



Transport Research Strategy

MAY 2007



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FOREWORD

In the 2005 *Transport Sector Strategic Directions* document, the government endorsed the concept of a transport research strategy. A significant amount of money and effort goes into transport related research every year, and it is important to the government that the funding is spent in a coordinated manner and results in innovation and sound knowledge. This strategy does not specifically seek to redistribute research funding, but rather seeks to guide those who fund and engage in transport research in New Zealand.

The *Transport Research Strategy* sets out the government transport sector's research needs for the shorter-term future. The transport sector is becoming increasingly complex and we need to understand the impacts that decisions in one area have on the rest of the transport system and New Zealand as a whole. This government is committed to building a sustainable nation across the four pillars of the economy, society, the environment, and nationhood. We need to understand what this means for transport. Research will help us find new ways of achieving our goals.

This strategy also aims to improve the value for money from our transport research investment. The strategy and research work programme will be regularly reviewed and updated. The Ministry of Transport will lead the implementation of the strategy through improved dissemination of good quality research results and strengthening the security of New Zealand's transport research capability in the future.

I extend my thanks to those involved in the transport and research disciplines who have contributed to this strategy.




Hon Annette King
Minister of Transport

INTRODUCTION

The development and implementation of transport policy works best when it takes an evidence-based approach. As such, the transport sector frequently uses research and information. Until now however, this research and information collection has been undertaken on a largely ad-hoc basis as individual 'knowledge needs' arise. Now, and for the first time, the sector has a strategic view of the information required to meet the needs of transport policy developers, implementation agencies and transport users.

I am, therefore, very pleased to introduce New Zealand's first *Transport Research Strategy*. The strategy addresses the key evidence challenges facing the sector and has a research work programme that sets out priorities for the sector over the next five years. The work programme will be revised regularly to take account of advancing developments in policy, technology and knowledge.

The range of people and organisations involved in transport related research is diverse and includes universities, research councils, local authorities, industry, international research institutions, public and private sector research establishments and non-governmental organisations. This strategy will help ensure that this wealth of experience and expertise addresses the key research needs of the transport sector, now and in the future.



Alan Thompson

Chief Executive, Ministry of Transport

THE STRATEGIC GOALS OF THE TRANSPORT SECTOR

The strategic context for the *Transport Research Strategy* is provided by:

- the government's goal of progressing New Zealand's economic transformation to a high income, knowledge-based market economy which is both innovative and creative and provides a unique quality of life to all New Zealanders
- the *New Zealand Transport Strategy* vision and objectives
- the *Transport Sector Strategic Directions* directional statements
- Strategic Transport Futures project outcomes.

Economic transformation

The government has adopted the theme of economic transformation as one of its three major areas of focus for the next decade. For transport, this means:

- ensuring the efficient use of transport infrastructure
- reducing greenhouse gas emissions from transport
- ensuring high quality investment allocation
- addressing under-investment
- addressing infrastructure bottlenecks and failures
- articulating the critical role urban form must play in the development of transportation.¹

The strategy identifies the need for improving understanding of the economic impact of transport, with a particular focus on understanding freight growth.



¹ *Economic Transformation: Giving Effect to the Five Themes*, Office of the Minister for Economic Development Cabinet paper, 21 August 2006. http://www.med.govt.nz/templates/MultipageDocumentTOC____23460.aspx

New Zealand Transport Strategy

The *New Zealand Transport Strategy* (NZTS) sets out the government's overall vision for an affordable, integrated, safe, responsive, and sustainable transport system by 2010. The vision is underpinned by four principles: sustainability, integration, safety, and responsiveness, and provides the framework within which transport policy is developed. The NZTS outlines how an integrated mix of transport modes can contribute to economic growth, increased safety and personal security, improved access and mobility, improved public health, and the enhanced environmental sustainability of transport in New Zealand.

The research topics in this strategy have been assessed against their contribution towards enabling the sector to achieve the NZTS vision.

Transport Sector Strategic Directions

Transport Sector Strategic Directions (TSSD) identifies the following strategic priorities for the transport sector for 2006-2009:

- an integrated approach to planning
- research and information
- a cross-modal approach to safety
- influencing demand for transport services
- managing environmental and public health benefits.²

These broad priorities represent the major cross-sectoral issues facing the New Zealand transport sector, and resolving them is essential for achieving the NZTS vision. As guided by the TSSD, this strategy identifies areas where research effort needs to be concentrated to enable progress to be made, and focuses on research that is useful for decision making.

Other government strategies

In considering the research needs of the transport sector, the research strategy has also taken into account the government's transport goals contained within:

- *National Rail Strategy to 2015* (2005)
- *Getting There – on foot, by cycle* (2005)
- *Road Safety to 2010* (2003)
- *Powering Our Future* (2006 draft)
- *New Zealand Energy Efficiency and Conservation Strategy* (2006 draft).

² Transport Sector Strategic Directions, 2006-2009, Update 2006, pages 6-7.

Strategic transport futures thinking

Futures thinking is not about predicting the future but about anticipating and preparing for new risks and opportunities. The only way to reach the desired future is to anticipate change and to plan actions based on this knowledge. The sector must ensure that it is well placed to exploit opportunities. Futures thinking can comprise:

- identifying possible futures and visions, that is what transport in the future should look like, or
- identifying long-term trends, forecasting and developing scenarios as an aid to understanding the future world.

The transport sector is undertaking a Strategic Transport Futures project which seeks to identify the major long-term issues facing the transport system. By identifying these issues it is anticipated that the risks arising from short-term, problem-solving policy solutions will be reduced and that strategic thinking will be embedded into transport policy and planning. The project also expects to recommend issues for strategic transport research.

The outcome of the project will be incorporated in the next update of the research strategy and will help shape the priority of future transport research.



Definition of research

For the purposes of this strategy, the term 'research' means research that:

- informs the development of policies, technologies or systems that contribute to the vision and objectives of the NZTS
- meets the needs of more than one potential end user
- is accessible to end users.

This broad definition is intended to allow a range of research to be undertaken, including data collection.

STRATEGIC RESEARCH NEEDS

The *Transport Research Strategy* and its work programme focus on providing information and analysis to better understand the issues facing the transport sector. This information will allow the sector to work towards the government's vision for transport in New Zealand. The direction and research programme provided by the strategy will be updated regularly to reflect information gains and additional knowledge gaps as new strategic issues emerge.

The strategy provides the direction for future transport research by identifying the topics where further knowledge is needed. Researchers can identify areas in which to focus efforts that contribute to the direction and themes provided by the strategy. The research needs were identified through consultation within the sector, and with external stakeholders.

The following strategic research themes represent areas where additional knowledge is needed:

- targeted data collection and analysis
- understanding the cost of transport
- investigation of future energy supply and use
- ensuring integrated planning for transport in the future
- improving safety and security in the network
- transport and the community
- managing transport demand
- transport, the environment and climate change
- transport and public health.

The strategy provides broad direction for focussing research efforts. A more comprehensive work programme in Appendix 2 lists the research topics in full, the priority for action and the contribution of the research towards one or more of the NZTS objectives.



Data collection and analysis

An initial priority for the sector is the collection of, and access to, improved and extended data on the nature, use and impacts of transport in New Zealand. Meeting this need is essential to ensure the provision of evidence-based policy advice. The list below includes data needs identified by stakeholders. In some cases the data may already be available but needs to be identified or collated in a useful format that is readily accessible to users.

Data needs:

- freight and passenger movements across all modes of transport
- life-cycle assessments (including costings) for each mode
- the environmental impact of all modes of transport
- travel for work purposes (excluding travel to and from work), including mode and vehicle type
- travel crashes that occur while people are driving for work purposes
- public transport usage by region and mode.

In developing and collecting data, researchers should also consider improving linkages between existing datasets, and ensuring that planning the future development of traffic information databases allows integration between datasets.

Understanding the cost of transport

A strong focus for the transport sector is to improve understanding of the costs of transport, including improving the level of understanding by transport users of the costs they create and pay for when using the transport network. Research should focus on the following:

- determining how information about transport costs and charges can be used in policy development
- investigating what cost and charge components are required and how to estimate them. This includes capital charges, return on capital and robust measures of externalities, and determining the level of data disaggregation required to meet these needs
- extending the *Surface Transport Costs and Charges 2005* study to investigate the cost and charges of the maritime and aviation modes, including updating the data in the 2005 report
- investigating whether new pricing or charging mechanisms are required and how such mechanisms can be implemented
- assessing the value for money from investment in the various transport modes.

Future fuel and energy supply and use

A goal of the transport sector is to reduce energy use, and replace non-renewable energy resources with renewable resources. Achieving this goal requires investigation of the future availability and price of fuel and alternative fuels, and the impact of changes on the transport system. Research should also cover new technology, vehicle compatibility and transport energy use. Research should focus on:

- the resource implications of using alternative fuels
- the availability of aviation fuel, and assessment of the potential impact if no alternatives are found
- the impact of the possible fuel types and costs on travel behaviour and safety
- the impact of fuel changes or cost on the sustainable growth of the transport system
- identification and development of the infrastructure needed to sustain a future hydrogen-based and electric transport fleet in New Zealand.

Planning for transport in the future

Making the most of the existing transport network, and planning for future investment, requires integrated planning across the sector. Integrated planning will improve the ease with which goods and people are moved throughout New Zealand. Mechanisms for improving the efficiency of the transport network need to be understood. Planning for future investment and development in the transport network needs to be forward thinking and long-term.

Gains in efficiency can be made by:

- developing new initiatives and trials for the strategic maintenance of the roading network and for innovative road construction and management technologies
- better understanding the nature of movement of freight around New Zealand, including the role of coastal shipping and rail in supply chains.

To inform our planning for transport in the future, research is needed to improve knowledge in the areas of:

- developing better demand elasticities (short and long-term) for all transport modes to determine responses to changes in prices and income
- the economic impact of expanding New Zealand's shipping infrastructure, and the appropriateness of current levels of port company investment (infrastructure is defined as the entire shipping sector, including the shipping fleet)
- the relationship between freight growth and economic growth in New Zealand, including how the transport network can support likely future freight growth and New Zealand's economic development priorities
- the impact of tourism growth on the transport system and its infrastructure, including impacts on airports, traffic growth, personal security and tourist focussed transport
- identifying the structure and future capability of the transport related labour market.

Improving safety and security in the network

The sector is adopting a cross-modal approach to transport safety and security, with the aim of promoting a common understanding of principles and targets, and ensuring sharing of effective practices. Research consistent with this approach is needed in the areas of:

- the impact of drugs, alcohol and fatigue on users of the transport network, with focus on high risk groups and the development of effective interventions for addressing the injury burden for these groups
- international best practice for enhancing security in public transport and its application in the New Zealand context
- evaluating the effectiveness of operationalising risk management systems.

Transport and the community

Transport and communities are integrally linked. Transport planning and urban planning need to be integrated to ensure that changes in the urban environment are supported by transport services and facilities. To further inform policy development aimed at achieving this goal and to better understand the relationship, additional research is needed to understand:

- how to integrate modes to achieve sustainability and optimal urban form
- the impact transport has on communities, in terms of social and health outcomes
- the factors that drive New Zealand commuters' transport decisions.

Managing transport demand

Historically, economic growth has been strongly correlated with growth in demand for transport services and infrastructure. Transport congestion and its impacts are now significant issues worldwide, and government transport agencies are increasingly looking to effective policy tools that can be used to influence transport demand. To assist with this, research is needed to understand:

- the relationship between the generalised cost of travel and travel behaviour
- the relationship between public transport service quality factors and travel behaviour
- the relationship between urban planning and mode choice (walking and cycling, public transport patronage, travel avoidance through lifestyle changes).

Transport, the environment and climate change

The transport sector is committed to reducing the environmental impact of transport. To build on existing knowledge that supports this goal, research should focus on:

- a comparison of the long-term (50 years plus) environmental impacts of the various modes, particularly the impact of long-term emissions constraints (such as carbon pricing and regulation) on the New Zealand transport system
- extending the New Zealand Vehicle Fleet Emissions Model, specifically to:
 - consider the changing costs and impacts associated with vehicle fleet age
 - forecast the renewal and expansion projections of the vehicle fleet
 - identify purchase choice factors
 - examine the effect of changes in the vehicle fleet on traffic volume, emissions and safety.

Transport and public health

Research is needed to continue work towards ensuring the protection and promotion of public health, specifically:

- undertake a comparison of the health impacts of the various transport modes, including emissions, noise and exercise
- identify causes of occupational disease in the transport workforce.

IMPLEMENTING THE TRANSPORT RESEARCH STRATEGY

As well as providing a transport research work programme that will provide direction to researchers and research funders, the strategy has the related goals of:

- improving the dissemination of research results
- ensuring the quality of research results
- developing New Zealand's research capability.

Work will begin in mid-2007 on implementing the strategy, including integrating it with other transport related research programmes, and developing an integrated publications and dissemination programme for transport research.

Funding transport research

The Ministry of Transport, in its role as the government's principal transport policy adviser, has collaborated with the transport sector to produce this strategy to guide government spending on transport research. Transport research is funded and managed by several government agencies, primarily Land Transport New Zealand, the Foundation for Research, Science & Technology, and to a lesser extent, the Ministry of Transport. Each agency is responsible for managing and prioritising its own research funding.

The government maritime and aviation sectors are not directly funded to undertake research. The Foundation for Research, Science & Technology and the Ministry of Transport may need to fund research in these sectors where it is identified as a priority need.

By identifying and setting out the strategic research needs of the sector across all modes, this strategy can be used by each funding agency to develop work programmes that will contribute to understanding all aspects of transport within the context of the NZTS.

The research strategy provides:

- guidance to research funding agencies that consider bids for transport funding. The direction provided in the strategy allows these agencies to consider the bids against the priorities for research identified by the transport sector and listed in the research work programme
- guidance to researchers when considering transport related research topics and preparing expressions of interest for research funding.

Information on the funding requirements and process for Land Transport New Zealand and the Foundation for Research, Science & Technology can be found at:

Land Transport New Zealand

<http://www.landtransport.govt.nz/research/strategy.html>

<http://www.landtransport.govt.nz/research/funding-process.html>

Foundation for Research, Science & Technology

<http://www.frst.govt.nz>

Other funders of transport related research include:

- Road Safety Trust <http://www.roadsafety.govt.nz>
- Health Research Council <http://www.hrc.govt.nz>

FEEDBACK

We welcome feedback on the Transport Research Strategy, which can be provided to:

Transport Research Strategy Feedback

Ministry of Transport

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Photo courtesy of Land Transport NZ

APPENDIX 1 – DEVELOPMENT OF THE RESEARCH PROGRAMME

The development of the research work programme commenced with a series of government sector workshops at which we identified the research needs of the sector, based on the government's objectives for transport as described in the *New Zealand Transport Strategy* (NZTS). A draft research programme was compiled, which identified anticipated research needs for the sector for the next three to five years.

The draft research programme was sent out for consultation to stakeholders who undertake, fund or use transport research. The stakeholders were asked for their views on what research will help take the transport sector forward and what gaps they see in transport research. Industry members, transport associations, universities, researchers, consultants, and local and central government agencies were consulted.

Prioritising the programme

The results of the consultation were incorporated into a list of potential research needs. This list was reviewed and prioritised across the government transport sector using a prioritisation framework which rated the proposal by reflecting the sector's positive or negative response to the research idea. The prioritisation framework considered:

- how a research topic would contribute to achieving the NZTS
- how important and feasible the idea was
- within what timeframe the research needed to begin.

The framework was also used to filter out research that would solely satisfy the 'business as usual' needs of the government transport sector. The result is a prioritised programme of research needs.

To ensure the programme is strategically aligned, the programme has been evaluated against the government's priorities outlined in the NZTS, the goal of progressing economic transformation, and other government transport and energy strategies.



Photo courtesy of Land Transport NZ








Photo courtesy of Transit

APPENDIX 2 – RESEARCH WORK PROGRAMME

The following research work programme is a list of key research topics that the transport sector has identified as necessary. It builds on existing knowledge and seeks to fill gaps. The programme sets out broad topics and does not prescribe research projects.

The research needs of the transport sector have been considered in the context of the five objectives of the *New Zealand Transport Strategy* (NZTS). These objectives are often interdependent and overlapping in their context, and it is recognised that the research needs identified can contribute to more than one objective. The following illustrates each proposal's contribution to the NZTS objectives.

RESEARCH THEME	ABBREVIATION	COLOUR CODE
Assisting economic development	ED	
Improving access and mobility	AM	
Protecting and promoting public health	PH	
Assisting safety and security	SS	
Ensuring environmental sustainability	ES	

HIGH PRIORITY

THEME					MODE	TOPIC	INDICATIVE NEED
ED	AM	PH	SS	ES			
					All modes	<p><i>Surface Transport Costs and Charges 2005</i> – immediate steps include:</p> <ul style="list-style-type: none"> • determining how information on transport costs and charges can be used in policy development • investigating whether new pricing or charging mechanisms are required and how such mechanisms can be implemented • investigating what cost and charge components are required and how to estimate them (this includes capital charges, return on capital and robust measures of externalities) • determining the level of data disaggregation required to meet these needs. 	1-3 years
					All modes	<p>Update and extend <i>Surface Transport Costs and Charges 2005</i> to investigate the cost and charges of the maritime and aviation modes. Research should investigate:</p> <ul style="list-style-type: none"> • the costs transport users are paying at present • the costs that transport users impose on society as a whole (ie includes measures of externalities) • who besides users pay for transport • improved understanding of the impacts of congestion • the impact transport cost and charging has on access and mobility • what the consequences of the above research might be. <p>The research should consider the externalities and life cycle issues as global impacts.</p>	1-3 years
					All modes	<p>Assess the value for money from investment in the various transport modes. Research should consider:</p> <ul style="list-style-type: none"> • life cycle assessments/costings for each mode (planning, construction, maintenance, use and disposal/recycling) • investigating ways to understand users' willingness to pay for road attributes (aesthetics, safety, free-flow) and the significance of these values. Requires full account of social cost of externalities. 	1-3 years

HIGH PRIORITY

THEME	MODE	TOPIC	INDICATIVE NEED			
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="background-color: red; color: white; padding: 2px 5px;">ED</div> <div style="background-color: orange; color: white; padding: 2px 5px;">AM</div> <div style="background-color: cyan; color: white; padding: 2px 5px;">PH</div> <div style="background-color: green; color: white; padding: 2px 5px;">SS</div> <div style="background-color: blue; color: white; padding: 2px 5px;">ES</div> </div>						
		<p>All modes A comparison of the environmental impacts of the various modes, particularly the impact of possible long-term emissions constraints (eg carbon pricing and regulation) on the New Zealand transport system.</p> <p>This includes environmental impact of freight movements in New Zealand. Impacts should look 50 years plus.</p>	1-3 years			
		<p>All modes A comparison of the health impacts of the various modes, including emissions, noise and exercise.</p> <p>This includes identifying causes of occupational disease in the transport workforce.</p> <p>Maritime and rail are the priority sectors.</p>	1-3 years			
					<p>All modes The future availability and price of fuel, alternative fuels and energy and their impacts on the transport system. Research should investigate:</p> <ul style="list-style-type: none"> • resource implications of using alternative fuels • availability of aviation fuel • the potential impact if no alternatives are found • the impact on travel behaviour and safety (building on work already completed on fuel impacts on vehicle kilometres and the fuel price impact on vehicle ownership) • the impact of fuel changes or cost on the sustainable growth of the transport system. 	1-3 years
		<p>All modes Develop better demand elasticities (short and long-term) for all transport modes (including public transport) to determine responses to changes in prices and income.</p>	1-3 years			
		<p>Maritime Evaluate the economic impact of expanding New Zealand's shipping infrastructure, and the appropriateness of current levels of port company investment (infrastructure is defined as the entire shipping sector, including the shipping fleet).</p>	1-3 years			
		<p>All modes Assess the impact of drugs, alcohol and fatigue on users of the network. Watching briefs should be kept on developments in the drug taking and impairment research, engineering solutions, testing devices and procedures.</p>	1-3 years			
		<p>All modes Evaluate the effectiveness of operationalising risk management systems. Research should focus on:</p> <ul style="list-style-type: none"> • establishing how to make risk management systems operationally effective and user friendly, especially for small businesses • new approaches to risk management for natural hazards affecting transport. 	1-3 years			

HIGH PRIORITY

THEME	MODE	TOPIC	INDICATIVE NEED
ED AM PH SS ES			
	All modes	Undertake research on high risk groups to develop effective interventions for addressing the injury burden for these groups. May involve compiling existing research.	1-3 years
ED	All modes	Identify the structure and future capability of the transport related labour market.	1-3 years
	Land, ferries	Examine international best practice for enhancing security in public transport and apply this to the New Zealand context.	1-3 years
ED	All modes	Investigate the impact of international shipping on the New Zealand transport system, including the impact on supply chains and freight movement, and inter-modal facilities.	1-3 years
AM ES	All modes	Investigate how to integrate modes to achieve sustainability and optimal urban form. Research should investigate: <ul style="list-style-type: none"> the impact of land use development on transport infrastructure and the future viability of public transport development of a traffic modelling programme to assess the impact of urban planning for walking/cycling to predict up-take and mitigate traffic demand. 	1-3 years

MEDIUM HIGH PRIORITY

THEME	MODE	TOPIC	INDICATIVE NEED
<div style="display: flex; justify-content: space-between; width: 100%;"> <div style="background-color: #e34a33; color: white; padding: 2px 5px;">ED</div> <div style="background-color: #f4a460; color: white; padding: 2px 5px;">AM</div> <div style="background-color: #42b8d1; color: white; padding: 2px 5px;">PH</div> <div style="background-color: #42a85e; color: white; padding: 2px 5px;">SS</div> <div style="background-color: #2e3192; color: white; padding: 2px 5px;">ES</div> </div>			
		<p>All modes Understand the factors that drive New Zealand commuters' transport decisions, particularly passenger willingness to transfer between modes or services during trips and key factors in achieving modal shift (eg tax policies). Research should improve knowledge on:</p> <ul style="list-style-type: none"> • willingness to transfer between modes or services during trips • the impact of tax policies to encourage modal shift and sustainable transport choices • case studies should focus on investigating local issues in local areas, with local solutions. 	1-3 years
		<p>All modes Identify the impact of transport on communities, in terms of social and health outcomes. Research should:</p> <ul style="list-style-type: none"> • evaluate the impact of poor access to transport on communities • undertake mental health impacts and sensitivity analysis, including the impacts of severe accidents/incidents on public health and emergency service workers/crash investigators • evaluate the impact of new roading developments on transport behaviours, particularly walking and cycling • improve methods for quantifying social and environmental benefits. 	3-5 years

MEDIUM PRIORITY

THEME	MODE	TOPIC	INDICATIVE NEED
ED AM PH SS ES			
	Maritime	Identify the impact of regulatory frameworks and economic variables on accident rates in the commercial fishing sector.	3-5 years
ED SS	Road	Assess technical advances in roading maintenance and construction materials. Investigate the New Zealand application of international technical advances in roading maintenance and construction materials. Evaluate technical research initiatives relating to roading maintenance and construction.	1-3 years
ED SS ES	Road	Extend the New Zealand Vehicle Fleet Emissions Model to: <ul style="list-style-type: none"> • consider the changing costs and impacts associated with vehicle fleet age • forecast the renewal and expansion projections of the vehicle fleet and identify purchase choice factors, examining the effect on traffic volume, emissions and safety. 	1-3 years
AM PH	Land	Develop tools to identify the impact of land use and urban planning on encouraging walking and cycling in New Zealand.	1-3 years
AM PH	Land, ferries	Evaluate the impact of rising public transport costs on walking and cycling as a transport mode.	3-5 years
AM	Land, ferries	Investigate options and the feasibility of establishing demand responsive public transport networks in New Zealand.	1-3 years
ED SS ES	All modes	Examine New Zealand freight supply chains and the movement of freight around New Zealand, particularly the role coastal shipping and rail can play in transporting freight. Research should include: <ul style="list-style-type: none"> • identifying ways to improve coastal shipping linkages between road and rail and key ports • identifying off-road freight solutions • assessing the impact of different delivery methods (including just-in-time) on freight movement. 	1-3 years
ES	All modes	Identify ways to reduce waste and improve waste recovery from the transport sector.	3-5 years
ED SS	All modes	Investigate the impact of tourism growth on the transport system and its infrastructure, including impacts on airports, traffic growth, personal security and tourist focussed transport. Links to developing forecasts for air traffic levels and destination trends.	3-5 years
PH	All modes	Develop best practice for Health Impact Assessments for transport.	3-5 years

MEDIUM LOW PRIORITY

THEME	MODE	TOPIC	INDICATIVE NEED
ED AM PH SS ES			
	Maritime	Develop mechanisms to mitigate the effects of sea-level change, tsunami and other marine phenomena on port infrastructure.	3-5 years
	All modes	Improve understanding of the perceptions of noise emissions and air quality.	3-5 years
ED	All modes	Continue establishing the relationship between freight growth and economic growth in New Zealand. Research should include how the transport network can support likely future freight growth and New Zealand economic development priorities.	3-5 years
	Land	Investigate ways to reduce vandalism and incident occurrence to state highways, rail infrastructure and rolling stock.	3-5 years
ED	Maritime, aviation	Assess the scope for changes to economic regulation in New Zealand of international shipping and international aviation based on developments overseas in competition law applied to these industries.	3-5 years
	Road	Identify and develop the infrastructure needed to sustain a future hydrogen-based and electric transport fleet in New Zealand.	5 years +

LOW PRIORITY

THEME	MODE	TOPIC	INDICATIVE NEED
ED AM PH SS ES	Road	Research the role/contribution of loss of concentration in road crashes.	1-3 years
	Maritime	Identify the impact of commercial shipping operations on recreational boating and waterside communities (including noise and wake).	3-5 years
	Maritime	Continue to understand the impacts of pollutants on the marine environment. Includes: <ul style="list-style-type: none"> the impact of copper-based anti-fouling products on the marine environment gathering data on the sources, type and quantity of oil discharged into the sea from ships and offshore installation within New Zealand, eg using/adapting the methodology developed by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection to develop global estimates of oil in the marine environment the type and impact of residue cargo sweepings from marine vessels. 	3-5 years
	Road	Investigate methods for building external costs into vehicle and fuel prices as a travel demand management tool in the event that road pricing is adopted.	3-5 years
	All modes	Investigate the perception of personal security on the transport network in New Zealand, with particular focus on gender differences. <i>(Note: problem is still being scoped by the Ministry of Transport and is part of Crime Prevention through Environmental Design).</i>	3-5 years

