

OECD Review of Higher Education in Regional and
City Development

State of Victoria, Australia



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.

OECD reviews of higher education in regional and city development

Universities and other higher education institutions can play a key role in human capital development and innovation systems in their cities and regions. In the context of global economic and financial crisis, OECD countries are seeking to mobilise higher education institutions (HEIs) to support more strongly their economic, social and cultural development.

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 and regional governments for more responsive and proactive higher education institutions. As a result, 14 regions in 11 countries have undergone the OECD review process in 2008-10.

This OECD Review of Higher Education in Regional Development of the State of Victoria in Australia (<http://www.oecd.org/dataoecd/54/14/46643288.pdf>) explores a range of policy measures and institutional reforms to mobilise higher education for the development of the region. It is part of the series of the OECD reviews of Higher Education in Regional and City Development. The reviews analyse how the higher education system impacts local and regional development and help how this impact can be improved. In addition to human capital and skills development, technology transfer and business innovation, the reviews also considers higher education's contribution to social, cultural and environmental development and regional capacity building.

To know more about the OECD review process and requirements, visit Higher Education and Regions' website at

www.oecd.org/edu/imhe/regionaldevelopment.