



Closing the Productivity Gap





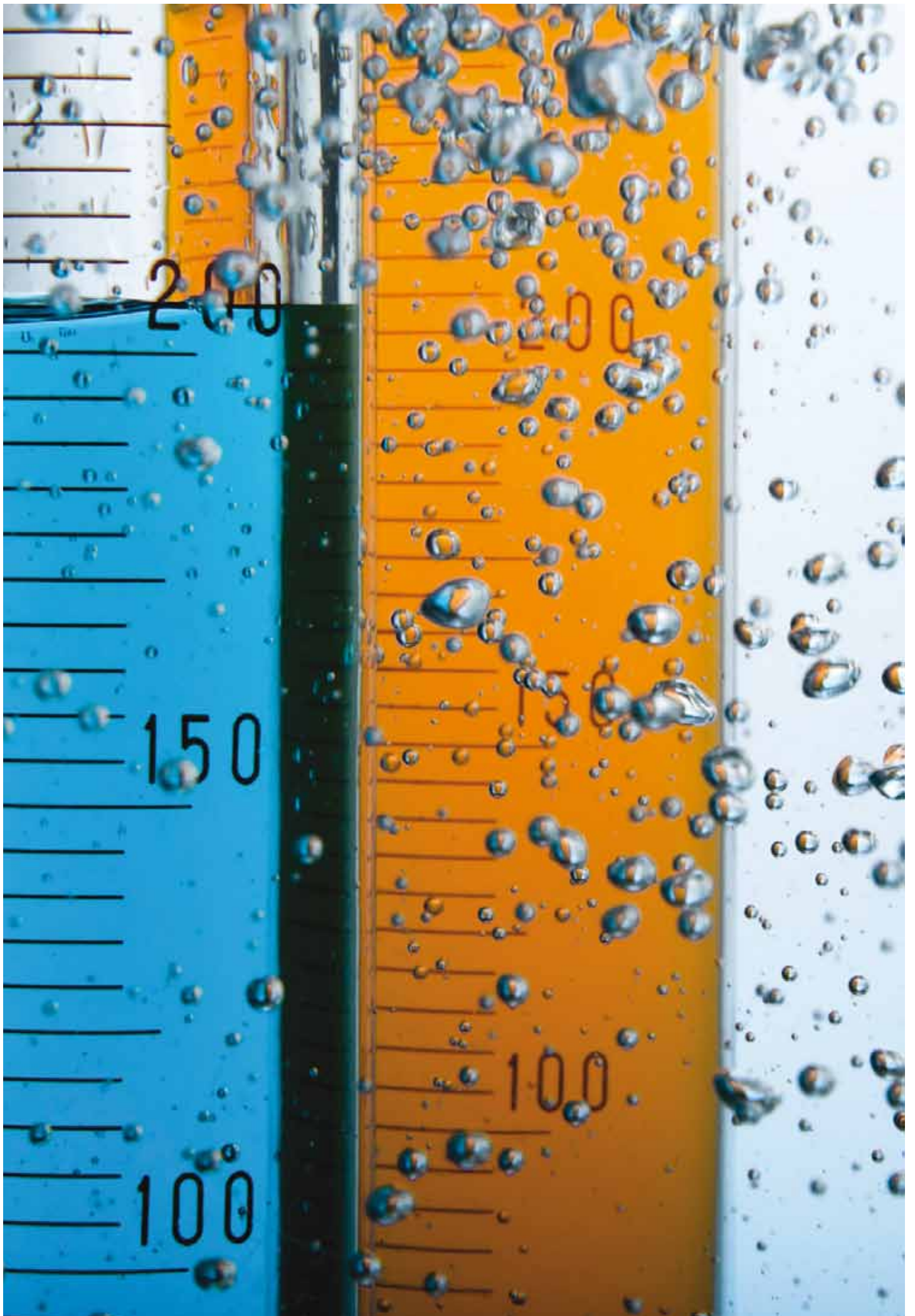
Summary

New Zealand needs to sustain labour productivity growth two to three times the rate of the last decade if we are to close the gap with Australia. If we succeed:

- New Zealand will still have a strong biological sector, but a much more diversified economy that is less at risk from commodity price fluctuations
- new private sector investment will have built a significant high-technology sector – not only capital-intensive manufacturing, but also high-technology services and possibly energy or minerals
- the biological sector will have created a range of more specialised functional industrial products
- the employment of research workers in the private sector will have increased significantly – an increasingly common career path will be through a publicly owned research entity towards innovation management in the private sector.

In order to achieve this outcome, as well as paying attention to regulation, infrastructure, government efficiency and fair taxation, government policies need to:

- Improve the deployment of private sector capital in productive assets by:
 - drawing on the capital in superannuation schemes to deepen capital markets
 - opening up opportunities to harness New Zealand's mineral and energy resources
 - reshaping the taxation system to minimise the capital tied up in the building stock and
 - lowering risk through managing inflation domestically to avoid wild fluctuations in the New Zealand dollar.
- Assist companies at critical development stages to stay in New Zealand by facilitating access to amounts of capital that enable them to operate globally from our small domestic base.
- Build private sector capability to undertake research and development (R&D) and commercialise innovation by:
 - replacing the scrapped R&D tax incentive with a partial funding of R&D workers in their early years of employment
 - creating a single industry capability development agency that operates not only in research, but across commercial innovation
 - applying performance measures on public investment that focus on maximising private sector co-investment and transferring research-literate personnel to the private sector, rather than on generating patents and papers.
- Over a period of time, lift the government's investment in R&D (in percentage terms) to the OECD average and use the extra funds for the above purposes.
- Build human capital through preferential investment in the key educational areas that have the greatest potential to lift productivity, i.e. international marketing, logistics, engineering, technology and the science-business interface.



What most experts agree on

Based on a variety of analyses and research efforts, there has been considerable debate over the last five years into what is needed to lift New Zealand's prosperity. Few would disagree on the following points.

- New Zealand needs a sustained period of above-average growth in labour productivity (GDP per hour worked) if we are to close the gap with Australia. Most commentators agree that we need two to three times the growth rate of the last decade (or four per cent per annum) to make real progress.
- Looking at the wealth of nations internationally, the natural capital (minerals, what grows on the land, etc) counts for only a small part of wealth, the manufactured capital (buildings, power dams, etc) is again only a small part. The largest contributor to wealth is the intangible capital that arises from good institutions (see below) and the capability of the people.
- Some parts of the private sector have intrinsically low productivity – like tourism and retail, whereas other parts can have very high productivity – like advanced service industries and capital-intensive manufacturing. Whilst we need to play to the strength of tourism and the biological sector for export earnings, we need new high-productivity industries as well (whether based on natural resources or not).
- Our capital deployment in our economy is either too low, too dominated by property investment, or both. We need to move away from debt leveraging land and buildings into investment in growth businesses.
- We need more investment, particularly by the private sector, in “commercial innovation”, both fast-follower uptake of advanced technology and R&D that will build the “earning” part of the economy i.e. the businesses that sell goods or services overseas.
- We need higher skill levels in our economy in order to obtain benefit from capital deployment (whether deployed for R&D, physical plant and machinery to implement R&D outcomes, or simply as a fast-follower adopter).
- In order to support the development of the private sector, attention to underpinning good government is vitally important. That is: high-quality public spend keeping government as small as possible, a broad-based taxation system with a low marginal rate and few opportunities for gaming, high-quality regulatory systems to minimise unwarranted deadweight costs on private sector activity, and efficient infrastructure.
- These underpinning activities (corresponding to four of the so-called “six-pack” of government measures) are necessary, but insufficient to make the progress sought. The other areas of importance are to lift private sector performance so that an hour of endeavour in the private sector earns more, and to create products or services that are profitable to export.



Conventional wisdoms that might be holding New Zealand back

In respect of innovation

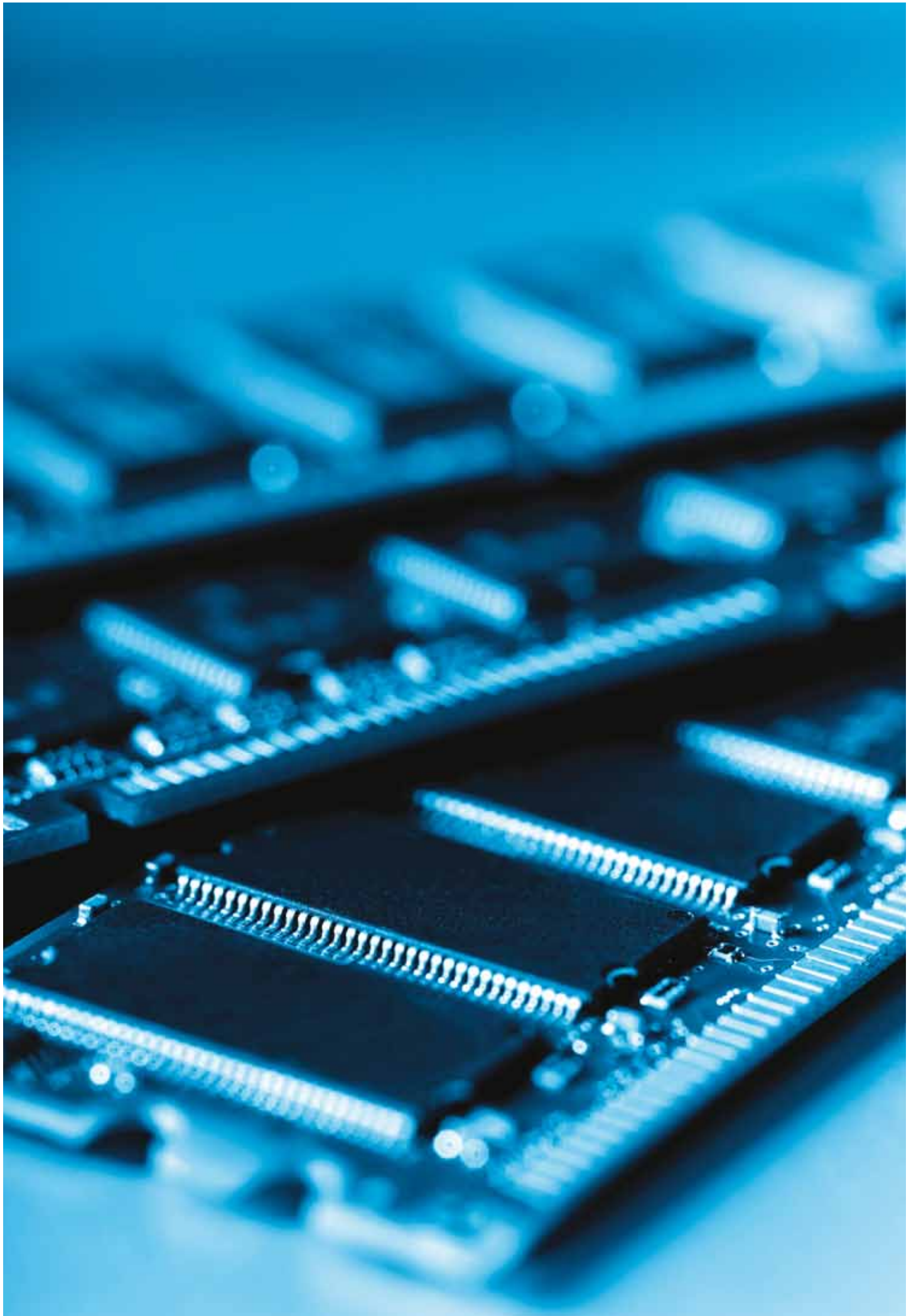
- Given our limited resources, New Zealand should only play to its strengths and focus where we have expertise – in the land-based industries. The converse argument is that whilst there is no choice but to process perishable resources here, there is no reason to restrict New Zealand's development to only those resources. In our public R&D investment, New Zealand has taken the line of largely playing to strengths for the last 20 years and failed to make any progress against the rest of the world. Further, the scale of expansion that would be needed in our traditional biological production sector is simply not possible within hard environmental limits. In contrast, other countries have been happy to gain intellectual advantage in any sector, and have been able to launch major new developments that have contributed to their rise in wealth. Maximising value from the biological land-based industries is absolutely necessary, but insufficient in itself, to make the gains New Zealand needs.
- The predominance of small-to-medium enterprises (SMEs) holds New Zealand back. The counter-argument is that many of our SMEs are very innovative – the poor performance is at least as much in our medium-to-large companies, or in New Zealand's inability to retain companies that reach that size in our economy – too often they disappear offshore to be closer to the market, often after a long New Zealand incubation period.
- It does not matter if manufacturing moves to China as long as we do the smart stuff here. The counter argument is that if we build skills overseas to make our products, those countries become better equipped to reverse engineer our products and enter the market as a competitor in a few years. Manufacturing can be economic from New Zealand as long as it is capital-intensive, rather than labour-intensive, and the products are high value per unit volume.
- New Zealand should direct its publicly funded R&D towards creating value in the public sector institutions that can be transferred to the private sector. The converse argument, looking at evidence from around the world, is that governments are extraordinarily poor at guessing what research will succeed in the private sector. Where governments have been directive, it has been mainly to develop capability in the private sector with the choice of research topic a secondary issue.



- New Zealand can achieve its goals by focussing public funding on basic research in science. The converse argument is that only once there is a well performing private sector R&D capability can government focus on basic research. Further, most countries have found that they need to spread their basic R&D spend across medicine, engineering and even into technological disciplines, as well as science. These types of research need to be differently assessed for quality than the way that science is. The likelihood of disruptive technologies from basic research in applied fields is at least as high as from basic research in science.
- Whilst the competitive model generally gives best-value for the government spend, when the government does partner with the private sector it should be even-handed and do so through co-ordinated industry sectors. The converse argument is that this is back-to-front thinking – the government is seeking to force co-operation between private sector companies, which naturally compete, and requiring competition between state-sector agencies (the Crown Research Institutes), which naturally co-operate.

In respect of skills

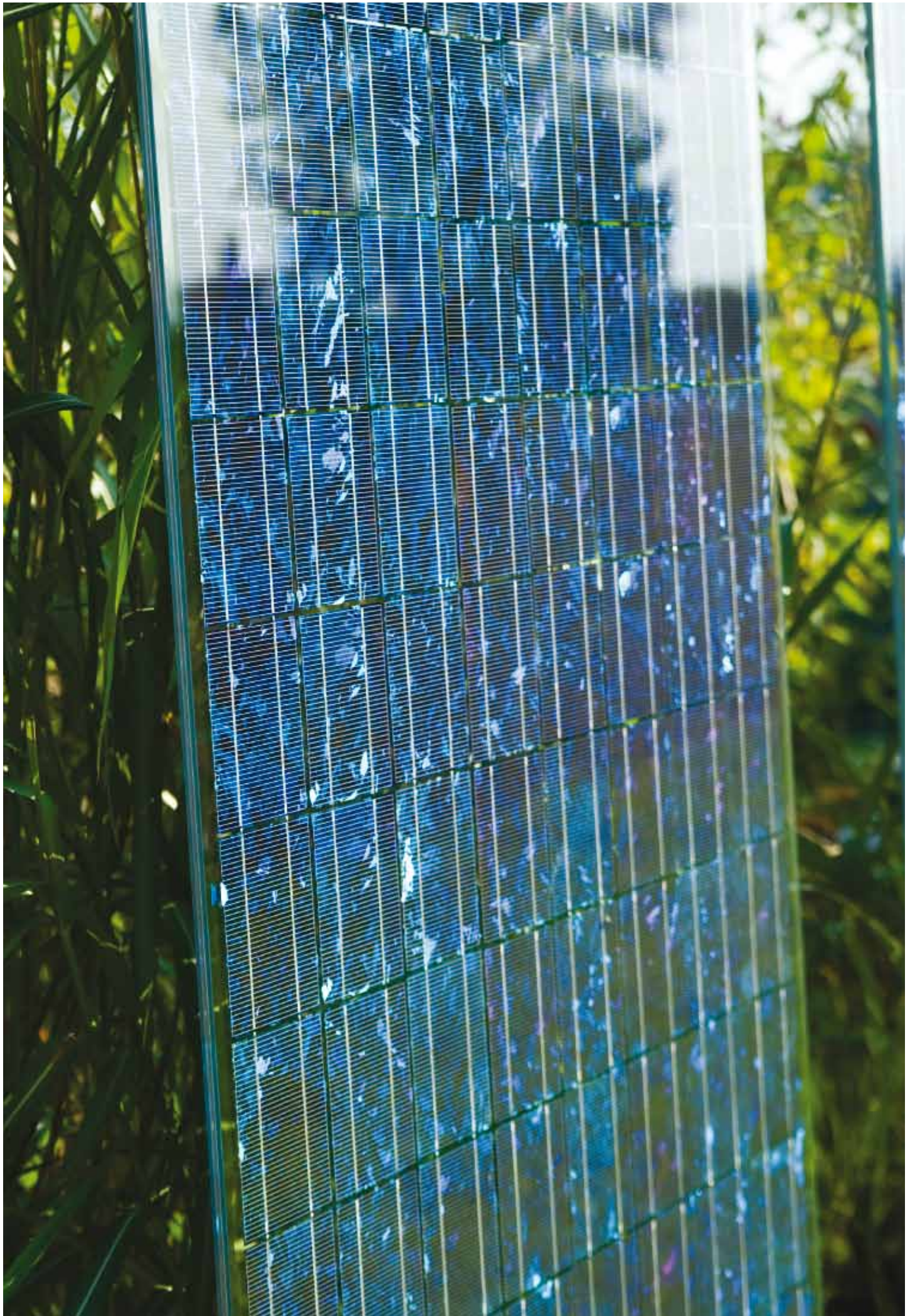
- We need better business skills. The converse argument is that relative to the OECD average we overproduce business graduates. The needs are much more specific – international industrial marketing, supply chain management, the ability to deploy new technologies (as a fast follower) and to apply research and development. Business-literate science, engineering and technology graduates seem to be areas where we are low compared to the OECD norm.



An improved statement of issues

Success will only be achieved when New Zealand has a vastly increased private sector investment outside real estate (in R&D, fast-follower adoption of new technologies, and commercial application of innovation). We need to recognise that the real problems are:

- Our companies are undercapitalised – particularly our medium-sized companies. As well as venture capital for start-ups, there is a need for what is sometimes termed “patient capital investment” to morph existing entities – investors prepared to take a long-term view to build and then benefit in the longer term from new industrial activity. Building exports from a small domestic market base (which cannot necessarily support a manufacturing system with sufficient economies of scale to be internationally competitive) requires long term commitment by capital investors.
- New Zealand badly needs to develop a number of medium-size high-productivity companies (with turnover exceeding \$200,000 per employee per annum). These will be high-technology companies, will employ a highly skilled workforce of scientists, engineers and technologists, and only a few will rely on links to New Zealand’s raw materials. Each will be based on world-leading intellectual capital – and the domains of knowledge from which they arise could be biological or physical science, engineering or information technology.
- Because it requires high-technology solutions, New Zealand has undervalued the opportunities arising from our rich mineral and energy base – there are opportunities here as the technologies to access and harvest those resources improve.
- The pool of research-literate business people, those skilled in uptake of new technologies, and those with entrepreneurial skills is too small.
- Based on our default national vision that economic development is best accomplished by adding value to food, too often we attempt to market directly to overseas consumers when we should focus (even at Fonterra’s scale) on being a dominant industrial marketer in niches where we have a competitive advantage.
- Faced with the most difficult marketing challenge of any country, we have under-resourced international marketing skill development and tend to undertake market analysis far too late – our research is misaligned with the marketplace.
- The linkage of marketing, R&D and capital investment in new technology has been inadequately recognised and valued in this country. We have too little overall expertise in deploying capital effectively.
- The labour market for researchers is distorted – the tradition of relatively standardised postgraduate stipends applied across all disciplines has attracted more students in disciplines already in oversupply (because they have limited employment opportunities), which worsens the problem. This has led to pressure to supply large amounts of temporary post-doctoral employment which perpetuates the issue and ultimately leads to low morale in the research workforce.
- In seeking to build the industry capability to attract and apply capital, previous government policies may have required the private sector to act in ways with which it was not familiar, rather than the policies boosting the level of naturally occurring and desirable behaviours.



Some new policy thinking is required

Focussed action is required to bring about two to three times the rate of labour productivity growth. Government policy needs to focus on the following objectives.

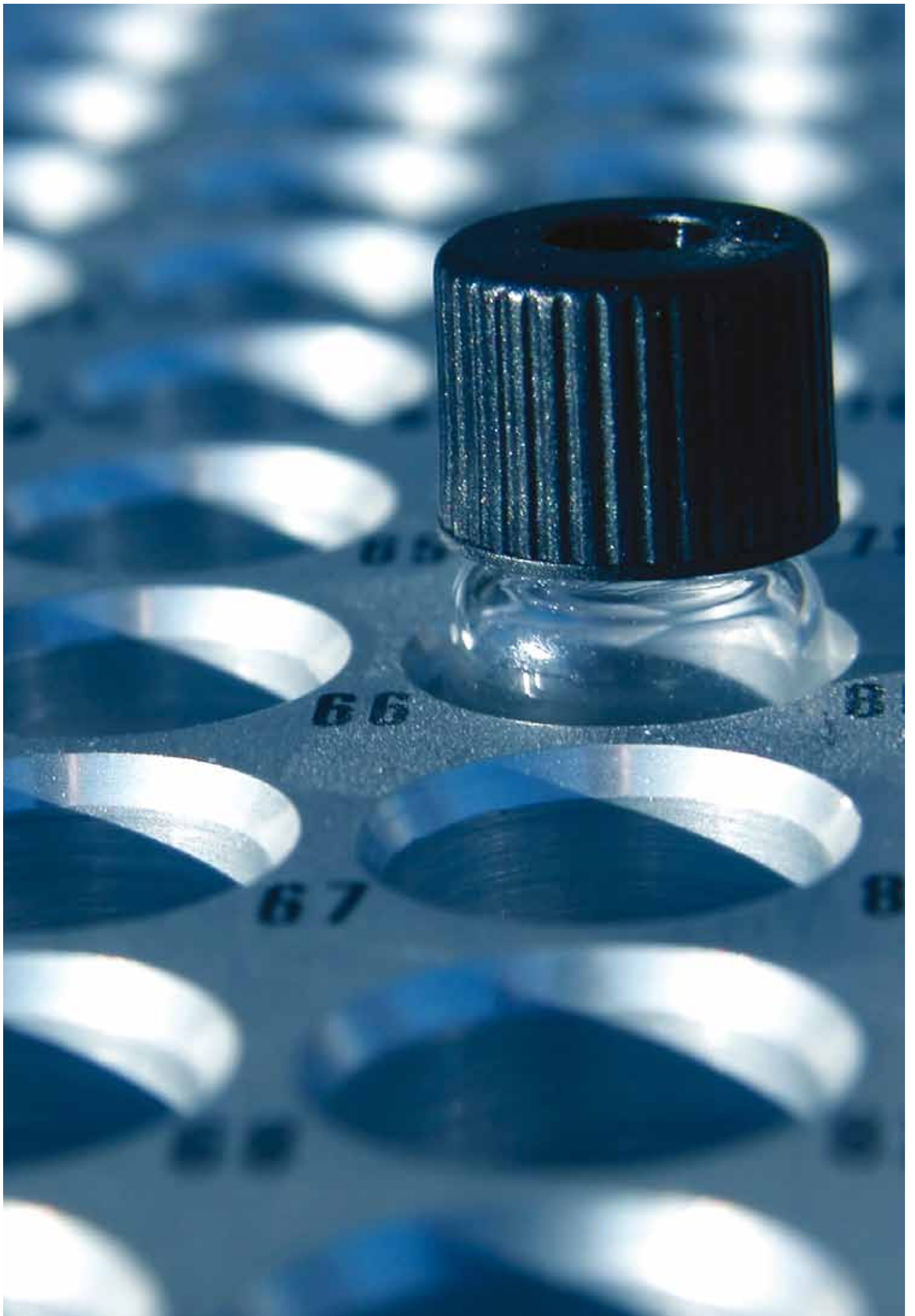
- Improve the private sector capital deployment in productive assets.
 - Recognise that unpredictable exchange rate fluctuations act as a huge disincentive for private sector investment in export opportunities compared to investment in the local economy (mainly property), and thus consider changing the means by which inflation is managed domestically (presently through the central bank interest rate).
 - If analysis shows that the capital tied up in the building stock exceeds the replacement cost of these buildings consider taxation changes to bring the investment in real estate down to this level.
 - Require the National Superannuation Fund to invest in New Zealand's private sector to build our "earning" capital base in productive assets (this might also be made a condition on Kiwisaver schemes as a balancing requirement against the tax breaks on the schemes, and there may be other types of public or community capital that could be required or incentivised to invest locally).
 - Consider whether risk capital is adequately recognised as an asset class for superannuation, and in particular whether the treatment is consistent with Australia.
 - Create a regulatory environment that fosters investment in exploring and harnessing New Zealand's mineral and energy resources.
- Have policies that support start-ups but also help to morph old companies (innovation at the fringe of "old") – it is easier to add a new product line to an existing company than to start-up a new company.
 - Reconsider how to obtain the outcomes the scrapped R&D tax incentive was seeking to address. The critical success measure is that companies develop their own commercial innovation capability for the future. Capability development is enhanced if the R&D takes place on the company premises. Thus vouchers or other schemes that co-fund companies to purchase research services from a public entity are less likely to be successful in building capable companies than partial funding of the early years of employment of a new R&D worker directly in the company.
 - Work with the private sector in an even-handed manner, however it organises itself.
- Have policies that assist companies at critical development stages to stay in New Zealand.
 - Consider how to deepen capital markets so companies can easily access large amounts of capital that can be recovered as the company succeeds. The National Superannuation Fund and Kiwisaver schemes may have a role here (see above).



- Recognise intellectual capital development as a key national outcome.
 - Shift the measurement of public-investment research outcomes from patents and research papers to the ability to attract private sector investment in the research outcomes.
 - Recognise “fitness for purpose” (the valuing of research by the private sector) as an equal quality measure to peer review (the valuing of research by researchers) in the Performance-Based Research Fund.

- Focus on increasing the capability of the private sector to undertake its own research and development linked to market opportunity rather than trying to pick what research the public purse should fund to develop industry.
 - Shift the purpose of government funding for industry development to this outcome, and away from the research itself. Let the private investor and the research entity collectively decide what research to do and avoid making this decision through a bureaucratic process driven from Wellington.
 - Create a single industry capability development agency encompassing functions presently undertaken by New Zealand Trade and Enterprise, Technology New Zealand and the parts of the Crown Research Institutes primarily focussed on industry development outside the biological sector (primarily Industrial Research Limited).
 - Allow this capability development agency to focus across commercial innovation – not just performing and using New Zealand R&D but also building the capability for fast-follower adoption of new technologies from anywhere, for example, advanced manufacturing methods and rapid prototyping.
 - Apply performance measures on public investment that focus on maximising co-investment from the private sector and transferring research-literate personnel to the private sector. Bulk-fund the agencies according to performance on this basis so the boards and chief executives can plan their organisations’ futures.
 - Set the incentives for public sector research agencies so that they are better rewarded for uptake and use by New Zealand-based entities than they are by solely maximising their own royalty or similar income. Where they cannot attract commercial partners within a suitable timeframe consider requiring them to put the intellectual property up for tender.
 - Prevent or limit (both in share and duration) ownership of spin-off companies by public sector research entities – this will force them to find co-investment partners and encourage them to sit at the strategy sessions of these partners so that market information flows back to the research bench.
 - Partially fund the first or early years of employment of research workers (holding postgraduate degrees in engineering, science or technology) in the private sector, particularly those in SMEs, to overcome the initial barrier to entry.

- Over a period of time lift the government investment in R&D (in % terms) to the OECD average and use the extra funds largely for the above purposes so no other form of research is affected. (However in the longer term, as the private sector develops its own capability, the government co-fund might be reduced and the public investment shifted towards basic, environmental and economic security research). Within the increased basic research spend there should be a significant minority share of the funding directed to basic research in applied disciplines as has proven necessary elsewhere in the world.



- Build human capital in the key educational areas that have the most potential to lift productivity, and in which we lag the OECD average i.e. international marketing, supply chain management (logistics), engineering, technology and the science-business interface.
 - Maintain programmes to explain to students, caregivers and business the quality of careers possible in intellectual capital-based business.
 - Deliberately move the government investment in senior secondary and tertiary education towards disciplines and student age groups most likely to improve productivity through the working life of the graduate, that is, towards young people studying engineering, technology, design, international marketing, logistics and science.
 - Where public investment is applied to support postgraduate students, ensure it enables full market rates to be applied differentially across disciplines to attract candidates in fields such as engineering and technology.
 - Ensure that marketing, engineering, technology, design and science qualification structures and graduate profiles conform to best international practice

The government should not:

- Rely only on better regulation, smaller government, an improved taxation system and improved infrastructure to bring about the changes required – these matters are necessary but insufficient.
- Make significant changes to the goals of the basic research programmes – serendipitous discovery leading to economic opportunity will always arise, but it cannot be planned for.
- Think that the important work being undertaken to reduce inefficiency in the public research funding system will solve the big problem (although this work is justified for other reasons). There is also a need to ensure that our environmental research investment is strategically applied to tackle the big issues for New Zealand.
- Expect that improving the apparent efficiency with which commercialisable discoveries arising from publicly-funded basic, economic security, or environmental research is rolled out to industry (by improved company to research institution linkages) will be sufficient to provide the magnitude of change required – it is a small part of the total change required.
- Pursue new economic activity based on forestry to earn income from emissions trading – competitive advantage based on strongly politically-dependent economic conditions may be too risky. Such an approach is unlikely to change productivity significantly.



What will success look like?

- New Zealand will still have a strong biological sector, but a much more diversified economy that is less at risk from commodity price fluctuations.
- Through the increased private spend in R&D, the government will have been able to pull back from near-industry research to basic research, from which disruptive new technologies might emerge.
- New private sector investment will have built a significant high-technology sector – not only capital-intensive manufacturing, but also in high-technology services and potentially in the energy/minerals sector.
- The biological sector will have become less dominated by the short-term needs of its material suppliers and more driven by market opportunity – creating a range of more specialised functional industrial products.
- The employment of research workers in the private sector will have increased significantly. An increasingly common career path from postgraduate study in science, engineering and technology will be through a publicly-owned research entity towards innovation management in the private sector.



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