Climate Change Office

State of Play Report
Tasmania's Industrial Processes and Product Use sector

September 2024

Renewables, Climate and Future Industries Tasmania
Department of State Growth

Tasmanian Government

In recognition of the deep history and culture of these islands, we acknowledge all Tasmanian Aboriginal people as the continuing Custodians of this Land and Sea Country and pay our respect to Elders past and present.

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Contents

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Executive summary

Reducing our emissions

Tasmania recorded net zero greenhouse gas emissions for the first time in 2014, and have maintained our net zero status each year to 2022. However, our emissions profile is not guaranteed into the future, and we know we must do more to maintain our net zero status by reducing emissions in all our sectors, while also increasing the carbon stored in our managed forested state.

Tasmania's legislated economy-wide target of net zero emissions, or lower, from 2030, provides a flexible approach to emissions reduction and acknowledges that different sectors have different opportunities to reduce their emissions. For some sectors, more time, support and technology will be needed to transition to a low emissions future. To ensure a practical and balanced approach is taken to reducing emissions from our key sectors and building resilience to climate change, Tasmania's climate change legislation includes a requirement to develop sector-based Emissions Reduction and Resilience Plans (Plans).

Under the *Climate Change (State Action) Act 2008,* the industrial processes and product use (IPPU) Plan is to be prepared by November 2024. This State of Play Report is the first step to prepare a Plan for the IPPU sector. It provides an overview of the IPPU sector in Tasmania to identify gaps and future opportunities for the draft Plan, which will be released for public consultation.

Tasmania's IPPU sector

The IPPU sector currently accounts for nearly one-fifth of Tasmania's greenhouse gas emissions, excluding the land use, land use change and forestry (LULUCF) sector. The largest contributors to emissions from the sector are the mineral industry, which includes the production of cement and lime, the metal industry, which includes the production of aluminium and ferroalloys, and the use of synthetic greenhouse gases such as hydrofluorocarbons (HFCs) in products such as refrigerators and air conditioners.

Tasmania's major industrials are essential to our economy and are a key provider of skilled jobs. Importantly, as a result of Tasmania's 100 per cent renewable electricity generation capacity, these energy-intensive industries often have lower emissions than they would if located elsewhere in Australia or the world. However, the chemical processes used to create essential products like cement, aluminium and steel inherently release large amounts of greenhouse gases. In many cases, the opportunities to reduce the emissions from these processes are limited as the technology has not yet been commercialised and is costly.

As regulations and global markets change, support from governments to transition to a low emissions future will be required. The Australian Government is responsible for the Safeguard Mechanism, Australia's key policy for reducing emissions at our largest industrial facilities. It is also important that we ensure the sector is prepared for the physical impacts of climate change, such as an increased frequency of extreme weather events, which can damage facilities and disrupt supply chains.

There are already many emissions reduction initiatives underway by Tasmania's industries and at an international, national and state government level. It will be important to reduce barriers and explore and support new opportunities that will best assist the IPPU sector in the transition to a low emissions economy.

Background

Tasmania's *Climate Change (State Action) Act 2008* (the Act) sets out the government's agenda for action on climate change. Under the Act, Tasmania's emissions reduction target is to achieve net zero greenhouse gas emissions, or lower, in Tasmania from 30 June 2030. To help us achieve this goal, the Act requires the government to develop five-yearly sector-based Plans in consultation with business and industry. The Plans will support a practical and balanced approach for our key sectors to reduce greenhouse gas emissions and build resilience to climate change.

The Plans must support greenhouse gas emissions reduction, the transition to a low emissions economy, and resilience to climate-related risks. The legislation also requires that the objects of the Act are taken into account during the development of the Plans. The objects of the Act include supporting emissions reduction, adaptation and a consultative, partnership approach to action on climate change.

Plans must be developed for the following sectors:

- energy
- transport
- industrial processes and product use (IPPU)
- agriculture
- land use, land use change and forestry (LULUCF)
- waste
- any other sector or sub-sector determined by the Minister (the government has committed to develop a Plan for government operations).

A whole-of-economy roadmap outlining the links and cross cutting issues between all sectoral plans and Tasmania's first statewide climate change risk assessment will also be developed.

Delivery and timeframes

Under the Act, this Plan must be prepared by November 2024. The Minister for Energy and Renewables, as minister responsible for climate change, is to consult with each relevant portfolio Minister, and with business and industry representatives, to develop the Plans. The Minister is also required to publicly consult on each draft Plan.

The Plans are to be tabled in Parliament and updated at least every five years. This work is being led by the Climate Change Office in Renewables, Climate and Future Industries Tasmania (ReCFIT) in collaboration with relevant portfolio agencies.

Why sector-based emissions reduction and resilience planning?

The latest data[1] show that Tasmania recorded net zero greenhouse gas emissions for the first time in 2014 and has maintained its net zero status in the nine reported years since. Our emissions profile is largely due to the carbon sink in our managed forest estate and our longstanding investment in renewable electricity generation.

However, our emissions profile is not guaranteed into the future. Emissions are influenced by a range of factors such as population growth, major bushfire events, changes in consumer demand, market forces and technological advancements. We know we must do more to maintain our net zero status by reducing emissions in all sectors.[2]

The *AR6 Synthesis Report: Climate Change 2023* by the Intergovernmental Panel on Climate Change (IPCC)[3] confirms that humans are causing global warming and makes it clear that we need to act now. Global temperatures are now over 1.1˚C above pre-industrial levels and are likely to reach 1.5˚C above pre-industrial levels in the early 2030s. In Tasmania, the environmental, economic and social impacts of climate change are already affecting our business, industries, built environment and our natural values. It is important that we adapt effectively to a changing climate and build strong, resilient communities, while continuing to reduce our emissions.

A consistent theme from consultation on the government's action on climate change is that a partnership approach between government and industry is the preferred approach to support emissions reduction, transition to a low emissions economy, and build resilience in Tasmanian businesses and industries.

Purpose of this State of Play Report

This State of Play Report (Report) has been developed to support the requirement to prepare a Plan for the IPPU sector and to guide consultation. The Report provides a high-level summary of Tasmania's IPPU sector, its emissions, and the impacts of climate change on the sector. It also outlines emissions reduction and resilience opportunities and barriers, and relevant policies and actions at the local, national and international level. The Report identifies gaps and future opportunities for the draft Plan, which will be released for public consultation in mid-2024.

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[1] Tasmania's latest reported greenhouse gas emissions were released in April 2024 as part of the Australian Government's *National Greenhouse Accounts 2022* and *State and Territory Greenhouse Gas Inventories 2022*. The Australian Government reporting framework is consistent with UNFCCC and Paris Agreement reporting rules. National inventory reporting runs two years behind the current date and represents the most recent official data in Australia on annual emissions.

[2] Point Advisory and Indufor (2021) '2021 Update of Tasmania's Emissions Pathway Review – technical report' (prepared for the Tasmanian Climate Change Office) recfit.tas.gov.au/__data/assets/pdf_file/0009/492093/Tasmanian_Emissions_Pathway_Review_-_Technical_Report.pdf

[3] IPCC (2023) 'Climate Change 2023: Synthesis Report - Summary for Policymakers' www.ipcc.ch/report/ar6/syr/

Framework for development of the Plans

Purpose	To develop pathways for key sectors to reduce greenhouse gas emissions that support Tasmania achieving its target of net zero emissions, or lower, from 2030, support the transition to a low emissions economy, and build resilience to the impacts of climate change.
Objectives	To identify priority actions for government, business and industry.
Principles	• Sustainable development and social equity • Transparency and reporting • Science-based approach • Integrated decision making • Risk management • Community engagement • Complementarity
Sectors	• Energy • Transport • IPPU • Agriculture • LULUCF • Waste • Any other sector or sub-sector determined by the Minister (the government has committed to develop a Plan for government operations)
Consultation	• Portfolio Ministers • Climate Change Reference Group • Targeted consultation with key industry stakeholders and government departments • Public consultation on each draft Plan
Timing	• All Plans are expected to be finalised and published by 30 November 2024
Key public outputs	• State of Play Report • Draft Plan • Final Plan • Whole-of-economy roadmap
Next steps	• Implementation • Reporting through the annual climate change activity statement • Review of the Plans to identify gaps and opportunities for the development of Tasmania's next climate change action plan • The Plans are to be updated at least every five years

Scope of the Plan for the IPPU sector

The sectors identified for the development of Plans are based on the sectors identified in the United Nations Framework Convention on Climate Change (UNFCCC) greenhouse gas reporting framework.

Under the UNFCCC reporting framework, Tasmania's emissions from the IPPU sector include the direct emissions from a range of chemical processes used to manufacture products, in addition to the use of synthetic greenhouse gases and use of fossil fuels for non-energy purposes.

Tasmania's emissions from IPPU under the UNFCCC Reporting Framework	Related emissions accounted for in other sectors and sub-sectors
• Industrial process that chemically or physically transforms materials to produce metals and minerals such as cement, steel, lime and alumina. • Synthetic greenhouse gases such as HFCs used in products such as fridges, air conditioners and aerosol cans as substitutes for ozone-depleting substances. • The release of sulphur hexafluoride (SF_6) in electrical switchgear. • Use of fossil fuels for purposes other than the generation of energy (for example as lubricants). • The manufacture and use of other products, such as the nitrous oxide from aerosol products and anaesthesia, and process uses of carbonates.	**Energy sector** • Emissions from the combustion of coal and gas to generate heat, steam, or pressure for commercial and major industrial operations. • Fugitive emissions in oil and gas industries. **Transport sector** • Transportation of products and materials imported and exported by major industrials. **Waste Sector** • Disposal and incineration of solvents and other products without energy recovery.

The majority of Tasmania's IPPU emissions are from the manufacture of metals and minerals, followed by the use of synthetic greenhouse gases such as HFCs and SF_6. The Australian Government has the regulatory responsibility for the phase out of HFCs under the Montreal Protocol. The remaining sub-sectors combined make up less than 1 per cent of total IPPU emissions. The plan will focus on the largest IPPU emissions sources for Tasmania.

The Plan will also consider the resilience of Tasmania's IPPU sector to the impacts of climate change and the transition to a low emissions economy. The physical impacts of climate change and extreme events will affect industrial processes and supply chains to varying degrees. Demand for low emissions products and a changing regulatory environment may also impact businesses' competitiveness and access to markets, if businesses do not transition successfully.

Due to the nature of the IPPU sector and the UNFCCC reporting framework, there is significant overlap between the IPPU and energy sectors. Emissions associated with the stationary energy and combustion of fossil fuels used in industrial production processes are accounted for in the energy sector, while the emissions from the processes themselves are accounted for in the IPPU sector.

For example, the emissions from the combustion of coal for heat during the manufacture of cement are reported as energy emissions, and the emissions from the calcination of cement clinker are reported in the IPPU sector. There may be initiatives or programs identified in the Plans that lead to reduced emissions from both stationary energy uses and industrial processes. In these instances, the initiatives will be reflected in both the IPPU and Energy Plans.

The future opportunities identified in the Plans for each sector will be combined and inform the development of Tasmania's next climate change action plan. Preparation of the next action plan will consider how priorities are managed that are not addressed through the development of the sector-based Plans.

Carbon offsets

Carbon offsets or carbon credits, such as Australian Carbon Credit Units (ACCUs), are tradable financial products used by organisations to compensate for their emissions. Carbon offsets are generated by projects outside the organisation that reduce, remove or capture emissions from the atmosphere.

Carbon offsets will not be considered in the Plan for the IPPU sector. The Plans will focus on practical actions businesses and industry can take to reduce emissions within their organisation and contribute to low emissions from Tasmania's IPPU sector.

However, we recognise that for some organisations in the sector, carbon offsets or credits may play a role in meeting organisation-level emissions targets, or emissions requirements imposed by the Australian Government under the Safeguard Mechanism.

Scope 1, 2 and 3 emissions sources for the IPPU sector

Tasmania's emissions data, according to the UNFCCC reporting framework and as reported by the Australian Government, relate to the state's scope 1 emissions. These are emissions that are released as a direct result of an activity occurring in Tasmania such as the production of cement, steel and alumina.

Tasmania's legislated emissions reduction target of net zero, or lower, by 2030 refers to these scope 1 emissions. The Plan for the IPPU sector will focus on opportunities to reduce the state's scope 1 (direct) IPPU emissions, such as from the production of cement, aluminium smelting, and use of refrigerants and aerosols on-island.

Scope 2 emissions for Tasmania relate to electricity that is generated in another state and imported into Tasmania. The use of imported electricity with a higher emission factor than Tasmanian renewable electricity can impact the emissions estimates of Tasmanian businesses and will be considered as part of the energy Plan.

For Tasmania, scope 3 emissions are emissions that occur along supply chains outside Tasmania. For the IPPU sector this could include the emissions from the manufacture of products such as cement and steel that are manufactured elsewhere but used in Tasmania. These emissions represent the carbon released during the lifecycle of building materials, including extraction, manufacturing, transport, construction, and disposal, and are also known as 'embodied carbon' emissions. These emissions will be considered as part of the IPPU Plan, as well as in Plans for other sectors, where relevant. For example, one way to reduce these emissions is the use of low emissions products such as wood in building and construction, reducing the reliance on more emissions-intensive products. This opportunity will also impact the LULUCF sector and will be considered as part of both Plans.

Tasmania's IPPU sector

Tasmania's longstanding investment in hydro electricity generation that provides affordable and reliable electricity to consumers has attracted energy-intensive major industries, including manufacturers of cement, paper, zinc, aluminium, iron ore pellets and manganese (used to produce steel). This means that a small number of major industrials account for a large share of electricity consumption in the state.

As a result of Tasmania's 100 per cent renewable electricity generation capacity, many major industrials in Tasmania have lower emissions than they would if located elsewhere in Australia or the world. For example, in the manufacture of zinc, the electricity source is the primary influence on greenhouse gas emissions.[4]

Tasmania's industries are highly diversified and consist of a wide range of businesses across many different sub-sectors, including food production, primary metal and metal product manufacturing (including mining), wood product manufacturing, transport equipment, beverage product manufacturing, non-metallic mineral product manufacturing, and basic chemical and chemical product manufacturing.[5]

Tasmania's major industrials are critical to Tasmania's economy and are a key provider of high paying and skilled jobs. Manufacturing currently accounts for over 5 per cent of Gross State Product. The sector employs 18,000 people directly and supports numerous supply chains throughout Tasmania, underpinning thousands of jobs in other sectors including services, primary production and raw material production, such as forestry.

In 2021-22, the total value of Tasmania's international exports of processed metals and metal products was $1,783.2 million. The value of zinc and associated products was $986.7 million and aluminium and associated products $778.6 million. In the same year the total value of Tasmania's international exports of ores and concentrates was $1,333.0 million. The value of iron ores and concentrates was $700.1 million.[6]

[4] Nyrstar, 'Responsibility - Sustainability' www.nyrstar.com/responsibility/sustainability

[5] For more information see the *Tasmanian Advanced Manufacturing Action Plan 2024,* available on the Department of State Growth website at: www.stategrowth.tas.gov.au/business/sectors/advanced_manufacturing

[6] Department of State Growth 'Value of Tasmania's International Exports by Product 2017-18 to 2021-22' www.stategrowth.tas.gov.au/__data/assets/pdf_file/0009/359271/Exports_by_Product_-_2017-18_to_2021-22.pdf

Greenhouse gas emissions

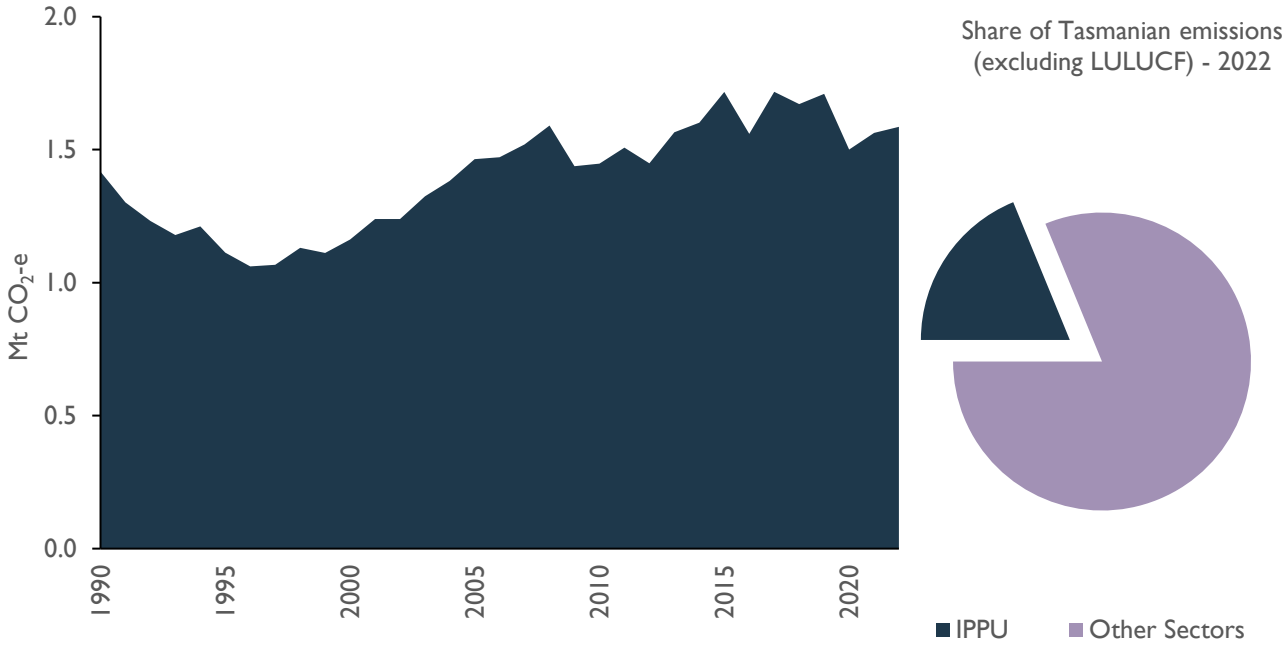
Tasmania's IPPU sector accounted for around 19 per cent of the state's emissions excluding LULUCF[7] In 2022.

The IPPU sector emits a wide variety of greenhouse gases including carbon dioxide, methane, nitrous oxide and perfluorocarbons, as well as synthetic greenhouse gases such as sulphur hexafluoride (SF_6) and hydrofluorocarbons (HFC), and other gases used as substitutes for ozone depleting substances. Many of these gases are more potent than carbon dioxide. For example, different HFC compounds have global warming potentials (GWP) of up to 12,000 times greater than carbon dioxide, and SF_6 is 23,500 times greater.[8]

As each greenhouse gas traps a different amount of heat in the atmosphere, known as its GWP, emissions for all greenhouse gases are reported as carbon dioxide equivalent to allow for comparison between gases.

The annual emissions from IPPU increased by 168 kilotonnes (kt) of carbon dioxide equivalent (CO_2-e) (11.9 per cent) between 1990 and 2022. Changes in emissions from the sector have historically been primarily driven by changes in production levels due to global commodity fluctuations, and the increased use of synthetic greenhouse gases as substitutes for ozone depleting substances.

Figure 1: Tasmania's IPPU sector emissions - 1990 to 2022



Source: Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, State and Territory Greenhouse Gas Inventories 2022

[7] DCCEEW (2024) 'State and Territory emissions' www.greenhouseaccounts.climatechange.gov.au/

[8] DCCEEW (2023) 'Australian National Greenhouse Gas Accounts Factors' www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-account-factors-2023.pdf

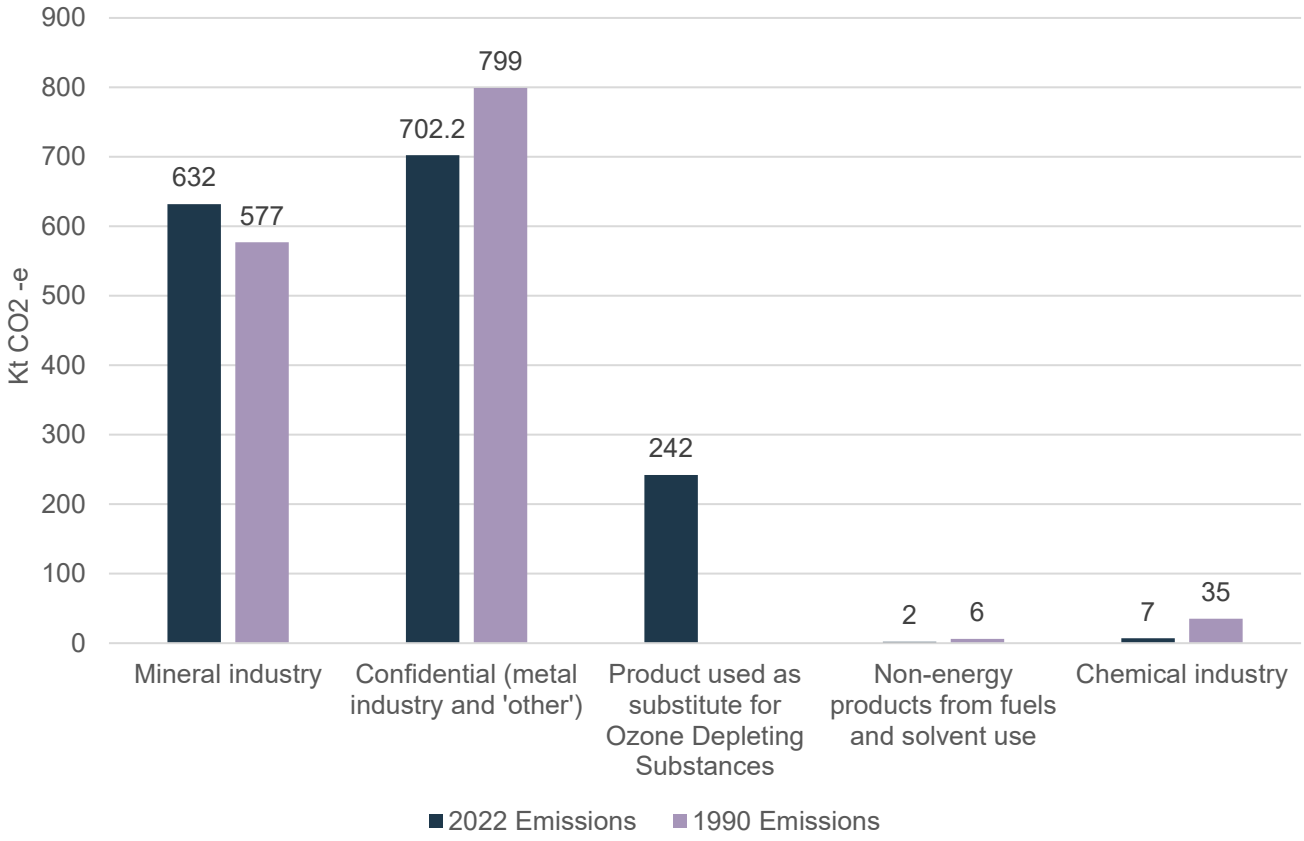
Sources of greenhouse gas emissions for the IPPU sector

Tasmania has six major industrial facilities which each have scope 1 emissions over 100,000 tonnes (t) of CO_2-e per year. The facilities include manufacturers of cement, paper, aluminium, iron ore pellets and ferro- and silico-manganese (used to produce steel), as well as mining.[9]

The production of these substances creates emissions through a range of chemical processes, outlined in the table below. These processes are often also electricity- and energy-intensive. The emissions from the electricity and energy used in these processes are accounted for in the energy Plan.

The use of synthetic greenhouse gases such as HFCs, carbon dioxide in the food and beverage industry, and fossil fuels for non-energy purposes such as solvent and lubricant are also included in the IPPU sector.

Figure 2: Tasmania's IPPU sector emissions by sub-sector – 1990 to 2022



Source: Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024, State and Territory Greenhouse Gas Inventories 2022

[9] The Clean Energy Regulator has publicly reported 2021-22 emissions data for six Tasmanian facilities covered by the ERF Safeguard Mechanism. The data is provided in the Appendix. For more information see the Clean Energy Regulator website: www.cleanenergyregulator.gov.au/NGER/The-Safeguard-Mechanism/safeguard-data/safeguard-facility-reported-emissions/safeguard-facility-reported-emissions-2021-22

Sources of IPPU emissions

Sub-sector	Description
Mineral industry	The main contributors to this sub-sector are cement clinker and lime production. Cement production involves the heating of raw materials, principally limestone, at extremely high temperatures in a cement kiln. This creates cement 'clinker' and carbon dioxide. Lime production involves a heating process to calcinate limestone, which turns the limestone into lime and carbon dioxide. Tasmania has one cement manufacturing facility and a limestone production plant.
Metal industry	Tasmania's emissions from the metal industry are not reported at the sub-sector level, to avoid the potential disclosure of commercially sensitive data.[10] However, these emissions are included in Tasmania's total IPPU emissions. The production of metals, including iron, steel and aluminium, involves chemical processes that produce a range of greenhouse gases. Tasmania has one aluminium smelter and two major industrials which manufacture inputs to the steel production process – iron ore pellets and manganese compounds.
Product uses as substitutes for ozone depleting substances	This sub-sector comprises emissions from the use of synthetic greenhouse gases such as HFCs and sulphur hexafluoride (SF_6). HFCs are used in products such as fridges and air conditioners, fire extinguishers, aerosols and some inhalers, as substitutes for chemicals that deplete the ozone layer that were historically used. Commercial and industrial refrigeration are the major contributor to this sub-sector.
Chemical industry	Emissions from the chemical industry come from the production of chemicals such as ammonia, nitric acid and carbide. Emissions from the use of nitrous oxide in aerosols and anaesthesia are estimated, however they are treated as confidential and aggregated.
Other product manufacture and use	Emission sources in the 'other product manufacture and use' sub-sector include SF_6 used in electricity supply equipment and distribution networks and other miscellaneous uses. Tasmania's 'other product manufacture and use' emissions are not reported at the sub-sector level to avoid the potential disclosure of commercially sensitive data.
Other	The 'other' IPPU sub-sector includes emissions from carbon dioxide used in the food and beverage industry (for example in carbonated drinks and a small contribution from sodium bicarbonate used in food production). Tasmania's 'other' emissions are not reported at the sub-sector level to avoid the potential disclosure of commercially sensitive data.

[10] In accordance with the Australian Government's reporting protocols, where reporting at a sub-sector or subcategory level could lead to the disclosure of commercially sensitive emissions data, the Australian Government treats the information as confidential and aggregates it with other sub-sectors prior to publication. For more information see the *National Inventory Report 2022*: www.dcceew.gov.au/sites/default/files/documents/national-inventory-report-2022-volume-1.pdf

Sub-sector	Description
Non-energy products from fuels and solvent use	The use of fossil fuels as lubricants, paraffin wax, and solvents (for example in paint, for cleaning and degreasing) releases carbon dioxide emissions.

Factors influencing Tasmania's IPPU emissions

Market forces

Tasmanian companies are recognising the market risk in producing emissions-intensive products and are exploring opportunities to decarbonise their industrial processes. Reforms to the Australian Government's Safeguard Mechanism commenced on 1 July 2023, and include setting emissions baselines for facilities covered by the scheme that will reduce by 4.9 per cent each year.

There are increasing opportunities for domestic production of high value products with low emissions equivalents, such as green steel and aluminium, and low carbon cement and concrete.

Cement and lime production

Changes in emissions from the 'mineral industry' sub-sector are strongly correlated with changes in volumes of cement production, which generally responds to market conditions. Competition with imported products has become a significant issue for production of cement in Australia in recent years. Nationally, improvements in industry practices such as the recycling of cement kiln dust, improvements in thermal efficiency, increased use of alternative fuels and clinker substitution have resulted in small reductions in emissions per unit of production.

Further opportunities include Carbon Capture, Use and Storage (CCUS). However, these will take time to develop and implement and are out of scope for the IPPU sector plan.

The energy sector plan will address hydrogen production as an alternative fuel source for energy-intensive industries. This is an important priority for the Tasmanian Government. The Tasmanian Renewable Hydrogen Action Plan outlines the vision for Tasmania to build on its existing and expanding renewable energy resources to become a leader in large-scale renewable hydrogen production, and become a significant global supplier of renewable hydrogen for export and domestic use by 2030. The government will deliver a $50 million package to support the Renewable Hydrogen Action Plan action over 10 years.

The $300 million Tasmanian Green Hydrogen Hub project at Bell Bay has recently commenced, with funding from both the Tasmanian and Australian governments. In January 2024, the Australian Government announced $70 million for the project. The project will investigate providing carbon-neutral feedstock for a range of Tasmanian industries, including ammonia production and metals manufacturing.

Metal manufacturing

Emissions from the production of metals are generally driven by production levels and the associated consumption of emissions-producing inputs in the production process.

Since the 1990s, Australia has seen a strong downward trend in emissions per tonne of aluminium produced as a result of reductions in perfluorocarbon emissions and improvements in process control.[11]

[11] DCCEEW (2023) National Inventory Report 2021 Volume I.

These emissions occur when the alumina ore content of the electrolytic bath falls below critical levels optimal for the production of aluminium. Emissions from perfluorocarbons can be reduced by lowering the frequency and duration of 'anode effects' through new computer systems, control of raw materials and careful attention to work practices.

Products used as substitutes for ozone depleting substances

Ozone depleting substances are chemicals that destroy the earth's protective ozone layer. They were commonly used in products such as fridges, air conditioners, fire extinguishers and aerosols.

In 1987 the international community adopted the *Montreal Protocol on Substances that Deplete the Ozone Layer* which commits to phasing out ozone depleting substances. Synthetic greenhouse gases such as hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) are now widely used to replace ozone depleting substances. While they do not damage the ozone layer, these products are potent greenhouse gases.

The parties to the Montreal Protocol agreed in 2016 to phase down the use of HFCs. The Australian Government has introduced the Ozone Protection and Synthetic Greenhouse Gas Management Program to control the manufacture, import, export, use and disposal of ozone depleting substances and synthetic greenhouse gases. This program includes a phase-down of imports of HFCs into Australia, which commenced in 2018. The Montreal Protocol will result in an 85 per cent phase-down in developed countries by 2036, an 80 per cent phase-down by 2045 in most developing countries, including China, and the remaining developing countries reaching an 85 per cent phase-down by 2047.

Alternative technology has been developed to replace SF_6 gas in lower voltage level switchgear to enable distribution network service providers to transition to lower global warming potential options. Alternative technology is still in development for higher transmission voltages. Alternatives to SF_6 often do not hold the same insulating properties, which means that alternative equipment can be larger, and this can cause issues when replacing or upgrading existing equipment.

Governments in Europe are banning the installation of new SF_6 switchgear from 1 January 2026 for medium voltage switchgear up to 24 kilovolts[12]. International market forces may have an impact on SF_6 switchgear technology availability in Tasmania.

[12] European Commission, Energy Climate change, Environment (2024) 'EU-Rules, Guidance on the EU's F-gas regulation and its legal framework' climate.ec.europa.eu/eu-action/fluorinated-greenhouse-gases/eu-rules_en

Impacts of climate change on the IPPU sector

Under a changing climate, Tasmania is expected to experience increased storm events and changes in rainfall patterns, which are likely to result in increased flooding, coastal inundation and erosion. We are also expected to experience increased temperatures, more hot days and heatwaves and longer fire seasons, with more frequent and intense bushfire events. Tasmania is expected to experience marine heatwaves, rising sea levels and increased windspeed. Extreme weather events are projected to increase in frequency and intensity over time. In Tasmania, the environmental, economic and social impacts of climate change are already affecting our businesses, industries, communities, built environment and our natural values.

Many energy-intensive industries in Tasmania are located based on their access to sea transport and proximity to the relevant raw materials. Most of Tasmania's major industrials are located on the north and north-west coast. Key physical risks include disrupted supply chains and energy supplies due to extreme weather events, as well as the direct physical risks to facilities associated with droughts, floods, sea level rise, coastal hazards and storms. For industries with outdoor labourers, increased temperatures can create unsafe conditions for workers that may also impact productivity. [13]

Risks for the sector in the transition to a low emissions economy

Transition risks are the risks and challenges associated with the transition to a low emissions economy. They can arise from changes in policy, shifts in market preferences and technological advancements. They may include financial risks such as difficulties accessing finance or insurance, reputational damage and impacts on an organisations social licence, legal risks such as liability related to climate change impacts, and challenges for workforce and labour markets. Transition risks for the IPPU sector include:

- Decreased demand for emissions-intensive products due to changing consumer preferences, for example a move away from emissions-intensive cement and steel to lower carbon alternatives.
- Increased costs of compliance with regulations, including the requirements for large emitting facilities to reduce emissions in line with reforms to the Safeguard Mechanism.
- The need to comply with climate-related financial disclosure requirements, which are proposed to commence in Australia for large businesses from 1 January 2025.[14]
- Reputational risks for companies that do not take genuine steps to reduce their emissions.
- Businesses exporting to interstate and overseas markets will increasingly need to demonstrate sustainability to remain competitive. This will be increasingly important in the manufacturing sector for businesses looking to access or benefit from sustainability credentials.
- Risks to international trade for industries that are slow to decarbonise, including through the adoption of carbon border adjustment mechanisms by international trading partners.

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[13] IPCC (2022) 'Industry' in *Climate Change 2022: Mitigation of Climate Change – Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter11.pdf

[14] For more information see Australian Treasury's *Climate-related financial disclosure: exposure draft legislation* released in January 2024: treasury.gov.au/consultation/c2024-466491

Opportunities, challenges and barriers

Emissions reduction opportunities

There are limited emissions reduction opportunities for the IPPU sector that are currently economically and technologically feasible.

The 2021 Tasmanian Emissions Pathway Review identified four emissions reduction opportunities for the IPPU sector. Three of these were identified as having low achievability due to the time to conduct the necessary research and development, and high implementation costs, and therefore were not included in a "best-fit" emissions reduction pathway for Tasmania.[15] The four opportunities are summarised below.

1 Use of wood in construction in place of emissions-intensive building products

Use of alternative lower emissions materials, such as wood, in construction, provides an opportunity to reduce emissions in both scope 1 and scope 3 emissions for Tasmania's IPPU sector, by decreasing demand for more emissions-intensive locally produced or imported products.

While there are opportunities to displace the use of some emissions-intensive products in building and construction, products such as steel and cement remain essential to the building and construction industry, and these heavy industries are critical to Tasmania's economy. It is important that this opportunity is considered in the context of supporting the transition of Tasmania's emissions-intensive industries as low emissions technologies become available.

This opportunity will also require an increase in on-island timber processing, which will be considered as part of the LULUCF sector Plan.

2 Use of cement substitutes or low emissions cement variants

Waste products such as fly ash, unburnt limestone, blast furnace slag, waste glass and clay can be blended to reduce the amount of limestone in cement, which reduces emissions from the manufacturing process.

For example, a reduction in clinker content, to produce a lower carbon-type cement, can be achieved by increasing the maximum mineral addition (unburnt limestone content) from 7.5 per cent to 10 per cent. Reducing clinker content through this process is being considered as part of a review of the Australian cement standard (AS 3972).

Use of fly ash is an important opportunity in other jurisdictions. Fly ash is a waste stream from the operation of coal-fired power stations and is also a waste stream from the operation of the Norske Skog Boyer paper mill. As Tasmania does not have any operating coal-fired power stations, fly ash in viable

[15] For more information see the *2021 Update of Tasmania's Emissions Pathway Review – technical report* prepared for the Tasmanian Climate Change Office by Point Advisory and Indufor: recfit.tas.gov.au/__data/assets/pdf_file/0009/492093/Tasmanian_Emissions_Pathway_Review_-_Technical_Report.pdf

commercial quantities would need to be imported from Victoria or New South Wales. This would increase the transport costs and emissions, making this an unviable opportunity for Tasmania.

3 Carbon-free aluminium smelting

Innovative technologies are under development for aluminium smelting which have the potential to reduce Tasmania's IPPU emissions. Technology is being developed internationally to produce aluminium carbon-free. This technology uses proprietary materials to replace the use of carbon anodes, which release oxygen rather than carbon dioxide in the aluminium smelting process and can also increase productivity. However, there are uncertainties associated with the timeframes for commercialisation and the capital investment required to retrofit an existing smelter.

4 Low emissions ferromanganese production

Substituting the coking coal used in ferromanganese production with bio-coke using charcoal, and/or the use of renewable hydrogen, has the potential to significantly reduce emissions from the ferromanganese smelting process.

This opportunity requires significant volumes of biomass, for example from forest residues. The current prices for bio-coke and renewable hydrogen are currently not viable and would result in an increase in operating costs for ferromanganese producers.

Critical decarbonisation pathways report

An independent report was commissioned by the mineral products sector and supported by financial and in-kind contributions from the Cement Industry Federation (CIF), Cement, Concrete and Aggregates Australia (CCAA), the SmartCrete Cooperative Research Centre (CRC), and the Reliable, Affordable, Clean Energy (RACE) for 2030 CRC. The report was developed by VDZ, a world-renowned research centre, to identify the critical pathways and practices that will enable the sector to lower its CO_2 emissions and to decarbonise by 2050. Engagement plans are being developed by the Australian cement and concrete sector to implement key recommendations of the report.

The report highlights key approaches for the successful decarbonisation of the sector, including:

- increased use of alternative fuels and raw materials
- lowering the clinker factor in cement and concrete, supported by new regulations to address cement and concrete standards
- accounting for recarbonation (the uptake of CO_2 by concrete products)
- capture, storage and/or use of the remaining CO_2 emissions, through the development and adoption of carbon capture, use and storage (CCUS) technologies
- standardisation of regulations to accelerate the transition process, to avoid multiple interpretations and implementations across jurisdictions, such as specifications of road authorities or waste to energy regulations
- transition from product push to market pull, and an expectation that governments and regulators will lead procurement processes to focus on embodied carbon and the clinker factor.

Some pathways are available now, but others such as CCUS are being tested and will need time for commercial implementation.

Innovation areas for future research have also been identified. These include developing opportunities for CCUS, specification of concrete durability by performance, beneficiation of fly ash, additive manufacturing and digitisation, as well as recarbonation. Other areas for innovation identified in the VDZ report are focused on the energy and fuel types used in the process of making concrete and cement.

Resilience opportunities

The opportunities to increase the resilience of Tasmanian industry to the physical impacts of climate change will depend on the risks for each industrial facility. The risks are influenced by a range of factors, including the products manufactured, location and supply chains.

In the global transition to net zero emissions, companies that take genuine steps to reduce and report on their emissions and improve their sustainability credentials more broadly will be well placed to adapt to the changes in markets. Some examples include investing in supply chain resilience, building flexibility, and investing in research and development of efficient and innovative technology to both reduce emissions and build competitiveness in new markets.

Industries that implement measures to decarbonise may also be able to register for the national Emissions Reduction Fund, allowing them to generate additional income through the sale of Australian Carbon Credit Units (ACCUs) or Safeguard Mechanism Credit (SMC) units.

Tasmania's high levels of renewable electricity generation may mean some Tasmanian-manufactured products are less emissions-intensive than others in the global market, already affording them a competitive advantage.

Investing in new technologies has the potential to create new jobs and skills in Tasmania, especially in regional areas where many major industrials are located.

Challenges and barriers

There are a number of potential barriers to reducing emissions and building resilience in Tasmania's IPPU sector. The cost and availability of low emissions alternative technologies remains a significant barrier to emissions reduction. Although low emissions technologies exist for some industries, these are often not yet price competitive with existing practices, as outlined in relation to the opportunities above.

Additional challenges include the skills and capabilities of the local workforce and the low level of industrial experience with emerging low emissions technologies. The international momentum to decarbonise is creating significant competition for labour and skills. Implementing low emissions technology will require a workforce with new skills, and significant resourcing required to retrain existing employees and attract workers with expertise in green technologies.

Other barriers include escalating costs for industries in the current global economic environment, regulatory barriers and the reform needed to appropriately regulate emerging technologies. Businesses will need to make ongoing adjustments to their processes to comply with evolving emissions standards and regulatory requirements. Businesses often have a low appetite for the risk of implementing innovative technologies. New technologies often require substantial capital investment and it can take some time before this is offset by benefits such as improved efficiency or reduced energy costs.

Trends, targets and initiatives

To identify the best emissions reduction and resilience options for Tasmania's IPPU sector, it is important to understand the current state and national policies, emissions reduction goals (from both government and businesses) and the initiatives already in place to support emissions reduction and resilience in the IPPU sector.

International

Emissions from industrial processes

In the international transition to net zero, the governments of many developing countries are redirecting investment away from fossil fuels and emissions-intensive industries, and instead investing in emerging clean industries. For example, the United States Inflation Reduction Act allocates more than US$369 billion to accelerate the clean energy transition in the US, including subsidies and tax credits for the decarbonisation of emissions-intensive industries, and procurement policies that require the purchase of low-carbon materials for government projects.[16]

Carbon pricing is becoming an increasingly common way to reduce the greenhouse gas emissions of large emitters. Over 70 countries around the world, which together account for more than 80 per cent of the world's greenhouse gas emissions, have introduced carbon prices to encourage large emitters to reduce their emissions.[17]

To prevent 'carbon leakage' in countries with strong emissions reduction measures such as carbon prices, many countries are implementing, or investigating options to implement, Carbon Border Adjustment Mechanisms (CBAMs). A CBAM places a tariff on imported products that is broadly equivalent to the carbon costs faced by domestic producers. This is generally aimed at discouraging emissions-intensive industries such as cement, iron, steel and aluminium from relocating to countries with less ambitious climate policies in order to reduce costs, undermining efforts to reduce global emissions ('carbon leakage'). At the same time, a CBAM is intended to encourage international trading partners to reduce their emissions.

The European Union (EU) is progressively implementing a CBAM from 2023 to 2026, to place a carbon price on imports from less climate-ambitious countries. The EU CBAM will initially apply to imports of certain products whose production is carbon-intensive and at most significant risk of carbon leakage. Other countries, including the United States, the United Kingdom and Australia, are considering the implementation of a CBAM.

In Australia, a high proportion of alumina and steel is exported to countries where carbon prices are in place or under consideration. Implementation of CBAMs could reduce overseas and domestic competitiveness of Australian-produced materials if the industry is slow to transition to low emissions production.

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[16] Climate Council (2023) 'Australia's clean industry future: making things here in a net zero world' www.climatecouncil.org.au/wp-content/uploads/2023/03/CC_MVSA0350-CC-Report-Industrial-Decarbonisation_V8-FA-Screen-Single.pdf

[17] Climate Council (2023) 'Australia's clean industry future: making things here in a net zero world'.

Australian Government

The Australian Government has several key policies in place to support emissions-intensive industries to decarbonise as part of its legislated emissions reduction targets of 43 per cent by 2030 and net zero by 2050.

Sectoral Decarbonisation Plans

The Australian Government is developing six sectoral emissions reduction plans, including a plan for industry which has the same scope as the IPPU plan, as guided by the UNFCCC greenhouse gas reporting framework. These sectoral plans will provide granular analysis of Australia's emissions reduction pathways, and the role of each sector in supporting Australia's transition to net zero. These sectoral plans will also consider any cross-cutting issues that are relevant to multiple sectors, and key enabling technologies.

The Australian Government is working closely with all state and territory governments to develop the sectoral plans, including looking for opportunities for jurisdictions to work together where collaboration will support emissions reduction.

Australian Carbon Credit Unit Scheme

The ACCU Scheme, formerly called the Emissions Reduction Fund, is a key element of the Australian Government's climate change policy and is particularly important for emissions-intensive industries. It has three key elements:

- providing businesses the opportunity to earn ACCUs for every tonne of carbon dioxide equivalent stored or avoided through the adoption of eligible practices and technologies
- allowing organisations to purchase ACCUs to meet their emissions reduction goals

Safeguard Mechanism

Reforms to the Safeguard Mechanism commenced on 1 July 2023. Under the reforms, baselines for facilities will decline over time, meaning Australia's largest emitters will be required to reduce their emissions. Carbon credits can also be purchased to support these requirements.

The Safeguard Mechanism applies to facilities with scope 1 emissions of more than 100,000 t CO_2-e per year. There are six Tasmanian facilities that currently meet this threshold and are covered by the Safeguard Mechanism, as outlined in the Appendix.

Support for industries to reduce emissions in line with reforms to the Safeguard Mechanism

The Australian Government has announced a large amount of funding and policy measures to support industries to decarbonise as part of the reforms to the Safeguard Mechanism. There are several streams of dedicated funding available through the Powering the Regions Fund:

- the Safeguard Transformation Stream ($600 million), to assist trade-exposed facilities to reduce emissions
- the Industrial Transformation Stream ($400 million), to support regional industrial facilities, including rail and aviation, and new clean energy industries
- the Critical Inputs to Clean Energy Industries Stream ($400 million), supporting primary steel, cement, lime, aluminium and alumina industries.

As part of this funding, the Australian Government announced $700,000 to trial biochar as an alternative to using anthracite in the smelting process at Liberty metals and manufacturing in Bell Bay.

The Australian Government also announced a $52.9 million upgrade to the kiln and to increase alternative fuel use at Cement Australia's Railton facility, $15 million to electrify Grange Resources Iron Ore mine in Savage River, and $5 million for fuel switching at Grange Resources Iron Pellet plant in Port Latta. The energy emissions reduction potentials as part of these projects are not in scope for IPPU.

To address the risks of carbon leakage in light of the Safeguard Mechanism reforms, the Australian Government has also commissioned an independent review to consider additional policy options to address carbon leakage, including examining the feasibility of an Australian CBAM. The review will focus on the steel and cement industries (including clinker and lime production). It is due to be completed by September 2024.

Other policies and programs to support industrial emissions reduction

Additional policies and measures include:

- up to $3 billion from the $15 billion National Reconstruction Fund to support renewable energy manufacturing and the deployment of low emissions technologies, including to modernise steel and aluminium production
- establishing the national Net Zero Authority to promote orderly and positive economic transformation associated with decarbonisation and energy system change in regional areas, including support for impacted workers

Ozone Protection and Synthetic Greenhouse Gas Management Program

The Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) is responsible for implementing the Ozone Protection and Synthetic Greenhouse Gas Management Program to control the manufacture, import, export, use and disposal of ozone depleting substances and synthetic greenhouse gases. DCCEEW licences the businesses and technicians who are the major end users of these gases and is responsible for the phase-down of HFC imports in Australia from January 2018, as part of Australia's obligations under the Montreal Protocol.

The Australian Refrigeration Council Ltd (ARC) is the peak body for the refrigeration and air conditioning industry in Australia. ARC administers refrigerant licenses and refrigerant authorisations on behalf of the Australian Government, to professionals in the refrigeration, air conditioning and auto industry. ARC aims to actively reduce direct and indirect greenhouse gas and ozone depleting emissions through licensing, compliance and education.

Tasmanian Government

Support for the modernisation of major industrials

The *Tasmanian Advanced Manufacturing Action Plan 2024* provides a framework of Tasmanian Government actions to support the state's advanced manufacturing sector, to enable the industry to grow its capability and become more successful and sustainable. As part of the plan, $1 million has been committed for the Advanced Manufacturing Accelerating Growth Grants program to assist Tasmanian manufacturers to become more competitive, resilient and scale up to global markets. This program will provide $10,00-$100,000 grants to eligible recipients, and builds on the success of a previous grant program.

The Tasmanian Government is investing $4 million to establish a crumbed rubber plant to support development of low emissions alternatives for materials for road construction projects. Options to expand

this type of funding to include low emissions concrete production or green steel in building projects could be considered in the future.

The Tasmanian Government signed a Memorandum of Understanding (MoU) with Rio Tinto in 2022. The MoU includes investigating options for future investment to secure the competitiveness of the Bell Bay smelter and potential new industrial opportunities that will create more local jobs and an economic boost to Tasmania while encouraging the creation, expansion and uptake of innovative technologies to decarbonise the Bell Bay smelter. This MoU demonstrates the commitment of the Tasmanian Government to work with industrial businesses collaboratively to reinforce our recognised renewable energy credentials and industrial future.

Access to renewable energy

The Renewable Energy Approval Pathway (REAP) is a group of actions that will support projects such as wind farms, transmission lines and other renewable energy investment entering the Major Projects Assessment Process under the *Land Use Planning and Approvals Act 1993* (LUPAA).

The REAP is an important step towards improving regulatory outcomes to support renewable investment and align with community expectations. Components of the REAP include:

- Establish a Major Renewable Energy Project case management function in State Government, composed of a dedicated case management officer for each project in ReCFIT and a cross-agency team to facilitate a more integrated and coordinated assessment process.
- Provide for the development of sector-specific renewable energy information requirement guidelines for the Major Projects Assessment Process.
- More resourcing for regulatory agencies, including the Tasmanian Planning Commission, EPA, and Aboriginal Heritage Tasmania.
- A coordinated pre-assessment process, including consideration of the Reserve Activity Assessment and related assessment processes, in parallel to the Major Project Assessment Process.

The Tasmanian Renewable Hydrogen Action Plan outlines the vision for Tasmania to build on its existing and expanding renewable energy resources to become a leader in large-scale renewable hydrogen production, and become a significant global supplier of renewable hydrogen for export and domestic use by 2030. The government will deliver a $50 million package to support the action plan measures over 10 years.

In January 2024, $70 million in funding from the Australian Government's Regional Hydrogen Hubs program was committed for the Tasmanian Green Hydrogen Hub project at Bell Bay. This project will support industrial businesses to decarbonise by providing carbon-neutral feedstock for a range of Tasmanian industries including ammonia production and metals manufacturing.

The energy sector plan will address hydrogen production as an alternative fuel source for energy-intensive industries.

Resilience

The Tasmanian Government has committed to updating the fine-scale climate projections for Tasmania to provide new information for a range of stakeholders, and developing of Tasmania's first statewide climate change risk assessment, due to be completed by November 2024. Once this risk assessment is complete, these data will assist in planning for future resilience of the sector and support ongoing investment.

Business Tasmania has also developed an Emergency Preparation Toolkit to improve business resilience to extreme weather events. This toolkit is aimed at small to medium-sized businesses, and includes considerations such as reviewing insurance policies, ensuring data is backed up, and considering planning for alternative trading methods and business dependencies.

Other state governments

New South Wales and Western Australia have implemented examples of regulatory reforms and programs to support emissions reduction from emissions intensive industries.

New South Wales Government Regulatory Approach

The New South Wales (NSW) Environmental Protection Authority (EPA) has developed the *Climate Change Action Plan 2023-26*, which has a focus on its regulatory approach to ensure NSW is more resilient and adapted to a changing climate. The NSW EPA aims to encourage and support environmental protection licensees and other parts of the regulated community to access government decarbonisation programs such as the Net Zero Industry Innovation Program, the Coal Innovation NSW Fund, the Emissions Intensity Reduction Program and Sustainability Advantage.

Action 19 in the *Climate Change Action Plan 2023-26* is to encourage and support the regulated community to innovate. This includes considering whether the regulated community require additional targeted assistance to reduce their emissions or exposure to climate risks, and exploring new ways to provide a regulatory environment that fosters innovation. Actions include:

- Consider if changes to policies or procedures could assist with innovation.
- Explore regulatory reforms or consider alternative forms of regulation, such as an alternative for low-risk renewable energy projects.
- Provide links to relevant programs, case studies and latest trends on the NSW EPA website.
- Regularly engage with relevant licensees and industry groups to provide up-to-date information on innovation opportunities and programs, new regulatory approaches, and emerging initiatives through regular meeting forums.
- Support the development of innovative technologies and approaches that reduce emissions, and showcase industry-led innovative climate-friendly practices.

Western Australian Government Carbon Innovation Grants

The Carbon Innovation Grants Program is a Western Australian program launched in 2021 to build the capacity of heavy industry sectors to transition to net zero emissions by 2050 in line with government targets.[18] This program has funded feasibility studies and trials that help to avoid, reduce or offset carbon emissions from the heavy industry process, with a focus on innovative technologies for carbon abatement and sequestration.

Business and industry

Many of Tasmania's major industrials have commitments and actions in place to reduce their emissions and support their transition to a low emissions economy.

Targets of some of Tasmania's largest IPPU emitters

- Cement Australia is committed to achieving a carbon reduction of 40 per cent by 2030 and net zero emissions by 2050.
- Grange Resources, the owner of the Port Latta iron ore pellet plant and Savage River iron ore mine, has targets to reduce emissions by 50 per cent by 2030 and net zero scope 1 and 2 emissions by 2035.
- Rio Tinto, the owner of Bell Bay Aluminium, is committed to a 15 per cent reduction in emissions by 2025, 50 per cent by 2030 and net zero by 2050. This reduction will be supported by short-term changes in processes, medium-term actions such as transitioning to renewable fuels and electric vehicles, and long-term transitioning to new technologies as they become commercially available for the sector.
- GFG Alliance, the owner of Liberty Bell Bay ferromanganese plant, has a goal to become carbon neutral by 2030.

Heavy Industry Low carbon Transition Cooperative Research Centre

The Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC) is investing over $200 million for collaboration between industry, research, and government to deliver three industry-led research programs to de-risk technology pathways for the decarbonisation of heavy industry. Grange Resources and Liberty Steel Group have locations in Tasmania and are Core Partners of HILT CRC, and the CEO of the Tasmanian Minerals, Manufacturing and Energy Council (TMEC) is a current director of the CRC.

The research programs are:

1. **Process technologies**

   Focusing on accelerating carbon reduction in industrial processes with preferred emerging technologies, including green iron and steel, green alumina and low-carbon cement and lime.

2. **Cross-cutting technologies**

   Develop and demonstrate technologies that have economic potential to lower carbon intensity through low-carbon heat, fuels, oxidants, and reductants.

[18] Government of Western Australia (2023) 'Carbon Innovation Grants Program' www.wa.gov.au/service/community-services/grants-and-subsidies/carbon-innovation-grants-program

3. **Facilitating transformation**

   Assessing the best ways to bring new low-carbon technologies to market, including where to establish new processes, which technology options make the most sense and how best to transition, as well as developing solutions to the social, commercial, and regulatory barriers that may affect the pace of decarbonisation across all heavy industries.

The Australian Government has engaged HILT CRC to fulfil Australia's co-leadership role in coordinating knowledge, sharing benefits, and building further international networks on heavy industry decarbonisation. The Tasmanian Government is yet to become a member of HILT CRC, although this is an opportunity that could allow greater collaboration and engagement in research and innovation for the sector.

Materials Embodied Carbon Leadership Alliance (MECLA)

Over 100 organisations from the building industry and all levels of government have formed the Materials Embodied Carbon Leadership Alliance (MECLA). MECLA launched in April 2021 and is funded by the NSW Government and Government of South Australia. This collaboration has several working groups which are addressing barriers and identifying opportunities to:

- demonstrate the demand and activate the supply of materials that meet the needs of net zero carbon goals
- define a best practice embodied carbon evaluation framework
- capture industry case studies that showcase excellence and share this knowledge widely
- develop a common language for procurement guidelines
- help manage climate transition risk, and risks associated with adopting innovative materials
- support the acceleration of the supply of low carbon and innovative materials.[19]

University of Tasmania Certificate in Climate Accounting

The University of Tasmania is running an Undergraduate Certificate in Climate Accounting, which equips learners with the essential knowledge and hands-on skills for the change in Australian legislation that will occur over 2024-25. These changes will ultimately mandate large companies to report on climate issues, including climate reporting.[20] The course also includes the science of climate change, evolving climate policy, and collecting and analysing carbon data to inform strategic decisions for businesses.

[19] Materials and Embodied Carbon Leaders' Alliance – 'MECLA' (2024) https://mecla.org.au/about/

[20] Undergraduate Certificate in Climate Accounting, University of Tasmania (2024) www.utas.edu.au/courses/bus/courses/30c-undergraduate-certificate-in-climate-accounting

Appendix

Roles and responsibilities

Entity	Key roles and responsibilities
Australian Government	DCCEEW delivers the Australian Government's climate change and energy agenda. A key part of this work is the development of policies, programs and investment to support the decarbonisation of Australia's emissions-intensive industries such as the ACCU Scheme, Safeguard Mechanism, Powering the Regions Fund, and National Reconstruction Fund. DCCEEW is also responsible for the regulation of ozone depleting substances and synthetic greenhouse gases, in line with its international commitments under the *Montreal Protocol on Substances that Deplete the Ozone Layer.*
Clean Energy Regulator	The Clean Energy Regulator administers schemes legislated by the Australian Government for measuring, reporting, managing, reducing and offsetting Australia's greenhouse gas emissions. The schemes that are administered by the Clean Energy Regulator include the National Greenhouse Gas and Energy Reporting (NGER) Scheme, the ACCU Scheme, and the Safeguard Mechanism.
Tasmanian Government	The Department of State Growth delivers strategic policy and investment for advanced manufacturing in Tasmania, to allow the industry to grow its capability and become more successful and sustainable. Renewables, Climate and Future Industries Tasmania (ReCFIT) coordinates Tasmania's action on climate change and renewable energy growth, including ensuring manufacturing, commercial and industrial operations can access Tasmania's renewable electricity resources. The Environment Protection Authority (EPA) is the independent environmental regulator of industrial activities and their impacts on the environment, such as groundwater contamination and treatment, industrial wastewater treatment and disposal, atmospheric emissions quality, and noise, dust and odour emission management.

Entity	Key roles and responsibilities
Government businesses	Given the significant electricity consumption by Tasmania's major industries, a number of government businesses play important roles in the IPPU sector. This includes: • Hydro Tasmania: generates renewable hydro electricity to power industrial processes • TasNetworks: owns, operates and maintains the electricity transmission and distribution networks • Aurora Energy: provides electricity and gas retail services throughout mainland Tasmania, including a range of products tailored to the needs of residential, business and government customers through tariffs, market contracts and payment options.
Local government	Local governments play an important role in supporting emergency management services and land use planning and development, which impact on the planning requirements for energy projects and infrastructure. Local governments are responsible for their own climate change adaptation policies, community-based awareness campaigns, and also implement projects to reduce emissions in their own operations.
Business and industry	Tasmania is home to several major industrial facilities, including: • Cement Australia Railton cement works • Rio Tinto Bell Bay aluminium smelter • Liberty Bell Bay ferromanganese smelter • Norske Skog Boyer paper mill • Nyrstar Hobart zinc smelter • Grange Resources Port Latta iron ore pelletising plant and Savage River mine. The Tasmanian Minerals, Manufacturing and Energy Council (TMEC) represents the state's mining exploration, extraction and processing businesses, energy sectors, advanced manufacturers and associated supply chains.
Research institutions	The Heavy Industry Low-carbon Transition (HILT) Cooperative Research Centre (CRC) was established in 2021 to de-risk the technology pathways needed by Australia's heavy industry to be internationally competitive in the transition to low-carbon products. Grange Resources and Liberty are both core partners of the HILT CRC.

Safeguard Mechanism

Business and industry emissions and energy production and consumption data are reported on a commercial-in-confidence basis to the Australian Government's Clean Energy Regulator under the NGER Scheme. To avoid identifying individual businesses, the Clean Energy Regulator controls the public release of these data through strict non-disclosure requirements. The Tasmanian Government is unable to publicly identify the largest greenhouse gas emitting businesses in Tasmania that report under the NGER Scheme.[1]

However, the Clean Energy Regulator is required to publish certain information each reporting year for each facility covered by the Safeguard Mechanism. The Safeguard Mechanism applies to all designated facilities with scope 1 emissions over 100,000 t CO_2-e per year. Only direct or scope 1 emissions are included in this threshold: that is, greenhouse gas emissions released into the atmosphere as a direct result of an activity undertaken at that facility. This includes, for example, direct emissions from fuel combustion for transport and stationary energy uses and industrial processes such as cement production but does not include the emissions from electricity purchased from the grid (scope 2).

2022-23 reported emissions for Tasmanian facilities covered by the Safeguard Mechanism

Company	Facility	Emissions (t CO_2-e)
Cement Australia (Goliath) Pty Ltd	Railton cement works	1,056,965
Rio Tinto Aluminium (Bell Bay) Ltd	Bell Bay aluminium smelter	352,704
Liberty Bell Bay Pty Ltd	Bell Bay ferromanganese smelter	334,929
Norske Skog Paper Mills (Australia) Ltd[21]	Boyer paper mill	172,392
Grange Resources (Tasmania) Pty Ltd	Port Latta iron ore pelletising plant	123,076
Grange Resources (Tasmania) Pty Ltd	Savage River mine	110,660

Source: Clean Energy Regulator, 2024, Safeguard Facility Reported Emissions 2022-23

[21] The majority of Norske Skog Boyer paper mill emissions fall under the energy sector plan as stationary energy.

Glossary and acronyms

Term or Abbreviation	Description
ACCU	Australian Carbon Credit Unit. One ACCU represents one tonne of carbon dioxide equivalent (CO_2-e) that is stored or avoided due to a project. ACCUs are issued by the Clean Energy Regulator for eligible projects registered under the Emissions Reduction Fund.
ACCU Scheme	Formerly called the Emissions Reduction Fund, the ACCU Scheme is a key element of the Australian Government's climate change policies and is particularly important for emissions-intensive industries. It provides businesses the opportunity to earn ACCUs for every tonne of carbon dioxide equivalent stored or avoided through the adoption of eligible practices and technologies, and facilitates the trading of ACCUs.
Beneficiation	The treatment of raw materials such as iron ore to improve physical or chemical properties especially in preparation for smelting.
Biofuel	A fuel that is derived from biomass (plant, algae or animal material).
Biogas	Gas created from the anaerobic decomposition of organic matter (plant, algae or animal material). Biogas is principally a mixture of methane and carbon dioxide.
Bioenergy	A form of renewable energy produced using biomass (plant, algae or animal material). Bioenergy can include electricity, heat, gas and transport fuel.
Calcination	Calcination is the process of heating a substance at a high temperature to separate the chemicals in a substance. For example, calcination of raw materials such as limestone, iron ore and clay creates cement clinker.
Carbon leakage	Carbon leakage is a situation where large emitters in countries with strong climate policies, where costs of production are increasing, relocate to other countries with less stringent climate policies. The carbon emitted by these businesses is therefore not avoided or reduced but has 'leaked' to another country.
CBAM	Carbon Border Adjustment Mechanism, which places a tariff on imported products that is broadly equivalent to the carbon costs faced by domestic producers
CCUS	Carbon Capture, Utilisation and Storage. A suite of emissions reduction technologies that involve the capture and separation of CO_2 from other gases at industrial facilities and the compression, transport and either utilisation as an input to other processes or storage (usually underground) of the CO_2.
Clinker	Clinker, or cement clinker, is the key component of cement. It is made by heating raw materials, principally limestone, at extremely high temperatures in a cement kiln, which forms the clinker and also releases carbon dioxide. The clinker is generally ground into a powder and combined with other materials to create cement.
CO_2	Carbon dioxide; a greenhouse gas.

Term or Abbreviation	Description
CO_2-e	Carbon dioxide equivalent. This is a standard unit for measuring the global warming potential of gases. Each different greenhouse gas is represented in terms of the amount of CO_2 that would create the same amount of warming.
CRC	Cooperative Research Centre, an Australian Government initiative that funds industry-led collaboration between industry, researchers and end users.
DCCEEW	Australian Government Department of Climate Change, Energy, Environment and Water
Direct combustion	Burning of fuel(s) for energy, predominantly in manufacturing, mining, residential and commercial sectors.
Emissions	Greenhouse gas emissions.
Embodied carbon	Embodied carbon refers to the greenhouse gas emissions associated with the manufacture and use of a product or service, regardless of where that occurs. For example, for buildings and infrastructure this means the emissions associated with the extraction, manufacture, transport, construction, maintenance and disposal of the materials used.
EPA	Tasmanian Environment Protection Authority. The EPA is an independent statutory authority. Its purpose is to regulate developments and activities that may impact on environmental quality and to promote best practice, sustainable environmental management.
GWP	Global warming potential. A value that allows direct comparison of the impact of different greenhouse gases in the atmosphere by comparing how much energy one tonne of a gas will absorb compared to one tonne of carbon dioxide.
HFCs	Hydrofluorocarbons. Various synthetic greenhouse gases, mostly used in refrigeration and air conditioning equipment, with high GWP.
IPCC	Intergovernmental Panel on Climate Change, an independent body that assesses the scientific, technical and socioeconomic information relevant to understanding the risk of human-induced climate change. The IPCC develop guidelines for national greenhouse gas inventories which are used under the UNFCCC.
IPPU	Industrial Processes and Product Use, one of the sectors in the UNFCCC greenhouse gas reporting framework.
kt	Kilotonnes. A kilotonne is equivalent to 1,000 tonnes or 1 million kilograms.
Lime	Lime is a material used in a range of products and processes including steel, glass and paper manufacturing, agricultural practices, chemical processes, plaster, mortar and other building materials. Lime is produced by heating carbonate materials in a kiln, which releases carbon dioxide.
LULUCF	Land Use, Land Use Change and Forestry, one of the sectors in the UNFCCC greenhouse gas reporting framework.
Methane	A greenhouse gas, which contributes approximately 28 times more atmospheric warming than carbon dioxide.

Term or Abbreviation	Description
Montreal Protocol	The *Montreal Protocol on Substances that Deplete the Ozone Layer* is the landmark multilateral environmental agreement that regulates the production and consumption of nearly 100 man-made chemicals referred to as ozone depleting substances.
Mt	Megatonnes. A megatonne is equivalent to 1,000 kilotonnes or 1 million tonnes.
Nitrous oxide	A greenhouse gas, which contributes approximately 265 times more atmospheric warming than carbon dioxide.
Recarbonation	The process where part of the carbon dioxide emitted during the cement production is re-absorbed by concrete structures through carbonation.
ReCFIT	Renewables, Climate and Future Industries Tasmania
Safeguard Mechanism	The Safeguard Mechanism is one of the Australian Government's key emissions reduction policies, which requires Australia's highest greenhouse gas emitting facilities to keep their emissions below an emissions limit (baseline). If a facility covered by the Safeguard Mechanism exceeds their baseline, they must manage their excess emissions. They can become liable to pay a financial penalty if they fail to comply with the Safeguard Mechanism.
SMCs	Safeguard Mechanism Credit units are tradeable carbon credits designed to incentivise Safeguard Mechanism facilities to reduce their emissions beyond their baselines. One SMC represents one tonne of CO_2-e.
SF_6	Sulphur hexafluoride, a synthetic gas used in electrical switchgear with a GWP of 23,500.
Substitutes for ozone depleting substances	Ozone depleting substances are chemicals that destroy the earth's protective ozone layer. They were commonly used in products such as fridges, air conditioners, fire extinguishers and aerosols. Synthetic gases are now widely used to replace ozone depleting substances. While they do not damage the ozone layer, they are potent greenhouse gases.
t	Tonnes. 1,000 kilograms.
UNFCCC	United Nations Framework Convention on Climate Change

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