CLIMATE COUNCIL

MARKETS ARE MOVING: THE ECONOMIC COSTS OF AUSTRALIA'S CLIMATE INACTION

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Key findings

1

The world is moving to respond to the climate crisis with carbon border tariffs now inevitable. Australians will pay a price due to our slow and weak national progress in cutting greenhouse gas emissions.

- The European Union has already announced a Carbon Border Adjustment Mechanism (CBAM) and this is expected to be the first of many such schemes as countries seek to re-level the playing field on climate action.
- Such moves are being considered by other jurisdictions, including Australia's key trading partners, as countries readjust their response in line with the urgency of the climate challenge.
- As one of the world's heaviest per capita emitters, and an advanced economy, Australia is under increasing international pressure to use its natural advantages to cut emissions rapidly and deeply this decade and help the world reach net zero as quickly as possible.
- Australians are already wearing considerable climate costs related to worsening extreme weather. Under a high emissions scenario, the costs of more frequent and severe events such as bushfires, storms and floods, as well as longer-term trends such as rising sea levels and average temperatures, could rise to $94 billion per year for Australia by 2060 and $129 billion per year by 2100.

2

Economic modelling shows that carbon border tariffs will reduce demand for Australian exports, lower economic growth and put thousands of Australian jobs at risk.

- Australia will experience a cut to our Gross Domestic Product (GDP) from the EU's CBAM. If South Korea, China and the Group of 7 (G7) follow suit our GDP losses will reach more than $4 billion. The loss to national income is more than $12.5 billion, representing a loss in living standards. Several thousand jobs are also at risk.
- The impacts will not be even across states, or sectors, with Queensland and New South Wales to bear the brunt due to the dominance of targeted export goods – particularly coal – produced in those states.
- If South Korea, China and the G7 follow the EU in introducing CBAMs, Queensland could lose more than 50,000 jobs, while in NSW around 20,000 jobs would be at risk. Under this scenario, Queensland is projected to lose more than $10 billion in Gross State Product, and NSW more than $5 billion.
- Such economic losses will be compounded by other factors such as a rise in the cost of capital which will result in falling public and private investment; dragging down growth and employment further.

3

Every day that the Australian Government delays climate action it is hurting households and businesses in missed economic opportunities and rising costs.

- By failing to act on climate change and promote low emissions industries, Australia is missing out on significant economic opportunities as global demand for clean products accelerates. For example, Sweden is providing green steel for Volvo, while the Canadian Government has announced it will become a world leader in carbon neutral cement in partnership with that industry.
- Modelling by Deloitte Access Economics suggests support for a low carbon economy in Australia will add $680 billion in economic growth and 250,000 new jobs by 2070.
- The green economy in the UK is now estimated to be worth almost $A400 billion, which is four times bigger than the manufacturing sector, and growth is forecast to increase by 6.7% a year over the five years to 2025-26.
- A growing number of countries have a carbon price which requires those responsible for creating emissions to pay for them. As such carbon prices continue to rise over time in the face of stronger global commitments on net zero, the costs of failing to act will also rise.
- The science is clear that all countries must slash emissions this decade, with the Climate Council recommending a 75% cut this decade for Australia on the way to net zero by 2035. As a first step, the federal government should at least match the commitments of our key allies, and pledge to at least halve our national emissions by 2030.

1. Introduction

The world's climate scientists could not be clearer: human induced climate change is accelerating and poses severe environmental, social and economic risks to us all (IPCC 2021). Our response must match the scale and urgency of this challenge.

We are already counting the costs from climate-driven disasters such as bushfires, droughts, cyclones, and flooding. These worsening climate impacts do not only cause physical damage to property. Economic activity is disrupted, productivity is lost, and health costs – both physical and mental – rise. Even education is being disrupted as a result of increased absenteeism, when schools cannot adequately cool classrooms (Canadian Institute for Climate Choices 2020). The loss of life and biodiversity is challenging to measure precisely in economic terms, but we know these costs are unacceptably high. All told, these disasters are estimated to have led to global economic losses of A$272 billion in 2020, according to Munich Re research (Climate Council 2021).

Acting swiftly on climate change matters. Failing to rapidly cut emissions this decade is forecast to lead to exponential increases in the costs of climate change over multiple generations. One estimate puts global economic losses of failing to act at A$24.1

Climate disasters cost the global economy A$272 billion in 2020.

trillion per year by 2100[1] (Kompas et al. 2018). For Australia, the figure is A$129 billion per year. In reflecting on both the economic risks of climate change and the opportunities for cleaner economic investment and growth, the International Monetary Fund (IMF) chose to include climate change in its regular economic reporting and financial stability assessment program (Gaspar and Parry 2021).

Many countries are readjusting their climate response in line with the scale and urgency of the challenge, but not all and not evenly. This lack of coordination means that, from an international trade perspective, there is an uneven playing field, with some countries bearing an economic loss because other countries are slower in cutting their emissions. The IMF has recently proposed an international carbon price floor arrangement as a solution. However, this is still a new idea and likely a long way from adoption (Gaspar and Parry 2021).

There is no time to lose, and the patience of nations that have led the way on climate action for laggards like Australia to catch up is rapidly wearing thin. The Australian Government has failed to recognise the costs of climate change, and the significant economic opportunities in acting swiftly and early on climate change. In contrast, carbon border tariffs are now inevitable with Australia in the firing line due to our slow and weak national progress in cutting greenhouse gas emissions. The question isn't whether we should act on climate change, but when will we choose to do so? Every day we delay, we pay a heavier price.

1 The modelled difference between RCP 8.5 (4°C) and RCP 4.5 (2°C).

2. Levelling the economic playing field

'Net Zero Emissions' has emerged as the key overarching objective in responses to climate change across the globe, with many countries also setting strong interim targets for 2030. In fact, net zero targets are now in place across 68% of global GDP and 61% of global emissions (Black et al. 2021). This includes Australia's largest trading partners – China, Japan, the United States (US), South Korea and the United Kingdom (UK). Indeed, over 80% of our country's 20 largest trading partners are racing to reach net zero by 2050 at the latest (Phillips 2021).

While the pathways to achieving net zero vary widely across, and even within, countries, global momentum for coordinated action has been building throughout 2021. At US President Joe Biden's Leaders' Summit on Climate in April 2021 and the Group of 7 (G7) Summit in June 2021, national leaders were forthright in their public statements on the need for urgent climate action. In the lead up to November's United Nations climate talks in Glasgow (known as COP26), countries have announced a series of higher and faster commitments to reduce their greenhouse gas (GHG) emissions by 2030.

While there are numerous policy options which can and should be adopted to ensure meaningful action on climate change, we are seeing increasing consideration and adoption of carbon pricing mechanisms as the most effective and efficient means of accelerating emissions reduction (OECD 2016).

2.1 The role of carbon pricing

A carbon price requires those responsible for creating emissions to pay for them. Without this price, the costs of emissions and the climate impacts that result cascades across societies and countries over multiple generations, creating significant inequality. By contrast, carbon prices make the cost of GHGs for any product clear, and send a price signal that reduces both consumption and production of that product, and stimulates investment in low-carbon alternatives. Carbon prices may be implemented either under an Emissions Trading Scheme (ETS) or as a fixed price (a carbon tax). The price is set by and payable to the government operating the scheme.

In 2021, there are 64 carbon pricing instruments in place, with a further three scheduled to be put in place, as shown in Figure 1. These schemes are operating in 45 national jurisdictions and 35 sub-national jurisdictions[2], which together cover over one fifth (21.5%) of global emissions, up from 15% in 2020 (World Bank 2021). This increase in coverage comes chiefly from the launch of China's national scheme, which is now the largest carbon market in the world (World Bank 2021). The World Bank recently launched a Partnership for Market Implementation to support countries wanting to adopt a carbon price scheme (World Bank 2021).

However, while many countries have adopted a carbon pricing mechanism, to date there has been no global coordination. This means the price of carbon applied, the products to which the price is applied, as well as the design of the schemes all vary considerably.

Even among jurisdictions that have a price on carbon, that price varied from as little as US$1 per tonne of carbon dioxide equivalent (tCO_2e[3]) up to US$137 per tonne in 2021 (World Bank 2021). This lack of coordination means that, from an international trade perspective, there is an uneven playing field, with some countries bearing an economic loss without any overall change in emissions.

The challenge for countries with, or considering, carbon pricing is twofold:

1. There is the potential for a loss of economic activity if companies chose to move production offshore to a country without a carbon price – a concept known as "carbon leakage"

2. There is the likelihood of loss of competitiveness for local producers forced to compete with imports from countries that don't have (or have a lower) carbon price.

To date, jurisdictions such as the European Union (EU) have dealt with this challenge by allowing "free" carbon permits to emitters. Such practices undermine the effectiveness of carbon pricing.

The IMF has recently proposed an international carbon price floor arrangement as a means of addressing these challenges. However, this is still a new idea and likely a long way from adoption (Gasper and Parry 2021).

2 Some schemes such as the US Regional Greenhouse Gas Initiative (RGGI) cover more than one state (jurisdiction).

3 CO_2e is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming potential.

CARBON PRICING MAP (2021)

Figure 1: Global carbon pricing schemes. **Source:** World Bank (2021).

- ETS implemented or scheduled for implementation
- Carbon tax implemented or scheduled for implementation
- ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled
- Carbon tax implemented or scheduled, ETS under consideration
- ETS implemented or scheduled, ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled, ETS or carbon tax

TCI-P = Transportation and Climate initiative Program

RGGI = Regional Greenhouse Gas Initiative

2.2 Carbon Border Adjustment Mechanisms are on the way

There is now increased consideration being given to Carbon Border Adjustment Mechanisms (CBAMs) as an alternative pathway to mitigate the above challenges and ensure a level playing field for economies that have carbon pricing schemes. Such schemes are actively under consideration by the EU, US, UK, Canada, and Japan.

BOX 1: WHAT IS A CARBON BORDER ADJUSTMENT MECHANISM (CBAM)?

Under a CBAM, importers to countries with a carbon price will need to buy carbon certificates based on the price they would have paid if these goods were produced under their own carbon pricing rules. In effect, they will pay a tariff for the carbon embedded in products, such as manufactured metals, that has not been paid for during production. Imports from countries with similar emissions policies are treated equally with domestic goods.

Any emissions-intensive product or sector could potentially be covered by a CBAM.

In December 2019, the EU formally proposed the introduction of a CBAM, as part of the European Green Deal (European Commission 2020). Investigations of a CBAM have been underway for several years but accelerated throughout the first half of 2021, culminating in the July 2021 announcement of the "Fit for 55" climate package which includes the introduction of a CBAM from 2023.

The scheme will initially apply only to direct emissions from iron, steel, cement, fertiliser, aluminium, and electricity, with other products to be added in the future. Actual tariffs will be introduced from 2026 once the scheme is fully operational. Details of the scheme are yet to be sorted, but the introduction is now inevitable.

The Canadian Government has also committed to explore the potential of a CBAM with like-minded economies (World Bank 2021). While in the US, President Biden is considering a "border adjustment tax" on countries that fail to meet climate obligations (Jordans 2021).

At the moment, countries like Australia that have poor climate policies are economically benefiting from exporting emissions-intensive products at the expense of countries with carbon pricing. As the EU Commission has stated: "Climate change is a global problem that needs global solutions" (European Commission 2021). In the absence of global carbon pricing and other commitments on emissions reductions, we can expect to see wider adoption of CBAMs accelerate over time.

Under a CBAM, a carbon tariff is applied to exports of targeted goods from countries like Australia at the price of the importing country's ETS. This raises the price of our exports, which in turn is likely to reduce demand for these goods. As exports make up a significant portion of overall Australian economic activity, Gross Domestic Product (GDP) can be expected to be lower under such a scenario.

There will also be flow-on implications beyond export demand with the size of the "shock" to the economy depending on a number of factors including the number of countries imposing a tariff, the percent of total exports affected, and the size of the tariff imposed.

Countries such as Australia that will be adversely affected by the EU CBAM have criticised the scheme as being protectionist and potentially in conflict with World Trade Organisation (WTO) principles. The legal technicalities of a CBAM are outside the scope of this paper. However, we note that the European Parliament has consistently and explicitly stated support for a WTO-compatible CBAM scheme (European Commission 2021) and a scheme that aims to reduce carbon emissions globally and that does not discriminate against any one particular trading partner is likely to comply with WTO rules (McKenzie et al. 2021). This view is supported by the Australian Institute of International Affairs, which has observed that there are "many reasons" to justify that the proposed CBAM is WTO-compliant (de Orte Júlvez 2021).

Carbon tariffs will affect the economy of climate laggard Australia.

3. The economic impacts of carbon tariffs

A Carbon Border Adjustment Mechanism will affect the Australian economy through multiple channels. Initially, the scheme raises the cost of targeted exports in the countries imposing a carbon price. This reduces demand for these exports, which, as noted, leads to lower economic growth. Over time, lower export volumes will result in different price impacts for different goods.

Falling export prices mean a deterioration in Australia's terms of trade because the prices of exports fall relative to the prices of imports. This reduces real income available for consumption which results in lower consumer spending, also reducing economic growth.

On the other hand, lower export demand typically leads to a lower value for the Australian dollar, which acts as an economic adjustment mechanism over time by stimulating investment in other (non-carbon-intensive) exports.

To understand the full implications of the introduction of a CBAM by different countries on a range of different goods, Victoria University's Centre of Policy Studies undertook Computable General Equilibrium (CGE) modelling using the Victoria University Regional Model (VURM). This provides a balanced assessment of the adjustments on Australia's economy and its industrial structure, reflecting the economic environment within which changes occur.

BOX 2: THE VURM MODEL

VURM is a bottom-up model of Australia's six states and two territories. By bottom-up we mean that each of the regional economies is modelled as an economy in its own right, with region-specific households, industries, prices, etc. The regions are linked via model-determined changes in inter-state trade and movement of labour and capital.

In the version of VURM used for the study, there are 83 industry sectors, of which 34 are potentially affected directly by carbon tariffs.

It is noted that CBAMs by their nature are complex. They need to consider factors such as global trading rules and also whether a product is made with localised renewable energy or energy from the grid that is emissions-intensive. These complexities are outside the scope of consideration of this paper. Rather, we focus on the broad implications for the Australian economy of the introduction of CBAMs on emissions-intensive goods produced with average levels of carbon intensity for the country as a whole.

3.1 Scenarios modelled

To understand the ramifications for Australia of introducing CBAMs elsewhere, three scenarios were considered:

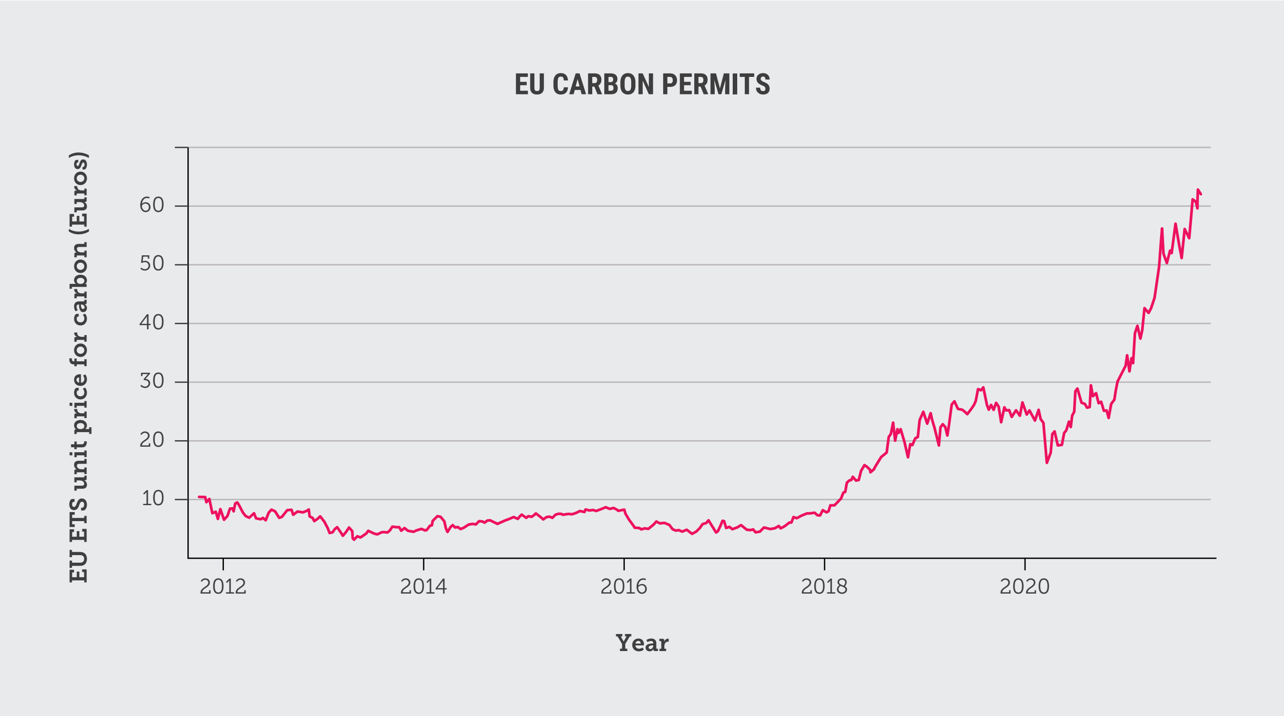
1. **The EU** – imposes a CBAM with a price on carbon of €59 (A$95) per tonne (ETS price as at 27 August 2021).

2. **G7[4] and South Korea** – all impose a CBAM with an average carbon price of US$39 (A$54) per tonne (based on the IHS Weighted global carbon price, which includes the EU and US schemes, as of 27 August 2021).

3. **China** – imposes a CBAM at the average global price of US$39 (A$54) per tonne, as there is no live price for China's national carbon scheme.

The carbon prices chosen reflect recent market prices, but are likely conservative if recent trends in prices continue into the future. Increases in prices are a reasonable expectation. For example, modelling suggests that to meet the EU's latest ambitions on emissions reductions (a cut of 50% to 55% by 2030 on 1990 levels), the carbon price under the ETS will rise to €129 (A$208) per tonne in 2030 (Pietzer et al. 2021). This implies that the modelled economic impacts for this report are likely to be conservative estimates.

Figure 2: EU ETS unit price for carbon (Euros). **Source:** Trading Economics (2021).



4 G7 includes USA, Japan, Canada, UK, France, Germany and Italy.

Under each of these scenarios, a carbon price is applied to the following goods, either already selected by the EU for its CBAM or considered likely to be included in future schemes, and also representing a significant percentage of Australian exports:

- Coal[5]
- Gas (LNG)[6]
- Chemical products
- Cement
- Primary and secondary iron and steel products
- Alumina and primary and secondary aluminium products.

The relative importance of each of these products is shown in Table 1 below with products linked to Australian Bureau of Statistics' industry categories.

Table 1 clearly shows that, while the EU alone imports a relatively small share of these Australian products, if schemes were introduced among our major trading partners that also have a price on carbon, the effect is magnified significantly.

Table 1: Regional share of Australian exports (2019).

Product	EU (%)	G7+S.Korea (%)	China (%)
Iron and steel	2.5	23.7	1.7
Alumina refining	0.0	0.3	0.0
Aluminium smelting	0.0	65.3	0.8
Fabricated metal products	8.1	59.2	20.2
Basic chemicals, plastics, rubber	12.5	36.0	23.4
Non-metallic building products	6.1	17.1	8.3
Gas mining and LNG	0.0	7.1	22.4
Coal mining	5.2	38.7	39.0

Source: Data from DFAT (2021).

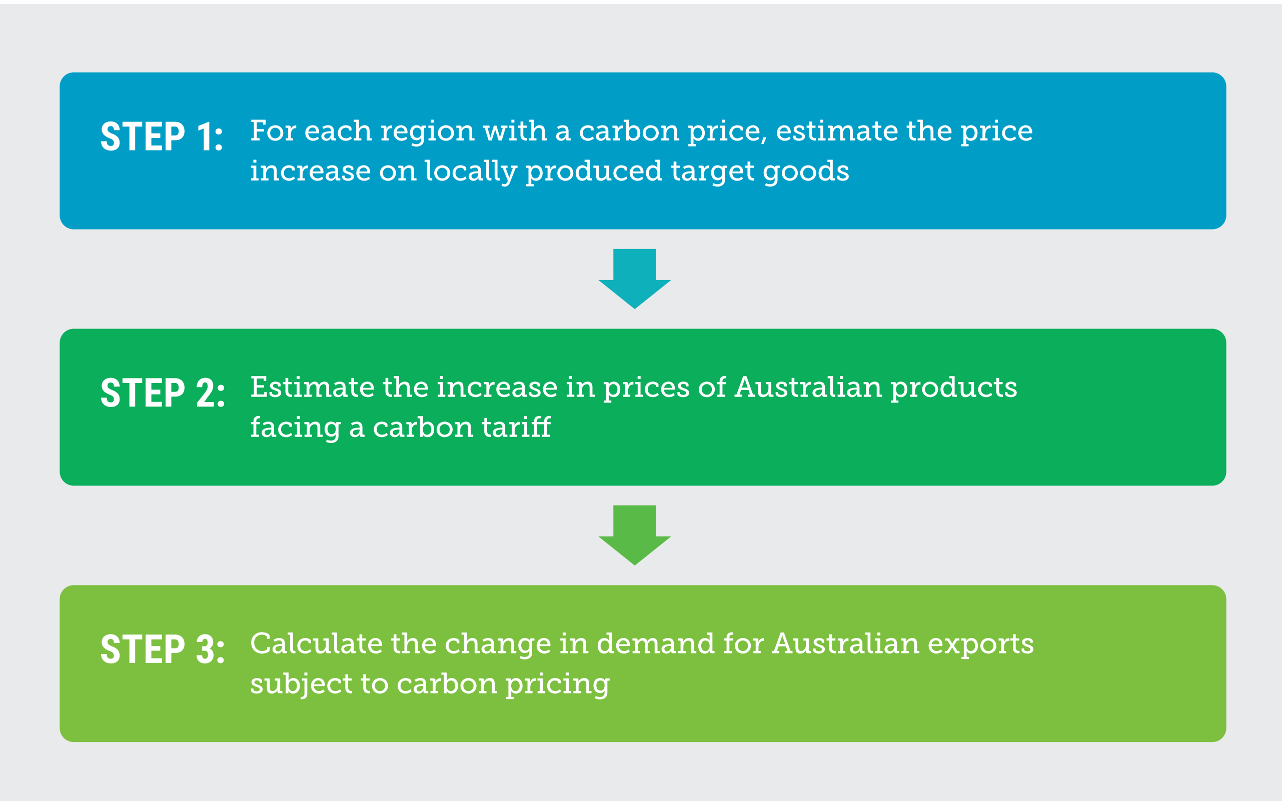
5 Untaxed fugitive emissions in Australia only. Combustion emissions from coal and gas will be taxed in each region regardless of the source of the product under the existing local carbon tax schemes.

6 As above.

3.2 Calculating the impact

The first stage of the modelling process is to estimate the change in demand for Australian exports to target regions, which is calculated in three steps, as shown in Figure 3 below. The changes in Step 3 are then used as inputs to “shock” the VURM.

Figure 3: Calculating the initial impacts of carbon tariffs on Australia’s economy.



Step 1: Effects of a carbon price on buyer prices for domestically produced goods in select regions

First, for each of the three regions, we estimate the impact of the assumed carbon price on the purchasers' price of domestically produced products.

A price on carbon emissions affects prices paid in a region in line with the carbon content of production. Calculating carbon content is not straightforward. Take for example the production of aluminium. Compared to the immense quantities of fossil fuel burned to supply electricity to the plant, aluminium smelting uses little fossil fuel directly. Its main inputs are alumina and electricity. Gas is an important input to production of alumina, while electricity supply currently relies on significant amounts of coal and gas power. Aluminium production seldom occurs close to the point of alumina production, so significant amounts of transport fuel are used in transporting alumina to the aluminium smelters. The same applies to moving aluminium from the smelter to downstream customers. Thus, aluminium has a relatively high carbon content, even though direct emissions at the smelter are small.

As can be seen from this example, calculating carbon content requires knowledge of direct emissions at the point of production plus information on indirect emissions that arise through forward and backward linkages to the rest of the economy.

To calculate the initial effects on purchaser's prices of domestically-produced products as a result of their emissions, simulations from a specially adapted version of the Global Trade Analysis Project (GTAP) CGE model are used. GTAP is rich in detail, particularly for the type of forward and backward linkages described previously. Appendix A contains a brief description of GTAP.

For each of the three regions, a carbon price is imposed on all relevant emissions and the impact on purchasers' prices is modelled under the following assumptions.

- All primary factor prices are held fixed, so that the emissions price cannot affect the unit costs of capital, labour and land.
- Final demand (consumption, investment, stock build up and exports) is fixed. Thus, final demand cannot respond to changes in price, allowing the carbon charge to flow fully into final demand prices.
- All relative-price substitution elasticities are set to zero. This, along with fixed final demand, forces demand generally to be unresponsive to price.

With the model set up in this way, simulated changes in purchasers' prices give, in principle, the cost of the carbon charge only.

Step 2: Estimate the increase in prices for Australian products under CBAM

We assume that each region imposes tariff increases on Australian imports that raise the purchasers' prices of the Australian produced item by the same amount as the increase in price of the domestically produced product (from Step 1).

Table 2 shows, for each region, the percentage changes in the price of selected imported Australian products with a carbon tariff.

Table 2: Estimated impact of carbon price on buyer prices of domestically produced products (% change).

Product	EU (%)	G7+S.Korea (%)	China (%)
Iron and steel	14.7	7.7	10.0
Alumina refining	5.3	2.8	3.6
Aluminium smelting	5.8	3.1	4.0
Fabricated metal products	3.7	1.9	2.5
Basic chemicals, plastics, rubber	1.9	1.0	1.2
Non-metallic building products	2.2	1.1	1.3
Gas mining and LNG	31.3	16.4	18.5
Coal mining	341.7	178.9	204.0

Source: Data from VU CoPs modelling.

Table 3: Estimated increase in landed duty-paid prices of Australian products (% change).

Product	EU (%)	G7+S.Korea (%)	China (%)
Iron and steel	14.7	7.7	10.0
Alumina refining	5.3	2.8	3.6
Aluminium smelting	5.8	3.1	4.0
Fabricated metal products	3.7	1.9	2.5
Basic chemicals, plastics, rubber	1.9	1.0	1.2
Non-metallic building products	2.2	1.1	1.3
Gas mining and LNG	6.3	3.3	3.7
Coal mining	23.9	12.5	14.3

Source: Data from VU CoPs modelling.

Step 3: Estimating changes in export demand as a result of CBAM

Carbon tariffs directly affect Australian producers via a contraction in export demand. For each region and product, we calculate the percent change in export demand based on price shifts and regional share of exports.[7] This is shown in Table 4 below.

A more detailed explanation of the Step 3 calculation is given in Appendix B.

Table 4: Estimated change in Australian export demand as a result of carbon prices (%).

Product	EU (%)	G7+S.Korea (%)	China (%)
Iron and steel	-0.3	-1.7	-0.2
Alumina refining	0.0	0.0	0.0
Aluminium smelting	0.0	-1.9	0.0
Fabricated metal products	-0.3	-1.1	-0.5
Basic chemicals, plastics, rubber	-0.2	-0.4	-0.3
Non-metallic building products	-0.1	-0.2	-0.1
Gas mining and LNG	0.0	-0.2	-0.8
Coal mining	-1.0	-4.3	-4.9

Source: Data from VU CoPs modelling.

7 The shift in demand is the product of (1) the inverse of the percentage increase in purchasers' price of the Australian-produced product given in Table 1 and (2) the share of the respective region in total export demand.

3.3 National economic impacts

The model allows for all direct and flow-on impacts to be estimated. The results presented in this section compare the three regional outcomes, noting that Germany, France and Italy are in both the EU and the G7. Results under a Chinese CBAM are marginally higher than for the G7 plus South Korea scenario, implying a doubling of impact if G7, South Korea and China were to impose CBAMs simultaneously.

Under each scenario, Australia's terms of trade decline in the first few years of the scheme: by -0.2% for the EU, -0.7% for the G7 and South Korea, and -0.8% under a China scheme. This leads to falls in real GDP and national income (GNI), as well as employment, as shown in Table 5 below.

A loss in GDP of more than $4 billion would occur if the G7, South Korea and China were all to implement a CBAM, which is equivalent to more than $12.5 billion in terms of national income. This represents a small, but meaningful loss in living standards, with several thousand jobs also put at risk.

These impacts are not spread evenly across regions or industries.

Table 5: Estimated long run change in Australian economy as a result of CBAM.

Product	EU (%)	G7+S.Korea (%)	China (%)
Real GDP	-$0.42 bn* (-0.02%)	-$1.95 bn (-0.11%)	-$2.45 bn (-0.13%)
Real GNI	-$1.75 bn (-0.07%)	-$5.87 bn (-0.29%)	-$6.65 bn (-0.33%)
Employment	-800	-2,600	-3,600

* In 2021 prices. **Source:** Data from VU CoPs modelling.

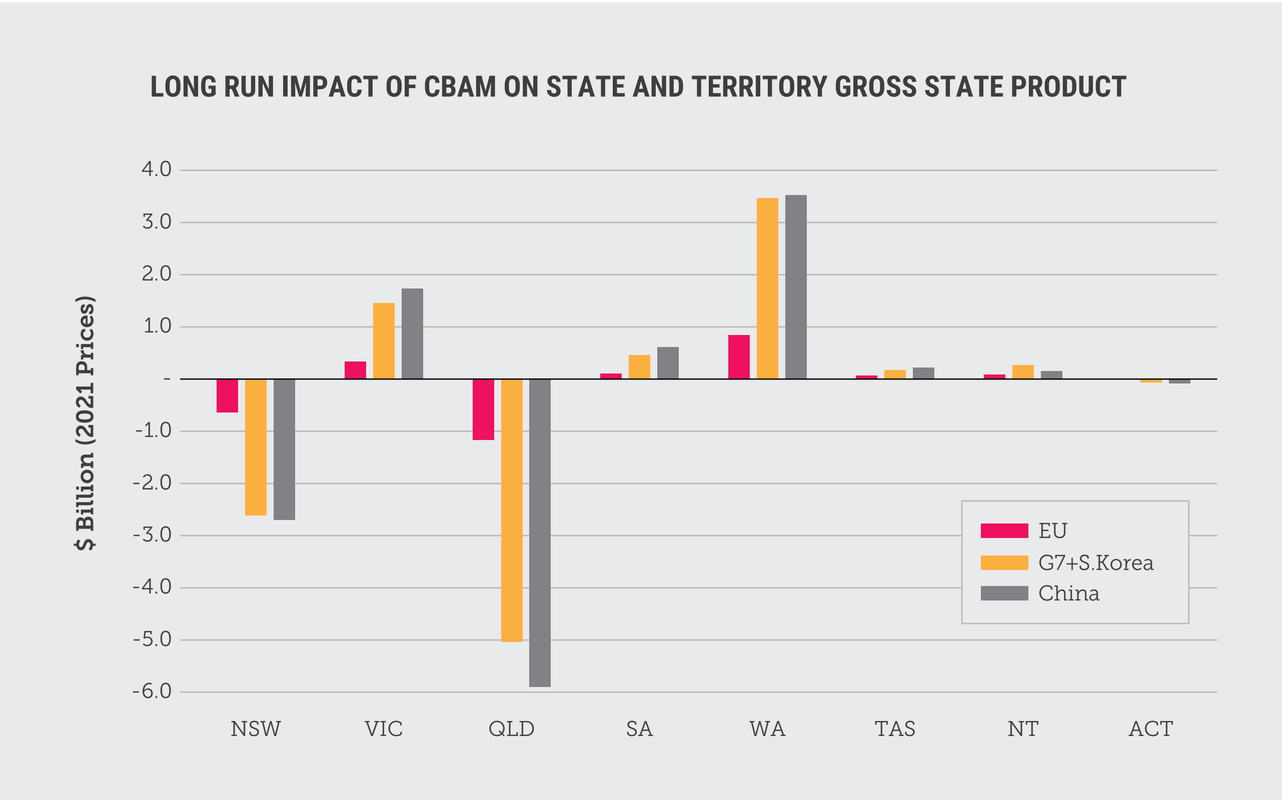
Australia would lose $12.5 billion in national income and thousands of jobs are at risk, if the G7, South Korea and China were all to implement a CBAM.

3.4 State and territory economic impacts

As shown in Figure 4 below, Queensland and New South Wales (NSW) bear the brunt of the impact, reflecting the dominance of targeted export goods produced in those states. Employment losses in Queensland would be in the tens of thousands, as shown in Figure 5.

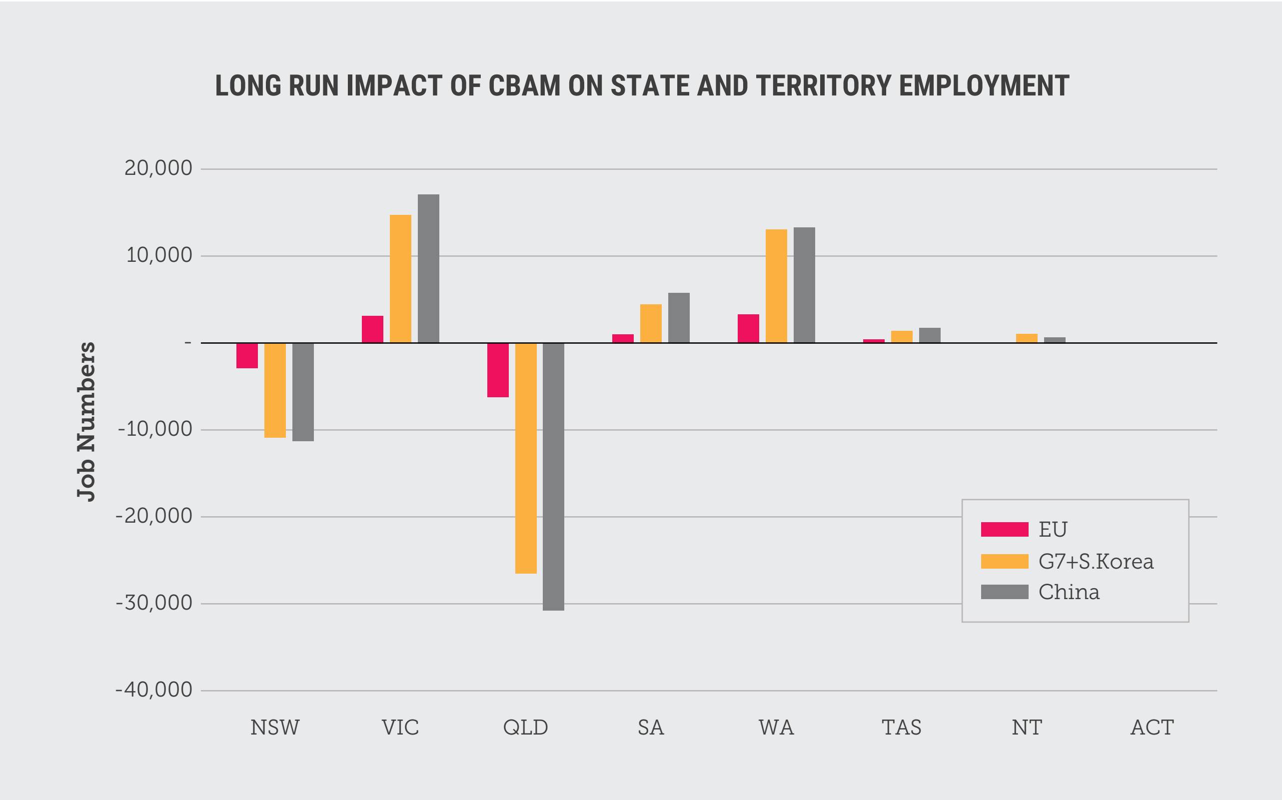
In contrast, Western Australia and Victoria actually benefit as a result of adjustment in the structure of the economy in response to the CBAM and the lower Australian dollar.

Figure 4: Long run impact of CBAM on state and territory Gross State Product ($ billion, 2021 prices).



Source: Data from VU CoPs modelling.

Figure 5: Long run impact of CBAM on state and territory employment.



Source: Data from VU CoPs modelling.

New South Wales and Queensland would be hit the hardest if our trading allies implement a Carbon Border Adjustment Mechanism.

3.5 Industry economic impacts

It is important to remember that there are both short and long term impacts from such schemes as a CBAM.

In the short term, demand for specific products falls. For example, if coal is included within the CBAM then, unsurprisingly, the hardest hit sectors in terms of both real value added[8] and employment lost are coal mining and mining services. This is due not only to its emissions intensity, but also because a large percentage of coal is exported.

It is worth noting that, in contrast, cement and fertiliser are not directly impacted, because they are not currently exported. These sectors will be adversely affected, however, as Australian companies shift demand to meet their own net zero targets and consumer preferences for 'clean' products. Updating technology within these sectors to cut emissions, as a number of states are doing, could support both domestic demand and export growth.

As export demand falls and reduces overall economic growth and household income, the services sector is also hit hard, even though it is not directly affected by tariffs.

Over the longer term, however, a decline in the Australian dollar due to falling exports makes Australian goods more competitive. This supports new investment in non-carbon-intensive export sectors as well as domestic industries that compete against imports. The extent to which these sectors are able to grow over time will be heavily influenced by government policies.

Detailed sector results from the CBAM modelling are presented in Appendix C.

8 'real value added' is an economic concept used instead of GDP to describe industry level economic contribution.

4. Conclusions

The estimates outlined in this paper are based on current carbon pricing schemes and a limited set of products. The potential losses could be significantly greater under higher carbon prices, which are reasonable to expect over time as countries increase their climate commitments, as well as if a broader range of products are included under the schemes.

There are also other potential economic losses that are not captured in this modelling.

In particular, and as recently flagged by both the Reserve Bank Governor (Reserve Bank of Australia 2021) and the Federal Treasurer (Commonwealth of Australia 2021), Australia's failure to act on climate change has profound implications for both the cost and potential supply of capital to Australian firms, as well as the cost to governments of raising funds through the bond market.

Research shows that worsening climate change has already had an impact on the cost of capital in climate vulnerable developing economies, raising borrowing costs from 1991 to 2017 for private sector firms by 0.63% (King et al. 2021). For sovereign debt (government borrowing) over the past decade borrowing costs in climate-vulnerable countries have increased by 1.17 percentage points on average.

Rising interest rates and tightened credit supply lead to a reduction in private sector investment and lower growth and employment outcomes. Higher government borrowing costs mean increased interest payments and reduced ability to spend, leading to lower economic growth. When it comes to climate inaction the costs are many, and compounding.

In addition, in failing to act on climate change and promote low emissions industries Australia is missing out on the opportunity to be a first mover and benefit from increased global demand for clean, green products. For example, Sweden is already providing green steel for Volvo (Sayyad 2021), while the Canadian Government has announced a partnership with its cement industry to be a world leader in carbon neutral cement (Cision Canada 2021). Australia could grow a new green export mix worth $333 billion per annum, almost triple the value of existing fossil fuel exports (BZE 2021). Modelling by Deloitte Access Economics suggests support for a low carbon economy in Australia will add $680 billion in economic growth and 250,000 new jobs by 2070 (Deloitte Access Economics 2021). In the UK, the green economy has now grown to an estimated $400 billion, which is four times bigger than the manufacturing sector. Growth in the sector is forecast to increase by 6.7% a year over the five years to 2025-26 (kMatrix 2021).

More critically, and on a much larger scale, the costs of failing to act on climate change are well documented. As noted earlier in this report, for Australia under a high emissions scenario, the costs of extreme weather events coupled with acute risks such as rising sea levels and higher average temperatures, could amount to $94 billion per year by 2060 (Australian Business Roundtable 2021) and $129 billion per year by the end of this century (Kompass et al. 2018). We are already bearing considerable costs from the 1.44°C of warming in Australia.

The EU's decision to introduce a CBAM is an early warning signal from countries taking action on climate change that they will not remain silent and ignore the inaction of other countries.

During the course of 2021, calls for tougher and more immediate action on climate change from many global leaders have risen dramatically in volume and are increasingly being backed by actions, such as the EU's "Fit for 55" climate package and net zero commitments from Japan, China and South Korea. We can expect to see further commitments made at COP26, and heavy pressure on any recalcitrant.

While the modelling shows that, at the national level, the CBAMs examined are unlikely to have a significant national impact, they will, however, have noticeable impacts at the industrial and state levels. Those impacts are due, in the main, to a reduction in output and employment in the coal sector, and will be necessary in order for Australia to shift towards a zero emissions economy.

These reductions are unavoidable, but ideally would occur within Australia's control with appropriate support for communities and workers directly affected. The NSW Government reached similar conclusions in its 2021 Intergenerational Report stating that a transition plan is vital for communities and workers to adjust to a new, post-carbon economy.

As one of the world's heaviest per capita emitters, Australia should embrace the economic opportunity ahead, step up and lead on climate change. This would involve not only a firm national commitment to net zero emissions, preferably by 2035, but also a detailed plan for how to cut emissions swiftly each year backed by robust policies and adequate funding.

The price of failing to do so is too high, both for Australians today and future generations.

Australia has much to gain if it chooses to become a first mover in the new economy, with growing demand for clean, green products.

Appendix A: Brief overview of the GTAP model with Environmental Enhancements

The GTAP family of models and VURM are based on a common theoretical framework – the ORANI model of the Australian economy. Each of the GTAP family can be likened to a series of ORANI models, one for each national region, linked by a matrix of bilateral international trade flows. Similarly, VURM can be likened to a series of ORANI models, one for each Australian state and territory, linked by a matrix of inter-state trade flows. However, unlike the static ORANI model, VURM and GTAP-COPS are recursively dynamic models, developed to address long-term global policy issues, such as climate change mitigation costs.

The version of GTAP used in this paper is labelled GTAP-COPS.

STRUCTURE OF DEMAND

GTAP-COPS models demand and supply by region, and the inter-regional linkages arising from the flows of tradable goods and services and of capital. In doing so, it ensures that each region's total exports equals total imports of these goods by other regions.

There are four sources of demand: (1) Industry demands for current production; (2) Demands for inputs to capital creation; (3) Household demand; and (4) Government demand.

Industry demand for current production

Industry demands in each region in GTAP-COPS are derived from solutions to a cost-minimisation problem involving a multi-level production function. Common to all GTAP models, in GTAP-COPS regional substitution is allowed between different national regions.

GTAP-COPS's structure of industry demand differs from that specified in GTAP by making explicit allowance for substitution possibilities between capital and energy and between different forms of energy. Such substitution is relative-price induced.

A maintained assumption in both models is that producers are price takers in both input and output markets. GTAP recognises two broad categories of inputs: intermediate inputs and primary factors. Industries in each region are assumed to choose the mix of inputs that minimises the costs of production for their level of output. They are constrained in their choice of inputs by a production technology of several branches, each with a number of levels (or nests).

At the first level, the primary-factor bundle (value added) and bundles of intermediate inputs (including energy units) are used in fixed proportions to produce output. The value-added and intermediate-input bundles are formed at the second level. The primary-factor bundle is a constant-elasticity-of-substitution (CES) combination of labour, fixed capital and agricultural land. Each intermediate-input bundle is a CES combination of a domestically produced good and an internationally imported composite.

At the third level, the import-composite is formed as a CES combination of goods from each foreign region. Note that the regional structure of imports is not user-specific.

In GTAP-COPS, energy is taken out of the intermediate bundle and is incorporated into the value-added nesting. This is done in two steps. First, energy commodities (primary fuels (fossil fuels), refined petroleum and electricity) are separated into two: electricity and non-electricity. Some CES-substitution is allowed within the non-electricity group and between electricity and non-electricity.

Second, the energy bundle is combined with capital to produce an energy-capital composite. This is combined with other primary factors in a value-added-energy (VAE) bundle.

Demand for inputs to capital creation

The second major form of demand is for inputs to capital creation (investment). The cost-minimising capital creator in each region in GTAP-COPS combines inputs to assemble units of capital, subject to a nested production technology similar to that facing each sector for current production.

Investment in each region is financed from a global pool of savings. In standard comparative-static GTAP, there are two alternative ways of allocating this pool to investment in each region. The first makes investment in each region a fixed proportion of the overall size of the pool – if the pool increases by 10%, investment in each region increases by 10%. The second relates investment allocation to relative rates of return. Regions that experience increases in their rate of return relative to the global average will receive increased shares of the investment pool, whereas regions experiencing reductions in their rate of return relative to the global average will receive reduced shares.

In GTAP-COPS, we adopt a third way. It is similar to the second approach adopted for comparative static modelling, but allows for a dynamic relationship between capital growth (investment) and expected rate of return. To ensure that at the global level savings matches investment, saving by region is endogenously adjusted in an equi-proportion way to ensure that the global condition holds.

Household demand

In the GTAP-family, in each region household (private) consumption is distinguished from government (public) consumption. It is assumed that the household demands goods and services to maximises utility from a given level of income. The utility maximising decision is based on given prices and a utility function with a constant-difference of elasticities (CDE) function form. Once the consumption of good *c* is determined, then the household decides on how much domestically-produced *c* to use and how much of imported good *c* to use. The sourcing allocation of imports is determined in line with the general allocation decision made for all users.

Government demand

In GTAP government consumption expenditures is assumed to be based on Cobb-Douglas allocation across all commodities. Summary of Environmental enhancements in GTAP-COPS.

Brief summary of environmental enhancements in GTAP-COPS

- Global emissions database that includes all major sources of greenhouse gases, except land-use change. This database is built primarily from data compiled for the GTAP-E model. That model, however, ignores most non-carbon emissions associated with agriculture, fugitives, industrial processes and waste. Data for these non-combustion emissions come from work largely undertaken at the CSIRO.
- As in VURM, in GTAP-COPS it is assumed that combustion emissions of carbon are proportional to the quantity of fuel combusted, while non-carbon emissions are proportional to the level of production in the industry generating them.
- Emission response functions are defined for non-carbon emissions. These specify abatement as increasing functions of the rate of carbon tax and reflect the assumption that the marginal cost of abatement rises with the level of abatement.
- GTAP-COPS has the facility to use the "technology-bundle" approach to model electricity generation, transport and steel manufacture. Under this approach, multiple technologies are specified for the production of the relevant output. The shares of the technologies in aggregate output depend on their relative profitability but there is no input substitution within technologies.
- For emerging electricity generation technologies, such as solar and geothermal, learning-by-doing mechanisms are added. These lower primary-factor input requirements per unit of output over time.
- In some mining industries, factor productivity is assumed to decline with increases in the cumulative level of resource extraction, reflecting increasing extraction costs as the resource base diminishes.

Appendix B: Calculating the exogenously imposed shifts in export demand schedules in VURM

We start with the assumption that world demand for Australian exports is determined with a constant elasticity. Hence, if *X* is the volume of Australian exports and *P* is the world price, then:

$$X = \left(\frac{P}{F}\right)^{\sigma} \tag{1}$$

X is the volume of Australian exports;

P is the world price of the exported product;

F allows for vertical shifts in export demand; and

σ is the export demand elasticity (a number like -5).

We assume that there are no transport costs and that all bi-lateral exchange rates are one. Under these assumptions, the world price is the same as the fob export price in Australia and the cif import price in any importing region.

The approximate percentage change form of (1) is:

$$x=\sigma(p-f) \tag{2}$$

where variables written with lower case letters signify percentage changes in variable written in corresponding upper case letters. For example, “x” is the percentage change in the volume of Australian exports (*X*). Note that (2) is accurate for small changes.

For commodity *c*, export demand equals global import demand. In other-words, for commodity *c*:

$$\sigma(c)\big(p(c)-f(c)\big)=\sum_r s_r(c)\times\sigma(c)\big(p(c)+t_r(c)\big) \tag{3}$$

The LHS of (3) is the same as the RHS of (2) with the addition of the commodity (*c*) index. The RHS of (3) is the sum of region-specific demands for commodity *c* exported from Australia. We assume that the import substitution elasticity is the same across all regions and equal to the export demand elasticity. The variable $t_r(c)$ is the percentage change in the purchases' price of imports due to the imposition of a carbon tariff; $p(c) + t_r(c)$ is therefore the percentage change in duty-paid cif price in region *r*. S_r is the share of region r in total import demand for commodity *c*.

Simple manipulation of (3) yields

$$f(c)=-\sum_r s_r(c)t_r(c) \tag{4}$$

Equation (4) says, for commodity *c*, that the vertical shift in export demand equals a trade-share weighted sum of percentage changes in purchases' prices due to the imposition of a carbon tariff.

Equation (4) is our formula for generating the shifts in export demand required as input to the VURM simulations of carbon tariff effects. 2019 data for export shares come from the Australian Bureau of Statistics. Shares for EU, G7+S.Korea and China are given in the first three columns of Table 3. The remaining columns of Table 3 are values for the shifts in export demand calculated using (4) for each of the three settings of *r*, using values for $t_r(c)$ given in Table 2. Note that an adjustment is made to remove the approximation arising from second-order effects not included in equation (2).

Appendix C: Estimated changes in real value added and employment by industry

Table 6: Projected changes ($m, 2021 prices) in Australian Real Value Added.

Product	EU	G7+S.Korea	China
1. Sheep and cattle (live)	33.5	139.1	148.7
2. Grains	24.6	102.0	109.1
3. Dairy cattle and raw milk	5.3	22.1	23.6
4. Other crops	24.2	100.5	106.8
5. Other agricultural products	11.4	47.6	50.9
6. Fishing products	3.1	12.9	13.7
7. Forestry and logging	3.2	13.8	14.6
8. Agricultural services	7.0	28.9	31.0
9. Coal mining	-790.4	-3,317.6	-3,781.7
10. Oil mining	50.5	208.5	224.0
11. Gas mining and LNG	107.8	339.1	99.3
12. Iron ore mining	388.3	1,598.7	1,715.0
13. Other non-ferrous metal ores	78.6	335.5	471.8
14. Non-metallic mining products	6.6	27.8	29.9
15. Mining services	-161.5	-689.2	-799.1
16. Meat products	24.9	103.6	110.5
17. Dairy products	5.5	23.0	24.5
18. Sugar (refined and raw)	5.6	23.2	24.7
19. Other food products	23.0	95.4	101.3
20. Drink (and tobacco) products	11.8	48.7	51.6
21. Textiles, clothing and footwear	18.5	76.7	81.7
22. Wood products	6.6	26.7	27.5
23. Paper products	5.9	25.5	27.5
24. Refined oil products	14.1	56.9	62.8
25. Basic chemicals, plastics, etc.	4.9	148.8	184.4
26. Non-metallic building product	7.7	41.5	44.5
27. Iron and steel	-2.1	-15.0	27.7
28. Alumina refining	12.1	49.2	53.6
29. Aluminium smelting	6.8	-32.5	34.0
30. Fabricated metallic products	-34.0	-118.8	155.5
31. Motor vehicles and parts	23.7	97.6	103.5
32. Other transport equipment	3.3	12.3	8.6
33. Other manufacturing	52.3	211.5	222.5
34. Other industries	-404.2	-1,792.7	-2,254.7

Table 7: Projected changes ('000 jobs) in Australian Employment.

Product	EU	G7+S.Korea	China
1. Sheep and cattle (live)	0.6	2.3	2.5
2. Grains	0.2	0.7	0.8
3. Dairy cattle and raw milk	0.1	0.4	0.4
4. Other crops	0.2	0.9	1.0
5. Other agricultural products	0.1	0.4	0.4
6. Fishing products	0.0	0.1	0.1
7. Forestry and logging	0.0	0.1	0.1
8. Agricultural services	0.1	0.3	0.3
9. Coal mining	-3.1	-12.9	-14.7
10. Oil mining	0.1	0.4	0.4
11. Gas mining and LNG	0.3	0.9	0.3
12. Iron ore mining	0.5	2.0	2.2
13. Other non-ferrous metal ores	0.4	1.5	2.1
14. Non-metallic mining products	0.1	0.2	0.2
15. Mining services	-1.0	-4.5	-5.2
16. Meat products	0.3	1.0	1.1
17. Dairy products	0.0	0.2	0.2
18. Sugar (refined and raw)	0.1	0.2	0.2
19. Other food products	0.3	1.1	1.2
20. Drink (and tobacco) products	0.1	0.5	0.5
21. Textiles, clothing and footwear	0.3	1.4	1.5
22. Wood products	0.1	0.2	0.2
23. Paper products	0.1	0.4	0.5
24. Refined oil products	0.0	0.1	0.1
25. Basic chemicals, plastics, etc.	0.1	1.5	1.8
26. Non-metallic building product	0.0	0.1	0.1
27. Iron and steel	0.0	-0.1	0.2
28. Alumina refining	0.2	0.9	1.0
29. Aluminium smelting	0.0	0.0	0.0
30. Fabricated metallic products	-0.2	-0.5	0.8
31. Motor vehicles and parts	0.3	1.2	1.3
32. Other transport equipment	0.0	0.1	0.1
33. Other manufacturing	0.7	2.9	3.1
34. Other industries	-1.7	-6.8	-8.4

References

Australian Business Roundtable (2021) Special report: Update to the economic costs of natural disasters in Australia. An Australian Business Roundtable for Disaster Resilience & Safer Communities commissioned report by Deloitte Access Economics. Accessed at http://australianbusinessroundtable.com.au/our-research.

Black R, Cullen K, Fay B, Hale T, Lang J, Mahmood S, and Smith S (2021) Taking Stock: A global assessment of net zero targets, Energy & Climate Intelligence Unit and Oxford net zero. Accessed at https://www.socsci.ox.ac.uk/article/net-zero-pledges-go-global-now-action-needs-to-follow-words-oxford-eciu-report.

BZE (Beyond Zero Emissions) (2021) Export Powerhouse: Australia's $333 billion opportunity. Accessed at https://bze.org.au/research_release/export-powerhouse/.

Canadian Institute for Climate Choices (2020) Tip of the iceberg Navigating the known and unknown costs of climate change for Canada. December 2020. Accessed at https://climatechoices.ca/wp-content/uploads/2020/12/Tip-of-the-Iceberg-_-CoCC_-Institute_-Full.pdf.

Cision Canada (2021) Government of Canada and Cement Association of Canada announce partnership to advance global leadership in low-carbon concrete production. News provided by Innovation, Science and Economic Development Canada, 31 May 2021. Accessed at https://www.newswire.ca/news-releases/government-of-canada-and-cement-association-of-canada-announce-partnership-to-advance-global-leadership-in-low-carbon-concrete-production-853485782.html.

Climate Council (2021) Hitting home: the compounding impact of climate inaction. Accessed at https://www.climatecouncil.org.au/resources/hitting-home-compounding-costs-climate-inaction/.

Commonwealth of Australia (2021) The Hon Josh Frydenberg MP, Treasurer, Capital markets and the transition to a low emissions future, Australian Industry Group Speech. 24 September 2021. Melbourne. Accessed at https://joshfrydenberg.com.au/wp-content/uploads/2021/09/Treasurer-Speech-Capital-markets-and-the-transition-to-a-low-emissions-future-Australian-Industry-Group-24-September-2021.pdf.

Deloitte Access Economics (2020) A new choice, Australia's climate for growth. November 2020. Accessed at https://www2.deloitte.com/content/dam/Deloitte/au/Documents/Economics/deloitte-au-dae-new-choice-climate-growth-051120.pdf.

de Orte Júlvez I (2021) EU Carbon Border Adjustment Mechanism Compliance With WTO Rules. Analysis, Australian Institute of International Affairs. 13 August 2021. Accessed at https://www.internationalaffairs.org.au/australianoutlook/eu-carbon-border-adjustment-mechanism-compliance-with-wto-rules/.

DFAT (Department of Foreign Affairs and Trade) (2021) Trade statistical pivot tables. Australian Government. Accessed at https://www.dfat.gov.au/about-us/publications/trade-statistical-pivot-tables.

European Commission (2020) EU Green Deal (carbon border adjustment mechanism). Accessed at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12228-EU-Green-Deal-carbon-border-adjustment-mechanism-_en.

European Commission (2021) Carbon Border Adjustment Mechanism: Questions and Answers. 14 July 2021. Accessed at https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_3661.

Gaspar V and Parry I (2021) A Proposal to Scale Up Global Carbon Pricing. IMFBlog, 18 June 2021. Accessed at https://blogs.imf.org/2021/06/18/a-proposal-to-scale-up-global-carbon-pricing/.

IPCC (Intergovernmental Panel on Climate Change) (2021) Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Jordans F (2021) Kerry says US examining carbon border tax, sees risks. AP News, 19 May 2021. Accessed at https://apnews.com/article/europe-environment-and-nature-business-government-and-politics-6a020cd7bb93a639e7445cf4999276a2.

King G, Volz U, Murinde V, and Ayas S (2021) The impact of climate vulnerability on firms' cost of capital and access to finance. World Development, Volume 137, January 2021, 105131. Accessed at https://doi.org/10.1016/j.worlddev.2020.105131.

kMatrix (kMatrix Data Services Limited) (2021) United Kingdom: Low Carbon Environmental Goods and Services - "Where we were, where we are, and where we're going". May 2021. Accessed at kMatrix_LCEGS_UK_2007_08_to_2020_21_with_forecast_2025_26_final.pdf.

Kompas, T., Pham, V. H., and Che, T. N. (2018) The effects of climate change on GDP by country and the global economic gains from complying with the Paris Climate Accord. Earth's Future, 6, 1153–1173. Accessed at https://doi.org/10.1029/2018EF000922.

McKenzie J, Lloyd A, Lloyd O, and White M (2021) EU carbon tariffs on the horizon – what Australian trading businesses need to know. Allens, 28 April 2021. Accessed at https://www.allens.com.au/insights-news/insights/2021/04/eu-carbon-tariffs-on-the-horizon-what-australian-trading-businesses-need-to-know/.

OECD (Organisation for Economic Co-operation and Development) (2016) Effective Carbon Rates: Pricing CO_2 through Taxes and Emissions Trading Systems, OECD Publishing, Paris. Accessed at https://doi.org/10.1787/9789264260115-en.

Phillips T (2021) Global climate action will reshape Australia's trade. Published in The *Australian Financial Review,* 09 February 2021. CPD (Centre for Policy Development) in the News. Accessed at https://cpd.org.au/2021/02/toby-phillips-global-climate-action-will-reshape-australias-trade/.

Pietzer RC, Osario S and Rodrigues R (2021) Tightening EU ETS targets in line with the European Green Deal: Impacts on the decarbonization of the EU power sector. Applied Energy, volume 293, 1 July 2021, 116914. Accessed at https://doi.org/10.1016/j.apenergy.2021.116914.

Reserve Bank of Australia (2021) Delta, the Economy and Monetary Policy. RBA webcast. Tuesday, 14th September, 2021, 01:00 PM AEST. Address by Philip Lowe, Governor, at the ANIKA Foundation – Online. Accessed at https://webcast.boardroom.media/reserve-bank-of-australia/20210914/NaN6136ff2f68f085001ab2ab2d.

Sayyad R (2021) Volvo gets "world-first" delivery of fossil-free steel for car production. *RenewEconomy,* 25 August 2021. Accessed at https://reneweconomy.com.au/volvo-receives-world-first-delivery-of-fossil-free-steel-for-car-making/.

Trading Economics (2021) EU Carbon Permits. Accessed at Source: https://tradingeconomics.com/commodity/carbon.

World Bank (2021) State and Trends of Carbon Pricing 2021. Washington, DC: World Bank. Accessed at https://openknowledge.worldbank.org/handle/10986/35620.

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