

# NOW IS A GOOD TIME TO **CIRCLE BACK**

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Global conditions are forcing Australia to seriously consider its onshore capabilities in order for industry to become more resilient, localised, sustainable and socially responsible.



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Since the COVID-19 pandemic, Australian businesses have had to learn some important lessons about resilience and flexibility — and also how to manage disruptions to their supply chains. Other global events in 2022 — the war in Ukraine and ongoing tensions over Taiwan — have since added to the challenges faced by Australian businesses and the economy. Australia's long-term reliance on imported fuel and overseas manufacturing has presented a need for radical new approaches to onshoring several key industries for strategically important goods that are essential for national resilience, and to reduce our reliance on fossil fuels.

Traditionally, the main barrier to making things in Australia or to entering into new business opportunities is the high cost of doing so, and the inability to compete on the global market, due to those high local costs. But if the supply chain crisis has shown us anything, it is that the savings achieved by sourcing products or services overseas can evaporate very quickly when global supply chains are constrained. For this reason, there is a growing impetus to expand Australia's onshore capabilities and reduce dependence on overseas supply chains.

There will of course always be products and materials for which we will remain dependent on overseas suppliers. The most significant among these are fossil fuels other than natural gas and coal — and even though we have an abundant supply of natural gas, the political and business situation at the moment is forcing Australians to pay global prices for it.

### Removing fossil fuel dependence

Many would agree that the way forward is to work towards removing all dependence on fossil fuels, not only for the cost, but for the environmental benefit this also brings. It is becoming increasingly clear that fossil fuels have a limited future.

For this reason there is also much talk about the possibility of Australia becoming a "renewable energy superpower"; however, the abovementioned factors also present a significant challenge in this regard. Batteries and solar cells manufactured overseas (mostly China), and imported steel used for wind turbines are notable examples: all a legacy of insufficient local investment in manufacturing over the last 4–5 decades. The salient example is that the current technology in solar cells was developed right here in Australia, but almost none are manufactured here: Australian research was put to use by overseas entrepreneurs.

### The decline in local manufacturing

In the same way as for energy, we export our raw materials to buy back finished goods we no longer manufacture ourselves. The loss of our car manufacturing industry was significant, both for jobs across a wide supporting industry and for the loss of its potential to provide ongoing support for a modern, digital and more technologically advanced manufacturing sector.

There is some potential for a resurgence however: the lower barriers for entry into manufacturing presented by electric vehicles mean that a number of small entrepreneurial businesses are already manufacturing special electric vehicles in Australia now. Good examples are Applied EV — now showcasing a number of practical autonomous electric industrial vehicles it has developed — and ACE Electric Vehicles, already producing locally made commercial vehicles.

### Circularity and product stewardship

There is also a significant need to make better use of what we have, and to waste less: resource recovery and product stewardship have never been more important. According to the Waste Management and Resource Recovery Association (WMRR), in order to support Australia's stated emissions reduction target, it will in fact be necessary to create a roadmap for circularity in Australia which requires a complete re-think of how we extract and manage materials to mitigate GHG emissions.<sup>1</sup>

Over recent years, there has been a growing awareness that our waste recycling industry is in a sorry state. While we would all like to be more environmentally responsible with our waste, there is still far too much of our waste ending up in landfill and in the oceans. Without smart automated technology, the cost of processing mixed waste materials is costly and labour-intensive, and therefore not profitable or cost-effective for companies that might like to take part.

It is not an unsolvable problem however. With the right technological investment, and public policy, Australia can accelerate its green manufacturing capabilities, according to Dr Veena Sahajwala of the UNSW Centre for Sustainable Materials Research and Technology (SMaRT@UNSW).

"Many of the commodities and critical materials needed for global electrification can come from waste, and metals can be recovered and used many times over," she said in a recent opinion piece<sup>2</sup>. "Even many plastics can be used multiple times, or used in completely new ways, such as being reformed into plastic filaments for 3D printing to save on creating original plastic."

An example she cites is a recent breakthrough at the SMaRT Centre on using carbon and hydrogen from various wastes for steelmaking, leading to efficiency gains.

"Our first generation of Green Steel is well known for using millions of waste rubber tyres destined for landfill as an alternative source for partial replacement coke and coal in electric arc furnace steelmaking," she said. "This technology locks the carbon from waste resources into the steel, hence causing no emissions by creating a form of carbon capture."



## Batteries and electronics

Another factor, which is difficult to avoid, is the current political rhetoric over the future of Taiwan. A major reason that China's claims over Taiwan are a concern for the rest of the world is the global dependence on Taiwan for semiconductor chips.

Taiwan's position in the world of semiconductor manufacturing is akin to Saudi Arabia's status in OPEC.<sup>3</sup> One company alone, Taiwan Semiconductor Manufacturing Corporation (TSMC), has a 53% share of the global foundry market (factories contracted to make chips designed in other countries), according to a report from the White House.<sup>4</sup> Other Taiwan-based manufacturers claim a further 10% of the market. After TSMC, the only other company that can make the most advanced semiconductors (five nanometres in size) is Samsung in South Korea.

Electronics production depends on a number of critical minerals — the supply chains for which are also a global issue.

As of 2021, Australia had the largest share of lithium production, at 55% of the world supply; however, when it comes to other critical minerals, China totally dominates.<sup>5</sup> Although Australia mines and processes so much lithium, it is nearly all exported to China to make the batteries that our renewable energy transformation relies on. This is now beginning to change however, with companies such as the Tomago-based Energy Renaissance now producing large storage capacity smart battery systems with more than 90% Australian content.

Geopolitical challenges aside, there is clearly a need for Australia — with our well-resourced and experienced mining industry — to become a net supplier of the other

critical minerals needed by the electronics industry worldwide, since critical minerals other than lithium are needed for most of our modern electronics. To that end the federal government has recently announced major initiatives to support growth in this area.

## Digital transformation to the rescue

One of the factors that can work in our favour is the rapid development of technology that can have a significant impact on the cost of achieving all these goals: digital transformation.

When applied the right way, modern digital technologies have the potential to make businesses more efficient and more competitive. Transformative technologies such as artificial intelligence (AI), the internet of things (IoT), virtual and augmented reality (VR/AR), cloud computing, and super-fast network protocols like 5G are beginning to be applied in more areas of industry.

In the coming years there will not be very much excuse for being in business and not having an understanding of how AI and the other technologies will impact business and industry.

The Industrial Internet of Things (IIoT) makes it easier to collect data that can then be used to enhance the manufacturing process. Data gathered from sensors in the manufacturing process can help manufacturers understand how machines are performing, optimise the maintenance process, reduce machine downtime, and even predict when things will go wrong.

The penetration of 5G networking into manufacturing is also predicted to enable manufacturers to more easily connect their

IIoT technology and leverage the data collection and data processing within devices using private 5G networks on their premises. Together these technologies enable beneficial outcomes in a number of ways, the most likely first outcome being in the form of predictive maintenance — where AI can be used to detect failure patterns in machinery and components.

Then there are digital twins, which can be used to simulate any physical process or object, including the manufacturing process itself. Digital twin technology can even be used to visualise and simulate an entire supply chain.

Of course one of the well-known enablers of automation is the use of robots. Robots and cobots have been shown over many years to help manufacturers achieve greater efficiencies, and will be one of the many technologies that will enable the future development of 'dark factories' — fully automated sites where production can occur without human intervention.

## Bringing it together

There will always be events and conditions that will present challenges, and the current global situation is an opportunity to learn lessons and to invigorate Australia's manufacturing, resource recovery, product stewardship and energy transition goals.

To do so will require greater investment in the latest technologies and the policy settings and support from government that will enable manufacturers to do so. It has never been more possible to make Australian manufacturing more competitive through automation.

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