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# GENERATING GROWTH: INFRASTRUCTURE

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A perspective on New Zealand's infrastructure issues and how they are affecting businesses and economic growth

***A report for the Growth and Innovation Advisory Board***

**Prepared by**

**Infometrics**

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## Executive summary

1. Most businesses have traditionally regarded access to basic infrastructure, such as energy, telecommunications, transport and water, at reasonable prices, as a "given". That is, something that they take for granted.
2. Infrastructure problems (price volatility, cost, access, reliability, congestion) directly and significantly raise business risks. Higher risks mean less investment, which eventually undermines growth and innovation.
3. The current study is centred on interviews with 50 major businesses and business organisations. The aim of the interviews was to gauge how significant infrastructure constraints to growth were, the nature of those constraints and the actual/likely responses to them.
4. Transport rates as one of the top four general constraints to business along with demand, compliance costs and access to labour/skills.
5. Fifty-nine percent of firms raised transport and/or energy as a constraint to their business growth, placing infrastructure, in general, in the top group of management concerns.
6. **Transport** accounts for around 9% of total costs in the firms interviewed compared to the economy-wide average of 4.4%<sup>1</sup>. Transport concerns appear to fall into one or more of the following categories:
  - availability of the right type of transport services;
  - reliability, speed or frequency of freight services to meet customer requirements;
  - the cost of freight and business travel; and
  - the social and business costs of traffic congestion.
7. There is evidence from the firms interviewed that businesses are actively pursuing solutions to the difficulties they face with the transport infrastructure - extending delivery times through the night, changing working hours to help staff avoid congestion, inland ports, etc.
8. **Energy** accounts for a higher proportion of total costs in the firms interviewed than for the economy as a whole (3.4% cf 2.0%). There are three key aspects to their concerns:
  - the volatility of peak period energy prices (making it increasingly difficult for businesses exposed to spot prices to plan and optimise operations);
  - the long-term increase in the cost of energy (eroding a significant competitive advantage for a number of major export businesses – aluminium, forestry, methanol); and
  - reliability/security of supply.

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<sup>1</sup> Relates businesses only – excludes consumers

9. Firms have cut or shifted production to avoid high and volatile peak prices. They have also instituted energy savings plans or had audits carried out. Over the longer term some companies indicated that they would be compelled to abandon (to imports, or offshore processing) some energy intensive activities to remain competitive in the face of higher energy costs. The current electricity crisis has raised awareness amongst businesses of the need to plan for the possibility of disruptions to power supplies.
10. Telecommunications (broadband) and water/waste water are well down the list of concerns raised by managers surveyed for this study. The lack of broadband, however, is an issue for specific companies, for example, those dealing with farmers. The absence of broadband capacity is likely to constrain the ability – in many cases of leading edge businesses outside the main centres - to deal with their customers and vice versa.
11. Water and waste water are generally a local government responsibility, and where issues were raised by firms, they related them to local rather than national difficulties. The Resource Management Act (RMA), however, is seen as a national issue that makes any solution to water/waste water problems more difficult.
12. The current infrastructure-related problems obscure more crucial longer-term issues including:
  - few instant solutions to infrastructure bottlenecks and therefore what appear to be short-term problems are likely to become more regular or persistent;
  - a lack of certainty about access to good quality and stable priced infrastructure discourages business investment – almost a prerequisite for growth and innovation;
  - poor infrastructure will discourage foreign investors and possibly add to, and/or raise the cost of servicing, the nation's debt burden.
13. Within the last two years direct price inflation for both transport and energy outputs has begun to accelerate. Higher prices are a logical (though not the only) reflection of supply shortages. Besides these explicit cost increases business will have faced increasing implicit costs - congestion and insecurity of supply.
14. New Zealand compares reasonably well on a number of international comparative measures of infrastructure – still relatively low electricity prices (although this is changing); relatively low transport congestion; and good uptake by businesses of internet technology whose cost is in line with other developed economies.

# 1. INTRODUCTION

## Objective

The objective of this project is to:

- identify what businesses see as the three or four most important infrastructure constraints to their growth and, by implication, overall economic growth
- outline the rationale behind businesses' concerns and their actual/likely response to the perceived constraints

Infrastructure has been identified by the Growth and Innovation Advisory Board as an important element in pursuing faster economic growth. The purpose of this project, therefore, is to inform the Board about the key infrastructure issues faced by business, and the implications of those issues for economic growth.

The consulting project is required to focus on physical infrastructure including:

- energy – electricity, gas and coal
- telecommunications – broadband, next generation internet
- transport – international and national – road, rail, shipping, air
- waste and water.

The emphasis of the analysis is on how infrastructure constraints may compromise economic growth and innovation.

## Approach

The two basic strands to the work programme were:

- Direct interviews with 50 businesses/organisations
- Analysis of the characteristics of infrastructure in New Zealand, including domestic price trends, international benchmarking.

The interviews were based around an interview guide that sought responses to four broad issues:

- the main constraints to business growth and where infrastructure fits amongst them;
- the relative significance of key physical infrastructure inputs to the business;
- how infrastructure constraints affect business performance; and
- how the business is responding.

In addition, most firms provided some basic details about their business: number of employees, growth in turnover, extent of exports and also the

significance of their expenditure on infrastructure. We have used a short web-based questionnaire to help obtain the objective data.

The interviews provide the Growth and Innovation Advisory Board with an insight to how a wide range of companies view infrastructure:

- its importance as a constraint to business growth;
- the cost of infrastructure in the context of total business expenditure;
- the nature of the infrastructure problems, where they exist; and
- the actual/likely response to infrastructure bottlenecks.

We approached 57 businesses/ organisations for interviews. Seven companies declined our request for an interview. Interestingly, one that rejected our invitation to participate has been very public about the predicament it is facing with respect to high power charges.

Of the 50 interviews, 43 were of businesses and seven were with other organisations including Business New Zealand, the Major Energy Users Group (MEUG), the New Zealand Council of Trade Unions (CTU) and the Telecommunications Users Association of New Zealand (TUANZ).

Of the businesses interviewed 73% (unweighted) had some export sales (on average 48%<sup>2</sup>). The firms collectively employ around 74,000 people (an average of 1725 per business).

The table in Annex 1 shows the spread of firms interviewed by industry and the contribution that industry makes to GDP.

In the interests of time, logistics and the need to co-ordinate with busy people, seven of the 50 interviews were conducted by phone. The remaining 43 were conducted face-to-face. The latter approach encourages respondents to range beyond the narrow focus of the interview guide, and that often throws up useful/unexpected comments that help to build a richer picture of the concerns businesses have. especially with respect to infrastructure.

## The report

The report covers three main areas:

- The findings, or themes, that emerge from the interviews. These are brought together under each of the four main categories of infrastructure, and by the three main areas of investigation: the significance, nature, and response to the particular infrastructure constraint. We also comment on the wider economic consequences of infrastructure problems.
- The quantitative findings from the interviews including a scoring of constraints to growth, the relative significance of infrastructure

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<sup>2</sup> Some respondents chose not to provide export data and therefore have been excluded from this average.

spending and the relative importance of the individual categories of infrastructure to firm-level performance.

- In Chapter 4 we look at the trends in infrastructure prices and how prices and other measures of infrastructure performance compare with other countries.

## 2. GENERAL FINDINGS

In this section we outline and interpret the key findings from interviews with the 50 firms and organisations. Generally the points made below are based directly on interviewee responses. We have also interpreted responses using the quantitative information gathered from firms as well as the data and analysis of general trends, and comparisons of infrastructure measures.

### Business risk

Businesses face an array of constraints (such as labour, capital, sales, etc) to their performance (growth and innovation). More specifically firms must manage a range of risks – the exchange rate, labour/skill shortages, cashflow, debt, pollution, accidents, product development, R&D, etc.

As the level of risk facing a firm rises, the less likely that firm is to invest and therefore to grow and innovate. Rising uncertainty about energy prices, security of supply and the timely delivery of goods has increased business risk. Moreover, many businesses lack the experience to manage these new infrastructure risks, and consequently the problems can escalate through poor option taking, or simply a lack of knowledge as to what options are available.

### General constraints to business growth

Costly or hard-to-access infrastructure is a possible drag on business growth and innovation. However, infrastructure is only one of many factors limiting growth.

We specifically asked firms what were the major factors preventing them from growing faster. The most commonly listed constraints were<sup>3</sup>:

- availability/cost/timeliness of transport;
- access to skills/labour;
- demand for output or sales;
- compliance costs/ regulations/RMA.

It is significant that transport tops the list. Although energy rates further down, transport and energy combined were rated by nearly 60% of the firms as constraints to their growth. That puts infrastructure firmly in the picture as an impediment to business and economic performance<sup>4</sup>. Infrastructure is generally an area that businesses do not have a lot of control over and the Government has a key role to play in fixing the problem.

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<sup>3</sup> See Table 3.1 for a more detailed list of constraints and the percentage of respondents that listed each as a constraint.

<sup>4</sup> NB: the firms were not randomly selected and they were aware that the prime purpose of the interviews was to delve into infrastructure bottlenecks. Therefore, if anything, we would have expected firms to be more conscious of infrastructure problems when responding to the question about general constraints to business performance.

Over a third of firms said labour was a limiting factor. In some cases it was simply the supply of unskilled or semi-skilled labour. The forestry industry, distribution businesses and manufacturers are short of people to carry out relatively unskilled tasks. In other businesses there are not enough technically skilled people (tertiary educated) and middle managers.

Labour regularly has a high score in the New Zealand Institute of Economic Research's Quarterly Survey of Business Opinion (QSBO) as a factor limiting firms' growth. Firms in this study indicating a shortage of skilled workers were active (and generally successful) in attracting appropriate immigrants, though many pointed out that the costs involved in hiring foreigners was high.

Sales or demand for output is commonly cited in QSBO as the major constraint to business growth. It is therefore no great surprise that it should come near the top of the list in this study as an issue cramping growth.

Over 40% of all businesses interviewed raised compliance costs and/or the Resource Management Act (RMA) as a constraint to their growth. Indeed these two combined were the most commonly listed impediments to business performance. The results are consistent with the National Bank's survey of small businesses where compliance costs regularly come at the top of the list of business problems.

The results from this work are generally consistent with a wide range of studies that have examined business growth and performance in New Zealand over the past decade.

## **Infrastructure constraints**

For many of the businesses interviewed, infrastructure accounts for a small proportion of all costs. Energy, transport, telecommunications and water/waste water in total account for around 14% of total costs. That is reasonably consistent with input-output data for the whole economy that show the four categories of infrastructure account for just under 10% of all business costs (see the next section for more details).

The public face of infrastructure problems is electricity price increases, traffic congestion and the precarious state of Tranz Rail. These issues have attracted media attention and are the most obvious signs of shortcomings in the country's infrastructure.

It is clear from talking with business managers that infrastructure bottlenecks, mainly in transport and energy, are inhibiting growth and innovation. Firms perceive they can no longer rely on infrastructure – it is becoming a significant business risk. Uncertainty about energy prices and supply, and transport delivery times are adding costs to businesses and absorbing valuable management resources.

The increasing uncertainty is possibly accentuated because most businesses had until recently worked on the assumption that energy, water, transport and telecommunications services would always be readily available at reasonably predictable prices. They expected that any disruption to these services would be short term.

### **A long term issue**

The immediate infrastructure-related problems some firms face obscure more crucial longer-term issues including:

- few instant solutions to infrastructure bottlenecks and therefore what appear to be short-term problems are likely to become more regular or persistent;
- a lack of certainty about access to good quality and stable priced infrastructure discourages business investment – almost a prerequisite for growth and innovation;
- Concerns about our medium to longer-term competitiveness will not only deter foreign investment in New Zealand, it may also increase the cost of servicing debt.

## **Transport**

Transport is one of the most highly ranked general constraints to business growth, and also ranks as the most important infrastructure constraint to business growth. Transport accounts for double the share of total costs in the businesses interviewed than is the case for the economy as a whole – 8.8% compared to 4.4%.

The greater significance of transport probably reflects the fact that this study is biased toward large export businesses that have both internal and international transport costs as well as significant travel costs. We know from our study of export companies<sup>5</sup> that distribution is a crucial factor in determining their growth, particularly given the time and distances involved in dealing with major global markets.

The nature of the transport problem appears to fall into one or more of the following categories:

- availability of the right type of transport services;
- reliability, speed or frequency of freight services to meet customer requirements (commercial costs of congestion);
- the cost of freight and business travel; and
- the social costs of commuter congestion.

Firms tend to view transport in its widest sense covering freight both into and out of the business (domestically and internationally) as well as business travel, the cost of bringing immigrants to New Zealand and congestion problems.

### **Availability of services**

Corporate convulsions have affected both air and rail transport services over the past two to three years. Air cargo services have deteriorated right through the country. The withdrawal of United Airlines from New

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<sup>5</sup> Firm-level Manufacturing Export Study, Ministry of Economic Development (et al), Infometrics Ltd, March 2002

Zealand reduced air-freight capacity in and out of the country. The replacement of Boeing 767 aircraft with smaller 737 planes by the main airlines servicing the Tasman in and out of Wellington and Christchurch airports has further reduced airfreight options for businesses outside Auckland. The loss of United has also narrowed the options available for business travel to and from the US and Europe.

New Zealand does not have a specialised or dedicated air cargo service – it is currently an adjunct to the primary business of moving passengers. New Zealand's remoteness and increasing emphasis on high valued innovative products to help expand our export earnings suggest that air transport is a crucial element of our export infrastructure.

There has been a steady decline in companies' use of rail transport because of poor or non-existent service. A fertiliser company interviewed indicated that it would ideally freight around a third of its product by rail if rail would provide the capacity to do so. Currently around 10% of its output goes by rail. Another fertiliser company we are familiar with transports all its production by road because Tranz Rail no longer makes wagons available.

### **Reliability, speed, frequency**

Reliability, speed and frequency of deliveries are important for most businesses trying to meet or exceed customer requirements. The most obvious problem here is congestion, particularly in Auckland. It makes delivering goods both slower and more expensive. It also compels firms to take extra care in managing logistics and configuring cargo (ready mix concrete must be able to survive traffic delays!).

From the interviews there is clear evidence that congestion is costing companies money. More vehicles than before are needed to deliver goods on time.

But reliability and speed are not just related to traffic congestion in Auckland. A number of companies exporting goods work to tight delivery schedules to offset the disadvantages of being so far from key markets. They often have the same lead times as their competitors, but have less time to manufacture the product given the longer delivery times involved.

They therefore seek to squeeze time by delivering to ports/ airports as late as possible. That means they rely heavily on fast and secure transport systems to the main export ports. Changes in airline capacity and schedules, as well as port services, mean that some export companies have had to rely even more heavily on internal land transport services to get to export ports. We can expect further rationalisation of global transport systems, especially with a growing emphasis on security. That will require exporters to consolidate cargoes at fewer and fewer exit points, thereby increasing the demands on internal transport services.

### **Transport costs**

The cost of transport (as measured by the producer output price index) rose by nearly 10% over the two years ended December 2001 (the index largely ignores the cost of congestion). Since then it has remained relatively stable. For some businesses transport costs have increased as a result of congestion pushing up travel times, particularly through Auckland. One major distribution company noted that five years ago they

were achieving four deliveries a day compared to just 2.5 round trips today.

A number of export businesses, especially those seeking skilled workers, noted the increasing size of their travel and accommodation budgets. Recruiting from overseas is expensive in terms of interviewing people as well as relocating successful candidates.

In simple terms, distance from markets makes doing business more expensive, but many of the higher freight and business-related travel costs noted by companies have little or nothing to do with domestic transport infrastructure.

### **Commuter congestion**

Peak time congestion on Auckland's road network is creating social and business costs. Commuters have had to change their working hours and/or spend more time commuting. To accommodate a wider range of working hours businesses have had to pay higher building operating costs to have services running for longer.

## **Responses**

*Contract out logistics* – specialist firms are better placed to manage the increasingly complex job of managing storage, delivery and congestion.

*Re-tender transport contracts* – to encourage transport operators to offer the most efficient package for all transport requirements, or to attract foreign operators (one forestry company has been able to hold its transport costs and gain other logistical efficiencies by contracting an Australian transport company)

*24-hour delivery* – evidence of firms delivering at night to avoid congestion. A port company has seen an increase in the volume of freight shifted at night from around 13% two years ago to just under 30% today. It is not always possible to deliver at night because of curfews at some supermarkets in residential areas. One business claimed that transporting goods at night was around 10% cheaper than daytime transport.

*Make greater use of inland ports* – the main port companies are developing inland ports that allow businesses and freight companies to drop and pick up containers from more convenient locations. Ports and shipping companies are then able to consolidate cargoes and make greater use of rail, therefore bypassing congested roads.

*Greater use of communications systems* – firms are making greater use of the web, video conferencing, etc to conduct business internationally. Terrorist and health threats will help spur the use of communications and reduce reliance on physical travel.

*Clustering activities* – bringing together in one area related activities reduces transport costs and opens up other possibilities including shared energy generation plants (see forest processing example below)

*Extend operating hours* – many firms in Auckland have changed or extended operating hours to help workers avoid rush hour.

## Energy

Energy is rated as the second most important infrastructure issue facing businesses. However, it rates around sixth in the list of general constraints to business growth. Given its current profile it is perhaps not surprising it features so highly on the list of general constraints.

There are at least three aspects to firms' concerns:

- the volatility of peak period energy prices (making it increasingly difficult for businesses exposed to spot prices to plan and optimise operations);
- the long-term increase in the cost of energy (eroding a significant competitive advantage for a number of major export businesses – aluminium, forestry, methanol); and
- reliability/security of supply.

### Volatility of peak prices

The volatility of peak power prices affects most companies, but particularly those that have failed to, or been unable to, secure comprehensive supply contracts. We have interviewed more than one business in each of three industries where there have been high profile energy problems – baking, and fish and forest processing. In each of these industries we have found businesses that are either unconcerned, or very concerned, about peak load prices.

The stark difference in experience within the same industry suggests that the problem relates either to poor management (customer and/or retailer), or some imperfections in the energy market.

Given that this study relates to business experience and behaviour the focus here is on business management rather than market imperfections. Most managers, particularly of small to medium sized businesses, have little experience in electricity risk management. Therefore, it is not surprising that some firms have been caught out by the current crisis, while others have been unaffected, as much because of good luck rather than good management. Clearly, firms will become more sophisticated in energy risk management now that the need is obvious.

From the very limited evidence we have from this study, it seems that the level of exposure a business faces to peak load price volatility relates to:

- contract duration / timing of contract renewal;
- size of business and its demand for energy (is it a priority customer for the energy supplier).

Most companies have been able to sign up new contracts, albeit at much higher prices. But we have interviewed some companies whose contracts have expired recently and who have been unable to negotiate new contracts with retailers. This leaves them exposed to the spot market.

Small to medium sized businesses are perhaps the most vulnerable in these circumstances. They may not be important enough customers for retailers, or they have little knowledge/ experience of negotiating a new contract under such uncertain conditions.

A number of large businesses (and also big energy users) covered in this study have a portion of their energy supply coming from the spot market. Excessive peak load prices, or volatility in spot prices have reached a point where they are being forced to cut production (Comalco and Pacific Steel being obvious examples<sup>6</sup>).

Two points are important here:

- Firstly, it may be economically more sensible to cut marginal production (consumption) than to activate the most marginal electricity generation. The signalling device is, of course spot prices.
- The second point is that businesses lose more than just their marginal output (assuming they are forced to trim production because of high and volatile spot prices). Lost production means unfulfilled orders and possibly dissatisfied customers and a tarnished reputation. Export oriented businesses are likely to be particularly vulnerable to this problem.

A number of businesses interviewed attempt to operate 24 hours a day seven days a week. They cannot easily escape surges in energy prices without compromising their commitment to round the clock production. The inference is that high spot energy prices are a disincentive to efficient (and possibly also large-scale) production.

### **A structural change in the cost of energy**

Businesses face a permanent and significant lift in the cost of energy. The current crisis masks a longer-term change in New Zealand's energy market. The first signs of the coming structural shift are already here with firms facing higher *contract* power prices. The impact on the economy over the long-term promises to be substantial. The rising cost of energy will compel energy intensive businesses to re-evaluate their medium to long-term strategies – several companies noted such pressures.

Many of the country's largest export businesses are heavy energy users. Higher energy costs, therefore, will erode their competitiveness, with significant long-term consequences for the New Zealand economy. Again a number of big primary product processors recognised the issue and indicated that it would have consequences for future investment in New Zealand.

Companies are already experiencing 20-50% increases in their energy costs. Such big price hikes for an essential business input create problems for business planning, and also create uncertainty as to when and where energy costs will settle.

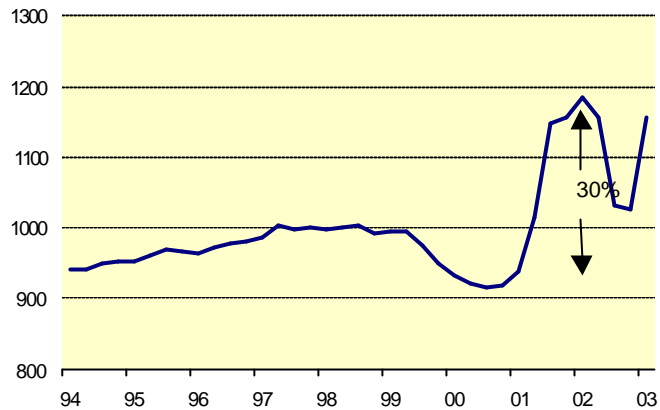
One firm pointed out that it is negotiating contracts with a foreign client to supply product in two to three years' time. Not knowing where the cost of an important input will be at that time puts it at a real disadvantage to many of its international competitors.

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<sup>6</sup> One company pointed out that at current spot prices the value of electricity in their products exceeded the price of the product on international markets.

### Electricity prices

Producer output price index, Dec 97 = 1000



Graph 2.1

As data in Graph 2.1 indicate, electricity prices were relatively stable until about 1999. The *underlying* cost of electricity has become more volatile and the rate of increase has accelerated from around 0.7%pa 1994-98 to 2.3%pa 1999-03.

Companies are reporting that they face future significant (annual double digit) increases in the cost of contracted power. The structural change in energy costs is therefore turning out to be quite rapid, thanks mainly to a shortage of traditional fuels.

### Security of supply

The reliability or security of supply is something most businesses used to take for granted. The possibility of power shortages has helped raise awareness of just how vulnerable they might be to power cuts, or “brownouts”.

Without energy most businesses would cease to operate, with serious consequences for their profitability and credibility with their customers. Auckland’s 1998 electricity crisis caused severe disruption to business. A technical publication by the Auckland Regional Council “Risk Management: Looking Forward from the Auckland Power Crisis” reports that 54% of businesses in the affected regions were forced to shut down, resulting in 400 businesses failing. The long term economic consequences have been estimated to be equivalent to 0.1-0.3% of GDP<sup>7</sup>.

A firm in the film-related industry emphasised that any power cuts would set back (or possibly destroy) the international reputation New Zealand firms have been building over the past decade. Deadlines in the film industry are often tight and commercially crucial.

Thus any increase in the prospect that businesses might lose supply threatens the medium term credibility of New Zealand as an attractive business environment. Continuity is crucial.

<sup>7</sup> Infrastructure Failure in Auckland ([www.arc.govt.nz](http://www.arc.govt.nz))

Several firms pointed out that the reliability of gas supplies would deteriorate as capital spending to maintain Maui production was influenced by the looming closure of the field. Disruptions to gas supplies would affect some firms directly and many others indirectly through surges in spot electricity prices.

## Responses

*Reduce consumption at peak times* – for 24 hour seven day a week businesses the most common response is to schedule maintenance shut downs to coincide with peak demand. In one case the company has shifted its whole production schedule to operate at full capacity through the latter part of the week and through the weekend when it has been able to secure hedges against peak pricing.

*Shut down production at peak times* – at least two big companies indicated they had had to shut down production in the face of surges in electricity prices.

*Contract more energy supplies* – companies are looking to contract more of their energy requirements. Although it is difficult to secure contracts, one generator has been trying to attract bids for significant blocks of electricity for one-year contracts.

*Energy saving* – a number of companies have adopted energy saving schemes within their business. Some have sought outside energy audits to direct energy savings efforts.

*Emergency energy arrangements* – the threat of power shortages/cuts has heightened companies' awareness of the need to have back up plans to maintain electricity supplies. Some firms have emergency power systems but only to cover essential equipment (freezers and the like).

*Cogeneration* – it has been an important source of additional supply over the past ten years. The general impression from firms was that the commercial opportunities for new co-generation plants was now limited apart from some potential clustering of forest processing activities.

## Telecommunications

Few companies raised telecommunications as a problem for their business development. Where they did it was mainly a matter of the quality/performance of their service provider, and a switch in provider had helped sort out any problems.

There were, however, some national businesses that faced broadband issues for far-flung branches and customers. Those companies with clients in the rural sector were most aware of the lost opportunities from not being able to provide some customers services because of a lack of broadband capacity.

It is worth noting that the consequences of a large number of rural/provincial businesses not having access to high speed internet probably compromises the productivity gains that these important businesses are able to achieve. In simple terms, broadband technology could save farmers a trip or two to town a month. This study covered very few small regional businesses and therefore may underestimate the impact of slow access to the Internet.

Companies that rely heavily on telecommunications, including broadband capacity, acknowledge that most problems can be solved through spending more – the solutions are available at a price.

Those companies most reliant on telecommunications did not raise access and reliability of services as a concern.

## Responses

*Rely on low technology communications* – revert to older technologies such as fax. One company had to revert to filling out faxed versions of MAF forms, because his rural phone line was not capable of handling MAF's web-based documentation.

*Avoid "large" sites* – Some users and providers may avoid large sites. Where a large portion of a firm's customers do not have access to broadband they will tailor their web site to suit the limited capacity to upload/download information. This is particularly the case in the agricultural industry where the key customers of agriculture service providers are farmers in remote locations.

*Switch providers* – businesses recognised that they had a choice of provider and were willing to exercise that choice to help solve problems.

## Water and Waste

Four companies raised water and or waste water as an infrastructure issue of some importance. All four are in the primary product processing industry. Water is a significant by-product for these companies. It is also increasingly important to farming, particularly dairying in the South Island.

Companies perceive that the Resource Management Act (RMA) adds to the difficulty and cost of resolving problems with water supply as well as treatment/disposal of waste water.

Water/waste water is the least significant infrastructure constraint at the moment based on the firms interviewed. But, as Auckland's 1994/95 water crisis (and the current crisis in Kapiti) illustrate, a lack of water can quickly rise to the top of businesses' agendas.

## Responses

*Find alternative economic uses for waste* – partner with green waste composting firms to dispose of waste and thereby avoid landfill costs.

### 3. QUANTITATIVE FINDINGS

#### Constraints to business growth

Firms were asked to list the main constraints to their growth. The most frequently raised issues from 42 respondents<sup>8</sup> are set out in Table 3.1.

#### Constraints to growth

Constraint	% of respondents identifying constraint
Transport (availability and cost)	41%
Labour (availability and cost)	36%
Demand	30%
Compliance costs/regulations	25%
Exchange rate volatility	25%
Energy (cost and security)	18%
RMA	18%
Access to international markets	18%
Cost/availability of inputs	14%
Capital	11%
Capacity	7%

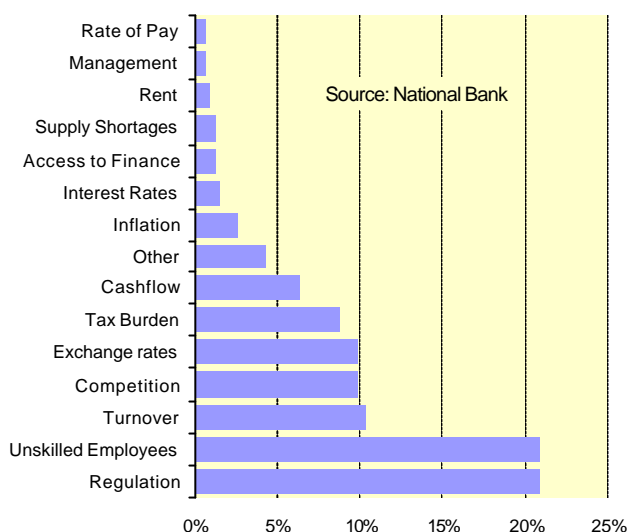
Table 3-1

We have already discussed the top four constraints and the fact that transport and energy combined put infrastructure issues well out in front as an actual or potential impediment to growth. Interestingly, telecommunications and water/waste water do not feature as a factor cramping growth.

The National Bank’s survey of SMEs shows a significantly different rating of business problems from that which we have gathered in this study. But remember, we have targeted larger firms, so that contrasting results may provide some insights into what different sized firms view as key growth inhibitors. Moreover, it is difficult to exclude the possibility of a bias toward infrastructure in this study.

<sup>8</sup> Not all firms interviewed provided quantitative responses on all areas.

### Biggest problem facing SMEs



Graph 3.1

### Infrastructure constraints

Firms were asked to rank the four categories of infrastructure in order of significance in terms of actual/potential constraint to their business growth and innovation. The results for the 42 firms that responded to these questions are set out below.

Of the respondents, 27% identified energy as the most significant issue with 59% identifying transport as the most significant issue. Interestingly, 18% of the respondents identified energy as the least significant issue.

#### Infrastructure constraints to growth

Ranked from most (1st) to least (4th) constraining % of participants

Constraint	1st	2nd	3rd	4th
Energy	27%	36%	11%	18%
Transport	59%	27%	5%	2%
Telecommunications	5%	11%	25%	52%
Water and waste	2%	5%	18%	68%

Table 3-2

These results are consistent with the relative contribution to total costs of each type of infrastructure suggesting a degree of internal consistency between the ranking of constraints and cost.

### Infrastructure costs

The table below sets out the percentage of total business costs accounted for by the various categories of infrastructure. For many of the

businesses interviewed, infrastructure accounts for a very small proportion of all costs. However, the firms in this study appear to spend more on transport and energy than companies on average. In the case of transport the ratio amongst the firms in this study is twice that for the economy as a whole. That may partly reflect the character of the sample of companies we have interviewed, and particularly the emphasis on primary processing industries and manufacturing export companies. These businesses tend to be relatively transport and energy intensive. Export business will obviously be more dependent on transport and distribution than purely domestic businesses.

The infrastructure survey results may also be higher than the economy-wide data because of:

- Differences in the definition of infrastructure costs (and the match between input-output and interpretation of respondents) and the definition of total cost. For instance respondents may have included transport between third countries (distribution), which would not be covered in the inter-industry tables.
- The exclusion of own sales within an industry from the economy wide results to minimise the bias of sales between the same industry on the overall result (particularly energy companies). For some of the respondents, the contribution of own-industry sales will be significant and as a result the survey results may be higher than the inter-industry proportions. (Note, if own-industry sales are included in the inter-industry calculations energy would account for 3.4% of total costs. Transport would account for 5.4% of total costs.)

Economy-wide data from input-output tables show that transport accounts for roughly half of total expenditure on infrastructure. That is consistent with the survey results.

**Contribution of infrastructure to business costs**

% of total costs

	Economy wide <sup>1</sup>	Infrastructure survey
Energy <sup>2</sup>	2.0%	3.4%
Transport <sup>3</sup>	4.4%	8.8%
Communications <sup>4</sup>	2.4%	1.3%
Water and waste <sup>5</sup>	0.4%	0.3%

1. As calculated from the 1996 Inter-industry tables (Statistics NZ). Calculated from inter-industry transactions (Table 4) as total use in producers prices plus compensation of employees

2. Energy includes coal, gas and electricity (excluding intra-energy industry transactions).

3. Transport includes petroleum, road, water, rail and air transport (excluding intra-transport industry transactions).

4. Communications includes postal and courier services, and telecommunication services.

Statistics New Zealand does not provide separate telecommunications results.

5. Waste includes waste disposal, sewerage and drainage services, and water supply.

Table 3-3

The relative significance of each of the four categories of infrastructure gathered from the interviews is roughly in line with the economy-wide data.

### Infrastructure costs by industry

At an individual industry level transport and energy remain dominant especially in the primary sectors. The survey data in the tables below should be treated with caution given the very small sample size available. The forestry and dairy industries are particularly intensive users of transport services. They also represent some of the fastest growing areas of the economy in absolute terms.

#### Agriculture, Forestry and Fishing

Contribution of infrastructure to total costs, % total costs

	Economy wide	Infrastructure survey
Energy	1.9%	8.3%
Transport	6.3%	23.0%
Communications	1.5%	1.6%
Water and waste	0.0%	1.1%

Table 3-4

For the manufacturing industry the survey results are lower than economy wide data for energy, transport and telecommunications. That simply highlights the small sample size in this study. Nonetheless, the results are sufficiently consistent between the firms interviewed and the economy-wide data, to give us some confidence that the points underpinning Chapter 2 are reasonably representative. An earlier study of small to medium sized manufacturers indicates an average energy contribution of around 3%<sup>9</sup>.

#### Manufacturing

Contribution of infrastructure to total costs, % total costs

	Economy wide	Infrastructure survey
Energy	3.4%	1.8%
Transport	4.1%	6.3%
Communications	4.0%	0.9%
Water and waste	0.9%	0.3%

Table 3-5

<sup>9</sup> Source: SME's – Competitiveness at Risk (CAR) Survey March 2003, New Zealand Climate Change Office and Business New Zealand.

## 4. INFRASTRUCTURE TRENDS

Trends in infrastructure costs vary by infrastructure type. Given the link between infrastructure constraints and the cost of infrastructure, an assessment of trends in the cost of infrastructure services provides further confirmation of the dominance of transport and energy as important issues occupying management time.

In this section we bring together trends in infrastructure prices and compare New Zealand's infrastructure with other countries.

We discussed electricity in Chapter 2 – see Graph 2.1 for details of the trend in prices, which have become more volatile and the underlying rate of increase has accelerated.

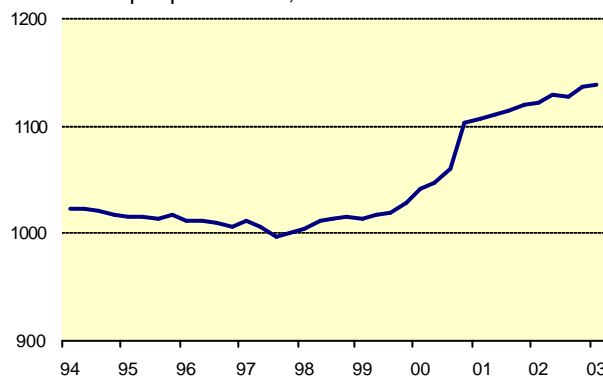
### Transport

Transport prices have increased steadily since 2000. Higher oil prices over 2000 were an important factor pushing up airfares and, to a lesser extent, road and rail rates. Between 1994 and 2000 transport costs increased by just 0.7%pa. The recent lift in output prices in this industry has lifted the annual average rate of inflation in transport prices to 1.3% – still very respectable by comparison with overall inflation.

Within the transport category air transport has produced the fastest rate of growth in prices – 2.5%pa over the past eight years. Although air transport is generally not seen as part of the infrastructure bottlenecks businesses struggle with, it is an increasingly important input to high value exports. It is also crucial to firms trading internationally – a number of companies noted the increased cost of air travel as well as the shrinking travel options.

#### Transport prices

Producer output price index, Dec 97 = 1000



Graph 4.1

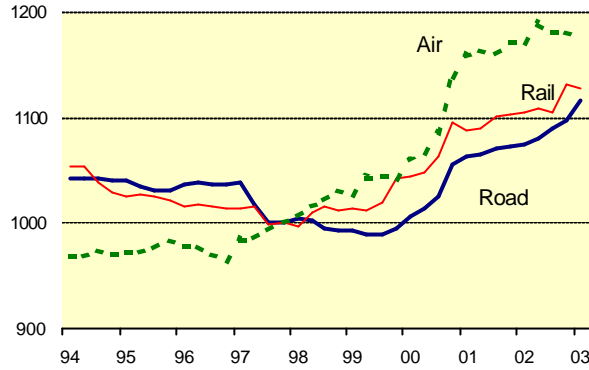
Despite growing problems in the rail sector, rail charges<sup>10</sup> have changed at the same rate as road charges over the past four years. Some companies that were interviewed for this study argued that rail freight

<sup>10</sup> Rail charges include other transport and storage costs.

rates tended to shadow road rates rather than reflecting the true commercial costs involved in freighting goods by rail.

**Transport prices**

Producer output price index, Dec 97 = 1000



Graph 4.2

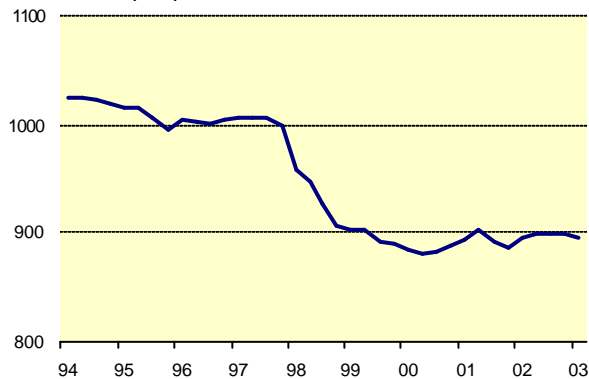
**Telecommunications**

Consumer price data show that the cost of telephone calls by households has fallen by between 6 and 7%pa since 1990. Internet charges have halved over the past three years.

Producer output prices for communication services (telecommunication, postal and courier) have declined 10% since December 1997. Given that postal and courier service charges have been at best static this suggests that telecommunications charges have fallen by more than 10% over the past five years.

**Communication services prices**

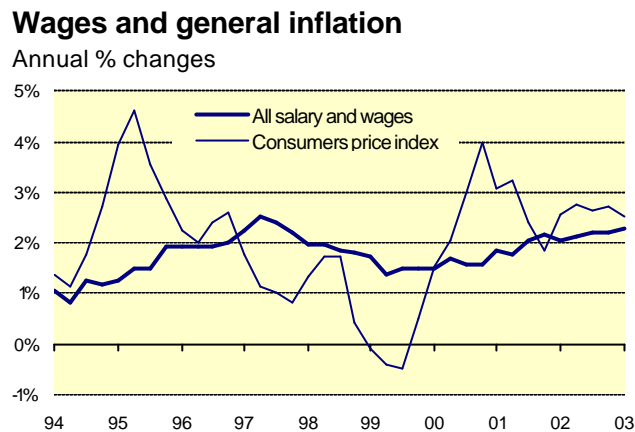
Producer output prices, index Dec 97 = 1000



Graph 4.3

## Trends in other business costs<sup>11</sup>

Businesses put labour issues near the top of the list of constraints to business growth. Typically the problem with labour relates to a shortage of supply of both skilled and unskilled labour. Supply shortages might normally be expected to translate into higher prices for this vital input to business. The following graph shows that the price of labour has risen at less than 2%pa over the past nine years. Indeed the difference between labour inflation and producer output price inflation is negligible over the past eight years.



Graph 4.4

## International comparisons

The latest (2003) IMD world competitiveness results<sup>12</sup> show New Zealand ranked 18<sup>th</sup> most competitive out of 59 economies. The results are based on the views of executives in each country. In the latest study New Zealand's infrastructure came in at 16<sup>th</sup> implying it is helping rather than hindering our competitiveness. The 2003 results, though, are probably based on 2002 survey results – several months before gas and electricity problems surfaced.

### Energy

According to the International Energy Agency<sup>13</sup> data New Zealand's wholesale electricity prices have increased faster over the past decade than in any of our major trading partners' economies. Note that the IEA study does not indicate relative price levels – only relative changes in prices over time.

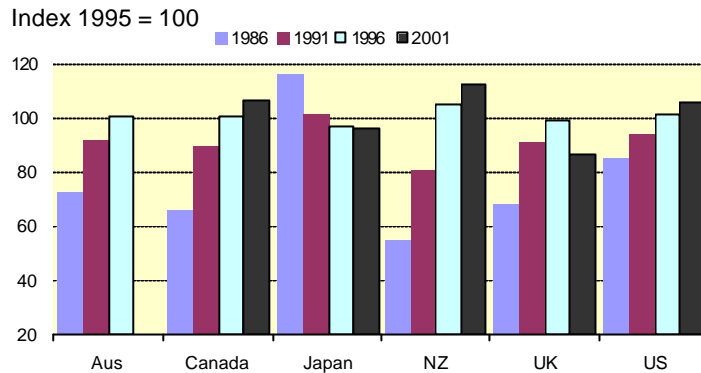
Despite bigger increases in electricity prices over the past decade than other major developed economies, New Zealand still enjoys relatively low industrial electricity prices. IMD, a Swiss business school's, World Competitiveness Yearbook, 2002, ranks New Zealand's electricity costs for industrial users 4<sup>th</sup> to lowest out of 48 countries (see Graph 4.6).

<sup>11</sup> There is no detailed official data available on water and waste water. However, CPI data show that local authority rates have increased at close to 4%pa since 1990.

<sup>12</sup> Source: Dominion Post 15 May 2003

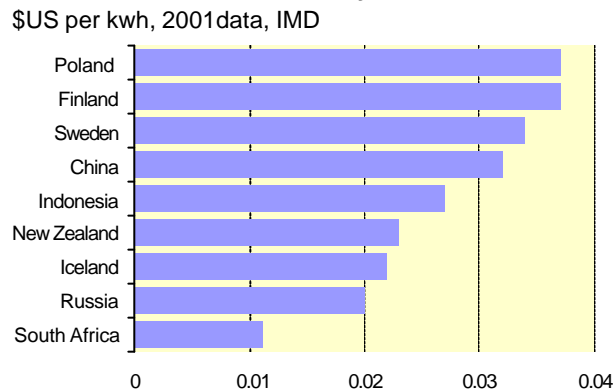
<sup>13</sup> Source: Energy Prices and Taxes: Quarterly Statistics, Third Quarter 2002, International Energy Agency

### Relative wholesale electricity prices



Graph 4.5

### Industrial client electricity costs



Graph 4.6

We suspect our ranking will change when the data is brought up to date. Firstly the data is based on 2001 data when New Zealand electricity prices were low and, secondly, the New Zealand dollar was also low relative to the US dollar. Both these factors have reversed in rather spectacular fashion over the intervening period.

The price of energy is a relevant factor determining foreign investment and the location of processing and manufacturing activities. New Zealand has traditionally rated very favourably in terms of energy costs, but current trends suggest we are losing our relative attractiveness. Significant in this regard is that fact that Australian industrial electricity costs 5.66c/kw (NZ) compared to 7.15c/kw in New Zealand (IEA data for June 2002).

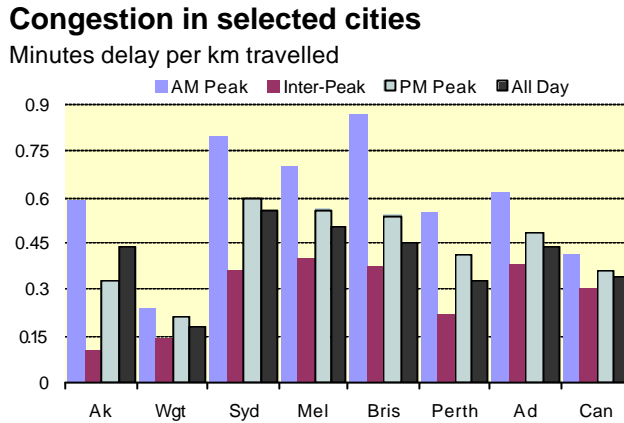
### Transport

A 1997 Ernst & Young report estimated that the economic cost of congestion to the manufacturing and distribution sectors in the Auckland region was approximately \$185 million per year. The total cost of congestion to the Auckland regional economy was put at \$755 million<sup>14</sup>.

<sup>14</sup> Ernst and Young, Alternative Transport Infrastructure Investments and Economic Development for the Auckland region, 1997.

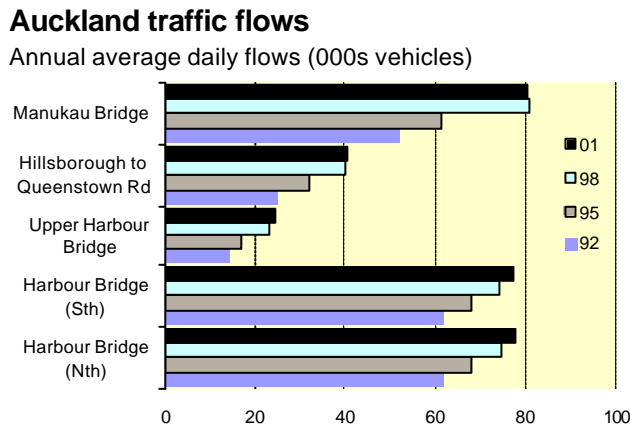
However, there is a lack of consistent performance indicators to monitor congestion trends overtime and between cities.

To address this gap the Ministry for the Environment and Transit New Zealand have developed a travel time methodology for reporting road congestion. It is consistent with the Austroads' methodology and allows comparison of congestion levels and trends between New Zealand and Australian cities. A pilot study following the methodology was undertaken in May 2002 for Wellington and Auckland. The findings are set out the graph below<sup>15</sup>. Results for selected Australian cities in 2000 (the latest results available) are also provided.



Graph 4.7

The results indicate that congestion in Auckland is generally less severe than in Australia's three main cities, and on a par with the other state capitals.



Graph 4.8

One approach to approximating congestion overtime is to assess trends in traffic flow data. By focussing on sections of highway that have remained relatively unaltered over a period of time, it is possible to measure rising congestion from traffic flow data. Graph 4.8 provides trends in annual average daily traffic flows at key Auckland motorway

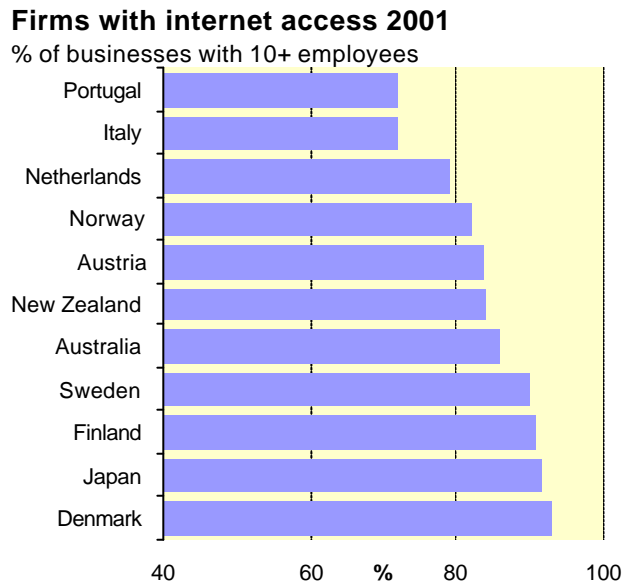
<sup>15</sup> Source: Transit Committee Paper, Travel Time Performance Indicators, 2002.

points from 1992 to 2001<sup>16</sup>. There has been little improvement in these sections of road since 1992 (Transit has plans for some major improvements within the next 10 years), while traffic flows have increased around 4%pa.

Although not directly comparable, congestion trends in Australia (as measured by the congestion indicator at a state level<sup>17</sup>) have been variable. The congestion indicator for New South Wales increased 2.6%pa, in Western Australia it increased 6%pa, while in Victoria and Queensland the congestion indicator remained relatively static, and in South Australia it declined.

**Telecommunications**

There is a range of potential barriers to ICT use. Internationally these may include the cost of development and use of internet sites, the high cost/slow speed of accessing the internet, lack of ICT skills, and lack of security. New Zealand has a relatively high proportion of businesses with internet access and peak internet charges that compare favourably to other OECD countries.



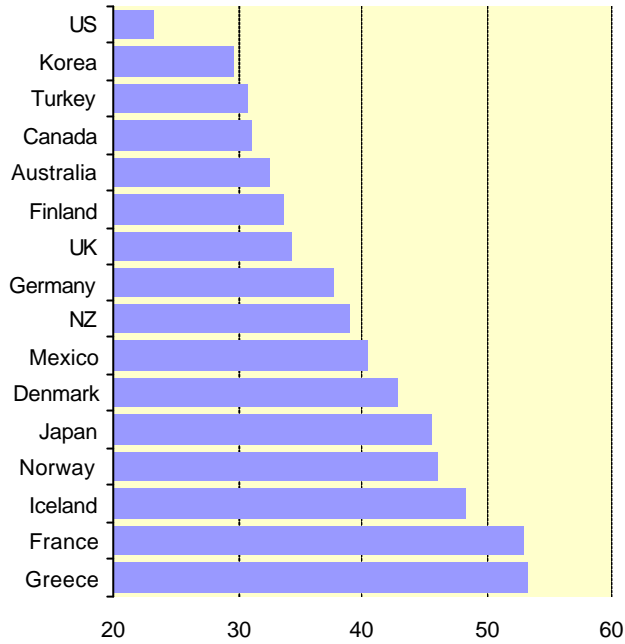
Graph 4.9<sup>18</sup>

<sup>16</sup> Source: Transit New Zealand

<sup>17</sup> Source: Austroads National Performance indicators (www.algin.net/austroads/)

<sup>18</sup> Source: OECD, ICT database and Eurostat, E-Commerce Pilot Survey 2001, August 2002

**Price of 40 hours of internet use at peak times**  
 August 2001 in PPP dollars

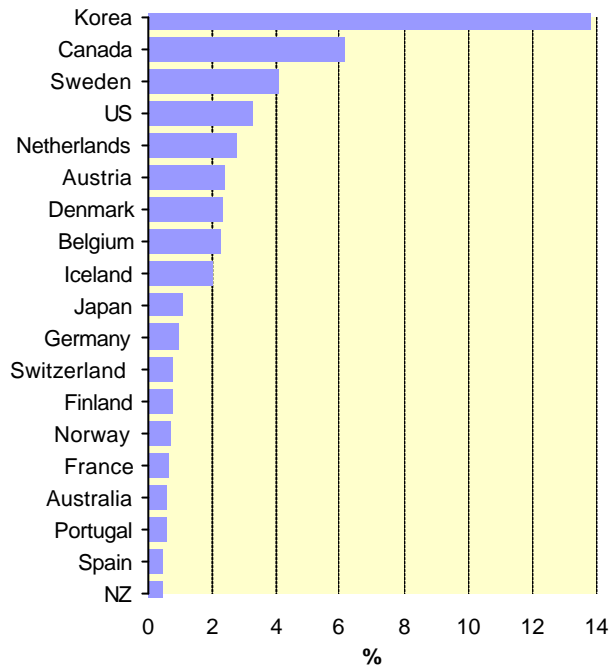


Graph 4.10<sup>19</sup>

New Zealand’s broadband penetration rate, however, is relatively low compared to the OECD. There are a range of likely reasons for this including cost, service plans (particularly the lack of “capped” service options) and a lack of awareness of potential benefits.

<sup>19</sup> Source: OECD, Telecommunications Database, June 2002.

**Broadband penetration rates in OECD countries June 2001**



Graph 4.1<sup>20</sup>

According to IMD survey results, New Zealand executives rate the adequacy of New Zealand’s communications (availability, reliability and cost) quite highly – above Australian and UK executives.

<sup>20</sup> Source: S. Paltridge, The Development of Broadband Access in OECD Countries, OECD, Paris, October 2001.

## Annex 1

The following table shows the spread of industries and regions we have obtained responses from. Many of the firms interviewed have business activities that fall into more than one industry classification. For simplicity, the table below allocates each firm to one industry classification.

### Respondents

Industry	Contribution to GDP*	# of respondents
Agriculture	5.3%	2
Forestry	1.3%	2
Fishing	0.2%	2
Mining	1.2%	
Food and Beverage	4.7%	7
Textiles, Clothing and Footwear	0.9%	1
Chemicals, Plastics, Rubber	1.7%	4
Metals	1.7%	2
Machinery and equipment	2.2%	4
Other manufacturing	4.0%	3
Utilities	2.0%	1
Construction	3.9%	
Wholesale/retail	14.1%	5
Accommodation, Cafes and Restaurants	1.6%	2
Transport	5.0%	2
Communications	5.1%	
Finance	5.8%	1
Property and Business services	12.3%	3
Education	3.7%	1
Health	5.7%	
personal, cultural, recreational	1.1%	1
<b>Total</b>	<b>83.7%</b>	<b>43</b>

\* Based on production GDP data for the year ending 31 March 2003  
(Statistics New Zealand) (Industry definitions based on ANZSIC)

The remaining 16% of GDP is attributed to home ownership and government services