Investing in a post-COVID-19 tech boom.

INTRODUCTION

The economic pause created by Australia's approach to COVID-19 presents an opportunity to focus government investment on a post-pandemic tech boom that is integrated and opens new pathways to build Australian health, wealth, resilience and wellbeing.

It is essential that any such investments are directed towards greater economic sustainability and environmental sustainability. It is equally vital that these investments include mechanisms for retraining at a time of high unemployment, and unlock the full potential of our future workforce by deliberately including gender equity targets, as well as ensuring vulnerable people are not further marginalised.

By investing in responsible technological solutions for agile and responsive modern manufacturing and agribusiness, clean energy, integrated digital healthcare, and advanced data collection and analytics, technology can and will provide more reliable and better equity of access to goods, services and utilities. At the same time it will create genuine and valuable opportunities for employment for people with disability, those living in rural and remote areas, and others who traditionally have found it difficult to train for and gain meaningful work.

Critical national capabilities recommended for investment in technology	KEY NEEDS
Advanced manufacturing	**Capacity**, agility, **digitisation** and **workforce development**
Health	Domestic capability, supply chain resilience, **digitisation**, **workforce development**
Energy	Clean electricity, accelerated transformation of the electricity market, system and infrastructure, and hydrogen generation and storage
Information & communication technology	**Capacity** of the National Broadband Network (NBN), **digital skills**
Agribusiness	Biosecurity, cross-sectoral **connectivity**, traceability

ADVANCED MANUFACTURING

KEY NEEDS — Capacity, agility, digitisation and workforce development.

COVID-19 provides an opportunity to review the capacity of existing manufacturing infrastructure to rapidly and flexibly address the needs of small-volume market demands. Australia should invest in digitising and applying industry 4.0 principles to reduce costs of rapid evolution in manufacturing, and enhance capacity to respond quickly as new needs emerge. A National capability database should be further developed to highlight gaps.

Supporting digitally-enabled bespoke manufacturing techniques will provide manufacturing agility, quality management systems will deliver high value manufacturing, and public support programs can create deliverables and a supply relationship. Support packages for readily applicable and genuine R&D should encourage updates to plant and equipment; the public sector should act as an early adopter to create strong and immediate viable markets for new domestic products including vaccines, pathology testing and test kits, equipment and consumables for medical stockpile and humanitarian activities. Interventions should focus on building domestic manufacturing capacity, to reduce reliance on imports from big international companies and create more supply chain resilience.

Investment in digital and data technology would improve inventory management, identify critical parts early, and optimise location of manufacturing centres; and therefore create more robust business models. Blockchain and other cybersecurity improvements should be made to the supply chain and Internet of Things, in which appliances and smart devices are increasingly connected.

The current workforce disruption creates a strong opportunity to take advantage of the entire potential workforce, by incentivising and encouraging more women into STEM-skills training and related careers. SME employers must be able to access new approaches through peer-to-peer learning methods and industry networking bodies. Tertiary education institutions should reconfigure learning packages into smaller blocks that encourage continuous education, and develop industry-based learning programs, for example to train engineers on new product introduction to manufacturing systems and pharmaceutical manufacturing through VET.

HEALTH

KEY NEEDS — domestic capability, supply chain resilience, digitisation, workforce development.

Full deployment of electronic health records should be accelerated through carefully designed regulatory interventions, investment in infrastructure and upskilling of the healthcare workforce in digital technology to facilitate rapid, agile, safe and effective inclusion of urban, regional and remote patients, and response in times of crisis.

Investment in digital technologies and data utilisation are vital to ensure improved preventative healthcare, access for marginalised populations, and response to future pandemics. This would also enable better use of artificial intelligence (AI) to model outbreak data more accurately and monitor population health and movement. Any such work must include consideration for and representation of diversity in health and population data and ensure protections of privacy, data integrity and equitable access to health care.

Pressures placed by the COVID-19 pandemic on the health system provide an opportunity to expose constraints and barriers, including infrastructure, systems and processes, regulatory and policy, market access, supply chain , advanced manufacturing (biotech, medtech and pharma), communication and logistics issues. This should be used to most effectively focus investment in digital and data infrastructure, digital workforce skills, telehealth and e-health delivery, and development of healthcare management systems with learnings from industry 4.0 in automation and connectivity. Investment (and incentives for investment) is also required in local manufacturing infrastructure and training to enable rapid response manufacturing capability. Technologically advanced infrastructure would also better manage critical stockpiles and coordinate government procurement: this means wider application of Industry 4.0 principles for supply-chain stabilisation and resilience and customer engagement.

ENERGY

KEY NEEDS — clean electricity, accelerated transformation of the electricity market, system and infrastructure, and hydrogen generation and storage

In the short-term, energy demand and emissions are falling and new investment in energy has stalled. Liquefied natural gas prices and oil prices are low, as are future electricity prices; this could trigger early closure of coal fired power stations and there is a risk of a cascading failure of energy retailers, but with the right active programs and investments, Government has an opportunity to fast-track transformation to a clean energy economy.

While COVID-19 has demonstrated how a crisis can break down political barriers, bi-partisan and state-federal barriers have been and remain a problem in the energy sector. The COAG Energy Council should take the opportunity to apply COVID-19 cooperation lessons to the energy sector, including, but not be limited to, the Australian Energy Market Agreement.

The priority should be to revive the energy sector while avoiding support for coal-fired power and increasing support for long-term, resilient, solutions for a low-emissions world.

Priority should be given to the clean energy, transport and grid technologies; the integrated system plan, renewable energy zones and reliable domestic, commercial, and system-scale energy storage. Investment into the regulated transmission businesses would enable construction of priority transmission lines and interconnectors, as identified by AEMO in its Integrated System Plan to increase energy productivity: underpinning low-cost clean energy investment. The regulatory arrangements for these transmission/interconnector assets should be structured to reduce consumer prices, relative to the business-as-usual build – ensuring access to clean energy at all levels of consumption and reducing the risk of a clean energy class divide.

Of particular opportunity: Australia is ready to be a world leader in hydrogen generation and storage. Accelerated development of this industry will provide a secure domestic energy source and a valuable export commodity. The emerging hydrogen industry has the potential to replace Australia's LNG exports in the long term, but will need investment in storage and network integration. Governments should give priority to actions that could drive down the cost of hydrogen production and storage, using the National Hydrogen Strategy as the framework.

INFORMATION & COMMUNICATION TECHNOLOGY

KEY NEEDS — capacity of the National Broadband Network (NBN), digital skills

Information and communications technology (ICT) is arguably the key driver of productivity growth and innovation in the 21st century. Australia's manufacturing, production and services sectors will increasingly be enabled by access to broadband, both fixed and mobile, as well as low-power network technologies. This can facilitate the widespread adoption of digitally-enabled, productivity-enhancing technologies such as 3D printing, nanoscale fabrication, machine learning and automation. Australian success stories in digital technology include Atlassian, Technology One, Vitalcare, VPI Photonics and Aconex – but research investment in digital technology is only a tiny fraction of its potential contribution to Australia's future prosperity. We need to promote closer partnerships between industry and the research sector to ensure Australia is best placed to realise opportunities in digital technology.

COVID-19 has thrown the disparity in network access into stark relief, with many regional and remote households left disadvantaged by limited and unreliable connections. **To improve equity of access to health, education, information and the digital economy, Australia should invest strongly in accelerating the upgrade of weaker parts of the network to ensure minimum network fixed user access speeds of 100/40mbps, regardless of user location.** This upgrade also represents an opportunity to support flexible working arrangements, allowing more people to balance work and home life in a way that best works for them. This in turn will boost productivity. To support enduring access to flexible working arrangements, the NBN business model must evolve to protect against artificial limitations on network capacity during times of peak usage. This would also support improved access to widely implemented and available telehealth and digital education.

Nations with better data are more able to predict looming crises, and more agile and resilient in times of crisis. As well as investing in better modelling and data analysis capacity, Australia should consider carefully how it wishes to support government access to data from mobile

phones, surveillance cameras, network usage and linked records. Such use must be strictly regulated to protect against misuse and uphold individuals' right to privacy; this is particularly important for marginalised populations who may experience what could in effect become state-sanctioned discrimination should increased government access to personal data be allowed. Any enhanced powers of data collection during national emergencies should be reduced once the emergency passes, and data collected in these circumstances deleted.

The knowledge and competencies required to engage with ICT have become critical in our 21st century society. Generic ICT skills and digital literacy have emerged as prerequisites for jobs across the economy. They are also central to the process of learning, as primary, secondary and tertiary educational institutions increasingly utilise technology in the delivery of educational programs. As a result, the skills required to understand and use ICT have become a fundamental element in all levels of education, and for essential life-long learning. As a national priority, all students must have courses that teach computational thinking (e.g. mathematics and coding) as part of the curriculum.

AGRIBUSINESS

KEY NEEDS — biosecurity, cross-sectoral connectivity, traceability.

The COVID-19 pandemic has exposed weaknesses in the data-sharing, biosecurity, logistics and supply chain for agribusiness, and these weaknesses should be viewed as opportunities for investment to strengthen the sector going forward.

Early alert surveillance systems, data sharing partnerships with regional neighbours and global supply chains, and deeper research and application of successful monitoring and control in other nations are all opportunities for investment to strengthen the sector.

Blockchain and similar technologies should be implemented to increase traceability and point of origin certification for consumable biological products. Labelling and tamper-proof packaging systems would further protect the quality and security of Australian products.

Integrating technology training into agricultural science degrees and supporting investment and manufacture of smart robots specifically created for the agricultural sector; investing in large-scale data collection and analysis to enable whole-of-system predictions and resilience against climate change; deeper development of domestic supply chains and investing in research (and application) in holistic urban vertical farming systems to reduce the distance from 'farm gate' to table would all build capacity and resilience while removing emissions from the system.

For an integrated approach to long term resilience against threats to biosecurity, Australia must renew its commitment to the World Health Organisation's 'One Health' initiative, which involves multiple sectors communicating and working together to achieve better public health outcomes through programs, policies, legislation, and research. A One Health approach is particularly relevant in the control of zoonoses (diseases that can spread from animals to humans, such as COVID-19, flu, and Hendra), food safety, and combatting antibiotic resistance, where animal and human health systems are increasingly intertwined. For One Health to effectively detect, respond to, and prevent outbreaks and other problems, health (epidemiological) data and laboratory information must be shared across sectors, jurisdictions and borders.