



**Higher Education in Regional and City
Development**

The State of Victoria, Australia



Higher Education in Regional and City
Development

State of Victoria, Australia

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Foreword

Universities and other higher education institutions can play a key role in human capital development and innovation systems in their cities and regions. Reviews of Higher Education in Regional and City Development are the OECD's vehicle to mobilise higher education for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts local and regional development and help improve this impact. They investigate how higher education institutions contribute to human capital and skills development; technology transfer and business innovation; social, cultural and environmental development; and regional capacity building. The review process facilitates partnership building in regions by drawing together higher education institutions and public and private agencies to identify strategic goals and work together towards them. To know more about the OECD review process, visit the Higher Education and Regions website at www.oecd.org/edu/imhe/regionaldevelopment.

These reviews are part of a wider multi-annum work of higher education in cities and regions co-ordinated by the OECD Programme on Institutional Management of Higher Education (IMHE). In 2004-07, the OECD/IMHE conducted an extensive study with 14 regional reviews across 12 countries. This resulted in the OECD flagship publication *Higher Education and Regions: Globally Competitive, Locally Engaged* (OECD, 2007) with recommendations to benefit both higher education institutions and national and regional governments. In 2008, the OECD/IMHE launched a second series of OECD reviews of Higher Education in Regional and City Development to address the demand by national, regional and local governments for more responsive and active higher education institutions. As a result, 14 regions in 11 countries have undergone the OECD review process in 2008-10. The reviews have been carried out by the OECD/IMHE in collaboration with international organisations and associations and other OECD programmes and directorates. This work also supports the OECD Innovation Strategy and OECD Green Growth Strategy.

This OECD review of the State of Victoria in Australia is part of the second round of OECD reviews of *Higher Education in Regional and City Development* and the second one of its kind in Australia.

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Numerous stakeholders in Victoria and representatives of tertiary education institutions – universities and TAFE institutes – provided valuable insights during the review visit and in the form of comments. The OECD would like to thank in particular Jane Niall, Pin Ng and Tony Pensabene from the Government of Victoria and Faye Burton, the regional co-ordinator, as well as other active local counterparts for this review.

This publication draws on interviews carried out during a week-long review visit on 6-12 December 2009, on the findings of Victoria's Self-evaluation Report prepared by John Howard and using additional information provided to the review team. The OECD review team had a full and intensive programme and were received openly by a wide range of stakeholders. The team were able to rely on a range of other reports, produced for/by the Australian or the Victorian governments and tested their conclusions and recommendations within the tertiary education sector in Victoria.

This publication was co-ordinated by Jaana Puukka from the OECD Programme on Institutional Management in Higher Education (IMHE). The members of the peer review team – David Charles (Curtin Business School, Australia), Ellen Hazelkorn (Dublin Institute of Technology, Ireland), Mario Piacentini (OECD/Directorate for Public Governance and Territorial Development) and John Rushforth (University of the West of England, UK) – contributed to this report. In addition, Steve Garlick, national expert, participated in the review visit. Further details about the Review Team can be found in Annex 1 of this report.) Rachel Linden supervised the publication process and Austin Delaney and Fionnuala Canning provided invaluable assistance in the editing phase.

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List of acronyms

ABS	Australian Bureau of Statistics
ACE	Adult community education
ACFE	Adult, community and further education
ACU	Australian Catholic University
AFL	Australian Football League
AEI	Australian Education International
AIG	Australia Industry Group
AIM	Australian Institute of Management Victoria & Tasmania
AQF	Australian Qualifications Framework
ARC	Australian Research Council
ASHE	Academy of Sport Health and Education
AUCEA	Australian Universities Community Engagement Alliance
AUD	Australian Dollar
BFS	Bulldogs Friendly School
BIAC	Business and Industry Advisory Committee
BURF	Better Universities Renewal Fund
CAE	College of advanced education
CBD	Melbourne’s Central Business District
CCS	Carbon Capture Storage
CDP	Capital Development Pool
CERTIFICATE I-VI	Australian Qualifications Framework VET certificate
CGS	Commonwealth Grant Scheme
COMET	Commercialising Emerging Technologies
COAG	Council of Australian Governments
CPD	Continuing professional development
CRC	Cooperative Research Centre
CRN	Collaborative Research Network
CSIRO	Commonwealth Scientific and Industrial Research Organisation

CSP	Commonwealth Supported Place
CV	Curriculum vitae
CUB	Carlton and United Breweries
DEECD	Department of Education and Early Childhood Development
DEEWR	Department of Education Employment and Workplace Relations
DIIRD	Department of Innovation, Industry and Regional Development
DIISR	Department of Innovation, Industry, Science and Research
DIT	Dublin Institute of Technology
DVC	Deputy Vice Chancellor
EFTSL	Effective full time student load
EIF	Education Investment Fund
ENTER	Equivalent national tertiary entrance rank
ERA	Excellence in Research for Australia
ETC	Education and Training Committee
EUA-CDE	European University Association
FTE	Full time equivalent
GCCA	Graduate Careers Council of Australia
GDS	Graduate Destination Survey
GES	Gippsland Education Precinct
GHG	Greenhouse Gas Emissions
GIS	Geographic Information System
GOTAFE	Goulburn Ovens TAFE
G21	Geelong Regional Alliance
GSF	National Research Centre for Environment and Health, Germany
GSP	Gross State Product
HE	Higher Education
HECS	Higher Education Contribution Scheme
HEFCE	Higher Education Funding Council for England
HEI	Higher Education Institution
HEIF	Higher Education Innovation Fund (UK)
HELP	Higher Education Loan Programme
HESA	Higher Education Statistics Agency (UK)
IACE	Institute for Advancing Community Engagement
ICT	Information and communication technology
IESC	Industry Education Steering Committee
IGER	Institute for Grassland & Environmental Research
IMHE	OECD Programme on Institutional Management in Higher Education

IPO	Initial public offering
IPR	Intellectual property rights
ITC	Information technology and communications
IIT	Indian Institute of Technology
KTN	Knowledge Transfer Networks
KPI	Key Performance Indicator
LGA	Local Government Association of South Australia
LIVE	Leadership, Involvement and Volunteer Experience
LLEN	Local Learning and Employment Network
LLL	Life-Long Learning
LOA	Licensing Options Assignment
LOTE	Languages other than English
LTPF	Learning and Teaching Performance Fund
MCTEE	Ministerial Council for Tertiary Education and Employment
MPIP	Melbourne Institute for Indigenous Partnerships
MOU	Memorandum of understanding
NCDEA	The National Centre for Dairy Education
NSW	New South Wales
NHMRC	National Health and Medical Research Council
NRP	National Research Priority
OECD	Organisation for Economic Co-operation and Development
OECD REGPAT	OECD Registered Patent database
OUA	Open University of Australia
PV	Photovoltaic
QAA	Quality Assurance Agency for Higher Education
QLD	Queensland
R&D	Research and development
RDA	Regional Development Australia
REEF	Renewal Energy Equity Fund
RMIT	Royal Melbourne Institute of Technology University
RPL	Recognition of prior learning
RTO	Registered training organisation (providing VET)
SES	Socio-economic status
SET	Science, engineering and technology
SEMIP	South East Melbourne Innovation Precinct
SME	Small and medium enterprise
SNAP	Schools Network Access Program
STI	Science, technology and innovation
TAFE	Technical and further education

TAP	Technical Assistance Programme (Purdue University, US)
TTO	Technology Transfer Office
UB	University of Ballarat
UNS	Unified National System
VEIL	Victorian Eco-Innovation Lab
VET	Vocational education and training
VCIP	The Victorian Community Indicators Project
VTAC	Victorian Tertiary Admissions Centre
VU	Victoria University
WA	Western Australia
WIL	Work integrated learning

Assessment and recommendations

Towards a stronger tertiary education and innovation system in Victoria

With more than 5.3 million inhabitants Victoria is the second most populous state in Australia. Once a manufacturing economy, Victoria is now transforming itself into a service and innovation-based economy. Currently, the largest sectors are education services and tourism. In terms of social structure, Victoria is characterised by a large migrant population, 24% of population were born overseas and 44% were either born overseas or have a parent who was born overseas. About 70% of the population resides in Melbourne.

Victoria faces a number of challenges, ranging from an ageing population and skills shortages to drought and climate change and increased risk of natural disasters. Rapid population growth, 2% annually, has implications for service delivery and uneven development as well as regional disparities. There are barriers to connectivity in terms of transport and infrastructure, and a high degree of inter-institutional competition in tertiary education sector. The business structure in Victoria includes some highly innovative activities such as in biotechnology, but other sectors, especially those with high number of small and medium-sized enterprises, are lagging behind. Most of the larger manufacturing enterprises are externally controlled and there is uncertainty over the long term investments they will make in the state, as well as the place of Victoria in the global production networks.

Victoria is a knowledge-intensive centre for Australia. It has a diverse range of institutions across the tertiary education sector ranging from research-intensive universities to industry- and community-engaged TAFE institutes as well as four dual-sector institutions. 96% of the approximately 280 000 students enrolled in tertiary education courses in 2008 studied in universities. About 35% of all students enrolled in tertiary education in 2008 were from overseas. As a net importer of students and by winning national

research grants and contracts, tertiary education and research make powerful direct and indirect impact on the development of the state. Tertiary education sector accounts for over 5% of Victoria’s GDP and educational services are Victoria’s strongest export, worth more than AUD 5.4 billion (Australian dollar), surpassing tourism and automotive sectors. The state is a magnet for immigration, attracting 178 638 international student enrolments in 2009 which represents 31% of the total for Australia – albeit that the overwhelming majority of these students come to Melbourne. The overseas student fee revenue represents a growing proportion of university budgets, ranging from 12% in Victoria University to 26% in RMIT.

The tertiary education sector is becoming increasingly competitive with the introduction of demand-driven funding. The Victorian Training Guarantee, to be fully implemented in January 2011, provides a universal entitlement to vocational education and training. From 2012, funding for university will also be demand-driven. The Australian Government funding will follow the students wherever they choose to enrol. In addition, the cap on the number of students that any university may enrol will be lifted.

The State of Victoria stands out among many other regions in the OECD area thanks to its efforts to make innovation and knowledge-based development a pillar of its future development. Victoria and its tertiary education sector have also made considerable strides in widening access to education, strengthening university-industry collaboration and improving the overall relevance of educational provision. At the same time, however, the current extent of locally or regionally relevant activities by Victorian tertiary education institutions are in many cases not fully reflected in tertiary education policy or institutional set-up. There are gaps in important areas such as lifelong learning, entrepreneurship education and support for small and medium-sized-enterprises. Innovative initiatives often remain isolated and insufficiently geared to serve the local and regional needs. This situation manifests itself in:

- Limited strategic anchoring within tertiary education institutions and within the tertiary education “system” in Victoria. Regionally relevant action is often not reflected in strategic development, curriculum development or budget allocation of the tertiary education institution. The universities’ compact negotiations do not provide sufficient alignment of institutional mission with the regional and local needs and priorities. The system of institutionally steered incentives and support activities linking tertiary education/research with the region remain inadequate.
- A lack of system coherence resulting in limited legitimacy of the needs and priorities of the Victorian Government among the

universities. Regionally and locally relevant activities are predominantly viewed by the tertiary education institution as a “third mission”, not linked to research or academic subjects, limiting the effort and resources invested in them. Incentives enable isolated initiatives, the impact of which is diminished by their non-co-ordinated character.

- A co-ordination deficit within the tertiary education system. Tertiary education institutions are each delivering their own range of activities and services with limited co-ordination, collaboration and sharing of good practice, leading to duplication of efforts and difficulties in monitoring the results. The co-ordination of information and action on the part of the public agencies, tertiary education institutions as well as various stakeholders is also in need of improvement.
- Weak evidence base. The system of information gathering about the regional environment, as well as about the successes and failures of respective activities of tertiary education institutions, is limited in scope and quality. There is a lack of information and robust data, for example in terms of innovation performance in the private sector, student progress, graduate employment, graduate destinations (outmigration) as well as the breadth and scope of work-based learning activities which make it difficult to evaluate the outcomes of local policies and institutional practices.

In order to address these challenges, Victoria needs a system approach to regional innovation and human capital development as part of a co-ordinated strategy. There is a need to develop collaboration across government, private and public tertiary education sector and to share, extend and scale up the many good practice examples that are already in place. Stronger incentive structures would help mobilise tertiary education institutions and their staff for local and regional development. In order to improve regional development outcomes, more robust data is required, for example in terms of student records. Furthermore, creating jobs and providing access to employment opportunities should be seen by the Victorian tertiary education institutions as an important goal of innovation and human capital development. The institutions could also make stronger efforts to use Victoria as a laboratory for learning and collaborative challenge-driven research. The establishment of flexible, multi-provider learning and extension centres could help serve the local and regional needs outside of metropolitan areas.

Innovation in Victoria

Australian Government's research and innovation agenda has a focus on science outputs, international excellence and commercialisation of university research results. Victoria is one of the prime locations for science and research in Australia and the state government aims to make innovation a pillar of its "healthy, sustainable and productive" future. While strong investments have been made in leading-edge science and research infrastructure, there is a need to ensure returns on investment in terms of job creation and business formation. Furthermore, the regional innovation system is faced with a risk of fragmentation ...

The Australian Government has a long-standing set of national research priorities including environmental sustainability, health, frontier technologies to transform industries, and safeguarding Australia. The emphasis of research policy is on international excellence. The excellence agenda is also pursued by the research assessment process and national level grant schemes. The recent review of national innovation system called for increased funding for research collaborations between universities and other research organisations in order to promote dissemination of knowledge. As a response, a ten-year reform of national innovation system was launched to address Australia's long-term weaknesses in business innovation and university-industry collaboration.

With its diverse set of tertiary education institutions, Victoria is one of the prime locations for science and research in Australia. The Victorian Government's science-led strategy seeks to build on Victoria's innovation capabilities while focusing them on the key drivers of ageing, climate change and international competitiveness. The government has made considerable investments in boosting leading-edge research and innovation: over a ten year period, 1999-2008, AUD 620 million was spent on the Science, Technology and Innovation Initiative. In 2008, Victoria launched a new strategy bringing forward AUD 300 million investments in addition to more than AUD 714 million in innovation funding announced in the 2008-09 state budget. This initiative represented a policy shift from a science-led innovation strategy towards a more user-driven strategy with

collaborative projects to deliver public benefits in health, sustainability and productivity.

Victoria's research-intensive universities are the cornerstones in the state government's ambition to transform Victoria into an innovative state with a high degree of knowledge-intensive industries and jobs. Their combined knowledge base has a considerable potential for new business formation and attraction of external firms. In 2007 Victorian universities received a total of AUD 653.9 million in external research income. Victoria's two largest universities, the University of Melbourne and Monash University, accounted for 82% of research income for the region. The main expenditure on research by the universities has been in medical and health sciences.

Victoria's science-led innovation strategy has supported the expansion of research-intensive universities. It has contributed to winning competitive national funding and has boosted the knowledge generation in universities. Furthermore, findings from the economic evaluation of *the Science, Technology and Innovation (STI) Initiative* by Deloitte (which supported 134 projects from 1999 through to 2007-08) show that investments have also delivered net economic benefit to Victoria. There is, however, a continuous need to ensure that the considerable investments will bring returns on investment in terms of employment growth and new companies. Furthermore, there is a need to improve information on innovation performance within private sector to ensure that the innovation policy will be developed on robust evidence of the region's needs.

To date, the Victorian Regional Innovation System has been characterised by competition. While there has been substantial investment in the research components and some areas of successful innovation within firms, there is limited integration between the system components and an absence of underlying culture of collaboration. There appears to be limited attempts to set out the collective needs of the state in terms of innovation infrastructure and for the universities to co-ordinate their action in meeting such needs. The culture of competition between universities has led to competing centres and initiatives and a strong emphasis on life sciences and other priority disciplines rather than wide coverage of industry's needs.

The Victorian Government has made efforts to provide funding incentives to enhance university collaboration. These efforts have been particularly successful in the field of ICT and health. For example the Parkville Comprehensive Cancer Centre (CCC) has created a largest concentration of cancer clinicians and researchers in the southern hemisphere, ranking it among the top ten cancer centres in the world. At the same time, however, promising cluster-type or industry-sector initiatives

such as Melbourne University’s Parkville Precinct and Bio21, Monash University’s South East Melbourne Innovation Precinct, Deakin University’s Geelong Technology Precinct, Swinburne University’s Industrial Research Institute Swinburne (IRIS) and RMIT’s Design Hub are characterised by limited collaboration with other tertiary education institutions in Victoria.

Science- and technology-led innovation strategy is not enough to address the challenges of a low absorptive capacity for innovation in the SME-based economy and the manufacturing base that is restructuring. Research has to be diffused to be exploited by firms in order to create employment and economic growth. This calls for enhanced collaboration between tertiary education institutions and a more balanced regional policy that is based on both science-led and user-driven innovation. The Victorian Government has taken positive steps to this direction...

The dynamism of local economies depends on the ability of local firms to innovate and to adapt to changing market and technologies by continually introducing commercially viable products, services and production processes. There is a weak innovation culture in small and medium-sized enterprises (SMEs) and lack of tradition of collaboration between the SMEs. One consequence of this is limited demand from SMEs for services offered by universities or poor articulation for this demand. In many other OECD countries SMEs are engaged in clusters through associations which are able to articulate generic needs and purchase services collectively on behalf of industry. Often such clustering is facilitated by tertiary education institutions. In Victoria, there was limited evidence of this, with some notable exceptions, for example, in the dairy sector with the well-organised services developed by Goulburn Ovens TAFE.

Victoria would benefit from an innovation strategy that supports both the innovation intensive sectors with leading-edge research, but also the wider SME base and particularly those sectors with low R&D investment including the service sector where innovation is incremental and user-driven. The AUD 40 million programme “Boosting Highly Innovative SMEs” has been designed to achieve this goal.

TAFE institutes are often better equipped than research-intensive universities to engage with small and medium-sized enterprises (SMEs) in

particular in managing the upgrading of their technologies. To ensure that TAFE institutes are well positioned to help upgrade and diversify existing industries, *i.e.* help existing firms to expand into a new line of business, their current focus on skills provision should be balanced with sectorally and locally focused comprehensive support for SMEs across Victoria.

Support for innovation appears to be fragmented with each university developing its own initiatives in competition with each other and often with other agencies outside Victoria. Recognising the need for more integrated response to industry, the nine universities in Victoria have developed Unigateway, a web signposting service for SMEs to access university expertise. If suitably supported and encouraged, this could provide the basis of a more integrated collaborative network for engagement with business.

Almost all universities have technology transfer offices which aim to facilitate industry collaboration and knowledge exchange. This activity is based on a technology-push model as inventions developed in the university are marketed to potential licensees in industry. The legal basis for intellectual property protection in Australian universities remains weak. While the Victorian universities have been proceeding on the basis that academic inventions can be commercialised by the institutions, the scale of the commercialisation activity is relatively small. Numbers of patents are increasing but so far revenues remain at a low level with AUD 7 million income in 2007. It can be expected that much of this involves commercialisation outside of the state.

One way of improving collaboration with business and industry is investing in knowledge transfer through people-based mobility schemes. Also PhD training could involve stronger links with key clusters and provide entrepreneurial skills.

Spin-off companies are locally based and likely to have a local economic benefit. This is also an area where Victorian universities could have a strong impact on the SME sector through support for enterprise within the student/graduate community. There is room for improvement, given the current low rate of spin off formation – less than one company per university per year. Universities could consider mainstreaming enterprise support with degree programmes and through supporting infrastructures. Better results could also be achieved through pooling of resources and collaboration across the tertiary education sector. Experience elsewhere shows that the best support for graduate entrepreneurship comes from teaching undergraduate and graduate levels programmes where students from across the sciences, engineering, business and arts disciplines to work in teams to form real companies mentored by entrepreneurs.

The following measures would enhance the contribution of tertiary education institutions to regional innovation in Victoria:

- The Australian Government should review the impact of its research policies on business engagement, especially including the new Excellence in Research for Australia (ERA) research assessment process. Australian Research Council's schemes such as the linkage programme could be made more accessible with a continuously open call and lightweight review for smaller projects.
- The Australian Government should consider the establishment of core funding for university engagement in order to promote knowledge transfer and the interests of industry. To reduce the tendency of the universities to measure success in innovation by the amount of (public) investment made, rather than the amount of commercial return generated or jobs created, efficiency/performance indicators should be created for tertiary education institutions involved in innovation.
- The Victorian Government should commission a comprehensive review of the innovation system to better understand the levers and demands within the private sector which can be better met by new university initiatives. This implies a large scale study of the innovation process within the business community rather than just an analysis of existing policies. Examples exist from for example the EU Regional Innovation Strategy (RIS) and Regional Innovation and Technology Transfer Strategy (RITTS) programmes in which studies of supply and demand of innovation support were undertaken, and various studies of regional innovation systems in Europe as part of the European Commission's information platform on European, national and regional research systems and policies (ERAWATCH).
- The Victorian Government should ensure that research on clusters and the demands of industry extend into the service sector and include clusters such as tourism. Clusters should also be conceptualised as cutting across the manufacturing-service divide – agribusiness clusters usually connect with tourism for example and increasingly manufacturing innovations incorporate service components. Universities should be encouraged to draw upon business schools and humanities in providing assistance to business.
- The Victorian Government should continue to encourage greater collaboration between universities, for example through its investment in research facilities.

- The Victorian universities should look to develop and enhance the Unigateway project to provide a more hands-on engagement with business and a more collaborative way of referring enquiries. The service should be proactive and interactive rather than just relying on a portal and the state and or commonwealth government should provide additional funding to encourage greater involvement by the small and medium-sized enterprises (SMEs). The Knowledge House in the North East of England provides a good example of a comprehensive service provided by five universities and the Open University. Innovation vouchers may be a way to encourage greater demand from SMEs.
- The Victorian universities should look to match global levels of excellence in supporting entrepreneurship in the curriculum, and build comprehensive support programmes encompassing entrepreneurship training, practical experience of creating new businesses for groups of students, and incubation and hatchery facilities together with seed funds for new graduate ventures.
- The Victorian TAFE institutes should seek to provide sectorally and locally focused comprehensive support for small and medium-sized enterprises (SMEs), connecting wider business improvement with training provision.

Human capital and skill development in Victoria

Australia is facing a skill shortage that will last beyond 2020. To face this challenge the Australian Government has introduced national targets to increase participation in tertiary education and to widen access of lower SES groups. Due to intra-regional disparities, diversified targets are needed in Victoria. The widening participation agenda requires sustained collaboration with schools, improved articulation arrangements between TAFE institutes and universities as well as strengthened focus on Life Long Learning and re-skilling and up-skilling. To advance tertiary education in Victoria stronger co-ordination is needed...

Due to a combination of rapid economic growth and ageing, Australia suffers from a skill shortage. The Australian Government has taken measures to ensure that by 2020, 40% of 25-34 year-olds complete an

undergraduate degree and 20% of undergraduate students will be from low SES background. The new targets present a considerable stretch: currently the national tertiary education attainment rate for students aged 25-40 years is at 34.6% with 15% of all undergraduate students from low SES backgrounds. People from rural and remote areas and Indigenous people are under-represented in tertiary education.

In the case of Victoria, there is considerable diversity in terms of population growth in different parts of the state. Outer Melbourne is growing more rapidly than anywhere else in the country. There is an estimated shortfall of 96 000 bachelor degree completions and 10 000 postgraduate degree completions till 2020. While Melbourne has almost reached the 40% tertiary education attainment rate, Victoria will still need to improve performance. In terms of students from low SES backgrounds, the target of 20% is challenging because only 19.8% of Victoria's population falls into this category, in comparison with the national average of 25%. To advance tertiary education in Victoria a combination of a state-wide goal with minimum growth goals for each of the five non-metropolitan regions could be considered.

Most Victorian tertiary education institutions are planning for significant growth in student numbers and also aim to recruit high proportion of students from low SES backgrounds. The new competitive situation involves also risks: some universities may capitalise on their status and ranking to over-power both TAFE institutes and universities whose excellence is manifested in other ways. Consideration should be given whether those universities that have a significant cohort of low SES students may need additional support.

Positive outcomes in widening participation require consistent, long-term action by tertiary education institutions to reach out to schools in order to improve the quality of teaching and to raise aspirations. For example, Victoria University, whose catchment area is one of the fastest growing but poorest areas of Melbourne, has a broad equity and diversity strategy. Its "Access and Success" programme provides a valuable example for tertiary education institutions worldwide aiming to widen access in harder-to-reach communities. It involves both school and community partners in designing and delivering interventions and constitutes early, long-term and sustained interventions, using a cohort-based approach to raising aspirations.

According to the ongoing OECD Review of Vocational Education and Training, only limited success has been reached in OECD countries in channelling students with VET backgrounds to tertiary education. While Australia and Victoria have made great improvements in developing pathways in education, articulation between TAFE institutes and universities

remains a challenge. In Victoria, only about 11% of commencing university students were offered study places in 2007 on the basis of a TAFE award, with tertiary rates from dual-sector universities, Swinburne University recording the highest rate of 27% and followed by Victoria, Deakin and La Trobe. Pathways between TAFE institutes and universities are in general need of strengthening.

Given the ageing of the population, Victoria cannot rely on young people as the primary suppliers on new workforce skills. Skills upgrading and general enhancement of qualifications would improve competencies of the work force. Upgrading the skills of the adult population is also likely to have a more direct effect on the region's economic performance since adult learners are less mobile than younger students. The Victorian Government and tertiary education institutions should take steps to ensure that flexible ways of provision are in place for those who combine work and study through work-based, e-learning and distance education. TAFE institutes either as a sector or in collaboration with universities could widen opportunities for entry level and mature students. Increasing emphasis on re-skilling and up-skilling would offer new opportunities for TAFE institutes especially if the training entitlement could be refashioned to recognise the value in reverse articulation.

One of the main issues impeding human capital development in Victoria is the absence of state-wide mechanisms to articulate a long-term vision and implement an integrated human capital development strategy for all educational institutions and stretching from pre-primary to tertiary education and beyond. In order to ensure a fully functioning human capital development system, transparent pathways for learners through the education system are required. This would involve the development of course and programme articulation agreements; stronger credit recognition schemes; more robust schemes to acknowledge prior learning as well as alternative selection mechanisms; clear and enforceable policies related to credit transfer and increased support for joint and collaborative programmes. Existing collaborative mechanisms between universities and TAFE institutes should be supported and scaled up.

In order to ensure that the wider participation rates will translate into improving retention rates and employability outcomes, there is a need to focus on “equity in progress” by providing stronger support services for students and embedding employability skills within the

curriculum. There is also a need to generate more robust data on student progress and employment outcomes.

While most Victorian universities are now engaged in the widening participation agenda and “equity in access”, there is a need to balance this approach with a focus on “equity in progress”. Currently, the retention levels vary considerably among Victorian universities. While most universities have improved their performance over the last decade, stronger focus is needed to improve the quality of induction process, the first year experience and appropriate support mechanisms for first-generation students to help them complete their studies and acquire relevant skills for employment and entrepreneurship.

There is a lack of robust data about student progress, graduate performance, employment outcomes and graduate destinations. Both TAFE institutes and universities in Victoria had limited information on graduate performance. Graduate Careers Australia’s Australian Graduate Survey does not provide an adequate vision of graduate employment. Moreover, the institutions themselves need to establish an appropriate method for tracking graduates as a way of informing curriculum – and understanding more comprehensively how education meets the needs of society and the economy. The Victorian Government could take the lead in setting up a national database to track the progress of students.

The concern for labour shortages and demographic trends means that the focus needs to shift to embedding employability skills within the curriculum, and to re-skilling and up-skilling opportunities in order to ensure that employees will have flexibility to adapt to changes. No system-wide data is publicly available on the extent to which academics or students in Victorian tertiary education institutions are engaged with industry and the public sector through their normal teaching and learning and related research. Institutional level data is also at a low level with only some exceptions.

The universities in Victoria have launched initiatives, projects and programmes to restructure or reformulate their approach to teaching and learning. For example, Victoria University has committed to integrating work and community-based learning into all its courses with at least 25% of assessment based on such learning. The University of Melbourne has restructured its curriculum, introducing six three-year broad-based undergraduate degrees leading to three possible pathways: entry into the workforce, a graduate professional degree or a research tertiary degree. Innovative initiatives have been launched to enrich learning experience and improve the employability of university graduates, such as global citizen

initiatives, student leadership programmes and volunteerism. However, often these types of programmes have a limited reach to a small proportion of students. It would also be useful to consider how such programmes could be better geared to serve the needs and priorities of the region. Experimentation with experiential and problem-based learning models in group setting could provide a solution that would bring benefits for a wider group of students. Furthermore there is a need to aggressively increase and improve entrepreneurship education.

TAFE institutes by their mission usually have close industry and business contacts and courses that are directly attuned to the needs of specific sectors of the economy. The move to the demand-based funding system may, however, bring unintended results to the detriment of such industry-links. Consideration should be given to developing collaborative programmes between TAFE institutes and universities at undergraduate and graduate level.

The following measures would enhance tertiary education institutions' contribution to human capital and skill development in Victoria:

- The Victorian government, tertiary education institutions, other educational institutions and key stakeholders of the economy and society should collaborate to establish a Regional Human Capital Development System to define region-wide goals, policies and priorities. As part of this system, the Victorian Government should establish a tertiary education co-ordinating body which will help define state-wide goals, policies and priorities, in line with the recommendations of the *Review of Australian Tertiary Education*, Report of the Review of the national Innovation System *Powering Ideas: an innovation agenda, for the 21st century*, and the Victorian Government's own objectives and targets. This body would play an important role in setting a common purpose across all tertiary institutions, including:
 - Embedding the Life Long Learning (LLL) agenda across entire system to encourage multi-level articulation across all SES and age groups.
 - Extending the training entitlement to facilitate reverse articulation.
 - Ensuring greater use of advanced entry and recognition of prior learning gateways.

- Publishing a clear guide to the pathways and opportunities.
 - Providing targeted funding for collaborative programmes at all levels.
 - Developing re-skilling, up-skilling and continuing professional development in collaboration between VET and universities.
- The Victorian Government should establish multi-provider and multi-level learning and extension centers or clusters, building on the example of Monash University at Gippsland or Swinburne at Knox City, and involving Open Universities Australia. This could provide an efficient and effective way to bring together different educational providers with key businesses (public and private) to provide meaningful learning pathways and sustainable employment.
 - The Victorian Government should take the lead in setting up a national database to track the progress of students across the system, and into employment and beyond. This would help inform education provision at all levels. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers to come together and students to move into employment; and using the data strategically to identify regional priorities and at an institutional level, to respond to the data in terms of course provision and the provision of employer specified skills.
 - The Victorian universities should strengthen the labour market relevance of their educational programmes in a systematic way. The universities should be encouraged to embark on targeted regionally relevant institution-wide initiatives which have greater institutional anchorage and legitimacy within the institutions.

Climate change and “Green” Growth in Victoria

Victoria is exposed to significant challenges in mitigating and adapting to the consequences of climate change. The Victorian Government is supporting the necessary technological innovations, skill upgrading and behavioural

changes. These systemic changes can lead to efficiency improvement, better living conditions in the rapidly growing Melbourne and ultimately faster growth in Victoria. However, this new strategy has not yet fully mobilised tertiary education institutions.....

Climate change is a major risk for liveability in Victoria. At the same time, Victoria has the potential of translating the climate challenges into a new driver of systemic change and economic growth. Responding to climate change can lead to tertiary efficiency in energy management; industrial production; urban land use; construction and operation of buildings; water management; agriculture and forestry. The Victorian Government is taking strong action to support “green” innovation, to improve the sustainability of urban development in Melbourne, to facilitate the growth of business in the emerging new sectors and to raise awareness of consumers about the benefits of energy efficiency. The transition towards a more sustainable growth pattern for Victoria can only be sustained if it is embedded in a comprehensive strategy. The Victorian Government has recognised the need for a comprehensive strategy and developed, in 2010, *The Victorian Climate Change White Paper*. This strategy provides a basis to raise the level of engagement of different partners.

Tertiary education institutions play a crucial role in supporting a climate change strategy which is aligned with regional growth objectives. Victorian tertiary education institutions are delivering practical responses to climate change and water challenges. They are bringing to the market more cost-efficient technologies that reduce water scarcity and energy consumption of both households and industries. They are taking steps to offer new courses and diplomas to re-skill workers and prepare the young in Victoria for the new jobs generated by the low-carbon transition. They are also improving the carbon-efficiency of their own infrastructure and promoting events to raise awareness of the climate challenges among the local population.

However, much more could be achieved in the domain of climate change through enhanced collaboration between the Victorian Government and tertiary education institutions. There is uncertainty over the extent of the climate change risks for Victoria, the consequences on local industries of policy instruments to mitigate warming (e.g. carbon taxes) and the identification of technologies with greater potentials for cost-reduction and marketing. Engaging universities in strategic policy making would significantly reduce these uncertainties and improve prioritisation. For their part, universities should recognise that they can gain tertiary returns from

their initiatives if they work in co-ordination with the Victorian Government and other universities in Victoria.

Innovation will be the key driver of a sustainable transition to a low-carbon economy. Victoria has achieved an international strength in environmental innovation, as evidenced by registered patents in solar and hydropower technologies. The research agenda on sustainability is comprehensive, involving different faculties and embracing multi-disciplinary approaches. An important outcome, for examples, has been the creation of the Victorian Eco-Innovation Lab (VEIL), a forum where researchers and policy makers identify trajectories for future development. Universities in Victoria are creating partnerships to better address crucial environmental and development challenges. A noteworthy example is also the joint work of the University of Melbourne and Monash University to make Australian cities “water supply catchments”.

However, some important challenges constrain innovation for climate change mitigation in Victoria. These include: the lack of a structured dialogue over research priorities and duplication of efforts in specific technology fields, limited reach of industry-university collaborations for emission reductions at the firm/facility level and limited experimentation for the development and delivery of renewable energy technologies in regional Victoria.

The development of a “greener” economy in Victoria will depend on extensive retraining and upskilling as well as on timely development of a diverse set of new skills. Several universities and TAFE institutes are becoming specialised providers of education and training in sustainability and climate-change related fields. Victorian TAFE institutes are providing spaces for effective learning-by-simulation within their campuses. Another important achievement is the engagement of tertiary education institutions, and TAFE institutes in particular, in the sustainability pillar of the new regional development plans. The main challenge is to identify in which industries the new jobs will be created, and in devising appropriate mechanisms to accelerate the restructuring of curricula offered by TAFE institutes. The new *Jobs for Future Economy – Victoria’s Action Plan for Green Jobs* is an important step towards.

The following measures would enhance the contribution of tertiary education institutions to the green growth strategy in Victoria:

- The Australian and Victoria Governments should intensify their (thematic funding) support to multidisciplinary research focused on the most pressing environmental challenges faced by Victoria,

i.e. sustainable development of the city of Melbourne, water management systems, sustainable food and agriculture, and renewable energy.

- The Victorian Government should seek active participation of tertiary education institutions in the definition of priority areas for research and skill development and their implementation. Strong interdepartmental co-operation at the state level is also needed for strategic policy making in the area of climate change. Exchanges between tertiary education institutions and the Victorian state departments can be organised as round-table meetings and could feed into the state-level policy making.
- The Victorian universities, the Victorian Government and the Australia Government should co-operate in the financing and implementation of collaborative market research programmes, aimed at identifying lead markets for technology development and reduce uncertainties in the innovation and skill development agenda.
- The Victorian universities should engage in the collection and analysis of environmental data for small-areas, with the financial and technical support from the Victorian Government (in the release and processing of data). The most informative results for policy-making come from effectively merging geographic information system databases (GIS) with socio-economic data. The Community Indicators Project (VCIP) is a good model to follow. This work can be undertaken in conjunction with other awareness raising tools and media campaigns on sustainability (in partnership with “Sustainability Victoria”).
- The Victorian and Australian Governments should strengthen their support to the organisation of researchers in “reference networks”, such as the Eco-Innovation Lab, which can offset the fragmentation of the system and facilitate multi-disciplinary, inter-university research in the area of climate change.
- The Victorian Government should provide more incentives to link small and medium-sized enterprises (SMEs) with research and training institutions. Specific voucher schemes or small business innovation/technology transfer programmes could be designed to reduce the costs of carbon emission reductions in SMEs.
- The Australian and Victorian Governments should explore the possibility of replicating international good practices in linking different organisations – industry, academia, government, the third sector – with a focus on objectives of emission reductions. In

particular, “Business Victoria” could consider innovating its Regional Innovation Clusters Program along the model of Knowledge Transfer Networks (KTN) developed in the United Kingdom.

- The Victorian universities should devote greater attention to the development of a highly qualified pool of human resources in climate change and sustainability research, with more active recruitment of international PhD and junior scholars.
- The Victorian Government should support economic feasibility analysis for production and delivery of renewable energy technologies in the rural Victoria. Regional universities and TAFE institutes should play a prominent role both in the feasibility analysis and in adapting to the demand for new skills.
- The Victorian Government should start promoting knowledge sharing on the experiences of community and social innovation for sustainability activated by the new Regional Plans. Universities with regional campuses could further engage to lead other “alliances” in the regional Victoria.

Capacity building in Victoria

The Victorian Government has pioneered capacity building for regional through investing in science and research infrastructure, linking education providers with industry and government agencies and improving the knowledge base for decision making. But the full potential of tertiary education institution has not been mobilised for regional development. There is a need to create a forum where the universities and TAFE institutes and stakeholders can meet with the Victorian Government to consider how best to respond to the big challenges facing Victoria’s future...

Among the Australian state governments, Victoria provides the strongest support for its universities, around AUD 350 million, making up approximately one half of the total State Government funding for universities in the country. Victoria has made considerable investments to build capacity for innovation: over a ten year period, AUD 620 million for

the Science and Technology Initiative and a further AUD 300 million under the *Innovation: Victoria's Future* Initiative. It has also invested in improving regional provision of tertiary education, including more than AUD 37 million in university infrastructure through the Regional Infrastructure Development Fund. The government facilitates and supports reciprocal relationships between universities, TAFE institutes, industry, the community sector and government departments and agencies. Tertiary education working parties have been established to improve participation in tertiary education in rural areas and outer urban areas of Melbourne and the Regional Engagement Forum has been established to develop initiatives that benefit regional areas. The government has also supported university-community engagement through sponsorship of pilot studies and conferences and has commissioned reviews of the regional role of tertiary education in Victoria.

With the challenge of the globalising knowledge economy and the widening participation agenda there is however, a need for more systematic collaboration through a forum where the universities and TAFE institutes can meet with one another, with the Victorian Government and key stakeholders to consider how best to respond to the big challenges facing Victoria, including spatial development of tertiary education as well as innovation and human capital development which requires well functioning educational pathways between the institutions and different levels of education. Furthermore, there is a need for sector-based networks between education institutions and industries.

One of the main constraints impeding human capital development in Victoria is the absence of state-wide mechanisms to articulate a long-term vision and implement an integrated strategy for all educational institutions. The ongoing process to establish a tertiary education plan for Victoria is a positive process. Consideration should be given whether this plan would benefit from a wider focus to Human Capital Development Plan ranging from pre-primary to tertiary education and beyond, embracing Life Long Learning.

Building a stronger Victorian Tertiary Education System calls for greater alignment of universities' institutional activities with regional priorities, new pattern of provision of tertiary education in regional Victoria, enhanced incentives to tertiary education institutions for collaboration and regional

engagement and reduction of perceived accountability burden.

In 2010 the Australian Government has moved to a system of compact negotiations, whereby individual universities negotiate their own funding agreement with the Australian Government. The mission-based compacts aim to facilitate the alignment of institutional activity with national priorities. In order to ensure that the institutional activity reflects not only national but also the state and regional needs and priorities, to reduce duplication of efforts and to improve better planning and reporting, direct state involvement in compact discussions would be desirable.

The provision of tertiary education in regional and outer urban areas is a key area for the growth of tertiary education in Victoria. The Victorian Government will need to carefully balance the provision of regional education with the projected demand – growth or reduction – in order to focus tertiary education provision on local needs rather than maintaining existing university campuses or opening additional campuses. As an intermediate step support should be provided for tertiary education learning and extension centres that draw on a range of providers.

Tertiary education institution’s culture, capacity for change, leadership and the appropriate co-ordination mechanisms and oversight regionally play an important role in their capacity to engage with partnership building and collaborative action. The Victorian universities and TAFE institutes acknowledge their role in the region. Universities may have a specific community engagement plan and a managerial responsibility for engagement. Some have recognised engagement as criteria for academic promotion. However, the picture of the diverse programmes and projects involving tertiary education institutions is one of fragmentation built on separate and non-co-ordinated initiatives without an overarching vision of needs and possible converging efforts.

The current incentive structures for mobilising research-intensive universities for regional and city development are limited. There are few direct funding mechanisms to stimulate regional engagement of tertiary education institutions. There is no explicit “third task” or regional development task assigned to them but regional and local engagement is left to the initiative of the individual institutions. The principal driver of research-intensive universities is scientific world class excellence. While the TAFE institutes usually have close links to the labour market and also local and regional development, they are constrained by their limited capacity to move in this direction.

To mobilise tertiary education institutions for regional development, consideration should be given to the creation of a specific funding stream which could be allocated by formula against outcomes or as part of a regional compact negotiation. For example, the Tertiary Education Innovation Fund in the United Kingdom has considerably increased locally relevant activities of tertiary education institutions. Furthermore, the investment in the fundraising infrastructure can generate real rates of return and support regional engagement.

Over-regulation is common in mature tertiary education systems, usually arising from the increasing expectations on tertiary education, the multiplicity of interested parties, all of whom have accountability requirements. It can generate significant burden on tertiary education institutions and reduce their interest in regionally and locally relevant activities. The Victorian Government should seek to investigate and reduce the extent of the accountability burden in order to bring savings in time and money.

The following measures would build capacity for regional development in Victoria:

- The Australian Government should mobilise the tertiary education sector, including research-intensive universities, for local and regional development by creating a specific funding stream allocated by formula against outcomes or expanding compact negotiations to include state funds only to be released on production of an integrated and collaborative plan of action of universities' regional engagement. In addition, the Australian Government and/or the State of Victoria should consider developing a match funded scheme to facilitate working with alumni.
- The Australian Government should encourage stronger engagement of tertiary education institutions in the development, implementation and evaluation of regional and local development policies, for example, by requiring the involvement of tertiary education institutions in the RDA Committees under the Regional Development Australia initiative. The Victorian Government should encourage stronger engagement of universities and TAFE institutes in the regional strategic planning process. The Victorian Government should also ensure that the sub-regional plans and the state-wide blueprint will embrace a broad approach to human capital development starting from pre-primary education and stretching to tertiary education and beyond to lifelong learning opportunities.

- The Victorian Government should assume a stronger role in tertiary education to facilitate the transfer to a knowledge-based economy through enhancing its capacity to analyse, support and facilitate positive developments emerging in this sector. Processes should be established across relevant planning activities that embed tertiary education engagement in regional and local development including economic, social, cultural and environmental development. The government should play a key role in ensuring that there is a flow of funds from the Australian Government, in advocating for funds on behalf of the tertiary education sector and in providing joined-up governance in state responsibilities that intersect with tertiary education such as schools, vocational education, innovation, business development and transport and infrastructure planning.
- The Victorian Government should collaborate with the universities to ensure that the needs of the State of Victoria are considered in compact negotiations with the Australian Government and in the development of the profiles of tertiary education institutions. In order to guarantee that the needs of Victoria are effectively met by tertiary education institutions, the compact negotiations with individual universities, particularly with the four multi-sector universities, should involve also state government. Joint compact discussions would reduce duplication of efforts and improve better planning and reporting.
- The Victorian Government, tertiary education institutions and key public and private stakeholders should establish a strategy platform or forum to establish the priorities, to enhance the dialogue and collaboration between the actors and to develop a clearly articulated long-term strategy that connects top-down policies and bottom-up initiatives. The first tasks of this forum should include mapping the current engagement activities within tertiary education institutions and carrying out a gap analysis (needs assessment and activity audit) to establish what else needs to be done. To improve the industry-university collaboration the Victorian Government should facilitate the development of the industry sector networks between employers and tertiary education providers.
- To ensure sustainable region provision of tertiary education, the Victorian Government should conduct a state-wide assessment of current and planned capacity against anticipated student numbers and identify gaps in staff, and infrastructure. As an intermediate step the Victorian Government should take steps to strengthen flexible multi-provider learning and extension centres. Support should be

provided for tertiary education centres that draw on a range of providers, including both universities and TAFE institutes, to ensure the broadest possible choice and the most sustainable future. When developing or rationalising the network of education providers, care should be taken to ensure that the region continues to have access to lifelong learning services and business-related services. Adequate IT infrastructure should be in place to ensure high speed, low cost connectivity. Co-ordinated negotiation and planning process should be led by the Victorian Government within each of the five non-metropolitan administrative regions.

- The Victorian Government should have the current costs of accountability of tertiary education institutions audited in order to identify and quantify the main sources and extent of burden as well as potential to ameliorate it by data sharing, learning from the work of others and a risk-based approach to quality assurance.
- The Victorian universities and TAFE institutes should review recruiting, hiring and reward systems to include regional and local development agenda. They should create systematic mechanisms to monitor and evaluate their activities in this area, to share good practice with the institutions and benchmark this experience with other institutions and localities. In addition they should invest in developing the skills of facilitators, i.e. those with boundary spanning roles who help create links between the tertiary education institution and other stakeholders.

Chapter 1: Tertiary education and regional innovation in Victoria

This chapter examines how universities and TAFE institutes in Victoria are engaging in the support for innovation in order to build a “healthy, sustainable and productive Victoria”. The chapter first reviews the national and state level policies and programmes in place. It then moves on to highlight the progress made by the tertiary education institutions in Victoria in supporting regional innovation, highlighting commercialisation activities, engagement with cluster and industry-based collaboration and other university-industry partnerships.

The main message of the chapter is that the regional innovation system in Victoria is highly competitive and diverse and in risk of fragmentation. Whilst universities are engaging with some local clusters, their engagement is heavily research focused. More concerted efforts by tertiary education institutions should be made to support cluster development, small and medium-sized enterprises and graduate entrepreneurship.

Introduction

In Australia innovation-related policies and the consideration of the role of universities lie between national and state policy. There are national policies and policy frameworks for innovation, which largely operate on an aspatial basis and are more focused on firms and various types of other organisations rather than regions. At the state level, the state governments implement varying degrees of innovation policy, some with quite extensive and complex innovation initiatives and strong support for university engagement with this, others with a relatively weak focus on innovation. Victoria is one of the more active states in this regard with an innovation policy that is well developed and has been through several iterations.

The major challenge for the Australian states and their universities with regard to innovation is to develop effective innovation systems that operate across the states as a whole, or at least beyond the major metropolitan areas. The concept of regional innovation systems (Cooke, 1998) as understood and implemented by policymakers in many OECD countries seems to be only partially accepted as relevant by many stakeholders in Australia, especially as the notion of the region is problematic and often assumed to apply only to the non-metropolitan areas rather than functional territories based on urban cores. The very geography of Australia with large capital cities and extensive sparsely populated areas means the European notion of the region is difficult to apply. The regional innovation system is also problematic. The larger cities have the scale resources and institutions which may form the basis of an innovation system, and which may reach out into surrounding areas. However, beyond the daily commuting zone of the cities, the remainder of the states are often very sparsely populated with small towns and limited innovation resources. Consequently it may be difficult to identify an innovation system as such in these areas, or indeed to connect them to the metropolitan centres. Similarly the huge distances between the major cities weakens their potential for mutual interaction and means that the national innovation system is defined by a national policy framework rather than significant institutional and inter-organisational interactions across the states.

Victoria in this context is better placed than other states in Australia as its smaller scale and its network of smaller cities, often with universities, gives a better framework for innovation policies and networks than some of the larger and less connected states. Nonetheless it

is clear that Melbourne, the capital of Victoria, offers great potential for the development of a stronger functioning innovation system, with a very strong university base, whilst some of the smaller cities also provide an opportunity for nodes for local innovation systems or clusters, either independent from or interconnected with Melbourne.

In this context, this chapter examines the following three dimensions to assess the effectiveness and coherence of innovation policies in Victoria:

- Is Victoria's regional innovation system well connected and responsive to the industrial structure of the state?
- Do the existing universities and TAFE institutes support a fully functioning regional innovations system? Are there gaps in delivery where performance could be improved?
- What lessons can be learnt from international experience?

1.1 National policy framework and the role of the Victorian Government

National policy debate

Over the last decade Australia has seen a number of major national policy statements on innovation and on related university research issues. More recently the incoming Labour government commissioned a review of innovation chaired by Terry Cutler, and was published as the report *Venturous Australia: Building Strength in Innovation* (Cutler, 2008). This made a number of points about innovation as a holistic process and suggested elements of the Australian innovation system that needed strengthening. With specific reference to universities, the report suggested increased funding for research and called for additional funding for collaborations between universities and other research organisations in order to promote the better dissemination of knowledge. It stressed the importance of highly-skilled workforce and the quality and focus of education system. It also recommended fully funding the costs of university research activities and broad national education reforms with focus on raising teacher quality.

The Australian Government's response to the Cutler Review, *Powering Ideas: An Innovation Agenda for the 21st Century* (Commonwealth of Australia, 2009) presents a ten-year reform agenda for national innovation system. Although this review refers in parts to the

nature of innovation as being more than just technology, there is a distinct focus on the commercialisation process, and a lower emphasis on some of the softer skills-based issues concerned with innovation. There is support for universities but mainly focused on greater research funding and support for technology transfer. Powering Ideas presents seven National Innovation Priorities to focus the production, diffusion and application of new knowledge. They are intended to address the country's long-term weaknesses in business innovation, and in collaboration between researchers and industry (see Box 1.1).

Box 1.1. National innovation system in Australia: ten-year reform agenda

There are seven national innovation priorities in Australia:

Priority 1: Public research funding supports high-quality research that addresses national challenges and opens up new opportunities.

Priority 2: Australia has a strong base of skilled researchers to support the national research effort in both the public and private sectors.

Priority 3: The innovation system fosters industries of the future, securing value from the commercialisation of Australian research and development.

Priority 4: More effective dissemination of new technologies, processes, and ideas increases innovation across the economy, with a particular focus on small and medium-sized enterprises.

Priority 5: The innovation system encourages a culture of collaboration within the research sector and between researchers and industry.

Priority 6: Australian researchers and businesses are involved in more international collaborations on research and development.

Priority 7: The public and community sectors work with others in the innovation system to improve policy development and service delivery.

In relation to expanding publicly-funded research capabilities, the Australian Government has committed to:

Increasing the number of research groups performing at world-class levels, as measured by international benchmarks.

Encouraging universities to organise themselves into research hubs and spokes and to pursue industry-driven research opportunities.

Addressing the gap in funding for direct research costs.

Assisting smaller and regional universities to develop capacity by teaming up with other institutions.

Box 1.1. National innovation system in Australia: ten-year reform agenda (continued)

Increasing the capacity of public research organisations to participate in domestic and international collaborations and to undertake multidisciplinary research.

Continuing to invest in infrastructure to support collaboration and to provide access to the latest technology.

In relation to skills the Australian Government will:

Address the expected shortfalls in the supply of research-qualified people by developing a research workforce strategy.

Increase the stipend for Australian Postgraduate Awards.

Significantly increase the number of students completing tertiary degrees over the next decade.

Create viable career paths for Australian researchers.

To promote accountability the Australian Government will:

Allow universities to determine their own research and collaboration agendas in line with national priorities by introducing mission-based funding compacts.

Measure the quality of university research and guide the allocation of resources by implementing Excellence in Research for Australia.

Require universities to provide more meaningful data on research costs through activity-based reporting, and to meet specific performance targets to be developed in consultation with the sector.

Source: Commonwealth of Australia (2009), “Powering Ideas: An Innovation Agenda for the 21st Century”, www.innovation.gov.au/innovationreview/Documents/PoweringIdeas_fullreport.pdf, accessed 30 March 2010.

The Enterprise Connect initiative

A new opportunity for Australian universities to engage with small and medium-sized enterprises (SMEs) is provided through the Enterprise Connect initiative: an Australian Government programme that provides comprehensive support to eligible SMEs. It aims to help Australian firms

develop the skills, tools and knowledge needed to improve their competitiveness and productivity and to maximise their growth potential. Core services include business reviews at no cost to eligible firms and grant assistance to implement recommendations flowing from the business reviews. “The Researchers in Business” element offers the placement of researchers from universities or public research agencies into businesses to help develop and implement new commercial ideas. Enterprise Connect’s Innovative Regions Centre is based at Deakin University in Victoria (see Box 1.2).

Box 1.2. Enterprise Connect’s Innovative Regions Centre

Enterprise Connect’s Innovative Regions Centre is based at Deakin University in Geelong and works with firms, business associations and authorities in regional areas to build knowledge of its programmes, identify region-specific strategies and develop partnerships, networks and alliances.

In addition to the core services, the Centre provides funding for initiatives such as:

- Business clusters and networks.
- Stronger connections between the local businesses, the industrial base and universities.
- Training and research institutions.
- Assistance with region specific issues and opportunities.

The “Mapping the Connections” project, which will initially focus on the defence, electronics and ICT industries in Northern Adelaide, will help develop strategies to connect companies to one another and improve supply chain opportunities.

Source: State of Victoria (2010a), “The State of Victoria, Australia: Self-Evaluation Report”, OECD Reviews of Higher Education in Regional and City Development, IMHE, www.oecd.org/edu/imhe/regionaldevelopment, accessed 21 August 2010.

Alongside the national innovation priorities the Australian Government has a longstanding set of National Research Priorities (NRPs) which were first introduced in 2002 by the previous Liberal Coalition Government and which were designed to focus the

government's research efforts in those areas that could deliver significant economic, social and environmental benefits to Australia (see Table 1.1).

Table 1.1. Australian national research priorities and their associated priority goals

Priority	Description	Goals
An environmentally sustainable Australia	Transforming the way Australia's land, water, mineral and energy resources are utilised through a better understanding of human and environmental systems and the use of new technologies.	<ul style="list-style-type: none"> • Water – a critical resource • Transforming existing industries • Overcoming soil loss, salinity and acidity • Reducing and capturing emissions in transport and energy generation • Sustainable use of Australia's biodiversity • Developing deep earth resources • Responding to climate change and variability
Promoting and maintaining good health	Promoting good health and well being for all Australians.	<ul style="list-style-type: none"> • A healthy start to life • Ageing well, ageing productively • Preventive healthcare • Strengthening Australia's social and economic fabric
Frontier technologies for building and transforming Australian Industries	Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research.	<ul style="list-style-type: none"> • Breakthrough science • Frontier technologies • Advanced materials • Smart information use • Promoting an innovation culture and economy
Safeguarding Australia	Safeguarding Australia from terrorism, crime, invasive diseases and pests; strengthening the understanding of Australia's place in the region and the world; and securing its infrastructure, particularly with respect to our digital systems.	<ul style="list-style-type: none"> • Critical infrastructure • Understanding our region and the world • Protecting Australia from invasive diseases and pests • Protecting Australia from terrorism and crime • Transformational defence technologies

Source: Commonwealth of Australia (2007), "National Research Priorities", Report prepared by the Department of Education, Science and Training, www.dest.gov.au/NR/rdonlyres/B7D545D8-CC60-438B-B6D0-AB00FDEDD594/17548/NRPreport_007.pdf, accessed 25 March 2010.

The emphasis of current research policy is on international excellence in research as well as relevance to these main Australian priorities. The excellence agenda is currently being pursued by the Excellence in Research for Australia (ERA) research assessment process which takes a narrow disciplinary focus and relies heavily on the quality of journals as a basis for evaluating research excellence. Equally the Australian Research Council's (ARC) grant schemes and notably the Discovery Grants focus primarily on international excellence and paradigm shifting research with previous track record in terms of publications as a key element of the assessment process. Engagement with regional or industry partners is supported through the linkage grants scheme but rather than making this

easier for business to engage with, a recent proposal was to reduce the call for proposals to just one round a year for non doctoral proposals instead of two. It might be more sensible to move to a permanently open call for proposals such as that being adopted by the research councils in the United Kingdom, so businesses wishing to engage in projects do not have to wait so long even just for the universities to be allowed to submit the proposal.

Overall the weight of emphasis is on traditional research funding and unlike the UK research councils for example the Australian Research Council (ARC) has not been innovative in experimenting with new forms of knowledge transfer. What is perhaps most surprising is that ARC has not developed knowledge transfer programmes based on people mobility such as the Knowledge Transfer Partnership scheme in the United Kingdom which has been running very successfully (previously as Teaching Company Schemes) since the 1970s (see Box 1.3). Overall the focus of national innovation policy has been on the commercialisation of technologies developed in universities rather than the exchange of knowledge between universities and firms in a more co-operative manner. The one exception to this is the Cooperative Research Centre programme outlined below, but which is not particularly targeted on the needs of small and medium-sized enterprises (SMEs) (Table 1.2.).

Box 1.3. Knowledge Transfer Partnerships in the United Kingdom

The Knowledge Transfer Partnership programme in the UK began in the 1970s as the Teaching Company Scheme, and was designed specifically to foster close collaborative partnerships between universities and companies with an explicit focus on the transfer of knowledge into company practice rather than supporting research in universities. The main focus is on improving the competitiveness of the industrial partner, through the work of post-graduate “associate” working in the company with supervision from the academic partner. The scheme is partly funded by the companies involved and partly by a public organisation such as the Technology Strategy Board or a Research Council, with more advantageous terms available for small and medium-sized enterprises (SMEs). Typically an SME would pay around GBP 20 000 per year for involvement.

The projects are usually two years in duration and the postgraduate associate is employed to work in the company during this period on a pre-defined project. The associate is paid a salary and in some cases is registered for a higher degree (usually devoting 10% of their working time to professional development), and this way forms the linkage between the company and the supervising academic in a university or research organisation. The academic partner is compensated for some of the time of the supervisor and for university overheads.

Box 1.3. Knowledge Transfer Partnerships in the United Kingdom (continued)

The primary outcome of the project is usually the implementation of some form of innovation or technology in the company. An additional benefit is usually the recruitment of the associate; around 75% of associates in projects lasting 1-3 years are offered jobs in the company. The 2008/09 annual report for the scheme reported 977 active projects. Estimated benefits to UK business include over 6 500 staff trained, 1 119 new jobs created and an increase in pre-tax profits of GBP 126 million.

Source: TSB (Technology Strategy Board) (2010), “Knowledge Transfer Networks”, www.innovateuk.org/deliveringinnovation/knowledgetransfernetworks.ashx, accessed 5 April 2010.

The other point to note on Australian national policy is that there is an absence of core funding for university engagement beyond specific research projects. So whilst in some other countries there are funds available to support the technology transfer offices and business development managers employed by universities, in Australia this has to be funded out of the core income of the university, and hence tends to be focused on increasing the revenue for the university rather than promoting the interests of industry. The universities also have a tendency to measure success in innovation by the amount of (public) investment made, not the amount of commercial return generated or jobs created. This could be remedied by constructing efficiency/performance indicators for public agencies including tertiary education institutions involved in innovation.

The Cooperative Research Centres (CRC) Programme

The Australian Government funded Cooperative Research Centres (CRC) Programme began in 1991. The objective of the programme is to deliver significant economic, environmental and social benefits to Australia by supporting end-user driven research partnerships between publicly funded researchers and end-users to address clearly articulated, major challenges that require medium to long term collaborative efforts (Commonwealth of Australia, 2008). The Cooperative Research Centres (CRC) Programme links researchers with industry to focus R&D efforts

on progress towards utilisation and commercialisation. The close interaction between Australian and international researchers and the users of research is a key feature. Another feature is industry contribution to CRC education programmes to produce graduates who are ready to enter the labour market. Since the inception of the CRC Programme in 1990, 186 CRCs have been funded, with 42 active in 2010-11 (State of Victoria 2010b).

Table 1.2. Cooperative Research Centres (CRCs) with more than one Victorian University

	Ballarat	Deakin	La Trobe	Melbourne	Monash	RMIT	Swinburne	Victoria
Sustainable Tourism			X		X			X
eWater				X	X			
Smart services						X	X	
Advanced Manufacturing		X				X	X	
CAST		X			X		X	
Advanced Automotive technology		X	X		X	X	X	
Advanced composite structures					X	X		
Polymers				X	X	X	X	
Aboriginal and Torres Strait Islanders health			X	X				
Greenhouse gas technology				X	X			

Source: Commonwealth of Australia (2010) CRC Directory: Cooperative Research Centres Program 2010-2011, Department of Innovation, Industry and Regional Development, Canberra, <https://www.crc.gov.au/HTMLDocuments/Documents/PDF/CrcDirectory-ebook-July2010.pdf>, accessed 11 October 2010.

In 2008 the existing Cooperative Research Centres (CRCs) only had ten centres with the involvement of more than two Victorian universities – others had one Victorian university but with university partners from other states only. The pattern of partnership is interesting – most of the

projects with more than one Victorian university were in the industrial technology areas – none were in agriculture or mining. (see Table 1.2).

Of the universities, Monash was most active in forming Cooperative Research Centres links with other Victorian universities with seven links. Joint second were Royal Melbourne Institute of Technology (RMIT) and Swinburne, very much concentrated on industrial technologies. Melbourne was only involved in four links, and these tended not to be in the industrial technology areas. Ballarat had no links with other Victorian universities, and Victoria University had only one link.

Collaborative Research Networks

Since the OECD review visit in December 2009 the Australian Government has released a discussion paper on Collaborative Research Networks (DIISR, 2010), in which the recommendation is to provide some modest research funding to those less-research intensive universities in suburban and non-metropolitan areas if they partner with other research intensive universities. One rationale for this funding is to support structural adjustment in institutions which are more strongly connected to local needs and priorities. The objectives are to focus such universities' activities on areas of excellence and to strengthen their links to other universities as well as addressing wider national research and innovation goals. It is, however, difficult to see how this initiative would better assist these universities to connect with local needs and areas of specialisation apart from one comment on larger "lighthouse" projects maintaining research capability in areas relevant to regional and outer-suburban areas.

The Victorian Government's policy for innovation

Innovation is important for Victoria as it seeks to become a service and innovation-based economy. However, Manufacturing remains a key part of Victoria's economy, accounting for AUD 30.6 billion or 11.4% of gross state product. It directly employs 326 000 people. Other export focused industries include tourism, food and education. Key sectors in Victoria are listed in Table 1.3.

Table 1.3. Key sectors in the State of Victoria

Sector	Sector's value* (AUD billion)	People employed
ICT and telecommunications*	27.39	87 000
Biotechnology and pharmaceuticals**	23.60	22 000
Food	22.00	144 000
Financial services	22.80	100 000
Tourism	15.10	179 000
Automotive	15.00	35 000
International education	4.45	40 000
Aviation	2.50	22 000
Defence	1.60	9 000

Source: State of Victoria (2009) , 2009-12 Corporate Plan, Department of Innovation, Industry and Regional Development, Victoria; *Additional information from State of Victoria (2010b) Australia Victorian ICT Industry Survey Factsheet May 2010; ** Additional information from State of Victoria (2010c) Victorian Life Sciences – Sector Performance.

* Annual turnover, except for biotechnology and pharmaceuticals, where it is market capitalisation of listed companies.

No detailed data on innovation performance is available for Victoria. It appears that the structure of business in the state includes some highly innovative activities such as in biotechnology, but other sectors, especially with concentrations of small and medium-sized enterprises (SMEs), are lagging behind. Most of the larger manufacturing enterprises are overseas owned and there is some uncertainty over the long term investments they might make in the state and the place of Victoria in global production networks – this is particularly acute in the automotive industry at present. The state therefore needs an innovation strategy that both supports the innovation-intensive sectors with leading-edge research, and the wider SME base, particularly those sectors with low R&D investment for example in the service sectors. While there appears to be a widespread recognition by the Victorian Government that innovation needs to embrace SMEs and a special initiative “Boosting Highly Innovative SMEs” (BHIS) has been launched, a more clearly articulated SME innovation strategy than incorporates the service sector would be useful (see Box 1.4)

Box 1.4. Boosting Highly Innovative SMEs (BHIS)

The AUD 40 million initiative “Boosting Highly Innovative SMEs” (BHIS) includes two programmes designed to support innovative SMEs:

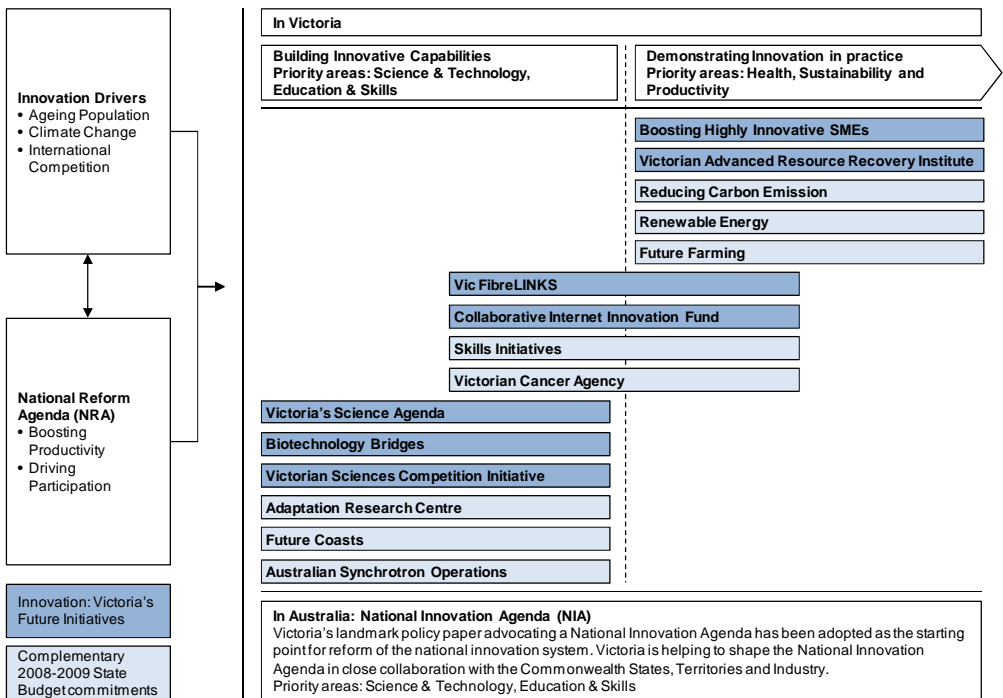
The Smart SMEs Market Validation Programme (MVP) is a pilot procurement-driven innovation programme modelled on the successful US Small Business Innovation Research (SBIR) programme. The AUD 28 million pilot is a competitive grants programme designed to help SMEs with innovative, commercially orientated R&D tailored to meet the technology needs of Victorian public sector entities. The funding will help SMEs pilot innovative R&D solutions and develop investment and commercial opportunities beyond the life of the programme. MVP is based on the premise that undertaking R&D in response to customer-specified needs provides an improved focus for an SME’s R&D efforts. As customers, Victorian public sector entities will develop specifications for new technologies to improve service delivery. SMEs will then be invited to undertake R&D to deliver solutions to these specified requirements. The Smart SMEs Innovation Commercialisation programme provides a suite of commercialisation learning and mentoring programmes to address the needs of innovative regional Victorian companies. This programme operates in a number of regional centres including Geelong, Wangaratta, Taralgon and Bendigo. More than 200 regional companies have participated in the program, resulting in more than 85 new partnering and alliance deals and more than AUD 13 million of external investment. The Collaborative Internet Innovation Fund (CIIF) is a AUD 15 million competitive grants programme to accelerate the innovative use of the next generation of ICT by Victorian government, business and community. Twenty projects have been granted up to AUD 500 000 to provide solutions to problems in areas such as the environment, health, education, food technology and resource management.

Victoria has also developed a state level innovation strategy *Innovation: Victoria’s Future* (State of Victoria, 2008a), which aims to continue to ensure a healthy, sustainable and productive future for all Victorians. The strategy seeks to build on Victoria’s innovation capabilities while focusing them on the key drivers of innovation, the challenges of an ageing population, climate change, and international competitiveness. The strategy will also identify Victorian reforms that encourage innovation in areas such as water, energy and carbon markets, prevention of obesity and diabetes and vocational education and training. These initiatives will underpin Victoria’s healthy, sustainable and productive future by providing leading-edge research and development infrastructure and supporting robust local and international networks (see Figure 1.1). The strategy also aims to maintain the Victorian Government’s innovation leadership by continuing its involvement in

conjunction with other state governments in influencing the Australian Government reviews of the innovation system, and the National Innovation Agenda (Victoria DIIRD, 2008b); (see also Chapter 3 for climate change).

The innovation policy in Victoria has two main dimensions: building innovative capabilities and demonstrating innovation in practice. A series of specific initiatives are mapped across these two themes – direct innovation policies and complementary initiatives.

Figure 1.1. Initiatives in the Victorian State Innovation Strategy



Source: State of Victoria (2008a), Innovation: Victoria’s Future; The Victorian Innovation Statement 2008, Department of Innovation, Industry and Regional Development (DIIRD), Melbourne, www.diird.vic.gov.au/__data/assets/pdf_file/0004/130837/victorian-innovation-statement.pdf

Policies and strategies have also been developed in Victoria with a focus on key strategic sectors. These policies have supported mainly the expansion of research-intensive universities and often have a strong science-push orientation to innovation:

- Biotechnology – including the 2007 Victorian Biotechnology Strategic Development Plan, biotechnology investment, and biotechnology precincts that include the Bio21 cluster.
- Healthy Futures – the Victorian Government's Life Sciences Statement that takes the next steps to build on Victoria's excellence in medical and clinical research and support clinical trials.
- Operational Infrastructure – operational infrastructure support is provided for medical research organisations that conduct fundamental or clinically-based biomedical research as their main focus.
- The Parkville Precinct – located on the northern edge of Melbourne's Central Business District, the Precinct is home to a number of well-established health, research and education institutions.
- Victorian Neurotrauma Initiative (VNI) – a five-year AUD 63 million health research fund established in 2005 as a partnership between the Transport Accident Commission and the Victorian Department of Innovation, Industry and Regional Development. It supports research into traumatic brain injury, spinal cord injury and peripheral nerve injury conducted by Victorian scientists in collaboration with their national and international colleagues.
- The Energy Technology Innovation Strategy – providing research and development funding to support partnerships for developments in greener and cleaner technologies where Victoria has a competitive advantage.
- The Victorian Government ICT Industry Plan 2005-10 – including major initiatives in the areas of export and investment, government procurement, workforce development and collaboration.

The Victorian Science Technology and Innovation (STI) Initiative

The Victorian Government has made considerable investment in boosting research and innovation. The centrepiece of the Victorian research investment has been the Science Technology and Innovation

(STI) Initiative co-ordinated by the Office of Science and Technology. The Initiative supported collaborative, leading-edge biomedical, environmental, agricultural, manufacturing, design, and information and communication technology (ICT) projects across metropolitan and provincial Victoria. The first generation of the STI Initiative (AUD 310 million over five years) was launched in 1999, followed by STI Initiative: Second Generation (AUD 310 million over five years) in 2002. The AUD 300 million *Innovation: Victoria's Future – The Victorian Innovation Statement 2008* (State of Victoria, 2008a) builds on the successes of two generations of STI Initiative, as well as other innovation policies and programmes by placing strong emphasis on using the capabilities built up over the period of the STI programmes to deliver user-driven innovation to Victorians under the key themes of health, sustainability and productivity. This is in addition to more than AUD 714 million in innovation funding announced in the 2008-09 state budget.

The main expenditure on research by Victorian universities over the last five years was in medical and health sciences as Victorian researchers won over 40% of national health and medical research funding. Other significant research concentrations were in biological sciences, engineering and technology and management and commerce. There are some partnership agreements between universities where there are complementary capabilities, for example the Melbourne/Monash Protocol in medical research. Furthermore the collaboration between the Victoria University and the University of Melbourne in the Teaching Training and Research (TTR) Centre is another example of collaboration through which Victoria University delivers nursing and paramedical training and the University of Melbourne educates doctors. There is a well-developed collaboration in the field of ICTs and in research programmes on environmental solutions (see Chapter 3). The Victorian Government has provided considerable support to boost inter-institutional collaboration. Some of the examples are presented in Box 1.5.

In spite of these various initiatives by the Victorian Government and the examples described above there seems to be little direct co-operation between the universities within the region. When questioned most universities found it difficult to identify areas of collaboration beyond the occasional Cooperative Research Centres (CRCs).¹ There is also evidence of competing projects in similar or related areas where the respective universities did not seem to be aware what the others were doing.

Box 1.5. Collaborative efforts supported by the Victorian Government

VPAC, an independent eResearch and Advanced Computing R&D service provider, is a not-for-profit registered research agency established in 2000 by a consortium of Victorian Universities: Deakin University, La Trobe University, Monash University, RMIT University, Swinburne University of Technology, the University of Melbourne, the University of Ballarat and Victoria University. VPAC provides expertise, training and support in eResearch, advanced computing, and professional R&D including the application of advanced computing for academia, industry, and government. The Victorian Government has invested approximately AUD 8 million in VPAC over the past five years.

VeRSI, the Victorian eResearch Strategic Initiative, is an eResearch programme funded by the Victorian Government to accelerate and co-ordinate the uptake of eResearch in universities, government departments and other research organisations. It is a collaborative joint venture between Monash University, the University of Melbourne, La Trobe University and the Victorian Government Department of Primary Industries.

VERNet was established in November 2004 by the nine Victorian universities and CSIRO to design, deploy and manage an optic fibre network of up to 2 000 km linking up to 200 research and tertiary education sites across the state. The Victorian Government is providing access to its AUD 21.5 million regional fast rail fibre optic network for VERNet. Victoria's nine universities are contributing AUD 17.1 million and the Australian Government AUD 14.7 million. The AUD 1.1 billion Parkville Comprehensive Cancer Centre (CCC) project involves the establishment of a formal collaboration between Peter Mac, Melbourne Health (the Royal Melbourne Hospital), the University of Melbourne, the Melbourne branch of the Ludwig Institute for Cancer Research, the Royal Women's Hospital and the Walter and Eliza Hall Institute for Medical Research. The Parkville CCC is designed to drive leadership and innovation in the fields of cancer treatment, research and education by having the largest concentration of cancer clinicians and researchers in the southern hemisphere, ranking it among the top ten cancer centres in the world. It aims to facilitate the rapid translation of ground-breaking discoveries from "bench to bedside", attracting talented researchers and clinicians, and drawing international investment and research collaborations.

Box 1.5. Collaborative efforts supported by the Victorian Government (continued)

The Victorian Life Sciences Computation Initiative (VLSCI) is an AUD 100 million investment in high performance computing facilities and research support services that will link the major life sciences research hubs in the University of Melbourne in Parkville, La Trobe University, the Department of Primary Industries at Bundoora, Monash University, and the Australian Synchrotron at Clayton.

The AUD 145 million Victoria's Science Agenda programme announced in 2008 includes two funds, the Strategic Project Fund and the Investment Fund designed to support collaborative projects to build innovation, science and technology capabilities. 60% of projects funded under the AUD 41 million Investment Fund are industry-led. Many involve multiple university partners.

1.2 Responding to regional needs and demands - achievements

A central concern of the current OECD review is to establish to what extent the universities respond to the needs of their region and the Victorian Government. Representatives from the business and policy community in the state and specific sub-regions consistently made the point that the state needed a more coherent innovation system, and that the universities were not always effective at filling the gaps and facilitating greater collaboration, especially as we have already noted they are not good at collaborating among themselves at a strategic level. Individually each university has developed mechanisms for engaging with business through research and commercialisation offices, and some are going down the route of having dedicated business development officers to give a more responsive approach. This does however reinforce a sense of fragmentation.

Commercialisation

There has been great encouragement as in other countries for Australian universities to promote the commercial exploitation of their technologies. Much of this activity is based on a technology-push model as inventions developed in the university are marketed to potential licensees in industry. Most if not all of the universities have commercialisation offices (see Box 1.6), but the legal basis for intellectual

property protection in Australian universities is relatively weak and a recent court judgement in another state challenged the automatic right of universities to claim the intellectual property of inventions made by academic staff. This matter has not yet been fully resolved but universities and academic staff need some certainty over the basis on which universities claim ownership of intellectual property.

Box 1.6. Monash Industry Engagement and Commercialisation Office

The Monash Industry Engagement and Commercialisation Office is resourced with 22 staff (full-time equivalents). This group is involved in establishing relationships and strategic alliances with industry as well as the protection of intellectual property, then establishing and implementing appropriate commercialisation strategies, including licensing and forming spin-out companies.

Resources include Directors of Commercialisation and Industry Engagement as well as 13 business development managers (BDMs) with wide research and commercial experience, and expert support services including a well resourced patent management capability. BDMs play an active role in initiating, facilitating and managing relationships between external parties and the University through contract research agreements and help leverage Victorian and Australian Government funding in these relationships. Specific staff have responsibility for developing and implementing strategies for engaging with industry, government and other external parties, and specifically development of the Clayton Innovation Precinct.

Source: State of Victoria (2010), “The State of Victoria, Australia: Self-Evaluation Report”, OECD Reviews of Higher Education in Regional and City Development, IMHE, www.oecd.org/dataoecd/5/2/44580211.pdf, accessed 21 August 2010.

Even though universities in Victoria have been proceeding on the basis that academic inventions can be commercialised by the institutions, the scale of the commercialisation activity remains relatively small. Numbers of patents are increasing but so far revenues remain relatively low with only AUD 7 million income in 2007 and no indication how much of this activity has benefited Victoria. It can be expected that much of this involves commercialisation outside of the state. Spin-off companies are much more likely to be locally based and have a local economic benefit and here there seems to be moderate success, although the current rate of formation is less than one company per university per

year, a rate that may certainly be regarded as poor for a large research university (compare with Georgia Tech, see Box 5, and with the UK – see Charles and Conway 2001 and HEFCE, 2008). It is clear that some of the universities are underperforming on this measure, although the smaller and less research-intensive universities cannot be expected to yield significant numbers of spin-offs as their research commercialisation opportunities will be less (see Table 1.7).

Box 1.7. Georgia Tech’s Enterprise Innovation Institute

Georgia Tech’s Enterprise Innovation Institute was created in 2007 out of the consolidation of previously separate programmes. It assists companies, government agencies and not for profits to improve their competitiveness through the application of science, technology and innovation.

One of the institute’s units works to commercialise ideas growing out of Georgia Tech’s research labs, by helping faculty become entrepreneurs through matching them with business minded people. In 2009 the institute helped form 20 new companies based on Georgia Tech’s research. These companies attracted almost USD 100 million in new capital.

A second unit offers similar services to small start-ups across Georgia, in concert with Georgia Tech’s incubator, the Advance Technology Development Center. Almost half the institute’s staff of 133 work in industry services unit that focuses on the needs of companies that are well established but want Georgia Tech’s help in adopting innovative new processes and strategies. Its services include business consulting for competitiveness, quality, lean manufacturing, environmental compliance and energy efficiency.

Source: Shaffer, D.F. and D.J. Wright (2010), “A New Paradigm for Economic Development”, in Higher Education, The Nelson A Rockefeller Institute of Government, March 2010

Table 1.4. Universities in Victoria – Start-up company activity

	2000	2001	2002	2003	2004	2005	2006	2007
Companies formed during year	7	11	13	10	6	8	6	5
Companies operational dependent on licensing/ assignment of technologies	12	21	21	51	63	36	39	37
Companies in which an equity holding	9	9	17	29	36	37	38	34

Source: State of Victoria (2010a), “The State of Victoria, Australia: Self-Evaluation Report”, OECD Reviews of Higher Education in Regional and City Development, IMHE, www.oecd.org/dataoecd/5/2/44580211.pdf

Engagement with clusters and precincts

Internationally many universities and their regional partners are focusing on particular clusters as a way of maximising the impact of their industry engagement and tapping into existing industry networks. Here, clusters refer to agglomerations of firms in inter-related industry areas, together with supporting institutions and infrastructures. Such clusters may have been initiated by government, but most successful clusters evolve independently of government support. However, there are government cluster policies which may be targeted on existing operating clusters or may be directed towards the development of new clusters from some pre-existing core activity (Hertog, *et al.*, 2001).

In Victoria there seemed to be a lack of clarity around the existence of real clusters, operating at state or sub-regional level. Some examples were discussed but a general view was expressed that firms in Australia were not engaged in collaboration, and that clusters did not operate well in Victoria. The state government did not identify particular clusters other than perhaps life sciences and biotechnology where there was a recognised concentration of research.

Several years ago a state government working group did identify a number of clusters at different spatial scales within Victoria (Victoria DIIRD, 2003). Despite this being a few years old now, the slow pace of change in clusters suggests this may still be valid (see Table 1.5). There is also Business Victoria’s Regional Innovation Clusters Programme which aims to grow businesses and create jobs and investment in provincial Victoria by supporting clusters through encouraging innovation and

building partnerships between tertiary education institutions, research centres and industry it helps regional industries become more competitive.

Table 1.5. Potential clusters in Victoria, identified by a state government working group, 2003

Sub-region	Sectors
Melbourne	Biotechnology, biomedicine, education, defence, engineering, aviation, automotive, tourism, financial services, entertainment, photonics, creative content (ICT), major events and related services, telecommunication, health services, furniture, textile, fashion and transport.
Regional centres	Ballarat (IT and education), Warrnambool (dairy), Geelong (wool and textiles) and Mildura/Sunraysia (horticulture and wine).
Rural areas	Daylesford (arts, holistic health and plantation eucalyptus), Yarra Valley (food and wine), Goulburn Valley/Southern NSW (horticulture, transport and dairy), Latrobe Valley (energy), East Gippsland (timber), Torquay (surfwear), Mornington Peninsula (wine) and North East Victoria (tourism and wine).

In other OECD countries small and medium-sized enterprises are engaged in clusters through associations which are able to articulate generic needs and purchase services collectively on behalf of industry. There was limited evidence of this in Victoria with the exception of the dairy sector where the industry has formed a strong alliance with the Goulburn Ovens Institute of TAFE to develop the National Centre for Dairy Education (see Box 1.8).

Box 1.8. The National Centre for Dairy Education

The Australian dairy industry employs 40 000 people on farms and in manufacturing plants, related transport and distribution activities and on research and development projects. Dairy is one of Australia's major rural industries, with AUD 3.3 billion (2005/06) in farmgate production and AUD 2.7 billion a year in exports, making it the country's fifth largest agricultural exporter. However, the industry is facing considerable challenges: the number of farms has steadily decreased and input costs, such as water and feed have risen. This has intensified the need for farmers to be more cost-effective.

Box 1.8. The National Centre for Dairy Education (continued)

In 2005, The Australian Senate Inquiry into Rural Skills Training and Research found that it was increasingly difficult to attract and retain young people in agriculture. The range of jobs available, the training and educational opportunities and pay conditions in rural and regional areas were not as attractive as those in cities. Other industries were out-competing agriculture in the attraction and retention of talented, well-trained people. Furthermore, the “baby boomer” generation of farmers was coming up to retirement. Agricultural faculties and teaching staff at educational institutions across Australia contracted, reducing career opportunities for the young and restricting the learning system’s capacity to meet the industry’s needs. The Senate Inquiry concluded that agricultural industries should get involved with vocational training to ensure it is relevant, timely and aligned with the needs of the industry. In response to the inquiry, national dairy industry representatives and key industry bodies identified future education and training directions and Dairy Australia formed a partnership with Goulburn Ovens Institute of TAFE (GOTAFE) to address the dairy industry’s education and training needs.

The National Centre for Dairy Education is an initiative of Dairy Australia and GOTAFE at Shepperton. It delivers nationally accredited short courses and customised programmes for dairy and processing organisation, individual farmers and people in the dairy service industry. Courses are offered in agriculture, food technology and food processing as part of a framework of re-skilling and up-skilling. An Industry Education Steering Committee (IESC) guides the direction of education and training, and ensures that the programmes remain relevant to the sector. A national network of nine industry advisory committees provides industry guidance on course content, priorities and outcomes. School-based apprenticeships or traineeships enabling secondary school student the opportunity to work with an employer and complete a nationally recognised qualification are also available. GOTAFE has responsibility for delivering the programme across Victoria.

Source: NCDEA (2010), National Centre for Dairy Education - Australia website, www.ncdea.edu.au, accessed 16 April 2010.

Whilst the universities were able to provide examples of engagement with individual businesses in Victoria, they found it difficult to identify examples of well-established and systematic, good practice engagement involving industries or groups of firms, particularly SMEs. Much of the evidence was of research-led one-off collaborations initiated by university researchers or centres. There were some early indicators of major

institutional initiatives but they were at an early stage and lacked demonstrable impact. In this the Victorian universities seemed to lag behind universities in other parts of the world with well established cluster initiatives.

Several examples however might be expected to yield positive results if pursued over time with adequate resources, and are currently being branded as cluster or precinct initiatives. For example, The Parkville Precinct is a hub of mainly life sciences research to the north of Melbourne Central Business District and surrounding the University of Melbourne campus. This is claimed to be the premier clustering of life sciences research in the Southern Hemisphere. In 2008, research organisations in the Parkville Precinct and immediate surrounds engaged over 10 000 researchers - including 6 500 research staff and 3 500 postgraduate research students. Within the Parkville Precinct, The University of Melbourne is forging closer relationships with the adjacent medical research institutes and hospitals. The close proximity of a large number of biomedical research organisations provides a significant collaborative resource for life science research in seeking answers to major health issues.

A new venture in this area is the University of Melbourne's Bio21 Institute, which is focused on exploring interdisciplinary opportunities in health-, agriculture- and environment-related biotechnology. The Bio21 Institute is the flagship of the Bio21 Cluster project, which includes 21 member institutions recognised for research excellence and translational outcomes in medical and biomedical science and biotechnology. The Bio21 Institute incorporates an incubator facility which accommodates several start up firms, and additionally the institute organises outreach activity to the wider community. As yet it is not clear how much more than a research facility this will be, given the likely long term difficulty of incorporating production activities within the precinct, but it has the potential to be a major new node for biotechnology industry.

South East Melbourne Innovation Precinct (SEMIP) – Monash University's engagement in the South East Melbourne Innovation precinct is another example of a research base being connected to industry. This is an ambitious initiative based on a considerable university presence with adjacent public, Commonwealth Scientific and Industrial Research Organisation (CSIRO) and private research facilities, connected to the major manufacturing area of Victoria. The South East of Melbourne is a manufacturing zone which is under significant international competitive pressures. Survival of manufacturing will depend on its ability to innovate and this is the focus of the precinct's strategy. This initiative is interesting in the way it is evolving in terms of complexity and multilayered nature,

which suggests over time it has the potential to have a transformative impact:

- The South East Melbourne Innovation Precinct (SEMIP) initiative operates at two levels with a Clayton Innovation Precinct core of research institutions, and a wider SEMIP area that covers four local authorities and considerable areas of industry.
- The core of the innovation precinct includes Monash’s main science and engineering campus, but also the biggest centre of CSIRO activity, the Australian Synchrotron and a number of other research institutions.
- There is a strategic partnership involving the research organisations, the local authorities and the State of Victoria’s Department of Innovation, Industry and Regional Development (DIIRD) which oversees the strategy.
- Softer networks are being developed through two Knowledge Clubs to promote business innovation.
- Monash University is actively promoting business engagement through a network of 13 business development managers across the faculties to foster links with local industry.
- Monash is also working with the CSIRO SME Engagement Centre to reach out to local SMEs and with the Enterprise Connect Manufacturing Centre in the Dandenong industrial zone.
- There is active support for local spin-off firms.
- Monash and CSIRO are planning the development of a major AUD 175 million New Horizons Initiative to support the transformation of manufacturing. This will involve 300 Monash staff and 150 CSIRO staff in new facilities across a range of industrial technologies.

The challenge of the South East Melbourne Innovation Precinct (SEMIP) initiative is to effectively integrate and sustain the effort over time, and to expand the scope of activity to incorporate students and graduates, to develop a “pipeline” of spin off firms and graduate start-ups and ensure effective support is delivered to small and medium-sized enterprises (SMEs) while not just collaborating with leading-edge firms.

The Geelong Technology Precinct at the Geelong Campus at Waurn Ponds is a major focus of Deakin University’s partnerships in Geelong. As the only university with a presence in Geelong, Deakin is a key partner

of the sub-region in its G21, a formal alliance of government, business and community organisations working together for the development of the Geelong Region, along with Gordon Institute of TAFE. On the 3.6 km² technology precinct site Deakin has developed a number of industry-focused centres and initiatives including several Cooperative Research Centres (CRCs) and the BioDeakin Centre for Biotechnology and Interdisciplinary Sciences. The site also accommodates the Enterprise Connect's Innovative Regions Centre outlined in a Box 2 earlier in this chapter. Linked with the Geelong Technology Precinct, Deakin is developing a number of new partnerships with industry through its engagement in G21. These have a strong manufacturing orientation through organisations such as the Victorian Centre for Advanced Materials Manufacturing (VCAMM), the Geelong Investment and Innovation Fund (GIIF) and the Geelong Manufacturing Council and aim to support some of the traditional industries of the sub-region such as automotive technology and engineering. New emerging sectors such as aviation and logistics also present opportunities for collaboration. Agribusiness and engineering represent significant clusters, but care must be taken not to focus unduly on high tech sectors without a solid private sector base. Bio-Geelong for example was said to consist of only two to three firms and a focus on biotechnology may not make sense compared with the greater resources devoted to this sector elsewhere in the state.

Ballarat University Technology Park is a precinct designed to support the development of both emerging and existing technology-oriented enterprises. Tenants that enjoy strong collaborative partnerships with the University include IBM, the State Revenue Office, Ambulance Victoria, as well as a number of SME technology firms and start-up firms.

At present the universities seem to be focusing their activities on selected clusters mainly of their own choosing and mainly in high tech areas or manufacturing. A cluster such as tourism which is well developed in the region was rarely seen as a focus for university activity, and perhaps this is partly due to industrial engagement being seen as primarily a science and engineering role rather than a role that could embrace business schools and the humanities. A broadening of the sectoral orientation and the disciplines that underpin engagement could be beneficial for large and growing clusters in the service sector.

Other university-industry partnerships

Victorian universities are increasingly building partnership arrangements with major business enterprises and government agencies in

the areas of teaching, learning and research. Collaborations are supported by research funding programmes, such as the Australian Research Council Linkage and Centres of Excellence Programmes, NHMRC (National Health and Medical Research Council) Partnership Projects and Partnership Centres of Research Excellence.

RMIT University is developing a new initiative based on its expertise in design and providing link with the design industries in Melbourne. The Design Hub will be a new building adjacent to the RMIT University city campus which will provide facilities, accommodation and a research base for RMIT University's diverse range of design initiatives, design research groups and postgraduate programmes. It is intended that its programmes will be developed in collaboration with industry and will be embedded in partnerships with a strong multi-disciplinary focus. This is an interesting initiative which promises to transform the research and education provision by a more structured engagement with industry, but more importantly provides a real impetus to getting design expertise into the business community. It is hoped that this will act as an interface with the Design Victoria strategy, an existing partnership between RMIT and the Victorian Government to provide support and assistance to business.

Another industry focused centre is Swinburne University's Industrial Research Institute Swinburne (IRIS). The mission of the centre is captured by the statement "Providing innovative manufacturing research and education to individuals, industry, and government organisations." IRIS is involved in four Cooperative Research Centres of the Australian Research Council (ARC), and runs a Masters in Advanced Manufacturing Technology. One recent case study has been a project with the Australian subsidiary of Pilkington, manufacturing vehicle windscreens in Geelong. IRIS' Robotics and Non-Contact Inspection Group has developed an inspection system that would test windscreens for defects during production, and which is now being put into use in the production system.

There is also a growing understanding among Victorian tertiary education institutions of the opportunities for "bespoke" industry courses and award programmes and the contribution of university research to addressing industry and business problems and issues.

Box 1.9. La Trobe University – Strategic research partner

To be located at La Trobe's Bundoora campus, the Biosciences Research Centre (BRC) is an AUD 230 million world-class facility for agricultural biosciences research and development and is a joint venture between La Trobe University and the Victorian Government, through the Department of Primary Industries (DPI).

La Trobe staff will have increased opportunities to undertake research, and will gain access to leading-edge technology, high-cost equipment and associated expertise including the nuclear magnetic resonance (NMR), spectroscopy, imaging and analysis including synchrotron.

A key objective of the Biosciences Research Centre (BRC) is to facilitate science collaboration between La Trobe's staff and students and staff of the Department of Primary Industries (DPI), leading to better science outcomes for the benefit of Victoria. Initial collaborations will include animal, plant, soil and microbial biosciences, and ecology and biodiversity. There will also be joint BRC scientific programmes.

Research will span the spectrum from strategic to applied science. Potential collaborations may include materials science, forensic science, nanotechnology, electronic engineering / sensor technology, bioinformatics, e-science and chemistry.

Source: State of Victoria (2010a), "The State of Victoria, Australia: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, www.oecd.org/dataoecd/5/2/44580211.pdf, accessed 21 August 2010.

The nine universities in Victoria have developed the Unigateway project as a signposting service for small and medium-sized enterprises (SMEs) to contact someone who can deal with their enquiries. The Unigateway is a website which firms or government agencies can contact and which gives the contact details of a key person at each university. This could provide the basis of a more integrated collaborative network for engagement with business, in line with similar one-stop networks in other countries. However it seems to be limited at the moment to a web signposting service rather than a genuine attempt to offer a seamless and collaborative support service. Comparison may be made with the Knowledge House project in North East England which has a more hands-on approach to working with small and medium-sized enterprises to identify their problems and then bringing in appropriate academics from

across their five university partners (see Box 1.10). Nonetheless Unigateway may provide the beginnings of a more comprehensive service if suitably supported and encouraged.

Box 1.10. Knowledge House: a collaborative network to support SMEs

Established in 1995 Knowledge House is a joint effort of the five universities in the North East of England (Durham, Newcastle, Northumbria, Sunderland and Teesside) along with the Open University in the North through universities' regional association, i.e. the Universities for the North East (Unis4NE). It helps companies access university skills, expertise and specialist resources. It offers expert solutions for developing ideas and solving problems through collaboration, consultancy, training and research. Knowledge House has a central headquarters and staff are placed at partner sites of different universities. The network and its operations are supported by a web-based enquiry handling/project management and client relationship management system.

The idea behind the Knowledge House was that small and medium-sized enterprises (SMEs) face a range of barriers in accessing the knowledge resources of the universities which discouraged regional university/SME collaboration. Knowledge House was created specifically to overcome these barriers and to increase the amount of technology transfer taking place between local firms and universities. The purpose of the scheme was to create a structure which suited SMEs looking for help with a particular technical problem. The first barrier an SME faces in contacting a university in search of help is the lack of knowledge of whom to contact. Therefore, Knowledge House offered the benefits of a single point of contact for all universities in the region.

Knowledge House can be accessed via a central node, based at a Regional Technology Centre, or any of the five university nodes. The initial enquiry would then be sent out to contact people at each of the five regional universities, inviting them to suggest academics that could address the identified need. Each university has a co-ordinator responsible for ensuring that the leads are disseminated to the correct contacts. Ideally Knowledge House will be able to offer the SME a choice of academic consultants and will facilitate a meeting for the firm's managers to meet with and select the most appropriate person for their needs.

Knowledge House has generated an income in excess of GBP 13 million for its universities from over 1 300 projects since 1996, with GBP 7.6 million of this coming in the last four years. Knowledge House's profile has risen significantly over time, with more than half (60%) of all enquiries generated since 2003. In 2007 Knowledge House generated GBP 4.7 million for the participating universities by delivering 364 completed projects from over 800 business enquiries. Business growth has averaged 25% since 2000.

Box 1.10. Knowledge House: a collaborative network to support SMEs (continued)

In contrast to networks that provide only signposting services, Knowledge House offers a comprehensive service, stretching from the receipt and circulation of enquiries through project management and delivery to post-completion evaluation. It is also playing its part in the integration and consolidation of the business support services in the North East through formal agreements and joint appointments with other non-university business support agencies such as the Business Links Service and the Regional Development Agency. Knowledge House is also facilitating a cultural change within the academia, since an increasing number of higher education staff across the region's universities are becoming engaged with Knowledge House activities.

Source: OECD (2007), Higher Education and Regions: Globally Competitive, Locally Engaged, OECD Publishing, Paris; Potts, G. (1998), "The HESIN Knowledge House: A Front Door to North East Universities" Local Economy, Vol. 13, No.3, Routledge, London, pp.267-271.

Enterprise

A core element of university support for innovation and enterprise in most countries is through new business incubation and graduate entrepreneurship (Potter ed., 2008). There seemed to be limited mainstreaming of entrepreneurial experience in curriculum and little practical experience of new venture formation provided to students in the Victorian universities. Experience elsewhere in recent years shows that the best support for graduate entrepreneurship comes from teaching programmes where students work in teams to form real companies mentored by entrepreneurs. Such programmes can run at undergraduate and graduate levels and be targeted at students from across the sciences, engineering, business and arts disciplines. None of the universities highlighted the existence of such programmes and the OECD Review Team was able to find relatively little evidence of this type of crucial activity. Swinburne University calls its graduate business school the Australian Graduate School of Entrepreneurship. However, even its flagship MSc in Entrepreneurship and Innovation seems to be largely conventionally taught.

In supporting graduate enterprise the Victorian tertiary education institutions would benefit from collaboration and sharing good practices among themselves and the key stakeholders. Examples of collaboration between higher education institutions and the regional development agency can be found for example in Brandenburg, Germany (see Box 1.11) where a joint resource centre in entrepreneurship and small and medium-sized enterprises (SMEs) has been established in order to pool resources and gain critical mass.

Box 1.11. BIEM - The Brandenburg Institute for Entrepreneurship and SMEs

The Brandenburg Institute for Entrepreneurship and SMEs (BIEM) is the entrepreneurship institute of the regional development agency and nine public higher education institutions including universities and universities of applied sciences (*Fachhochschulen*). BIEM was founded in 2006 as a registered non-profit organisation. One of its main objectives is to reinforce, complement and coordinate the entrepreneurship support activities offered by Brandenburg's higher education institutions by pooling resources and enhancing collaboration and exchange. BIEM helps to achieve the "critical mass" needed to realise projects with wide ranging impact.

The annual budget of EUR 100 000 is financed by the European Structural Funds, the Ministry of Economics of Brandenburg and other project-related revenues (e.g. fees for services). BIEM has eight employees. Each partner organisation runs additional projects and employs additional personnel according to project needs or the overall management of an entrepreneurship institute/centre.

BIEM's activities include entrepreneurship education, start-up support, entrepreneurship research and networking with business support organisations and other universities. It focuses on the expansion and better integration of entrepreneurship education into curricula, including innovative teaching methods, broad communication of activities, and an expansion of co-operation beyond BIEM's core partners (e.g. by involvement of university staff and external experts, agencies and companies). The partnering higher education institutions benefit from the increasing numbers of students participating in entrepreneurship education activities and the number and variety of courses available for their students.

Higher education institutions have established "entrepreneurship location managers/animations" (Standortmanager), who act as "one-stop-interlocutors" for would-be entrepreneurs. This structure contributes to building stronger linkages between the university's internal and external support services and to integrating entrepreneurship education and start-up support services.

Box 1.11. BIEM - The Brandenburg Institute for Entrepreneurship and SMEs (continued)

Other projects include “Entrepreneurship ACs”, that evaluate entrepreneurial potentials and learning needs before start-up and match them with adequate mentoring during start-up, “Team Competency Lab” that focuses on team building and coaching at the BTU Cottbus or GO:Incubator at the University of Potsdam.

In 2009, 370 would-be entrepreneurs received initial consultation by BIEM, 203 were referred to external business support structures and 86 business start-ups were supported. The key elements for the institute’s success is the multidimensional co-operation between all higher education institutions and their external partners, the involvement of higher education institutions in regional leadership and a phased approach to entrepreneurship.

Source : Source: OECD (2009), Universities, innovation and entrepreneurship: Criteria and Examples of Good Practice, OECD, Paris; BIEM-Brandenburg (2010), Brandenburg Institute for Entrepreneurship and Small and Medium Sized Enterprises website, www.biem-brandenburg.de, accessed 10 February 2010

The role of the Technical and Further Education (TAFE) sector

The TAFE sector should be well placed to support the small and medium-sized enterprises (SMEs) in particular in managing the upgrading of their technologies, where the emphasis lies in the use of existing, often well established technologies and techniques, rather than in advanced technology development. Some of the TAFE provision within Victoria is in dual sector institutions as part of universities, and in these cases the TAFE provision seems to focus on training rather than wider technology support and diffusion. At the other end of the spectrum there were interesting projects being undertaken by Goulburn Ovens TAFE to support local industry, connecting wider business improvement with training provision (see Box 6). This kind of sectorally and locally focused comprehensive support for SMEs is in need of development across Victoria as a whole.

Victoria would also benefit from learning from the US experience where community colleges play an important role in strengthening the local capabilities for innovation. Much of the community colleges’ workforce training is state sponsored and charge free to employees.

Approaches vary from a one-stop-shop such as the Georgia Quick Start programme and to a centralised service offered by 58 community colleges in Northern Carolina (see Box 1.12).

Box 1.12 Free, employer-specific training in the US

The Georgia Quick Start programme

The Georgia Quick Start programme offers a number of innovations in the process of training for job specific needs in new technology. An arm of the 33 campus Technical College System of Georgia (Georgia does not use the term “community college”), it is located in close proximity to the State Department of Economic Development. The programme is free for new employers but also for existing companies that are increasing employment and/or making substantial upgrades in plant and equipment. Quick Start has the centralised staff, resources and experiences to quickly develop and deploy customised training anywhere in the state. The basic programme, carrying Georgia’s commitment to provide free training for new and growing businesses, dates back to 1967. The state ramped it up in the 1990s after finding that offshore competitors were undermining the state’s traditional cost competitiveness. By early 2010 it has conducted almost 6 000 projects involving 780 000 trainees. The basic budget is USD 22 million a year, at times that is supplemented with extra funds allocated as part of the incentive package for a major plant.

When qualifying employers want training or retraining for their workers, Quick Start assigns teams of analysts to examine the process of workflow in question. Then it develops a customised training programme, complete with handbooks, presentations, videos, online lessons or other training material produced by its own specialists. For all new projects, Quick Start will pre-screen potential hires for the company, using the technology it has acquired of the production system to match candidates with the skills required. The training is deployed at the company location, at one or more of the technical colleges or at any five Quick Start facilities located around the state.

North Carolina Community College Collaboration

In North Carolina the provision of free, employer specific workforce training began in community colleges in 1958. Currently, North Carolina Legislature provides USD 12.4 million a year for its customised training programme. Each of North Carolina’s 58 community colleges can access the funds to design and deliver training tailored to the specific needs of a new or existing company without charge to the company. North Carolina is looking to help businesses that grow its economy. The company must demonstrate that it is making an appreciable capital investment, deploying new technology, creating new jobs or expanding an existing workforce or enhancing productivity and profitability.

Box 1.12 Free, employer specific training in the US (continued)

The training programme is developed at the local college in concert with the employer. Colleges design the programmes and share their experiences. Each community college has an employee assigned to reach out to local business and industry, identify their training needs and find ways to meet them. The cost of this post is shared by the state and the local college.

For the five years leading up to the current recession, North Carolina community colleges averaged training 26 277 employees a year at an average of 774 companies a year. The recession cut that to 19 861 employees at 671 companies in 2008/09. The cost to the state averages about USD 500 per employee. For example, Talecris Biotherapeutics has a longstanding training relationship with Johnston Community College. Every year the facility's production is put on hold for three weeks for maintenance and upgrades while the entire 550 person manufacturing workforce goes to training classes operated by the college.

Source: Shaffer, D.F. and David J. Wright (2010), A New Paradigm for Economic Development, in Higher education, The Nelson A Rockefeller Institute of Government, March 2010

Conclusions and recommendations

Victoria is one of the prime locations for science and research in Australia. The Victorian Government's science-led strategy seeks to build Victoria's innovation capabilities while focusing them on key drivers of ageing, climate change and international competitiveness. There has also been a recent shift towards more user-driven strategy with collaborative projects to deliver public benefits in health, sustainability and productivity.

However, whilst there has been significant investment in the research infrastructure in Victoria, the connection between research and innovation is not adequately developed and the focus of most universities is in knowledge generations, rather than knowledge transfer and exchange and creation of products and processes that are tested on the market and will eventually create jobs. Hence there remain a number of challenges which the state faces and where universities could offer more to support the development of businesses. These include: *i*) limited sense of an innovation system, *ii*) fragmentation of support for innovation, *iii*)

incipient innovation culture in SMEs, a lack of tradition of collaboration and poor articulation of demand for university R&D, *iv*) limited alignment between national research and innovation support and state issues and policies, *v*) lack of information and data on innovation performance in the private sector and *vi*) fragmented and emerging support for enterprise from universities.

Overall in Victoria there seemed to be little sense of a regional innovation system. There appears to be substantial investment in the research components of the system and some areas of successful innovation within firms, but little integration between the system components. Furthermore, despite considerable investment to boost collaboration, the underlying culture of innovation and collaboration has not reached its full potential. The universities themselves did not present themselves as a coherent system. Despite major investments in ICT infrastructure, there appeared to be limited attempt to set out the collective needs of the state in terms of innovation infrastructure or for the universities to co-ordinate their actions in meeting such needs. The culture of competition between universities seemed to lead to competing centres and initiatives, and to an excessively strong emphasis on life sciences and other priority disciplines rather than wider coverage of industry's needs.

Support for innovation seems to be fragmented with each university developing its own initiatives in competition with each other and often with other agencies. Currently, there is no effective guidance system for business to identify where best to source support for innovation. The main emphasis of innovation support from the universities is on technology, and there are few attempts to connect up technology centres with business faculties and with other disciplines to provide support for services and non-manufacturing sectors.

Within Victoria as a whole there is a weak innovation culture in small and medium-sized enterprises (SMEs), and lack of tradition of collaboration between the SMEs. One consequence of this is a poor articulation of demand for services from the universities for the SME sector. In many OECD countries SMEs are engaged in clusters through associations which are able to articulate generic needs and purchase services collectively on behalf of industry. Although this type of cluster development apparently takes place in the forestry and food sectors as well as in professional fields such as nursing, there was little evidence of this in Victoria provided to the OECD review team with the exception of the agriculture sector.

There seemed to be a limited alignment between national research and innovation support and state issues and policies. National research funds

are focused on primarily science outputs and the Australian Research Council (ARC) has little in the way of knowledge transfer schemes compared with for example the UK research councils, and consequently does not fit well with a state level interest in connecting with small and medium-sized enterprises (SMEs) and local industry. Much of the resources has been concentrated on leading edge science with limited spillover effects for local SMEs. The Victorian Government has taken steps to address this challenge and should continue to address the needs of SMEs through programmes such as Smart SMEs Market Validation Program, the Collaborative Internet Fund and Victoria's Science Agenda Investment Fund.

There was a lack of information and data on innovation performance within the private sector. The state was not able to provide us with a detailed investigation of the nature of innovation within firms, the barriers and problems, and the experiences of collaboration with universities. There is a need to ensure that the innovation policy is developed on a robust evidence of the region's needs. Similar challenges were also faced in the recent Cutler Review.

One area where universities can have an impact on the SME sector is through support for enterprise within the student/graduate community. There was little evidence of such enterprise support being mainstreamed within degree programmes and through supporting infrastructures, and again when such support existed, it remained fragmented with no real collaboration across universities.

The OECD review team recommends that the following measures are taken to promote regional innovation in Victoria:

- The Australian Government should review the impact of its research policies on business engagement, especially including the new Excellence in Research for Australia (ERA) research assessment process. Australian Research Council's schemes such as the linkage programme could be made more accessible with a continuously open call and lightweight review for smaller projects.
- The Australian Government should consider the establishment of core funding for university engagement in order to promote knowledge transfer and the interests of industry. To reduce the tendency of the universities to measure success in innovation by the amount of (public) investment made, rather than the amount of commercial return generated or jobs created,

efficiency/performance indicators should be created for higher education institutions involved in innovation.

- The Victorian Government should commission a comprehensive review of the innovation system to better understand the levers and demands within the private sector which can be better met by new university initiatives. This implies a large scale study of the innovation process within the business community rather than just an analysis of existing policies. Examples exist from for example the EU Regional Innovation Strategy (RIS) and Regional Innovation and Technology Transfer Strategy (RITTS) programmes in which studies of supply and demand of innovation support were undertaken, and various studies of regional innovation systems in Europe as part of the European Commission's information platform on European, national and regional research systems and policies. (ERAWATCH)².
- The Victorian Government should ensure that research on clusters and the demands of industry extend into the service sector and include clusters such as tourism. Clusters should also be conceptualised as cutting across the manufacturing-service divide – agribusiness clusters usually connect with tourism for example and increasingly manufacturing innovations incorporate service components. Universities should be encouraged to draw upon business schools and humanities in providing assistance to business.
- The Victorian Government should continue to encourage greater collaboration between universities, for example through its investment in research facilities.
- The Victorian universities should look to develop and enhance the Unigateway project to provide a more hands-on engagement with business and a more collaborative way of referring enquiries. The service should be proactive and interactive rather than just relying on a portal and the state and or commonwealth government should provide additional funding to encourage greater involvement by the small and medium-sized enterprises (SMEs). The Knowledge House in the North East of England provides a good example of a comprehensive service provided by five universities and the Open University. Innovation vouchers may be a way to encourage greater demand from SMEs.
- The Victorian universities should look to match global levels of excellence in supporting entrepreneurship in the curriculum, and

build comprehensive support programmes encompassing entrepreneurship training, practical experience of creating new businesses for groups of students, and incubation and hatchery facilities together with seed funds for new graduate ventures.

- The Victorian TAFE institutes should seek to provide sectorally and locally focused comprehensive support for small and medium-sized enterprises (SMEs), connecting wider business improvement with training provision.

Notes

1. Collaborative examples involving multiple Victorian universities, research organisations and industry partners include the following Victorian-based Co-operative Research Centres (CRCs): CRC Oral Health Sciences, CRC for Polymers and Cancer Therapeutics CRC.
2. ERAWATCH is the European Commission's information platform on European, national and regional research systems and policies. In 2010, it covers 49 countries: 27 EU Member States, countries associated with the European Commission's Research Framework Programme and main trading partners of the EU. ERAWATCH information is collected and presented with the support of the ERAWATCH network of national experts. Its main objectives are to support policy-making in the research field in Europe and to contribute to the realisation of the European Research Area (ERA) for more information on ERAWATCH, see <http://cordis.europa.eu/erawatch>.

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Chapter 2: Tertiary education and human capital development

This chapter examines how effectively the Victorian TAFE institutes and universities contribute to meeting the social and economic needs of the population in terms of opportunities to study and relevance of the qualifications offered. It identifies some key achievements and areas for improvement. The chapter closes with a series of recommendations that include the need for a greater system approach to tertiary education in order to support sustainable regional development.

The main message of this chapter is that despite considerable efforts made by the Victorian Government, TAFE institutes and universities, more needs to be done to address the multiple challenges in human capital and skill development in Victoria. Progress can be made through three major actions: i) establishing a tertiary education co-ordinating body to define state-wide goals, policies and priorities, ii) establishing multi-stakeholder flexible learning and extension centres or clusters to address the challenge of regional delivery and iii) supporting the widening access initiatives with strengthened focus on equity in success through the provision of necessary support for student learning and employability.

Introduction

There is a strong correlation between education and social and economic health for individuals and for countries. Completing tertiary education has a significant effect on employability, earnings, productivity and health of individuals. The OECD (2009) data shows that more highly educated employees receive higher earnings and are less often exposed to unemployment. While the level of gross earnings premium over lifetime is lower for women, it averages out at over USD 134 000. OECD estimates that an average increase of one year in education attainment is associated with a 4% to 7% increase in per capita GDP. Those who complete higher education also tend to enjoy better health, are more interested in politics and more trusting of other people. This correlation is especially vital as countries respond to the requirements of the knowledge economy and the impact of the global financial crisis:

In the new economy where knowledge is the source of wealth creation, human capital becomes as important as financial capital. Measures to enhance the quality of the supply of human capital are essential. A primary source of productivity growth is technological readiness and innovation, which in turn requires a well-educated and skilled workforce (BIAC, 2008)

In many ways, Australia's issues are unique; it has been less exposed to the global financial crisis than other OECD countries, and its population is poised to grow to 35 million by 2049 making it the fastest growing industrialised nation over the next four decades, with a rate of population growth higher than India (Irvine and Saulwick, 2009). While many OECD countries face declining and ageing populations, Australia continues to attract people with professional qualifications; one third of international students take up residency. Access Economics (2005) has estimated that the number of domestic students is likely to expand from approximately 720 000 currently to over a million in the next 20 years. As a consequence, most of Australia's major metropolitan and regional centres expect to expand over the next decades. The state of Victoria is projected to grow at the same rate as Australia over the next 30 years, with the city of Melbourne anticipating growing from four to seven million people by 2036 (DPCD, 2009). While this rapid growth has both benefits and challenges for tertiary education, it is widely acknowledged that

human capital is the key resource for social and economic development.

The Review of Australian Tertiary Education provides a framework to ensure Australia has “enough skilled people able to adapt to the uncertainties of a rapidly changing future” and that the “all citizens [can] share in its benefits” (Bradley, et al., 2008). In response, the Australian Government announced an increase of AUD 5 billion over the next six years in its May 2009 budget. It aims to ensure 40% of all 25-34 year-olds complete an undergraduate degree, and 20% of undergraduate students will be from low SES backgrounds by 2020. The new targets present a considerable challenge for Australia, as currently 32% of all 25-34 year-olds complete an undergraduate degree, and 16% of undergraduate student have low SES backgrounds (Gillard, 2009). Furthermore, people from rural and remote parts of Australia remain seriously under-represented in tertiary education and their participation rates have worsened in the last five years. Indigenous people are particularly poorly represented.

To help stimulate growth, enrolment quotas are being phased out, and universities are encouraged to grow as big as they like, in line with their mission, which will be monitored by compacts negotiated with the Australian Government. The government funding will follow the students wherever they choose to enrol, and the universities will have to compete to attract them. Special funding will be used to support universities which meet widening access targets. In Victoria, demand-led funding is also being extended to TAFE institutes.

Australia aims to place itself in the top group of the OECD countries in terms of participation and performance by 2020. Achieving these goals involves three key challenges. Firstly, a major challenge will be meeting the skills requirements of the rapidly expanding society and economy. Estimates suggest that from 2010, total demand for people with tertiary qualifications will exceed supply – especially at the undergraduate level – and that this will continue until 2018 (Bradley, et al., 2008). Secondly, there is a need to maintain the attractiveness of rural and remote tertiary education provision as a mechanism to help widen participation rates and as part of the wider strategy to ensure viable regions. Regional disparity is a significant handicap to cohesive and integrated strategy of regional development. Thirdly articulation between different levels of education needs to be enhanced for example between TAFE (Technical and Further Education) institutes and universities, within dual-sector universities and from undergraduate to postgraduate, especially to PhD. The *Review of Australian Tertiary Education* notes that the “looming

shortage of academics” and the “*stock of researchers in the innovation system*” (Bradley, *et al.*, 2008). A key way of overcoming many of these challenges is by widening participation, improving retention and ensuring continuing access to education throughout one’s life with opportunities for mature adults to undertake re-skilling and up-skilling.

In this context, this chapter examines the following dimensions to assess the effectiveness and coherence of human capital formation policies in Victoria:

- **Widening access:** do the existing TAFE institutes and universities offer adequate learning and training opportunities to the region’s population? To what extent can more formal pathways and collaborative frameworks widen opportunities not only for entry-level learning but also life-long learning (e.g. re-skilling and up-skilling) as well as provide a basis for social and economic sustainability?
- **Demand for skills:** are the existing educational programmes offered by TAFE institutes and universities adequately aligned with the skill needs of the region’s economy? How can programmes be strengthened to provide better employment and career opportunities to meet anticipated skill shortage needs and graduate desires?
- **Governance and financing framework:** whilst acknowledging the complex governance and funding framework, how can the Victorian Government co-ordinate and govern TAFE and university education in a manner that can balance the needs of the metropolitan areas as well and regional Victoria?

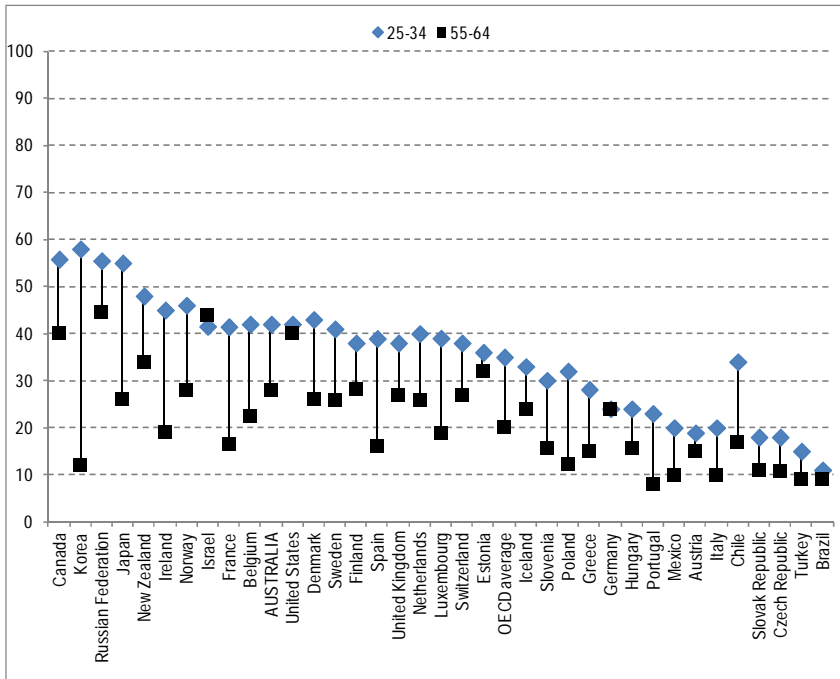
2.1 Widening access to tertiary education

Overview

Australia, unlike most of the OECD countries, is anticipating a skill shortage that will run to 2018 and beyond. Australia is likely to face a shortfall in tertiary education graduates, particular those with undergraduate qualifications. While the country continues to attract significant inward migration, this will not be sufficient to meet all its requirements. Australia will also experience the challenges associated with an aging population and therefore the need to continuous supplement of new labour. Thus, there is a need to increase the number of students entering tertiary education and successfully

graduating. In 2008, Australia was 11th among the OECD countries in terms of attainment among 25-34 year-olds, down from 9th in 2007 (see Figure 2.1).


Figure 2.1. Population that has attained at least tertiary education 2008
Percentage, by age group



1: Year of reference 2002

Note 1: Countries are ranked in descending order of the percentage of 25-34 year-olds who have attained at least tertiary education.

Note 2: For technical reasons, these figures use Israel's official statistics, which include data relating to the Golan Heights, East Jerusalem and Israeli settlements in the West Bank

Source: OECD (2010), *Education at a Glance*, OECD, Paris.  StatLink
<http://dx.doi.org/10.1787/888932310092>

In Australia, there are low participation rates among low SES, rural and remote communities, and the indigenous population. The participation rates of a wide range of minority groups (non-English

speaking background, rural remote, low SES, disabled or Indigenous students) in tertiary education has remained stagnant from the year 1989 to 2007 Australia (Bradley, *et al.*, 2008). Around 30% of tertiary education students from non-metropolitan areas and around 50% of students from remote areas come from low SES backgrounds compared with 10% of students from metropolitan areas. Some of this inequity is a direct result of the low-SES definition which gives large weighting to property values and this way highlights rural and nearly all remote areas low SES. Although the participation rate has increased between 1996 and 2006, participation from metropolitan areas increased at a faster pace – so that the actual share of regional and remote students among all domestic students in tertiary education has fallen (DEEWR, 2009a).

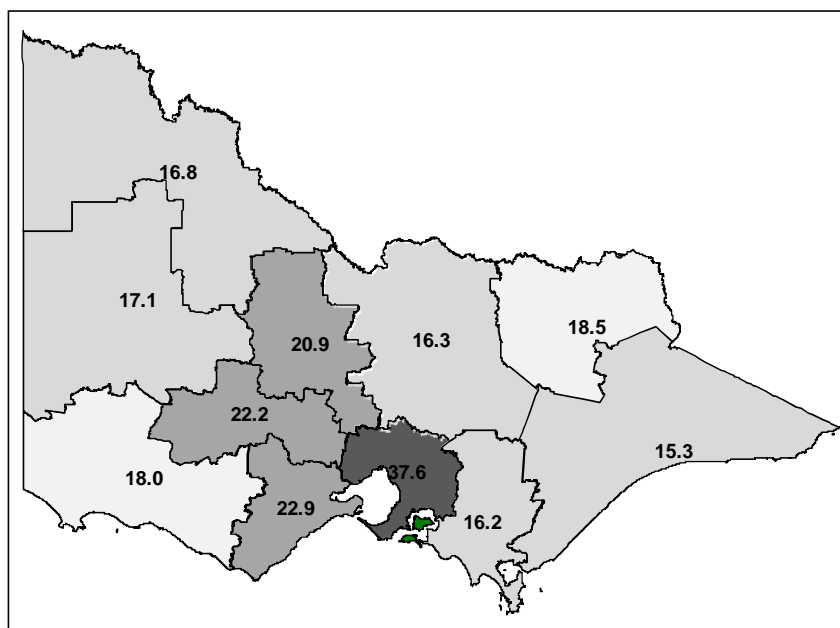
Population growth in Victoria has been significantly tertiary than in previous decades, with metropolitan Melbourne experiencing the fastest growth of any Australian capital city. Largely due to high levels of net overseas migration, outer Melbourne is growing more rapidly than most Australia, while the City of Wyndham in Melbourne's outer west is growing faster than anywhere else in the country absorbing six new families a day. Outer Melbourne has a large number of small tertiary education campuses as well as TAFE institutes (Lee Dow, *et al.*, 2009). While Melbourne is forecast to receive more than 90% of Victoria's overseas migrants, also Geelong, Ballarat and Bendigo will also continue to grow as a result of net migration from Melbourne for lifestyle reasons. More remote areas, particularly in the north and eastern part of the state, are likely to experience only marginal demographic change.

There is considerable diversity among Victorian universities in terms of the proportion of students from rural areas and low SES backgrounds. According to the Department of Education, Employment and Workplace Relations (DEEWR), the proportion of rural students ranged from 6.5% at Swinburne University to 71.1% at the University of Ballarat. The proportion of low SES students ranged from 7.9% at the University of Melbourne to 23.7% at Victoria University. Between 2001 and 2005 there was a decline in the proportion of rural students in seven of Victoria's eight main universities and a decline in the proportion of low SES students in six out of eight universities.

Figure 2.2. below indicates the proportion of the Victorian population aged 25 to 34 with post-secondary degree in 2006. Central to the issue of widening access in rural and remote areas is the physical presence of tertiary education institutions, including TAFE institutes and universities. But the “*causes of geographic differences in*

tertiary education participation rates go beyond the obvious barriers of distance and costs. They also stem from differences in the ambitions and aspirations of students and their families, school completion rates and academic achievement levels” (ETC, 2009). Findings from the 2007 *On Track* survey of Victorian school leavers also revealed great variation in articulation rates from VET to university, with relatively low levels of transition to upper and entry level VET among school leavers, compounding lower levels of transition to tertiary education.

Figure 2.2. Victorian population aged 25 to 34 with bachelor degree or higher by statistical division, 2006 (%)



Source: Map originated by Department of Industry, Innovation and Regional Development, Victoria, based on data from *Expert Panel on Victoria's Tertiary Education Plan: First progress report*, August 2009, p11.

Several government initiatives are directed to the widening access agenda. In addition to the Australian Government's targets for completion and low SES participation rates, there is a national target for completion of year 12 or equivalent of 90% by 2015. The Council of Australian Governments (COAG) has also set a target for the next 10-15 years to reduce by half the proportion of people aged 16-64

without a Certificate III or above, to double the number of diploma and advanced diploma completions. The Victorian Training Guarantee, introduced in 2009, entitles all Victorians to a government-subsidised place in vocational education and training. The Australian Government is introducing demand-driven university funding in 2012. This means that all Victorians have universal entitlement to tertiary education from 2012. The Victorian Training Guarantee supports an integrated tertiary education and training sector, with a variety of pathways and multiple entry and exit points. However it does not allow university graduates to complement their theoretical learning with more practical skills at the TAFE sector.

Achievements

While 30% of Australia's public universities are physically located outside of the metropolitan or capital city areas, many universities claim a regional identity. Table 6 illustrates the extent to which Victorian universities operate campuses outside of Melbourne, and for which special funding, regional loading, has been granted by the Australian Government (see also Chapter 4).

Table 2.1. Regionally based universities and metro universities with regional campuses

University	Regional loading (AUD)	Regional campus
Deakin	595 945	Geelong
		Warrnambool
La Trobe	1 034 275	Wodonga
		Bendigo
		Mildura
		Shepparton
Monash	199 043	Gippsland (Churchill)
RMIT	31 796	Bairnsdale
		Hamilton
Ballarat	1 356 828	Ballarat (Mt Helen)
		Horsham
Melbourne	43 313	Creswick
		Dookie

Source: DEEWR (2009a), "Review of Regional Loading – Issues for Regional Provision", Issues Paper, December 2009, DEEWR, Melbourne, p. 10.

The widest range of provision is offered by the University of Ballarat, Deakin University and Monash University (at its Gippsland campus), while other universities focus on regionally-relevant programmes, for example nursing, agriculture, education, commerce, rural business or rural health. There are 14 TAFE institutes spread

across the non-metropolitan parts of Victoria – many with multi-campus – offering programmes from Certificate I-IV and Diploma closely aligned to the key employment sectors, for example business, adult community education, community services and health, tourism and hospitality, and electrotechnology and communications. In addition, there are an additional 558 registered VET providers. As part of the complexity of the Victoria’s tertiary education, four universities are dual-sector – Swinburne University of Technology, Victoria University, RMIT University and the University of Ballarat – providing both TAFE and university level programmes; they all have a presence outside Melbourne, but only Ballarat is exclusively outside Melbourne. Potential students have therefore a large range of options to choose from to match their level of academic preparation and their personal needs with the supply of education programmes.

Initial entry to university may either be directly onto undergraduate programmes on the basis of ENTER scores, mature age entry tests or via TAFE programmes. Roughly half of commencements are school leavers. A large group commences in the second year sometimes switching later to their preferred course. A more modest number enter based on VET (mostly TAFE) qualifications. The Australian Government’s target of 20% low SES students by 2020 is a challenge because many of those entering now are not sufficiently prepared for tertiary education.

Victorian universities have adopted different strategies to widening participation. For example Swinburne’s “First Stop” provides practical career advice and vocational training options to young people in the outer eastern suburbs of Melbourne. The Academy of Sport Health and Education (ASHE),¹ at Shepparton, is jointly operated by the University of Melbourne and GOTAFE Centre of Koorie Education and uses sport to create an attractive and culturally sensitive educational environment primarily for Indigenous people. Its goal is to use studies in sport as the catalyst for broad education and training that prepares people for work or further study. Schools Network Access Programme (SNAP)² is part of RMIT University’s equity strategy and is designed to improve access to Commonwealth Supported Places (CSP) in degree programmes and in TAFE programmes for students from designated Victorian secondary schools (see Box 2.1).

Box 2.1. Schools Network Access Programme (SNAP)

The Schools Network Access Programme (SNAP) is a partnership between selected disadvantaged Government schools and RMIT to increase access to tertiary education for students from low socio-economic backgrounds. It is a non-ENTER based early admission access scheme that uses recommendations from teachers and a student statement as the basis for selection.

The programme began in 2001 with seven schools and has recently been expanded to 75 schools with a geographic focus on the northern suburbs of Melbourne and Gippsland. Over 44% of SNAP students are identified as low SES, compared to 14.5% of the total domestic student population. SNAP students comprise 7.4% of the Bundoora student population and 4.8% of the City campus student population. Total SNAP enrolments in 2009 are 359 students comprising 7% of the total commencing load.

SNAP students consistently demonstrate similar patterns of academic achievement as their non-SNAP peers. Given the range of ENTER that SNAP students bring to their selection, and the highly selective nature of many RMIT programs, this is testament to benefits of an alternative entry scheme that recognises the academic potential of disadvantaged students. Future plans include the building and expanding relationships with SNAP schools through academic engagement activities (e.g. science in schools programmes), partnerships to recruit more Indigenous students and the delivery of university preparation programmes.

Source: Royal Melbourne Institute of Technology - RMIT (2010) *Schools Network Access Programme*, <http://rmit.com/browse/About%20RMIT%2FHelp%2FMedia%20Assets%2FImage%2F;ID=7unf1vuw6dob1.jpg;STATUS=A#content>, accessed 21 August 2010.

A comprehensive approach to widening access to education is provided by Victoria University, whose catchment area is one of the fastest growing but poorest areas of Melbourne. Its longstanding Access and Success programme provides a valuable example for higher education institutions worldwide aiming to widen access to harder-to-reach communities (see Box 2.2). The university has been commended by the Australian Universities Quality Agency (AUQA) for its success in building effective relationships with schools. Victoria University's broad equity and diversity strategy comprises also other student equity initiatives, such as: *i*) the investigation of secondary school students' educational aspirations, *ii*) strategies to address student finances and financial literacy; *iii*) provision of access to IT resources for low SES students, *iv*) provision of education for students with a disability, *v*) recognition of the cultural diversity of students,

vi) provision of programmes designed to increase the participation of students from equity groups through Access and Equity Scholarships and vii) a Portfolio Partnership Programme that provides an alternative pathway to university for capable students that do not have a competitive ENTER score. Victoria University has adopted a number of innovative ways to reach out to people who have traditionally been outside the TAFE/university education, for example through information stands in shopping malls as a way to directly meet. Victoria's multi-layered relationship with its most prominent business collaborator, the Western Bulldogs, contains a strong emphasis on widening access through sport and by using the "celebratory" attractiveness of sport as a beacon through which to introduce disengaged youth to education (see Boxes 2.2 and 2.4).

Box 2.2. Victoria University's Access and Success programme

Victoria University provides both tertiary education and technical and further education (TAFE). It has over 50 000 local and international students enrolled at campuses across the city-centre and western suburbs of Melbourne which experience below average educational outcomes. The university serves a student population with a higher than average representation of students from low SES backgrounds and non-English speaking backgrounds.

The Access and Success programme is a major initiative, working with schools in the west of Melbourne to improve access to and successful participation in post compulsory education. It has established collaborative teaching and research partnerships with schools and has implemented programmes across more than 70 different sites. It comprises different "arms", which involve university staff and students working in schools (Learning Enrichment); the professional development of teachers via their participation in post-graduate education (Teacher Leadership); working with senior secondary students to support their aspirations and provide information on pathways to tertiary education and employment (Youth Access); enhancing students' educational engagement through school-based programmes with community partners (Schools Plus); and developing and disseminating research about the work undertaken (Access and Success Research).

Box 2.2. Victoria University’s Access and Success programme (continued)

The Learning Enrichment arm involves learning teams of school and university staff and students working on projects to enrich learning environments. Continuous university presence in the schools improves student achievement and raises aspirations. One programme involves pre-service teachers working with in-service teachers and university researchers to design action research projects that investigate issues of student disengagement. Another programme involves pre-service teachers participating as literacy mentors in a whole-school literacy intervention at the secondary level, while also researching the effectiveness of this intervention with school staff. A programme addressing student aspirations for university and TAFE takes place at another secondary school and involves pre-service teachers working with a small group of Year 9 and 10 students that have high academic ability but low aspirations. This work in and with the schools responds to the specific needs of particular sites. The “immersion” approach to intervention, in contrast to approaches that target specific equity groups, increases the potential for continuous cross-sector collaboration between schools and the university when designing interventions and undertaking school-based research.

The Teacher Leadership arm aims to engage teachers and principals in professional learning that increases teaching capacity in the schools. This has involved delivering professional development that articulates with the university Graduate Certificate or Masters of Education programmes. Research partnerships are based on participatory methodologies, which give teachers and principals control over the research agenda in their schools.

The Schools Plus arm involves brokering partnerships with community organisations and agencies that work collaboratively to support school student learning and engagement. It aims to build school-community connections and increase the engagement of students and families with education and community life. One programme involves Australian Football League (AFL) players, specifically from the Western Bulldogs, visiting 30 primary schools in Melbourne’s west. Kinda Kinder programme seeks to address low levels of pre-school participation by engaging with parents and children in non-threatening environments. It is a literacy-focused, play-based learning environment for children aged from birth to four years. The children attend once a week with a parent or a caregiver for one hour free programme. Kinda Kinder has been designed to engage and work with children whose parents lack connection with education, and who may be less likely to enrol their child in pre-school or kindergarten.

Box 2.2. Victoria University's Access and Success programme (continued)

Operating in public libraries, other community settings and schools, the programme uses pre-service early childhood teachers to provide early childhood education in the form of storytelling and other play activities, while also supporting young parents to develop both social networks and their familiarisation with formal education and community services.

From its beginning in 2005, the Kinda Kinder programme has expanded and in 2009 operates in 19 sites including three libraries across the western region of Melbourne. Kinda Kinder has also enabled disengaged carers to re-engage with education. A new generation of adult learners including parents and grandparents are learning along with the children, the pre-service teachers and university staff in the Kinda Kinder setting. Kinda College is being developed in conjunction with the TAFE arm of the university and will involve offering parents the opportunity to gain further education accreditation for the skills they develop when participating in these groups. Regardless of accreditation, parents' increased involvement with education enables them to support their own children's educational experience. The multifaceted approach to building the educational capacity of communities that characterise this programme is a significant strength.

The research arm supports and contributes to the sustainability of the Access and Success programme by recording the work of different programme, as well as facilitating the production and dissemination of knowledge about equity issues and the effectiveness of intervention strategies. A range of different quantitative and qualitative research methodologies are used to evaluate and inform collaborations with school and community partners; to track the impact that Access and Success projects have on student engagement, achievement and aspiration; and to advise equity policy and practice. This investment in research and the emphasis on building of community capacity through cross-sector and cross-agency partnerships has increased the reach and sustainability of the project.

Source: Sellar, S., et al. (2010), *Interventions Early in School as a means to Improve Tertiary Education Outcomes for Disadvantaged (Particularly Low SES) Students: Case Studies of Selected Australian University Outreach Activities*, Department of Education, Employment and Workplace Relations, Canberra

Victoria University's work demonstrates a strong commitment to collaboration across sectors. It involves both school and community partners in designing and delivering interventions to increase their relevance to particular contexts. It builds relationships between school

students and mentors, such as university students or prominent community figures. It constitutes early, long-term and sustained interventions. Some projects take a cohort-based approach to changing student attitudes and peer culture in relation to education in order to improve achievement and aspirations for future education and employment. However, while the partnership approach has benefits over the implementation of pre-designed intervention strategies, it also has challenges due to the time and financial commitments that it requires from both school and university partners. The legitimacy of the knowledge produced by collaborative practitioner research methodologies and by teachers and students as researchers may also be called into question. Furthermore, equity programmes may not always benefit those in most need.

Articulation between TAFE institutes and universities remains a challenge. Across Australia, post-1988 established universities admit the biggest number of low-SES students while the “Group of Eight”³, a group of research-intensive prestigious universities including The University of Melbourne and Monash University in Victoria, admit the least. The Group of Eight admitted an average of 10.9% of their students from poor backgrounds, compared with an average across the tertiary education system of 17.4%. Another key difference is the distinction between universities in capital cities and universities in regional areas (Wheelahan, 2009). In Victoria, only about 11% of commencing university students were offered places in 2007 on the basis of a TAFE award, with higher rates, as expected, from dual-sector universities. Table 2.2. shows Swinburne University recording the highest articulation rate of 27%, followed by Victoria, Deakin and La Trobe. However, a recent study indicates there has been little change since 2004, and that any growth in the number of TAFE students entering university came at the expense of school leavers and mature age, non-university graduate entrants (Phillips KPA, 2009).

Table 2.2. Commencing undergraduate students admitted on the basis of previous TAFE qualification

University	Basis of Admission: TAFE	All Commencing Students	% of TAFE students	TAFE as % of University
Monash	518	8 265	11	6
Melbourne	94	5 956	2	2
La Trobe	788	5 841	17	13
RMIT	734	5 123	16	14
Deakin	973	7 133	21	14
Swinburne	751	2 780	16	27
Ballarat	8	1 451	0	1
Victoria University	747	4 532	16	16
State of Victoria	4 613	41 081	100	11

Note: PhillipsKPA the report questions the veracity of the low number for Ballarat.

Source: PhillipsKPA (2009), "We Can All Spell 'Articulation' Now: Final Report on Articulation and Credit Transfer within VET and between VET and Tertiary Education", DIIRD and DEECD Joint Policy Unit on Youth Transitions, Melbourne.

Credit transfer arrangements exist on an individual basis between TAFE institutes and universities, or within the same institution with growing use of recognition of prior learning, advanced standing and/or status in accordance with the qualifications framework. Table 8 below provides an indication of how some universities operate the credit transfer system. On the other hand, students from low SES who attend the "Group of Eight" universities are likelier to finish their degrees (Wheelahan, 2009). Research suggests that once enrolled, low SES people do almost as well as medium SES and high SES in terms of retention, success and completion. Hence low SES participation is primarily an issue of equity in access rather than success. Students from low SES background, remote areas and from Indigenous backgrounds remain an exception (James, *et al.*, 2008).

Table 2.3. Formal pathways and credit transfer arrangements available to prospective university students by broad field of education

Broad Field of Education	University								
	ACU	Ballarat	Deakin	La Trobe	Melbourne	Monash	RMIT	Swinburne	Victoria
Society & Culture		✓	✓	✓			✓	✓	✓
Creative Arts		✓	✓	✓			✓	✓	✓
Education		✓	✓	✓			✓		✓
Health		✓	✓	✓			✓		✓
Management & Culture		✓	✓	✓			✓	✓	✓
Information Technology		✓	✓	✓		✓	✓	✓	✓
Natural/Physical Sciences		✓	✓	✓			✓	✓	
Architecture/Building			✓	✓			✓	✓	
Engineering & Related Technologies		✓	✓	✓		✓	✓	✓	
Food/Hospitality		✓	✓	✓			✓	✓	✓
Agriculture & Environment			✓	✓			✓		

Source: PhillipsKPA (2009), “We Can All Spell ‘Articulation’ Now: Final Report on Articulation and Credit Transfer within VET and between VET and Tertiary Education”, DIIRD and DEECD Joint Policy Unit on Youth Transitions, Melbourne, p. 52

According to a recent report (DEEWR, 2008) retention levels for all commencing bachelor students vary considerably amongst Victorian universities, but all universities have showed an improvement over the years since 2001 with the exception of the University of Ballarat, Monash University and the University of Melbourne’s higher rates of retention may be associated with their high SES student cohort. While levels compare well with international standards for public institutions, there is room for improvement around the level of higher education-preparedness, the quality of the induction process and the first year experience, and how learning is facilitated. Key factors in improving retention can be attributed to the five “C”s: course choice, career choice, commitment and confidence (social and academic) and connections (to the college and the college community). At the same time, retention rates can hide changes in institution, programme or career (see Table 2.4).

Table 2.4. Retention rate for all commencing bachelor students for the state of Victoria, 2001-2007

Tertiary Education Provider	2001	2002	2003	2004	2005	2006	2007
Deakin University	80.31	80.49	82.04	82.73	82.46	83.86	83.85
La Trobe University	79.66	78.16	79.00	80.32	82.09	83.33	81.63
Monash University	86.07	86.08	87.41	87.46	87.95	88.67	90.12
RMIT University	82.42	82.03	84.36	83.33	85.39	84.69	88.34
Swinburne University of Technology	82.80	81.58	83.29	82.48	80.90	83.35	84.25
University of Melbourne	84.66	83.26	84.33	85.08	91.93	92.19	92.41
University of Ballarat	80.10	79.70	77.80	78.66	78.84	79.05	78.12
Victoria University	73.15	75.29	75.03	78.48	77.65	78.27	78.56
State Total	82.02	81.57	82.69	83.40	84.70	85.25	86.18

Source: DEEWR (2008), "Attrition Progress and Retention Rates for commencing bachelor students", www.deewr.gov.au/TertiaryEducation/Publications/HEStatistics/Publications/Documents/2008/Appendix4AttritionProgressRetention.xls

The *Review of Australian Tertiary Education* (Bradley, et al., 2008) has set retention targets for all categories of students in recognition of the fact that "early school leavers represent a significant untapped economic resource." By increasing rates of retention in education and training for young Australians between 2004 and 2010, the report estimated that benefits of around AUD 8.2 billion in net present value terms (at a 5% discount rate) could be achieved (Access Economics, 2005). One strategy therefore is to strengthen the links between TAFE institutes and universities, while another is to review university curriculum and support services for such students. The targeted funding for university recruitment of low SES students may not be sufficient to overcome the challenges for those universities with a significant cohort of such students.

There is increasing evidence of cross-sectoral and multi-stakeholder collaborations including examples of educational campuses being established between multi-level institutions, for example GOTAFE and La Trobe University at Shepparton, Monash University at Gippsland (see Box 2.3). Deakin University has also launched the "Deakin at Your Doorstep" programme (see Chapter 4, Box 4.5). Another initiative is the mix-used development being planned by Swinburne University of Technology and Knox City Council. The Knox Central Urban Design Framework brings together the City of Knox, Fairhills High School, Villa Maria Society & Wantirna Hospital, the Institute of Horticultural Development, and the

Lewis Park and Blind Creek Reserve with Swinburne University's TAFE institute to establish an integrated suite of facilities and educational programmes around the theme of sustainability by taking advantage of the generous parkland setting and the particular partner attributes. The National Centre for Sustainability, collaboration between Swinburne University of Technology and the University of Ballarat, TAFE institutes, and the local community, is also located here. It aims to provide educational programmes, resource development and applied research to support the development of sustainable practices.

Box 2.3. Gippsland Education Precinct

The Gippsland Education Precinct (GEP) is a multi-sectoral 'institution' formed by a partnership between Monash University, Kurnai College, Apprenticeship Group Australia (formerly Gippsland Group Training), GippsTAFE and La Trobe City. It aims to improve access equity and education and employment opportunities through integrated learning pathways from Year 11 to TAFE diploma, university degree or PhD, with strong partnerships with business, industry and all levels of government. By co-locating all four education providers on a single site, the precinct helps widen access by enabling easier transition to apprenticeships, TAFE or university. As part of a AUD 20 million project, the Precinct offers state of the art facilities in all areas including IT, Science, Art, Library, Sport & Recreation and Technology – and students can utilise Monash facilities including laboratories, computers, student union and staff. The GEP provides the option to remain in Gippsland to live and work. Educational programs are being developed in close consultation with local industry to help improve the employability in the region and hence its sustainability.

Source: Monash University (2006), Gippsland Education Precinct website, www.gep.vic.edu.au, accessed 16 April 2010.

2.3 Demand for skills

Overview

Australia suffers from a skills shortage predicted to last beyond 2020 due to a combination of rapid economic growth and aging. But the picture is much more complex. While the economic downturn has not impacted as severely on Australia as other OECD countries, unemployment has nevertheless risen from a historic low of 4.1% in

May 2008 to 5.7%. Early 2009 projections suggest unemployment could reach almost 7% by June 2010. These rates hide higher under-utilisation rates, which combine unemployment with underemployment; this currently stands at 13.9% (ABS, 2009). In Victoria the unemployment rose from 4.4% to 5.6% over the same period, and is likely to climb to near 7% by 2012-13 (DIIRD). It also has the second highest underutilisation rate in Australia, having climbed from 10.7% in May 2008 to 14.2% in May 2009.

Australia will experience a demographic challenge associated to an ageing population in line with similar projections for other OECD countries by the end of 2020. Approximately two out of every five workers are currently aged 45 years or older with about half of those in agriculture, forestry and fishing; education; and health and community services aged over 45 years. Australia has experienced a significant shift in the composition of the labour market in terms of the age of the employees. When in the late 1980s, people under 45 years of age made up 76% of the market, by the late 1990s, the number of workers under 45 years of age had declined to 69%. Labour market projections show that by 2016 workers under 45 years of age will make up 58% of the labour market (Lee Dow, *et al.*, 2009). The *Review of Australian Tertiary Education* has projected a serious shortcoming in the number of academics and researchers. As a partial compensation for the impending pension costs and labour shortages, retirement has recently been lifted to 67.

Given the ageing of the population and rapidly changing skill requirements in working life, Australia and Victoria cannot rely on only young people as the suppliers of workforce skills but need to accommodate enrolments and graduations throughout the working life of the population and also ensure that flexible reskilling and upskilling opportunities are in place. Upgrading the skills of the adult population is likely to have a more direct effect on the region's economic performance since adult learners are generally less mobile than younger students due to family commitments. For non-traditional learners, who often combine work and study, flexible ways of provision need to be in place through work-based, e-learning and distance education. In addition, attendance on the basis of non-formal and informal learning should be allowed (OECD 2007; 2008).

Most growth in employment is expected in services, reflecting the broad global pattern across the OECD countries (Australian Government, 2009). The Australian Industry Group (AIG) estimated a shortfall of 180 000 to 240 000 full-time employees in Australia (AIG, 2008). The biggest gap is expected at the undergraduate level, with

postgraduate numbers being at or near the projected number required. By 2018, it is estimated that there will be a shortfall of 22 000 people with undergraduate qualifications compared with an estimated 129 000 undergraduate completions that year (Bradley, *et al.*, 2008). Correspondingly, the most significant skills gap is at the middle management level, with the smallest gap at top level management of Australian organisations (CEOs, Board directors and business owners) (Funston and Quach, 2009).

The structure of the Victorian economy is moving away from manufacturing base to become more services and innovation oriented. In Victoria, there is an estimated shortfall of 96 000 bachelor degree completions and 10 000 postgraduate degree completions till 2020 (Lee Dow, *et al.*, 2009). In the last decade the main source of the rapid growth in employment in Victoria was in professional occupations in the government, administration, education and health sectors. In the period 2003-08, for example, 30.5% of employment growth occurred among those in professional level occupations, which has led to significant increase in demand for university qualified employees. Further, the process of skill deepening increases the demand for more qualified workers (Lee Dow, *et al.*, 2009).

A major survey of CEOs raised the spectre of a serious mismatch between actual skills of graduates and labour market needs, pointing to the absence of soft skills. The study found that problem-solving is rated as the most important soft skill (31.7%), followed by communication (25.8%); adapting to change (23.5%); and teamwork (18.9%). Whilst problem-solving skills are regarded as the most important for innovation, communication skills are considered to be the soft skills most lacking in organisations (53.5% of firms). Nearly half of the firms surveyed (47.2%) indicated they lacked skill in adapting to change. Australian Government's initiatives were seen as too often geared at entry level access initiatives rather than on up-skilling or re-skilling, which the firms estimated to be a company's primary source of potential innovation. However, more than half of the firms who have undertaken training believe it has not provided them with the skills they need to take advantage of emerging technologies (AIG, 2008). According to the Australian Industry Group representatives, employers often found it difficult to employ PhDs while acknowledging that PhD graduates faced challenges to get employment which fully utilised their skills. Universities had another perspective on PhD graduate employment; they claimed that because of skill shortages and attractive salaries, it was often difficult to retain PhD students until completion and then within the academy.

The challenge therefore is to better align both graduates and labour availability – underutilisation plus high skilled migration – with economic growth and employment opportunities while avoiding the unintended consequences associated with workforce planning. Over the years, the Australian Government has used migration criteria as a way to solve particular skill shortages and rural development requirements. Migrants need to show particular work skills, be nominated by particular employers, have other links to Australia or have successful business or investment skills and sufficient capital to bring to Australia to establish a business or investment of benefit to the country. Lower points are required for people willing to live in a designated area of Australia, for example the Shepparton area in the State of Victoria. To ensure that the scheme aids rural development, migrants can only apply for a permanent visa after living for two years and working for at least one year in a specified regional area. Another prominent group is international students, approximately one third of whom seek residency. While migration makes a useful contribution to enhancing the skills base of the Victorian economy, there is a need to ensure that talent is nurtured at home and participation rates are widened.

Achievements

In response to the dynamic situation, Victorian tertiary education institutions, TAFE institutes and universities, are transforming their recruitment practices and curriculum and introducing various initiatives aimed at broadening the student experience and forging closer links between the academy and the broader enterprise community. TAFE institutes by their role and mission are more directly involved in programmes with a direct business or employment orientation. Some are moving beyond typical vocational programmes to establish robust relationships with industry sectors. A good example is the Goulburn Ovens Institute of TAFE industry partnership with the dairy industry – which has already been highlighted in Chapter 1 (see Box 1.8).

Several universities in Victoria are restructuring or reformulating their approach to teaching, learning and research – creating what could be termed “global citizen initiatives” – in ways which present interesting models for other jurisdictions. For example, the University of Melbourne has restructured its curriculum, introducing six 3-year undergraduate degrees characterised by both disciplinary depth and academic breadth leading to three possible pathways: direct entry into

the workforce; a graduate professional degree; or a research higher degree. An innovative feature of the *Melbourne Model* is the development of university breadth studies, which adopt an interdisciplinary approach to disciplinary or global challenges, inter alia climate change, human rights and global justice or emerging technologies for transformation. Melbourne has taken a gamble in making these changes, and pushing (or postponing) professional programmes such as law and medicine to the postgraduate level. Some trends are already apparent: the university admits to seeing a shift from high enrolments from a relatively small base of schools to increased participation from previously underrepresented schools and students from low SES backgrounds.

Other “global citizen initiatives” include “Monash passport” and RMIT University’s “Global passport” that enables students to combine degree programmes with international exchanges, leadership programmes, work training programmes and volunteer and research opportunities. Swinburne University of Technology is reformulating its programmes grouping a professional major with a minor subject through its *Curriculum Framework Project*, while Victoria University has developed a Graduate Capabilities Statement which defines the attributes required to be “career ready, work ready and future ready”. A common thread to all these initiatives is the focus on broadening the curriculum to develop additional skills and understanding either in Australia or abroad to enable student to “*excel in an open world economy*” (RMIT Global Passport). They also include a strong focus on employability via the experiential learning and the acquisition of soft skills, which employer groups most regularly identify as vital (see Table 2.5).

Table 2.5. Global citizen initiatives

Initiative	Main Features
Melbourne Model, University of Melbourne	Six broad-based undergraduate degrees with key features: disciplinary depth, breadth studies, knowledge transfer and capstone experience. Together with increased prospects for internships, study abroad and participation in industry projects, the degrees offer the chance to explore a range of interests before committing to a particular career path. http://www.futurestudents.unimelb.edu.au/about/melbournemodel.html
Monash Passport, Monash University	Combines degree programmes with international exchanges, leadership programmes, work training programmes and volunteer and research opportunities as a grounding for careers. http://www.monash.edu.au/education/passport/
Global Passport, RMIT University	International education and industry networks provide a wide range of opportunities for students to enhance their education or research experience – at the university's campuses in Melbourne and Vietnam; with partner institutions in Singapore, Malaysia and China and through education and industry links throughout the world www.rmit.edu.au/globalpassport .
Graduate Capabilities Statement, Victoria University	Graduate capabilities transcend technical skills and curriculum content and enable students and graduates to be work, career and future ready. On graduation, students will receive a Victoria University Graduate Capabilities statement as part of the Graduation Statement. http://wcf.vu.edu.au/GovernancePolicy/PDF/POA050510000.PDF
Curriculum Framework Project, Swinburne University of Technology	Model for Professional Learning which emphasises real world learning experiences within a supportive environment, integrated with skills development in order to prepare graduates to make the transition to professional practice. www.swin.edu.au/hed/framework/

Furthermore, student leadership and volunteerism initiatives are being promoted by several universities. The University of Melbourne claims that 80-85% of students who work with an employer either as part of an internship or work-experience programme will be hired by them; likewise, employers are more likely to interview such students. Through these initiatives, students learn leadership, team working, interdisciplinary and a variety of related skills. It has a dedicated Leadership, Involvement and Volunteer Experience (LIVE) unit which host a range of programmes and resources which provide students with opportunities to get involved in leadership, volunteering and community engagement activities. Monash University's *Ancora Imparo* Programme has been designed to help students prepare for future leadership roles. A key feature is participation in seminars and workshops led by distinguished Australian leaders and high profile community leaders. A central feature of these initiatives is the focus on community engagement – at the individual student level rather than at the institutional level.

Global citizen, student leadership and volunteerism initiatives represent good practice examples. In view of the regional development of Victoria it might be useful to consider how these programmes could be better geared to serve the needs and priorities of the region. In addition, it can be expected that many of these programmes reach only a small proportion of students, while particularly students from low SES may face challenges in participation in such initiatives. Experimentation with experiential and problem-based learning models in group settings and embedding these in regular learning programmes could provide a solution that would bring benefits for a bigger number of students (see later under “employability challenges and work-based learning”).

Governance and financing framework

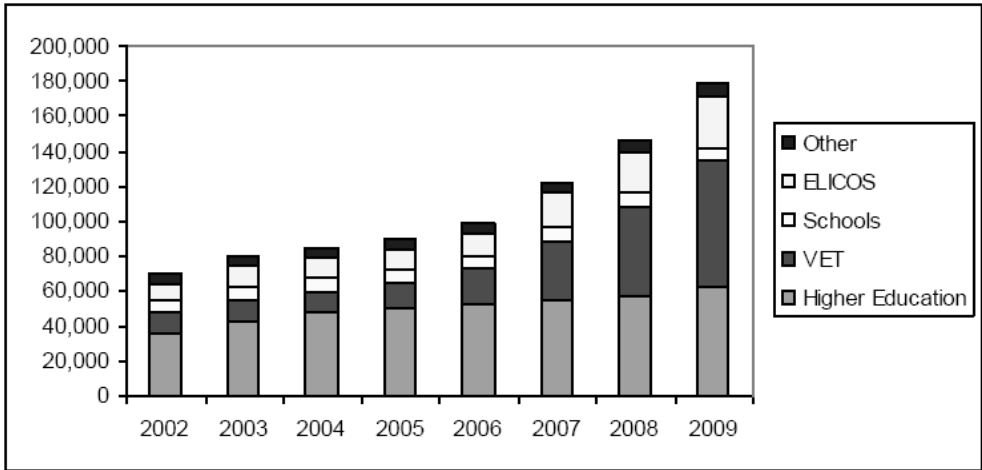
Australian tertiary education operates in a complex governance and funding matrix, with the Australian Government having jurisdiction for funding universities while the state oversees TAFE institutes. Over recent decades, the trend has been towards increasing the marketisation of tertiary education, encouraging greater independence from government and competitiveness at the national and international level. This approach may have enhanced regional disparities within the state, which are a “logical” reaction to urbanisation, climate change and geographic/geological structural challenges. Hence demographic projections for Victoria indicate the number of 15-24 year-olds outside of Melbourne is expected to decline, with an -0.2% growth rate to 2018, and a 0% growth rate to 2038 (Bradley, *et al.*, 2008).

The Australian Government has sought to reconcile the obvious difficulties of sustaining tertiary education outside the capital through regional loading funding. This funding roughly reflects the number of students enrolled in regional campuses and the degree of remoteness from a major centre. Universities which maintain campuses outside of metropolitan area are supplemented for the increased costs which come from operating facilities in environments with relatively low student numbers, a high proportion of students from low SES backgrounds and difficulty attracting students from elsewhere to study at these campuses. The history of individual rural and remote campuses derives from various reasons including efforts to widen access and reasons associated with the original Dawkins restructuring. The Review of Tertiary Education however notes that there seemed to be “*little relationship in a number of cases to the existence of a*

loading and the location of a campus” and as a result, funding was “not sufficiently targeted to those campuses which have major problems” (Bradley, *et al.*, 2008). The Australian Government has recently introduced a review of regional loading in which it has outlined several possible funding models, including formula-driven institution centred funding, demand-driven formulaic allocation, a competitive grant scheme or performance-based funding (DEEWR, 2009a) (see also Chapter 4).

Changes in regional loading will complement changes already occurring as a result of the *Victorian Training Guarantee* which creates a universal entitlement to vocational education and training; this will extend to a universal entitlement for university education in 2012, with the introduction of a demand-driven funding system in universities. In addition, the cap on the number of students that any university may enrol will be lifted. Thus, no matter what changes occur in regional loading, TAFE institutes and universities will be competing directly with each other for students.

Another manifestation of the complex governance and financial system has been the increasing reliance on international student revenues which is now worth AUD 5.4 billion to the Victorian economy making it the state’s biggest export, surpassing tourism and automotive sectors (AEI 2009). International student enrolments grew by 159% between 2002 and 2009, and Victoria’s share of international enrolments increased from 27% in 2002 to 30% in 2009. Approximately 50 000 international students live in the Melbourne area. About 33% of all international enrolments were in tertiary education – representing a drop of 3% from 2008 – with 41% of total international enrolments in VET, an increase of 5% from 2008. TAFE institutes have experienced a growth rate of 510% (see Figure 2.3). Another way of stating the significance of international students is that overseas student fee revenue represents a growing proportion of university budgets, ranging from 26% for RMIT University to 12% for Victoria University (Bradley, *et al.*, 2008).

Figure 2.3. International student enrolment, September 2002- September 2009

Source: DEEWR (2009b), “International Student Enrolment Data”, September 2009 summary, http://aei.gov.au/AEI/Statistics/StudentEnrolmentAndVisaStatistics/2009/MonthlySummary_Sep09_pdf.pdf

These issues – overlapping governance and policy arrangements, demographic and geographic disparities of communities and institutions – and the financial significance of international students who congregate primarily in the Melbourne metro area – combine to create particular challenges for Victoria’s regional development strategy.

Strategic co-ordination of the regional human capital system

One of the main challenges of an integrated tertiary education system in Victoria is the complex governance architecture between the Australian Government and state jurisdictions, often with overlapping or clashing policy objectives. For example, the Australian Government’s target of 40% participation by 2020 among 18-24 year-olds has almost been met in the Melbourne metropolitan region, while it represents a significant stretch for the more rural and remote parts of the state. Demand-based funding will further intensify the trend towards marketisation and competitiveness and may bring forth unintended consequences for isolated institutions – especially when the cap on student numbers is lifted. The ability of some universities to capitalise on their status and ranking could over-power TAFE

institutes and/or universities whose excellence is manifested in other ways.

Furthermore, the goal to have 20% of undergraduate students from low SES backgrounds by 2020 is particularly tough for Victoria since it has a lower proportion of people from a low SES background (*i.e.* 19.8% compared to 25% nationally) (Lee Dow, *et al.*, 2009).

The absence of a co-ordinated or integrated tertiary education system is further evident by the degree to which individual institutions appear more interested in establishing partnerships and collaborative networks with international partners than with colleagues within the state; as one participant remarked: “*we are interested in cities, just not this one*”. Thus the competitiveness which has been a strong hallmark of Australian tertiary education has a serious fault-line which may have perverse implications for both students and Victoria. Furthermore, global rankings are setting the performance goals for some universities.

Academic challenges

There are probably two major and inter-related challenges which have been identified by a wide range of stakeholders and the Australian Government and state reports: the participation of students from low SES and Indigenous backgrounds coupled with the challenges of rural and remote communities. While low SES and indigenous participation remains an enduring issue for urban areas, it is a particular issue for rural and remote areas of Victoria. Hence, a major barrier ensuring equity and access to tertiary education are the difficulties associated with geographic disadvantage which in turn has major implications for the development and sustainability of these non-metro areas. Better educational opportunities in such districts may however only halt migration to the larger towns and to Melbourne for the length of the period of study; likewise, improved communication links, for example road and rail, may enhance the attractiveness of such towns or enable people to commute more easily to Melbourne. For example while Deakin University is strongly associated with Geelong, the bulk of their students are actually Melbourne based. These are special challenges for the State of Victoria, but the issues are replicated elsewhere in Australia and in many other countries.

The *Review of Australian Tertiary Education* (Bradley, *et al.*, 2008) while noting the importance of a differentiated tertiary sector, recommends greater coherence and co-ordination. This is especially important in light of forecast that the greatest future skill shortages are

likely to be at the undergraduate level. Accordingly, the Australian Government is aiming to halve the number of 20-24 year-olds without a qualification at Certificate III and above between 2009 and 2020 and to double the number of tertiary qualification completions over this same period. Because societies are dynamic and the demand for skills can be volatile, the objective is to ensure that the system as a whole is flexible and capable of responding to society needs and student aspirations. Programmes of study, at any level, should enable students to reach their ability and not be caught in a *cul-de-sac* – in other words, acquire a qualification that is not accredited, recognised nor capable of articulation.

Table 2.6. shows the growing number of students seeking a diploma or higher TAFE qualifications, with approximately one-third of diploma and higher qualification students seeking a university degree (Stanwick, 2006). Hence, VET courses can and do provide a ladder-of-opportunity. There is however a significant countervailing trend; students progressing to university tend to be from middle to high SES and not low SES bands. While VET programmes provide an educational pathway for low SES student, they do not provide a “*social ladder of opportunity or contribute to widening participation for low SES students*”. This is because “*low SES students are not a designated equity group in VET*” (Wheelahan, 2009). If access and equity can be reconfigured within an integrated tertiary education framework and articulation pathways improved, there is a growing pool of students.

Table 2.6. VET course enrolments by qualification level: 1999, 2007 and 2008

AQF course enrolments	1999 number	2007 number	2008 Number	2008 % of total	1999 - 2008 % change	2007 - 2008 % change
Diploma or higher	70 999	87 279	98 614	14	39	13
Certificate IV	63 287	69 433	70 129	10	11	1
Certificate III	89 630	154 142	167 126	24	86	8
Certificate II	94 751	101 873	105 293	15	11	3
Certificate I	33 776	44 062	41 374	6	22	-6
Total	352 443	4 456 789	482 535	69	37	6

Source: DIIRD (2009), “Victoria’s Vocational Education & Training Statistics: A Pocket Guide”, www.skills.vic.gov.au/_data/assets/pdf_file/0014/100265/Pocket-Guide.pdf

The role of VET programmes as a “ladder-of-opportunity” has wider implications for TAFE institutes. While it is important to

maintain differentiation between programmes and institutions, the boundaries need to be flexible and “*it is no longer helpful to seek stark contrasts between higher education and VET in the level and types of qualifications they deliver*” (Bradley, *et al.*, 2008). There is increasing overlap between the types of programmes with an increasing emphasis on vocational training, employability and work with industry/business (Wheelahan and Moodie, 2005). Occupational destinations are increasingly less distinct except for the trades or other regulated occupations (Karmel, *et al.*, 2008). While diploma or advanced diploma qualifications are well regarded, they face strong competition from people with degrees and the general trend towards tertiary qualifications in the workplace. Dual sector universities would appear most able to fill this gap but other universities are also extending their programme offering to the sub-degree level in line with the widening-access agenda, and often in direct competition with neighbouring TAFE institutes. This trend is apparent in many other OECD countries.

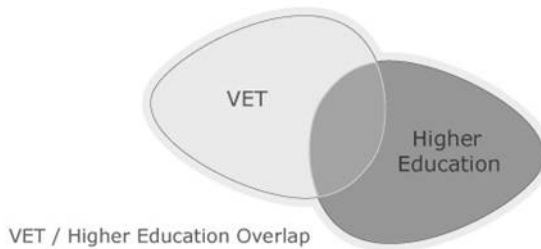
TAFE institutes are concerned about their future position and status; colleges in rural and remote parts of Victoria are especially vulnerable and concerned about the impacts of the new demand-driven funding system. Some wish to participate directly in research, which has implications both for the students, the academic staff, and the institutions themselves. The question remains whether VET programmes are simply a “ladder-of-opportunity” or whether they represent a valuable qualification in their own right (see Figure 2.4). As the funding cap is removed and universities seek to widen participation, there is a risk that some TAFE institutes will fall victim to cherry-picking the most able students and valuable programmes. Despite these tensions, VET programmes offer important and valuable skills for both TAFE and university students and graduates. Increasing emphasis on employability and work-based learning offers new opportunities for TAFE institutes, especially if the training entitlement can be refashioned to recognise the value in reverse articulation. Employers have commented on the absence of sufficient support for re-skilling and up-skilling or continuing professional development. TAFE institutes either as a sector or in partnership with universities could widen opportunities for entry-level and mature students to gain vital skills while also refocusing and repositioning TAFE institutes for a new generation and type of students.

Figure 2.4. Relationship between TAFE and Universities

Ladder of Opportunity



Partnership Model



Articulation pathways between VET and tertiary education programmes need to be strengthened, even within dual-sector universities. While there appear to be many individual arrangements between TAFE institutes and universities and abundant information available, from the student point of view there does not seem to be a single way of processing this information. There also appears to be limited opportunities for or recognition of advanced entry or recognition of prior learning initiatives. They are readily used in other

jurisdictions for *i*) entry to programme at the initial stage where the applicant may not meet the standard entry requirements, *ii*) advanced entry to a programme at a stage beyond the first stage, *iii*) transfer from one programme to another, *iv*) exemption from some programme elements or from programme modules, *v*) non-standard entry to post-graduate programmes where the applicant may not have the standard honours primary degree or *vi*) application towards a full award (DIT, 2009).

For pathways to be genuine, articulation routes need to be clear and meaningful. The submission to the OECD Review by Holmesglen TAFE (State of Victoria, 2010) noted that: *“...transfer routes between VET and Tertiary Education are not always clear and often depend on the policy and commitment of the Tertiary Education provider. In contrast, the national vocational system, based on Training Packages, gives very good portability and clear transfer arrangements between registered training organisations.”* This view was collaborated in a recent report which said that *“Victoria lacks an easy means for TAFE students and graduates to test how their VET qualification could lead them into tertiary education...Other States have attempted to provide co-ordinated information”* (PhillipsKPA, 2009).

Developing collaborative programmes at TAFE institutes and universities' undergraduate and postgraduate level would represent another variant of this collaborative systemic approach to tertiary education. It is becoming more evident that as the cost of education provision rises in tandem with competition, the capacity of individual institutions to provide comprehensive programming and choice at the highest level is becoming more and more difficult. For example with the European Union countries, higher education institutions are coming together to provide collaborative programmes whereby students are eligible to take specific courses or modules in partner institutions. This approach encourages higher education institutions to differentiate themselves through specialisation while enabling students to have access to the people and educational programmes that would not be possible in a single institution. Victoria has an extensive tertiary education network that could take advantage of a more co-ordinated approach which offers collaborative programmes. Two different models that Victoria could consider are the Erasmus Mundus programmes funded by the European Union⁴ or the Graduate School for Creative Arts and Media funded by the Tertiary Education Authority in Ireland.⁵

Resolution of some of these issues is not simply a Victorian issue, but the establishment of a governance council or board with

representation from tertiary education sectors would help ensure a co-ordinated or integrated tertiary education system.

Employability challenges and work-based learning

According to the Graduate Careers Council of Australia's *Graduate Destination Survey*, 79.2% of undergraduates were in full employment in 2009 four months after completing their studies, a slight fall from 84.5% in 2007; at the same time, 15.2% had a job before May of their final year of study in 2009 compared with 12.3% in 2007 (GCCA, 2009).

There is a lack of robust data about graduate performance, employment outcomes and graduate destinations. Both TAFE institutes and universities in Victoria had limited information on graduate performance. Graduate Careers Australia's Australian Graduate Survey accounts for first destination albeit this is at four months after graduation. In a full-employment environment the data has served a purpose, but it fails to provide an adequate vision of graduate employment and especially for the visual, performing and media arts where students are more likely to be freelance and mobile. Furthermore, the institutions themselves need to establish an appropriate method for tracking graduates as a way of informing curriculum – and understanding more comprehensively how education meets the needs of society and the economy. The Victorian Government could take the lead in setting up a national database to track the progress of students.

On-going concern for labour shortages and demographic trends means that the focus needs to shift to embedding employability skills within the curriculum, and to re-skilling and up-skilling opportunities. Focus on narrow skills development will not benefit the region in the long run in the fast-changing environment where employees need to have flexibility to adapt to changes. However, there is a strong need to improve the work-based learning opportunities and industry links, particularly in the university sector. TAFE institutes by their mission have a long tradition of being close to employment issues; VET courses are directly attuned to the needs of specific sectors of the economy. There are many examples of how TAFE institutes have developed specific training package programmes to meet the specific needs of an industry, for example dairy, hospitality and early childhood education. GOTAFE and Holmesglen, for example, also deliver English-for-specific-purpose programmes targeted at the large

international student population and for the migrant community who has settled in parts of rural and remote Victoria. The university track record is, however, more uneven. In recent years the Australian Government and the universities have placed considerably emphasis on building world-class research excellence, a goal often highlighted by politicians and university leaders in speeches and mission statements in response to the popularity of global rankings. Accordingly, the emphasis has been on research skills and collaboration with peer institutions, usually abroad, and not so much with local industry or business.

The Australian Industry Group (AIG) identified the difficulties associated with different institutional cultures and work practices between business and university research, including issues of ownership of intellectual property and approaches to contracting. Other than in isolated areas, linking successfully with business is not a leading objective of universities or the research agencies in Victoria. Linking with business appears to be seen as a diversion of effort, a waste of time and something that can lead to a corruption of purpose. When business linkages are more actively sought after, they are seen as a way of diversifying funding sources. It is also not clear that innovation can be taught in the same way that education has traditionally introduced new fields or competences. This has implications for both the curriculum and the way in which universities have linked with industry and business.

Strategic partnerships between tertiary education institutions and business and industry are becoming an important mechanism by which to forge strong relationships with key stakeholder groups. Such relationships usually fit within either of these two models:

- Vertical partnerships involve a deep relationship with a single stakeholder covering a wide range of activities and involvements.
- Horizontal or cluster partnerships are usually formed around a specific sector, *e.g.* health, hospitality, sustainability, and bring together several stakeholders.

Victoria University's relationship with the Western Bulldog football club is an example of a vertical partnership that embraces a wide range of activities and agendas of mutual interest including widening access, developing teaching and research excellence in sports science, up-skilling and re-skilling initiatives and scholarships (see Box 2.4).

Box 2.4. Victoria University and the Western Bulldogs

Victoria University and the Western Bulldogs have formed a strategic partnership around a shared commitment and vision for the western region of Melbourne, with approximately AUD 150 million being invested into the establishment of a Sports Precinct funded via a variety of sources. The focus is on teaching and research, with the shared development and use of high-quality, cutting-edge sport science, training, research and service facilities at both the Bulldogs' Whitten Oval and Victoria University's brand new sports science complexes. Both organisations share access to highly educated sports scientists who can apply their skills, conduct research and communicate effectively with a range of different audiences. In addition, the Bulldogs Friendly Schools (BFS) programme, being developed in collaboration with Victoria University, the Western Jets, the Australian Football League (AFL) and AFL Victoria, works with disadvantaged schools to actively encourage more students into tertiary education.

The Western Bulldogs players visit 30 primary schools in Melbourne's west. Pre-service teachers from the university located in each of these schools build on the player visits by enhancing student learning in areas including nutrition, literacy, health and well being, leadership, team work, physical fitness and skill development. This partnership has supported a range of associated community development activities, such as sponsoring low SES and recent arrival families to attend football matches. It has also increased the engagement of boys in literacy and academic practices.

The Western Bulldogs School Cadets programme delivers the skills component of the Footy in Schools Programme, which offers students skills in communication, leadership and coaching. In addition, the partnership facilitates work and practical placement of Victoria University's students in business, administration, event management, tourism and hospitality.

Universities can also make strategic decision to establish education and research activities around co-located facilities shared with other stakeholders. This is the case with the Swinburne University of Technology's relationship with Knox City Council and Monash University's specialised campuses for pharmacy and pharmaceutical sciences at its Parkville campus and for allied health at its Peninsula campus. The concept of strategic clusters is important for regional development and innovation purposes, but also as a means of institutional differentiation based on specialisation (see also Chapter 1 on innovation).

A broad range of skills and experiences, not necessarily related to the field of study, are essential for workplace readiness and finding work. New learning strategies which incorporate team working, problem-based learning, communication and other soft skills plus internships and work-based learning should be embedded in all levels of educational programmes, even at the doctoral level. Internationally, many universities and higher education institutions are building closer, more systematic links with the world of work. In the United Kingdom, Knowledge Transfer Partnership programme (Former Teaching Company Scheme) provides a grant to cover part of the operation cost to transfer and embed knowledge into business via a strategic project. Small and medium-sized enterprises represent about 90% of industry partners (see Chapter 1). Co-operative education in Canadian universities helps students complete work terms in industry as part of their curriculum. Some universities, such as the University of Aalborg in Denmark, have also taken steps to embed employability and transferable skills in their core curriculum and have this way built an ongoing relationship with the employers in the region (see Box 2.5).

Box 2.5. Problem-based learning at Aalborg University

Aalborg University was established in 1974 after years of popular campaign in the region to establish a university in northern Jutland in Denmark. The campaign formed the basis for a close dialogue with the surrounding society relying on co-operation with the business sector, trade unions and cultural life. An important early decision was to base research and educational activities on interdisciplinary integration, problem orientation and group work.

In project oriented problem-based learning, study programmes are organised around interdisciplinary project work in groups. Up to 50% of the study is problem-oriented project work: student work in multidisciplinary teams to solve real-life problems which have been defined in collaboration with firms, organisations and public institutions. At any one time, there are 2 000 to 3 000 ongoing projects to ensure a high degree of collaboration with the society and private sector.

Box 2.5. Problem-based learning at Aalborg University (continued)

The Aalborg model is based on a win-win situation: It provides students with transferable skills and authentic work experience while enterprises benefit from a clearer picture of what the university stands for and how students might fit in as prospective employees. Finally, the university gains feedback from the world of work and also benefits from access to instructive cases and ideas for research and teaching.

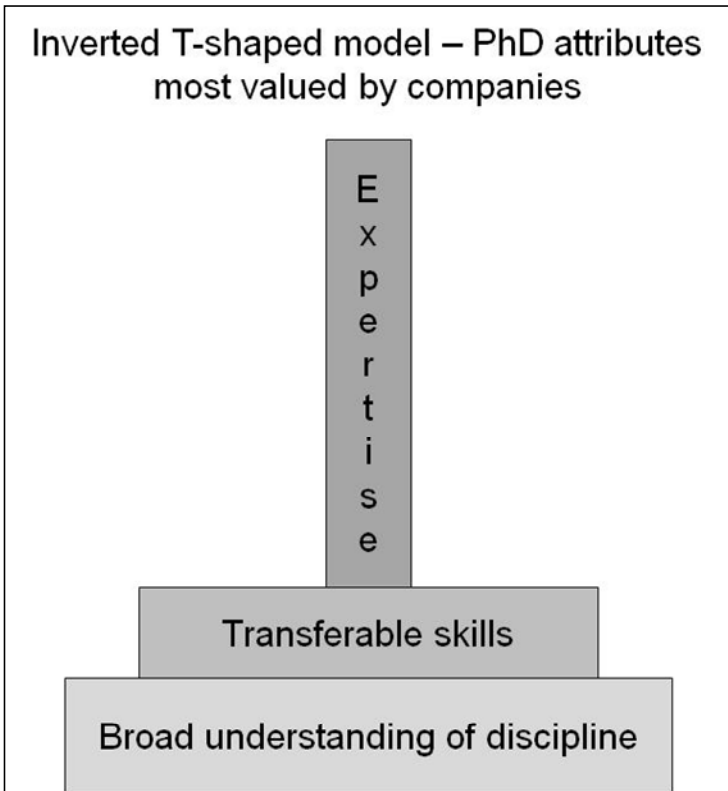
Source: OECD (2007), Higher Education and Regions: Globally Competitive, Locally Engaged, OECD, Paris, p. 157.

In Victoria, there are a number of valuable initiatives being undertaken through partnerships between industry, community and universities to develop work-based learning programmes. For example Victoria University has committed to integrating work and community-based learning into all its courses with at least 25% of assessment based on such learning. Integrated learning opportunities are available mostly in large companies. RMIT University defines work integrated learning as professional or vocational work in a work context including feedback from industry and community. In addition to being responsive to the needs of industry, RMIT also seeks to work for the future through research and innovation. The Swinburne TAFE has designed a Swinburne Employability Skills Passport which is a record developed and maintained by the learner and validated by the course director highlighting to which extent the learner has improved his/her employability skills through engagement in a range of activities and projects.

The European University Association's Council for Doctoral Education (EUA-CDE) has been leading the restructuring of European doctoral programmes – moving away from the traditional thesis-only-approach to one which incorporates discipline/interdisciplinary courses or modules and transferable skills as a means of enhancing research training and research career development. The Salzburg Declaration (2005) noted that while the “*core component of doctoral training is the advancement of knowledge through original research*” it is important that “*doctoral training must increasingly meet the needs of an employment market that is wider than academia*” (EUA, 2005; 2009, see Figure 2.5). Mobility should be embedded in the

programme, in addition to other opportunities such as internships with “industry” – public and private sector as well as the non-profit sector. These have become known as “structured doctoral programmes” because they provide a framework for timely completion over four years and a framework for collaboration. This will require changes at a number of levels within the tertiary education system (see also Chapter 1 on innovation).

Figure 2.5. Structured PhD Model



Source: ACSTI (Advisory Council for Science Technology and Innovation) (2009), “The Role of PhDs in the Smart Economy”, Forfas, Ireland, www.forfas.ie/media/asc091215_role_of_phds.pdf

The *Review of Australian Tertiary Education* (Bradley, et al., 2008) notes that approximately 1 725 additional academics would be required each year between 2006 and 2016 to replace staff leaving the

academic workforce or retiring. While about 4 000 domestic PhDs will be produced each year over that period, only about 900 seek employment in the academic labour market. Victorian universities confirmed this scenario, indicating also a poor level of articulation between undergraduate and postgraduate levels within their own institutions. Several dual sector universities in particular noted that they could not recruit PhD students from within their own graduating cohort. While this is not surprising given the vocational orientation of the undergraduate programmes, it poses a challenge, particularly as these universities have forged an important mission for useful knowledge and research which addresses “real world issues”. RMIT, for example, describes its approach: “*We focus on applied research that is delivered in partnership with leading organisations and individuals who are capable of using research outcomes to create products and services that are leading edge.*” While it is important that universities recruit outside their cohort and jurisdiction, their inability to recruit sufficient research students from their student cohort jeopardises this significant contribution to the diversity of knowledge.

International students and migrants constitute a significant proportion of the Victoria population. Their ability to claim residency and successful employment is vital. While overall technical ability is deemed to be the most important issue, along with a capacity to fit in, English language proficiency is an important attribute. Australian employers are often willing to accept perceived lower levels of English depending upon the state of the labour market; the effect of the economic downturn may thus affect their employment. This is especially important as research indicates that employment rates for non Commonwealth-Asian migrants, such as China, are markedly worst than for other groups. Accordingly, a recent report recommended that: “*Education providers develop closer links with industry and employer groups in order to assist in work placements and internships specific to the students’ field of study in Australia, as well as offering advice regarding employability skills that can be embedded within for-credit curriculum teaching and assessment*” (Akroudis, *et al.*, 2009).

There is a contrast between the employment pattern of low SES, rural and remote, and indigenous populations compared with the performance of international students. Despite the issues raised above, when compared with the Australia-born, the unemployment rate for 2001-06 arrivals – at 7.5% for those with bachelor degrees, 7.3% for those with masters/ postgraduate degrees, and 4.2% for those with

doctorates – were historically low. International migrants have been an important success story for Australia and Australian education, but also pose a potential social imbalance and inequity within society and the system.

Governance and funding challenges

Over the years, Australia has a multiplicity of reports and studies at the Federal and state level, and produced by public authorities, research centres and institutes, and consultancies: 1997 was the West Review which led to an abandoned Cabinet proposal for a market driven system; 2002 was the Nelson Crossroads process leading to a major set of changes announced in 2003 for implementation from 2005. The challenge appears to be the ability to provide consistent and co-ordinated action to tackle the range of issues already identified in these studies.

There is a need to establish a state-wide governing council or board to help ensure better co-ordination, integration and efficiency across the whole tertiary education system in Victoria. The United States provides an example of different models of governance; a state tertiary education co-ordinating agency, which varies in its role from advisory to regulatory, from weak to powerful. Co-ordinating agencies were created to manage tertiary education's growth and development and referee institutional disputes. Such "agency" should not have responsibility or jurisdiction authority over budgeting and academic programmes, authorising new institutions or allocating research capacity, but focus on state-wide planning and strategy, determining enrolment growth, assessing state workforce needs, monitoring results and intervening when there is a market failure. It is important to protect institutional autonomy while ensuring accountability, leverage institutional collaboration, and advocate effectively to government leaders and other external stakeholders (Novak, 2009). A key feature of this approach would be to place emphasis on the tertiary education system-as-a-whole being world class rather than on individual world class universities. This has implications not just for how all the institutions relate and work with each other but also to the wider Victoria region. There are implications for how state level planning fits with institutional funding based on demand (enrolments) in both VET and tertiary education.

Drawing on the experience learned from innovation clusters, a co-ordinating council might be able to deal with the disparities between

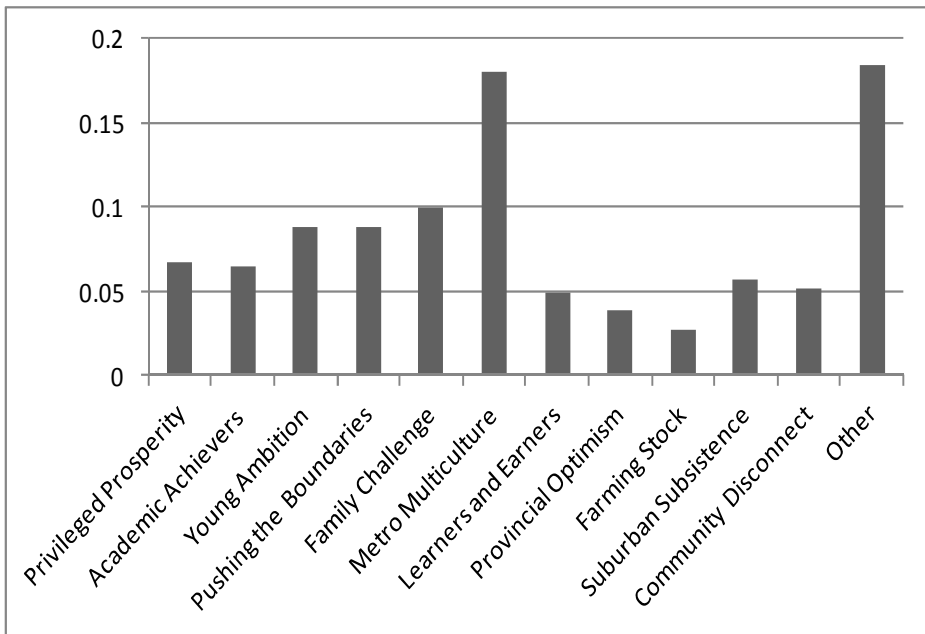
metro and rural/remote Victoria. Porter (2003) has identified the diversity of recognised universities and research institutions as a critical input factor for success. The OECD (2006) has similarly supported this approach: *“With rapid technology changes, single universities or research institutes may not be able to accommodate the needs of business development for skills, knowledge and innovation....[T]he most successful high-science locations today are those that take a multiple form, rather than a link between firms and a single university.”*

Better co-ordination is vital to ensure government targets to widen access and successful participation in tertiary education among low SES, rural and indigenous populations can be met. Because accessibility, even in metropolitan Melbourne, is a key factor underpinning participation, structured frameworks and other organisations mechanisms need to be established rather than relying on individual agreements. Likewise, while TAFE provides a pathway to tertiary education, it appears to be less effective for low SES students. Thus, building on good practice examples, consideration might be given to establishing multi-level campus education and stakeholder clusters, following the example of Monash University at Gippsland or Swinburne University of Technology at Knox City. Open Universities Australia (OUA) could be a partner in this approach, providing that the model is revisited and made appropriate to new learners from rural and remote communities and/or low SES groups. As a package, such clusters could provide viable and sustainable teaching and learning environments, underpinned by research which is locally relevant and globally engaged. While reversing the demographic trends remains a challenge, this approach might enable institutions, which are struggling to provide a comprehensive and quality learning experience within efficiency parameters, to thrive and survive.

Evidence from Open University Australia suggests its programmes are most frequently taken up by mature learners from Melbourne who are high achievers and/or in the high SES categories: 41% of students have a SES status that is tertiary than the intermediate one while only 23% of the students have a SES status lower than the intermediate one (SES classification used by Open University Australia) (see Figure 2.6), 67% are mature learners (over 26-year-old), and 82% reside in Victoria’s major cities. This picture challenges some conceptions of open and distance learning as a tool for widening participation. However, the experience of the Open University in the United Kingdom with its network of mentoring arrangements and seminars could be helpful.

The reformulation of regional loading will probably not be a sufficient driver of change. Demand-based funding and other market-based policies – meant to recognise student choice and reward excellence – may unintentionally further regional disparities. The hope is that student choice will align over time with planning views on needs – but this remains a challenge, not only because labour market forecasting is difficult to apply beyond specific fields. Tertiary education should not be construed simplistically as the “engine of the economy” but rather part of the wider eco-system. Hence, the Victorian Government’s ability to transform the demographic and regional deficit will need to be underpinned by a more holistic regional spatial strategy.

Figure 2.6. Open University Australia students by socio-economic status, Victoria



Source: Mario Piacentini, OUA Data Supplied to OECD.

Note: Socio economic status is classified in eleven categories, from the lowest one on the left (community disconnect) to the highest one in the right (privileged prosperity). As can be seen, the distribution skewed to the right, meaning that those from a relatively higher SES tend to attend more OUV. 18% are metro multiculture (intermediate level of SES), 41% SES higher than the intermediate one, 23% SES lower than the intermediate one, 18 % with unknown/not classified SES.

Conclusions and recommendations

Victoria is a knowledge-intensive centre for Australia. It is host to nine self accrediting universities, two other self accrediting bodies, and 18 non self accrediting providers; the vocational education and training (VET) sector is predominantly made up of 14 technical and further education (TAFE) institutes and the TAFE divisions of four “dual sector” universities. Educational services are Victoria’s strongest export, worth more than AUD 5 billion. Based upon this success, the state is a magnet for immigration, attracting 178 638 international student enrolments in 2009 which represents 31% of the total for Australia – albeit the overwhelming majority of these students come to Melbourne.

At the same time, Victoria faces the challenges of great differences between its metropolitan and urban populations with 70% of the state’s 5 million people living in Melbourne. This is compounded by disparities in educational completion rates and qualifications levels, employment rates and opportunities. People in the low SES and indigenous populations have lower rates of participations notwithstanding the presence of so many tertiary education institutions. Despite this situation, the state of Victoria – like the rest of Australia – faces a projected skill shortage beyond 2020.

The OECD review team recommends that the following measures are taken to improve human capital and skills development in Victoria:

- The Victorian Government should establish a tertiary education co-ordinating body which will help define state-wide goals, policies and priorities, in line with the recommendations the *Review of Australian Tertiary Education*, Report of the Review of the National Innovation System Powering Ideas: an innovation agenda for the 21st century, and the Victorian Government’s own objectives and targets. This body would play an important role in setting a common purpose across all tertiary institutions, including:
 - Embedding the Life-Long Learning (LLL) agenda across entire system to encourage multi-level articulation across all SES and age groups.
 - Extending the training entitlement to facilitate reverse articulation.
 - Ensuring greater use of advanced entry and recognition of prior learning gateways.

- Publishing a clear guide to the pathways and opportunities.
 - Providing targeted funding for collaborative programmes at all levels.
 - Developing re-skilling, up-skilling and continuing professional development in collaboration between VET and universities.
- The Victorian Government should establish multi-level and multi-stakeholder learning and extension centres or clusters, building on the example of Monash University at Gippsland or Swinburne University of Technology at Knox City, and involving Open Universities Australia. This could provide an efficient and effective way to bring together different educational providers with key businesses (public and private) to provide meaningful learning pathways and sustainable employment.
- The Victorian Government should take the lead in setting up a national database to track the progress of students across the system, and into employment and beyond. This would help inform education provision at all levels. The most effective region-wide graduate labour market systems are based on the collection of comprehensive labour market intelligence, on-line publication of the data in a single place to improve students' ability to make rational choices about their studies and to help graduates and employers to come together and students to move into employment. They use the data strategically to identify regional priorities and at an institutional level, to respond to the data in terms of course provision and the provision of employer specified skills.
- The Victorian universities should strengthen the labour market relevance of their educational programmes in a systematic way. The universities should be encouraged to embark on targeted regionally relevant institution-wide initiatives which have greater institutional anchorage and legitimacy within the institutions.

Notes

1. For more information on the Association of Sport Health and Education (ASHE), see *www.ashe.com.au*
2. For more information on the Schools Network Access Program (SNAP), see *www.rmit.edu.au/browse;ID=ekrskftjjz6h*
3. The Group of Eight (Go8) is a group of eight Australian universities: The Australian National University, the University of Sydney, the University of Melbourne, the University of Adelaide, the University of Queensland, the University of Western Australia, The University of New South Wales and Monash University. The Group of Eight was established informally as a network of vice-chancellors in 1994 and was formally incorporated in 1999. All members of the group except the Australian National University, the University of New South Wales and Monash University are known as “sandstone universities” and all of their primary campuses are based in the six largest Australian capital cities. The group supports prioritisation of research funding and lobbies for increased funding for the largest and most popular campuses.
4. Available at *http://ec.europa.eu/education/external-relation-programmes/doc72_en.htm*
5. Available at *www.gradcam.ie*

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Chapter 3: Tertiary education and climate change in Victoria

This chapter examines how universities and TAFE institutes are responding to the challenge of climate change in Victoria. It considers both research and innovation in the domains of climate change and water management and efforts to respond to the increasing demand for new skills for “green jobs”. Highlighting achievements and challenges and providing examples of international good practice, this chapter reviews how universities are producing relevant research and innovative solutions for facilitating the transition to a low-carbon economy and discusses collaborative models to respond to the demand for new skills in green industries and occupations. This chapter concludes with recommendations for tertiary education institutions and the Victorian and Australian governments.

The main message of this chapter is that in order to seize the development opportunities from the low-carbon transition, the reach and effectiveness of the various initiatives should be scaled up through systemic collaboration among tertiary education institutions and the Victorian Government.

Introduction

World greenhouse gas emissions (GHG) have roughly doubled since the early 1970s (Kamal-Chaoui and Robert, 2009). The OECD projects that if we continue on the present trajectory, global greenhouse gas emissions will increase by more than 50% by 2050, causing world temperatures to rise significantly (Kamal-Chaoui and Robert, 2009). Victoria is expected to warm at a faster rate than the global average (Victorian Government, 2009). Moreover, climate change in Victoria will magnify the scarcity of water resources, by reducing inflows and increasing demand for water.

In addition to representing a major risk, climate change can also drive fundamental changes towards higher efficiency in energy management, industrial production, spatial development of cities, construction and operation of buildings, water management, agriculture and forestry. Climate change is thus not only an environmental challenge, but also a window of opportunity for developing economies that are more resilient to risk and more able to sustain growth. However, these improvements will not come automatically. They require information to identify opportunities for changes, innovations to make low-carbon technologies more attractive and new skills to widen the use of these new technologies.

In this context, higher education institutions have a fundamental role to play as sources of technical expertise, as generators of innovation and as educators and trainers. Universities and TAFE institutes in Victoria increasingly recognise the need of up-scaling their efforts in these three domains to address the challenge of climate change. A large number of initiatives of tertiary education institutions in Victoria are bringing practical responses to climate change and water challenges. Research is bringing to the market more cost-efficient technologies likely to improve economic and environmental sustainability. TAFE institutes are in the progress of launching new courses and diplomas to prepare young Victorians for the new jobs generated by the low-carbon transition. Some of these initiatives rely on multi-disciplinary teams which pool diverse technological expertise to better address the synergies between the local environment and local development.

The urgency of the climate change agenda can spur the right incentives to develop new models of partnership between government and tertiary education institutions. Some collaboration experiments are

already in place but much more can be done to avoid duplications of efforts and increase the scale of interventions. More public support to research in energy sources and conservation technologies is clearly needed. But the challenges go beyond properly scaling the amount of funding. Behavioural and organisational changes are required for more cross-fertilisation in policy documents for climate change, more collaborative research projects within the state, and a timely response to future skill needs for the Victorian economy.

The Victorian Government is taking strong action on climate change, although the strategy underlining this action does not fully account for synergies with tertiary education institutions. There are clear difficulties in engaging universities in strategic policy making. However, with respect to climate change and sustainability, objectives of educational institutions and governments clearly converge. A low-carbon economy is more attractive and more dynamic. In turn, a vibrant and attractive economy signals government effectiveness and is a pre-condition for universities to grow. Collaboration in the sustainability domain is therefore becoming a competitive necessity for both government and universities, and there are ample margins for a win-win scenario.

The effectiveness of the partnerships between the state government and tertiary education institutions in tackling climate change will depend on how these public institutions liaise with third party actors, such as industry and civil society. Universities in Victoria have taken steps to support entrepreneurship, but few programmes targeting explicitly emission reduction in industries have been identified. The Victorian Government has taken steps to increase its support for green business start-ups and the generation, demonstration and diffusion of sustainable energy technologies. Again, collaborative platforms for eco-innovation can bring to more efficient exchange of information, less duplications, wider adoption of new technologies and integrated environmental strategies by local industries. Allowing for greater participation of civil society within these networks can help accounting for the way demand and behaviour are adjusting to environmental pressures.

A crucial challenge is to avoid fragmentation of efforts in green technology development, creating the right incentives for universities to collaborate without hampering the productivity benefits of competition among institutions. Existing funding schemes in Australia tend to favour competition among universities, reducing the scope for transfer of information and joint research. Given their public good character, environmental research and education for sustainability will

clearly be under-supplied within fully competitive funding schemes. Public policies to “induce” more collaboration among universities might also raise the relevance of the research for *local* environmental problems. However, in the absence of clear policy incentives, universities efforts in environmental research might be insufficiently focused on specific challenges of Victoria, for example water recycling, carbon capture and storage, agricultural emissions, and instead targeting challenges with highest international visibility, for example electric cars.

Institutions in Victoria can learn a lot from effective international models of collaboration. In several countries, partnerships between government and academia have proven fruitful in the set-up of eco-innovation clusters. These clusters successfully merge excellence in education, frontier research in environmental technologies, and job creation through spin-offs, venture capital and integration of enterprises. Moreover, relevant international models show that skill creation for the “green jobs” can be more efficiently organised by pooling learning resources of education institutions and industries. Several national and regional governments in OECD are adjusting their skill strategies to take into account the emerging demand for new skills, using appropriate incentives to facilitate re-training and efficient mobility of learners between TAFE institutes, universities and industry.

An important transition towards more bottom-up local development policies is in progress in Victoria. The new Regional Alliance in Geelong and the Gippsland Regional Plan show local governments, business and community leaders agreeing to put sustainability and climate-change resilience upfront in their development agenda. Tertiary education institutions can give new impetus to these local coalitions for sustainable development, bringing in technical expertise and information to identify risks and opportunities. Vocational education institutions can also benefit from more active participation in these place-based networks. In fact, within these regional alliances, the demand for new “green” skills and the capacity of education institutions to supply these skills can be properly matched. There are large differences in exposure to climate change risk and adjustment costs for industry within Victoria. These space-based assessments and strategic plans at the local level are thus important to provide targeted responses for innovation and skill creation needs.

In this context, this chapter examines the following two dimensions to assess the effectiveness and coherence of policies and practices designed to fight the climate change in Victoria:

- To what extent do the existing universities and TAFE institutes facilitate the transition to a low-carbon economy and support “green” growth in Victoria? Are there gaps in delivery where performance could be improved?
- To what extent are there effective public policies, HEI-government partnerships in place to address the climate change? Does the public policy help collaborative efforts among tertiary education institutions in this domain?
- What lessons can be learnt from international experience?

3.1 The research & innovation agenda for climate change

Australia has developed some of the leading environmental technologies and processes, such as the world’s first major solar-powered telecommunications link, or the development of new membranes to purify water (Pears, 2005). The internationally recognised universities in Melbourne are providing significant advances in scientific research, thanks also to an efficient network of scientific infrastructure. This network comprises various Commonwealth Scientific and Industrial Research Organisation divisions (CSIROs), leading R&D facilities and Cooperative Research Centres.

Despite progress made in knowledge generation and relevant discoveries, the achievements in energy-saving and environmental technologies have not yet reached the full potential of universities in Victoria. While the priority in R&D and innovation investments under the current policy is given to health, sustainability and productive enhancing measures. There is still a lack of research clusters specialised in eco-innovation. The high dynamism of scientific activity in Melbourne could represent a fertile ground to develop competitive strength in eco-innovation. The increasing national and international demand for these technologies should guarantee successful dissemination and commercialisation.

Up-scaling the research and innovation effort on climate change will also yield significant returns in terms of regional development. Investments in new energy technologies, in particular, and their

commercialisation and deployment will create new employment opportunities across the occupational spectrum. Even if estimates differ significantly, there are clear empirical predictions that jobs related to renewable energy and energy efficiency will increase to several millions worldwide by 2030, most of these new jobs concentrated in a handful of innovative regions (Ditlev and Kammen, 2009; Kamal-Chaoui and Robert, 2009).

Achievements

Research and innovation to curb climate change are increasingly recognised by the Victorian government as an imperative. The “*2008 Innovation: Victoria’s Future*” positions sustainability and climate change as top priorities for the innovation agenda of the Victorian Government. A key commitment of the *Victorian Climate Change White Paper - The Action Plan* released in July 2010 is setting Victoria a target to reduce emissions by at least 20% by 2020 compared to 2000 levels (State of Victoria 2009). The “*Energy Technology Innovation Strategy*” is funding large scale sustainable energy and Carbon Capture Storage (CCS) demonstration projects. Universities have responded to this call for new ideas and new solutions by scaling up their efforts in the area of environmental research, although only seldom through collaborative agreements involving other universities or state departments.

The region of Melbourne has already achieved an international strength in environmental innovation, being one of the top ten innovating regions for solar and hydropower technologies, as measured by registered patents (see Table 3.1). In these two technologies, however, the number of registered patents is lower than the one of the closest benchmark in Australia, Sydney. The innovation output, measured as patented inventions over a large spectrum of green technologies, was fairly stable on a moderate level up to 2000, then shifting to a relatively high level in 2001 (see Figure 3.1).

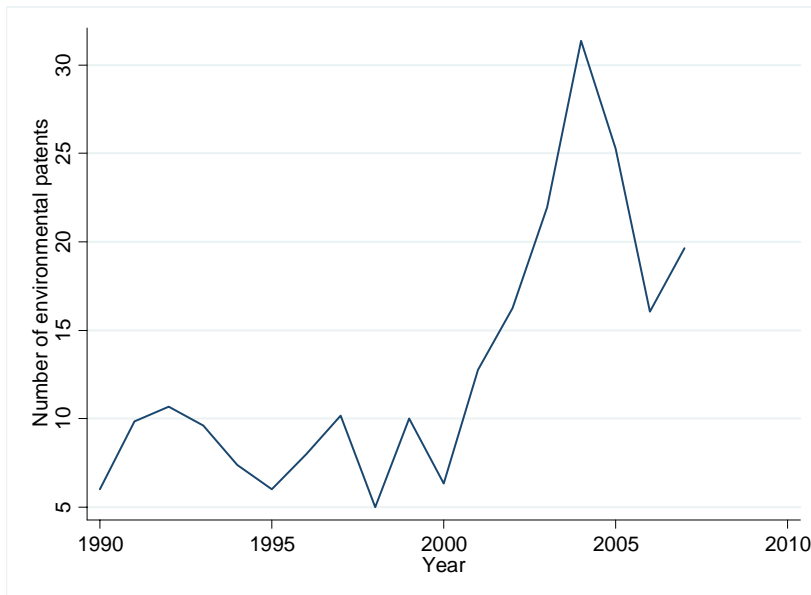
Table 3.1. Patented innovation in key environmental technologies

Technology	Region	Patents
Wind	Ost-Friesland (DE)	340
	Los Angeles-Long Beach-Riverside (US)	129
	Tokyo (JP)	81
	Navarra (ES)	81
	Berlin (DE)	64
	Schleswig-Holstein Mitte (DE)	58
	Osaka (JP)	58
	Seoul (KR)	49
	Fyns amt (DE)	47
	San Jose-San Francisco-Oakland (US)	43
Solar	San Jose-San Francisco-Oakland (US)	323
	Los Angeles-Long Beach-Riverside (US)	191
	Tokyo (JP)	151
	Boston-Worcester-Manchester (US)	148
	Detroit-Warren-Flint (US)	141
	Sydney (AU)	139
	Munchen (DE)	137
	Washington-Baltimore-N.Virginia (US)	129
	Melbourne (AU)	94
	Kyoto (JP)	87
Hydropower	Ostwuerttemberg (DE)	28
	New York-Newark-Bridgeport (US)	28
	Isère (FR)	22
	Los Angeles-Long Beach-Riverside (US)	22
	Sydney (AU)	19
	Linz-Wels (AT)	18
	Rogaland (NO)	18
	Melbourne (AU)	16
	Philadelphia-Camden-Vineland (US)	16
	Osaka (JP)	15
Geothermal	Aichi (JP)	21
	Los Angeles-Long Beach-Riverside (US)	19
	Stuttgart (GE)	14
	Houston-Baytown-Huntsville (US)	14
	Atlanta-Sandy Springs-Gainesville (US)	13
	Aachen (DE)	13
	Zug (CH)	12
	Hamburg (DE)	10
	Industrieregion Mittelfranken (DE)	10
	Greater Vancouver (CA)	10

Table 3.1. Patented innovation in key environmental technologies (continued)

Biomass	Oxfordshire (UK)	148
	New York-Newark-Bridgeport (US)	142
	Cleveland-Akron-Elyria (US)	135
	San Jose-San Francisco-Oakland (US)	128
	Cheshire (UK)	62
	Rheinpfalz (DE)	53
	Houston-Baytown-Huntsville (US)	50
	Philadelphia-Camden-Vineland (US)	41
	Unterer Neckar (DE)	30
	Berkshire (UK)	29

Source: own calculations with the OECD RegPat dataset. Counts of patents are weighted according to the methodology described in OECD (2008), The OECD REGPAT Database: A Presentation OECD STI Working Paper, OECD, Paris.

Figure 3.1. Registered environmental patents in the region of Melbourne

Source: Calculations by Mario Piacentini with the OECD RegPat dataset. Counts of patents are weighted according to the methodology described in OECD (2008d), The OECD REGPAT Database: A Presentation OECD STI Working Paper, OECD, Paris. The environmental technologies included in the count are those identified in Johnstone *et al.* (2008)

A relevant achievement is the comprehensiveness of the research agenda on sustainability, involving scholars from many different departments. Important contributions are emerging from non-science and engineering faculties, like design, agronomic and social sciences. This reflects an understanding that process, organisational and behavioural changes are as important as technological improvements. The environmental effectiveness of energy-saving technologies will depend on how fast firms and people learn to appreciate their added value. It is thus of critical importance to account for what drives the demand for low-carbon goods and what are the main constraints contributing to the slow adoption of new technologies.

Multi-disciplinary teams in different universities are pushing forward the sustainability agenda both in Melbourne and in Regional Victoria. The Centre of Design of the RMIT University is a good model of integration of different skills to pursue industry-linked sustainability research. The staff of the centre have increased in the last years not only in number but also in diversity, hiring experts in cultural and behavioural change as well as in environmental education. According to the centre's director, this strategic choice has increased the relevance of the research work in terms of local environmental problems, such as the sustainable development of Melbourne's suburbs. Moreover, it has helped the centre bridge the gap between advanced research on materials and the end-users, in particular small industries in the construction sector. Among the different researches pursued at the centre, the centre's Sustainable Built Environment Programme aims to reduce the environmental impact of the built environment through development of tools, strategies, advisory services and professional development courses.

Furthermore, there have been relevant efforts to raise the visibility of the research on climate change through better communication. For example, an important outcome has been the creation of the Victorian Eco-Innovation Lab (VEIL), which provides an effective forum where researchers and policy makers can make the point on achievements and identify trajectories for future development. VEIL is an important opportunity to bring research outside the university labs. This process can simplify the search for unexplored applications, open possibilities of collaboration and funding, and enable a better understanding of how the new technologies respond to local demand (see Box 3.1).

Box 3.1. The Victorian Eco-Innovation Lab and the Eco-city of the future

The Victorian Eco-Innovation Lab (VEIL) seeks to identify and promote emerging technical and social innovations that could form part of future sustainable systems. VEIL also creates conditions to explore emerging ideas and stimulate new ones. Among the innovative ideas that VEIL is bringing forward is the idea of building a new model of sustainable city (the Eco-city), in last remaining vacant land available for development in Melbourne’s Central Business District (CBD), known as E-Gate.

This vision of development focuses on new sustainable systems (infrastructure, lifestyles, behaviour, enabling technologies) with an overall aim to demonstrate models for a “super-low” consumption community, suited to a zero carbon future. Furthermore, the aim is to address homelessness with the development of integrated and sustainable living systems. The site is intended to be highly productive (energy, water, food, new business), adding value to the existing city and suited to people who desire to be part of a unique high-density residential and working precinct. The premises for a “green industry incubator” are already set, with twelve new potential businesses currently located in the Eco-city space, most of them set up by recent graduates with great entrepreneurial ideas.

VEIL was established by the Victorian Government through the Victorian Sustainability Fund as part of the government’s Sustainability Action Statement. VEIL was first a project of the Australian Centre for Science, Innovation and Society at the University of Melbourne. It is now a project that brings together the University of Melbourne (Faculty of Design), Monash University (School of Design) and RMIT (School of Architecture and Design). Collaborating research groups include Swinburne University (Faculty of Design) and La Trobe University (Centre for Sustainable Regional Communities).

Source: VEIL, 2010

In recent years, there has been an increase in research programmes on environmental solutions promoted in partnerships by different universities, despite the pressures from a very competitive funding system. Collaboration among universities increases the critical mass, allows shared use of research equipment, and efficiently pool the risk of pursuing uncertain research programmes. These collaborations tend to emerge around research areas of immediate relevance for the local environment. For example, a recent research partnership between the

University of Melbourne, Monash University and other partners is studying how Australian cities can become “water supply catchments”, harnessing the potential of storm water to overcome water shortages (LGA, 2010). The collaboration between Monash University and the University of Melbourne on water management issue has now strong roots, also thanks to the positive experience of the “Uniwater Partnership”. The Uniwater research partnership was initiated through an initial funding of AUD 1 million by both universities, and has produced research on water problems of two geographic locations, Melbourne and the Goulburn Valley, Victoria’s food bowl and part of the Goulburn Murray river system.¹

Universities in Victoria increasingly realise that the market for environmental technologies is growing fast, opening important commercialisation opportunities. Deloitte’s 2009 survey on Global Trends in Venture Capital reports that, despite the global and economic financial crisis, 63% of surveyed venture capitalists anticipate an increase in their investment in clean-tech, the highest percentage among all sectors considered (Aghion, *et al.* 2009). Collaboration with industries clearly enables a smoother transition between development and production of environmental technologies. Frontier laboratory investigation in storm-water treatment at Monash University delivered “Enviss”, one of the most efficient technologies of porous pavement to capture storm-water. The first positive results of the research project lead to AUD 1.2 million of investments from industry. After successful trials in two sites in Melbourne, the Enviss technology is now being commercialised in Australia and abroad by a newly established firm in Bendigo (Enviss, 2010). Another relevant partnership is the one joining Swinburne University of Technology with Suntech to develop the next generation of solar cells. Swinburne and Suntech are each contributing AUD 3 million to the joint project, which is expected to deliver solutions to gather solar energy across a wider colour range, doubling the efficiency of current solar cells (SUT, 2009a).

One crucial area of research for sustainable growth of Victoria relates to food systems. University research on sustainable food systems in Victoria is advancing at a fast pace, with a fairly comprehensive agenda. The main areas of progress have been: *i*) lifecycle analysis of key food products (particularly around greenhouse emissions and water), enabling measures to correct market failure and support modelling of the impacts of policy interventions throughout the food system; *ii*) measurement of the actual effectiveness of innovations and existing known agricultural

techniques in different climate conditions, *iii*) collection and processing of information on ecosystems, especially the quality and condition of soils (VEIL, 2009). This research is highly relevant as there might be severe inconsistencies between the carbon-emission reduction goals and the current path of food production for internal consumption and exports (*e.g.* in the emission-intensive dairy sector).² Foot-print assessments and technological improvements can help smooth these inconsistencies and avoid the need for painful structural “corrections”, in regional Victoria in particular (see also Chapter 1).

Main challenges

Despite these positive developments, a number of constraints undermine the effectiveness of university research and innovation for climate change. The review identified the following main constraints:

- The absence of a structured dialogue over research priorities.
- Highly competitive and centralised funding systems undermining information sharing and collaborations among universities.
- Missing incentives for firm-university collaboration, low demand for services of tertiary education institutions by firms and a lack of cluster dynamics.
- Limited engagement of universities in environmental and vulnerability assessments.
- Limited efforts to attract talents through international recruiting.
- Modest effort to test and attract investments for renewable energy technologies in the regional Victoria

Fostering systematic dialogue on research priorities is probably the most important issue to address. Human and infrastructural capital for boosting research and innovations for climate change are already present. What is missing is a sense of direction about which technological improvements would be more important for Victoria. On the side of the Victorian Government, there is probably an excessive scepticism over the possibilities of influencing the focus of university research. On the side of universities, collaboration with the government over the definition of the research and innovation agenda is still under-valued, and fears of interference are strong.

Victorian universities would need strategic indications of priority areas for technological advancements to tackle regional climate issues. In several instances, the review team was informed that universities had no clear guidelines to follow if they wanted to pursue more research on environmental problems. For example, they would be eager to invest relatively more resources in the renewable energy technology most suited to the regional context (solar, wind or geothermal), if they could be helped to select the right one. The choice of research priorities is thus left only to the tastes and sensitivity of individual researchers. This generates possible inefficiencies – mainly caused by duplications in research programmes – and reduces the potential impact of university research to solve local problems.

The Victorian Climate Change Green Paper is a possible entry point for greater engagement of tertiary education institutions in informing the innovation strategy for climate change of the Victorian government. In the implementation of a *White Paper on Climate Change*, the Government of Victoria could look at international models of strategic policy making successfully integrating the contribution from tertiary education institutions, industry and civil society. One such model is the “transition management approach” adopted by the government of the Netherlands in order to address the uncertainty and complexity of environmental problems and the interdependence of related policies. This approach sets a long-term vision, which constitutes a framework for formulating future policy objectives and transitional pathways. Interim targets and short-term policies are derived by back-casting from the long-term objectives (see Box 3.2).

Box 3.2. HEI and the strategic "transition management" in the Netherlands

The Energy Transition Programme first identified seven priority themes (bio-based raw materials, sustainable mobility, chain efficiency, new gas, sustainable electricity, energy in the built environment, and “greenhouse as energy source”) for the transition to a sustainable energy system, based on a multi-stakeholder consultation process and scenario studies. For each theme, representatives from industry, academia, non-governmental organisations and the government worked together and proposed several paths and experiments.

The Energy Transition Task Force, consisting of leading stakeholders, has been working to identify favourable opportunities and specify what needs to be done by the government, by the universities and the other partners to exploit them. Some of the selected transition experiments are currently under way. The transition management approach is expected to enable the government to organise its policy around a cluster of options, without choosing specific solutions, while giving an overall policy direction to the market. It also provides opportunities for the government to facilitate networks and coalitions among actors in the transition paths as well as to build mutual trust with stakeholders by sharing common goals.

Source: OECD (2010), *Eco-Innovation in Industry: Enabling Green Growth*, OECD Green Growth Strategy, OECD, Paris.

The Victorian Government has been increasingly financing collaborative research projects which can have a relevant impact on climate change. Under the new *Jobs for the Future Economy: Victoria's Action Plan for Green Jobs*, AUD12 million are invested in seven new research and industry partnership projects that will support 56 high-skill green jobs (State of Victoria 2010a). These new public investments can rely on solid verification mechanisms, such as the investment funds of the Victoria's Science Agenda. As the selection of projects in these new areas requires substantial expertise, competencies of the Premier's Climate Change Reference Group could be expanded to provide peer expert advice on the funding allocation.

Universities should see the Victorian Government as a potential partner in their interactions with the government of Australia. The Australian innovation strategy is moving towards a greater empowerment of the state governments. The Victorian Government is

likely to get more voice over the definition of priority areas and in the design of programmes and mechanisms to stimulate universities' research and engagement with industries. Proposals that are developed in partnership between universities and the state government are more likely to be heard at the federal level, ultimately impacting also availability of funding for research from the Australian government.

Universities in Victoria should seek greater federal support for their efforts in eco-innovation within the compact agreements. A specific section of the compacts could be dedicated to climate change and sustainability research. The “social” value of universities' research for the environment should be properly recognised and funded by the federal government under the new compact agreements.

A delicate issue is how to provide good incentives for joint research among universities within a funding framework emphasising competition. On the one hand, while international collaborations are now much easier to implement, proximity is still a source of important economies, in particular in capital-intensive research. On the other hand, competition might be more severe between closely located competitors, especially if the funding system is demand-based. As the *Review of the Cooperative Research Centres Programme* (Commonwealth of Australia, 2009a) emphasises, collaboration among research institutions should not be viewed as a goal in itself but as an instrument to achieve research or development objectives.

The greater availability of funding for major research programmes on climate change should lead to an automatic response in terms of more inter-university joint-research agreements. Rather than complex governance structures, there is a need for more space and opportunity of exchanges among individual researchers. This exchange should be carefully organised, though, and it could focus on specific fields where complementarities between individual researches can be more easily identified. The Victorian Eco-Innovation Lab can be the “sheltered environment” where these cross-fertilisations can take place (see Box 3.1).

Another great challenge is how to properly facilitate industry-university collaboration for emission reductions at the firm/facility level. The review team could not find evidence of a strong engagement by universities in this crucial aspect of climate change mitigation. An ABS 2005 study found that Australian firms “*which do collaborate typically collaborate with other firms and not with research organisations or governments*” (Cutler & Company Pty Ltd, 2008). Several reasons for this absence of systemic co-operation between

firms and public research institutions were advanced during the review visits. Both universities and representative of business associations agreed that the absence of a culture of co-operation (“they do not speak our language”) is the major obstacle.

In order to curb emissions in the long run, it is not sufficient to raise the amount of industry-university co-operation. Universities should engage more in supporting clean industries. In the total absence of public measures to “direct” university-industry collaboration, there is the risk that the main beneficiaries of technical services from universities will be the large enterprises using carbon-intensive technologies. These are relatively large firms that can afford financing costly university research and problem solving services. While innovation in highly carbon-intensive technologies might lead to substantial gains in terms of emission reductions, innovation that “builds on the shoulders of giants” might delay the market penetration of immature “backstop technologies” – those that are zero-emission and not dependent on constrained resources. As shown by Acemoglu *et al.* (2009) delaying intervention not only leads to further deterioration of the environment, it allows dirty innovation to continue to outpace clean innovation, widening the gap between dirty and clean technology.

What incentives can lead universities to engage more with industries, and with small and medium-sized enterprises (SMEs) in particular, in the clean energy sector? A large majority of manufacturers in the Victorian supply chain are SMEs, and they are generally much less likely to embark on environmental improvement programmes than larger companies³ (Zutshi and Sohal, 2004). Many have not established indicator systems owing to a lack of resources such as finance, personnel, time and technical knowledge as well as motivation and awareness. So the dilemma is how to translate this higher demand for services from tertiary education institutions, given current resource constraints. As suggested in the Cutler review, targeted innovation vouchers might be helpful. An innovation voucher can enable new SMEs in green industries to collaborate with the research community by submitting research questions to them. These vouchers can be effective at promoting the transfer of knowledge between the research and the business community, and also speed the pathway to commercialisation of experimental research in climate change.

In fostering the growth of new green industries, Victoria might learn from the positive experience of the Knowledge Transfer Networks (KTNs) in the United Kingdom. KTNs are generally set up

and funded jointly by government, industry and academia (OECD, 2010). They bring together diverse organisations and provide activities and initiatives that promote the exchange of knowledge and the stimulation of innovation. KTNs in the field of eco-innovation have been initiated by regional development agencies in the UK. A major review of the KTNs in the UK showed that 75% of business respondents rated KTN services as effective; 50% developed new R&D and commercial relationships with people met through these networks; and 25% made a change to their innovative activities as a result of their engagement within KTN (OECD, 2010). Models of cluster policies developed in Finland, France, Japan or South Korea should also be considered (see Box 3.3).

Box 3.3. Eco-Innovation Clusters

Much of the eco-innovation is concentrated in space and occurs in “green clusters”. Clusters mobilise specialised knowledge and resources and organise them in a functioning system. Within the cluster, proximity and complementarities generate the critical mass to sustain industrial development in novel and risky fields. Commercially successful regional poles in bio or nano-technology show that each cluster has a distinctive genesis process which is deeply rooted on local industrial histories or scientific and technical leaderships. It is thus hard to design effective policy packages that can replicate ex-novo the most effective innovation ecosystems. However, public policy can accelerate their development, by directed R&D, enabling infrastructure, and institutional platforms for collaboration. Clusters specialised in eco-innovation are not yet common as in other industries, despite very promising market commercialisation opportunities (Cooke, forthcoming).

Some relevant examples can however be identified. The Lahti Cleantech cluster in **Finland** encouraged innovation and development of environmental technologies by bringing together small and large enterprises, educational organisations and regional authorities. As a result, 170 new jobs have been created, 20 new clean-tech companies have set up in the Lahti region and the project has attracted more than EUR 30 million in total investment⁴ (Kamal-Chaoui and Robert, 2009).

In the Rhône-Alpes Region of France, regional and national investments in R&D were instrumental to the development of the Tenerrdis competitiveness cluster, which is promoting scientific collaboration to develop clean technologies applied to construction, transport and energy production. Tenerrdis brings together 185 stakeholders, who developed, between 2005 and 2008, altogether 226 R&D projects, for a total of EUR 440 million of investments, of which EUR 200 million came from public funding.

Source: Kamal-Chaoui, L. and A. Robert (eds.) (2009), “Competitive Cities and Climate Change”, *Regional Development Working Papers*, 2009/2, OECD, Paris.

The analytical capacities of universities in Victoria could support the state in its efforts to monitor progresses in reducing carbon emissions and evaluate green investment programmes. Better synergies can be found in the production and analysis of environmentally-related data between university research programmes and policymakers in Victoria. The Victorian Community Indicators Project (VCIP) is a good model of collaborative and engaged data collection effort that could be replicated (or up-scaled) to include indicators of exposures to climate change risk (see Chapter 4, Box 4.2). The Geelong Region Alliance has launched a project for the creation of a Regional Data Centre with the support of Deakin University (GRA, 2009). The new Data Center will integrate demographic, social, economic and geographic (GIS) data for the region. This project could support the monitoring of the environmental effects of the large infrastructural investments foreseen in the Geelong region (Hailes Road Industrial Estate and the international terminal of the Avalon Airport, see Geelong Region Alliance, 2009). Specific investments would be needed to develop a complete environmental module for the Data Centers, with proper indicators. One relevant international example is the Purdue Climate Change Research Center,⁵ which has been combining climatic and socio-economic indicators to study economic implications of changes in regional climates, and how they are distributed across space, time and economic strata.

Given that energy and environmental technologies are increasingly competitive research fields, universities in Victoria need to raise fast their research capacities. More effort to attract talents in the job market for PhD and junior researchers can strengthen their competitive position in energy and environmental sciences. Graduate education in top universities in China (Tsinghua or Peking Universities) and in India (the Indian Institutes of Technology) has already reached level of excellence in several fields of applied science that are of relevance for climate change research. These universities are large pools of talents that Victorian Institutions could manage to attract through a more active recruiting policy on international job markets for junior researchers. Beside the traditional top universities in the United States, new competitors are getting stronger in the run for these talents (*e.g.* the National University of Singapore, see Poh-Kam Wong *et al.*, 2007).

There is limited evidence of experimentation and deployment of renewable energy technologies in rural Victoria. Renewable energy might be a new development pathway for rural areas of Victoria, and

integrate the policy package for regional development. According to the Victoria's Future Energy Statement notes that there is wide spread deployment of wind, solar PV, some biomass and bio-fuels, and research and demonstration on a wide range of other technologies (State of Victoria 2010b). Venture capital investments in renewable energies are large and increasing. In perspective, installation of renewable energy facilities could provide an opportunity of re-employment of laid-off workers. The effects on employment in regional Victoria are likely to be relevant, since jobs in installing, operating, and maintaining renewable energy systems tend to be local in nature. Moreover, the investment in skills to sustain renewable energy production is likely to raise the overall level of human capital and reduce pressures for out-migration of the young.

Do universities and research institutes matter for the growth of the renewable industry in regional Victoria? International experience shows that they can have a very important role. The competences in wind engineering and wind energy at the *Danish Technological Institute* and at Ålborg and Århus Universities have been essential for the development of the Danish wind energy industry (Cooke, forthcoming). Similarly, patented research on improved pasture seed mixes (SugarGrass) at the Institute for Grassland & Environmental Research (IGER) gave rise to a dynamic bio-fuel cluster in the rural North Wales. Bavaria, heavily dependent on agriculture in the early twentieth century, has now become Germany's leading state for photovoltaic technology, partly thanks to the collaborative efforts of the Max-Planck-Institute and the National Research Centre for Environment and Health (GSF), operating under the umbrella of the Bavarian Energy Technology Cluster initiative.

The European Nordic countries have been among the forerunners in the greening of industry. Their experience show that a state like Victoria can undergo fundamental transformation processes in their energy systems with large social gains and within a relatively short period of time (see Box 3.4).

Box 3.4. Green innovation in the Nordic energy industry

Green innovation in Nordic energy industries has achieved impressive results with development of new and more efficient windmills incorporated in the electricity system; with development and improvement of combined heat and power (CHP)-technology; and with new types of bio-fuel-feedstock. A striking feature of these innovation and diffusion successes has been the diversity and complexity in institutional and commercial settings and the variation in trajectories under which they have taken place.

The Danish wind power and bio-industry, The Finnish bio-energy industry and Swedish bio-energy industry have all substantially increased their market shares in the 1990s becoming primary suppliers of municipal energy systems. The sequencing of the innovation and distribution indicates that the success of the innovative technology arises as the function of a sequential interplay between several arenas, where products generated in one arena (such as industrial CHP) is further developed and modified for another arena (municipal CHP) and entails externalities (technology development and supply-industry) which generates value in a third arena (international markets for advanced systems). Successful innovation, in this perspective, is conditioned on a sequence of public and private initiatives where complementary societal needs and markets work together to extract the full value of the innovation initiative.

Source: Midttun, A. and A.L. Koefoed (2007), “Green Innovation in Nordic Energy Industry: Systemic Contexts and Dynamic Trajectories” in M. Weber and J. Hemmelskamp (eds.), *Towards Environmental Innovation Systems*, Springer, Berlin.

3.2 Skill creation for green jobs

The development of a dynamic, greener economy in Victoria will be crucially dependent on the availability of skilled and trained people to fill the new jobs. Extensive retraining will be necessary, as there will be significant changes in the profiles, tasks and work methods assigned to workers in traditional occupations (*e.g.* plumbers, electricians, metal workers and construction workers). Skill creation for the new “green jobs” can be more efficiently organised by pooling learning resources of education institutions and industries at the regional level. As business needs evolve during the green transition, demands are placed on VET institutions and training systems to adapt. The rising demand for low-carbon products will require the

simultaneous development of very diverse skills. For example, demand for low emission residential estates will require developers knowing the building materials with low-embedded energy use, engineers and designers able to embed energy efficient products in the building, manual workers with the technical capability to install and maintain these products, and salespeople able to promote such estates in the market (New South Wales Government, 2007).

As the climate change risks and the growth opportunities are better identified at the local level, so eventual skill shortages can only be defined and addressed through a local perspective. The essential challenge will be to anticipate what the employment effects and labour reallocation across industries will imply in terms of future skill needs and possible absorption of laid-off workers. According to the *Jobs for the Future Economy – Victoria’s Action Plan for Green Jobs statement* (State of Victoria 2010a), a Green Skills Taskforce will be established through the Victorian Skills Commission to provide strategic advice on Victoria’s green skills and training needs. The Taskforce, informed by Victorian Industry Training Advisory Bodies, will audit green jobs and skills needs and advice on the capacity of the Victorian training sector to address these needs.

Creating high quality human capital is critical for raising the chances of wider market penetration of renewable energy and low carbon technologies. Inadequate skills and poor quality systems might in fact limit the growth of renewable energy technologies by affecting market reputation. As emphasised by Lund *et al.* (2000):

The failure of renewable energy systems to live up to users expectations can lead to an ingrained mistrust of renewable energy technologies and diminish their competitiveness in a competitive energy market place. For renewable energy to gain and maintain a substantial and secure foothold in the energy supply market place there is a need for high quality, practical, flexible renewable energy training of engineers, architects, technicians, trades people, builders, salespeople and the users themselves.

Achievements

The Victorian Government has recently taken concrete steps to identify and remedy possible skill shortages in climate-change related professions. The “*Jobs for the Future Economy, Victoria’s Action Plan for Green Jobs statement*” shows a high level of political commitment.

The action plan lists 18 actions covering: more jobs in the construction and energy sectors, developing sustainability skills, driving low emissions industry growth and promoting innovation. The commitment of the Victorian Government is also made evident by some specific initiatives undertaken in collaboration with HEIs. For example, the government initiated a partnership with Swinburne University to establish the first Australian training course for the retrofitting of conventional vehicles to battery electric vehicles and for subsequent vehicle servicing and maintenance (Victoria's Action Plan for Green Jobs, page 31).

The importance of anticipating future skill needs is also recognised in another policy initiative of the Victorian Government: "Securing Jobs for your future: Skills for Victoria". This skill strategy indicates a clear pathway for improving information on new employment opportunities, raising competition in the delivery of training, and strengthening capacity and quality of vocational education and other training providers. The strategy focuses on supporting TAFE providers, which can play a very important role in helping industries with re-training. The Victorian Government is also targeting specific needs of the SMEs that might lack internal capacity to provide training on the workplace, through "*Skill for Growth – Workforce Development Program*" and "*Jobs for the Future Economy: Victoria's Action Plan for Green Jobs*"

Several universities and TAFE institutes are becoming specialised providers of education and training in sustainability and climate-change related fields. Swinburne University has recently released a sustainability strategy, strengthening its commitment for sustainable development of Victoria. Among the targets of the strategy is to "*ensure that the design, delivery and promotion of all tertiary education programmes develop appropriate discipline-specific expertise, skills and attributes in our graduate that assist them to contribute to a sustainable future, within the context of their particular professions*" (SUT, 2009b).

The Center of Design at RMIT is training private consultants in "Life Cycle Assessment (LCA)", an internationally recognised approach to evaluating the potential environmental impacts of products and services.

TAFE institutes have a central responsibility in ensuring training that is responsive to the changing needs, in collaboration with industry and professional bodies. The development of training infrastructure in renewable energy is relatively new but adequate training resources and

training packages now exist across most areas. The Box-Hill Institute of TAFE, in particular, received funding from the Government of Australia to develop a skills hub. The Box-Hill TAFE also recently introduced a Vocational Graduate Certificate in ICT Sustainability, teaching IT graduates how to implement sustainable IT initiatives.

Green campus initiatives are not only improving the environmental performance of the tertiary education institutions, but are also important opportunities for their staff and students to experiment sustainability techniques and tools. An increasing number of projects in Victorian TAFE institutes are transforming the campus infrastructures and providing spaces for effective learning-by-simulation (see Table 3.2). The competencies created within these new centres are wide, ranging from water harvesting and re-use, refurbishing of intelligent buildings, green plumbing and others.

Table 3.2. Commonwealth-financed sustainability learning projects

Applicant	Project summary	Funding (AUD)
Swinburne University (TAFE Division)	The Flexible Green Trades Complex (FGTC) project at Croydon consists of three integrated projects. The FGTC project consists of three integrated projects: <ul style="list-style-type: none"> • Green Trades Building • Green Plumbing Tower • Refurbishment of the existing building to provide blended learning spaces 	9 958 980
Northern Melbourne Institute of TAFE	A 5-star green energy rated open framed building in Epping with a mezzanine floor incorporating specialised low carbon sustainable technologies supporting practical and classroom facilities. The facility will provide learning models that support the delivery of knowledge and skills development in environmentally sustainable practices.	9 509 377
RMIT University (TAFE Division)	The refurbishment of level 5 of RMIT building 56 (Carlton) for enhanced green and sustainable skills training. Installing a renewable energy training facility on the roof of building 57(Carlton). Installation of interactive energy performance metering and interpretive equipment for building 55 (Carlton). Installation of a conditioned laboratory supporting Textiles, Clothing and Footwear (TCF) programmes on Building 512 on the Brunswick campus.	8 350 000
Chisholm Institute of TAFE	Construction of a new Centre for Sustainable Water Management at the Cranbourne Campus, inclusive of workshops and laboratories for water supply, treatment, distribution, environmental water management, production horticulture industries, support areas and amenities.	8 200 000

Table 3.2. Commonwealth-financed sustainability learning projects (continued)

Gordon Institute of TAFE	The project will enhance and extend the existing Constructing Futures Enterprise at East Geelong, which delivers programmes to equip students with practical and theoretical skills to meet all construction industry requirements.	7 800 000
Wodonga Institute of TAFE	To provide housing for a collaborative network focused upon skilling the Wodonga region to meet emerging industry needs driven by the Global Financial Crisis, and global warming and climate change. This forms a part of a larger initiative to create a learning commons in the CBD.	5 510 000
Central Gippsland Institute of TAFE	The refurbishment and construction project at Traralgon will enable versatility in total suites of course offerings by employing flexible delivery modes using cutting-edge technologies for a range of training programmes, including childcare, hospitality, business management and event management.	5 210 000
South West Institute of TAFE	Construction of a new training centre at the Institute's Portland campus and the extension of an existing building to meet the demand for Certificate III courses and above in the region.	4 950 000
University of Ballarat (TAFE Division)	The refurbishment and extension of the existing Primary Industries Training Facility at Wendouree, transforming the vacated Council works depot into a centre for environmental education and providing additional space for conservation and sustainability programmes.	2 980 000
Box Hill Institute of TAFE	The project, based at Box Hill, will refurbish existing internal training space, install a new rooftop solar energy generating system, a solar training facility, a new rainwater harvesting system and a green plumbing training facility.	2 736 544

Source: Extract from Australian Government Department of Education, Employment and Workplace relation
www.deewr.gov.au/Skills/Programs/Infrastructure/TLCF/Documents/TIIFTProjects61009.rtf

Another important achievement is the engagement of tertiary education institutions, and TAFE institutes in particular, for the sustainability pillar of the regional development plans. Both the Geelong Region Plan and the Gippsland Regional Plan put a strong emphasis on sustainable development, and set clear targets in terms of environmental improvements, sustainable land use and energy efficiency. Active participation of education institutions in these multi-agency “alliances” for local development can bridge important gaps between the supply of specialised education and the community demand for green jobs or environmental skills.

Main challenges

The main challenge in the domain of skill formation for “green” jobs is to successfully integrate the individual initiatives of tertiary education institutions with the many “green” training programmes pursued at the state and at the federal government level. As already emphasised, consultative mechanisms (invitation to individual submissions) are common practice in the strategy making of Australian Government. However, the possibility of going beyond this model should be considered, putting in place round-tables where information can be shared and conflicting demands assessed.

The reach of the training services for improving clean production management in Victoria can be improved through greater engagement of tertiary education institutions. Comprehensive training programmes could particularly help small and medium-sized enterprises (SMEs) in Victorian Government to adapt and grow. In a survey of SMEs in the Geelong region, Andrews *et al.* (2002) found that familiarity with cleaner production principles among businesses is low, although a more general awareness of the environmental and economic advantages of implementing CP-like change is fairly high, suggesting that there is fertile ground for further cleaner production educational initiatives. Despite the significant initiatives undertaken by the Victorian Government, more has to be done to raise levels of awareness and to convince these businesses of the potential benefits of cleaner production. Engaging tertiary education institutions and TAFE institutes in particular, within these programmes could also help these institutions to build more solid connections with businesses in the region.

Pooling information and resources is crucial for the identification of the new skill needs. Uncertainties around the market prospects of the new green industries are deep, and TAFE institutes cannot afford to undertake complex market analysis to adjust their curricula. Introducing new courses and certificates is a risk in particular for smaller TAFE institutes in regional Victoria, as the inability to meet class size benchmarks has significant budget implications.

The development of the skills base for “green” growth in Victoria can be accelerated if clearer signals are sent to the market by the federal and state governments. In the absence of clear policy messages to the industries (*e.g.* carbon pricing, adjustments in industrial policies), firms might lack the incentives to introduce sustainable management practices and monitoring, thus reducing the demand for specialised “green workers”. Wind farms in Australia were almost

entirely sourced from overseas, as this was a less risky strategy that on-the-firm training in a context of great uncertainty over future revenues. Similarly, contractors installing photovoltaic systems, burnt by previous policy swings, work long hours to cope with orders instead of engaging or training more local labour because they cannot develop expectation of an on-going stream of work (Briggs, *et al.*, 2008).

Box 3.5. A partnership for green manufacturing certification in Indiana, US

To help pave the way for those with specialised manufacturing skills looking to add sustainability to their body of knowledge, the Society of Manufacturing Engineers in Indiana is collaborating with Purdue University's Technical Assistance Program (TAP) to develop the Green Manufacturing Specialist Certificate.

The Purdue University's Technical Assistance Program (TAP) curriculum focuses on such topics as sustainable manufacturing, energy efficiency, water conservation, reuse and recycling, designing for the environment, and how different pollutants affect the environment. The program came together as part of a US Department of Labor funded programme in North Central Indiana.

“Our goal was to provide training that would help people become more effective in their existing jobs or help them transition to jobs with new companies in emerging green industries,” says Ethan Rogers, manager energy efficiency services, Purdue University TAP. While there are other green programmes available, *“no other program offers validation that a student has a comprehensive understanding of the many topics that comprise sustainable manufacturing. This is valuable to potential employers and by extension to students.”*

This partnership includes the Society of Manufacturing Engineers developing an accompanying exam or outcome-based assessment, which will be tested by participants in the Purdue TAP green workforce-training programme. Upon successful testing in Indiana, the Society of Manufacturing Engineers will offer the exam nationwide.

Source: Purdue University, (2010), “Energy Efficiency & Sustainability”, Manufacturing Extension Partnership website, www.mep.purdue.edu/prod_services/energy, accessed 25 March 2010.

It will be important to monitor how TAFE institutes will face the competition of new entrants in a liberalised market for training. As in many occupations (plumbers, installers of residential photovoltaic systems) only minor re-training will be needed, private vocational institutions might be better suited to respond to industry's demand. While the liberalisation process can be effective in keeping training prices low, several TAFE institutes raised the issue of possible "unfair competition" lowering the quality of the offered courses.

As already stated, the opportunities from the development of supply capacity in renewable energies are relatively greater in regional Victoria with respect to densely populated areas. Rural areas in Victoria are however experiencing out-flows of young and entrepreneurial individuals, those more likely to start a business in relatively risky fields. The debate over regional loading and other specific support for regional university campuses should acknowledge the important role these education institutions can play in bringing rural areas at the core of the energy transition. TAFE institutes and regional university campuses, in turn, could engage more in providing specialised services for companies investing in renewable energies in rural Victoria. Such services could include technical support to apply to specific national funds, such as the Renewable Energy Equity Fund (REEF).

Conclusions and recommendations

Addressing the challenge of climate change will require a broad set of instruments. Market-based mechanisms such as cap and trade systems, carbon taxes, or both, should be key elements of the policy mix to help build a global carbon market (OECD, 2009). These instruments will need to be complemented by removal of subsidies to fossil fuel energy and reallocation of the financial resources into increased investment in clean energy R&D and into new training programmes. Universities can make a difference as relevant economic actors in the regional economies, generators of innovations, producers of new skills, forums for information exchanges and behavioural changes both at an international and a community level.

Tertiary education institutions in Victoria have taken a number of commendable initiatives to fight climate change and support new paths of sustainable development in the state. However, this effort has so far been too fragmented and disconnected from the climate change strategies developed at the state and national. The state government

and tertiary education institutions of Victoria could champion new modes of collaboration for:

- The establishment of clear environmental targets.
- The definition of priority areas of research and innovation in cleaner technologies.
- Spatial-based assessments of eco-systems and industrial/agricultural production.
- Flexible, demand-based strategy making for new skill development and retraining.

In any of these areas of intervention, the Victorian Government and the tertiary education institutions should try to include relevant partners from the civil society, business and worker organisations.

The OECD review team suggests that the efforts of the Victorian Government to foster sustainable development would be further enhanced if the following measures were implemented:

- The Australian and Victorian Governments should intensify their (thematic funding) support to multidisciplinary research focused on the most pressing environmental challenges faced by Victoria, i.e. sustainable development of the city of Melbourne, water management systems, sustainable food and agriculture, and renewable energy.
- The Victorian Government should seek active participation of tertiary education institutions in the definition of priority areas for research and skill development and their implementation. Strong interdepartmental co-operation at the state level is also needed for strategic policy making in the area of climate change. Exchanges between tertiary education institutions and the Victorian state departments can be organised as round-table meetings and could feed into the state-level policy making.
- The Victorian universities, the Victorian Government and the Australian Government should co-operate in the financing and implementation of collaborative market research programmes, aimed at identifying lead markets for technology development and reduce uncertainties in the innovation and skill development agenda.
- The Victorian universities should engage in the collection and analysis of environmental data for small-areas, with the

financial and technical support from the Victorian Government (in the release and processing of data). The most informative results for policy-making come from effectively merging geographic information system databases (GIS) with socio-economic data. The Community Indicators Project (VCIP) is a good model to follow. This work can be undertaken in conjunction with other awareness raising tools and media campaigns on sustainability (in partnership with “Sustainability Victoria”).

- The Victorian and Australian Governments should strengthen their support to the organisation of researchers in “reference networks”, such as the Eco-Innovation Lab, which can offset the fragmentation of the system and facilitate multi-disciplinary, inter-university research in the area of climate change.
- The Victorian Government should provide more incentives to link small and medium-sized enterprises (SMEs) with research and training institutions. Specific voucher schemes or small business innovation/technology transfer programmes could be designed to reduce the costs of carbon emission reductions in SMEs.
- The Australian and Victorian Governments should explore the possibility of replicating international good practices in linking different organisations – industry, academia, government, the third sector – with a focus on objectives of emission reductions. In particular, “Business Victoria” could consider innovating its Regional Innovation Clusters Program along the model of Knowledge Transfer Networks (KTN) developed in the United Kingdom.
- The Victorian universities should devote greater attention to the development of a highly qualified pool of human resources in climate change and sustainability research, with more active recruitment of international PhD and junior scholars.
- The Victorian Government should support economic feasibility analysis for production and delivery of renewable energy technologies in the rural Victoria. Regional universities and TAFE institutes should play a prominent role both in the feasibility analysis and in adapting to the demand for new skills.

- The Victorian Government should start promoting knowledge sharing on the experiences of community and social innovation for sustainability activated by the new Regional Plans. Universities with regional campuses could further engage to lead other “alliances” in the regional Victoria.

Notes

1. For more information on the Uniwater initiative, see www.uniwater.edu.au
2. The Garnaut Climate Change Review rightly emphasises the need of effective mitigation strategies for emissions related to agriculture and dairy production in particular. It also underlines how the research efforts to develop technologies to reduce emission related to biological processes have been so far relatively modest in Australia. ‘Effective use of the biological opportunities for reducing and sequestering emissions requires large commitments for public funding on research, development and commercialisation of new variations on old technologies, and on measurement of emissions changes.... yet our commitments to research in this area have been miniscule compared, for example, to our commitments in geo-sequestration of emissions from coal combustion (carbon capture and storage CCS)’ (from Garnaut, 2009)
3. A survey of a cross-section of SMEs in Australia shows that SMEs tend to consider environmental issues as a potential cost and not as a market opportunity. They also tend to take environmental measures only in response to threats of penalties by authorities and usually respond with “end-of-pipe” pollution control solutions (Zutshi and Sohal, 2004)
4. For more information on the Lahti and the other clean-tech clusters of Finland (Kuopio, Oulu, Uusimaa), see www.cleantechcluster.fi/en
5. For additional information on the Purdue Climate Change Research Center, see www.purdue.edu/climate

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Chapter 4: Capacity building for regional co-operation

This chapter will examine the current capacity and capacity building for state-wide and local co-operation in Victoria and its universities and TAFE institutes. It will highlight the systems and processes in light of the ongoing changes, and the efforts made by the Australian and Victorian governments and the institutions. It will examine where policies and practices can be improved and provide examples from other countries. The chapter will conclude with recommendations to help capacity building for regional and local engagement among the Victorian tertiary education sector.

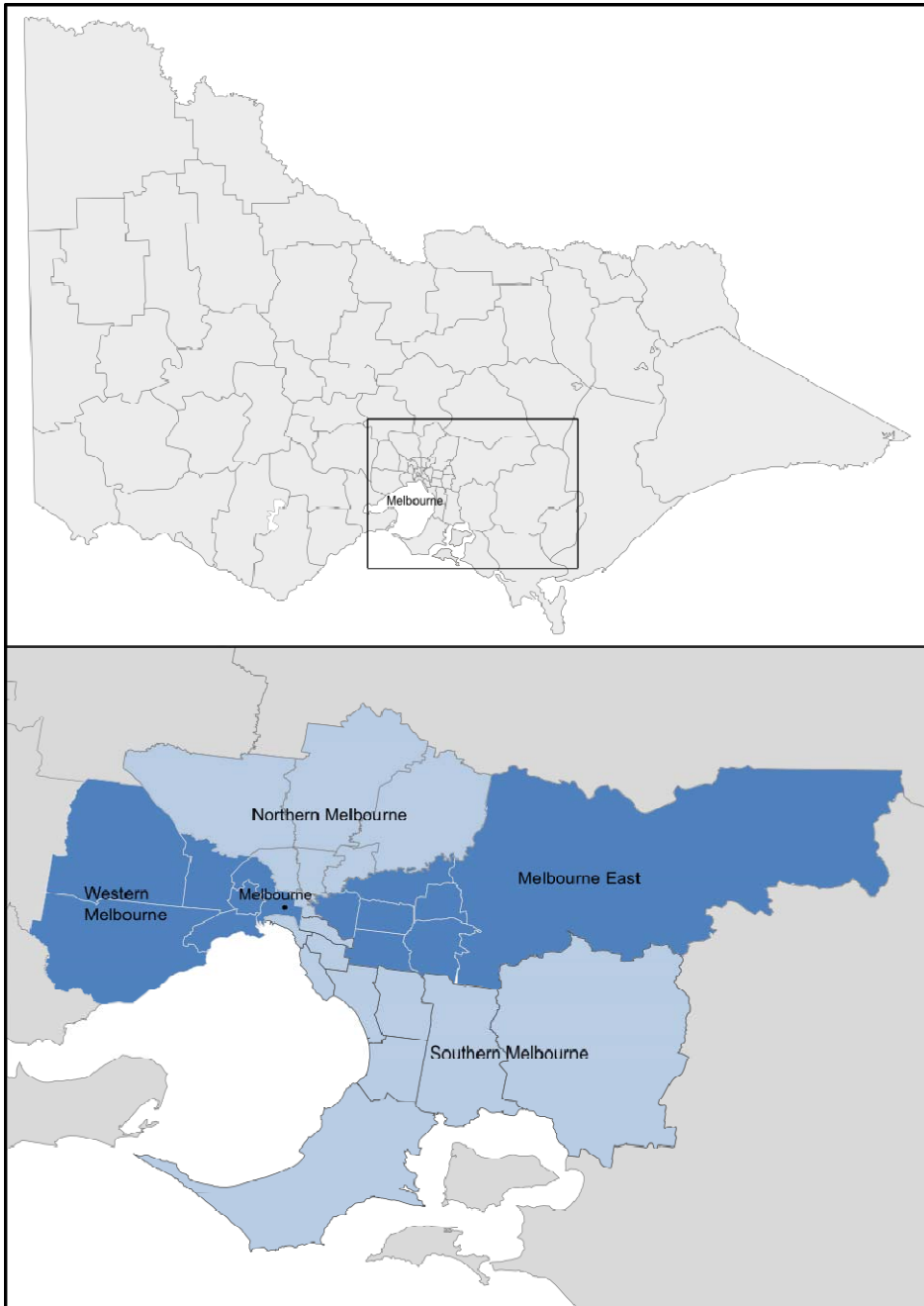
The key message of this chapter is that despite the efforts made by the Victorian Government and its tertiary education institutions, there is room for improvement to provide stronger engagement and a more efficient tertiary education system. Progress can be made through four major actions: encouraging stronger involvement of universities and TAFE institutes in the ongoing regional planning process; establishing a permanent forum bringing together the Victorian Government, its tertiary education institutions and key stakeholders; improving the incentives for state-wide and local engagement of tertiary education institutions; and reducing their perceived accountability burden.

Introduction

The *2008 Review of Australian Tertiary Education* (Bradley *et al.*, 2008) highlighted the challenges of tertiary education provision in Australia in terms of its future sustainability and viability in a changing economy. The review addressed the question of whether tertiary education is structured, organised and financed to position Australia to compete effectively in the new globalised economy and suggested major reforms in the financing and regulatory framework in order to increase the tertiary education attainment. In response, the Australian government launched a reform which involves a move to a demand-led system where the government funding will follow students wherever they go. This change is likely to increase the competition among tertiary education institutions. Stronger efforts and incentives are therefore needed to support collaboration between them.

The tertiary education sector is a major contributor to the development of Victoria's economy and society. It generates skills and knowledge for the Victorian business, industry, community and government sectors. It constitutes an important knowledge-based service industry and is Victoria's largest export industry in terms of revenue. The Victorian Government has taken steps to ensure that Victoria will in future have access to a highly skilled, flexible labour force. The government has introduced Skills Reform that will transform the Victorian TAFE sector to a demand-led system and is also in the process of developing the Victorian Tertiary Education Plan. In this context, this chapter examines:

- Does the Victorian Government have a clear strategy for the development of the tertiary education and capacity to steer the system to meet the needs of Victoria?
- Do the current structures and mechanisms for co-ordinating the activities of universities and TAFE institutes help maximise their impact on the development of Victoria? Do they support collaboration between the institutions?
- Do the current structures and mechanisms support and incentivise regional and civic engagement of tertiary education institutions in Victoria?
- What lessons can be learnt from international experience?

Figure 4.1. Map of the State of Victoria and the City of Melbourne

4.1 Collaboration between the Victorian Government and tertiary education

Traditions of partnerships within the city or region between tertiary education institutions, businesses, regional agencies and government bodies, acting in concert with each other, is a critical factor in attracting inward investment and partnering with other regions and educational institutions globally. The Victorian Government facilitates and supports reciprocal relationships between universities, TAFE institutes, industry, the community sector and government departments and agencies. It contributes to capacity building in various ways, for example through supporting networking and collaboration. Collaboration is promoted at a policy level and reflected in a range of initiatives:

- The Regional Tertiary Education Working Party was established in 2002 to improve participation in tertiary education in rural areas, bringing together university representatives with local government, employer and industry groups, education unions and the Victorian and Australian governments.
- The Outer Urban Tertiary Education Working Party, made up of university, state and local government members was initiated to identify and address issues pertaining to the provision of tertiary education in outer urban areas of Melbourne, including partnerships with business and industry, community engagement and inter-institutional co-operation.
- The Regional Engagement Forum which encourages collaboration between state ministers, education leaders, industry leaders and community representatives in order to develop initiatives that benefit regional areas.

In addition, the Victorian Government has supported university-community-industry engagement through sponsorship of studies (the pilot study *Redefining Excellence*), conferences (the annual conference of the Australian Universities Community Engagement Alliance, AUCEA). An abundance of reviews and policy papers have been produced, including the *Inquiry into Regional Centres*, *Inquiry into Geographical Differences in the Rate in Which Victorian Students Participate in Tertiary Education*, and *Report advising on the development of the Victorian Tertiary Education Plan*.

State governments in Australia have tended to play a secondary role in tertiary education.¹ However among the Australian state governments, Victoria provides the strongest support for its universities, around AUD 350 million per annum, making up approximately one half of the total state government funding for universities in Australia. Furthermore, in 2007, the Victorian Government provided three times more in financial assistance than it collected in payroll tax from universities. Over a ten year period, the government has invested AUD 620 million in the Science, Technology and Innovation Initiative. The government has also invested substantially in Victoria's regional universities. In recent years, this has included more than AUD 37 million in university infrastructure through the Regional Infrastructure Development Fund. Victoria has also committed over AUD 54 million to support health-related services, infrastructure for clinical placements, medical clinic academic posts and a regional dental school (Lee Dow, *et al.*, 2009).

Given the considerable investments in tertiary education by the Victorian Government and the growing role of education in the future of Victoria, collaboration between the state government and tertiary education institutions should be enhanced. In line with the recommendations of the *Report on Advising on the Development of the Victorian Tertiary Education Plan* (Lee Dow, *et al.*, 2009), the Victorian Government should further strengthen its role in tertiary education to facilitate the transfer to a knowledge-based economy through enhancing its capacity to analyse, support and facilitate positive developments emerging in this sector. Processes should be established across relevant planning activities that embed the engagement of all levels of education in regional and local development including economic, social, cultural and environmental development, for example through the ongoing regional development planning processes. The Victorian government should continue to play a key role in ensuring that there is a flow of funds from the Australian Government, in advocating for funds on behalf of the tertiary education sector and in providing joined-up governance in state responsibilities that intersect with tertiary education such as schools, vocational education, innovation, business development, transport and infrastructure planning.

The Victorian Government has issued a number of policy statements to steer the development of tertiary education sector.² Despite the efforts made there appears to be a lack of clarity of what government expects at either national or state level expects from tertiary education institutions either individually or as a collective.

Given the range and scope of possible activity of Victoria's tertiary education sector together with the complex needs of businesses, communities and students it is unlikely that every institution can meet all of the needs all of the time. Therefore there is a need for a statement that makes clear what the expectations are, where the focus should be, how success will be measured and how funding might be available to support it.

In 2010 the Australian Government has moved to a system of compact funding, whereby individual universities negotiate their own bespoke funding agreement with the Australian Government. The mission-based compacts facilitate the alignment of institutional activity with national priorities. They will define the university's particular mission and describe how it will fulfil that mission and meet the government's policy goals. In order to ensure that the institutional activity reflects also the state and regional needs and priorities, there is a case for direct state involvement in compact negotiations. In Victoria, this is particularly relevant in terms of the four multi-sector universities, which are the largest education providers in the state enrolling 84 000 TAFE students and 56 000 domestic tertiary education students (Lee Dow, 2009). Joint compact discussions with Victorian universities would help reduce duplication of efforts and improve better management of the sector.

4.2 Regional strategic planning in Victoria

An important transition towards more bottom-up local development policies is in progress in Australia. The Australian Government in 2009 launched a top-down initiative "The Regional Development Australia" (see Box 4.1), which aims to ensure long-term sustainability in Australian regions. Despite their significant contribution to economic, social and community development in their cities and regions, universities and TAFE institutes have not been systematically engaged in the development, implementation and evaluation of regional and local development policies in Australia. This is also manifested in the Regional Development Australia and its RDA committees where the participation of educational institutions remains patchy.

Box 4.1. Regional Development Australia (RDA)

The Regional Development Australia (RDA) initiative was launched in 2009 by Australian Government to bring together all levels of government – national, state, territory and local governments – to ensure the long-term sustainability and the growth and development of Australian regions. RDA aims to work with all sectors of the community, including women, young people, Indigenous Australians and people from a variety of cultural backgrounds. A key focus is on the economic, social and environmental issues affecting communities. Regional Development Australia aims to be an important contributor to, and driver of:

- Regional business growth plans and strategies, which will help support economic development, the creation of new jobs, skills development and business investment.
- Environmental solutions, which will support ongoing sustainability and the management of climate change (including the impact of drought, flood or bushfires).
- Social inclusion strategies, which will bring together and support all members of the community.

RDA committees have been set up in different regions to build partnerships between governments, regional development organisations, local businesses, community groups and key regional stakeholders to provide strategic and targeted responses to economic, environmental and social issues affecting the regions of Australia. The national RDA Charter sets out the areas of focus for the RDA network. The Australian Government provides funding to support the establishment and operation of the committees. In some jurisdictions, state/territory and local governments also provide funding and/or other forms of support.

There are four key functions that underpin the role of the national network of RDA committees:

- Advice on consultation and community engagement.
- Support for regional planning.
- Promotion of whole-of-government programmes, policies and initiative.
- Support for community and economic development.

Box 4.1. Regional Development Australia (RDA) (continued)

RDA is delivered through a national network of 55 committees which provide a strategic framework for economic growth in each region. The RDA network aims to ensure that input is provided to the Australian, state and local governments on regional development issues and priorities; promote regions to secure sustainable long terms jobs; promote investment and regional prosperity; and raise awareness of programmes and services available to regional communities. The network will also play a key role in ensuring that advice about key issues in the region is provided to all levels of government.

Source: Australian Government (2010), Regional Development Australia website, www.rda.gov.au, accessed 15 April 2010.

In Victoria, the Regional Strategic Planning Initiative was launched in 2008 with the aim to develop a long-term, state-wide blueprint to manage growth and change in provincial Victoria; to support the ongoing development of place-based regional plans that are integrated with the state-wide blueprint; and improve the processes and governance of regional planning across the state with greater co-ordination between all levels of government. As a result, eight place-based networks have been established in different sub-regions. They aim to support informed regional planning, contribute to business growth plans and investment strategies, environmental solutions and social inclusion strategies and develop and implement regional plans in collaboration with stakeholders. The engagement of universities and TAFE institutes in these networks varies across Victoria. For example the Geelong Region, through its regional alliance G21, has made good progress in involving educational institutions such as Deakin University in the process. There are, however, other instances where the role of educational institutions has been more limited to consultancy type of assistance. These place-based networks and plans can provide targeted responses for innovation and skill development needs and would benefit from stronger engagement of educational institutions. It would also be important to ensure that the regional plans and the state-wide blueprint will embrace a broad approach to human capital development starting from pre-primary education and stretching to tertiary education and beyond to lifelong learning.

The analytical capabilities of universities in Victoria could support the state in its efforts to improve place-based development. For

example, the university-led Community Indicators Victoria represents an innovative initiative to strengthen evidence-based decision making at local and state government level. It has been acknowledged for its leadership in research and new indicator development in Australia and New Zealand, and highlighted through the OECD Global Project on Measuring Progress of Societies. The Community Indicators Victoria initiative also provides a good basis for closer collaboration between tertiary education institutions and regional and local authorities. It was however not clear to what extent this initiative and expertise it had produced were used to support the ongoing regional strategic planning process. This type of work could help building a more robust evidence base for regional development and encourage citizen engagement (see Box 4.2).

Box 4.2. Community Indicators Victoria

Funded by the Victorian Health Promotion Foundation (VicHealth), and hosted by the McCaughey Centre, School of Population Health, at the University of Melbourne, the Community Indicators Victoria (CIV) is a collaborative project to improve citizen engagement, community planning and evidence-based policy making in local and state governments, using local community wellbeing indicators. The McCaughey Centre works in partnership with a wide range of government, community and academic organisations to ensure that Community Indicators Victoria responds to the needs of its users. Partners include RMIT, Australian Bureau of Statistics, Victorian Government, local government and non-governmental organisations.

Community Indicators Victoria aims to:

- Provide a sustainable mechanism for the collation, analysis and distribution of local community wellbeing indicator trend data across Victoria.
- Be a resource centre supporting the development and use of local community wellbeing indicators by local governments and their communities.
- Contribute to national and international policy research on the development and use of local community wellbeing indicators as a basis for improving community engagement, community planning and policy making.

Box 4.2. Community Indicators Victoria (continued)

Community Indicators Victoria presents data and reports on the wellbeing of Victorians using an integrated set of community wellbeing indicators. These indicators include a broad range of measures designed to identify and communicate economic, social, environmental, democratic and cultural trends and outcomes. Through the CIV Web Site users are able create user-friendly reports regarding the development at the local government level. The comprehensive framework of indicators was determined by a pilot project in 2005-06. The project involved extensive consultation with local and state government and academics.

Source: Community Indicators Victoria, www.communityindicators.net.au

4.3 Role of tertiary education in regional development

There is a growing recognition in Victoria that tertiary education institutions contribute to virtually every facet of regional development including business innovation, skills development, cultural life, health, social inclusion and environmental sustainability. In addition to teaching, learning and research, Victorian universities are playing a major role in providing services for and on behalf of government, industry and the community.³ University-industry collaborations are becoming increasingly important as requirements for new knowledge and breakthrough technologies underpin new product development in globally competitive industries (see Chapter 1). Universities and TAFE institutes are being called upon to address issues concerning the impact of climate change and global warming (see also Chapter 3). Victoria's cultural infrastructure, which is an important asset in retaining and attracting corporate headquarters and other sources of economic vitality, is closely linked to its universities. Universities are owners, patrons and agents in cultural life as well as being education institutions. They provide a wide-range of cultural and sporting facilities which are often available for wider community use. In Melbourne, they create and support "cultural precincts" and cultural activities across the city – for example, University Square, Federation Square and the RMIT Design Hub on the Carlton and United Breweries (CUB) site.

The question remains as to whether the Victorian Government is seeking to achieve a world-class tertiary education system through a

productive division of labour and enhanced collaboration between institutions. There is an obvious division of labour between the universities and the TAFE institutes. However the collaborative mechanisms between the tertiary education institutions remain limited. For example in the university sector, each institution is developing its own initiatives, often in competition with each other. Limited resources are spread thin leading to a lack of critical mass to generate projects which would have real impact at the local and regional level and create multiplier effects. The challenges in Victoria are manifold, including uneven development, lower participation of Aboriginal and Torres Strait Islander populations in education, climate change and the risk of major natural disasters. To address these challenges a more broad-based collaboration is necessary.

Despite the important role that the tertiary education institutions play, there is currently no forum in place where the wide ranging contributions of tertiary education to Victoria can be articulated. While there is some evidence of well-established collaboration and shared learning among universities at a technical level (see Box 4.3), there are no effective collaborative forums linking the Victorian Government, tertiary education institutions and other key stakeholders. Furthermore, there is a lack of readily available data and evidence of ongoing dynamic (as opposed to static) impacts of the sector within the state and the city developed and owned by the tertiary education institutions and their partners.

Box 4.3. Collaboration among university finance officers

The senior finance officers of Victorian universities and the University of Tasmania have formed a strong group that meets three times a year and acts as a means of sharing best administrative practices, in addition to providing staff development opportunities and sharing workload at peak times. For example upon the introduction of International Accounting Standards, the senior finance officers in Victoria were able to distribute responsibility for addressing the new standards by dividing them across the group. Each member was invited to present their solutions/interpretations available to the entire group. This saved each institution from having to individually deal with all the standards. The collaboration has also involved a staff development aspect through participation by staff at the next level down in two sub groups, tax and financial reporting/accounting that report back to the main group. Collaboration between Victorian Universities' Finance Officers is a national leader which is evidenced by the participation of Finance Officers from other states in tax and financial reporting sub-groups.

The City of Melbourne has developed the Knowledge Capital arrangements as a mechanism for considering the needs of the city. The Office of Knowledge Capital was established in 2008 as a jointly funded collaboration between the City of Melbourne, the Committee for Melbourne and Melbourne's eight major universities; Australian Catholic University, Deakin University, La Trobe University, Monash University, RMIT University, Swinburne University of Technology, University of Melbourne and Victoria University. Its aim is to drive the evolution and promotion of Melbourne as a global knowledge city, building on the city's strength in tertiary education, research and innovation. While the Knowledge Capital appears to be currently more focused on PR type of activities, it has managed to bring forth practical collaboration between universities and the city for example in organising the welcoming service for international students. It would be feasible to look at the lessons learnt in Knowledge Capital initiative and consider adopting and developing some of the practices in the context of the "Knowledge State", so that it encompasses all the potential contributors.

The Victorian Government should consider establishing a strategy platform or forum that would bring together tertiary education institutions and their key public and private stakeholders to establish the priorities, to enhance the dialogue and collaboration between the actors and to help connect top-down high-level strategies and bottom-up initiatives. The first tasks of this forum should include mapping the current engagement activities within tertiary education institution and carrying out a gap analysis (needs assessment and activity audit) to establish what else needs to be done. Such an organisation could consider mapping out the activities currently underway as well as providing a focus for a comprehensive needs analysis that would inform the debate on the contribution that tertiary education institutions could make.

Furthermore, while the TAFE institutes have usually fostered close linkages with employers, there is room for improvement in this domain with Victorian universities. During the OECD review visit in December 2009, conflicting views were heard on this issue, with the universities indicating that they had appropriate advisory boards in place to assist with developing industry-relevant content in learning programmes, and employers' organisations suggesting that their members were not satisfied with the employability skills of the university graduates. The Victorian Government could play a role to facilitate the development and strengthening the industry sector networks between employers and tertiary education providers.

One of the main constraints impeding human capital development in a region is the absence of a state-wide mechanism to articulate a long term vision and implement an integrated strategy for all educational institutions. Despite a number of multi-sector institutions and a range of collaborative initiatives between universities and schools, the Victorian education sector does not yet operate as an integrated system and more transparent pathways for learners through the education system are required. This would involve the development of stronger credit recognition schemes, more robust schemes to acknowledge prior learning as well as alternative selection mechanisms, course and programme articulation agreements, clear and enforceable policies related to credit transfer and increased support for joint and collaborative programmes. Collaborative mechanisms between universities and TAFE institutes should be supported. Some useful lessons are available from the UK experience of attempts to develop specific networks of institutions.⁴ While progress has been made in preparing for the Victorian Tertiary Education Plan, a more comprehensive approach embracing entire human capital development from pre-primary to tertiary education and beyond should be considered (see also Chapter 2).

4.4 Addressing the needs of regional Victoria

The provision of tertiary education in regional and outer urban areas is a key area for growth of tertiary education in Victoria. A number of Victorian universities have locations outside of the metropolitan areas of Melbourne. Some of these universities identify themselves as “regional” on the basis that they are primarily physically located in a regional area and provide services mainly to their regional communities. Across Victoria, university campuses vary in size and mode of delivery, from less than 1 000 students to many thousands (see Chapter 2, Table 6 for regionally based universities and metro universities with regional campuses).

Australian Government’s funding guidelines for regional university campuses specify that to be considered a campus, a site must have regular face-to-face teaching and entire courses must be delivered from the location (Commonwealth Grant Scheme Guidelines). However, there is no accepted definition of what constitutes a “regional university”. In some instances regional provision constitutes a single physical campus, while in others it comprises a multi-campus provider operating both physically and

virtually across a number of sites. Some regional universities also have campuses in capital cities and overseas, while some of those universities that are primarily located in “metropolitan” areas operate substantial regional campuses.

Smaller regional campuses suffer from economies of scale.⁵ In recognition of the tertiary cost of regional provision, the Australian Government introduced a regional loading in 2004, ranging from 2.5% to 7.5% depending on the size of the campus and its distance from a mainland capital city. In 2008, Victorian universities received AUD 3.5 million in regional loading. In practice most regional campuses are cross-subsidised by metropolitan campuses (Lee Dow *et al.*, 2008).

Regional Victoria is rapidly changing from the agriculture and resource-based economy to a more diverse regional economy. Regional universities can play an important role in this transformation. They can support sustainable development and help fight climate change and improve food security and water security (see Chapter 3). They can boost regional economies by providing jobs and infrastructure spending and through the expansion of regional skilled labour. While the evidence remains mixed whether increased provision would raise participation rates considerably, those who study in regional areas are usually more likely to stay in those areas, at least for some time, and contribute to the sustainability of these areas. The University of Ballarat provides an example of a regional university with strong local impact and support from the community (see Box 4.4).

Box 4.4. Ballarat University Technology Park

The University of Ballarat is a major regional employer, economic driver, infrastructure developer and telecommunications leader. It directly contributes AUD 500 million and 2 900 jobs annually to the Ballarat economy which represents 10.5% of the city’s economy. 11.8% of household income and 8.5% of employment. In 2007, the University of Ballarat generated 3 150 jobs in central and western Victoria. It contributed to more than AUD 511 million to the western Victorian economy; AUD 295 million in value-adding and AUD 150 million in household income. The University of Ballarat has a technology park which enhances regional innovation and skills. About 1 350 people are employed in the Ballarat University Technology Park and about 50% of them are graduates of the university.

Box 4.4. Ballarat University Technology Park (continued)

The university has forged strong links with the industry tenants including IBM Ballarat, Emergency Services Telecommunication Authority, Rural Ambulance Australia, State Revenue Office, Global Innovation Centre, ID Research and IBM Regional Software Solutions. Through the industry linkages, the university has gained national recognition as a telecommunication and IT hub. Partnerships and the development and application of skills has also transformed learning processes which increasingly include community engagement and work-based learning.

Source: Lee Dow, K., *et al.* (2009), *Report Advising on the Development of the Victorian Tertiary Education Plan*, Department of Innovation, Industry and Regional Development of the Government of Victoria, Melbourne.

However, there are also challenges linked to the future sustainability and responsiveness of tertiary education in regional Australia including: *i*) the increased costs associated with the smaller scale of regional university operations; *ii*) relatively low student numbers; *iii*) a high proportion of students from a low socio-economic status background; and *iv*) the difficulty of attracting students to study at regional campuses. The Bradley Review (2008) recommended an additional AUD 80 million per year from 2012 for sustaining regional tertiary education provision to replace current regional loading arrangements. While it encouraged “innovative, collaborative, local solutions” to regional provision through partnerships with local communities and institutional cross-collaboration, it also suggested that rationalisation or restructuring of traditional regional campuses may be necessary.

The Australian Government, as part of its *Transforming Australia’s Tertiary Education System* reform agenda, has committed to examining the provision of tertiary education in regional Australia in particular the appropriateness of regional loading, the current funding model under the Commonwealth Grant Scheme (CGS). The objective of the review of regional loading is to develop options for a new, more logical basis for funding. As part of this review the Australian Government has sought input from key sector stakeholders through a state-based consultation process and will commission research into good practice in regional tertiary education, both nationally and internationally. The Victoria Government’s Inquiry into Regional Centres of the Future stated that “*the State Government*

advocate(s) to the Commonwealth Government to consider a policy of promoting and further developing regional universities rather than city universities with regional campuses.” This is seen as a means of discouraging the flight to the cities and has been encouraged by some of the experiments that have been carried out to date.

A fully effective tertiary education institution has a need for a critical mass of some thousands of students. The numbers of qualified applicants in some areas of rural Victoria are likely to decrease over the next decade, while other areas will experience greater growth. There is also a need for great expansion in outer Melbourne. It is unrealistic to expect that Victoria can afford the breadth of university provision in many regional towns. Rather than maintaining existing university campuses or opening additional campuses, there is a need to design tertiary education provision and R&D development based on the particular local needs at the time. The Victorian Government will need to carefully balance the provision of regional universities with the projected demand in order to provide the growth or reduction in locations where they are required. It is advisable to conduct a state-wide assessment of current and planned capacity against anticipated student numbers and identify needs in terms of staff and infrastructure and taking into account related transport and student housing provision. In some cases there is a need to enhance infrastructure-sharing arrangements between different education providers. As an intermediate step, support should be provided for tertiary education centres that draw on a range of providers, including both universities and TAFE institutes, to ensure the broadest possible choice (see also Chapter 2). Increasing instances of resource sharing and closer collaboration between providers are already in place in some cases (see Box 4.5).

Box 4.5. The Deakin at Your Doorstep Programme

The Deakin at Your Doorstep Programme commenced in 2010 with the aim to allow regional Victorians to study for a VET diploma or Associate Degree embedded in a university degree at local TAFE colleges. The programme uses interactive e-learning blended with face-to-face learning. The programme also includes credit transfer arrangements. The participating providers have selected the courses to be offered in consultation with each partner rural community in order to meet local skills shortages.

The two-year associate degree programme will provide a pathway to tertiary education focusing on students who may doubt their ability to succeed in tertiary education or who are disadvantaged because of their location in rural and regional areas. The programme aims to address the systematic generational disadvantage suffered by rural and isolated people in relation to access to tertiary education and to improve the attractiveness, accessibility and perceived relevance of tertiary education to these young people and their families. Some of the students will go on to undertake full degree programmes. Others will be better positioned to obtain employment.

The programme is delivered from Deakin's Warnambool Campus which will have a major upgrade of its online teaching and learning facilities as well as the outcomes arising from the development and delivery of a new programme. The associate degree will also be delivered through Deakin Learning Centres established at TAFE institutes including Sunraysia Institute's Swan Hill Campus, East Gippsland TAFE's Bairnsdale Campus and Chisholm Institute's Dandenong Campus in 2010 and at Mildura, Sale and Rosebud in 2011. The course provides an introduction to the foundations of a discipline or several disciplines, as well as the development of the academic skills required for university study and generic employment related skills.

Deakin at your Doorstep is funded under the DEEWR Diversity and Structural Adjustment Fund programme.

Source : State of Victoria (2010), "The State of Victoria, Australia: Self-Evaluation Report", OECD Reviews of Higher Education in Regional and City Development, IMHE, www.oecd.org/edu/imhe/regionaldevelopment, accessed 21 August 2010.

The OECD review team supports the recommendations put forward in the Report on Advising on the Development of the Victorian Tertiary Education Plan (Lee Dow *et al.*, 2009) which calls for co-ordinated planning, led by the Victorian Government within each of the five non-metropolitan administrative regions to encompass

more specific and regular interactions between the tertiary education and TAFE leaders, to enable more effective planning and sharing of facilities and to co-ordinate the development of programmes which take better account of regional industry and labour market needs. Furthermore, the OECD team supports the recommendation of closer links between schools and tertiary education institutions to improve pathways and articulation and better information sharing to benefit students and their parents (Lee Dow, *et al.*, 2009).

Finally, when developing the network of tertiary education institutions, care should be taken to ensure that the region continues to have access to lifelong learning services and business-related services. Adequate IT infrastructure should be in place to ensure high speed, low cost connectivity. While progress has been made to implement the Victorian Broadband Strategy, there are still intra-regional disparities in this domain.

4.5 Institutional commitment to regional engagement

In Australia, there is no explicit “third task” or regional development task assigned to tertiary education institutions, instead regional engagement is left to the initiative of the individual institutions. For the major research-intensive universities the key driver is scientific world class excellence. TAFE institutes have by mission closer links to the labour market and to skills that are needed to underpin local and regional development.

However, several tertiary education institutions in Victoria have specific community engagement plans that sit alongside the strategic plan. RMIT University, for example, has a Community Engagement Strategy which aims to build community capacity, develop partnerships, ensure equity of access and develop RMIT’s ability to respond to community need. Swinburne University is currently developing a Community Engagement Plan to complement the well-established Industry Enabling Plan. This is part of Swinburne’s identification of engagement as part of its university’s core business and currently includes a statement of direction. This statement emphasises industry and community links as well as resulting graduate employment. Community engagement has also been discussed in the compact negotiations between the Australian Government and individual universities but with limited focus for example on widening participation in tertiary education.

In addition, some tertiary education institutions, for example The University of Melbourne and Deakin University, have identified explicit managerial responsibility for knowledge transfer and/or engagement, whilst some institutions have recognised engagement as criteria for academic promotion. The University of Melbourne had produced in 2009 detailed internal guidance on the process of embedding knowledge transfer, the use of performance metrics in knowledge transfer and academic criteria for promotion involving knowledge transfer (see Box 4.6).

Box 4.6. Embedding knowledge transfer at the University of Melbourne

- Appoint a staff member and management structure to develop and implement plan. Give consideration to potential role as outlined below and resources available.
- Identify priorities using the Knowledge Transfer Taxonomy as a guide. Include priorities in faculty/departmental business plans and individual action plans using KPIs.
- Include knowledge transfer priorities in review processes at faculty, team and individual level.
- Identify and acknowledge excellent practice. Communicate good practice to others and recognise at individual level in promotion criteria.
- Seek support and advice from Knowledge Transfer and Partnerships Office in partnership development and capacity building. Showcase good practice through publicity.

Source: University of Melbourne (2010), Knowledge Transfer and Partnerships website, www.knowledgetransfer.unimelb.edu.au, accessed 15 April 2010.

While innovative systems and mechanisms have been put in place, there appears to be a lack of monitoring and evaluating the outcomes of these activities. There is also a lack of dissemination of good practices throughout and across institutions and benchmarking the experience against other organisations and localities. Furthermore, there is limited evidence of programmes to enhance the skills of

tertiary education leaders and their partners as well as those with “boundary spanning” roles.

4.6 Incentivising regional engagement

While monitoring or professional development of tertiary education faculty and staff are important elements in the creation of a regional tertiary education system attuned to local needs and opportunities, they will not suffice if the incentives linked to time and money for individuals and whole institutions are not aligned to the regional development objectives. There were many good examples where institutions had found ways of working with their community – including Latrobe University in Shepparton and RMIT University at Hamilton. This work is however often driven by individual academics or department, project-based and dependent on short-term funding arrangements. In the absence of strong incentives for regional engagement there is a risk that the various initiatives that have been put in place will not be sustainable in the long term. An example of a whole-of-community approach to local development comes from Corio Norlane Neighbourhood Project which is closely linked with Deakin University (see Box 4.7).

Box 4.7. The Corio Norlane Neighbourhood Project

The Corio Norlane Neighbourhood Project encompasses a whole-of-community approach focused on health and wellbeing; crime and safety; employment; housing and physical environment; access to services and civic participation as well as education. The Corio Norlane Development Advisory Board (CN DAB) aims to make the area a “socially, economically and environmentally sustainable community that offers highest possible quality of life for all residents” and it plans to do this through direct links with residents, local, state and national governments, community organisations, agencies and businesses. Through its Northern Futures economic development arm, the CN DAB has developed its own strategic development plan that reflects the objectives of both the Victorian Government’s Neighbourhood Renewal project and the Australian Government’s Social Inclusion Policy. The aim is to “narrow the gap between disadvantaged communities and the rest of Victoria by encouraging collaboration between industry, community and government”.

Box 4.7. The Corio Norlane Neighbourhood Project (continued)

The CN DAB is partnered with Deakin University. There are well-established relationships between various project management teams and senior academics throughout the faculties, as well as student placements, honours programmes, guest lecture programmes and linked research projects. Through its association with Deakin, the CN DAB has recently been accepted as a full member of the WHO Alliance for Healthy Cities.

Source: CNDAB (Corio Norlane Development Advisory Board) (2010), CNDAB website, www.corionorlane.org.au, accessed 15 April 2010.

In order to mobilise tertiary education institutions for local and regional development, consideration should be given to the creation of a specific funding stream which could be allocated by formula against outcomes or as part of a regional compact negotiation in which funds would only be released on production of an integrated and collaborative plan. For example, the Higher Education Innovation Fund in the United Kingdom has contributed to a significant increase in the locally relevant activities of universities and has also generated considerable changes in the institutional management of knowledge exchange (see Box 4.8).

Box 4.8. The Higher Education Innovation Fund (HEIF) in the United Kingdom

The Higher Education Innovation Fund (HEIF) is designed to support and develop a broad range of knowledge exchange activities which result in economic and social benefit to the UK. The fund builds capacity and provides incentives for higher education institutions to work with business, public sector bodies and third sector partners, with a view to transferring knowledge and thereby improving products, goods and services. In September 2007 the UK Government announced a fourth round of HEIF, from 2008-09, with funding rising to a final year allocation of GBP 150 million for 2010-11.

Funds are being provided through a formula allocation to all eligible higher education institutions which are released once their knowledge exchange strategy has been assessed as satisfactory. The formula is based on two components:

- A first component (40%) has a focus on capacity-building and higher education institutions' potential and is based on full-time equivalent academic staff number.
- A second component (60%) is allocated on the basis of performance, using various measures of income from business and non-commercial sources as a proxy for the value placed on higher education institutions' activities by users of knowledge in the wider economy and society.

Evaluation of the use of HEIF monies suggest that it has generated significant changes to the institutional management of knowledge transfer and increases in the scope (type of activity, target sectors, etc.) of knowledge transfer and exchange activities. There has also been investment in development/training for mainstream academic staff and collaboration with one or more higher education institutions in the region.

Source : HEFCE (2009a), "Higher Education Innovation Fund 4", HEFCE, Bristol, www.hefce.ac.uk/econsoc/buscom/heif/

Another potential source of funding can come from charitable donations, the trusts, persons of wealth and alumni. Most Victorian universities had an alumni association in place but recognised that they could do much more to engage with alumni. Some were also considering the possibility of fundraising initiatives. However, the universities had not developed systematic mechanisms supporting

voluntary giving. Recognising that the investment in the infrastructure of fundraising can generate real rates of return, some OECD countries, for example the United Kingdom have sought to stimulate this activity by matched funding schemes (see Box 4.9).

Box 4.9. The UK matched funding scheme for charitable donations to universities

In April 2008, the UK Government launched a GBP 200 million matched funding scheme for voluntary giving. The matched funding scheme began in August 2008 for a three year period. Funding was available to match eligible gifts raised by English higher education institutions and directly funded further education colleges. There were three levels of funding:

- First Tier: 1:1 private to public: intended for the least-experienced fundraising institutions and those looking to build capacity from a low base. Every GBP 1 raised will be matched in full.
- Second Tier: 2:1 private to public: intended for the majority of institutions with existing development programmes. Every GBP 2 raised will be matched by GBP 1.
- Third Tier: 3:1 private to public: intended for the most experienced fundraisers. Every GBP 3 raised will be matched by GBP 1.

Higher education institutions were able to request their own tier, with the exception of the Universities of Oxford and Cambridge which were included in the third tier. All directly funded further education colleges wishing to participate in the scheme were automatically included in first tier. Each institution's tier and cap level was confirmed by the Higher Education Funding Council (HEFCE) prior to the start of the scheme.

The following forms of giving were eligible for match funding: actual gifts of cash, gifts of shares, gifts from small/medium-sized charitable trusts and foundations, gifts through higher education institutions own non-consolidated development trusts, corporate gifts and overseas gifts. Legacies and gifts in kind were not eligible for matching. Higher education institutions had the freedom to decide how match funding was spent.

Source: HEFCE (2008), "Matched Funding Scheme for Voluntary Giving 2008-2011", Circular Letter, No. 11/2008, HEFCE, Bristol, www.hefce.ac.uk/pubs/circlcts/2008/cl11_08/

4.7 Reducing the overregulation of the tertiary education system

There is some evidence in Victoria of accountability burden and overregulation of publicly funded tertiary education institutions both in terms of the approvals needed for courses and the nature and number of quality inspections. Furthermore, the system of regulating the private sector appears to be operating at a sub-optimal level. With the launch of the demand-driven system, the challenges in the private sector are likely to increase.

Overregulation of tertiary education is not uncommon in a number of mature systems, usually arising from the increasing expectations on tertiary education, the multiplicity of interested parties, all of whom have reasonable accountability requirements, which when taken together can generate a significant burden on tertiary education institutions. In Victoria, there is a case to investigate the extent of the accountability burden that is placed on institutions. Such an investigation should identify and quantify the main sources and extent of burden as well as the potential to ameliorate it by data sharing, taking assurance from the work of others and a risk-based approach to quality assurance. Similar investigations have been conducted in other OECD countries. For example the Higher Education Funding Council for England (HEFCE) commissioned an external consultancy agency to investigate the accountability burden of universities on three different occasions in 2000, 2004 and 2008. The process has led to considerable reductions in regulatory burden as well as savings (see Box 4.10).

Box 4.10 Reducing overregulation of higher education institutions in the United Kingdom

Universities are subject to a wide range of regulatory requirements and conditions, reflecting the diversity and scope of their activities. Many of these are the general public regulations applied to all organisations operating in regulated areas, such as health and safety, planning, equal opportunities and Freedom of Information.

HEFCE (Higher Education Funding Council for England) commissioned PA Consulting to carry out three studies on the costs, impacts and burdens of accountability in English higher education in 2000, 2004 and 2008. The latest report, “Positive accountability”, published in 2009, has found that costs to higher education institutions continued to fall between 2004 and 2008 by 21%. The PA study was based on in-depth research with 20 higher education institutions, involving more than 100 structured interviews with institution staff as well as extensive data analysis from institutions’ management systems.

Box 4.10 Reducing overregulation of higher education institutions in the United Kingdom (continued)

According to the research, higher education institutions were subject to over 75 different sector-specific accountability requirements. PA related these activities and other costs to the work and costs that each institution would otherwise incur for its own internal management controls and governance processes (what the report calls “business-as-usual activities”).

There has been a reported 25% reduction in administrative burden between 2000 and 2004. The 2004 review estimated the costs of compliance at around GBP 240 million (in 2008 prices). The equivalent costs to the 2004 estimate in 2008 were around GBP 190 million.

The studies have measured sector-specific accountability demands, where HEFCE and other bodies such as the Quality Assurance Agency for Higher Education (QAA) and Higher Education Statistics Agency (HESA) have worked with institutions to reduce burdens. Higher education institutions themselves have improved their systems significantly between the three studies, and this has further reduced their costs. A number of regulatory bodies have started to rely on the work of others and harmonised information needs. Universities have embedded many of the requirements such as risk management into their own systems. These were originally regarded as impositions by external bodies, but are now accepted as contributing to the effective management of institutions.

Source: HEFCE (2009b), “Positive Accountability: Review of the Costs, Benefits and Burdens of Accountability in English Higher Education”, Report prepared by the PA Consulting Group for HEFCE, Bristol, www.hefce.ac.uk/pubs/rdreports/2009/rd01_09

Conclusions and recommendations

The Victorian tertiary education sector, including universities and TAFE institutes collectively constitute a major magnet attracting students, researchers and business. They make up the most important industry sector in terms of export earnings. There is a clear recognition of benefits of collaboration, good examples at tertiary education institutions of working with their community, identification of explicit managerial responsibility for engagement in some tertiary education institutions and recognition of engagement as criteria for academic promotion. There is widespread enthusiasm for engagement across all

aspects of tertiary education activity and a number of good practice examples.

However, there is limited evidence of a systematic approach to engagement across all the stakeholders that would ensure that the various examples of engagement could be sustained in the long term. There is a lack of underpinning collaborative culture between the tertiary education institutions which are more inclined to compete than to collaborate. There is also a lack of engagement of tertiary education institutions in the ongoing regional strategic planning process across the Victorian sub-regions

The OECD Review Team recommends that the following measures are taken to improve the capacity building for regional development and collaboration in the tertiary education sector in Victoria:

- The Australian Government should mobilise the tertiary education sector, including research-intensive universities, for local and regional development by creating a specific funding stream allocated by formula against outcomes or expanding compact negotiations to include state funds only to be released on production of an integrated and collaborative plan of action of universities' regional engagement. In addition, the Australian Government and/or the State of Victoria should consider developing a match funded scheme to facilitate working with alumni.
- The Australian Government should encourage stronger engagement of tertiary education institutions in the development, implementation and evaluation of regional and local development policies, for example, by requiring the involvement of tertiary education institutions in the RDA Committees under the Regional Development Australia initiative. The Victorian Government should encourage stronger engagement of universities and TAFE institutes in the regional strategic planning process. The Victorian Government should also ensure that the sub-regional plans and the state-wide blueprint will embrace a broad approach to human capital development starting from pre-primary education and stretching to tertiary education and beyond to lifelong learning opportunities.
- The Victorian Government should assume a stronger role in tertiary education to facilitate the transfer to a knowledge-based economy through enhancing its capacity to analyse,

support and facilitate positive developments emerging in this sector. Processes should be established across relevant planning activities that embed tertiary education engagement in regional and local development including economic, social, cultural and environmental development. The government should play a key role in ensuring that there is a flow of funds from the Australian Government, in advocating for funds on behalf of the tertiary education sector and in providing joined-up governance in state responsibilities that intersect with tertiary education such as schools, vocational education, innovation, business development and transport and infrastructure planning.

- The Victorian Government should collaborate with the universities to ensure that the needs of the State of Victoria are considered in compact negotiations with the Australian Government and in the development of the profiles of tertiary education institutions. In order to guarantee that the needs of Victoria are effectively met by tertiary education institutions, the compact negotiations with individual universities, particularly with the four multi-sector universities, should involve also state government. Joint compact discussions would reduce duplication of efforts and improve better planning and reporting.
- The Victorian Government, tertiary education institutions and key public and private stakeholders should establish a strategy platform or forum to establish the priorities, to enhance the dialogue and collaboration between the actors and to develop a clearly articulated long-term strategy that connects top-down policies and bottom-up initiatives. The first tasks of this forum should include mapping the current engagement activities within tertiary education institution and carrying out a gap analysis (needs assessment and activity audit) to establish what else needs to be done. To improve the industry-university collaboration the Victorian Government should facilitate the development of the industry sector networks between employers and tertiary education providers.
- To ensure sustainable region provision of tertiary education, the Victorian Government should conduct a state-wide assessment of current and planned capacity against anticipated student numbers and identify gaps in staff, and infrastructure. As an intermediate step the Victorian Government should take

steps to strengthen flexible multi-provider learning and extension centres. Support should be provided for tertiary education centres that draw on a range of providers, including both universities and TAFE institutes, to ensure the broadest possible choice and the most sustainable future. When developing or rationalising the network of education providers, care should be taken to ensure that region continues to have access to lifelong learning services and business-related services. Adequate IT infrastructure should be in place to ensure high speed, low cost connectivity. Co-ordinated negotiation and planning process should be led by the Victorian Government within each of the five non-metropolitan administrative regions.

- The Victorian Government should have the current costs of accountability of tertiary education institutions audited in order to identify and quantify the main sources and extent of burden as well as potential to ameliorate it by data sharing, learning from the work of others and a risk-based approach to quality assurance.
- The Victorian universities and TAFE institutes should review recruiting, hiring and reward systems to include regional and local development agenda. They should create systematic mechanisms to monitor and evaluate their activities in this area, to share good practice with the institutions and benchmark this experience with other institutions and localities. In addition they should invest in developing the skills of facilitators, i.e. those with boundary-spanning roles who help create links between the tertiary education institution and other stakeholders.

Notes

1. This has been partly due to the concerns that greater involvement might lead to the substitution of state for Australian Government funding. There is, however, no evidence of reduced funding for any state that has provided resources for higher education institutions' infrastructure, teaching or research. On the contrary, where states have provided resources, there has been match funding

opportunities from the government and industry (Lee Dow, *et al.*, 2009).

2. In 2002 (Knowledge & Skills:For the Innovation Economy), 2005 (Higher Education in Victoria: Opportunities for 2005 and Beyond), the Victorian Government’s submission to the Bradley review (2008) and the Tertiary Education Pan, currently under development.
3. Victorian universities are playing a major role in providing services for and on behalf of government, industry and the community, for example: University medical centres and teaching hospitals provide quality health care in Melbourne and in regional Victoria; Agricultural research institutes attached to the universities play an important role in maintaining animal and plant health and in agricultural extension in key primary producing areas; Scientific facilities are available to industry for experimentation, testing and scale up; Universities are strongly committed to outreach and community service providing education, health, social welfare, housing and environmental services; and University-owned performing arts centres and sporting and recreational facilities are available for community use (many are funded on a partnership basis with state and local government).
4. More information on Lifelong Learning Networks is available at www.hefce.ac.uk/widen/ln
5. Higher staff/student rations are needed to support student support services and an adequate range of courses. Delivery to a more dispersed catchment and a larger proportion of part-time, adult and first generation learners is also more costly. It is also more challenging for regional campuses to attract international and other fee-paying students.

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Annex I: Review team members

Jaana Puukka leads the OECD work on Higher Education and Regional and City Development. She joined the OECD Programme on International Management in Higher Education (IMHE) in 2005 to co-ordinate and manage the first round of OECD Reviews of Higher Education in Regional Development which took place in 2005-07 and embraced 14 regions in 12 countries. She is leading the second round of reviews in 2008-10 which is reaching out to 14 regions and city-regions in G8 countries and emerging economies. She is the co-author and editor of the OECD publication *Higher Education and Regions – Globally Competitive, Locally Engaged* (OECD, 2007). Before joining the OECD, Puukka had experience in higher education and regional development in Finland as a national and local government adviser, programme manager, practitioner and evaluator. She has management experience from both the university and polytechnic sector and has worked in university internationalisation, PR and communication and stakeholder management. In addition, she has experience in the corporate sector in the pharmaceutical industry.

Mario Piacentini joined the OECD Public Governance and Territorial Development Division in June 2009. He is co-ordinator of the OECD project on Rural-Urban Linkages, which focuses on labour mobility and other economic interactions between rural and urban areas. He is also responsible for a project on migration and regional development and has drafted the chapter on “Green Growth” for the forthcoming OECD publication on *Competitive Cities and Climate Change*. Piacentini is an applied economist with a strong background in analysis of micro data. He is the author of several papers in the areas of migration, human capital, firm performance, university productivity and social networks. He holds a PhD in Economics from the University of Geneva, a Master degree in International Economics from the Graduate Institute of International Studies, Geneva, and a BA in Political Science from the University of Florence. Piacentini previously worked for the Research Department of the World Bank,

the Swiss Development Co-operation, the African Economic Research Consortium and UNCTAD.

David Charles is Dean of Research and Development at Curtin Business School. He recently joined Curtin Business School from Newcastle University Business School in the UK where he was director of the research centre on Knowledge, Innovation, Technology and Enterprise (KITE). He led over 70 research or consultancy projects funded by research councils, the EU, OECD, national government, regional and local agencies and other public bodies, and has over 140 publications (books, chapters, articles and reports). His work on universities and regional development has included leading an eight-country EU Framework Programme project on this topic (UNIREG) along with a number of other projects for national government bodies, regional agencies, university associations, and OECD. Most recently he has been co-investigator on an ESRC project on universities and disadvantaged communities. Charles has also led a number of studies on regional innovation policy and innovation in clusters for the EU, OECD and regional development agencies. In the last couple of years he has been working with NESTA (National Endowment for Science Technology and the Arts) in the UK on projects on regional innovation strategies and science cities and has led an EU Framework 5 project entitled “City-Regions as Intelligent Territories: Inclusion Competitiveness and Learning (CRITICAL)” with partners in Dublin, Dortmund, Tampere and Melbourne.

Steve Garlick has more than twenty years experience in the field of regional development as a policy developer and ministerial adviser, programme manager, regional practitioner and researcher. He was a senior executive in the Australian Government for around twelve years in the areas of regional development, industry and local government. Formerly Professor of Regional Engagement at the University of the Sunshine Coast in Queensland (Australia), he retains an adjunct professorial position attached to the Centre for Sustainable Regions and is also Conjoint Professor at the University of Newcastle (Australia), attached to the Centre for Urban and Regional Studies. He was also Professor of Regional Development at Swinburne University of Technology and Professor of Regional Development at Southern Cross University. He is the immediate past Vice-President (2007-09) of the Australian Universities Community Engagement Alliance (AUCEA), a coalition of 35 Australian universities, and was awarded the inaugural AUCEA Fellowship (FAUCEA) in recognition of his academic services to university/community engagement. He is the immediate past co-chair of the editorial committee for the Australasian

Journal for University Community Engagement, and a Board Member of the international Pascal Observatory. He has participated in the OECD and European Commission projects on higher education and regional and community engagement. He is a Board Member of the Australian Innovative Regions initiative and a listed expert for the international Talloires network. In 2009, Rosemary and Steve Garlick were awarded the Global Shining Compassion Award by the international Ching Hai organisation. In his spare time Garlick rehabilitates injured native mammals.

Ellen Hazelkorn is Director of Research and Enterprise and Dean of the Graduate Research School, Dublin Institute of Technology; she also leads the Higher Education Policy Research Unit. She is a Consultant to the OECD Programme on Institutional Management of Higher Education (IMHE), and has worked with universities and university associations around the world. She is associated with the International Association of Universities (IAU) and a member of the Irish National Digital Research Centre (NDRC) Management Board and the International Advisory Council of the Irish Research Council for the Humanities and Social Sciences. She was appointed to the Review Body for Dutch Higher Education, and is a member of the review teams for the state of Victoria, Australia and Catalonia, Spain on behalf of the OECD Review of Higher Education and Regional and City Development. She has been nominated to the Board of the United Nations University. She was Rapporteur for the EU Expert Group on Assessment of University-based Research, and a member of the Arts, Humanities and Social Sciences Foresight Working Group (Ireland). Hazelkorn is also a member of the International Rankings Expert Group (IREG), the Executive Committee of the Dean and European Academic Network (DEAN), and of the Editorial Boards of Higher Education Management and Policy (OECD) and Higher Education Policy (IAU). Hazelkorn has authored/co-authored 80 articles, policy briefs, books and book chapters and other papers on Irish politics and society; digital technologies, gender, work practices and the cultural industries; relations between the media and the state; and higher education policy. Her study, *Developing Research in New Institutions*, was published by OECD (2005). She has published on the impact and influence of higher education rankings on decision-making and academic behaviour in association with IMHE and IAU, EUA, UNESCO and the Institute for Higher Education Policy (USA). Her book, *Rankings and the Reshaping of Higher Education: The Battle for World-Class Excellence*, will be published by Palgrave Macmillan.

John Rushforth is the Deputy Vice Chancellor of the University of West of England, with responsibility for the operational day to day management of all aspects of the university. He previously worked for the Higher Education Funding Council for England (HEFCE) for nearly fourteen years where his duties included estates (including sustainable development), research policy, audit, management review and capital funding. He has developed a wide range of good practice guidance for the English higher education sector including IT management, risk management, space management and strategic planning. As Director for Widening Participation, he had responsibility for overseeing the development of widening participation policies and funding formula, Aimhigher, higher education in further education and Life Long Learning Networks. He was also responsible at HEFCE for institutions in the Midlands, Performance Indicators, JISC, strategic and vulnerable subjects and Regional Policy. Rushforth has degrees from Sheffield and the Open Universities. He is a qualified accountant and was previously a senior manager with the Audit Commission, following a number of financial posts in local government. He is also a senior assessor for the European Foundation for Quality Management and was the Deputy Director of the Office for Fair Access (OFFA).

Annex II: Programme of the review visit

OECD Review Visit to the State of Victoria Region, 6-12 December 2009

Sunday 6 December

- 17:00 **OECD Review Team internal meeting**
- OECD Review Team meeting with Regional Co-ordinator and DIIRD Project Manager**
 Faye BURTON Regional Co-ordinator for Victoria
 Pin NG Senior Policy Adviser Department of Innovation, Industry and Regional Development (DIIRD)
- 19:00-22:00

Monday 7 December

- 09:00-11:00 **Economic Strategy for Victoria**
- Dean WICKENTON, Senior Policy Adviser, Policy and Co-ordination DIIRD
 Tony PENSABENE, Director Policy and Research, Policy and Co-ordination DIIRD
 Lill HEALY, Executive Director Regional Strategic Planning, Regional Development Victoria
- 11:00-12:00 **Victorian Steering Committee Meeting**
 Objectives for the Review
 Jane NIALL, Deputy Secretary Policy and Co-ordination DIIRD
 Lill HEALY, Executive Director Regional Strategic Planning, Regional Development Victoria
 Melanie O'TOOLE, Manager International Education Unit, DIIRD
 Matthew HARRIS, Manager Tertiary Education, Skills Policy Development, DIIRD
 Tony PENSABENE, Director Policy and Research, Policy and Co-ordination DIIRD
- 12:00-13:00 **Tertiary Education Plan Taskforce**
 Kwong LEE DOW, Taskforce Convenor
 Kirsten BRIGHT, Senior Policy Adviser, DIIRD
- 13:30-14:30 **The University of Melbourne**
 Commercialisation and Innovation activities
 David COOKSON Executive Director Melbourne Research Office
 Allan TAIT Chief Financial Officer
 Mike SANDIFORD The Melbourne Energy Institute
 Mariann FEE Executive Dean, Melbourne Custom and Consulting Programs Group
 Helen HAYES, Executive Director, Knowledge Transfer and Partnerships

- 14:30-15:00 **The University of Melbourne**
Strategic Overview
Glyn DAVIS, Vice Chancellor
Helen HAYES, Executive Director, Knowledge Transfer and Partnerships
- 15:00-15:30 **The University of Melbourne**
Indigenous Partnerships
Ian ANDERSON, Director, Murrup Barak Institute for Indigenous Partnerships
Ellen DAY, Partnerships Consultant, Knowledge Transfer and Partnerships
- 15:30-16:00 **The University of Melbourne**
Overcoming Disadvantage
Sarah DEASEY, Further Education Co-ordinator, Carlton Neighbourhood Learning Centre & Lynda GILBERT, Community Event Co-ordinator
- 16:00-16:30 **The University of Melbourne**
Applied research projects re Community Engagement and Workforce Development
Sue WEST, Research Fellow, Community Engagement and Workforce Development, School of Population Health, McCaughey Centre, UoM
- 16:30-17:00 **The University of Melbourne**
Applied learning and community engagement
Phil BATTERHAM, Associate Dean, (Community Engagement & Development), Faculty of Science, Bio 21, UoM
- 17:00-17:30 **The University of Melbourne**
Contribution to the built environment
Chris WHITE, Vice Principal, Property and Services, UoM
- 17:30 **The University of Melbourne**
Summation
Andrew GAFF, Executive Officer, Knowledge Transfer and Partnerships Office, UoM

Tuesday 8 December

- 9.45-11:00 **Swinburne University of Technology**
Senior Executive Discussion
Ian YOUNG, Vice-Chancellor
Margaret MAZZOLIN, A/g DVC Academic
Andrew FLITMAN, DVC Research
Jeffrey SMART, Pro Vice-Chancellor International and Recruitment
Barry TELFORD, Chief Financial Officer
Michael THORNE, Executive Director Chancellery
Linda BROWN, DVC TAFE
Sheila FITZGERALD, Director, Strategic Development, Office of the Deputy Vice-Chancellor and Director TAFE
- 12:00-14:00 **Royal Melbourne Institute of Technology (RMIT University)**
Senior Staff General Discussion
Colin FUDGE, PVC Design and Social Context

Julianne REID, Director Learning and Teaching
Julie WELLS, University Secretary
Daine ALCORN, PVC Research and Innovation
Ian KEARNEY, representing the Director of the Global Business Development Unit
Trent GILLAM, Chief of the Chancellery,
Bruce WILSON Head of Global Studies

- 15:00-17:00 **Victoria University**
Senior Staff, Community and Business Partners General Discussion
Peter CREAMER, Pro Vice Chancellor Industry and Community VU
Barbara McLURE, Co-ordinator Industry Engagement.
Eleni BEREDDED, Co-ordinator Community Engagement, and Victorian Multicultural Commissioner
Ros CASEY, Director Development Office
Meryn DAVIES, Acting Director Access and Success
Afshan MANTOO, Muslim Women Council
Campbell ROSE, VU Foundation and Chief Executive Western Bulldogs Football Club
Andrew ROTHBERG, Sustainability Manager, Victorian Employers Chamber of Commerce
- 16:30-17:30 **Open Universities Australia**
General Discussion
Stuart HAMILTON, Chief Executive Officer

Wednesday 9 December

- 09:00-9:30 **Australian Government**
Department of Education, Employment and Workplace Relations
Elizabeth TCHACOS, Deputy State Manager and nominee on Reference Group
Claire FINDLAY, Assistant Director (Regional Loadings Review) – By telephone
- 9:30-10:30 **Employer Group – Reference Group**
Lee-Anne FISHER, Manager Policy, Projects, Education and Training, Australian Industry Group (AiG)
- 10:30-11:15 **Community Policies and Programs**
Lauren MATTHEWS, Policy Analyst, Education & Training & Partnerships Policy Officer,
Victorian Council Of Social Service
Kim LITTLE, Team Leader, Early Childhood Development, Schooling and Tertiary Education
Team Department of Premier and Cabinet and nominee on Reference Group
- 11:15-12:30 **Victorian Reference and Contact Groups**
Tertiary Education Issues
Chris SHEARGOLD, Associate Vice-Chancellor (Melbourne) and Director of Libraries,
Australian Catholic University
Gerald BRENNAN, Senior Manager, Education Development, Gordon Institute of TAFE
Greg JAKOB, Director-Planning Quality & Review, University of Ballarat,
Helen HAYES, Executive Director, Knowledge Transfer and Partnerships, University of
Melbourne
Jennifer OLIVER, Box Hill TAFE
Sandra WALLS, Box Hill TAFE
Helen STEEL, Office of Knowledge Capital (OKC)

- 14:00-14:30 **Monash University**
 Overview and Future Vision
 Adam SHOEMAKER, Deputy Vice-Chancellor Education (MU)
 Peter YATES, Divisional Director, Student & Community Services (MU)
 Tangerine HOLT, Director, International Education (MU)
 Martin DOULTON, Director, Monash Sport (MU)
 Jane McLOUGHLIN, Manager, Government and External Relations, Office of the Vice-Chancellor
- 14:30-15.10 **Monash University**
 Examples of Cross Sectoral Engagement
 Helen BARTLETT, Pro Vice-Chancellor, Gippsland (MU)
 Loretta HAMBLY, Acting Director, Gippsland Education Precinct
 Jim VIVIAN, General Manager Corporate Services, GippsTAFE
 Phillip STEELE, Pro Vice-Chancellor, Campus Co-ordination (MU)
 Virginia SIMMONS, CEO, Chisholm TAFE
 Roger PAGE, Head Teacher, Nossal High School
 David WILKINSON, Economic Development Manager, City of Casey
 Anne PEEK, CEO, Dandenong Casey General Practice Association
- 15:15-16:00 **Monash University**
 Examples of Community Engagement through Teaching and Learning
 Monash Passport –
 Marnie HUGHES-WARRINGTON Pro Vice-Chancellor, Learning & Teaching
- Legal Practice Clinics –
 Ross HYAMS Convenor Legal Practice Program (MU),
 Ebony BOOTH Current Law student,
 Pauline SPENCER Magistrate
 David STARVAGGI Barrister and Law alumnus
- MUMA –
 Max DELANY Director, Monash University Museum of Art
 Amanda BROWNE A/General Manager, Market & Community Development, Arts Victoria
- Green Steps –
 Mark BOULET Program Manager, Monash Institute for Sustainability
 Erin SIMPSON Sustainability Services Manager, VECCI
- Ancora Imparo (student leadership programme) –
 David COPOLOV Pro Vice-Chancellor, Office of the Vice-Chancellor
 Nick ALLARDICE The Oak Tree
- 16:00-16:40 **Monash University**
 Examples of Research and Industry Engagement
 South East Melbourne Innovation Precinct –
 Rod HILL Pro Vice-Chancellor, Industry Engagement & Commercialisation,
 Erol HARVEY CEO, MiniFab, Peter Chaffey Economic Development Manager, City of Knox
 Ron MACK Technology and Innovation Adviser, CSIRO
- Melbourne Nanofabrication Centre
 Abid Khan Director, Institute of Nanosciences, Materials and Manufacture and Erol Harvey
- MUARC –
 Rod McClURE Director, Monash University Accident Research Centre
 David HEALY General Manager, Road Safety, Traffic Accident Commission

IBM –
Sarah NEWTON Director, Industry Engagement, MU
Jay Hannon

Water Sensitive Cities
Ana Deltic

19:00 **Department of Innovation, Industry and Regional Development Working Dinner**
Victorian Self Evaluation Report
John HOWARD, Pro Vice Chancellor (Development), University of Canberra and
Advisor/author to Victorian project team
Officers of Victorian Steering and project teams

Thursday 10 December

10:00-12:30 **Deakin University (Geelong Campus)**
Senior Staff and Industry and Community Partners
Sue KILPATRICK, PVC (rural & regional)
Phillip CLARKE, DVC (Academic)
Lawrie MILLER ED, Geelong Chamber Of Commerce
Michael BETTS, Chair Committee For Geelong
Bernadette UZELAC, Deputy Chair Committee For Geelong
Anne-marie RYAN, Executive Officer Smart Geelong Region
Ed COPPE, Chairperson G21 Geelong Region Alliance
Karen MOORE, Regional Manager Department Of Human Services

GORDON INSTITUTE OF TAFE
Gerald BRENNAN, Senior Manager, Education Development

15:30-17:00 **Goulburn Ovens Institute of TAFE (GOTAFE) Shepparton Campus**
GOTAFE Senior Staff And Partners
Overview of GOTAFE initiatives
Shane HELLWEGE, Executive Officer, Innoven & Primary Industries
Peter CARKEEK, Executive Officer, National Centre For Dairy Education AUSTRALIA
(NCDEA) MODEL
Helen RYAN, Commercial Manager, Health West, Kerang Nursing Project
Balvinder KAUR, Commercial Manager, Multicultural Education

**THE ACADEMY OF SPORT HEALTH AND EDUCATION (ASHE)/UNIVERSITY OF
MELBOURNE/GOTAFE**
Phil Guthrie, ASHE Manager
Carol Smith, Manager, Koorie Education Unit

Latrobe University – A regional focus
Liz Lavender, Executive Director, LaTrobe University Shepparton campus

GOTAFE AND PARTNERS ROUND TABLE DISCUSSION
THE REGIONAL CONTEXT: OECD HIGHER EDUCATION REVIEW KEY THEMES & FINDINGS
PAUL CULPAN, CEO

MICHAEL TEHAN, Gotafe Board President
Russ FRANCIS, GOTAFE, Deputy CEO
ROBYN FARLEY, GOTAFE Planning & Research Manager
Jeanne NORLING, GOTAFE, Executive Officer Service Industries
Albert AMADEI, GOTAFE, Executive Officer, Technology Industries
Geoff COBBLEDICK, GOTAFE General Manager, Business
Thomas GREENE, GOTAFE, General Manager, VET

Friday 11 December

- 08:30-15:00 **OECD Review Team internal meeting**
- 15:00-17:00 **Feedback session to Victorian Regional Stakeholders (Government and Tertiary Education Institutions)**
- 17:00:18:00 **OECD Review Team de-brief to Steering Committee**

Pre Meetings September 2009

- 2 Sept **Victorian Reference Group and Office of Knowledge Capital**

 The University of Melbourne
- 3 Sept **Box Hill Institute of TAFE**

 East Gippsland Institute of TAFE and Victorian TAFE Association nominee (discussion by phone)

 University of Ballarat
- 4 Sept **Deakin University (discussion by phone)**

 Regional Development Victoria

Higher Education in Regional and City Development

The State of Victoria, Australia.

The State of Victoria is a knowledge-intensive centre for Australia: Educational services are Victoria's strongest export worth more than AUD 5 billion, surpassing tourism and automotive sectors. Victoria is a magnet for immigration and the international student enrolment represents over 30% of the total for Australia.

The higher education system in Australia is moving to a more competitive phase with the decision that the government funding will follow students wherever they choose to enroll. How can Victoria continue to increase participation in higher education and widen access to lower socio-economic groups? How can its higher education institutions help transform Victoria into an innovative state with knowledge-intensive industries and jobs?

This publication explores a range of helpful policy measures and institutional reforms to mobilise higher education for regional development. It is part of the series of the OECD reviews of Higher Education in Regional and City Development. These reviews help mobilise higher education institutions for economic, social and cultural development of cities and regions. They analyse how the higher education system impacts upon regional and local development and bring together universities, other higher education institutions and public and private agencies to identify strategic goals and to work towards them.

The full text of this book is available on line via this link:

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