

Research Report

Impact of new and existing coal and gas projects under the safeguard mechanism

December 2022

Key findings

- Effective reform to the safeguard mechanism is an essential step to breaking the inertia that has locked Australia's biggest emitters into a pattern of increasing greenhouse gas emissions.
- Even before considering emissions from the eventual use of the fossil fuels produced at Australia's coal mines and liquefied gas terminals - which releases the greatest share of greenhouse gas emissions - one out of every seven tonnes of climate pollution created in Australia comes from coal and gas facilities covered by the safeguard mechanism. These facilities primarily relate to coal and gas production and activities such as coal mining, gas extraction and processing.
- Emissions from existing coal and gas facilities show no sign of declining. Without further intervention, these facilities will dramatically exceed their share of the emissions budget allowable for the Federal Government to reach its climate goals.
- Planned growth from Australia's coal and gas producers is enough to exceed the entire safeguard mechanism's emissions budget in 2030.
- Without action to limit the growth of Australia's coal and gas industry, reaching Australia's 2030 emissions reduction goal will be difficult or impossible.

Results and discussion

One area of considerable uncertainty that is unrelated to the final form of the safeguard mechanism rules relates to the future of the safeguard mechanism's two largest sectors: coal mines and liquefied gas terminals. Specifically, to date there has been no research to quantify the emissions impact of major changes to facilities' operations. This report, commissioned by the Australian Conservation Foundation (ACF), is intended to fill this gap by modelling the impact of known closures and expansions at coal and gas production and processing facilities over the course of this decade. A complete understanding of the scale of these sectors, including the scope of emissions projected to fall out of the safeguard mechanism as facilities close or adjust production versus emissions entering as facilities expand, is essential to ensuring that the settings of the reformed scheme are correct.

The full methodology that ERI applied is described later in this report.

Even before considering plans to expand Australia’s coal mines and gas production and processing facilities, existing facilities, if they continue producing at a consistent rate, will imperil the Federal Government’s goal of reducing emissions by 43% below 2005 levels in 2030. As shown in Figure 1, the facilities in operation today will dramatically overshoot their proportionate share of the emissions budget for the safeguard mechanism, leaving very little room for existing industries in other sectors, including manufacturing. After accounting for closures and known changes to production rates, the direct (scope 1) emissions from coal and gas facilities nonetheless exceed these facilities’ proportionate share of the safeguard mechanism emissions budget by more than 40%.

As shown in Figure 2, the extent of planned expansion within the coal and gas sector significantly heightens this tension and raises questions as to ability of the scheme to meet its intended target. When determining which new projects to consider, ERI focused on a relatively small number of projects in the pipeline, considering only those coal and gas projects that could be described as particularly likely to proceed this decade. In most instances, this consisted of projects that had received all, or most, of their environmental approvals. Nonetheless, the scope 1 emissions increase was dramatic. Before

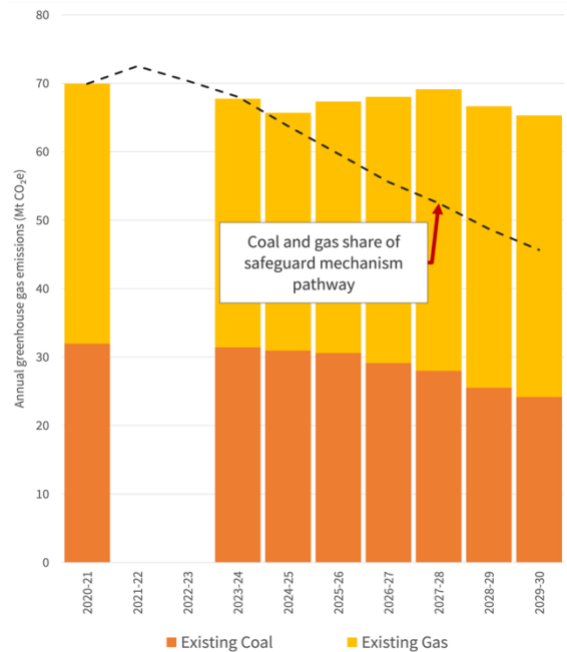


Figure 1: Modelled emissions from new and existing coal and gas production and processing facilities over the 2020s. ERI did not model recently concluded or in progress years.

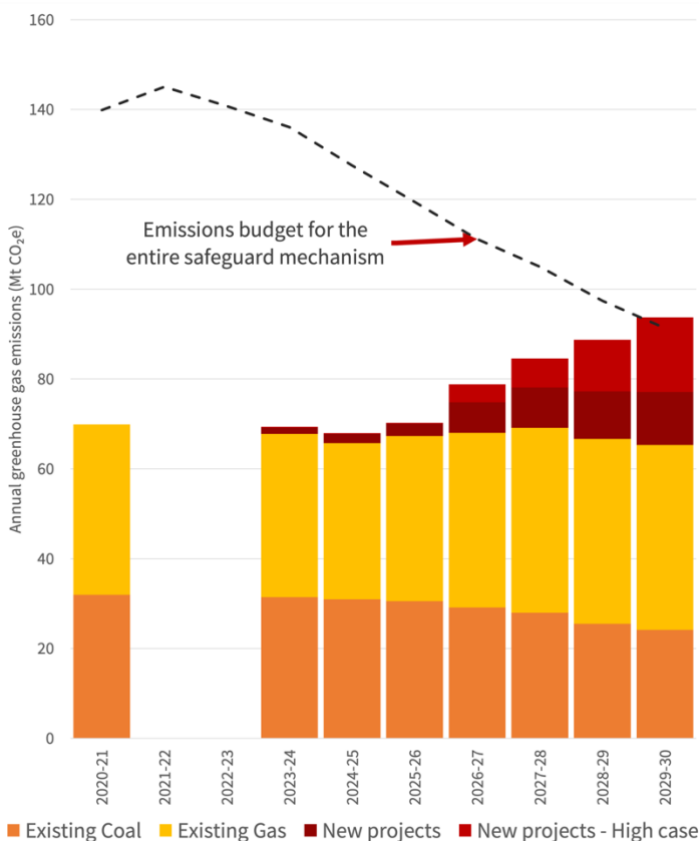


Figure 2: Modelled emissions from new and existing coal and gas production and processing facilities over the 2020s.

accounting for the climate impact of burning the fossil fuels produced, in 2029-30 between 11.8 and 28.4 million tonnes of additional scope 1 greenhouse gas emissions will be produced from just this narrow subset of projects in the pipeline. Fully realised, these expansion plans are sufficient to result in the coal and gas sector exceeding the entire emissions budget for the safeguard mechanism in that same year. This leaves no room for the more than 130 facilities currently covered by the safeguard mechanism that are not involved in the production and processing of coal and gas. This includes iron ore miners, fertiliser manufacturers, and cement and aluminium producers.

The quantity of excess emissions from new and existing coal and gas projects will also very likely dramatically outstrip the number of carbon credits available. In the most recent financial year an all-time record of 16.5 million Australian Carbon Credit Units (ACCUs) were issued by the Clean Energy Regulator.¹ There are a

diverse range of integrity issues with the current offsets system, and expert opinion indicates that over half of all abatement credits issued to date lack integrity.² That said, even assuming perfect integrity, and perfect fungibility between ACCUs and emissions from fossil fuel production,³ this gives a sense of the scale of the challenge ahead.

Our modelling shows that absent intervention, new and existing coal and gas projects will exceed their fair share of the safeguard mechanism’s emissions budget by between 31.4 and 48.1 million tonnes. Even noting the significant shortcomings of an approach that predominantly relies on offsets alone, should all new projects go ahead, for 2029-30 alone the total abatement task required to bring coal and gas back to their share of the safeguard mechanism’s budget is nearly three times the size of the record-breaking number of credits issued in the most recent financial year.

As a result, meeting Australia’s 2030 ambition will require dramatic emissions reductions from Australia’s coal and gas producers, and firm limits on growth from these sectors. There are a diverse range of mitigation measures available to reduce the impact of these sectors - especially for coal mine methane.⁴ The findings of this report highlight the need for these facilities to significantly invest in mitigation measures to reduce the on-site greenhouse gas impact of the sector. As this report demonstrates, Australia faces an enormous challenge when it comes to reigning in scope 1 emissions from these facilities.

	Existing facilities	New and existing facilities	New and existing facilities - High case
2020-21	69.9	-	-
2023-24	67.7	69.2	69.3
2024-25	65.7	67.8	67.9
2025-26	67.3	70.1	70.2
2026-27	68.0	74.8	78.8
2027-28	69.1	78.1	84.5
2028-29	66.7	77.2	88.7
2029-30	65.3	77.1	93.7

Table 1: Aggregate of modelled emissions from coal and gas production and processing facilities by year (Mt CO₂e).

Background

The safeguard mechanism was originally created by the Federal Coalition Government as a tool to restrain emissions increases from Australia’s largest industrial emitters. It consists of two main components. The first component is a sector-wide limit on the emissions of Australia’s electricity generators which is set at the historical high point of emissions for the electricity sector. The second component is facility level limits on the emissions of Australia’s largest industrial emitters in all other sectors.⁵ While in a technical sense both components constitute the full extent of the safeguard mechanism, it is the second that is most commonly known as “the safeguard mechanism”. The current Federal Labor Government is seeking to reform the second component of the safeguard mechanism, with emissions reductions from the electricity sector being met with alternative policies. As such, for the purposes of this report, where the phrase “the safeguard mechanism” is used, it is intended to only refer to the facility-level component.

Historically, on its own terms the safeguard mechanism has failed. Despite some early conjecture,⁶ under the Federal Coalition the safeguard mechanism was never meant to reduce emissions from covered facilities.⁷ Rather, it was intended to simply prevent significant growth in emissions from covered facilities that would offset abatement purchased under the Emissions Reduction Fund.⁸ Nonetheless, over five years of operation the aggregate emissions reported by safeguard facilities have trended upward, while the quantity of Australian Carbon Credit Units surrendered in order to offset excess emissions has trended down.⁹

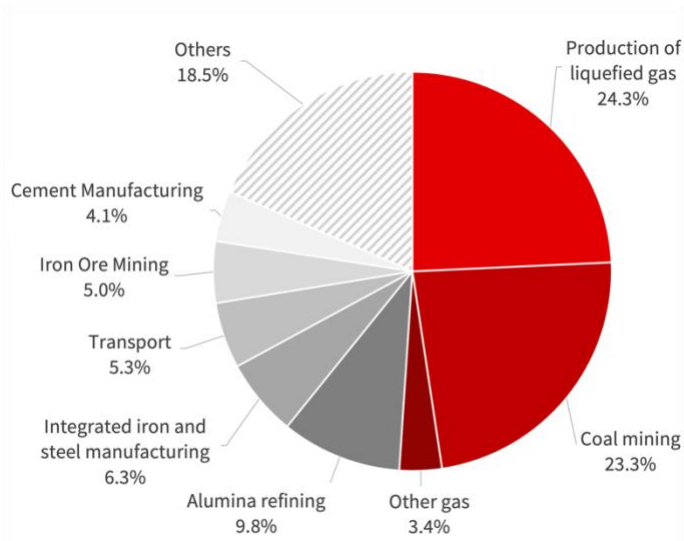


Figure 3: Sectoral breakdown of emissions covered by the safeguard mechanism in the 2020-21 financial year.

In the financial year ending 2021, the 213 facilities covered by the safeguard mechanism emitted 137 million tonnes of carbon dioxide equivalent greenhouse gas,¹⁰ or 28% of Australia’s net emissions in that year. While a diverse range of industries are covered by the scheme, it is dominated by fossil fuel production. Before considering the impact of burning the fossil fuels produced at these facilities - often overseas - gas production and processing facilities and coal mines are responsible for over half of all emissions under the scheme. Indeed, one-out-of-seven tonnes of greenhouse gas emissions released from Australia comes from the 59 coal mines, 20 gas facilities that were covered by the safeguard mechanism in the 2020-21 financial year. This is shown in Figure 3.

Reform to the safeguard mechanism is one of the central pillars of the federal government’s plans to reduce Australia’s greenhouse gas emissions by 43% below 2005 levels by 2030.¹¹ Modelling commissioned by the federal Labor Party ahead of the May 2022 election indicates that emissions reduction at or on behalf of facilities covered by the safeguard mechanism would deliver half of the outstanding abatement required to meet that goal.¹² After considering the emissions reduction impact of the National Reconstruction Fund, meeting the Federal Government’s emissions reduction target without additional policy would require facilities covered by the safeguard mechanism to reduce emissions to 91 million tonnes of carbon dioxide equivalent greenhouse gas in 2030. This is

around 46 million tonnes - or one third - below the aggregate of covered emissions in the 2020-21 financial year.

Done right, the safeguard mechanism could be the first effective emissions reduction policy in over a decade. However, if the policy settings are wrong, an ineffective safeguard mechanism risks Australia's 2030 target. At this stage, there is still much to learn about the Federal Government's plans for the reformed scheme, which is due to begin on 1 July 2023.

Methodology

This report takes a staged approach to modelling the future climate impact of Australia's coal mines and liquefied gas terminals. Necessarily, different approaches were taken to determine the emissions impact of different facility types.

Data was not available for the 2021-22 and 2022-23 financial years as these are either recently concluded or in progress.

For new projects, wherever possible ERI relied on estimates of operational emissions provided by the proponent through government environmental approvals processes. This was to ensure consistent treatment of projects under consideration. It should be noted that for several projects considered here, independent assessments have found that emissions could be far higher than what has been included by the proponent in their EIS.¹³ This means that on balance, ERI analysis is more likely to underestimate the emissions impact of new projects than it is to overestimate them. In turn, this means that despite the dramatic findings in this report, the emissions from new coal and gas are likely to be even higher than how it is presented here.

Existing coal

In the 2020-21 financial year, 59 of Australia's 94 operating coal mines reported against facility level safeguard mechanism baselines.¹⁴ Of these 59 mines, 35 were located in Queensland and 24 were located in New South Wales. None of the coal mines located in Victoria, Western Australia or Tasmania reported against facility-level baselines. This is because these are either too small to meet the designated large facility baseline of 100 kilotonnes of carbon dioxide equivalent scope 1 greenhouse gas emissions per year, or because the mines are integrated with grid-connected electricity generating infrastructure. In the latter case, emissions from these mines report – inappropriately, but within the current designations of 'facility' – under the electricity sector's sectoral baseline. If these coal mines were removed from the cover of the electricity sector's sectoral baseline, emissions from the coal sector would be even higher.

Emissions from the coal sector were determined based on three key inputs. Historical reports to the safeguard mechanism, conditions on development approvals including end dates given in the approval and known plans for expansion. For New South Wales, ERI created a database of all coal mine approvals, including key details of the development approval. For Queensland, ERI used information provided to the Australian Conservation Foundation by the state government under a Right To Information request earlier in 2022.¹⁵

While it is possible to estimate emissions from coal mines with basic emissions factors, to ensure that the output of this project was consistent with historical data provided by the Clean Energy Regulator, ERI chose to base its emissions projections on historical data as reported to the Regulator. This information was projected forward after accounting for closures, life of mine extensions and known changes to production for each mine.

Where production at a given mine is scheduled to change, due to conditions on the development consent or known expansions, relevant adjustments were made for each facility. This includes, for example, scaling up emissions at Glencore's Ashton mine this decade as the Ravensworth project begins production. Relevant emissions figures were taken from Glencore's Environmental Impact Statement for the project.

There were ten coal mines that reported against facility level baselines in 2020-21 that have scheduled closure dates in 2030 or earlier. These mines reported a total of 9.2 million tonnes of carbon dioxide equivalent greenhouse gas in the most recent year where emissions information is publicly available. In cases where there was no specific information publicly available about the staging of production as the mine closes, ERI assumed that production - and so, emissions - will scale down over the final 18 months of the life of mine. This was chosen as an intentionally conservative figure to ensure that our analysis is more likely to overstate the emissions reduction impact of these mines closing than it is to underestimate them.

In total, after accounting for closures and known changes to production, existing coal mines are expected to emit 24.2 million tonnes of carbon dioxide equivalent greenhouse gas emissions in the 2029-30 financial year. This can be compared to 32.0 million tonnes of reported emissions in 2020-21.

New coal mines

ERI found a total of ten coal developments that had not reported in 2020-21, but that are considered particularly likely to report this decade. This includes new mines - like Adani Groups' Carmichael mine - that have either begun production or that are under construction since 2020-21, as well as a number of mines that are proceeding through the approvals process and are considered especially likely to begin operation this decade based on in-house expert assessment.

In the first instance, ERI relied on start dates and emissions estimates provided by the project proponents in environmental approvals documents. Recognising that intended start dates as contained in environmental impact statements are often overly optimistic and new projects often face delays in financing, start dates were checked against publicly available information including shareholder reports and media statements and adjusted accordingly.

Two developments that are proceeding through the approvals process - Blackwater South and Baralaba South, both in Queensland - that are considered likely to commence operations if approved - were disregarded from this analysis because there was insufficient certainty around the scope 1 emissions impact of these projects.

Based on the statements from the proponents, the remaining eight mines are expected to add 3.6 million tonnes of scope 1 greenhouse gas emissions in 2030.

One additional mine, New South Wales Dartbrook is considered likely to proceed, but was not considered in the base case. This project's approval documents indicate that the mine would produce at a rate that would exceed the designated large facility threshold. As such, if the mine produces at the rate contained in its approval documents, it would be bound by a facility level safeguard mechanism baseline. However, recent media reporting indicates that the proponent is more likely to proceed with a stripped back mine that would most likely not meet the threshold.¹⁶ As it is possible, though not certain, that this mine will be bound by the safeguard mechanism, it is only considered in the high case. This case is discussed in more detail below. If it proceeds at the rate contained in the approval documents, it will nonetheless have a relatively minor impact on the aggregate of emissions at facilities covered by the safeguard mechanism. It would emit 0.16 million tonnes per year for five years and cease operations before 2029-30.

Liquefied gas terminals

Ten liquefied gas terminals reported under the safeguard mechanism in the 2020-21 financial year. In 2020-21 these were responsible for 33.3 million tonnes of carbon dioxide equivalent greenhouse gas, or 24.3% of emissions from covered facilities.

An equivalent process to what was undertaken for existing coal mines was used for this sector, though with several necessary adjustments. Unfortunately, it is not entirely possible to easily distinguish between new and existing projects, and these were considered together. Broadly, new upstream emissions sources are considered “new” for the sake of this analysis, while major changes to processing facilities such as the commencement of the second train at Pluto were considered an expansion to an “existing” facility.

None of the existing facilities are expected to permanently close this next decade, though one temporary shutdown and one temporary partial shutdown are on the horizon. Both have been taken into account, as described below.

Recent statements from Woodside indicate that one of the five trains in operation at Woodside’s Karratha Gas Plant (KGP) - the liquefaction plant forming part of the North West Shelf Project (NWS) - is likely to be taken offline in 2024 as source reservoirs deplete.¹⁷ Emissions from the facility have been reduced accordingly. The currently proposed North West Shelf Project Extension, seeks to extend the life of the KGP and maintain its full capacity. This project is a key prerequisite for full development of Woodside’s proposed Browse to North West Shelf Project. Emissions from the North West Shelf Facility have been modelled as increasing back to levels associated with full production in tandem with the commissioning of Browse.

As the Bayu-Undan field depletes fully, the Darwin LNG terminal is expected to shut down in the coming months.¹⁸ The current plan is that the terminal will sit idle for several years, then restart as the Santos-owned Barossa field begins production part way through this decade. This will necessarily cause a dramatic increase in the emissions produced at the terminal because Barossa has a far higher carbon dioxide content than the existing field. The timing for this project is uncertain. Earlier this year, the Federal Court overturned the environmental approvals for the project based on a failure to properly consult with traditional owners on the Tiwi Islands.¹⁹ With this rejection having been very recently upheld on appeal,²⁰ it is possible that the backfill project will face some delays. However, the proponent - Santos - has stated that it does not anticipate any “schedule impact”.²¹ ERI has assumed that the project will nonetheless come online in late 2025. Emissions from the facility have been adjusted to account for this temporary closure and change of source accordingly.

No entirely new terminals are planned for Australia this decade, but there are nonetheless several other substantial changes on the way for existing facilities. Alongside the shift at Darwin LNG from Bayu-Undan to Barossa that is noted above, the two other major changes considered in this analysis are:

- Pluto 2 and the exploitation of the Scarborough field
- The opening up of Beetaloo Basin

Woodside’s Pluto Project liquefied gas terminal is approved to operate with two trains, but only one was initially built. Over the course of this decade, as production commences in the Scarborough field, the second train at Pluto (which is currently under construction) will come online. According to the proponent, this will slightly more than double the total emissions impact of the Pluto project. In addition, the Scarborough upstream gas production will generate significant emissions, resulting in a new facility.

There is considerable uncertainty around the future of gas produced from the Beetaloo Basin. However, the disposition of both the Northern Territory and the Federal government is that

development of the field will occur. Given that it remains unclear which projects will proceed and how the gas produced in the field will be used, we have based our numbers on work previously conducted by Reputex, who in turn based their analysis on scenarios presented to the Pepper Inquiry.²² We have taken two cases from their report to include in our analysis. Our base case considers Reputex's mid scenario, and our high case uses figures from their high scenario. Only the latter case includes liquification and export of the gas produced from Beetaloo Basin and in both instances, we have only considered the upstream component.

One significant complicating factor when considering the future emissions impact of new gas projects is the vexed issue of carbon capture and storage. While neither proponent is legally bound to install carbon capture and storage at their facilities, both Woodside and Santos have claimed that they will capture reservoir carbon dioxide from their new projects: Browse and Barossa respectively. In the ERI base case, we assumed that carbon capture is installed, and operating effectively. The high case presumes that the proponents only do what is legally required of them and vent all reservoir carbon dioxide.

Other gas facilities

The other gas category considers production and processing of gas other than that which takes place at liquefied gas terminals (or is incorporated into the emissions reported by those facilities). It includes upstream facilities that supply gas export terminals as well as facilities that process gas for domestic use. Ten such facilities reported to the safeguard mechanism in the 2020-21 financial year, and these facilities emitted 4.7 million tonnes of carbon dioxide equivalent greenhouse gas, or 3.4 per cent of the total from covered facilities.

Two main adjustments have been made to this sector to account for the Narrabri Gas Project, and the decline of Bass Strait fields. We have also adjusted for Beetaloo Basin, as described in the previous section.

With the decline of the Bass Strait fields, emissions from the Lang Lang and Otway facilities are very likely to drop below the designated large facility threshold in the near future. Following projections contained in AEMO's Gas Statement of Opportunities 2022, ERI presumes both facilities cease reporting over coming years.

The commencement date and emissions figures from the Narrabri Gas Project are taken directly from the proponent's recent statements²³ and the construction timeframe outlined in the project's Environmental Impact Statement.

At this stage, in the absence of strong evidence to the contrary, ERI has elected to assume that emissions from facilities in the Cooper and Eromanga Basin remain at current levels. Nonetheless, we note that there is a high level of uncertainty about future production from this region.

The analysis did not consider emissions from pipeline operators or oil production and processing facilities.

The emissions budget for the safeguard mechanism

The federal government's emissions target is derived from pre-election analysis of the Federal Labor Party's suite of emission reduction commitments as they stood in late 2021. This assessment - commissioned by the party itself from Reputex²⁴ - determined that a reformed safeguard mechanism would reduce emissions to 115 million tonnes in 2030. Investments made through the National Reconstruction Fund would see that brought down by a further 24 million tonnes in that year, so that net emissions from the safeguard mechanism would be 91 million tonnes.

Should net emissions from covered facilities exceed 91 million tonnes in 2030, then the Federal Government will either need to look to other sectors to compensate for a lack of climate ambition in this sector or fail to meet its 2030 goal. A properly designed safeguard mechanism must aim to deliver abatement sufficient to meet that target.

When determining the coal and gas sectors' fair share of the total safeguard mechanism budget, ERI has simply pro-rated the scheme wide goal. Facilities considered in this report accounted for 51% of covered emissions in the 2020-21 financial year, and so this constitutes their fair share of the scheme wide emissions budget.

Improving measurement reporting and verification

The IEA has warned that global methane emissions from the energy sector are about 70% greater than the amount national governments have officially reported²⁵ – and its 2022 Global Methane Tracker update estimated Australian energy methane emissions are almost double the amount the Australian Government is currently reporting.²⁶ The Australian Government reported 1.30 million tonnes of methane from coal, oil and gas in 2021.²⁷ The IEA's figure for the same period is 2.35 million tonnes methane, a gap of 1.05 million tonnes, which is an increase of 78% from the Australian Government's figures. In carbon dioxide equivalent terms, this gap represents 29 million tonnes of emissions, almost as much as the total scope 1 emissions from all Australian coal mines.

The data from the International Energy Agency is not an outlier in this regard. Australia's methane emissions as reported by the Australian government are substantially lower than virtually all third-party estimates.²⁸

Nonetheless, ERI has not attempted to account for higher estimates of Australia's methane emissions in this analysis, and it can be considered conservative in terms of total current and projected methane emissions.

ERI notes the need for further quantification of unaccounted Australian energy methane. In particular, this requires improvements to Australia's National Greenhouse and Energy Reporting scheme and increased monitoring efforts to ensure the integrity of Australia's national emission accounts, as well as the integrity of the Safeguard Mechanism's emissions budget and policy design.

About ERI

Energy and Resource Insights is a specialist consultancy providing unique analysis of Australia's resource and energy sectors.

Grounded in a rigorous analytical approach and employing a wide range of scientific and investigative techniques, our research delivers clients the insights they need to engage with these complex industries.

Our expertise includes climate, environmental, corporate and commodity fields. We work with a diverse range of clients priding ourselves on delivering high quality independent advice tailored to client needs.

Endnotes

- ¹ Clean Energy Regulator, “Australian Carbon Credit Units Issued,” August 4, 2022, <https://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register/Historical-ACCU-data>.
- ² Andrew Macintosh et al., “Fixing the Integrity Problems with Australia’s Carbon Market” (ANU College of Law, April 6, 2022), https://law.anu.edu.au/sites/all/files/short_-_erf_reform_june_2022_final.pdf.
- ³ There is a substantial body of research, dating back decades which critiques the fungibility of land and fossil carbon. This was extensively covered in chapter 7 of IPCC Working Group III’s most recent assessment report. For a recent shorter example see Wim Carton, Jens Friis Lund, and Kate Dooley, “Undoing Equivalence: Rethinking Carbon Accounting for Just Carbon Removal,” *Frontiers in Climate* 3 (2021), <https://doi.org/10.3389/fclim.2021.664130>.
- ⁴ International Energy Agency, “Curtailling Methane Emissions from Fossil Fuel Operations: Pathways to a 75% Cut by 2030” (OECD, October 21, 2021), <https://doi.org/10.1787/1616ff90-en>; Ember, “Tackling Australia’s Coal Mine Methane Problem,” June 7, 2022, <https://ember-climate.org/insights/research/tackling-australias-coal-mine-methane-problem/>.
- ⁵ The safeguard mechanism is based on reporting under the *National Greenhouse and Energy Reporting Act 2007* and shares its limitations. As such, emissions reporting is limited to greenhouse gas emissions produced from energy use and production, industrial processes and waste. Emissions from agriculture processes - including ruminant methane and fertiliser application - and emissions from land use and forestry are not considered by the scheme. Facilities where these sources of greenhouse gas emissions dominate are unlikely to emit more than 100 kilotonnes per year from included sources and so unlikely to be bound to limits under the safeguard mechanism.
- ⁶ Lenore Taylor, “Hunt Plays the Long Game on His Glaringly Obvious Emissions Trading Scheme,” *The Guardian* (Online), May 27, 2016, <http://www.theguardian.com/australia-news/2016/may/27/election-2016-greg-hunt-coalition-emissions-trading-scheme>.
- ⁷ Mark Ludlow, “No New Limits for Big Polluters despite Net Zero Pledge: Angus Taylor,” *Australian Financial Review*, November 16, 2021, sec. energy, <https://www.afr.com/companies/energy/no-new-limits-for-big-polluters-despite-net-zero-pledge-angus-taylor-20211116-p599ft>.
- ⁸ Department of the Environment, “Emissions Reduction Fund Safeguard Mechanism,” Factsheet (Commonwealth Government of Australia, 2015), <https://www.environment.gov.au/climate-change/emissions-reduction-fund/about/safeguard-mechanism>.
- ⁹ Clean Energy Regulator, “Safeguard Facility Reported Emissions,” Dataset, September 9, 2022, <https://www.cleanenergyregulator.gov.au/NGER/The-safeguard-mechanism/safeguard-data/safeguard-facility-reported-emissions>.
- ¹⁰ Clean Energy Regulator; Department of Climate Change, Energy, Environment and Water, “Quarterly Update of Australia’s National Greenhouse Gas Inventory: June 2022: Incorporating Preliminary Emissions up to September 2022,” Australia’s National Greenhouse Accounts (Commonwealth of Australia, December 1, 2022), <https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-gas-inventory-quarterly-update-june-2022>.
- ¹¹ Department of Climate Change, Energy, Environment and Water, “Powering Australia,” 2022, <https://www.energy.gov.au/government-priorities/australias-energy-strategies-and-frameworks/powering-australia>.
- ¹² Reputex, “The Economic Impact of the ALP’s Powering Australia Plan,” December 3, 2021, <https://www.reputex.com/research-insights/report-the-economic-impact-of-the-alps-powering-australia-plan/>.
- ¹³ Among many other examples, see: Conservation Council of Western Australia and Clean State, “Australia’s Most Polluting Fossil Fuel Project: Why Woodside’s Burrup Hub Developments Should Not Proceed,” February 12, 2020, <https://www.ccwa.org.au/burrup-hub>; Nick O’Malley, “Narrabri Gas Project to Be One of Australia’s Top Greenhouse Emitters,” *The Sydney Morning Herald*, July 25, 2020, <https://www.smh.com.au/environment/climate-change/narrabri-gas-project-to-be-one-of-australia-s-top-greenhouse-emitters-20200725-p55ffe.html>; Climate Analytics, “Warming Western Australia: How Woodside’s Scarborough and Pluto Project Undermines the Paris Agreement,” November 2021, <https://climateanalytics.org/publications/2021/warming-western-australia-how-woodsides-scarborough-and-pluto-project-undermines-the-paris-agreement/>; Institute for Energy Economics and Financial Analysis, “How to Save the Barossa Project from Itself,” October 1, 2021, <https://ieefa.org/resources/how-save-barossa-project-itself>.
- ¹⁴ Clean Energy Regulator, “Safeguard Facility Reported Emissions”; Geoscience Australia, “Australia’s Energy Commodity Resources 2022,” 2022, <https://www.ga.gov.au/digital-publication/aecr2022>.

- ¹⁵ RTI-21-469: Documents relating to the Queensland Coal production analysis, for the period 1 January 2020 to 27 June 2022.
- ¹⁶ Josh Chiat, “Australian Pacific Coal Is Racing to Bring Dartbrook Mine into Production in Search of Boom Prices,” *Stockhead*, November 8, 2022, <https://stockhead.com.au/resources/bulk-buys-australian-pacific-coal-is-racing-to-bring-dartbrook-mine-into-production-in-search-of-boom-prices/>.
- ¹⁷ Woodside Energy Group, “Investor Briefing Day 2022,” Presentation, December 1, 2022, <https://www.woodside.com/docs/default-source/asx-announcements/2022/investor-briefing-day-2022.pdf>.
- ¹⁸ Santos, “2022 Investor Briefing Day,” Presentation, November 8, 2022, <https://www.santos.com/wp-content/uploads/2022/11/2022-Investor-Briefing-Day-ASX.pdf>.
- ¹⁹ Ben Butler and Lisa Cox, “Tiwi Islanders Win Court Battle with Santos over Drilling in Traditional Waters,” *The Guardian*, September 21, 2022, sec. Environment, <https://www.theguardian.com/environment/2022/sep/21/tiwi-islanders-win-court-battle-with-santos-over-drilling-in-traditional-waters>.
- ²⁰ Jacqueline Breen, “Santos Loses Landmark Legal Battle in Traditional Owner’s Fight against Barossa Gas Project off Darwin,” *ABC News*, December 2, 2022, <https://www.abc.net.au/news/2022-12-02/nt-santos-loses-appeal-barossa-tiwi-island/101726772>.
- ²¹ Santos, “Full Federal Court Decision for the Barossa Gas Project,” Media release, December 2, 2022, <https://www.santos.com/news/full-federal-court-decision-for-the-barossa-gas-project/>.
- ²² Reputex, “Analysis of Beetaloo Gas Basin Emissions,” October 2021, https://www.lockthegate.org.au/reputex_analysis.
- ²³ Santos, “2022 Investor Briefing Day.”
- ²⁴ Reputex, “The Economic Impact of the ALP’s Powering Australia Plan.”
- ²⁵ International Energy Agency, “Methane Emissions from the Energy Sector Are 70% Higher than Official Figures,” Press release, February 23, 2022, <https://www.iea.org/news/methane-emissions-from-the-energy-sector-are-70-higher-than-official-figures>.
- ²⁶ International Energy Agency, “Methane Tracker,” February 23, 2022, <https://www.iea.org/data-and-statistics/data-tools/methane-tracker>.
- ²⁷ Department of Climate Change, Energy, Environment and Water, “Quarterly Update of Australia’s National Greenhouse Gas Inventory: June 2022: Incorporating Preliminary Emissions up to September 2022.”
- ²⁸ World Resources Institute, “Climate Watch,” September 18, 2019, <https://www.climatewatchdata.org/ghg-emissions>; Monica Crippa et al., “EDGAR v6.0 Greenhouse Gas Emissions,” Dataset (European Commission, Joint Research Centre (JRC), 2021), <https://data.jrc.ec.europa.eu/dataset/97a67d67-c62e-4826-b873-9d972c4f670b>; Johannes Gütschow and Mika Pflüger, “The PRIMAP-Hist National Historical Emissions Time Series (1850-2021) v2.4,” Dataset, 2021, <https://zenodo.org/record/7179775>; Patrick R O’Rourke et al., “Community Emissions Data System (CEDS) v-2021-02-05 Emissions Data 1975–2019,” Dataset, February 5, 2021, <https://zenodo.org/record/4741285>.