energy Administration Swedish National Institute of Road Transport Research Taxation Department
The Netherlands	Ministry of Finance Ministry of Housing, Spatial Planning and the Environment Shell International

Inquiry Overseas Meetings (continued)

United Kingdom	BP p.l.c. Department for Environment, Food and Rural Affairs Department of Trade and Industry Department of Transport, Local Government and Regions HM Customs and Excise HM Treasury Institute for Fiscal Studies J F Chown and Co Ltd Trafigura Ltd University College London University of Leeds
United States	American Association of State Highway and Transportation Officials American Petroleum Institute California Air Resource Board California Board of Equalization California Department of Transportation Congressional Research Service Department of Energy Department of Transportation DRI-WEFA (Data Resources Inc and Wharton Economic Forecasting Associates): Global Automotive Group Environmental Protection Agency Federal Highway Administration Harvard Centre for Risk Analysis, Harvard University Internal Revenue Service Massachusetts Institute of Technology, Center for Energy and Environmental Policy Minnesota Department of Transport Professor of Urban Planning and Public Policy, John F Kennedy School of Government Toll Roads Newsletter Transportation Research Board Treasury

APPENDIX E: PUBLICATIONS

Issues Paper

The Issues Paper was released on 18 August 2001 and copies were sent to 345 organisations and individuals.

The paper could be accessed on the Inquiry's website and was available from Commonwealth Information shops, operated by Ausinfo.

Background Papers

The Inquiry issued three Background Papers providing information on aspects of fuel taxation, which were also available on the Inquiry's website:

- *History of Fuel Taxation in Australia*;
- *Previous Reports on Petroleum Products*; and
- *International Fuel Taxes*.

Press Releases

The Inquiry issued the following press releases which were made available to the public on the Inquiry's website.

- 18 August 2001 — Fuel Taxation Inquiry — Issues Paper Released.
- 29 July 2001 — Fuel Taxation Inquiry — Opportunities for Participation by the Public.
- 11 January 2002 — Fuel Taxation Inquiry — Update.

Update Statement

On 11 January 2002 the Inquiry Chairman wrote to all those who had made a submission to the Inquiry, updating them on the Inquiry's activities.

APPENDIX F: FUEL TAXES, REBATES, SUBSIDIES AND GRANTS IN AUSTRALIA

Fuel taxation

The main form of fuel taxation in Australia is Commonwealth excise. This is currently levied on petroleum products.

Table F.1 shows that the contribution of excise as a share of Commonwealth revenue has changed little over the past 15 years.

Table F.1: Fuel excise collections, 1986-87 to 2001-02

Year	Excise collections ($m)(a)	Share of C'wealth revenue (%)	Year	Excise collections ($m)(a)	Share of C'wealth revenue (%)
1986-87	5 217	7.1	1994-95	9 406	8.5
1987-88	5 426	6.7	1995-96	10 224	8.4
1988-89	5 828	6.6	1996-97	10 543	8.1
1989-90	6 416	6.7	1997-98(b)	10 895	8.0
1990-91	6 642	6.8	1998-99(b)	10 974	7.5
1991-92	7 093	7.6	1999-2000(b)	11 189	6.7
1992-93	7 200	7.6	2000-01(c)	11 907	7.5
1993-94	8 499	8.4	2001-02(c)(d)	12 190	7.5

(a) Does not include crude oil excise and excludes the Diesel Fuel Rebate Scheme.
(b) Does not include excise collections on behalf of State Governments as a replacement for business franchise fees.
(c) Does not include GST collected from fuel.
(d) Estimate.

Source: Cash estimates taken from Commonwealth of Australia, *Mid-Year Economic and Fiscal Outlook 2001-02*, p. 98, Commonwealth of Australia, Canberra, 2001; Commonwealth of Australia , *Budget Paper No. 1 2001-02*, p. 5-35, Commonwealth of Australia, Canberra, 2001; and Commonwealth of Australia, *Budget Paper No.1 1997-98*, p. 5-22, Australian Government Publishing Service, Canberra, 1997.

The main Commonwealth legislation relating to excise is set out in Table F.2.

Table F.2: Fuel tax legislation

Excise collection
Excise Act 1901 Excise Tariff Act 1921 Excise Regulations 1925 Fuel (Penalty Surcharge) Acts 1997 Fuel (Penalty Surcharges) Administration Regulations 1997 Tax Administration Act 1953 Tax Laws (Excise Arrangements) Administration Act 2001 Coal Excise Act 1949 Coal Excise Regulation 1925
Customs duty
Customs Act 1901
Diesel Fuel Rebate Scheme
Customs and Excise Acts 1901 Taxation Administration Act 1953
Diesel and Alternative Fuels Grants Scheme
Diesel and Alternative Fuels Grants Scheme Act 1999 Diesel and Alternative Fuels Grants Scheme Regulations 2000 Taxation Administration Act 1953
Fuel Sales Grants Scheme
Fuel Sales Grants Act 2000 Fuel Sales Grants Regulations 2000 Product Grants and Benefits Administration Act 2000 Taxation Administration Act 1953
Petroleum Products Freight Subsidy Scheme
State Grants (Petroleum Products) Act 1965 and corresponding State Acts
Product Stewardship (Oil) Scheme
Product Stewardship (Oil) Act 2000 Product Grants and Benefits Administration Act 2000 Taxation Administration Act 1953

The Excise Act sets up the basic excise regime, while the Excise Tariff Act defines the products to which excise is applicable and sets out the rates of duty. The Fuel (Penalty Surcharge) Acts extend the legislative framework beyond the point where the power of the Excise Act effectively ends (that is, when a product is removed from the licensed premises of an excise manufacturer).

Responsibility for excise collection was transferred to the Australian Taxation Office (ATO) from the Australian Customs Service (Customs) in 1998.

Current fuel excise rates

Table F.3 shows the current rates of excise for petroleum products along with specific other fuels that have been listed in the tariff with a zero rate of excise. Table F.4 shows estimated Commonwealth excise collections in 2001-02.

Table F.3: Fuel excise rates as at 1 February 2002 (cents per litre)

Product(a)	Engine Use	Burner Use	Other(b)
Petrol	38.143	38.143	Aircraft fuel 2.808(c)
Diesel	38.143	38.143	(b)
Kerosene	38.143	7.557	Aircraft fuel 2.845(c)
Heating oil	38.143	7.557	(b)
Fuel oil(d)	7.557	7.557	7.557
Condensate	38.143	7.557	(b)
Stabilised crude and topped crude	38.143	7.557	(b)
Other refined products	38.143	7.557	(b)
Coal tar and coke oven distillates	38.143	38.143	38.143
Petroleum based oils and lubricants (not for fuel use)	(e)	(e)	5.363
Ethanol(f)	0	0	0

(a) For some products the excise payable may be refunded or remitted.
(b) A number of 'other uses' are prescribed in excise legislation for most products. Where more than one rate applies for 'other use' per product, no rate has been given (except for aviation fuel rates).
(c) Excise collected on aviation fuel is hypothecated to the Civil Aviation Safety Authority and Airservices Australia for provision of aviation services such as traffic control, navigation and air safety regulation.
(d) Fuel oils are typically heavy fuels not suited for use in vehicle engines. The properties of fuel oil for the purpose of excise are defined in subsection 3(4) of the *Excise Tariff Act 1921*.
(e) The excise rate for these products only applies to use other than as a fuel (for example, as a lubricant).
(f) The excise status of other alternative fuels under the current legislation is being determined.
Source: Australian Taxation Office information drawn from *Excise Tariff Act 1921, The Schedule*.

Table F.4: Estimated Commonwealth excise collections, 2001-02 ($m)

Unleaded petrol(a)	Leaded petrol(b)	Diesel	Other(c)	Total(d)
7 025	2	5 035	128	12 190

(a) Includes lead replacement petrol.
(b) Leaded petrol was phased out on 1 January 2002.
(c) Includes aviation gasoline, aviation turbine fuel, fuel oil, heating oil and kerosene.
(d) Excludes crude oil excise.
Source: Commonwealth of Australia, *Budget Paper No.1 2001-02*, p. 5-15, Commonwealth of Australia, Canberra, 2001.

Concessional system

The current tariff structure has established a concessional system whereby certain products are either taxed at a lower rate when used as a fuel for industrial purposes or do not attract any excise when used other than as a fuel.

This concessional system generally applies to fuel as follows:

- products used as fuel, other than in an internal combustion engine (for example, heating oil and kerosene for industrial purposes) are taxed at a concessional rate;[1] and
- products not used as a fuel (for example, solvents) are excise free as are certain alternative fuels (including liquefied petroleum gas (LPG) and ethanol).

A number of remission and refund provisions are also set out in the excise regulations that reduce excise for certain industries and for prescribed uses of petroleum products.

The marker regime and the remissions system

In 1998 legislation came into effect requiring the addition of a chemical marker to concessional fuel sold in bulk. Fuel that attracts the full rate of excise can then be tested for presence of the marker to ensure that the correct amount of excise has been paid. Some exceptions to this regime exist where the addition of the marker will adversely affect the product. As a result, a 'remission system' has been put in place where permission is granted for excise to be remitted at the time of entry for home consumption on the basis of end use.

Rebates, subsidies and grants

This section covers the main rebates, subsidies and grants provided at a Commonwealth level, summarised at the end of the Appendix in Table F.5.

Commonwealth rebates, subsidies and grants

The Commonwealth has allocated $2.9 billion in funding for fuel-related rebates, subsidies and grants in 2001-02.

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1 With the exception of petrol, diesel and coal tar and coke oven distillates that attract the full rate of excise for all uses. This was introduced to combat fuel substitution.

Diesel Fuel Rebate Scheme

This scheme offsets the excise on diesel and like fuels used off-road for particular purposes by providing a full rebate of excise and customs duty. It is administered by the ATO under the *Excise Act 1901*.

The rationale for this scheme dates to the period when fuel excise revenue was hypothecated to fund road construction and all diesel fuel used off-road was exempt from excise when first applied in 1957. In 1982, due to administrative and eligibility concerns, the previous scheme for exemption from diesel excise was converted into the Diesel Fuel Rebate Scheme. Under the scheme all diesel users were required to pay excise, with some off-road users eligible to claim a full or partial rebate. Primary producers (agriculture, forestry and fishing), miners, users of diesel for heating, lighting, hot water, air-conditioning and cooking for domestic purposes, and at hospitals, nursing and aged care homes were eligible for the rebate. Primary producers received a full rebate of excise, while other categories were only eligible for a partial rebate.

The most significant change to the scheme in recent years was in 1998 when the Government announced its proposals for *A New Tax System*. This included an intention to extend the off-road scheme to include all off-road business use of diesel fuel. Subsequent negotiations with the Australian Democrats resulted in this extension being made to rail and marine transport only. However, activities that had previously only received a partial rebate were given a full rebate of excise (for example, mining and residential activities). The scheme was also extended to include rebates for fuel oils.

Administration issues largely concern eligibility requirements. These have resulted from the interplay between detailed legislation and case law, particularly for the mining industry.

Diesel and Alternative Fuels Grants Scheme

This scheme was part of *A New Tax System* changes in July 2000 and is administered by the ATO under the *Diesel and Alternative Fuels Grants Scheme Act 1999*.

The scheme is intended to reduce transport costs to business and particularly to benefit regional Australia. It provides a grant of around 18.5 cents per litre for diesel and reduces the cost of alternative fuels such as ethanol, compressed natural gas and LPG to maintain previous price relativities with diesel.

Eligibility is for all business related on-road use of diesel and alternative fuels in vehicles over 20 tonnes gross vehicle mass. Eligibility for vehicles between 4.5 and 20 tonnes depends on where the journeys are undertaken and the type

of transport service provided. The grant is not available for journeys solely within major metropolitan areas. However, journey restrictions do not apply to vehicles transporting passengers or goods solely on behalf of a primary production business, buses using alternative fuels, and emergency vehicles. The eligible journey restrictions are intended to address concerns about air quality in large metropolitan areas.

Fuel Sales Grants Scheme

This scheme was introduced on 1 July 2000 as part of *A New Tax System*. It provides to registered retailers a grant of one cent per litre in non-metropolitan zones and two cents per litre in remote zones. The aim of the scheme was to address the effects of the GST on the differential between city and country fuel prices. There is an additional remote zone premium of one cent per litre where the fuel price is consistently over $1.21 per litre.

Petroleum Products Freight Subsidy Scheme

This scheme was introduced in 1965 and is intended to reduce the price of eligible petroleum products in remote locations of Australia by reducing the freight component of the purchase price of fuel. The scheme subsidises the cost of transporting fuel to various points of sale in remote Australia to ensure that purchasers do not pay more than a 'customer pays margin' (currently set at 15.3 cents per litre).[2] Distributors receive refunds of freight costs over the customer pays margin if they undertake in writing to pass the benefits to retailers.

The Product Stewardship (Oil) Scheme

This scheme was introduced as part of *Measures for a Better Environment*. It is intended to encourage the environmentally and economically sustainable reuse of waste oils by providing a benefit to oil recyclers for the appropriate treatment of waste oil products. The scheme involves a levy-benefit arrangement where a five cent per litre levy is paid by manufacturers of virgin oil and lubricants to fund benefit payments to recyclers. Recyclers are able to claim benefits at various rates, depending on the final product and end use. The scheme is administered by the ATO under the *Product Stewardship (Oil) Act 2000* and the *Product Grants and Benefits Administration Act 2000*.

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2 This margin was indexed to the Consumer Price Index from 1983 subject to annual Ministerial review. Discretionary increases of four cents per litre in both 1985 and 1987 were intended to restrict coverage to more remote locations. Indexation was not applied in 2000 and 2001.

Table F.5: Overview of Commonwealth fuel rebates, subsidies and grants

	Diesel Fuel Rebate Scheme	Diesel and Alternative Fuels Grants Scheme	Fuel Sales Grants Scheme	Petroleum Products Freight Subsidy Scheme
Estimated funding 2001-02($m)	1 980	665(a)	210	3.5
Number of claimants(b)	136 742	53 335	4 700	22
Paid to	End users	End users	Fuel retailers	Fuel distributors
Eligibility	• Certain off-road activities primarily within mining, primary industry, marine and rail transport and hospitals and nursing homes	• On-road use in vehicles 4.5 tonnes and over • Excludes metropolitan use for certain vehicle size and type	• Non-metropolitan and remote areas only	• Non-metropolitan • Must be distributors of certain petroleum products • Incurred transport costs must be above an average amount
Main fuels covered	• Diesel • Fuel oils	• Diesel • Ethanol(c) • Compressed Natural Gas(c) • Liquefied Petroleum Gas(c)	• Diesel • Petrol	• Diesel • Petrol • Aviation gasoline • Aviation turbine fuel
Policy objectives contributing to overall scheme intent	• Rebate of tax for main export industries such as primary, mining; as well as off-road transport • Certain community and social welfare benefits	• Transport cost reduction • Addressing environmental concerns relating to emissions from diesel use within metropolitan areas	• Maintain regional and metropolitan price relativities on the introduction of the GST	• Transport cost reduction with the aim of lower fuel prices for remote Australia
Benefit	Rebate of excise: • diesel – 38.143 cpl • like fuels – 7.557 cpl	Fuel grant: • diesel – 18.510 cpl • ethanol – 20.809 cpl • CNG – 12.617 cents per m^3 • LPG – 11.925 cpl	Fuel grant: • regional Australia – 1 cpl • remote Australia – 2 cpl • remote where price exceeds $1.21 - 3 cpl	Fuel subsidy: • for transport costs incurred above an average amount known as the 'Customer Pays Margin'

(a) Alternative fuel grants account for less than one per cent, based on 2000-01 payments.
(b) The number of claimants refers to users that had actually lodged claims as at July 2001.
(c) Fuels that do not attract an excise.
Source: Australian Taxation Office and AusIndustry (Petroleum Products Freight Subsidy Scheme).

APPENDIX G: PETROLEUM SUBSTITUTE PRODUCTS

Petroleum substitute products include some that are relatively widely used in Australia in conventional engines, while others are less familiar and are most likely to be used with new power technologies such as fuel cells.

Liquefied petroleum gas (LPG)

Automotive LPG is a mixture of propane and butane and is gaseous at ambient temperature and pressure. LPG used for heating and cooking is usually pure propane, but LPG for vehicles can contain up to 60 per cent butane. LPG is stored as a liquid under moderate pressure (600 to 800 kilopascals (kPa) or three to four times passenger car tyre pressures).

LPG has a high octane rating, which allows engines running on this fuel to have higher compression ratios than petrol engines, and thus higher efficiencies. Most LPG light duty vehicles are retro-fitted petrol cars which do not exploit this advantage.

In 2001, Australian consumed 4 039 megalitres of LPG, of which 2 452 megalitres (or 61 per cent) was for automotive use.[1] Eight per cent of energy for road transportation in Australia was provided by LPG.[2]

World supplies of LPG will expand as it is often found in association with natural gas, production of which is expected to increase by 70 per cent from 2000 to 2020.[3] Flaring of LPG is likely to be reduced, thus increasing output from refineries. This increasing supply will be balanced by increasing demand for bottled LPG in India and China and petrochemical industries in the Middle East, so ready supply availability and moderate price levels are not likely to be markedly different from the present.

The IEA conducted a comprehensive comparison of different automotive fuels, and provided short and long term estimates of differences in cost of operation in comparison with petroleum fuels. The estimates of long-term (15-20 years) differences in cost per kilometre of travel for LPG powered cars compared to a petrol vehicle were 12.5 per cent higher (reflecting expected improved vehicle

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1 Department of Industry, Tourism and Resource, *Australian Petroleum Statistics*, Issue 65, Canberra, December 2001, p. 13.
2 Australian Liquefied Petroleum Gas Association, Submission 224, p. 2.
3 International Energy Agency (IEA), *World Energy Outlook Insights 2001*, Paris, 2001, p. 139.

technologies in petrol vehicles), but short-term (1-5 years) differences were 28 per cent higher.[4]

Natural gas

Natural gas (predominantly methane) occurs extensively in the earth's crust. Although it is used for automotive use in Italy, Argentina, New Zealand, Russia and the USA, it only supplies 0.5 per cent of road transport fuel among OECD members.[5] Countries with natural gas distribution grids can introduce compressed natural gas (CNG) as a vehicle fuel relatively easily.

Natural gas has a low energy content under ambient conditions, but in liquid form it compares well with LPG. On-board storage usually takes place under high pressure, as CNG, and sometimes also at low temperatures, as liquefied natural gas (LNG). Compression of the gas is energy-intensive and storage requires relatively heavy, high-pressure vessels, which take up vehicle space, thus limiting its efficient use to larger vehicles such as trains, buses and trucks.

CNG generally is stored in heavy steel tanks at a pressure of 20 000-24 000 kPa (or 100 times passenger tyre pressure). LNG is stored on-board at a pressure of 200 to 600 kPa and a temperature of –161°C. Natural gas has a high octane number, which allows higher compression ratios and can raise the thermal efficiency of a dedicated engine by about 10 per cent compared to a petrol engine. Natural gas engine efficiency is 15 to 20 per cent lower than that of heavy-duty diesel engines.[6]

Natural gas supplied less than 0.3 per cent of road transport fuel in Australia in 1998-99.[7] Even rapid increases from this small base will not significantly stretch the market's supply capacity. Natural gas supplies in Australia are expected to increase by 4.4 per cent per annum to 2019-20. Although the share of exports in total production is expected to increase from 33 per cent in 1998-99 to 44 per cent in 2019-20, this is derived from production on the Northwest Shelf, whereas natural gas for transport use will continue to be

4 IEA, *Automotive Fuels for the Future:The Search for Alternatives,* Paris, 1999, p. 51.
5 IEA, 1999, p. 23.
6 IEA, 1999, p. 23.
7 Anderson, J., Bush, S., Dickson, A., and Harman, A., *Australian Energy: Market Developments and Projections to 2014-15*, Australian Bureau of Agricultural and Resource Economics Research Report 99.4, Canberra, 1999, p. 25.

drawn from pipeline networks based on sources in south east Australia which will have ample supplies.[8]

IEA estimates of long-term (15-20 years) differences in cost per kilometre of travel compared to a heavy diesel-powered vehicle were 20 per cent higher reflecting expected improvements in diesel engines, but short-term (1-5 years) costs were 31 per cent lower.[9]

Ethanol (starch or ligno-cellulosic base)

Ethanol, a liquid alcohol, (C_2H_5OH) is usually produced from biomass, crops rich in sugar, starch or woody (ligno-cellulosic) material.

International studies usually find that ethanol costs three to five times as much to produce as gasoline, depending largely on feedstock costs. Production costs in Australia, however, it is estimated could be as low as 55 to 75 cents per litre using more advanced processes.[10] Ethanol can be used in both spark and compression ignition engines, but is mostly used in mixtures with petrol — both as a fuel and as an octane enhancer. Its use in proportions up to 10 per cent presents no technical difficulties for petrol or diesel engines. Motor manufacturers consider that use in higher percentages would require modification of some engine or fuel system components due to the more corrosive nature of alcohols.

Ethanol has considerably lower energy content than petrol or diesel, and pure ethanol would require a tank 50 per cent larger and 65 per cent heavier to deliver a petrol-equivalent amount of energy.[11]

Current production in Australia of fuel ethanol is 40 megalitres, which is just over 0.02 per cent of petrol use.[12] Fuel ethanol consumption in the United States is 1.2 per cent of petrol consumption, and biofuel consumption (including both ethanol and biodiesel) was 0.15 per cent of transport fuels in Europe in 1998.

Production of biofuels, such as ethanol, require sufficient agricultural land to produce the feedstock. Some fuel can be produced from waste materials, but

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8 Dickson, A., Donaldson, K., Harman, S., Tedesco, L., and Thorpe, S., *Australian Energy: Projections to 2019-20*, Australian Bureau of Agricultural and Resource Economics Research Report 01.11, Canberra, 2001, p. 4.

9 IEA, 1999, p. 51.

10 Reeves, Dr R., *Genesis and Development of the Australian Ethanol from Lignocellulosics Pilot Plant Project*, Apace Research Ltd, Dungog.

11 IEA, 1999, p. 26.

12 Manildra Group, Submission 247, p. 3.

significant displacement of oil-based fuels would require purpose grown crops. The IEA estimates that, with current agricultural technologies and fuel conversion processes, only ethanol from sugar beets or similar high-sugar feedstocks and methanol from cellulosic materials could be considered as realistic options for large scale fuel production. Three per cent of total world cropland would be required to produce enough ethanol to replace up to 10 per cent of oil based fuel.

IEA estimates of long-term (15-20 years) differences in cost per kilometre of travel compared to a petrol vehicle ranged from 74 to 161 per cent higher. Short-term (1-5 years) differences were 241 to 528 per cent higher. The reduced cost premium reflects expected greater efficiency in ethanol production.

Biodiesel

Biodiesel is esterified vegetable oil produced from different oil-containing crops, most importantly rapeseed, canola, soybean, sunflower and palm. It is also produced from waste meat products such as tallow, or recovered cooking oil. Esterification offers a low-cost way to transform vegetable oil molecules into molecules similar to the diesel hydrocarbons, though the production cost of such biodiesels exceeds those of diesel derived from crude oil.

Biodiesel can go almost directly into existing diesel engines and it mixes with oil-based diesel in any ratio. Its energy content is about eight per cent lower than diesel by volume depending on feedstocks, but it has a higher cetane number which provides better ignition characteristics. It needs about 15 per cent more fuel by weight than oil-based diesel for equivalent vehicle range. In addition, deposits generated by biodiesel require more frequent filter replacement and shorter tank cleaning intervals.

Biodiesel supplies face similar, but tougher, limitations to ethanol in terms of demands on agricultural land. Up to eight per cent of total world cropland would be required to produce sufficient biodiesel to replace up to 10 per cent of oil-based fuel.

IEA estimates of long-term (15-20 years) differences in cost per kilometre of travel compared to a petroleum-based diesel vehicle were 18 per cent lower, but short-term (1-5 years) differences were 120 per cent higher.[13]

13 IEA, 1999, p. 51.

Methanol

Methanol is an alcohol (CH_3OH) usually made from natural gas. Methanol production from biomass (that is, cellulosic material, mostly wood) is technically, but not yet commercially, feasible.

Methanol costs more to produce than petrol and has a lower energy density, but a quite high octane number, and can be used in high compression engines. It is mostly used in mixtures with petrol in spark ignition engines. It can be used in compression ignition (diesel) engines, but its cetane number is low, and engines require adaptation to ensure ignition. Given its lower energy density, methanol would require a fuel tank 75 per cent larger and twice as heavy as a petrol tank for a given driving range.

Methanol is toxic and corrosive and fuel systems need adaptation with materials resistant to the wear, corrosion and chemical effects of alcohols.

Methanol is the most common fuel used for fuel-cell vehicles, with on-board chemical processes (re-forming) producing hydrogen and carbon oxides (CO and CO_2).

Global methanol production is small, but future production from gas would not be limited by availability of gas. Production from cellulose or other biomass would face similar constraints of land availability as ethanol and biodiesels. Up to four per cent of total world cropland would be required to produce sufficient methanol from cellulosic material to replace up to 10 per cent of oil-based fuel.

IEA estimates of long-term (15-20 years) differences in cost per kilometre of travel compared to a petrol vehicle ranged from 17 to 26 per cent higher. Short-term (1-5 years) differences were 46 to 213 per cent higher.[14]

Dimethyl ether

Dimethyl ether (DME), (also known as wood ether) is manufactured using natural gas or biomass feedstocks. It has similar properties to propane and butane and has similar storage and handling characteristics to LPG. It is a gas at ambient temperatures, and can be stored as a liquid under moderate pressure (600 kPa). It has an energy density about half that of diesel, and needs

14 IEA, 1999, p. 51.

large on-board storage tanks for equivalent driving ranges. It has a high cetane number which makes it very suitable for use in compression ignition engines. DME is more expensive to produce than petrol, but in the long-term may well become price competitive with diesel.

IEA estimates of long-term (15-20 years) differences in cost per kilometre of travel compared to a petrol vehicle are for one per cent lower, but short-term (1-5 years) differences might be 21 per cent higher.[15]

Gas-to-Liquids (GTL)

Gas-to-Liquids refers to the conversion of natural gas into liquid fuels including methanol, DME, middle distillates (diesel and jet fuel), specialty chemicals and waxes. The technology, based on the Fischer-Tropsch process, for producing each of these distinct products was developed years ago, but only methanol is in widespread commercial production.

Attention has recently focused on diesel produced by GTL processes and the Australian government has taken measures to encourage investment in gas to liquids projects.[16]

Diesel produced in this manner contains almost no sulphur or aromatics, and is well suited to meet current and proposed cleaner fuel requirements of developed economies. GTL diesel has significant environmental advantages, in particular low emission of particulate matter and low nitrous oxide emissions, and also provides improved cold start performance and low combustion noise compared to standard quality petroleum-based diesel.[17]

In recent years there have been significant reductions in capital costs and process efficiency, which allow GTL diesel to approach competitive prices with oil-based middle distillates. No comparable IEA data exist, but GTL diesel is expected to be competitive on current technologies with oil prices over

15 IEA, 1999, p. 51.

16 Media Release of 18 February 2000 by Sen the Hon Nick Minchin, Minister for Industry, Science and Resources, 'Australia Secures World-leading Gas-To-Liquids Technology', and Media Release of 20 December 2001 by The Hon Ian Macfarlane, MP, Minister for Industry, Tourism and Resources, 'Australia Wins World Scale Methanol Plant'.

17 Taken from Department of Industry, Tourism and Resources, (ITR) http://www.isr.gov.au/invest/Industry_Sectors/Gas_to_Liquids_Taskforce/FINAL_GTL_Discussion_Paper.pdf, p. 6.

US$22 per barrel.[18] Further improvements in process technology would increase its competitiveness.

Shale oil

Shale oil, with tar sands and bitumen deposits, are part of the resources of unconventional oil which could become more economical to extract if shortages of conventional oil lead to higher prices.

Australia has extensive deposits of shale oil which is a form of fossilised algae called kerogen that under pressure and elevated temperatures has formed into hydrocarbons. The oil shale has to be heated to release the hydrocarbons as a vapour which when cooled becomes liquid oil and gas.

A pilot project is treating shale containing potentially 24 billion barrels of oil at Gladstone on the Stuart oil deposits. Stage 1 produced 100 000 barrels of oil by July 2001 and the pilot plant has a capacity of 4 500 barrels (715 5000 litres) per day.[19]

The production of shale oil reflects some of the dilemmas confronting the use of non-conventional oil sources. Unlike most conventional oil, tar sands and shale oil require the use of considerable amounts of additional energy to extract the oil. This energy costs money and contributes to greenhouse gas emissions and reduces the net efficiency from production of the oil.

Hydrogen

Hydrogen, a gaseous fuel, can be produced from almost any hydrogen containing feedstock. The main ways of producing hydrogen are electrolysis of water or gasification of a hydrogen-containing raw material. Natural gas is the most important feedstock for hydrogen production, but LPG, naphtha, heavy oils, coal and biomass can also be the basis of hydrogen production.

Although hydrogen can be used in internal combustion engines, its most widely expected use is in fuel cells. Hydrogen storage on vehicles in gaseous

18 ITR, p. 10.
19 Available at: http://www.sppcpm.com/.

form is impractical, given hydrogen's low energy content by volume. Storage in a chemical bond as a hydride or as a liquid are being considered. Liquid storage of hydrogen weighs 1.5 times as much as gasoline, and has a volume four times as great. The low temperature of –253°C poses safety and practicality issues.

APPENDIX H: FUEL TAXATION OBJECTIVES

The Inquiry analysed the objectives attributed to fuel taxation measures by government and/or perceived by the Australian community; a summary of this analysis is in Table H.1.

- In relation to government, the table shows the original objective (given in parliamentary debates or government announcements of the time) and the current objective drawn from recent government statements.

- In relation to the community, the table gives a summary of views provided to the Inquiry in submissions and consultations on the current objectives of fuel taxation and what they should be in the future.

There is far from unanimity of views on the objectives of fuel taxation. Indeed there are very diverse views on almost every aspect of fuel taxation, in part reflecting confusion within the community. A key message from the table is the changing nature of government objectives and community perceptions over time.

For example, Parliamentary debates indicate the excise treatment of liquefied petroleum gas (LPG) and ethanol was determined specifically for the purpose of diversifying Australia's liquid fuel sources.[1] In turn, this was seen to have the benefit of insulating the economy from the effects of potential increases in the price of crude oil. Both governments and the community have more recently referred to the environmental advantages of non-petroleum fuels as a basis for the excise exemptions.[2]

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1 See for example, in relation to ethanol, House of Representatives *Hansard*, 28 February 1980, pp. 507-08.

2 See the Government's recent policy announcement on biofuels, available at: http://www.nationalparty.org/policies/2001-10-31-biofuel.htm#twf.

Another message from the table is that a number of objectives are now attributed to one fuel taxation instrument. In the case of ethanol and biofuels for example, stated objectives of the excise exemption are to achieve environmental outcomes, fuel diversity and regional development. Whether the exemption is targeted at one or all of these objectives at any one time and in equal measure is not clear.

Table H.1: Comparison of government and community objectives for fuel taxation

Taxation measure	Government objectives		Views of interested parties	
	Original objective(s)	*Current objective(s)*	*Perceived objective(s)*	*Suggested objective(s)*
Fuel excise	Revenue, hypothecated to road funding at various times	Revenue	Road funding, fuel security, environment(a), revenue	External costs (road and environmental damage), rarely revenue
Ultra-low sulphur diesel excise differential	Environment	Environment	Environment	Environment
LPG exemption	Fuel diversity/security	Unclear	Environment and fuel diversity/security	Environment/health benefits, fuel diversity, sustain LPG infrastructure, maximise consumer choice
Ethanol zero excise rate	Fuel diversity/security	Fuel diversity/security, regional development, environment	Environment, fuel diversity, regional development	Environment, industry assistance, fuel security, regional development
Biofuels exemption	Fuel diversity/security, regional development, environment	Fuel diversity/security, regional development, environment	Environment, industry assistance, fuel security, regional development	Environment, industry assistance, fuel security, regional development
Natural gas exclusion	Not taxable(b)	Not taxable(b)	Environment	Environment
Burner fuel concessions	Industrial use (business inputs)	Industrial use (business inputs)	Reduce business input costs	Reduce business input costs
Aviation fuel levy	Airport infrastructure	Funds Civil Aviation Safety Authority	User charge	User charge

(a) Environmental objectives include protecting urban air quality and greenhouse gas abatement.
(b) The Excise Tariff only applies to liquid petroleum fuels so natural gas does not fall within the excise net.

APPENDIX I: GLOSSARY OF TERMS

Barrel	Measure of volume traditionally applied to petroleum. One barrel is equivalent to 42 US gallons or 159 litres.
Biodiesel	Automotive fuel consisting of esterified vegetable oils derived from crops such as canola, from re-used cooking oil or from tallow.
Catalyst	Catalytic reactor which reduces the emission of harmful exhaust gases from combustion engines.
Cetane Number	A measure of the ignition quality of diesel fuel based on ignition delay in an engine. The higher the cetane number, the shorter the ignition delay and the better the ignition quality.
Compression ratio	The ratio of the volume of the combustion chamber at the beginning of the compression stroke and the volume of the chamber at the end of the compression stroke.
Compression ignition engine	Internal combustion engine with an ignition caused by the heating of the fuel-air mixture in the cylinder by means of compression. This compression causes a rise in temperature and pressure which make possible the spontaneous reaction between fuel and oxygen. Also called a diesel engine (named after Rudolf Christian Carl Diesel (1858-1913), one of the founders of the combustion engine principle).
Crude; crude oil	Crude mineral oil. Naturally occurring hydrocarbon fluid containing small amounts of nitrogen, sulphur, oxygen and other materials. Crude oils from different areas can vary enormously.
Diesel	A mixture of different hydrocarbons with a boiling range between 250° and 350° C.
Diesohol	A blend of diesel fuel, hydrated ethanol and proprietary emulsifier.
Dimethyl ether (DME)	Chemical substance (structural formula CH_3OCH_3). Dimethyl ether can be used as an alternative motor fuel.
Dual-fuel vehicle	Also called bi-fuel vehicle. Vehicle fitted with one engine and two fuel systems. The engine can operate on both fuels. An example is an LPG/petrol dual-fuel vehicle.
Energy content	The amount of energy that becomes available when fuels are burned depends on the chemical composition, principally the ratio of carbon and hydrogen.
Ester	Chemical organic compound which is the result of a reaction between an acid and an alcohol.
Ethanol	An alcohol compound; C_2H_5OH.
Fuel cell	An apparatus in which electricity is generated by a reaction between hydrogen and oxygen forming water. Water and electricity are produced after hydrogen and oxygen ions are exchanged via an electrolyte.

Gas-to-liquids	Process of conversion of natural gas to liquids. Natural gas is converted to syngas (see below) which is then converted via the Fischer-Tropsch process to liquid hydrocarbons.
GJ	Gigajoule; unit of energy; 1 GJ = 10^9 joules.
Hydride	Hydrogen chemically bound to a metallic material.
Lean mixture	Mixture of air and fuel in a cylinder of a combustion engine containing less fuel than could be burnt by the oxygen present.
Liquefied gaseous fuels	The conversion of a gas to a fluid by lowering the temperature and/or raising the pressure. LPG is a liquefied gas; natural gas and hydrogen are sometimes liquefied.
LNG	Liquefied natural gas; natural gas in a liquid state (only possible at temperatures below -161°C).
LPG	Liquefied petroleum gas which consists mainly of propane (C_3H_8) and/or butane(C_4H_{10}) and which can be stored as a liquid under relatively low pressure for use as a fuel.
Megalitre	One million (10^6) litres
Methanol	Alcohol; CH_3OH; very toxic; highly inflammable.
MJ	Megajoule; unit of energy; 1 MJ = 10^6 joules.
NOx	Collective noun for the nitrogen oxides NO and NO_2 (N_2O or nitrous oxide is not considered a NOx compound). Noxious exhaust component of combustion engines; formed under the influence of a high temperature of combustion by a direct reaction of oxygen and nitrogen present in the air.
Octane number	A measure for the tendency of a fuel to detonate when combusted in the cylinder of a combustion engine. The higher the octane number, the lower the tendency to detonate and the better the quality of the fuel.
Petrol	Sometimes referred to as gasoline. A mixture of more than 100 different hydrocarbons with a boiling range between 25° and 220° Celsius. A fuel for ignition-compression or Otto engines.
PM	Particulate matter suspended in atmosphere. Particulate matter is measured in microns: PM_{10} = fine, $PM_{2.5}$ = ultra-fine.
Petajoule	The joule is the international unit of energy and heat. A petajoule is 10^{15} joules.
Renewable fuels	Fuels produced from plant matter such as ethanol from starch or cellulose, or biodiesel (see above).
Rich mixture	An air-fuel mixture in a combustion engine that contains more fuel than can be combusted by the air in the cylinder.
RON	Research Octane Number. Octane number which is measured by a special one-cylinder laboratory test engine.
Spark ignition engine	Internal combustion engine with an ignition of the fuel/air mixture by means of a spark; also called Otto engine.

Syngas	A mixture of hydrogen (H_2), carbon monoxide (CO) and carbon dioxide (CO_2). It may contain some impurities like methane (CH_4).
Tailpipe emissions	Emissions of a combustion engine after the catalyst (as distinct from engine-out emissions which are measured before the catalytic converter).
Three-way catalyst	Catalytic reactor for combustion engines which oxidises volatile organic compounds (VOC) and carbon monoxide, as well as reduces nitrogen oxides.
VOC	Volatile Organic Compound(s) carbon compounds that participate in atmosphere photochemical reactions.