



Environment Institute
of Australia and
New Zealand Inc.

23 November 2023

Committee Secretary
Senate Standing Committees on Environment and Communications
PO Box 6100
Parliament House
Canberra ACT 2600

Re: Climate Change Amendment (Duty of Care and Intergenerational Climate Equity) Bill 2023

The Environment Institute of Australia and New Zealand (EIANZ) is a not for profit, professional association of environmental practitioners. Its membership represents a diverse range of technical disciplines including scientists, policy makers, engineers, lawyers, and economists. We advocate for environmental knowledge and ethical and competent environmental practice.

In this submission, EIANZ contributes considered, professional opinions on the objectives of the Bill in relation to climate change and does not address the legal process elements of the Bill.

EIANZ supports:

- The intent of the Bill, being the requirement for makers of decisions likely to contribute to climate change to consider the health and wellbeing of future generations when making those decisions.
- Introduction of legislation that requires consideration of the impact of decisions on emissions reduction targets.
- A legislative obligation to consider the contribution of Scope 3 emissions to climate change.
- Reliance on the best available scientific knowledge to inform decision-making.

We note that the Bill provides for delivery on commitments made under:

1. The 2016 Paris Agreement, to substantially reduce greenhouse gas emissions and limit global temperature increase.
2. The 1992 Rio Declaration, to equitably meet the needs of present and future generations.

These are legally binding treaties and Australia must have legislation in force to ensure that it meets its obligations.

EIANZ recommends that:

- The Bill should apply to the EPBC Act or its replacement legislation once the current review is completed.
- The Bill should apply to relevant Commonwealth legislation relating to the export of materials and services that generate greenhouse gas emissions.
- The Bill should apply to all resources and services that generate significant volumes of greenhouse gases, including, but not limited to, fossil fuels.

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- A process whereby proponents of all projects that generate significant quantities of greenhouse gases would need to demonstrate that the proposal would not materially increase the risk of harm to future generations.

We do not recommend extending the Bill to State-based decisions, which we expect to be appropriately assessed for greenhouse gas emissions under the amended EPBC Act (or replacement).

EIANZ is aware of the submission made by the National Environmental Law Association (NELA) on this Bill, and gives particular support for the following points:

- Given the lack of a mandatory requirement to report on Scope 3 emissions in Australia, an alternative, desirable approach would be to follow the European Union's (EU's) Corporate Sustainability Reporting Directive by setting a threshold not based on emissions but based on the criteria of 'large' and 'listed' corporations. This Directive is to take effect in the EU from 2024 onwards and is to include Scope 3 reporting as well as other measures of environmental, social, and governance performance over time.
- The term 'materially increases the risk of harm' should replace the existing wording as the threshold for consideration of projects under the Bill. We consider that, based on the arguments presented by NELA, such a term would be more legally robust.
- 'Duty of care' is ambiguous and open to legal challenge. This should be replaced by the phrase 'absolute duty of care'.

EIANZ's Position Statement on Climate Change acknowledges the need for equity and whole of society considerations in mitigating greenhouse gas emissions. Our Supplementary Position Statement on Scope 3 emissions is also relevant, calling for mandatory reporting on Scope 3 emissions and consideration of Scope 3 emissions in impact assessment. These statements are attached as supporting information to this submission.

For further information please contact Executive Officer Jonathon Miller via office@eianz.org.

Best regards,

Vicki Brady

President,
Environment Institute of Australia and New Zealand



CLIMATE CHANGE POLICY AND ACTION

EIANZ Position Statement

The EIANZ:

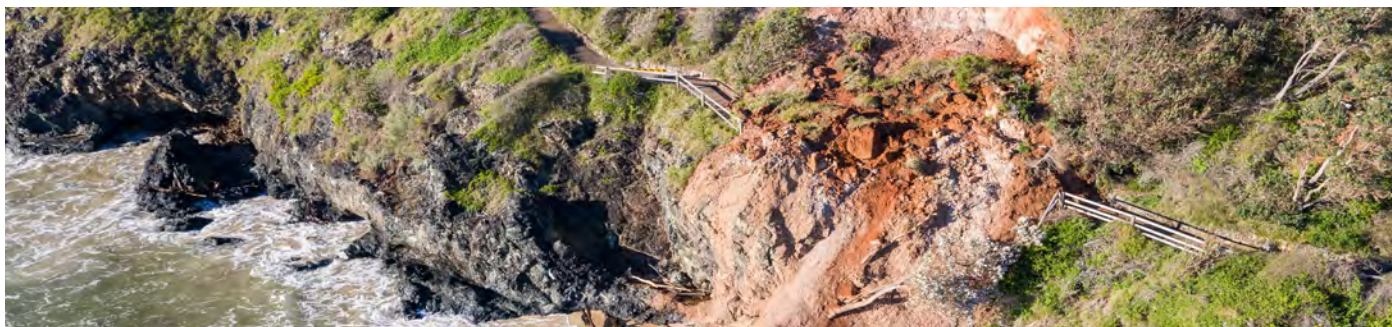
1. accepts the consensus of the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6) that:
 - global temperatures have risen more than 1°C since pre-industrial times;
 - human induced climate change is causing increasingly frequent, intense, and destructive natural events such as droughts, floods, fires, and cyclones;
 - immediate and bold action is required to reduce emissions, develop low emission energy and food production systems, and build adaptive capability so that we limit the increase in global average temperature to no more than 1.5°C above pre-industrial levels; and
 - a global temperature increment of 2°C above pre-industrial levels would have very high impacts for many important environmental and societal systems and must be avoided.
2. recognises the challenges of the actions required to mitigate and adapt to climate change particularly for fossil fuel dependent communities and developing economies, and encourages comprehensive planning and action for a just transition, noting that since the formation of the UNFCCC in 1992 emission increases have yet curtailed and immediate increased action is required;
3. demands that national, state, and local governments, industry, business and environmental practitioners to lead by promoting mitigation, building resilience, and scaling-up the application of technologically, socially, and economically viable low-emissions alternatives.

Climate change affects everyone and everything, but not equally. Its impacts are broad, complex, discriminatory, and cumulative. In 2022, scientific consensus and the [IPCC confirmed](#) that human activities have caused 1.0°C of global warming above pre-industrial levels – with a range of 0.8°C to 1.2°C. This change in global temperature is driving a change in sea level and global and regional climates. Land and ocean ecosystems and the services they provide are being degraded. Species are under threat, destructive weather events are increasing in frequency and intensity, and human social and economic systems (especially for disadvantaged groups) are being impacted.

Global warming is likely to reach 1.5°C between 2030 and 2050 if it increases at current rates – and then further increase. The 2022 IPCC synthesis report warns of a need to limit warming to 1.5°C to avoid the more serious impacts on terrestrial, freshwater and coastal ecosystems and their services to humans.

Limiting temperature rise this century to 1.5°C involves stabilising global emissions now and achieving net zero emissions before 2050 and requires lifestyle changes and technological transformation in our energy, transport, industrial processes, and land management systems. It also requires governments to enact legislation that obliges commerce and industry to drive down emissions and encourages development of low emission alternatives. Even in achieving this, resilience-building through adaptation to and recovering from residual impacts (loss and damage) will be necessary.

International efforts to understand and manage climate change have been underway through the International Panel on Climate Change (IPCC) since 1988. The 2015 Paris Agreement set two temperature increase goals ((i) less than 2°C and (ii) well below 2°C and as close to 1.5°C as possible), and introduced a new approach, the “bottom up” Nationally Determined Contributions (NDCs). Up until COP26 (2021), the cumulative NDC pledges were insufficient to limit temperatures to 2°C and national actions to implement these pledges have lagged, raising doubts as to whether the pledges will actually be delivered.



Role of decision makers

Australia and Aotearoa New Zealand are both signatories to the Paris Agreement and have been implementing specific climate related policies for over the past quarter century. Both have stated positions to achieve net zero by 2050. However, their emissions profiles, options, policies, legislated requirements and end of decade (i.e. 2030) targets and ambition differ. In particular, Australia's first formal 2030 target (26-28 percent reduction) received criticism internationally ahead of COP26.

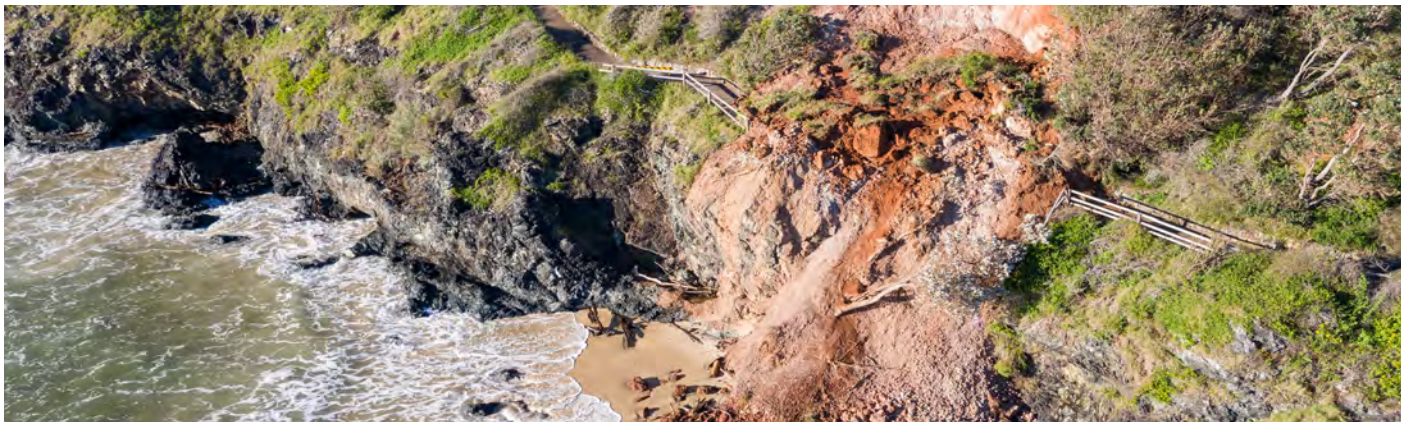
While climate change is a global challenge, solutions require personal, organisational, local, regional, national, and international action in a participatory and integrated manner.

Decision and action to address the causes and impacts of climate change need to occur at multiple levels across a broad range of sectors.

Governments have a key obligation to protect and enhance the environment by providing clear leadership, policy and legal frameworks that achieve the necessary emission reductions and adaptive responses. The business community has an obligation to support and implement these policies and actions and go beyond mere compliance to achieve zero emissions as soon as possible.

The EIANZ proposes and advocates for the following broad responses from Australia and Aotearoa New Zealand:

1. **Internationally** – engage with urgency to achieve effective, fair, and sustained global action and develop NDCs and implement responses that are consistent with limiting warming to 1.5°C (or less).
2. **Cooperation** – Collaborate with countries regionally to adapt to impacts of climate change and transition to low carbon economies. Support developing economies in our region, including by sharing technology. This includes Australia and Aotearoa New Zealand meeting all of their NDC obligations to developing economies.
3. **Strategy** – Implement a detailed strategy for delivering net zero by 2050, including short- and medium-term targets (50% by 2030 as a minimum).
4. **Regulation and policy** – Enact legislation that obliges industry and commerce to drive down emissions and encourages development of low emissions technology and adaptive capability.
5. **Whole of society** – Consider climate change impacts and opportunities for emissions reduction in every decision relating to planning, industry, business, finance, health, building, energy, transport, land and environment policy and law.
6. **Technology and capacity building** – Fund research into mitigation and adaptation; pilot low emissions technologies; and plan for the transition of fossil fuel related jobs to roles within a net zero economy.
7. **Mitigation** – Provide clear, simple, and credible legal and commercial frameworks for the efficient and economic shift to sustainable zero emissions technologies.
8. **Adaptation and impact response** – Build resilience through adaptability, strengthen emergency response capability, and ensure that adaptation strategies are supported by cutting edge research. This should include cooperation with our regional neighbours to ensure they have the capacity to adapt to and manage impacts including the potential for relocation of Pasifika communities affected by shore erosion and sea level rise
9. **Consultation** - Engage communities in the transition to a low carbon economy including the provision of clear information to enable informed decisions on investments, insurance, and other activities.
10. **Equity** – ensure that socioeconomic capacity does not limit communities' abilities to mitigate and adapt to climate change. Utilise the transition to achieve greater equity nationally and internationally.



Policy into practice

The EIANZ has a clear interest in environmental protection, sustainable development and maintaining objective professional standards as we address the risks and opportunities from climate change.

It will continue to:

1. **Educate** – train and certify environmental and sustainability professionals to drive emissions reduction and climate change adaptation activity.
2. **Engage** – work with peer institutes, associations, government, and communities to promote sound outcomes and accelerate climate action.
3. **Influence** – actively advocate for necessary change and engage governments and other decision makers at all levels to urgently reduce emissions consistent with IPCC targets and immediately build resilience and adaptive capacity.

The EIANZ encourages environmental policy makers and practitioners to undertake:

1. **Climate risk assessment** – embed assessment of climate related risk into strategic decision making and long-term planning.
2. **Informed decision-making** – remain informed of climate science and policy as well as mitigation and adaptation practice, and to use credible research results as foundations for policies and strategies to respond to and mitigate climate change.

3. **Resilience building** – consider the impacts of a changing climate on the current and future needs of human communities, other species, and ecosystems and to design management plans accordingly.
4. **Verification** – when monitoring and evaluating the outcomes of policy, strategies and actions account for both direct (e.g. increase in temperature, reduced rainfall) and indirect (e.g. altered fire regimes, shifting seasons) impacts of climate change (as distinct from a narrower process focus on management interventions).
5. **Advocacy and collaboration** – Be champions for climate action and advocate for necessary change. Co-design and implement strategies with sectors and communities to encourage behaviour change that increases mitigation and adaptation. The EIANZ recognises that environmental practitioners will act directly, to increase factual attention to the climate crisis and to affect solutions necessary in government policy and business practice.
6. **Landscape connectivity** – protect and reconnect natural landscapes to allow wildlife and plants to migrate and adapt in response to the effects of climate change.

The EIANZ is a not for profit, professional association for environmental practitioners from across Australia and Aotearoa New Zealand. The Institute has a certification scheme that recognises ethical and professional practice which assures government, industry and the community of practitioners' professional standing. It is represented by jurisdictional Divisions, a New Zealand Chapter and supported by Special Interest Sections covering climate change, heritage, contaminated land, ecology, environmental accounting, and impact assessment. Its membership is drawn from all areas of environmental practice, and includes practitioners with industry, government, community and academic careers.

SCOPE 3 EMBEDDED EMISSIONS

EIANZ Climate Change Supplemental Position Statement

November 2023

Summary

Addressing climate change requires work across international affairs, domestic mitigation, adaptation, and disaster recovery, with close attention to supporting the most impacted people and ecosystems.

This paper supports the EIANZ Climate Change position statement (2022) by giving further attention to Scope 3 greenhouse gas (GHG) emissions.

In relation to Scope 3 emissions, the EIANZ:

- i. Recognises that Scope 3 emissions are a major contributor to global emissions and a source of domestic economic risk for Australia and Aotearoa New Zealand.
- ii. Considers it important for governments, companies and other organisations to understand, report and reduce their Scope 3 emissions.
- iii. Calls on Australia and Aotearoa New Zealand to report and reduce Scope 3 emissions, through implementing domestic policies and programs, whilst recognising that the Paris Agreement does not require countries to specifically address Scope 3 emissions.
- iv. Considers that governments should work with organisations and trading partners on meaningful accounting, reporting, target setting, and strategy development and implementation.
- v. Recognises the complexity of Scope 3 emissions accounting and mitigation.

In addition, the EIANZ considers that specific actions should be undertaken in the near term that focus on reporting and reducing emissions embedded in internationally traded goods and services, particularly given the volumes of estimated GHG emissions from these sources in Australia and Aotearoa New Zealand.

Background

Under the UNFCCC and the IPCC, Scope 3 emissions have not been a primary focus. While there have been some bilateral and multilateral studies into mitigation pathways for major traded goods (e.g. steel, aluminium, and cement production), and Europe is instigating a carbon

border adjustment mechanism, the EIANZ considers that more action is needed.

While the following recommended approaches are generally relevant to all Scope 3 emissions, the EIANZ considers that there should be a specific focus on the emissions embedded in internationally traded goods and services, particularly given the volumes of estimated GHG emissions from these sources in Australia and Aotearoa New Zealand.

Role of Decision Makers

- **National Scope 3 Accounting** – Australian and Aotearoa New Zealand governments should prepare annual Scope 3 emissions inventories by sector to inform management of national import and export risks and opportunities as the world transitions to net zero. These should be staged to firstly capture the largest Scope 3 sources and then eventually to cover all sources.
- **National Scope 3 Targets and Mitigation Strategies** – Governments should set Scope 3 emissions targets, implement strategies to achieve them, and report on progress. Scope 3 targets must be consistent with Paris Goals, the remaining GHG budget, and domestic emission reduction targets.
- **Corporate Scope 3 Reporting** – Government-mandated corporate GHG reporting schemes should be expanded to include Scope 3 emissions for current reporting entities and for other entities with Scope 3 emissions greater than current direct emissions reporting thresholds.
- **Environmental Impact Assessments** – Scope 3 emissions should be included in the assessments of potential impacts of new and expanded projects. New developments should demonstrate that predicted Scope 3 emissions are consistent with the Paris goal of limiting global warming to 1.5°C and apply a precautionary approach to likely actions by other organisations and governments.
- **Socio-economic Studies** – Governments should disclose, under a range of global scenarios, national environmental, economic, and social risks associated with the nation's Scope 3 emissions, and the pathways to reduce adverse risks.
- **Commence taking action** – Governments and companies should immediately start to build understanding, capability and capacity through incentives to those that are already willing, and in priority areas (e.g.

new green materials and fossil fuel trade), whilst making it clear that those that delay will bear higher risks and costs.

- **Smart and Just Transition** – Governments should help the most vulnerable and adversely impacted as regions decarbonise. They should promote investment in low emission export activities that can substitute for loss of carbon intensive exports, to enable developing economies to have low Scope 3 emissions profiles in the future.
- **Shared Accountabilities** – Governments should work internationally and with Scope 3 supplier- and customer-countries to advance low emissions technology development and implementation, whilst avoiding carbon leakage, economic disruption, or bureaucratic delay.
- **Transparency** – Governments should use clear and internationally recognised protocols for calculating and disclosing Scope 3 emissions, reduction strategies, and actual mitigations. Disclosed information should be readily accessible to consumers for informed decision-making. Sanctions will be needed to drive real emissions mitigation and manage willfully misleading or materially inaccurate national or individual entity disclosures.

Role of EIANZ

- **Membership Engagement** – The EIANZ will promote understanding and refinement of our message and recommendations and support practical implementation by environmental practitioners.
- **External Engagement** – The EIANZ will continue to collaborate with governments and like-minded organisations.

Differences between Scope 1 & 3 reporting:

- **Materiality** – Only some types of upstream and downstream emission categories need to be reported e.g. where they: are large relative to the organisation's Scope 1 & 2 emissions; contribute to the organisation's GHG risk exposure; are deemed critical by key stakeholder (e.g. customers, suppliers, investors, or civil society); and can be reduced by actions undertaken or influenced by the organisation.
- **Overlap with others** – Two or more entities may report the same Scope 3 emission sources – where they share responsibility and /or exposure.
- **Interorganisation comparisons** – These can be difficult where companies are in different sectors or have their emissions predominantly in different reporting categories.
- **Non-additivity** – Companies have different levels

of influence across the 15 reporting categories. The value of Scope 3 reporting is in the strategic insights gained rather than the number derived from simple summation of the emissions from each category. There can often be double counting within a Scope 3 inventory – e.g. the emissions from two products sold may overlap in their estimated emissions, or overlap with upstream emission sources.

Concluding comments

National reporting of emissions embedded in traded goods is not a substitute for current national reporting arrangements under the Kyoto Protocol or the Paris Accord. It will come into more focus as countries / regions address issues of carbon leakage to places with lesser emissions controls.

Estimation of Emissions in Traded Goods and Services

Introduction

This summary sheet sets out what is known about the emissions embedded in Aotearoa New Zealand's and Australia's traded goods and services. These facts are provided to support EIANZ's related position.

Summary

- Government estimates of emissions embedded in Aotearoa New Zealand's imports are published. No comparable estimates have been found for Australia's import commodities. For Aotearoa New Zealand, these represent half of national emissions.
- Australia's three largest exported (mineral and energy) commodities have large carbon intensities and emissions footprints that represent 50%-250% of the national emissions inventory. Australia should be planning for leading in the inevitable adjustments as the world progresses to net zero emissions.
- Aotearoa New Zealand's main exports are not as Scope 3 emissions intense as Australia's.
- Much more analysis is necessary in order to properly understand and manage these Scope 3 emissions.

Aotearoa New Zealand

For the year ended March 2023, Aotearoa New Zealand's [GDP](#) was NZ\$385 billion. In 2022, exports (US\$44bn) and imports (US\$54) were roughly one-fifth of GDP.

Aotearoa New Zealand's 2021 net emissions were 55.7Mt CO₂-e - 3% less than the 57.2 Mt CO₂-e of emissions in 2005. Aotearoa New Zealand's Nationally Determined [Contribution](#) (NDC1) under the Paris Agreement is to reduce net GHG emissions to 50% below gross 2005 levels by 2030.

[Exports](#) – Eight of the top 10 export commodities are primary products or processed primary products. All of them are expected to have relatively low Scope 3 downstream emissions intensities.

| Commodity | US\$ billion | Per cent |
|-----------------------------|--------------|------------|
| Dairy, eggs, honey | 13.4 | 30.4 |
| Meat | 6.3 | 14.3 |
| Wood | 3.3 | 7.6 |
| Fruits, nuts | 2.4 | 5.6 |
| Beverages, spirits, vinegar | 1.6 | 3.7 |
| Modified Starches, glues | 1.6 | 3.6 |
| Cereal/milk preparations | 1.6 | 3.5 |
| Fish | 1.2 | 2.6 |
| Machinery | 1.1 | 2.6 |
| Aluminium | 1.1 | 2.4 |
| Other | 11 | 23.7 |
| Total | 44 | 100 |

[Imports](#) – Machinery and equipment, vehicles, fuels, and pharmaceuticals are Aotearoa New Zealand's largest 2022 import items. There are 30.7 Mt CO₂-e emissions associated with 2019 [imports](#) – equivalent to 51% of NZ's carbon footprint in that year. Seventy-six per cent and 8% of these emissions respectively were "manufacturing" and "transport" related.

Aotearoa New Zealand's Top 10 Imports (2022)

| Commodity | US\$ billion | Per cent |
|------------------------------------|--------------|------------|
| Machinery incl computers | 7.3 | 13.4 |
| Vehicles | 7.2 | 13.2 |
| Mineral fuels | 6.2 | 11.5 |
| Electrical machinery, equipment | 4.7 | 8.6 |
| Plastics | 2.0 | 3.7 |
| Optical, technical, medical | 1.7 | 3.1 |
| Pharmaceuticals | 1.7 | 3.1 |
| Food industry waste, fodder | 1.3 | 2.3 |
| Articles of iron or steel | 1.2 | 2.2 |
| Furniture, bedding, lighting, sign | 1.1 | 2.0 |
| Other | 20 | 36.9 |
| Total | 54 | 100 |

Australia

No definitive publication has been identified that details Australia's Scope 3 emissions.

For the year ended March 2023, Australia's GDP was [A\\$2.2 trillion](#) – placing it, in size, in the low teens globally. The economy is open to both imports and exports and in the year ended June 2022 both were valued at around \$A0.5 trillion (roughly one-quarter of GDP).

[Exports](#) – The three most valuable exports (iron ore, coal [both metallurgical and thermal] and natural gas) have high Scope 3 emissions intensities (i.e. emissions per \$M revenue). The remaining seven of the top 10 exports were mineral, energy, agriculture, or education related. Aluminium metal production is also emissions intensive.

The Australian economy, certain regions and society in general, would be much poorer without the export revenue from these export items.

| Australia's Top 10 Exports (2021-22) | | |
|---------------------------------------|-------------|------------|
| Commodity | \$A billion | Per cent |
| Iron ore & concentrates | 132 | 22.3 |
| Coal | 114 | 19.1 |
| Natural gas | 71 | 11.9 |
| Gold | 23 | 3.9 |
| Education-related travel services | 21 | 3.5 |
| Crude petroleum | 14 | 2.3 |
| Wheat | 11 | 1.9 |
| Aluminium ores & conc (incl. alumina) | 10 | 1.7 |
| Beef | 10 | 1.7 |
| Copper ores & concentrates | 8 | 1.3 |
| Other | 182 | 30.5 |
| Total | 595 | 100 |

Imports - The top 10 imported items include: petroleum products, vehicles, technology equipment, pharmaceutical items, and professional services. No quantitative estimate of their upstream emissions has been carried out. Several of the commodities could have embodied emissions in the low tens of Mt CO₂-e and there are similarities with Aotearoa New Zealand in the types of commodities imported.

Apart from the refined petroleum products, each of these imports contain appreciable non-energy intensive value-add in their production and hence will be not as emissions intensive as the top three export commodities. Emissions associated with petroleum refining will be a fraction of that at the final point of use.

| Australia's Top 10 Imports (2021-22) | | |
|--------------------------------------|-------------|------------|
| Commodity | \$A billion | Per cent |
| Refined petroleum | 40 | 8.7 |
| Passenger motor vehicles | 23 | 5.1 |
| Freight | 23 | 5.0 |
| Telecom equipment & parts | 16 | 3.4 |
| Goods vehicles | 13 | 2.8 |
| Computers | 12 | 2.7 |
| Professional services | 11 | 2.4 |
| Pharm products (excl. medicaments) | 9 | 2.1 |
| Medicaments (incl veterinary) | 9 | 1.9 |
| Crude petroleum | 8 | 1.8 |
| Other | 295 | 64.2 |
| Total | 460 | 100 |

Size relative to domestic emissions – The combined Scope 3 emissions associated with Australia's main exports are 2 – 3 times Australia's [domestic](#) emissions.

The Scope 3 emissions from the use of exported [coal](#) and the processing exported [iron ores](#) (assume 62% iron in the ore) both significantly exceed

Australia's domestic emissions. These two emission sources cannot be added as metallurgical coal is used in steelmaking and effectively is the source of steelmaking emissions. The quantity of metallurgical coal exported from Australia is insufficient to smelt all of Australia's iron ore exports.

Emissions from use of liquified natural gas ([LNG](#)) are equivalent to around half of Australia's national emissions, whereas those from the production of [aluminium](#) from bauxite and [alumina](#) are dependent upon the source of electricity used in the smelting process, and the quoted figure could rise to 200Mt CO₂-e if the electricity is fossil fuel derived.

Changes since 2005 - The physical amounts of these exports have all increased since 2005, which is the base year for Australia's domestic emissions [targets](#) under the UNFCCC Paris accord (i.e. 43% reduction by 2030 and 100% by 2050).

Economic and greenhouse gas contributions and growth of key Australian exports

| | Iron Ore | Coal total | LNG | Al - feed |
|--|----------|------------|------|-----------|
| Export Revenue (\$bn) | 132 | 114 | 71 | 10 |
| MTonnes Exported | 874 | 359 | 83 | 18 |
| Per Cent commodity growth (from 2005); | 283% | 54% | 686% | 116% |
| Downstream Emissions (Mt CO ₂ -e) | 1200 | 880 | 230 | 40 |
| Downstream Emissions Relative to 2022 National Emissions | 250% | 180% | 50% | 10% |

NOTES:

Coal total = Thermal + Metallurgical coal exports. In 2022 47% of exported coal was metallurgical coal. Assume carbon content for bituminous coal (0.663 t C/t fuel). DISR (2021) National Greenhouse Account Factors.

Al feed = approximation of the amount of aluminium made from bauxite and alumina exports - viz ~ 2 tonnes of bauxite is needed to produce 1 tonne of alumina and 2 tonnes of alumina is required to produce one tonne of aluminium metal

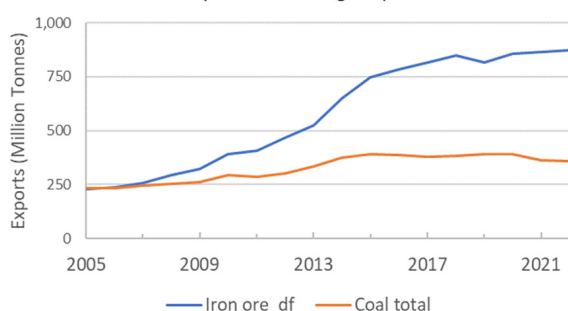
Emissions from processing of exported Al-feed is dependent upon emissions intensity of electricity used in smelting. This figure assumes 1.2t CO₂-e/t alumina and 1.7 t CO₂-e from anode use and PFC emissions during smelting. Emissions associated with smelter electricity consumption are excluded but can be quite high depending upon country of location.

Percent commodity growth (from 2005) - growth in physical exports since 2005 (the base-year for Australia's greenhouse gas emissions targets). For comparison of the same period Australia reduced its emissions by 22% (to 487Mt CO₂-e) and has committed to a 46% per cent reduction by 2030 and net zero by 2050.

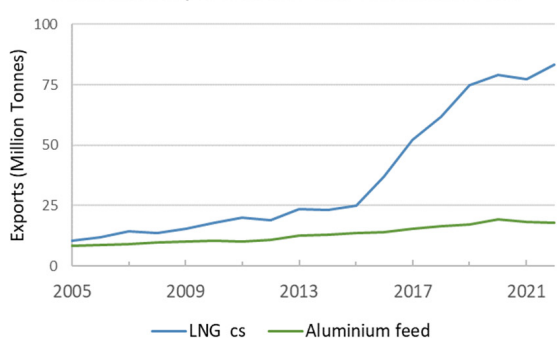
The emissions in traded goods and services are not included in Australia's Nationally Determined Contribution, so in this regard Australia is not in breach of international undertakings. However, as

the world works to the Paris Accord goal of net zero, Australia and its subregions will likely have to accommodate large changes in the markets for each of these commodities.

Australian Exports of Iron Ore and Coal (thermal plus metallurgical)



Australian Exports of LNG and Aluminium Feed



Concluding comments

There are plausible decarbonisation pathways for steelmaking, using hydrogen and electrification, and for aluminium production, using zero emissions electricity and inert anodes.

The only approach currently suggested for decarbonisation of fossil fuels is carbon capture and storage (CCS). CCS remains under-performing, expensive, socially contested, and dependent upon local geology and cannot be relied upon.

Some coal types are less emissions intensive than others (e.g. they have lower moisture content). Even so, relative to the need to achieve net zero by 2050 or earlier, there must be rapid phase-out of coal use, irrespective of differences in coal qualities.

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