

The global transition to a low carbon economy and the physical effects of climate change are driving demand for resilient, low carbon products. The Queensland manufacturing sector can benefit from responding to this demand, and implementing resource and energy efficiency measures to support the transition to a zero net emissions economy.

Megatrends are influencing the operations of Queensland's manufacturing industries. Robotics and technology are providing safer and more efficient operations through automation and data processing. Climate change is leading to more extreme weather events, which damages manufacturing infrastructure and disrupts supply chains. Public and private sectors are working toward achieving a low carbon economy, creating heightened demand for products such as renewable energy, battery storage, electric vehicles, and bioproducts. These megatrends are shaping future financial markets and creating opportunities in resource and energy efficiency.

Global capital is shifting from emissions-intensive products to those that support zero net emissions, as stated by institutional investors, rating agencies and corporates. The physical risks of climate change also necessitate the development and production of resilient materials for use in buildings and infrastructure. The manufacturing sector can respond to changes in demand through exploring opportunities to produce these resilient materials, as well as products such as biofuels, solar panels, and electric vehicles. Advanced manufacturing uses innovative technology to improve products and processes. In many cases, this has benefits for resource and energy efficiency, helping the manufacturing sector to contribute to carbon mitigation efforts. Some initiatives to reduce energy use, such as energy audits and automated lighting, can lead to a quick return on investment for manufacturing businesses.

Megatrends

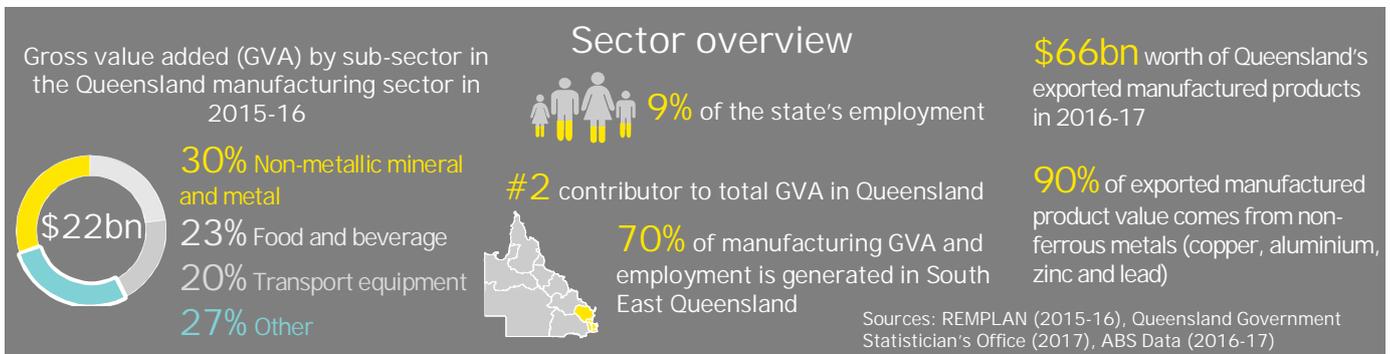
Growing global demand for renewable energy and zero emissions technologies

Emerging products and technologies, including biotechnology, 3D printing, energy efficient appliances and advanced manufacturing

Industry disruption and job creation as robotics, artificial intelligence and virtual reality provide safer and more efficient operations

"The government should advocate for this transition, focus on the positives and the importance of it to bring industry on board - particularly small business."
Manufacturing industry stakeholder

Queensland's manufacturing sector is highly diversified, and has an essential role in adding value to primary products. Approximately 93% of the Queensland manufacturing sector is made up of small manufacturing businesses, which should be considered when forming strategies for a zero net emissions sector and economy. Climate-related risks for the manufacturing industry are linked to other sectors, including agriculture and resources. Agricultural products and livestock are processed for local use and international export, while minerals and metals are primarily sold in international markets. In addition to raw materials produced by other industry sectors, the manufacturing sector also depends on technology, energy, water, skilled labour and robust transport infrastructure.



EY analysis shows that the transition to zero net emissions presents opportunities for the manufacturing sector. There are significant investment opportunities to realise these benefits and to effectively manage transitional risks.

- #### Key risks in a zero net emissions economy
- ▶ The price of electricity may increase as a result of carbon and energy policies.
 - ▶ Assets and supply chains may be exposed to extreme weather events.

- #### Key opportunities in a zero net emissions economy
- ▶ Demand would grow for the manufacturing of low carbon products and technologies.
 - ▶ Innovative design, production, advanced manufacturing and circular economy approaches would support resource efficiency and the creation of new products.

The current Queensland context

Small and medium-sized enterprises

- ▶ Food and beverage product manufacturing depends on the agriculture and transport sector.
- ▶ Nearly 60% of GVA from food and beverage manufacturing comes from Brisbane, Gold Coast and Ipswich.

Heavy industry

- ▶ Queensland exported over \$66 billion worth of manufactured products in 2016-17, of which 90% were non-ferrous metals, including copper, aluminium, zinc and lead.
- ▶ The main importers of non-ferrous metals are China (31%), Japan (14%) and the UK (13%).
- ▶ The heavy industry is reliant on the resources sector through products such as minerals, metals and energy sources (coal and gas).



Queensland in a zero net emissions economy

Small and medium-sized enterprises

- ▶ Climate change is predicted to affect the availability of agricultural inputs to manufacturing products, through more extreme weather events, droughts, very hot days and floods.
- ▶ Changing consumer behaviour, such as trends towards alternative protein sources such as grains instead of meat, would influence the manufacturing sector.

Heavy industry

- ▶ Climate change and extreme weather events is predicted to stress upstream activities and supply chains.
- ▶ Energy efficiency, low-carbon technology, affordable clean energy and automation may enable the manufacturing sector to compete in a carbon-constrained world.
- ▶ Emerging products and technologies will likely require manufacturing products from non-ferrous metals, minerals and rare earth elements.

How can Queensland position for the transition?

Attract investment

Facilitate growth

Government

To attract investment in the manufacturing sector, the Queensland government can:

- ▶ Position Queensland as an innovation hub of advanced manufacturing processes and forward-looking vision towards zero net emissions.
- ▶ Work with industry and academia to develop training programs for the advanced manufacturing workforce.

To facilitate growth of the manufacturing sector, the Queensland government can:

- ▶ Support programs which work with the manufacturing sector to improve resource and energy efficiency.
- ▶ Support research and development into resilient construction materials, low carbon products and advanced manufacturing processes.
- ▶ Provide information on risks and opportunities of climate change to manufacturing infrastructure, processes and supply chains in different regions.

Industry

To attract investment in the manufacturing sector, the industry can:

- ▶ Explore opportunities to manufacture low carbon products, such as energy storage batteries, electric vehicles parts, solar panels and biofuels and bioproducts.
- ▶ Partner with government and academia to support research and development into resilient construction materials, low carbon products and advanced manufacturing processes.

To facilitate growth of the manufacturing sector, the industry can:

- ▶ Upskill the current labour force to work with the materials and techniques required in a zero net emissions economy.
- ▶ Assess the risk of climate change on agricultural and resources inputs of manufacturing supply chains.

Proactive strategies and engagement will enable the Queensland manufacturing sector to remain resilient and sustainable in the face of climate change. The sector has a significant opportunity to contribute to a future zero net emissions economy through production of low carbon products and technologies.

Ernst & Young (EY) was engaged by the Department of Environment and Science (DES) to undertake a qualitative climate change risk and opportunity assessment for 8 sectors and 13 regions of the Queensland economy, under both a low carbon (2°C) and a business as usual scenario out to 2050. The assessment used the framework developed by the Task Force on Climate-related Financial Disclosures, which demarcates physical and transitional risk, as well as categories of opportunities and their implications.