

**Confidential  
Final Report**

**FINANCIAL ADVISORY  
SERVICES**

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# **Review of New Zealand's Biotechnology Sector Summary Report**

 **ERNST & YOUNG**

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# 1. Introduction

## 1.1 Terms of Engagement

As part of the government's 2002 Growth and Innovation Framework, biotechnology was identified as being a key contributor to New Zealand achieving its target of re-establishing itself in the top half of the OECD based on GDP per capita measures. A sector led Taskforce was established to develop New Zealand's Biotechnology Strategy.

Industry New Zealand have engaged Ernst & Young Corporate Finance Limited ("EYCF") to provide a commentary on the achievability of the targets set out in the vision of the New Zealand biotechnology sector, as outlined in the Taskforce Report. In providing the commentary we consider the current size of the New Zealand sector, and provide a review of the biotech sectors in a selection of seven international reference economies.

We understand that this information will feed into the biotechnology Taskforce Report, and other initiatives underway, from which a framework for joint government/industry action will be established, including a benchmarked vision for growth.

This short form report is a summary version of the full report produced for Industry New Zealand. The short form report has been produced to form part of the appendix to the Taskforce Report. We note that it should be read in the context of it being a summary document.

Our report is dated 31 March 2003.

## 1.2 Scope

In order for us to provide a commentary on the achievability of the growth targets, we aim to assess the current state of the industry as referenced in the targets set out in the Taskforce Report and then evaluate the future targets. This report does not provide an in-depth sector analysis or review and nor does the scope of this engagement require such a review. The scope of this report is to provide a commentary on the achievability of the growth targets proposed in the Taskforce Report through the following actions:

- Provide, where possible, reasonable verification of the base numbers as referenced in the sector vision targets;
- Research the biotechnology sector experiences in seven selected international countries with a focus on the growth achieved and the various drivers for this growth; and
- Review the New Zealand growth targets in the context of international biotechnology experiences.

We note that a number of limiting factors such as the lack of public information, the majority of the New Zealand biotech companies being private companies, and time constraints have to a degree limited our ability to accurately verify the exact size of the New Zealand sector.

Further to this, the sector is relatively young in New Zealand and has yet to establish a suitable measurement framework. We understand that setting a measurement framework is an objective of the sector in the near future.

### 1.3 Disclaimer

This report has been prepared solely for use by Industry New Zealand to assist them in the preparation of the biotechnology sector strategy.

We have relied on the information supplied by Industry New Zealand, and other information sources. A complete list of sources of information can be found in the full version of this report. Our duties, while involving an assessment of information provided and commenting as necessary, do not extend to verifying the accuracy of the information, and we have assumed its authenticity and completeness. We have not audited the information provided, nor have we been required to do so. We reserve the right, but will be under no obligation, to amend our conclusions if additional information or inaccuracies to information provided to us by Industry New Zealand, which was in existence at the time of the review but was not brought to our attention, subsequently comes to light.

In view of the high level nature of our investigations, which were carried out over a short timeframe, we have relied solely on publicly available information believed to be reliable at the time of receipt, but will accept no responsibility should it subsequently proven to be inaccurate, and have not carried out anything in the nature of an in-depth review of the global biotechnology sector, which is beyond the scope of this engagement.

This report should not be used for any other purpose and should not be reproduced or supplied to any other party without our prior written approval of form and context of such publication. We accept no responsibility for any reliance that may be placed on this report should it be used for any purpose other than for which it was intended. Further, no responsibility whatsoever is accepted for persons other than those to whom the report is addressed, and those we have agreed in writing will be provided with the report.

## 2. New Zealand Biotech Sector

### 2.1 Vision & Targets

The Taskforce Report will be a key document for establishing the path for the biotechnology sector in New Zealand over the next ten years. A key component of the Taskforce Report and the strategy is the sector vision, which is stated in section 1 of the Taskforce Report as:

“to ensure that within 10 years the biotechnology sector will not only make a major contribution to the process of lifting New Zealand into the top half of the OECD wealth rankings but will also elevate New Zealand’s position as a global nation of biotechnology excellence in innovation, commercialisation and business practice.”

To achieve this vision the Taskforce Report outlines specific benchmarks against which to measure progress. These have been formulated into targets to be achieved over the next ten years, and are listed below:

- A tripling in the size of the New Zealand biotechnology community to over 1,000 organisations from 350;
- An increase in total cluster employment to over 18,000 from around 3,900;
- A 5-fold increase in the number of core biotechnology companies to over 200 from 40; and
- Improving performance from both research organisations and private companies resulting in increased export values from the current base of \$250 million to over \$1 billion per annum.

### 2.2 Current State of NZ Biotech Sector

We have reviewed the approach to estimating the baseline New Zealand indicators, which reflect the current state of the New Zealand biotech sector. In all measures with the exception of export revenues we believe the approach adopted to be reasonable, and the resulting estimates to be reasonable. To further provide comfort in the estimates we have made comparisons with international benchmarks obtained through our review and research of seven benchmark countries. With respect to export revenues, we are not in a position to comment on that particular indicator, but understand the number was derived from a survey of the biotech sector undertaken by Biotenz.

### 3. International Benchmark Country Review

The following table provides a comparison of measures for New Zealand and each of the seven benchmark countries. The countries reviewed were chosen primarily because of the presence of a growing biotechnology community and the current or historical operation of an industry government framework to support growth in the biotech sector, and were also selected on comparability to New Zealand.

Country	Population – 2001 (m)	GNP per Capita <sup>1</sup> (US\$) - 2001	Average R&D % of GNP 1981- 95	% Science Graduates 1988- 1990
New Zealand	3.8	12,380.0	0.9%	17%
Ireland	3.8	23,060.0	0.9%	26%
Scotland	5.0	24,230.0 <sup>2</sup>	n/a	n/a
Finland	5.2	23,940.0	2.1%	33%
Israel	6.4	16,710.0	n/a	32%
Sweden	8.9	25,400.0	2.9%	22%
Belgium	10.3	23,340.0	1.7%	28%
Netherlands	16.0	24,040.0	1.9%	29%

Source: The World Bank Group, "Country Competitiveness Indicators"

#### 3.1 International Growth

The following table summarises the size of the biotech sectors, the total growth achieved over the respective periods, and the average growth per annum achieved in each of the countries.

Country	Period	No. of Core Biotechs: Base Year	No. of Core Biotechs: Recent Year	Total Growth %	Average Growth p.a. %	Phase
Scotland	1999-2002	49	97	98.0%	25.6%	Growth
Israel	1990-2000	30	160	433.3%	18.2%	Growth
Belgium	1999-2000	88	97	10.2%	10.2%	Established
Ireland	1980s-2001	15	40	166.7%	n/a	Established
Netherlands	1990s-2001	79	100	26.6%	n/a	Established
Finland	1990-2001	26	134	415.4%	16.1%	Established
Sweden	1995-2000	135	235	74.1%	11.7%	Established
<i>Average:</i>				<i>174.9%</i>	<i>16.4%</i>	

The start up nature and infancy of the industry has made historic data difficult to obtain however, from what was obtained, there appears to be evidence of growth in the sector. Average annual growth rates for the sample ranged from 10.2% for Belgium to 25.6% for

<sup>1</sup> GNP per Capita is defined by the World Bank Group as - the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNP is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad.

<sup>2</sup> GNP per capita for the UK.

Scotland. The average annual growth rate for the five countries for which a growth rate could be calculated was approximately 16.4%. Israel and Finland have in the last decade grown their biotech sectors by 433.3% and 415.4% respectively. The success of Scotland which has doubled the size of its sector in three years should also be noted.

We have identified Scotland and Israel as being in a “growth” phase. This is supported by the recent implementation of national biotechnology strategies in each of these countries, with significant future growth targets set, and the positioning of biotechnology as priorities. Scotland shows the highest average growth rate of 25.6% per annum over the last three years since the implementation of the sector strategy. The Israeli government also believes there is further potential for growth, and in 2001 backed a national strategy to grow the sector.

Another indicator of sector growth is the employment associated with the sector. The following table summarises the size of employment for the core biotech companies in each of the countries reviewed and provides an indication of the levels of growth that have been achieved.

Country	Period	Employees: Base Year	Employees: Recent Year	Total Growth %	Average Growth p.a. %	
Scotland	1999-2002	3,211	4,152	29.3%	8.9%	
Israel	1990-2000	600	3,500	483.3%	19.3%	
Belgium	1999-2000	6,227	7,160	15.0%	15.0%	
Ireland	1980s-2001	n/a	2,100	n/a	n/a	
Netherlands	1990s-2001	1,100	n/a	n/a	n/a	
Finland	1990-2001	n/a	4,178	n/a	n/a	
Sweden	1997-1999	2,312	2,998	29.7%	13.9%	
				<i>Average:</i>	<i>174.9%</i>	<i>14.3%</i>

Average growth per annum across the group is approximately 14.3%, which is in line with the growth in core biotech companies described above.

In light of the growth achieved we also note that the industry is characterised by high levels of cash burn, and business failure, which should also be taken into consideration when reviewing the sector. The sector typically has, during the early stages, a large number of small participants and will be prone to consolidation activity as the sector matures, consistent with the experience of most new and developing industries.

### 3.2 The Environment for Growth: Summary of Key Initiatives and Incentives

As summarised above, there is evidence of growth in the biotech sectors of each of the benchmark countries reviewed. We note that our full report contains a summary of the observations made for each country. In this section we provide a summary of the initiatives and factors in the areas of people, funding, institutions and infrastructure that these countries have typically had in place with a specific objective of facilitating or accelerating that growth. Without the ability to identify and isolate exact cause and effect, one cannot assume

that these factors formed a necessary prerequisite to growth, however the parallel pattern of growth and the existence of these initiatives would seem to suggest a degree of correlation.

### 3.2.1 People

People are cited by all countries as being a key input into the sector. The core of all innovation stems from a strong science base, and as such there is a strong recognition of the need to invest in education and invest in the people involved in biotech.

In addition to generating a strong science educated labour supply, there is recognition across the board that continued growth of the sector requires further development and training for those in the biotech sector as well as a focus on enhancing the sector's ability to attract and retain skilled staff. Biotech is a skilled labour driven industry, and the ability to attract staff to the cluster is seen as key. People related initiatives range from policy changes to increase the countries competitiveness in attracting staff, to subsidies to support ongoing training and development of biotech employees.

### 3.2.2 Funding

Funding is a key requirement for driving the sector. In the early stages of the sector, growth is firstly encouraged by investment in the innovation base (research and academic institutions). The second phase of growth is the commercialisation of research from the initial innovation base to a start up business and then through to an established commercial enterprise. Funding can be grouped into three types of funding, direct government funding, public funding and taxation.

The following table summarises some of the funding programmes implemented by governments in the benchmark countries, with an emphasis on funds directed specifically at biotechnology.

Country	Fund Target Area	Programme
Belgium	Science & Technology	Regional government funding, with the Flanders Regional government's science & technology budget increasing by US\$570 m over last five years.
Belgium	Biotech – VC	Established a "Guarantee Fund" to cover 50% of losses to venture capitalists investing in biotechs in the event of the venture failing. (Applicable to investments of between US\$ 75,000 and US\$1 million.)
Israel	Dedicated Biotech	US\$100m for dedicated biotech funding, including the establishment of two specialty biotech incubators.
Israel	Pre-seed Fund	Established pre-seed fund, providing government funding of US\$32 million in conjunction with private investors for biotech investment
Scotland	Proof of Concept	"Proof of Concept" fund of £5m to support a selection of biotechnology projects across academia and institutions.
Ireland	Dedicated Biotech	Establishment of the "Foresight Fund" which has €320m for biotech investment.
Sweden	Pre-seed Fund	Government provides pre-seed funding through loans and grants to a maximum of 50% of development costs.

The importance in supporting the industry at its early stage is reflected by the various commitments to pre-seed and proof of concept funding. At these early stages, it is more difficult to attract funding and, in a less established environment, there is a greater need for government support.

In the early stages of an industry, venture capital is also less established than in proven markets or sectors. Government stimulation of the VC market has also been evident in the countries we reviewed. Israel's VC market has grown significantly, since the establishment of the first VC fund by the Israeli government in 1991. There are now approximately 85 VCs in Israel.

The extent of private funding is difficult to determine. We do however note that, as one might reasonably expect, the countries, which tend to have more established profiles in the sector appear to have relatively higher levels of private funding and less reliance on government funding.

Another source of funding to be considered is the level of support provided through taxation policies. In all the countries reviewed, with the exception of Finland and Sweden, we found various tax incentives for R&D in place, which recognises the lead time and R&D investment required to develop biotechnology products. The absence of tax incentives in Finland and Sweden may reflect the more developed nature of the sectors there. The existence of tax incentives for many of the countries, at least in the early stages of the sector's development, is an indicator of government's role in encouraging investment in the sector.

### **3.2.3 Institutions**

The source of initial growth of the sector is recognised as being linked to the innovations and research being identified and undertaken by the research and academic institutions. In countries, which have been successful in establishing recognised biotechnology sectors, there are institutes with strong biotechnology focus, and strong networks and frameworks to promote commercialisation and technology transfer.

Initiatives to promote and enhance the commercialisation of ideas from academia and research institutions have been undertaken by all of the countries reviewed. A common initiative is the emphasis on utilising technology transfer units to transfer IP from public research bases to commercial enterprises.

### **3.2.4 Infrastructure**

In every country we reviewed, strong government drive to support the sector was evident, with many governments undertaking or commissioning sector reports and strategies. The involvement of the government, especially early on in the development of the sector, appears to have been a significant driver. Many governments have placed biotechnology as national priorities (Finland, Israel, Ireland, UK) and, through the allocation of resources and funding, have succeeded in establishing biotechnology industries.

The core to developing the sector is a united approach between all participants, government, industry, academia, institutions and other service providers. In all the countries we reviewed, the role of government appears to have been important. The development of biotech as a national focus has provided the framework and implementation of initiatives to support the sector, and has encouraged private sector involvement. Recently Israel (in 2001) and Scotland (in 1999) both undertook a process to create a strategy incorporating growth targets for the development of the biotech industries in their respective countries. For example, Scotland (in three years) has achieved its core target of doubling the number of biotech companies from 50 to 100 (targeted to be achieved in four years). Israel's employment target is to increase employment in the sector from 3,500 to between 10,000 to 14,000.

Many countries have also recognised the development of clusters as being a key in providing a supporting network for its biotech industry. Clusters act as a catalyst for regional growth, attracting other biotech companies and support firms to the area through provision of infrastructure such as R&D facilities, and other biotech industry participants which, in turn, attracts biotech specialists to the area.

Incubation is a concept that also appears to have been successful in assisting new companies start up on the road to commercialisation. Incubators select projects that have high commercialisation potential and assist in their commercialisation by providing lab facilities, financial, managerial, technical and networking support. Examples of this approach can be seen in Israel, Netherlands and Scotland.

The importance of technology transfer has been emphasised by all countries. The ability to commercialise opportunities from the innovation base shifts the emphasis from R&D to a commercial focus, and requires a different skill set. The success of technology transfer relies on co-operation between institutions and industry, access to pre-seed and proof of concept funds, access to investors and IP management and other business related skills. In the successful sectors such as those of Finland, Sweden, Ireland and Netherlands there are strong links between academia, institutions and industry. The strong relationships between industry and academia can be attributed to various factors, such as the provision of infrastructure such as science parks (or industry parks) that provide proximity and access to science and commercial resources, and a combined commitment to a joint effort to grow the sector. Science parks provide a collaborative environment for academia and industry, as well as enhancing the strength of the science base. Science parks operate in all of the countries reviewed.

Collaboration between industry and institutions has actively been encouraged in Sweden through the Higher Education Act, which made it an obligation for higher education institutions to co-operate with industry. In Finland the initial joint effort by industry and government to grow Finland's technology standing, has encouraged the continuation of collaboration between industry and academia.

### 3.2.5 Summary

The role of government in establishing an environment and base for growth of biotech sectors in the seven reference economies is extensive. The role has been particularly important at the beginning of the sector's development, where a co-ordinated approach drawing together the resources of each area of the sector can enhance the pace of growth and focus the efforts of the sector. Government contribution falls within three areas, being the support of basic research, forging links between research and industry and the facilitation of investment. In the early stages there appears to be a large requirement for capital to initiate the growth cycle. Government has provided this leadership in various forms, through the setting of sector strategy, to R&D funding support, provision of initial seed and VC funds and enhancing the countries' attraction as a biotechnology centre through tax incentives, investment in science education and other infrastructure. As with most areas of commerce, private sector investment enters once there are signs of commercial viability and returns. Among the reference countries we reviewed, those that appeared to be more established in the biotech field also evidenced greater levels of private invested capital relative to those still at an earlier stage of their biotech life cycle.

## 4. Assessment of Viability of Targets

We have been asked to comment on the viability of the targets set by the Taskforce. The key headline targets to be achieved over the next ten years are set out below:

- Target 1:** A 5-fold increase in the number of core biotechnology companies to over 200 from 40.
- Target 2:** A tripling in the size of the New Zealand biotechnology community to over 1,000 organisations from 350.
- Target 3:** An increase in total cluster employment to over 18,000 from around 3,900.
- Target 4:** Improving performance from both research organisations and private companies resulting in increased export values from the current base of \$250 million to over \$1 billion per annum.

The Taskforce Report also states that “growth in the size and number of core biotechnology companies is projected to achieve market capitalisation of around NZ\$10 billion, with at least a couple of multi billion \$NZ companies.”

### *Our Assessment of Target 1:*

The implied growth rate of 17.5% (which implies a net gain of approximately 16 biotech companies per year) is in line with the average growth rates for the benchmark countries, and the target level of growth of 400% has been achieved in two of the seven benchmark countries. The achievements to date in Scotland of 100% growth in three years is also encouraging support for the NZ target.

In assessing New Zealand’s target, we expect that the levels of growth being targeted by New Zealand will be unlikely to be only the result of organic growth in a vacuum. Rather, experience in the reference countries suggests that super-normal growth will probably need to be underpinned by a co-ordinated effort by government and industry participants to grow the biotech sector through a wide range of initiatives. It should, however, also be recognised that, due to the nature of the industry and the risk profile of the sector, growth is also likely to be accompanied by a degree of rationalisation, either through merger or consolidation activity or business failures.

Overall, the target level of growth appears to be achievable given the NZ sector is sufficiently supported by the necessary elements to drive growth.

From our analysis of listed biotechs in the reference countries, and the relative size of the New Zealand equity market, the comment (sub-target) in the Taskforce Report referring to the projected market capitalisation, would appear to be overly ambitious and we recommend that further work be undertaken to look at this projection more closely.

***Our Assessment of Target 2:***

Target 2 relates to the growth of the total number of biotech related organisations and implies an annual growth rate of 11.1% (total growth of 186%). Through our research we were only able to find a comparable measure for Scotland. Scotland has grown the total number of organisations by 85.6% in three years, which implies an annual growth rate of 22.9%. While we are not comfortable with using the experience of one country as a comparison, it does provide a reference for New Zealand's target, which appears to be conservative in relation.

This target appears to be reasonable, to the extent that the target level of growth in the core biotech companies is achieved.

***Our Assessment of Target 3:***

The third target proposes an increase in total cluster employment to over 18,000 from 3,900. This implies an annual average growth rate of 16.5%. The experience in the international benchmark countries (average employment growth of 14.3% per annum<sup>3</sup>) provides a positive indication that employment growth in the sector, can be achieved. It is however important to note that key initiatives to create the necessary base and environment for growth appear to have been instrumental in their success.

The achievability of this target is strongly linked to the growth in the core biotech companies. Given the other growth targets are met, the target level of growth in employment appears to be achievable.

***Our Assessment of Target 4:***

The fourth target looks to increase export values from the current base of \$250 million to over one billion dollars. This implies an annual growth rate of 14.9%. Although revenue information is limited, total revenues<sup>4</sup> (for each of the four countries we were able to obtain revenue information for) exceeded \$NZ 1 billion. However we believe these revenues are total revenues and are not specifically export revenues. It is reasonable to assume that should the sector achieve its core biotech growth targets, the revenue target would also appear to be achievable.

Notwithstanding this, we must also emphasise that the biotech sector is characterised by its long lead times and low, if not non-existent, revenues in its early stages of life. There is an unpredictable nature to the sector, as the path to commercialisation relies on a number of research, testing, regulatory and approval hurdles to be met before the realities of commercialisation are even addressed. For these reasons, it is difficult to forecast or predict the growth of its revenues. The success of one product that has global demand may result in this target being met easily. Equally, companies may find it difficult to obtain the necessary international regulatory approvals such as FDA approval and IP or patent related processes, which may delay commercialisation or even end the project before sales are made. As the

<sup>3</sup> Information only available for four of the seven countries.

<sup>4</sup> We note that we believe these revenues to be total revenues and not specifically export revenues.

New Zealand sector matures we are likely to see an increase in revenues however, as with all the other targets, achievability is strongly linked to the sector being actively managed and supported for growth.

## 4.1 Conclusions

There is evidence of significant growth in the seven international benchmark countries. A number of countries have more than doubled the size of their biotech sectors, and two countries have increased the number of core biotechs by five times over a ten year period. We note however that this growth has been accompanied by business closures and merger and consolidation activity.

Each of these countries have however typically had in place a package of governmental and industry wide, co-ordinated initiatives designed with a specific objective of facilitating or accelerating that growth. While we do not necessarily infer that such initiatives are a necessary prerequisite to such growth in New Zealand over the next ten years, the link in the reference countries seems unlikely to have been coincidental. Indeed, within those countries, specific initiatives have been implemented to assist the sector's development and, although we cannot provide evidence of exact cause and effect, it can be inferred that the continuing adoption of such initiatives suggests they are regarded as having been instrumental.

Relative to the reference economies, New Zealand is uniformly smaller and more remote, relative to major markets for products and capital. Our terms of reference do not extend to an assessment of the impact of these factors, if any is possible. Intuitively however, each suggests that a co-ordinated approach between Government and industry participants will be an all the more essential ingredient to success.

Subject to that, we consider that Targets 1, 2 and 3 of the Taskforce Report (regarding growth in number of firms and employment within them) are reasonable. With regard to Target 4, we note our difficulty in forming a view regarding likely revenue and export growth levels, however we believe it to be reasonable in the context of the other targets being met. We also recommend that further work be undertaken to look at the market capitalisation projection more closely.