IMPACT OF NEW ENTRANTS ON THE SAFEGUARD MECHANISM EMISSIONS BUDGET

Modelling results for the Climate Council, March 2023

RepuTex ENERGY

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BACKGROUND

The Australian Government has released its design proposal for the reformed Safeguard Mechanism framework, outlining the establishment of a constraint on Scope 1 emissions from high emitting facilities, implemented via declining emissions baselines aligned with Australia's 2030 target.

While the framework incorporates key measures to "ensure the 2030 target will be met", the success of the proposed policy hinges upon the alignment of emissions baseline decline rates with the government's adopted emissions trajectory, ensuring that the scheme will meet its calculated emissions budget. This is a challenging task given the future variability of industrial production, and uncertainty around new projects entering the scheme.

To understand the potential risks to meeting the Safeguard Mechanism emissions budget, RepuTex has been engaged by the Climate Council and the Australian Conservation Foundation to model the potential effects of higher-than-expected emissions growth due to variation in fossil fuel production, and new entrants, on the Safeguard Mechanism emissions budget through to 2030.

Specifically, analysis presents different scenarios for coal and LNG production, and the impact on Scope 1 emissions covered by the Safeguard Mechanism, evaluating the baseline decline rates required to meet the emissions budget where production growth is higher-than-expected. In doing so, analysis also considers alternative regulatory options for the treatment of new projects.

Note that modelling seeks to explore the impact of expanded fossil fuel production and new coal and oil & gas projects on the Safeguard Mechanism's emissions budget. However, this should not be interpreted as Climate Council or Australian Conservation Foundation endorsement of new fossil fuel projects proceeding. Modelling is instead intended to evaluate the possible risk of new projects to the Safeguard Mechanism's emissions budget, and the potential need for additional policy settings to mitigate these risks.

This document presents the key findings and results for each scenario, and a description of the methodological approach applied by RepuTex.

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Established in 1999, our market data and forecasts have been at the forefront of energy and climate thinking for over two decades, with a history of providing trusted forward-looking intelligence to key trading and strategy decision makers.

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RepuTex is based in Melbourne, with a team of analysts with backgrounds in energy commodities, policy and regulation, mathematics and economic modelling. The company is a winner of the China Light and Power-Australia China Business Award for energy and climate research across Asia-Pacific.

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Summary of key findings and conclusions

Background to the project

- Because baselines under the Safeguard Mechanism are proposed to be established in emissions intensity, the main risk to meeting the Government's emissions budget is the potential for higher-than-expected production growth, particularly from the coal and LNG sectors.
- RepuTex has been engaged by the Climate Council and the Australian Conservation Foundation to model the potential effects of higher-than-expected coal and LNG production growth, and new entrants, on the Safeguard Mechanism emissions budget through 2030.
- Three scenarios are presented, including a Central Case pathway for emissions, comparable to Commonwealth estimates, and sensitivities for higher-than-expected coal and LNG production growth. Analysis also considers alternative regulatory options for the treatment of proposed new LNG projects entering the Safeguard Mechanism.

Meeting the emissions budget is sensitive to coal and LNG production

- Modelling under the Central Case is broadly comparable to the Safeguard Mechanism Reforms Positions Paper, with cumulative emissions of 1,231 MtCO2-e between 2021-30, 2 MtCO2-e below the government's budget.
- Under this pathway, emissions from "financially committed new projects" will be substantial, totalling 56.6 MtCO2-e between 2024 and 2030, underpinned by emissions from new coal and LNG projects.
- While the Government's proposed 4.9% baseline decline rate is modelled to meet the allocated emissions budget, given around half of all emissions covered by the Safeguard Mechanism are derived from coal mining and LNG facilities, there is potential for outcomes to be materially different where LNG and coal production varies from assumed settings within the Central Case.
- Under alternative pathways, modelling indicates that higher coal and LNG production could result in the emissions budget being exceeded by 13 to 35 $MtCO_2$-e by 2030, due to only modest increases in coal and LNG production.

More stringent baselines for new projects could reduce emissions baselines for existing facilities

- To account for higher-than-expected emissions from expanded coal and LNG production, and new projects, higher baseline decline rates could be necessary for existing facilities covered by the Safeguard Mechanism.
- Should LNG and coal production be higher than the Central Case, baseline decline rates of up to 5.8% may be required between 2024-30 to meet the emissions budget (up from the government's proposed 4.9%), or up to 8.9% over 2028-30 if implemented after the 2026-27 review.
- Alternatively, given the impact of new projects on total emissions, policy could be re-designed to make new entrants (rather than existing facilities) more accountable for emissions that potentially come into the scheme.
- Increased emissions baselines for new projects could be applied into more lenient baseline decline rates for existing facilities, potentially falling to as low as 4.1% per annum, while still meeting the emissions budget, or to between 5.1-5.6% under higher emissions (higher coal and LNG output) pathways.

Annual reporting of emissions performance could help to protect the emissions budget

- While it is impossible to prepare for all future emissions scenarios, more regular reporting could be built into the Safeguard Mechanism to track annual progress against the emissions budget, improving transparency for industry on the likelihood of potential future changes in baseline decline rates.
- If higher emissions are identified at an earlier stage, increased action could be flagged (or implemented) more quickly, providing stakeholders with a longer lead time to prepare for increased decline rates later in the decade.
- Alternatively, if initial emissions baselines are calibrated for the risk of higher-than expected production, but this outcome does not occur, the benefits of out-performance could create a larger safety net to protect against unforeseen emissions increases in other parts of the economy, and could help to provide an easier transition to a scaled-up emissions target.

2. Introduction

Potential risks to the emissions budget under the reformed Safeguard Mechanism

The Safeguard Mechanism has been designed to meet an emissions budget of 1,233 $MtCO_2$-e

On 10 January, the Australian Government released its design proposal for the reformed Safeguard Mechanism framework, establishing a proposed emissions budget and overall constraint for high emitting industrial facilities.

Australia's emissions budget represents the cumulative volume of emissions that may be released over the decade – Australia's contribution to global warming over the period – rather than emissions in a single year.

Given the Safeguard Mechanism contributes over 28% of Australia's total emissions, establishing the scheme's share of the national emissions budget is essential for achieving Australia's legislated 2030 emissions reduction target. Failure to meet the budget would therefore mean that Australia is unlikely to meet its emissions target, or improve on its emissions reduction ambition.

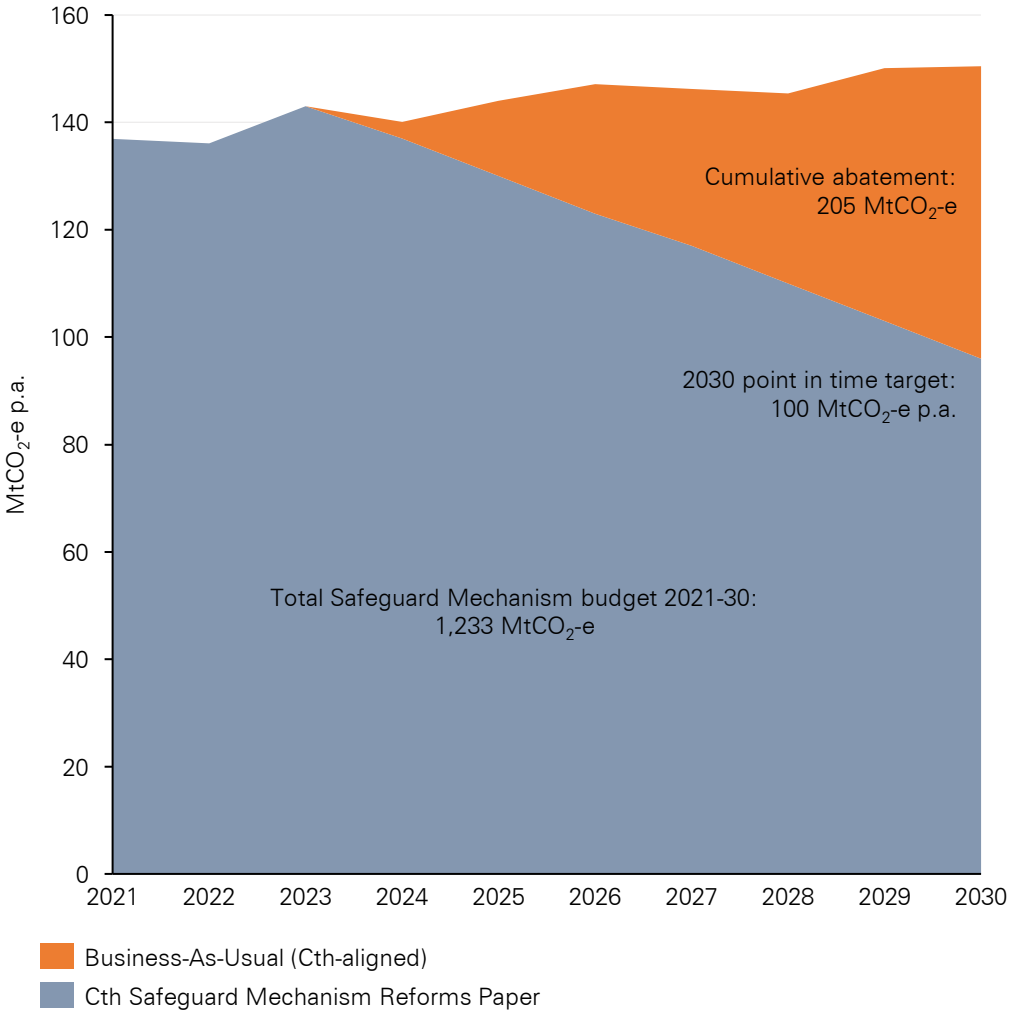
Based on a proportional share of national emissions in 2020-21 of 28.14% (excluding grid-connected electricity generation), an emissions budget of 1,233 $MtCO_2$-e between 2021 and 2030 has been calculated for the Safeguard Mechanism (from a national budget of 4,381 $MtCO_2$-e). This is represented via the area under the baseline trajectory (in blue) in Figure 1.

From the estimated starting point of 143 Mt in 2022-23, the baseline trajectory has been set to satisfy both the 1,233 Mt emissions budget and 100 Mt point target, with net emissions required to fall to 100 Mt or less in 2030.

This is proposed to be achieved via the implementation of "hybrid" emissions baselines for covered facilities, with production-adjusted (emissions intensity) baselines transitioning from 'site-specific' intensity values to wholly 'industry average' intensity values by 2030. A 4.9% decline rate is proposed to apply to emissions baselines each year from 2023-24 to 2029-30.

Based on the Government's Safeguard Mechanism Reforms Paper, cumulative abatement over the period is forecast to be 205 $MtCO_2$-e (orange wedge in Figure 1), based on the area between the baseline trajectory and business-as-usual emissions growth, prior to internal (on-site) or external (offsets) abatement.

Figure 1: Projected annual Safeguard Mechanism emissions outlined in the Commonwealth Safeguard Mechanism Reforms Positions Paper



Source: Safeguard Mechanism Reforms Positions Paper, 2023

There are risks to meeting the government's Safeguard Mechanism emissions budget

Given around half of all emissions covered by the Safeguard Mechanism are derived from coal mining and LNG facilities, future emissions outcomes are highly sensitive to variation in coal and LNG production. Should production be materially different than assumed by the government – for example if export demand for Australian LNG and coal is higher than expected – this could jeopardise the scheme's emissions budget.

To account for higher-than-expected production growth, the government has proposed measures to mitigate the risk of exceeding the target. These include:

- An emissions 'reserve' has been built into the proposed baseline decline rate. Based on the 4.9% decline rate, we calculate an implied reserve of 17-18 $MtCO_2$-e to 2030. This will increase baselines for existing facilities by around 0.3% more per annum (from the minimum level required to reach the target) to accommodate the creation of the emissions reserve.
- A review process has been scheduled for 2026-27, allowing baseline decline rates to be re-set for 2028-29 and 2029-30, accounting for the future publication of emissions information and progress to the target.

While the framework takes steps to "ensure the 2030 target will be met", the ultimate success of the proposed policy to meet the emissions budget hinges on the alignment of baseline decline rates with the government's adopted emissions trajectory – a challenging task given the variability of industrial output, and uncertainty around new facilities entering the scheme.

Because emissions baselines are established in emissions intensity (emissions per unit of output), the main risk to meeting the Safeguard Mechanism is the potential for higher-than-expected production growth beyond the government's modelled emissions reserve.

While production variability is common across many sectors, these risks are particularly evident in the coal and LNG export sectors - the two largest emitting sectors covered by the Safeguard Mechanism.

In addition, another potential source of risk to meeting the Safeguard Mechanism emissions budget relates to the treatment and classification of new projects entering the Safeguard scheme over time. While emissions from new projects are sometimes counterbalanced by the closure of ageing facilities, often leading to lower emissions, this assumes new production is less emissions intensive than output from the facility being replaced.

In some sectors, however, this is often not the case. For example, fugitive emissions from LNG processing are projected to increase mid-decade if new gas fields with higher reservoir CO_2 are developed, such as Santos' proposed Barossa field. While this new production has been proposed to notionally 'backfill' the depleted Bayu-Undan field at the Darwin LNG facility, the Barossa field has a much higher reservoir CO_2 content than the resource it is proposed to replace. As a result, emissions will increase if this reservoir CO_2 is vented to the atmosphere, despite LNG production effectively remaining the same.

How new projects are treated under the Safeguard Mechanism - e.g. the baseline that they are assigned - and how new projects are classified - e.g. what constitutes a "new" versus an "existing" facility - will have material implications for the government's assumed 'reserve' and emissions budget.

For example, Barossa is a proposed new gas field that would require an offshore facility to pre-process the gas before it is potentially piped to the existing Darwin LNG export facility. If the proposed offshore production facility over the Barossa gas field was classified as a "new" and separate facility, it would have a more stringent baseline set in line "best practice" (then declining 4.9% per annum). This would make Santos accountable for 90% of its emissions intensity (plus the additional 4.9% p.a.), with the balance accounted for by the emissions reserve.

Should Barossa instead be classified as 'backfilling' an existing facility, Santos would only be accountable for the difference in emissions between Barossa and the depleted Bayu-Undan field. This would make Santos less accountable for its emissions, given it would receive the existing baseline for the Darwin LNG facility, rather than a 'best practice' baseline for a new facility.

Should this occur, the balance of the emissions would be accounted for by other covered sectors, within the emissions budget, which could be quickly eroded.

Scenarios to analyse potential risks to the Safeguard Mechanism emissions budget

To understand the potential risks to meeting the Safeguard Mechanism emissions budget, modelling presented in this report evaluates the potential effects of higher-than-expected production growth, and the treatment of new projects, on the Safeguard Mechanism emissions budget through 2030.

Specifically, analysis considers the impact of different scenarios for coal and LNG production on Safeguard Mechanism covered emissions, and required baseline decline rates to meet the emissions budget over time. In doing so, analysis also considers alternative regulatory options for the treatment of new projects, and the implications for broader baseline decline rates.

Analysis considers the following scenarios:

1. **Required baseline decline rates to meet the emissions budget under a Central Case emissions pathway**: Analysis presents a pathway for covered emissions that is broadly comparable to the Safeguard Mechanism Reforms Positions Paper. Coal and LNG production is aligned with RepuTex in-house scenarios, meeting export demand from key regional markets.
2. **Required baseline decline rates under two sensitivities:**
    a) Alternative assumptions for coal and LNG emissions based on the potential for higher production and growth in export demand.
    b) Sensitivity analysis of the classification of LNG backfill projects, either as "existing" facilities (with more lenient baselines), or as "new" facilities (assigned more stringent best practice baselines).
3. **Alternative policy scenario for the treatment of new projects:** All new projects are made fully accountable for 100% of their emissions on entry, instead of best practice, removing their impact on the emissions budget.

In doing so, analysis seeks to explore alternative outcomes for covered emissions, helping to ensure that proposed policy is calibrated to "out-perform" the stated emissions budget and emissions reduction goal.

3.
Central Case

Required baseline decline rates under a Central Case emissions pathway

CENTRAL CASE SUMMARY

The Central Case models required baseline decline rates to meet the government's emissions budget under a pathway that is broadly comparable to emissions projections presented by DCCEEW in the Safeguard Mechanism Reforms Positions Paper.

No detailed methodology has been published by DCCEEW. The Central Case therefore makes assumptions for new projects comparable with DCCEEW projections, with coal and LNG production aligned with RepuTex in-house scenarios to provide comparable outcomes to government estimates.

Under this pathway, we assume that Australian coal and LNG production is shaped by projected export demand based on key regional export partners meeting their announced international commitments to reduce emissions by 2030. Outcomes are therefore dependent on international trading partners following through on their commitments to reduce emissions and implementing effective policies to achieve such an outcome.

Assumed settings result in an initial increase in coal production in 2023, before declining through to 2030 as key export partners implement their national emission reduction targets. Coking (metallurgical) coal production is expected to increase to a maximum in 2027, before remaining relatively constant to 2030 due to maintained high demand for steelmaking. Thermal coal production is expected to increase in 2023, before declining due to decreasing domestic use and decreasing international demand as key trading partners transition towards cleaner power generation.

Comparably, continuing and consistent demand for Australian LNG results in LNG production growing slightly to 2030, attributed to continued gas demand as Australia's trade partners transform their energy systems. Refer to Slide 18 for a depiction of our assumed production curves.

Projections incorporate "financially committed new projects" (refer to Slide 13 for further information), and accounts for policy described by the Safeguard Mechanism Reforms Position Paper, summarised in Table 1.

Table 1: Key Safeguard Mechanism policy parameters

Parameter	Modelled value
Scheme coverage	The current eligibility threshold for the Safeguard Mechanism is maintained at 100,000 tCO_2-e p.a. Facilities covered under Safeguard are assumed to "fall out" of coverage as emissions fall below 100,000 tCO_2-e p.a. but may continue to generate Safeguard Mechanism Credits for a further five years (noting that emissions baselines would continue to decline).
Baselines for existing facilities	Existing facilities are assigned a "production-adjusted baseline" (annually adjusted), set in emissions intensity terms. A hybrid model is adopted, transitioning from site-specific values to wholly industry average emissions intensity values by 2030.
Baselines for new facilities	New entrant baselines are set as "international best practice, adapted for an Australian context". This is based on secondary research of international facilities for all sectors except gas, LNG, and coal. For these sectors, best practice is defined as the intensity of the top 10% of Australian facilities.
Treatment of LNG backfill	Emissions and baselines for new LNG backfill projects are classified as part of their associated "existing" processing facility.
Rate of baseline decline	Baselines for existing facilities decline at 4.9% p.a. to 2030. For new entrants, baselines are assumed to decline at the same proportional rate as those of new entrants (4.9% p.a. to FY30) based on a corresponding back-calculated baseline.
Industry assistance	Trade-exposed, baseline-adjusted facilities (TEBAs) receive reduced baseline decline rates until major abatement technologies are implemented. TEBAs are assumed to have the maximum baseline reduction rate of 2.9% p.a. TEBA status is assumed for 11 facilities. No provision is made for multi-year monitoring periods as these are not anticipated to affect the overall covered emissions budget (only individual liabilities).

List of assumed new projects

New projects are assumed to be "financially committed new projects" (above the 100,000 tCO_2-e threshold) as published by Office of Chief Economist (OCE), along with new projects explicitly stated in Australia's Emissions Projections 2022 (DCCEEW). For the purposes of their liability under the proposed Safeguard Mechanism, new projects may be classified as "new" or "existing" facilities (in the case of LNG backfill projects) as described within each modelled scenario.

Modelling does not consider 'proposed' projects given these are in early planning and have not received regulatory approval or financial commitment. While the project pipeline may be viewed as conservative, analysis instead models the need for new projects to be developed based on higher coal and LNG export demand - a more appropriate driver of potential expanded fossil fuel production. If demand is higher than projected (beyond existing capacity), this could induce more projects being developed, amplifying the risks identified.

Table 2: List of new projects included in the projections[1]

Sector	Facility	Projected year of entry
LNG[2]	• Barossa • Browse • Pluto 2/ Scarborough	• 2025 • 2029 • 2026
Domestic Gas[3]	• Narrabri coal seam gas project • Beetaloo basin developments • Waitsia Stage 2	• 2024 • 2025 • 2025 • 2024
Coal[4]	• Wilkie Creek • Vickery • New Acland • Maxwell • Olive Downs Stage 1 • Hillalong • Wallarah 2	• 2024 • 2025 • 2024 • 2027 • 2024 • 2024 • 2028
Lithium	• Kwinana Lithium Plant (Covalent Lithium)	• 2025
Iron Ore	• Iron Bridge • Rio Tinto/Baowu Joint Venture	• 2024 • 2025

[1] These projects have been included because they have reached advanced planning. This should not be interpreted as Climate Council or Australian Conservation Foundation endorsement of these projects proceeding.

[2] The switch of Shell's FLNG facility from the Prelude field to the Crux field is accounted for in the model as a change in reservoir emissions.

[3] The expansion of the Gippsland Basin Project through the Kipper field, and of the QGC facility through the Goog-A-Binge project are accounted for in the model as an increase in capacity.

[4] Expansions to existing mines are not considered to be new entrants

Emissions from new projects would represent a growing share of total emissions

Under modelled business-as-usual conditions, broadly comparable to emissions projections presented in the Safeguard Mechanism Reforms Positions Paper (prior to internal or external abatement activities), emissions from identified new projects[5] are shown to be relatively small in 2024, increasing significantly in 2025, 2026, and again in 2029 due largely to the assumed ramp-up of the Pluto, Barossa, and Browse LNG projects.

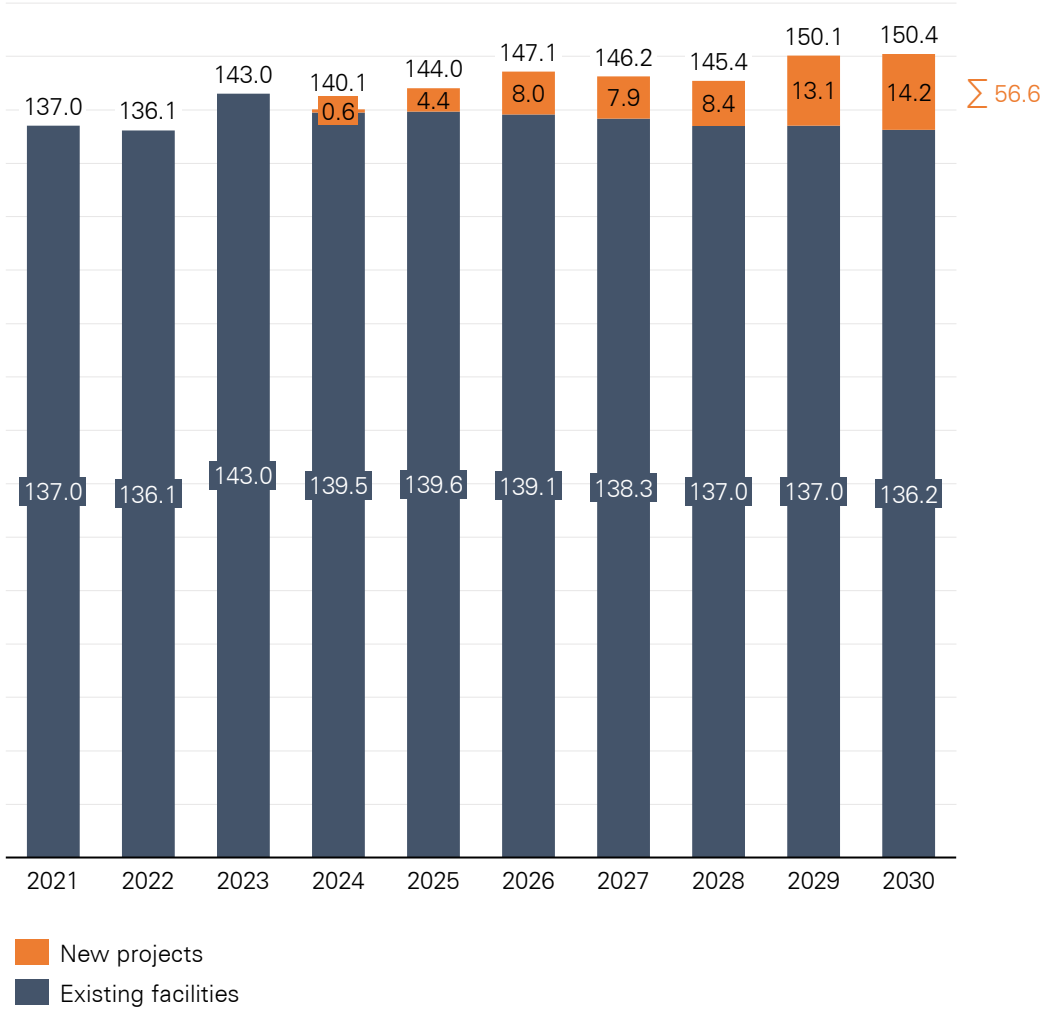
By 2030, in this scenario, these three projects account for approximately 69% of annual emissions from new facilities, with new domestic gas extraction facilities (Waitsia, Narrabri, and Beetaloo) accounting for a further 13%.

While emissions from new projects are relatively small over the projection period, the three largest of these (Pluto, Barossa, and Browse) only enter the Safeguard Mechanism in 2025 and 2029. These projects will therefore continue to require a growing share of the emissions budget after 2030.

Prior to abatement activities, annual emissions from new projects are expected to gradually increase their share of total emissions, accounting for 0.4% of emissions in 2024, 5.4% of emissions in 2027, and 9.4% of emissions in 2030. The increasing share of emissions is attributed to both the ramp-up of large new projects, and the closure of existing facilities towards the end of the decade.

Between 2024-30 the sum of emissions from new projects is substantial on an cumulative basis: 56.6 $MtCO_2$-e in the scenario depicted. This represents more than one-quarter of the total cumulative emissions reduction proposed to be achieved by the Safeguard Mechanism reforms through to 2030. Therefore, these proposed new projects represent a potential risk to the emissions budget – and Australia's emissions target - if not properly addressed in policy design.

Figure 2: Annual Safeguard Mechanism facility emissions under Business-As-Usual (Commonwealth aligned) – Existing facilities and new (financially committed) projects [$MtCO_2$-e]



Source: RepuTex Energy, 2023

[5] New projects as depicted on Slide 13. Note that these projects may not necessarily be classed as "new facilities" under the Safeguard Mechanism (for example LNG backfill projects).

Under these assumed conditions, Government policy can achieve the point in time target by 2030 and the cumulative emissions budget

Applying the Government's proposed policy settings, the Safeguard Mechanism is calculated to lead to large-scale abatement by 2030 (from both internal and external sources), resulting in annual emissions of 99 $MtCO_2$-e by 2030.

Measured from business-as-usual (Commonwealth aligned), annual abatement under these assumed conditions is expected to be 51 $MtCO_2$-e p.a. by 2030, with cumulative abatement of 209 $MtCO_2$-e over the period from 2024-30.

While projected emissions in 2030 in the Central Case are slightly higher than those estimated by DCCEEW (96 $MtCO_2$-e p.a.)[6], cumulative emissions from 2021-30 are expected to be effectively the same at 1,231 $MtCO_2$-e – just two $MtCO_2$-e below the emissions budget.[7]

The proportion of internal emissions reductions versus external offsets will depend on a range of factors (not considered here) such as the support of low-cost financing, the rate (and timing) of cost declines and technological maturation, policy certainty, and the strength of the underling price incentive (e.g., price of ACCU offsets), with potential for up to 74% of abatement from covered facilities to occur through on-site emission reduction actions (including Safeguard Mechanism Credits) under supportive conditions[8].

However, outcomes under this pathway are highly dependent on international trading partners following through on their commitments to reduce emissions by 2030 - and implementing effective policy to achieve such an outcome - translating into our assumed curves for coal and LNG production. Coal and LNG production variability therefore remains a significant risk to modelled outcomes.

Both the Central Case and DCCEEW projections are envisaged to "outperform" the Commonwealth's point in time target in 2030 of 100 $MtCO_2$-e p.a.

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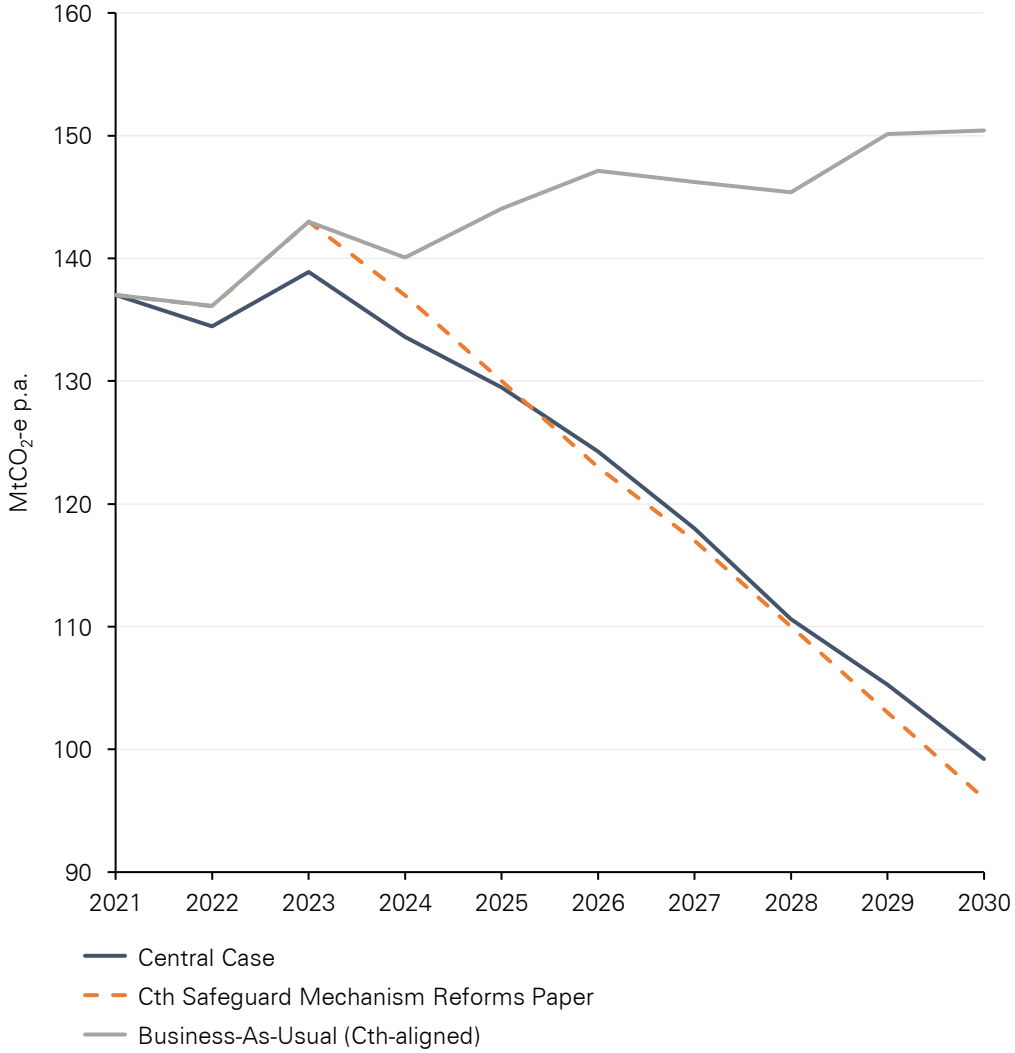
[6] Modelling presented in the Safeguard Mechanism Reforms Position Paper
[7] The Central Case is projected to outperform the emissions budget by 2 $MtCO_2$-e. A baseline decline rate of 4.8% could therefore met the emissions budget (see Fig. 6)
[8] RepuTex Carbon Market Outlook, February 2023

Figure 3: Projected annual Safeguard Mechanism emissions relative to Business-As-Usual (Commonwealth aligned)



Sources: RepuTex Energy, 2023; Safeguard Mechanism Reforms Positions Paper, 2023

4.

Sensitivity Analysis I

The potential impact of alternative coal and gas production

ALTERNATIVE PRODUCTION SCENARIOS

The coal and LNG sectors currently account for 24% and 23% of annual Safeguard Mechanism emissions, or 47% of total covered emissions.

In addition to being large contributors to total covered emissions, production in these sectors is strongly affected by global demand dynamics, influenced by geopolitical events (such as the Russia-Ukraine conflict), and the setting of emissions targets (and decarbonisation policy) in key export markets.

Given around half of all emissions covered by the Safeguard Mechanism are derived from LNG and coal mining facilities, future emissions outcomes are therefore likely to be particularly reactive to assumed changes in Australian export conditions, specifically regional demand for coal and LNG.

In the presented Central Case, emissions baseline decline rates are modelled to meet the government's emissions budget under the assumed settings, accounting for continued coal and LNG production to meet export demand should key regional markets take action to meet their 2030 targets. Under business-as-usual conditions (Commonwealth aligned), emissions are shown to gradually increase to 2030 (see Fig. 3), driven by continuing and consistent demand for Australian LNG, despite gradual declines in Australian coal exports as regional trade partners (particularly Japan and South Korea) pursue net-zero targets, and transition to renewables generation.

Should LNG and coal production vary from the Central Case, there is potential for emissions covered by the Safeguard Mechanism to be materially different based on factors external to Australian policy.

To consider the impact of materially higher-than-expected production growth at new and existing facilities, we consider two higher production pathways to observe their effect on the government's emissions budget.

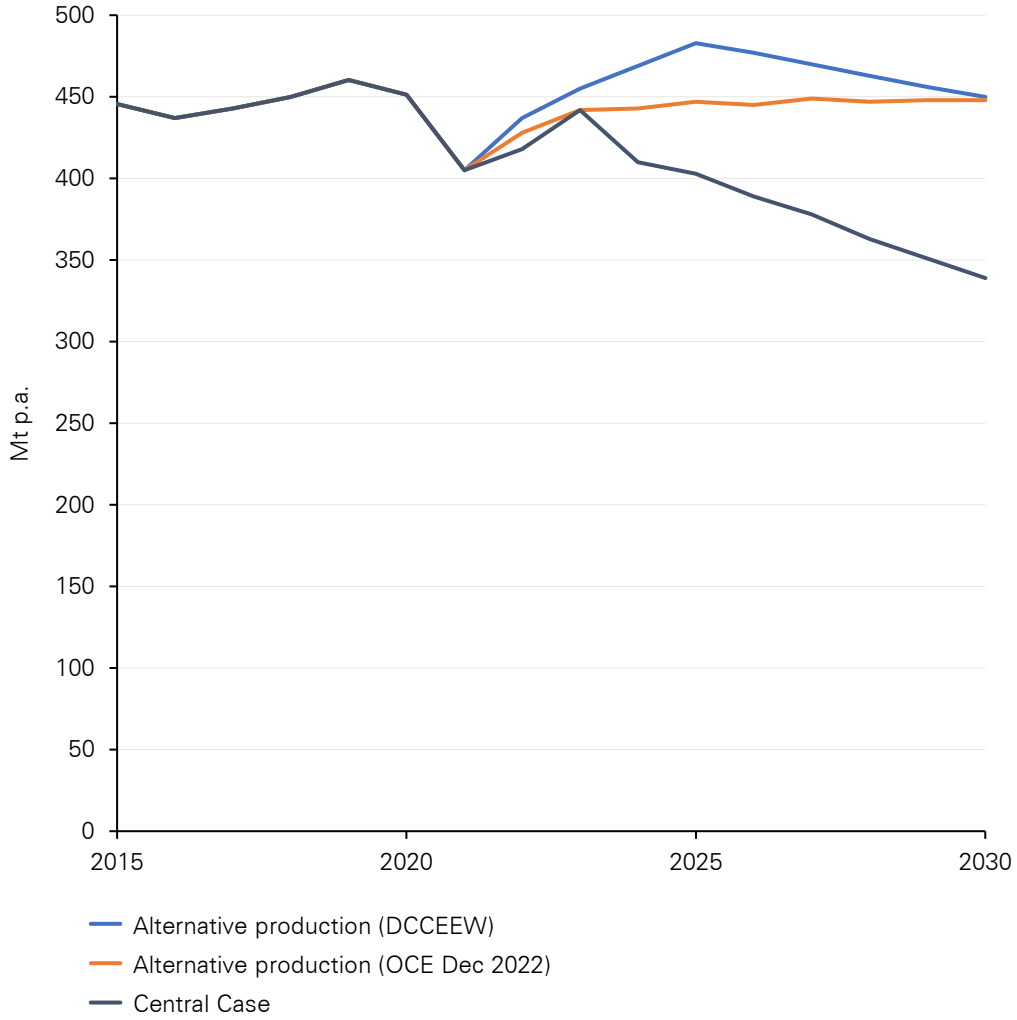
These production pathways are described in Table 3 and are visually depicted in Figs. 4A and 4B (over page).

Table 3: Summary of modelled LNG and coal production pathways

Pathway	Description
Central Case	Coal production assumed to decline after 2023 as trade partners decarbonise in-line with national targets, LNG production displays mild continued growth.
Alternative production (DCCEEW)	Emissions align with DCCEEW Emissions Projections 2022 – Coal production to show stronger-than-expected growth to 2025 before declining to 2030, moderate growth in LNG export demand.
Alternative production (OCE Dec 2022)	Emissions modelled in-line with OCE assumptions for coal and LNG production (December 2022) – Coal production increases to 2024 before plateauing to 2030, LNG export growth remains consistent.

Modelled coal production curves

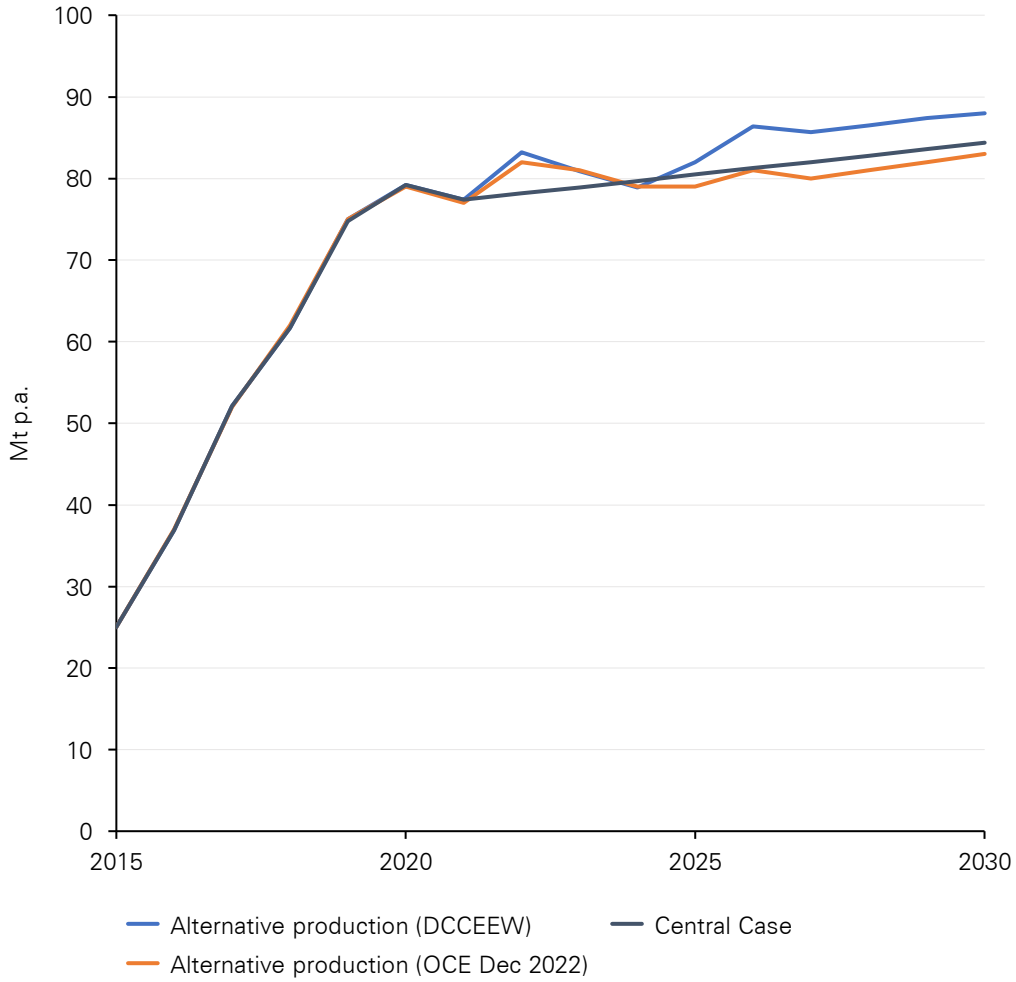
Figure 4A: Projected annual coal production by scenario



Sources: RepuTex Energy, 2023; Commonwealth Emissions Projections 2022; OCE Energy and Resources Quarterly December 2022

Modelled LNG production curves

Figure 4B: Projected annual LNG production by scenario



Sources: RepuTex Energy, 2023; Commonwealth Emissions Projections 2022; OCE Energy and Resources Quarterly December 2022

Higher coal and LNG production risk exceeding the emissions budget

Should LNG and coal production vary from the Central Case, in line with our modelled sensitivities, covered emissions could be materially higher than expected, jeopardising the Safeguard Mechanism emissions budget.

As depicted in Figure 5, the wider spread of potential coal and LNG production, shown in figures 4A and 4B, is expected to lead to a significant spread in total cumulative emissions over the period 2021-30. As a result, both higher-production pathways are found to exceed the emissions budget.

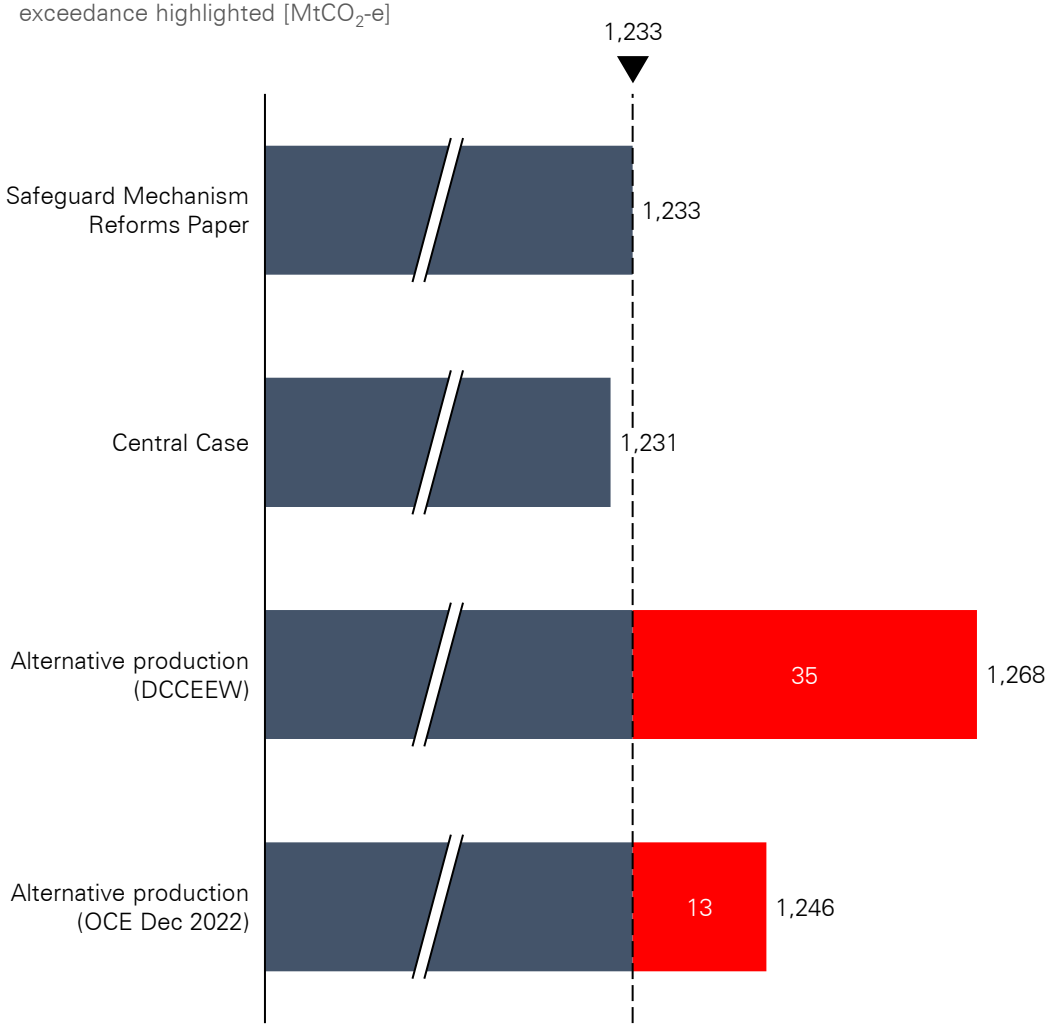
The modelled range of emissions budget exceedance varies from 13 to 35 $MtCO_2$-e by 2030, shown in red. This highlights the risk of potential "overshoot" of the Safeguard Mechanism budget based on relatively modest changes in coal and gas production. Analysis captures only additional Scope 1 emissions, and does not reflect larger Scope 2 and 3 emissions impacts.

The Safeguard Mechanism Reforms Paper projections are within the range of results obtained, yet are most closely aligned to the Central Case, which applies more conservative growth assumptions for coal and gas production.

Notably, the coal and LNG production curves presented within these alternative pathways may all be considered relatively moderate, with projections from other sources, such as the Reserve Bank of Australia[9], much more variable.

Results therefore highlight the potential for higher-than-expected production from the LNG and coal sectors to undermine the assumed emissions budget, even where increases in output are only moderate.

Figure 5: Projected Safeguard Mechanism emissions budget by pathway with possible exceedance highlighted [$MtCO_2$-e]



Source: RepuTex Energy, 2023

[9] Reserve Bank of Australia (Economic Analysis Department): Towards Net Zero: Implications for Australia of Energy Policies in East Asia, September 2021.

Under these scenarios, baseline declines rates of up to 5.8% would be required for all participants to meet the budget

In order to meet the emissions budget under higher production pathways, updated emissions baseline decline rates were modelled for covered facilities, with baselines of up to 5.8% required between 2024-30.

If implemented from commencement of the scheme in 2023-24, alternative baseline decline rates are shown to vary from 4.8% to 5.8% per annum depending on modelled coal and LNG production outcomes. Any increase in LNG and coal production beyond the Central Case, would thus require existing facilities across other sectors regulated by the Safeguard Mechanism to further increase their emissions reduction efforts.

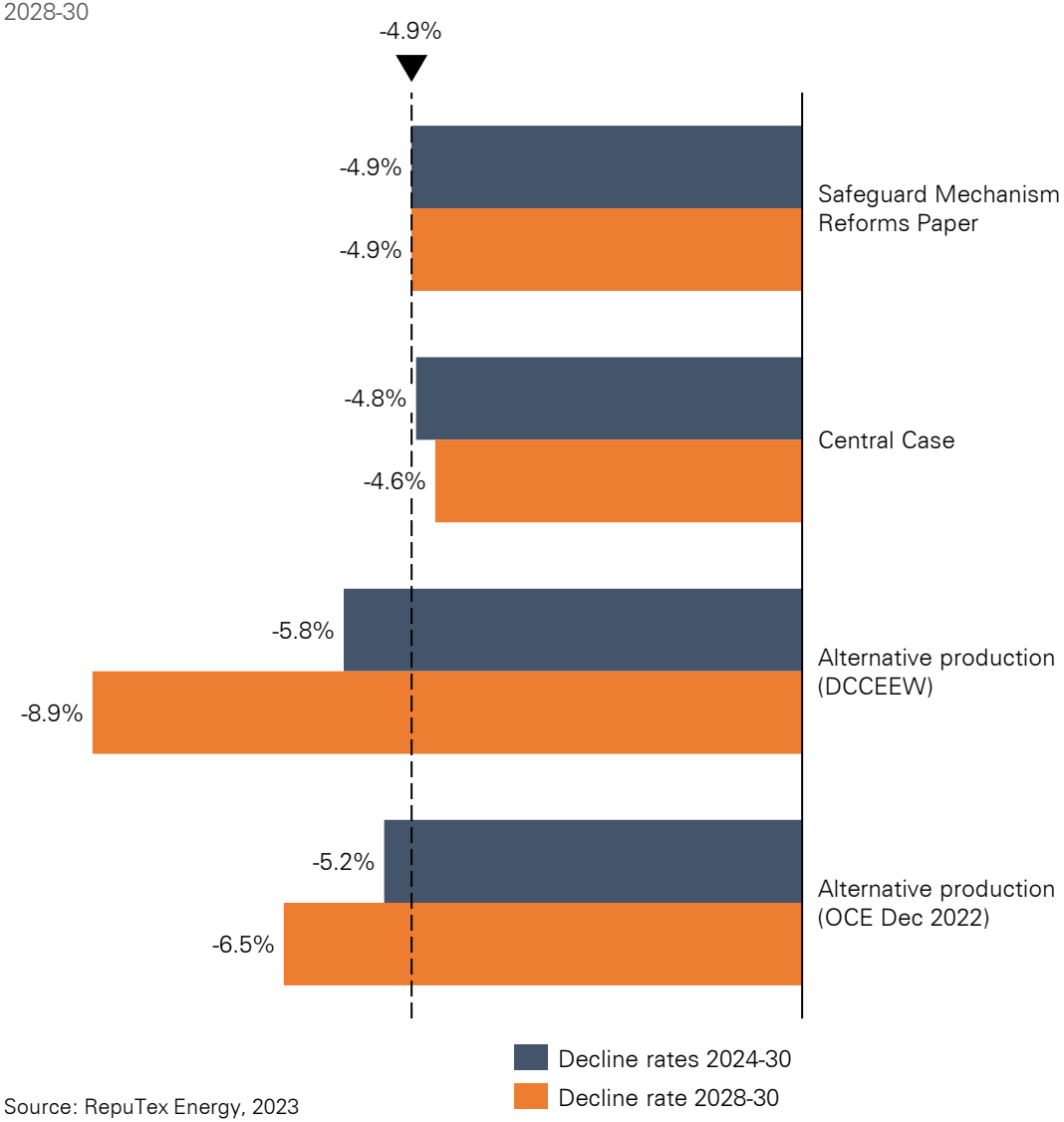
The Government has proposed a review of emissions baselines in 2026-27, with the ability to adjust decline rates for 2028-30.

Should the government wait until after the review to implement scaled up emissions baselines, scenarios which exceed the emissions budget could require decline rates of 6.5% to 8.9% per annum over 2028-30 to meet the government's proposed emissions budget under higher output scenarios.

Results highlight the large impact of relatively small proportional exceedance of the emissions budget. For example, an increase in an annual decline rate of up to 0.9% per annum from 2024-30 would represent an additional decline of up to 4.1% from 2028-30 should the review of baselines wait until the final two years.

Such an outcome could place increased pressure on industrial facilities to reduce more emissions within a shorter period of time, and/or could trigger the increased use of external abatement given the shorter lead time to signal the need for any increased emissions reduction ambition.

Figure 6: Required baseline decline rates to hit emissions budget by pathway, over 2024-30 and 2028-30



Source: RepuTex Energy, 2023

5.

Sensitivity Analysis II

The potential impact of varying LNG project classifications

CLASSIFICATION OF LNG PROJECTS

Two of the largest-emitting new projects expected to come online by 2030, Barossa and Browse, are 'backfill' LNG projects, that represent a new source of supply to an existing processing facility (the Darwin LNG facility and North West Shelf facilities). In total, these two new projects represent up to 5.4% of projected annual business-as-usual emissions (Commonwealth aligned).

The classification of these projects, as either "new" and separate facilities or as backfilling "existing" facilities, will have implications for the government's emissions reserve, and the broader emissions budget. This is because new facilities will be assigned a "best practice" emissions baseline, making responsible emitters liable for a greater proportion of their emissions, while existing facilities will be subject to a more lenient baseline.

As a result, the classification of these projects as "new" facilities, or as "existing" processing facilities will materially impact the emissions budget.

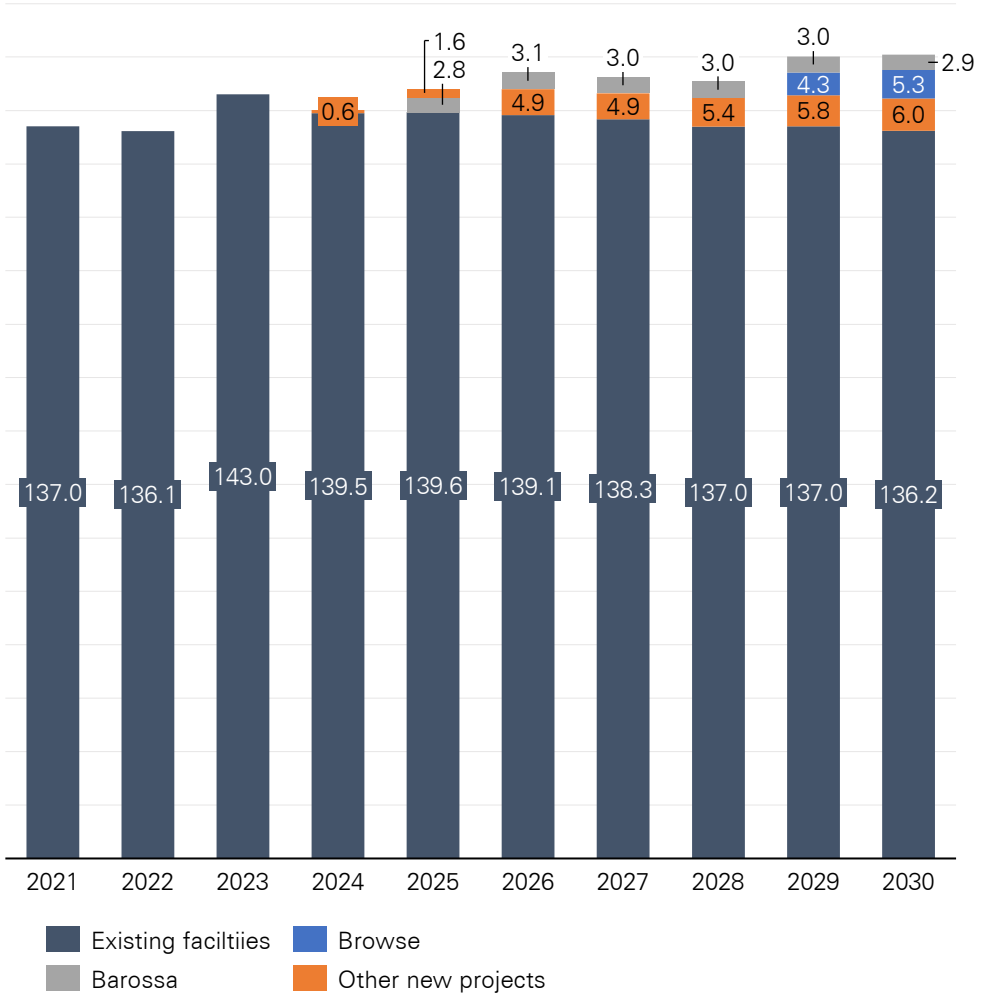
To date, the classification of new LNG backfill facilities in the Safeguard Mechanism reforms has not been confirmed. A sensitivity analysis has therefore been carried out for each of the three previously presented production pathways, with LNG backfill projects treated as a new facility rather than part of existing facilities (assumed under the Central Case).

In this analysis, the consideration of these LNG backfill projects as an existing facility or a new facility only affects facility baselines, and does not affect production or pre-baseline emissions.

It should be noted that in some cases of LNG field replacement, there is no significant change in emissions as adjacent fields typically have similar reservoir CO_2 contents. However, the impact of classifying backfill as new entrants is relevant for new projects that have a much higher reservoir CO_2 content than from existing fields, such as the Barossa and Browse fields.

In these cases, substantial separation and venting of CO_2 is required at the new extraction facility before the natural gas may be transferred to an existing LNG processing facility.

Figure 7: Annualised Safeguard Mechanism facility emissions under Business-As-Usual assumptions (Commonwealth aligned)



Source: RepuTex Energy, 2023

Allocating additional LNG projects "new facility" baselines could save up to 7 $MtCO_2$-e from the Safeguard Mechanism emissions budget

While not as significant as the effect of changes in coal and LNG production, the classification of major new LNG backfill projects as "new facilities", instead of existing facilities, may serve as a large lever to help meet the emissions budget.

For the given pathways, the effect of applying new entrant (best practice) baselines to the Barossa and Browse facilities is shown to lead to a decrease in cumulative emissions of 6 to 7 $MtCO_2$-e, depending on LNG production.

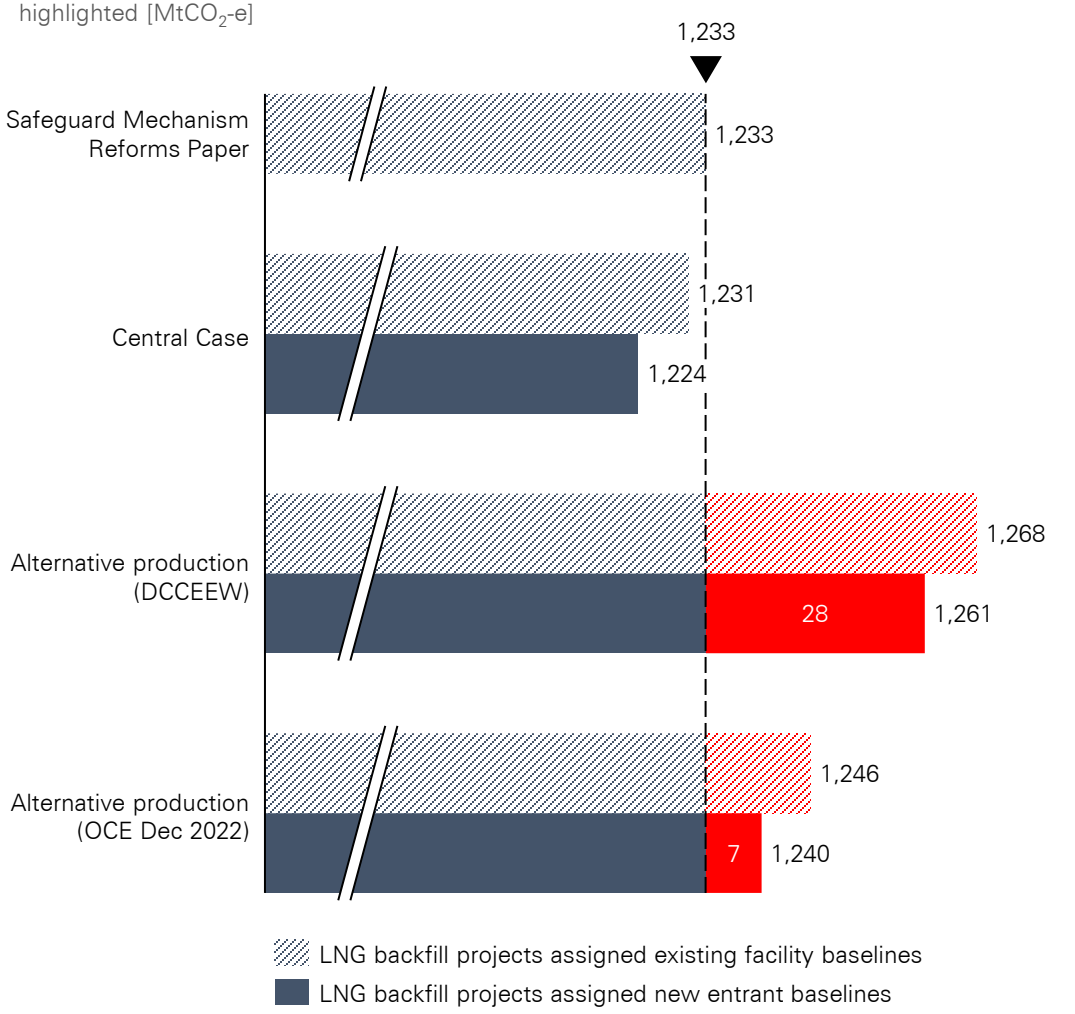
Under the Central Case, this would have the effect of total cumulative emissions outperforming the emissions budget by 9 $MtCO_2$-e, potentially providing a larger "safety net" for other areas of the Australian economy.

Under Alternative production pathways, the classification of LNG projects as new facilities is shown to reduce the projected exceedance of the emissions budget to 0.5 - 2.3% (down from 1.1 - 2.8%).

Although the classification of LNG backfill projects only affects the 2030 emissions budget by around 0.5 - 0.6%, it is worth noting that the two contributing projects only enter the Safeguard Mechanism in 2025 and 2029.

These high-emitting projects therefore have the potential to significantly affect longer-term carbon budgets. Decisions over their classification should thus incorporate longer-term considerations around Australia's future targets, including Australia's net-zero targets.

Figure 8: Projected Safeguard Mechanism emissions budget by scenario with possible overshoot highlighted [$MtCO_2$-e]



Source: RepuTex Energy, 2023

More stringent baselines for additional LNG projects could lower decline rates for all other facilities

The effect of setting more stringent "new facility" (best practice) baselines for the Barossa and Browse LNG projects could be significant for other liable entities, potentially allowing existing facilities to reduce their required baseline decline rates (particularly under the highest coal and LNG production pathway) while maintaining the integrity of the government's emissions budget.

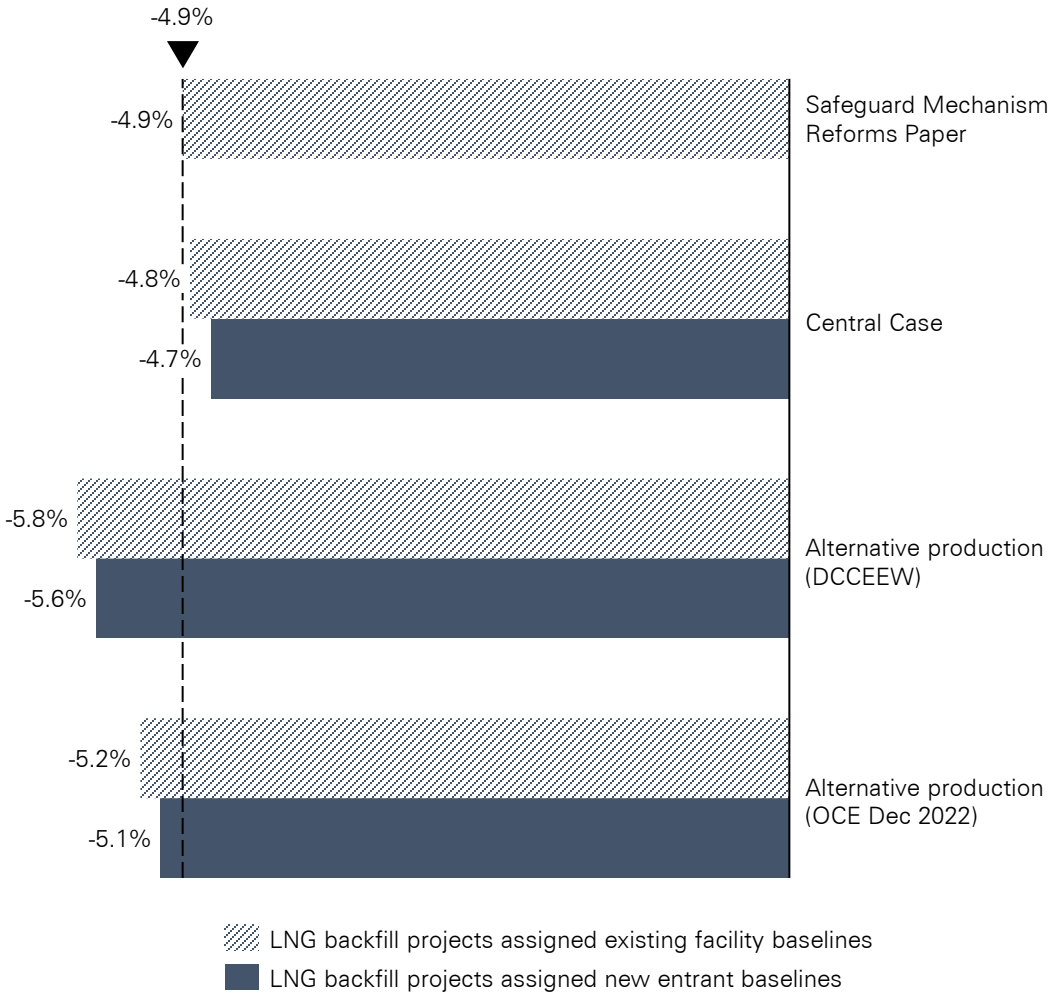
Over the period 2024-2030, the cumulative effect of lower decline rates has the potential to place significantly less pressure on other industries.

This benefit could also be targeted at true hard-to-abate industries with low profit margins (such as steel) which may otherwise be unlikely to qualify for Trade-Exposed Baseline Adjusted status due to the low impact of liabilities on revenue, despite a large relative impact on profits.

For scenarios in which the emissions budget is expected to be met, lower decline rates down to 4.7% would in theory be possible.

If lowered after the review period, decline rates could be reduced to 3.8% to 4.6% from 2028-30 under the Central Case. Alternatively, the benefit could be banked, creating an increased buffer of 2-7 $MtCO_2$-e. This would protect against any exceedance risk, or allow Australia to improve on its current 43 percent emissions reduction target.

Figure 9: Required baseline decline rates (2024-30) to hit emissions budget, by pathway



Source: RepuTex Energy, 2023

6.
Alternative Approach

The impact of making new projects accountable for all their emissions

ACCOUNTABILITY FOR NEW PROJECTS

As noted, if even a small number of new projects proceed, by 2030 annual emissions from new projects are expected to gradually increase their share of total covered emissions to 9.4%.

The sum of emissions from new projects between 2024 and 2030 is substantial in cumulative terms: 56.6 $MtCO_2$-e under business-as-usual conditions (Commonwealth aligned), e.g., prior to proposed policy reform, and up to 22 $MtCO_2$-e under proposed policy settings.

Three projects – the Pluto, Barossa, and Browse LNG projects - would account for approximately 69% of annual emissions from new facilities if they proceed, with new domestic gas extraction facilities (Waitsia, Narrabri and Beetaloo) accounting for 13% if these proceed.

Under the modelled Central Case and sensitivities, analysis considers the potential to adjust emissions baseline decline rates for all facilities in order to meet the Safeguard Mechanism emissions budget.

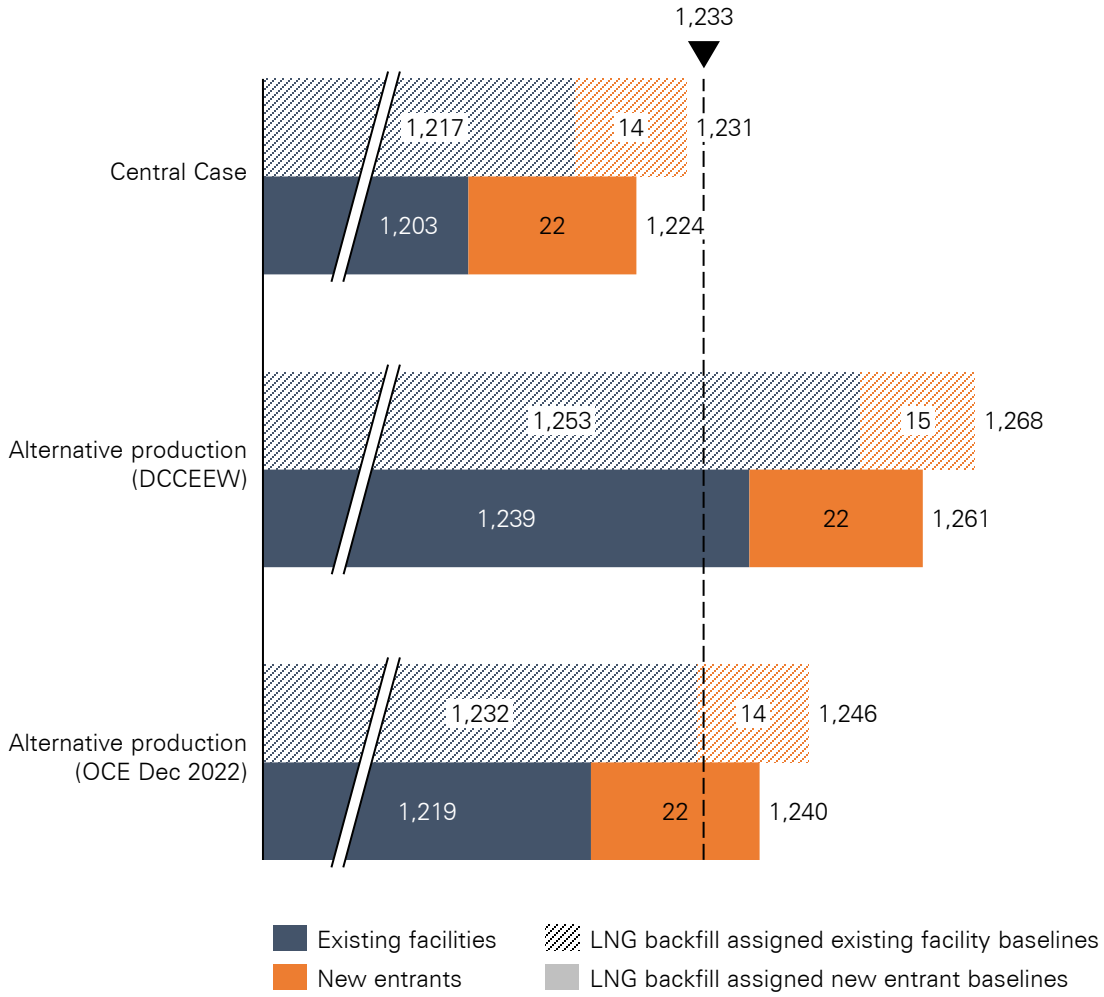
An alternative approach to meet the emissions budget is to adjust individual policy settings, varying the accountability for new emissions.

Analysis in this section evaluates the effect of making new projects accountable for the whole of their emissions. The impact on required decline rates is also investigated, given existing facilities would no longer required to abate as rapidly in order to accommodate new entrants' emissions.

In line with the Central Case, modelled parameters are aligned with proposed reforms outlined in the January 2023 Safeguard Mechanism Reforms Positions Paper, with all new projects instead assigned baselines of 0 tCO_2-e p.a. (and not permitted to "fall out" of the Safeguard Mechanism).

Such an approach may be analogous to tighter state-based regulation for large new projects to reduce or offset their emissions as a condition of their environmental approval, including the Northern Territory Pepper Inquiry, which recommended there be "no net increase in lifecycle emissions from onshore shale gas produced in the NT".

Figure 10: Projected Safeguard Mechanism emissions budget by pathway [$MtCO_2$-e]



Source: RepuTex Energy, 2023

Making new projects accountable for 100% of their emissions would allow the emissions budget to be met under a wider range of scenarios

Under the Alternative Approach, both the Central Case and the Alternative production sensitivity (OCE) are modelled to meet the emissions budget, irrespective of the classification of backfill projects as existing or new facilities.

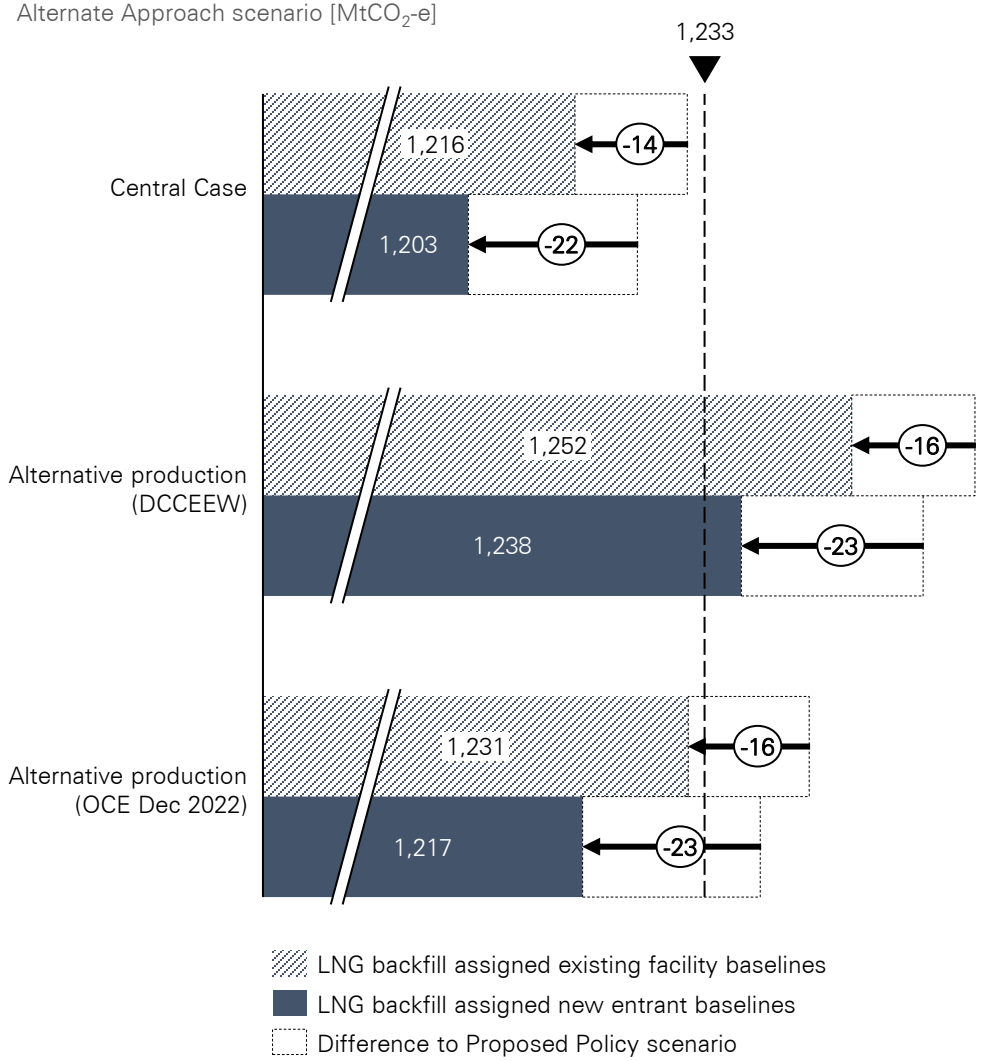
Furthermore, the degree of exceedance in the Alternative production (DCCEEW) sensitivity is shown to decrease from 1.5 - 2.8% to just 0.4 - 2.3%.

Implementation of the Alternative Approach using the existing 4.9% decline rate could therefore lead to cumulative emissions of as low as 1,203 $MtCO_2$-e in the Central Case (see Fig, 11). This would result in the Safeguard Mechanism emissions budget being out-performed by up to 30 $MtCO_2$-e, even in the absence of any further policies.[10]

This would allow Australia to further improve upon its current 2030 emissions reduction target under multiple production pathways. Alternatively, this could offer a larger safety net to account for potential changes in industrial output, and/or provide benefit to emissions sources which are harder to abate (either within Safeguard or the broader economy).

As per other scenarios, the continued exceedance of the Alternative production (DCCEEW) sensitivity further highlights the risk to the emissions budget represented by uncertain future coal and gas production levels.

Figure 11: Projected Safeguard Mechanism emissions budget by pathway under the Alternate Approach scenario [$MtCO_2$-e]



Source: RepuTex Energy, 2023

[10] While data in Fig. 2 shows new entrant emissions as 57 $MtCO_2$-e, this is under business-as-usual conditions (Commonwealth aligned) without Safeguard baselines. As shown in Fig. 10, under current proposed policies the sum of new entrants' baselines is 14 - 22 $MtCO_2$-e depending on the classification of additional LNG backfill. Under the Alternative Approach, these remaining emissions are also abated or offset.

Baseline decline rates could be further reduced for existing Safeguard Mechanism facilities

Under the Alternative Approach, the benefit of more stringent emissions baselines for new projects could be applied into more lenient decline rates for existing facilities, which would no longer need to take increased action to accommodate the emissions of new entrants.

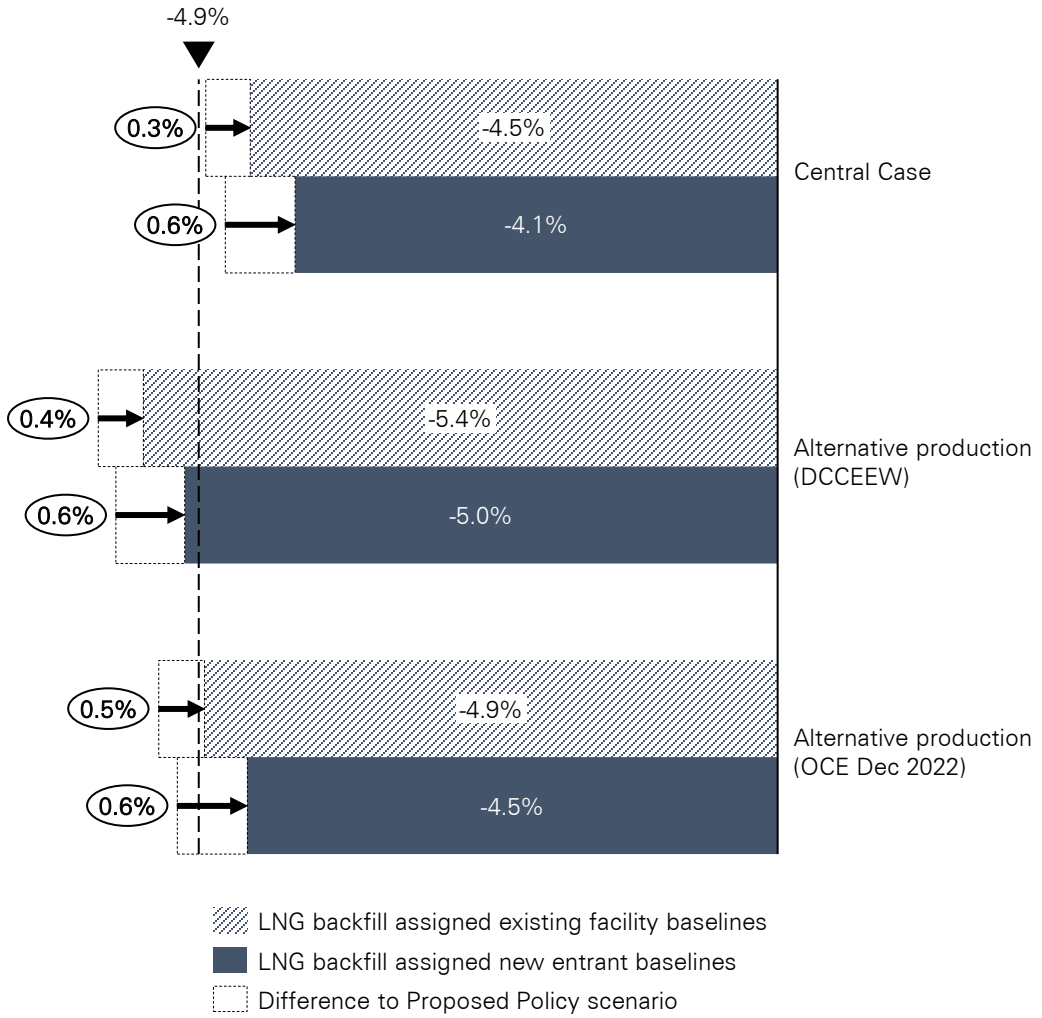
For 4 out of the 6 modelled scenarios, this would correspond to decline rates below the current rate of 4.9% (and as low as 4.1%), however, while this would meet the emissions budget, it would remove any emissions reserve.

Expectedly, the drop in decline rates is most significant for pathways in which additional LNG projects are classified as new facilities, as all emissions from Browse and Barossa are abated or offset.

By implementing the Alternative Approach, while classifying LNG backfill as new facilities, using a 4.9% decline rate would be sufficient to meet the emissions budget under a wider range of fossil fuel production pathways.

There would also be more scope for small degrees of correction following the 2026-27 review period. Under the conditions outlined above and the Alternative production (DCCEEW) pathway, a slightly higher decline rate of 5.5% would be sufficient from 2028-30 to compensate for a 4.9% decline rate from 2024-30.

Figure 12: Projected Safeguard Mechanism emissions budget by pathway under the Alternate Approach scenario [$MtCO_2$-e]



Source: RepuTex Energy, 2023

7.
Key conclusions

Summary of key outcomes, conclusions and recommendations

There are foreseeable scenarios in which proposed Safeguard Mechanism reforms could be at risk of exceeding the emissions budget

Modelling under the presented Central Case, broadly comparable to emissions projections presented in the Safeguard Mechanism Reforms Positions Paper, suggests that proposed policy settings are expected to meet the allocated emissions budget of 1,233 $MtCO_2$-e, and 2030 point in time target.

However, this outcome is sensitive to the assumed pathway for LNG and coal production, and the classification of additional LNG facilities as either new entrants or existing facilities.

Under reasonable alternative pathways, modelling indicates that the emissions budget could be exceeded by up to 35 $MtCO_2$-e (~2.8%). Proposed policy settings may therefore be insufficient to meet stated targets.

While the government has taken steps to account for the risk of higher-than-expected production growth (via the implementation of an emissions reserve, and the 2026-27 review of baselines), under some scenarios, much higher decline rates could be necessary from 2028-30 to meet the emissions budget.

One option to protect against such emissions increases would be to classify potential new LNG backfill facilities as new entrants, ensuring that they are held to best practice baselines and reducing their impact on the emissions budget.

Policymakers could also consider more stringent baseline settings for all new projects, making new entrants wholly accountable for their emissions, potentially leading to a lower decline rate for existing facilities, and/or greater certainty that the emissions budget will be met. This would synergise with classifying LNG backfill as new entrants and thus enhance its impact.

The Government has levers to mitigate against risks of exceedance, but regular reporting could help to ensure long-term certainty for industry

Because emissions baselines are established in emissions intensity terms, the main risk to meeting the Safeguard Mechanism is the potential for higher-than-expected production growth beyond the government's modelled reserve.

As noted, the government may choose to employ several options to hedge against these risks in the design of its Safeguard Mechanism reforms.

While it is impossible to prepare for all emissions scenarios, and future outcomes are impossible to predict, findings suggest that more regular reporting of emissions should be built into the Safeguard Mechanism framework to track annual progress against the emissions budget. The impact on the emissions budget could also be modelled when new high emitting facilities are proposed to formally 'enter' the Safeguard Mechanism.

If drivers of emissions are higher than anticipated, annual reporting could improve transparency for industry by flagging the likelihood of possible future changes in baseline decline rates to meet the budget. This may provide industry with a longer lead time to mitigate the risk of large decline rates later.

Quantitative rules could also be established during scheme design to trigger increased action under specific circumstances, providing greater transparency of potential future changes to market participants.

Furthermore, careful modelling of the emissions budget should underpin the definitions and values of default variables currently under review, in particular reservoir CO_2, coal mine methane, and best practice baselines for new entrants.

8.
Appendix A

Methodology statement and key assumptions

METHODOLOGY STATEMENT

In undertaking this analysis we use our in-house Australian Energy and Emissions Model (A-EEM), our Marginal Abatement Cost (MAC), and covered facility Safeguard Mechanism models to simulate market outcomes in line with the emissions constraints described within each scenario.

Safeguard Mechanism Model

RepuTex's Safeguard Mechanism model captures site-specific parameters for all Safeguard liable facilities, accounting for:

- Facility age;
- Lifespan of the facility;
- Location (e.g., onshore or offshore);
- Capacity and output;
- Operational efficiency;
- Resource intensity (e.g., reservoir CO_2 content);
- Emissions sources and activities;
- Inputs (e.g., processed or unprocessed);
- Expansion plans
- Ambition of voluntary targets (e.g., base years, target year, scope, etc.)

Non-announced adoption of abatement technology is modelled using RepuTex's MAC and ACCU price model (refer to below sections). In doing so, we utilisebehavioural models which approximate industry investment decisions using representative facilities and site-specific factors (such as facility age and capacity, lifespan, operational costs and efficiency, location, site resource intensity, etc.).

Based on its industrial activities, a range of decarbonisation options are identified for each facility. Each decarbonisation option has an associated price which varies over time. Investments in new technologies are generally assumed to take place a specified period after the price reaches a "breakeven" level, which considers the inter-temporal effects of investment decisions.

The marginal abatement cost is matched by the future cost of compliance with the Safeguard Mechanism (derived from a facility's projected offset requirements and the projected cost of ACCUs), while accounting for other behavioural parameters (such as policy certainty, price certainty, etc).

Modelling assumes that entities aim to minimise costs via the 'least cost combination' of internal emissions reductions, below-baseline credits (Safeguard Mechanism Credits) or domestic ACCU offsets. Additional timing assumptions may also be made, for example, for participants to identify and cover expected shortages by planning to abate emissions in advance.

In addition to the relative economics of decision making based on the price of carbon units in each scenario, decision making is also informed by behavioural assumptions for the timing and volume of emissions reductions (based on the responsible emitter's perceived degree of innovation), as well as site-specific factors, such as the suitability of a technology at a particular site, the age and remaining lifespan of the facility, or the emissions intensity of the facility. Modelled outcomes are therefore derived from a unique hybrid top-down/bottom-up modelling approach, enabling the analysis of both external and internal site-specific emissions reduction considerations.

Analysis overlays constraints in line with policy settings described within each scenario. Compliance market participants must bring their net emissions into line with their baselines though the surrender of carbon credits to meet their annual compliance needs by the end of March each year (from FY24).

Facility baselines are calculated according to the announced "hybrid" baseline system, shifting from site-specific in 2022-2023 (based on a trimmed mean of emissions intensities from 2018-19 to 2021-22), to a pure industry average system from 2029-2030 (based on default production variables). Industry average baselines are set using current published default production variables. The only exceptions to this are the Rail Transport, Air Transport, Other, Other Non-Ferrous Metal Ores, Gas Supply, and Oil Extraction industries (currently accounting for 17% of national Safeguard emissions). In addition, an extra default production variable is implemented for fugitive emissions from open-cut coal mines, starting as 1 tCO_2-e per tCO2-e of net fugitive emissions.

MODELLED FACILITY CLOSURES

Table 3: List of facility closures included in projections

Sector	Facility	Projected closure year
LNG	• Darwin LNG	• 2024 (temporary)
Coal	• Liddell • Integra • Newlands Coal Complex • Moorvale • Dartbrook • Coppabella • Hunter Valley • Carborough Downs • Ashton • Dendrobium • Clermont Coal	• 2024 • 2024 • 2024 • 2028 • 2028 • 2028 • 2030 • 2030 • 2030 • 2030 • 2030-32[11]
Petroleum	• Altona Refinery • Kwinana Refinery	• 2022 • 2022
Chemicals	• Gibson Island	• 2023 (temporary)

Source: RepuTex Energy, 2023

[11] Closure date dependent on production pathways

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