MODELLING RESULTS

SAFEGUARD MECHANISM EMISSIONS SENSITIVITIES AND BASELINE IMPACTS

2026-27 Safeguard Mechanism policy review, March 2026

RepuTex ENERGY

Contents of this report

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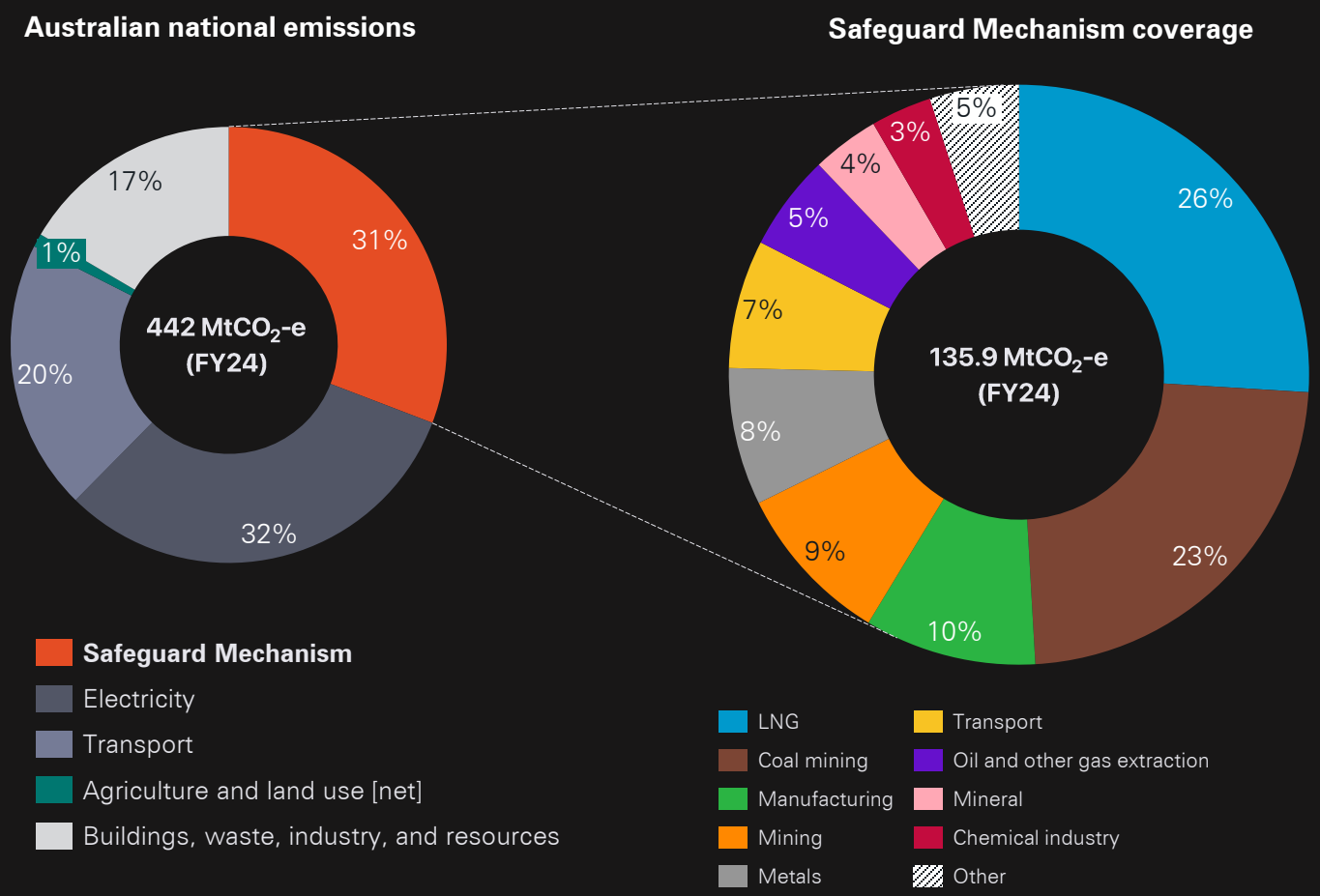
Background to this project

- The Australian Government has committed to review the Safeguard Mechanism in 2026-27 to ensure that the scheme is appropriately calibrated and delivering emissions reductions in line with Australia's emissions targets. This will include the setting of decline rates for the 2031-35 period, aligned to Australia's Nationally Determined Contribution (NDC).
- Similar to the design of Safeguard Mechanism reforms over 2022-23, which was informed by RepuTex modelling, post-2030 policy settings will need to account for uncertainties that could affect future emissions, and the emissions budget, such as the timing and scale of new entrants (both new and expanding facilities), the potential for increased production by currently covered facilities, and possible changes to the reporting of coal mine methane emissions.
- To understand these potential emissions risks, RepuTex has been engaged by the Australian Conservation Foundation and the Climate Council to forecast Safeguard Mechanism emissions from 2031-35 under a range of scenarios.
- Analysis is presented in three sections:
  - The first models a Reference Case, depicting emissions under existing policy (with an assumed continuation of the 4.9% p.a. baseline decline rate after 2030) and plausible assumptions for future technology deployment, differentiating new entrants and existing facilities.
  - The second section investigates the effects of emissions sensitivities on Safeguard Mechanism emissions.
  - The third section investigates the effects of potential policy changes on Safeguard Mechanism emissions.
- This report provides a summary of our key modelling results, including a description of the modelled scenario details, methodology statement, and key assumptions.
- The following section (Section 1) presents an overview of key settings and assumptions. Section 2 provides deeper insights into Reference Case modelling outcomes. Sections 3 and 4 summarise sensitivity results. Section 5 summarises key findings. An Appendix lists more detail about our modelling process, including assumptions and key inputs.

Section 1.
Introduction and scenarios

Introduction to the Safeguard Mechanism and our modelled scenarios

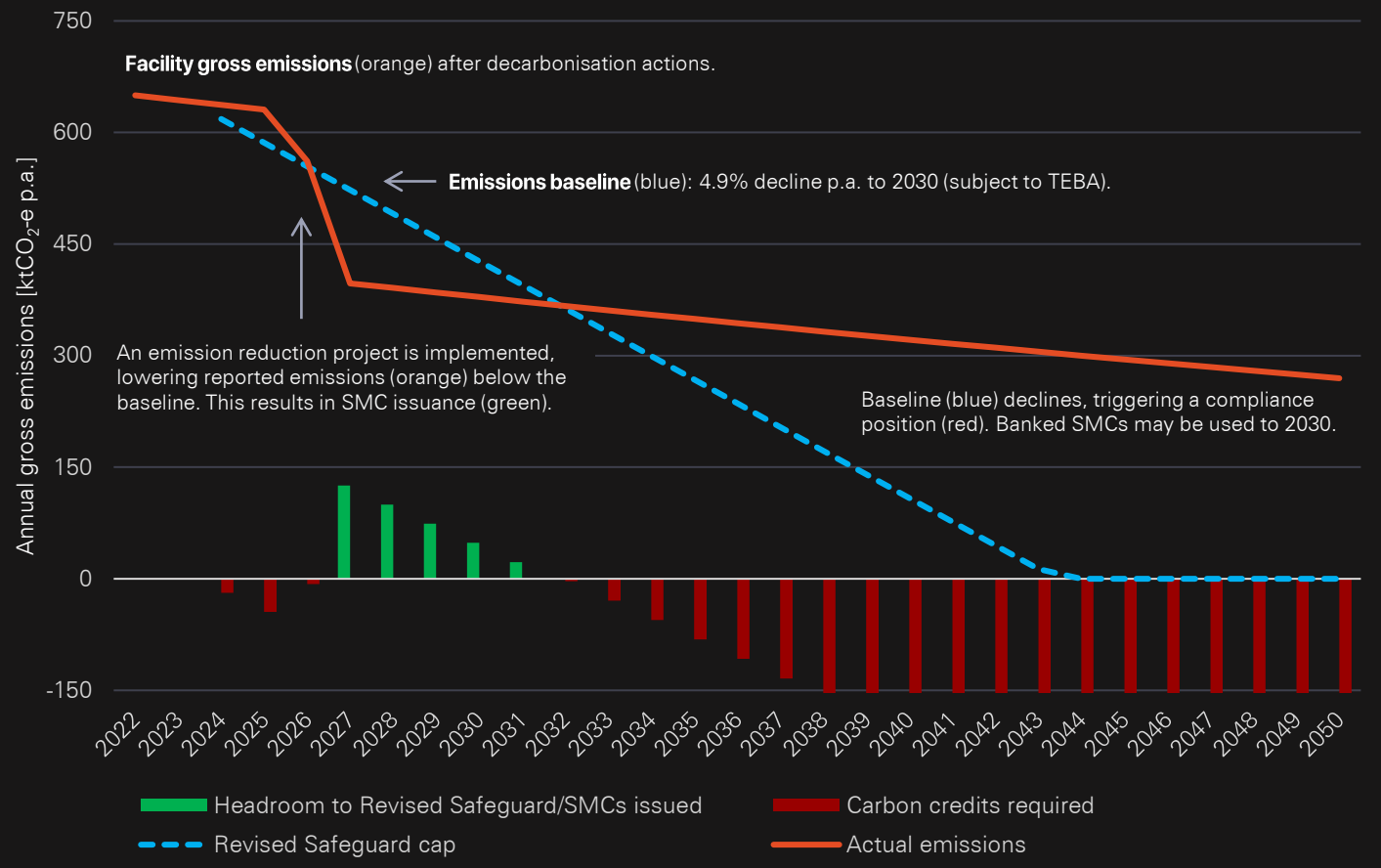
The Safeguard Mechanism covers 219 large facilities across the industrial sectors



- The Safeguard Mechanism was introduced by the Abbott Government (Coalition) in 2016 to limit greenhouse gas emissions from Australia's largest industrial facilities, protecting investments made by the Commonwealth under the former ERF.
- In 2022-23 the scheme was reformed by the Albanese Government to align the Safeguard Mechanism to Australia's 2030 NDC and long-term net-zero emissions goal by 2050.
- The Safeguard Mechanism covers around 120 companies operating 219 facilities (over 100,000/t CO_2-e p.a.), in the mining, oil & gas, manufacturing, transport & waste sectors, responsible for around one third (31%) of national emissions.
- This represents a blend of hard-to-abate industries (such as Aluminium, Air Transport), and other faster decarbonising sectors (such as Chemicals, and Metal Ore Mining).
- Covered emissions are dominated by fossil fuel producing sectors which make up over 50% of total emissions, led by LNG (26% of covered emissions,) and Coal Mining (23% of covered emissions).

The Safeguard Mechanism operates like a "baseline and credit" trading scheme

Illustrative example of facility compliance trajectory



- The Safeguard Mechanism operates like a "baseline and credit" trading system.
- Facilities are accountable for emissions above their baseline, which declines each year in line with Australia's NDC. To incentivise investment in onsite emissions reductions, facilities with emissions below their baseline receive Safeguard Mechanism Credits (SMCs), which may be banked or traded.
- Emissions baselines are calculated in emissions intensity terms (a hybrid of facility level and industry average intensity), declining each year.
- To meet their compliance obligations, Safeguard facilities have several options:
  - Reduce on-site emissions.
  - Surrender Australian Carbon Credit Units (ACCUs) or SMCs.
  - Apply for a trade-exposed baseline-adjustment (reduced accountability).
  - Apply to borrow from the following year, or for a multi-year monitoring period (MYMP).

The Safeguard Mechanism legislates four compliance phases after 2030

Phase I of Australian compliance market

2024	2025	2026	2027	2028	2029	2030

2026-27 review of post-2030 market settings → Baselines for Phase II

Legislated market phases for the post-2030 period

	2031	2032	2033	2034	2035
Phase III	2036	2037	2038	2039	2040
Phase IV	2041	2042	2043	2044	2045
Phase V	2046	2047	2048	2049	2050

This analysis: To the conclusion of Phase II (2035)

RepuTex Long-term Market Outlook: Outlook across all compliance periods to 2050

Note: Timeline shown in financial years

Summary of our modelled scenarios

- To understand potential bounds for Safeguard Mechanism emissions over Phase II, analysis presents a Reference Case for medium-term emissions and sensitivities to consider alternative market and policy assumptions.

Reference Case	**Reference Case forecast for covered emissions based on announced policy** and default emissions reduction technology costs, with fossil fuel exports aligned with the IEA's 2024 APS scenario. Current policy assumes the continuation of current 4.9% p.a. baseline decline rate.
Sensitivity 1	**Higher fossil fuel production** (metallurgical coal, thermal coal, gas extraction, and LNG) driven by increased export demand along with increased domestic gas production.
Sensitivity 2	**Reduced onsite abatement at coal and gas** facilities, accounting for non-mature technology risks.
Sensitivity 3	**Reform of coal mine methane reporting** to account for the Australian Government's current review to improve accuracy of fugitive methane emissions estimation.
Sensitivity 4	**Alignment of rules for fossil fuel facility "extensions and expansions" with those for new facilities** across existing coal mines and backfill-related emissions at LNG facilities.
Sensitivity 5	**Stronger baseline decline rates for fossil fuel extraction and LNG facilities** to reduce SMC crediting attributed to site characteristics, not meaningful investment to reduce onsite emissions.

- In undertaking this analysis, we utilise our Australian Energy and Emissions Market (A-EEM) model. Our A-EEM framework consists of four modules (compliance demand, voluntary demand, supply, and policy) which simulate the operation of Australia's carbon market and greenhouse gas emissions, capturing dynamic interdependencies between changes to overall demand, supply, and carbon price development. Refer to Appendix A for further information
- Note: Reference Case settings differ to RepuTex's Central Case forecast published within our quarterly Carbon Market Outlook (CMO). Results are therefore not directly comparable.

Modelled scenarios and settings

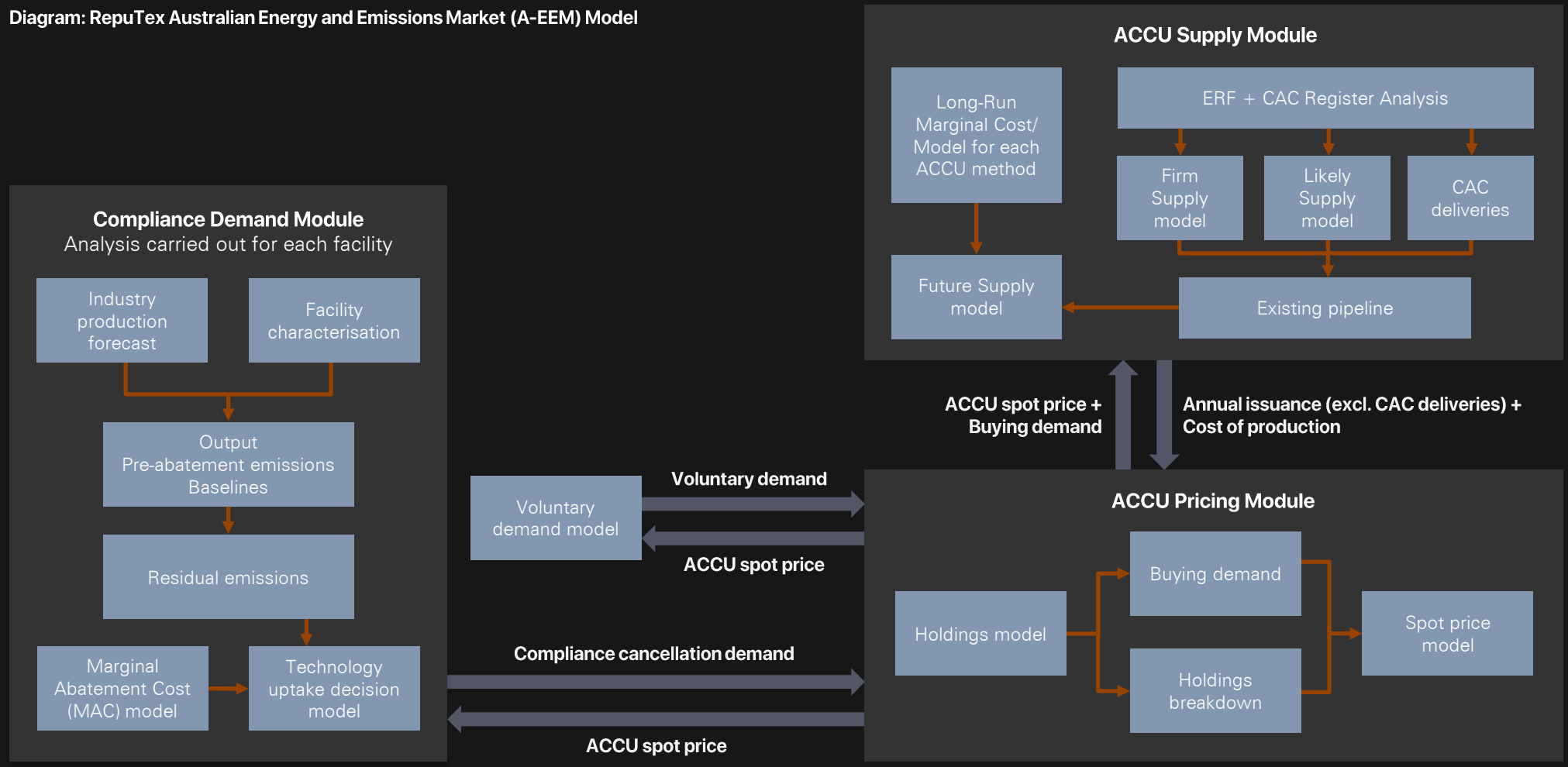
Analysis presents a Reference Case forecast, along with supplementary sensitivities

	Reference Case	S1: Higher fossil fuel production	S2: Slower fossil fuel onsite abatement	S3: Coal mine methane reporting	S4: Tighter treatment of expanding facilities	S5: Tighter limits on fossil fuel SMCs
Safeguard coverage	100,000 tCO_2e p.a.	No change	No change	No change	No change	No change
Commodity production	OCE blended with IEA 2024 APS long term	OCE blended with IEA 2025 CPS long term for coal, LNG, and domestic gas plus OCE blended with IEA 2024 STEPS for coal and LNG	No change	No change	No change	No change
Technology costs and industry abatement	Default technology costs, progressive industrial decarbonisation	No change	Reduced deployment of abatement technologies at coal and gas facilities	No change	No change	No change
Baseline decline rate Phase I (FY24-30)	-4.9% p.a. (subject to TEBA)	No change	No change	No change	No change	No change
Baseline decline rate Phase II (FY31-35)	-4.9% p.a. (subject to TEBA)	No change	No change	No change	No change	-6.8% p.a. for LNG, coal mining, and oil and gas extraction
Coal mine methane reporting reform	Safeguard facilities transition to current Method 2 by FY27	No change	No change	Method 2 reformed in FY28	No change	No change
Expanding facilities	Default baseline	No change	No change	No change	International best practice baselines	No change

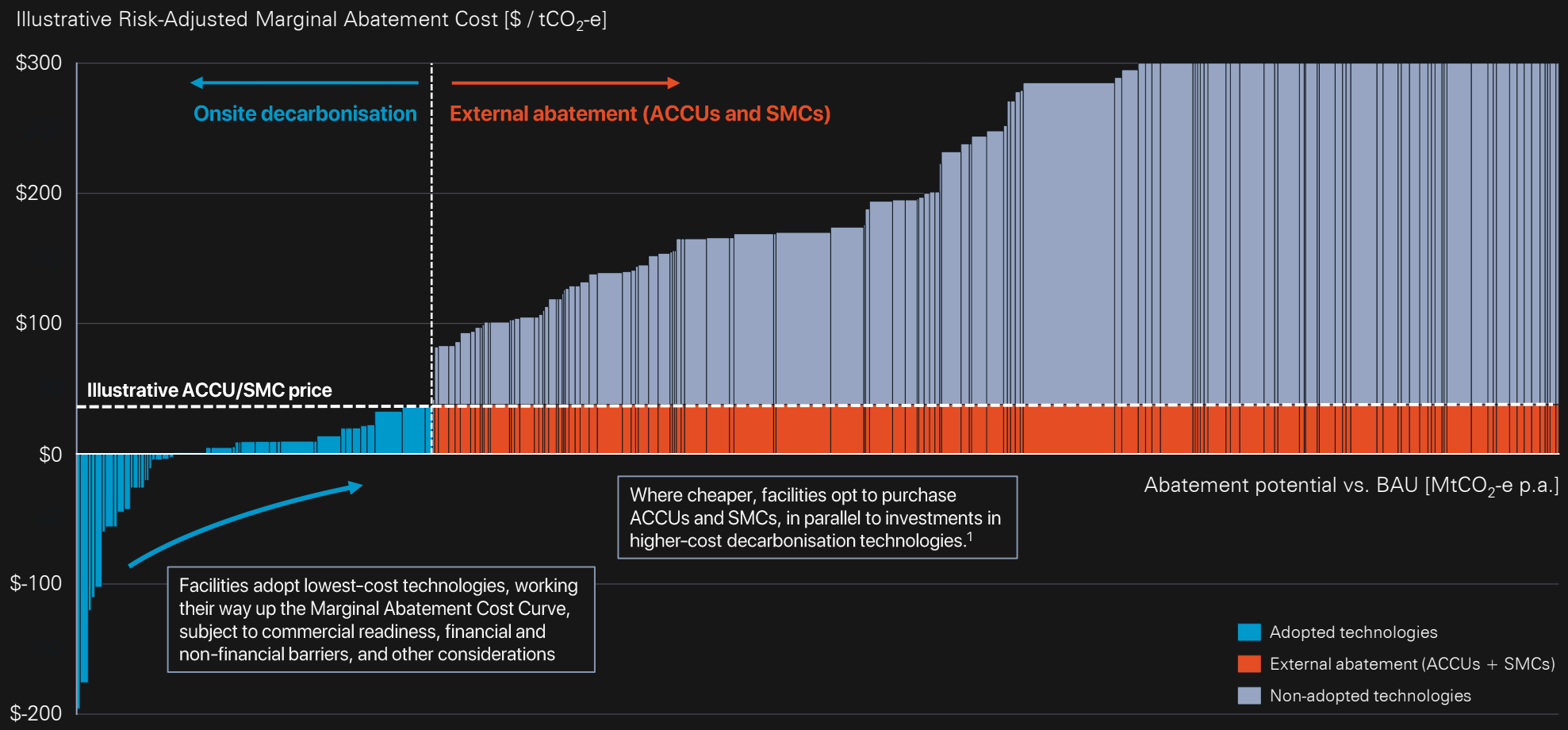
Note: Reference Case settings differ to RepuTex's Central Case forecast published within our quarterly Carbon Market Outlook. Results are therefore not directly comparable.

Our A-EEM Model simulates interdependencies across Australia's carbon market

Diagram: RepuTex Australian Energy and Emissions Market (A-EEM) Model



Facilities dynamically adopt the “lowest cost combination” of onsite and external abatement



Section 2.
Reference Case results

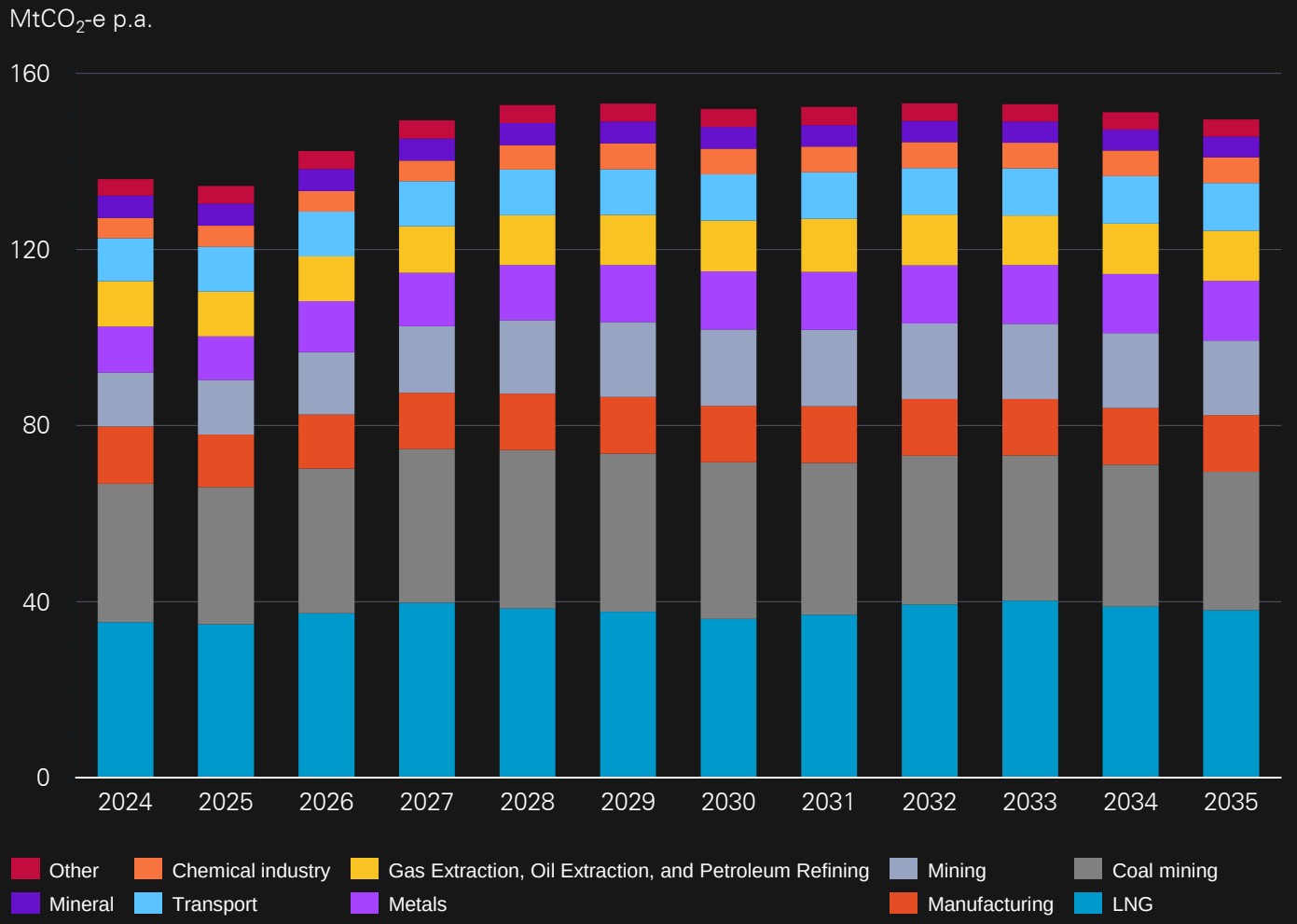
Summary of Reference Case modelling outcomes

We expect 43 new and expanding facilities to enter the Safeguard Mechanism by 2035

1) Projected year of entry into Safeguard may be multiple years after projected start of operations.
2) New entrant emissions shown includes onshore reservoir CO_2 emissions, subject to best practice baselines.

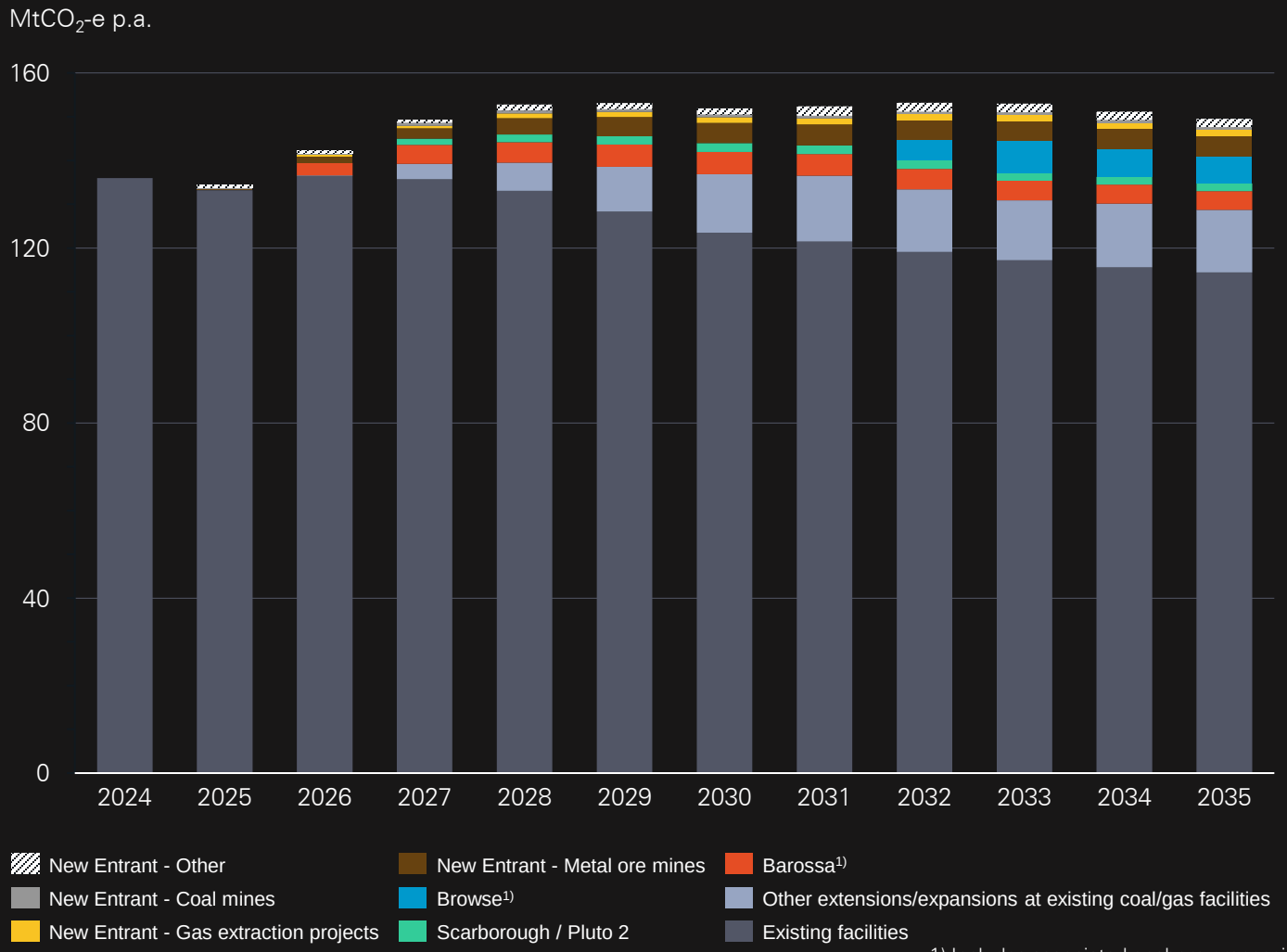
- Modelling includes two types of new entrants to the scheme: **"new facilities"** (currently assigned international best practice baselines) and **"expanding facilities"** entering the scheme due to expansions or increases in emissions intensity (currently assigned default baselines).
- Only a sub-set of announced projects progress to Final Investment Decision (FID). Inclusion of all announced projects would thus lead to an overly high projection of Safeguard emissions.
- Modelling includes only facilities considered highly likely to enter the scheme:
  - Financially committed projects within DISR's Resources and Energy Major Projects List.
  - New facilities within DCCEEW's Australia's Emissions Projections.
  - Other likely new facilities as determined by RepuTex and industry experts.
- Commissioning dates are estimated based on announcements, government resources, and/or adjusted based on in-house views.
- Modelling also includes **"expansions/extensions"** of already-covered facilities, currently assigned standard baselines (see Sensitivity 4).

Before on-site action (BAU), covered emissions are expected to grow 12% to 2030



- Business-as-usual (BAU) emissions assume each facility maintains its current emissions intensity, and is thus affected by production, coverage exits, and new entrants. BAU emissions are therefore prior to onsite emissions reduction actions.
- Under BAU, covered emissions are forecast to grow from 136 Mt in FY24 to 152 Mt by 2030, and 150 Mt by 2035, leveling off around 150-153 Mt from 2028.
- The main sources of BAU growth from 2024 are from export-based sectors:
  - Mining (excluding coal) BAU emissions are expected to account for around one third of total BAU emissions growth to 2035.
  - LNG is expected to account for around 20% of BAU emissions growth to 2035.
- Around 20% of growth is from the Metals sector, due to the assumed re-opening of Whyalla (closed over much of 2024).
- Coal sector emissions are modelled to grow to 2030 driven by metallurgical coal demand, before declining post-2030 as key thermal coal markets decarbonise their power generation.

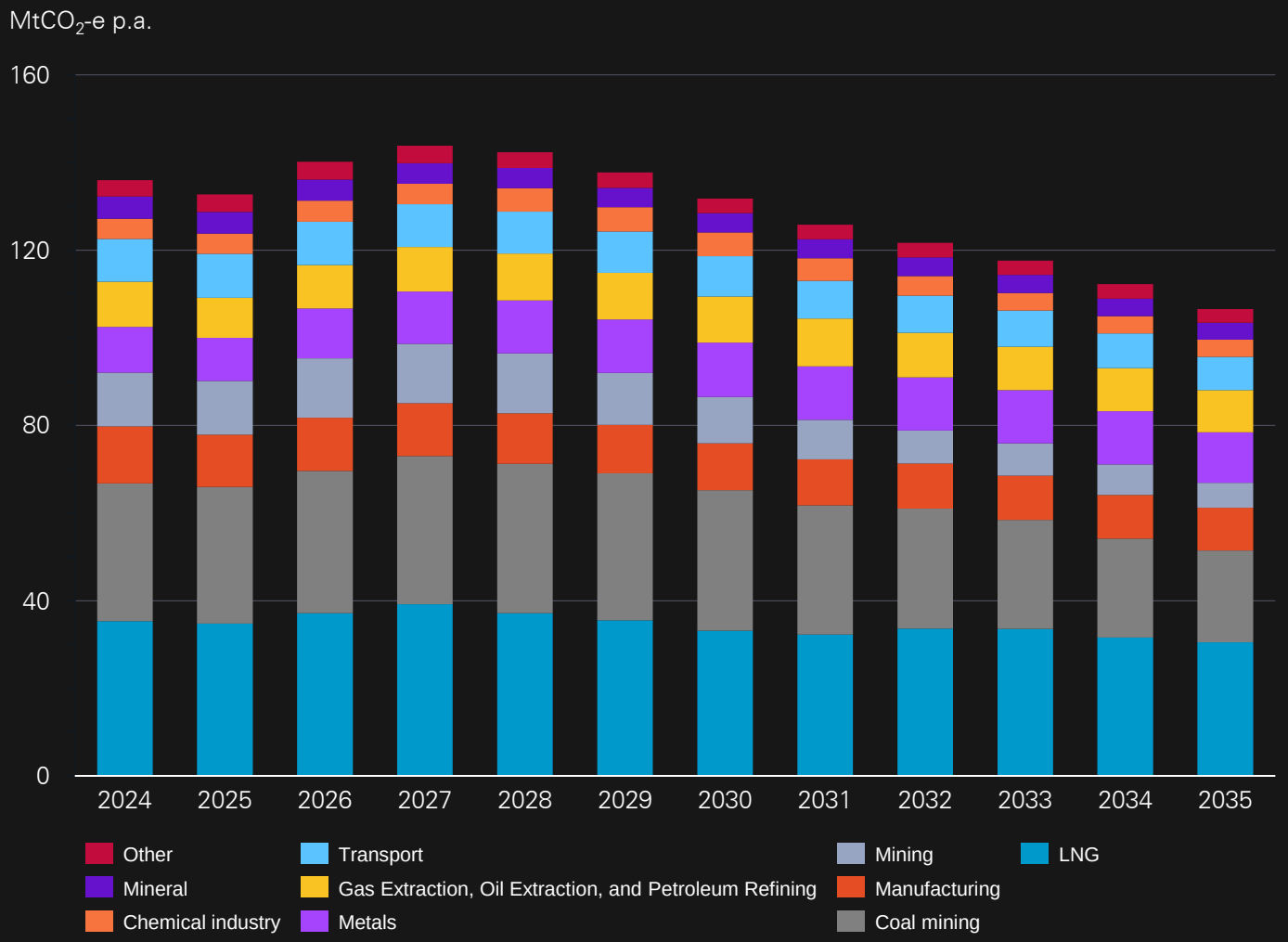
New and expanding facilities account for 14% of BAU emissions by 2035, driven by new gas fields



- New entrants are modelled to generate 160 $MtCO_2$-e of pre-abatement emissions to 2035, of which around two thirds will be covered by new entrants with more stringent "best practice" baselines.
  - In 2025, new entrants are estimated to account for 1% of pre-abatement covered emissions.
  - This is forecast to rise to 10% in 2030, and 14% in 2035.
  - The majority of total new entrant BAU emissions (100 $MtCO_2$-e) are therefore expected to occur post-2030.
- LNG facilities including Pluto 2, Barossa[1)], and Browse[1)] account for over half of pre-abatement emissions from new entrants; metal ore mines around a quarter; and gas extraction facilities and coal mines both under 10%.
- The relatively low footprint of new coal mines reflects trends towards extensions/expansions of existing facilities rather than new mines.
- Expansions and extensions at existing coal and gas facilities[2)] are also found to increase over time, accounting for 10% of BAU emissions by 2035

1) Includes associated onshore processing emissions, of which only reservoir CO_2 are best-practice.
2) Excluding Scarborough/Pluto 2, and onshore emissions from Browse and Barossa

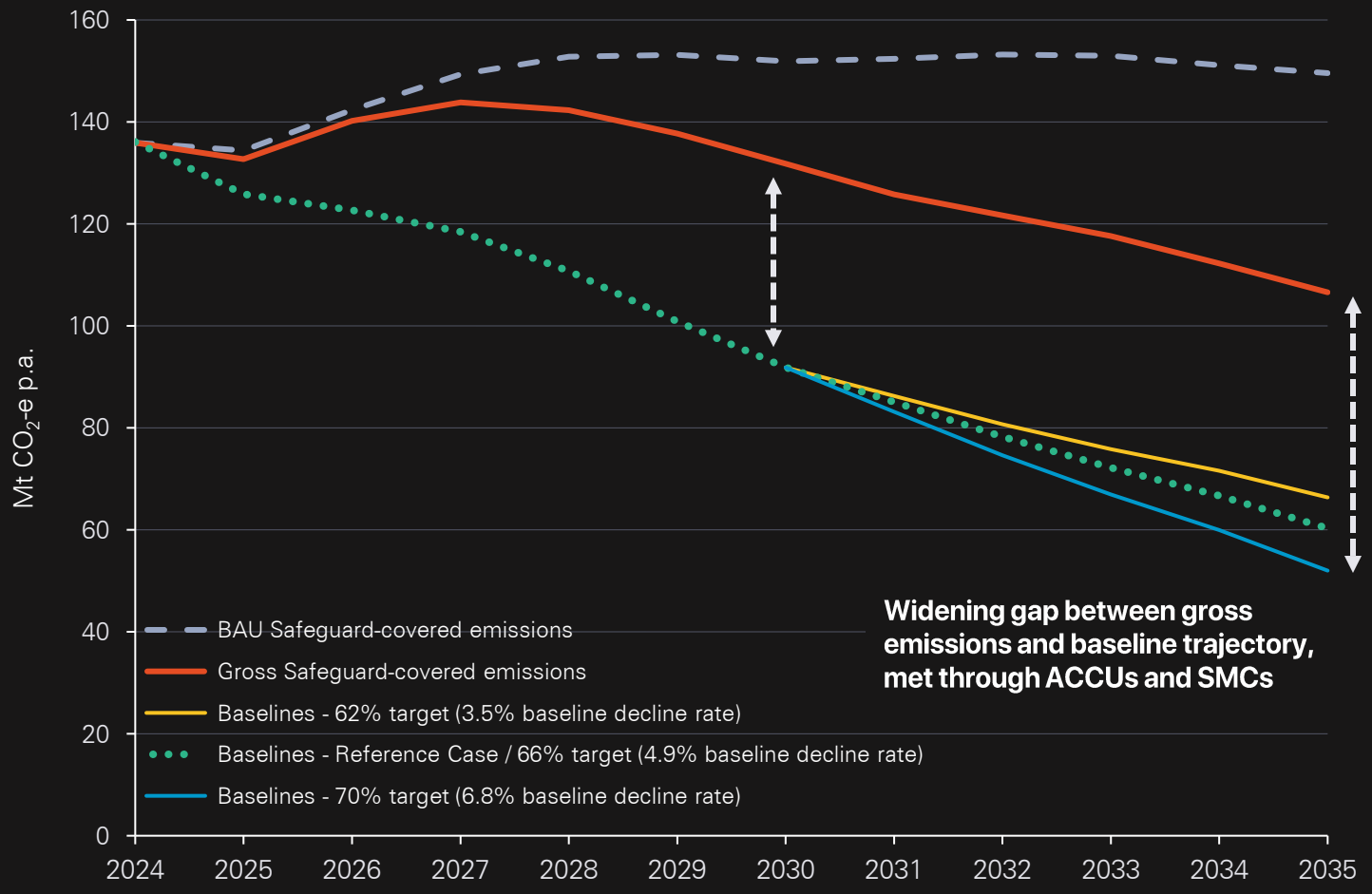
With onsite decarbonisation, reported emissions fall by 22% to 2035 under the Reference Case



- Accounting for on-site decarbonisation actions (excluding ACCUs and SMCs), reported emissions are forecast to decline year-on-year from 2027.
- On-site action is modelled to increase post-2030 as new decarbonisation technologies become available and costs decline, with uptake further incentivised as market prices rise.
- Under the Reference Case, changes in reported emissions include both onsite decarbonisation and reductions in covered emissions due to facilities falling out of coverage, assuming the coverage threshold remains fixed at 100,000 tCO_2-e.
- By 2035, new entrants are expected to account for a material proportion of Safeguard emissions.
  - Browse, Barossa, and Pluto 2 are forecast to account for almost two thirds of annual emissions from new entrants by the end of the modelled period (with onshore processing emissions).
  - Over the whole modelled period, these facilities are expected to account for over half of new entrant emissions.

A continued 4.9% decline rate is consistent with Australia's NDC – if the scheme stays the same*

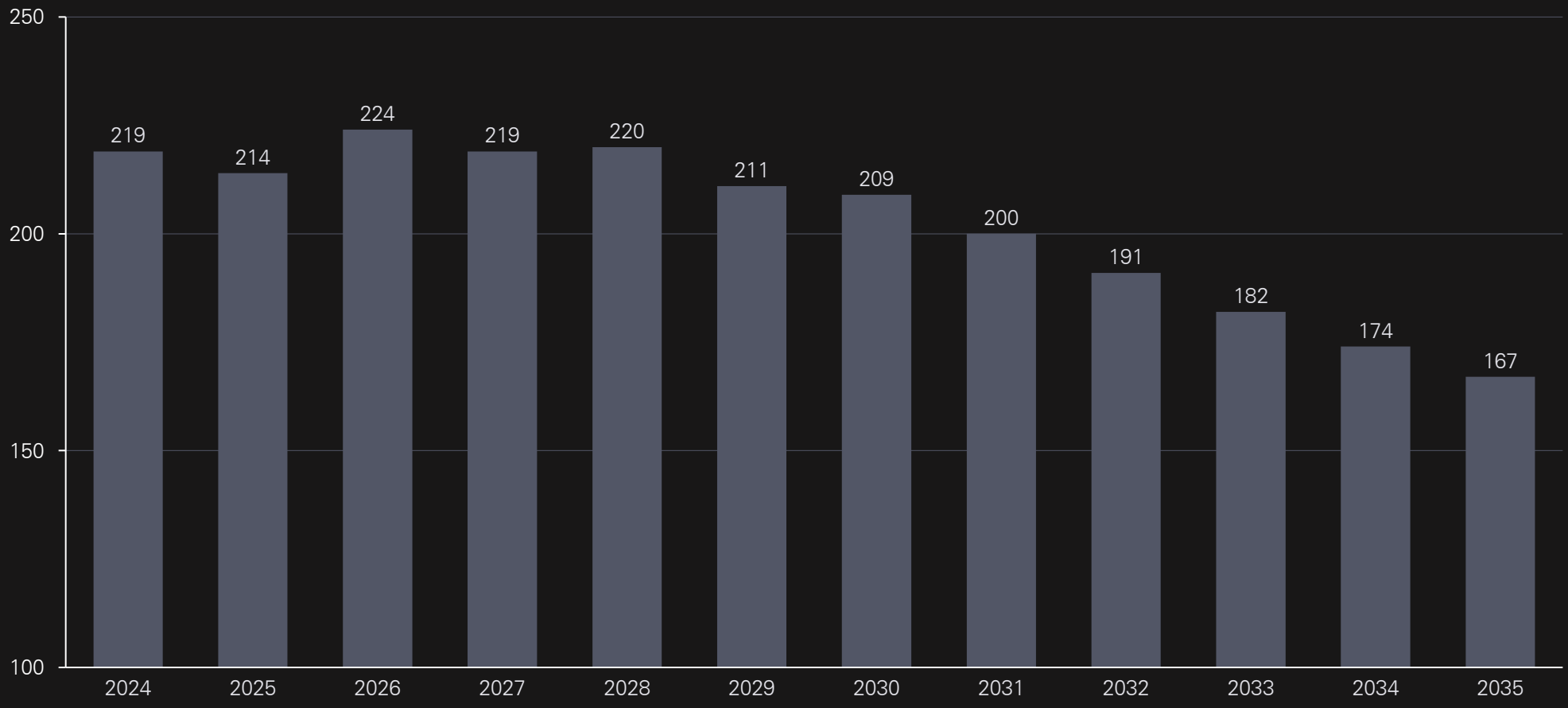
Scenarios for a range of 2035 targets.



- Australia's 2035 NDC commits to a reduction in emissions of 62-70% below 2005 levels. Modelling indicates that the continuation of the current 4.9% baseline decline rate would correspond to a midway target within this band, which ranges from 3.5-6.8% per annum (with no emissions reserve).
- * In practice, baseline decline rates are subject to several uncertainties that will be resolved at the upcoming 2026-27 review. Presented baseline decline rates are therefore preliminary.
- Key determinations required to quantify baseline decline rates after 2030 include:
  - Future scheme coverage, such as the inclusion of new sectors, a lower coverage threshold, and the treatment of facilities that "drop below" the current threshold.
  - Potential re-baselining of certain industries, or different treatment of sectors;
  - Future compensation for emissions-intensive, trade-exposed activities

The number of covered facilities declines by 2035 as entities fall below the current threshold

Number of covered facilities by compliance year (current 100,000t/CO_2-e annual threshold)



Section 3.
Emissions sensitivities

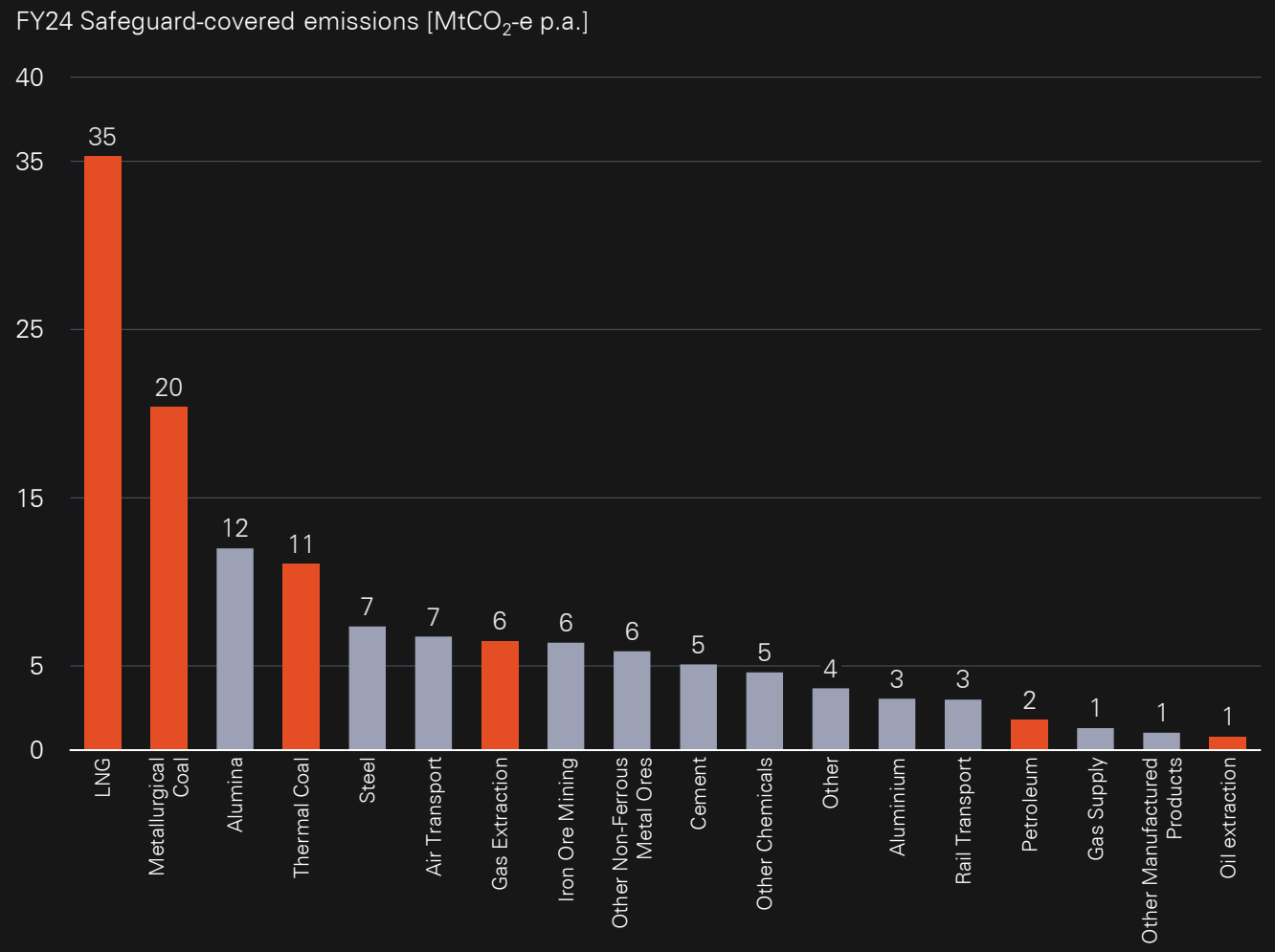
Summary of modelled sensitivities around risks of increased emissions

Section 3.1

Higher fossil fuel production

Impact of increased coal, LNG, and other gas production

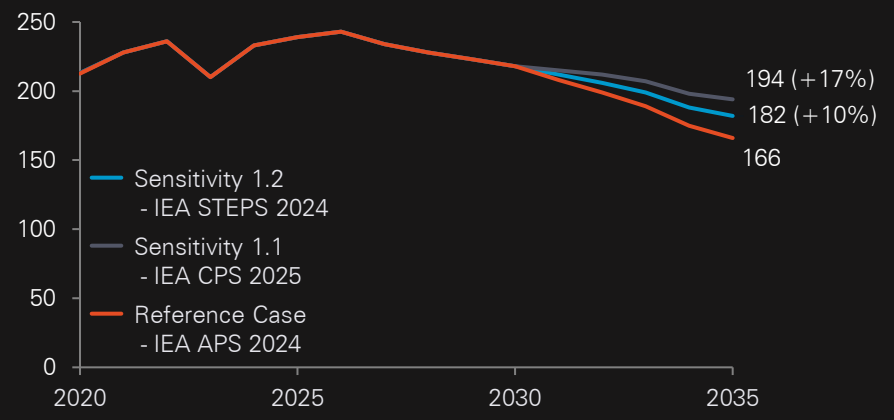
The volume of Australia's coal and gas exports is a key driver of Safeguard Mechanism emissions



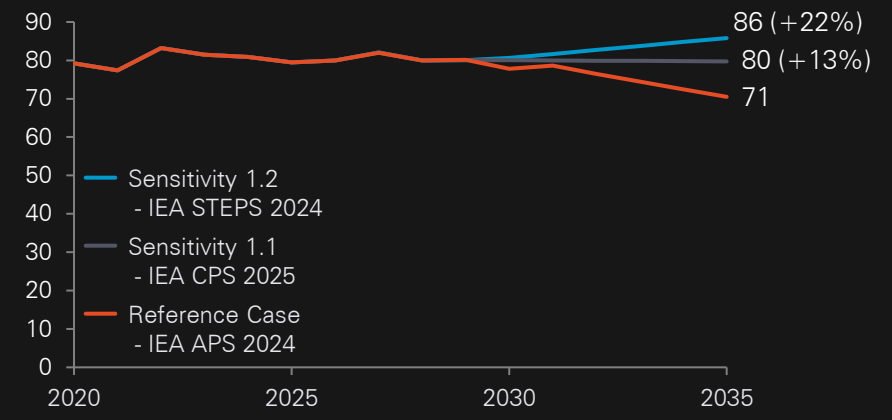
- Thermal Coal, Metallurgical Coal, Gas Extraction, and LNG accounted for 54% of total Safeguard-covered emissions in 2024 (66.7 $MtCO_2$-e) and made up three of the four largest covered sectors.
- Under the Reference Case, these sectors are expected to maintain their share of total emissions, however, there is uncertainty over the trajectory of coal and gas production. Export-driven demand underpins these sectors, which depends on a range of macroeconomic and geopolitical factors.
- Within the modelled Reference Case, exports align with the IEA's Announced Pledges scenario, in which Australia's trade partners reduce emissions in-line with announced pledges (as of 2024).
- However, a range of other export scenarios are possible, many of which drive higher production. These are considered in Sensitivity 1:
  - Sensitivity 1.1: coal and gas exports, and other gas production aligned with IEA's 2025 Current Policies Scenario.
  - Sensitivity 1.2: coal and gas exports aligned with IEA's 2024 Stated Policies Scenario.

Under this sensitivity, coal and gas production varies by around 10-20% by 2035

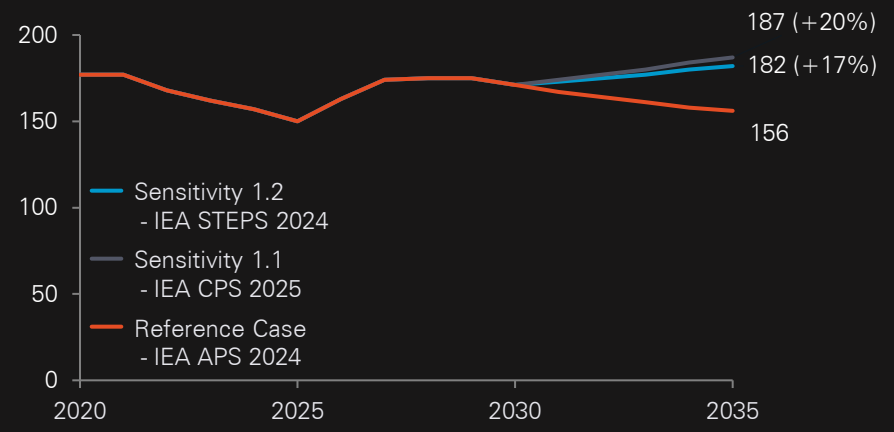
Thermal Coal - National production [Mtpa]



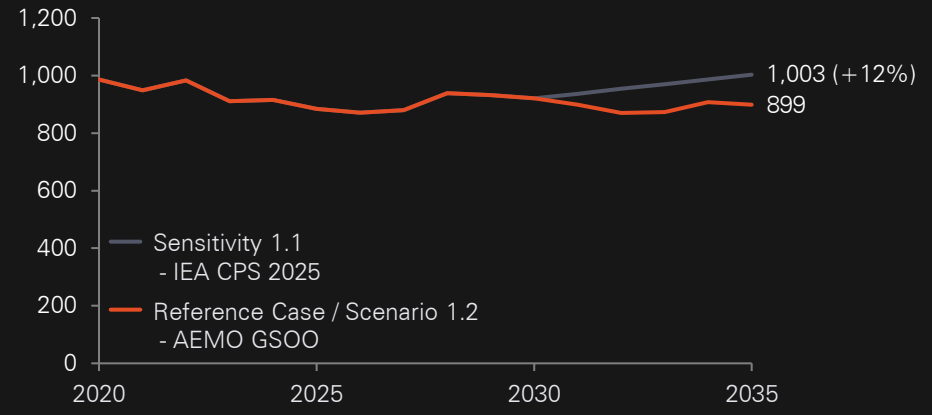
LNG - National production [Mtpa]



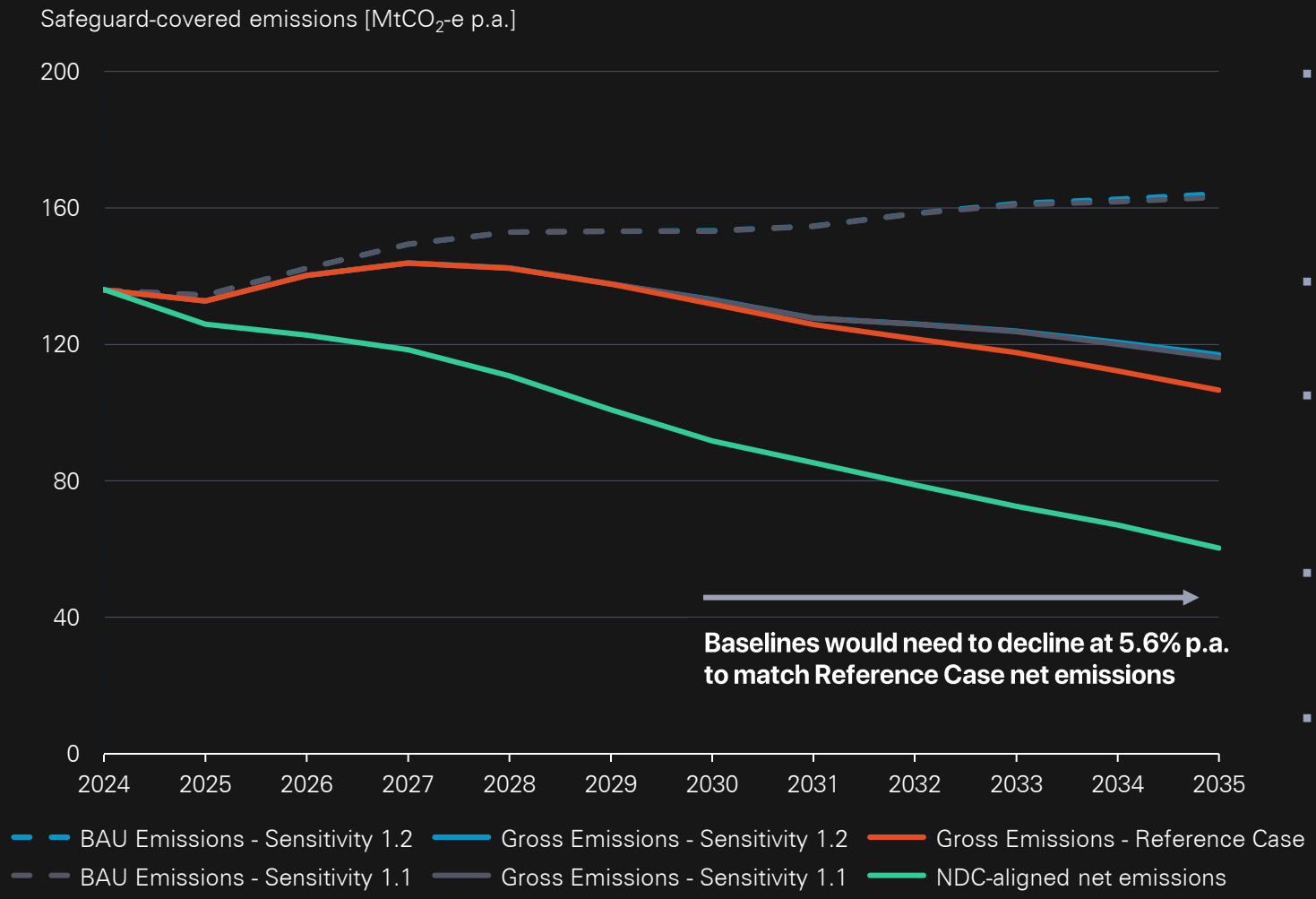
Metallurgical Coal - National production [Mtpa]



Other Gas - National production [PJ]



Higher-than-expected fossil fuel production could raise total 2031-35 gross emissions by 5%



- Both sensitivities see an increase in total gross emissions of 5% across the modelled period, with increased fossil production and BAU emissions slightly tempered by projected abatement within these sectors (noting that some abatement hinges on immature technology, see Sensitivity 2).
- The similarity of outcomes is due to higher coal and other gas production in Sensitivity 1.1 balancing higher LNG production in Sensitivity 1.2.
- The production-adjusted nature of Safeguard Mechanism baselines means that higher-than-expected production would be accompanied by increased baselines – presenting a risk to Australia's 2035 NDC emissions budget.
- Under these settings, baselines would need to decline at 5.6% p.a. to match Reference Case net emissions, increasing from 4.9% within the Reference Case.
- Increased decline rates would increase ACCU demand and place upward pressure on prices. Despite this, little further resulting decarbonisation is expected by 2035, with many sectors having limited and/or high-cost abatement options.

Section 3.2

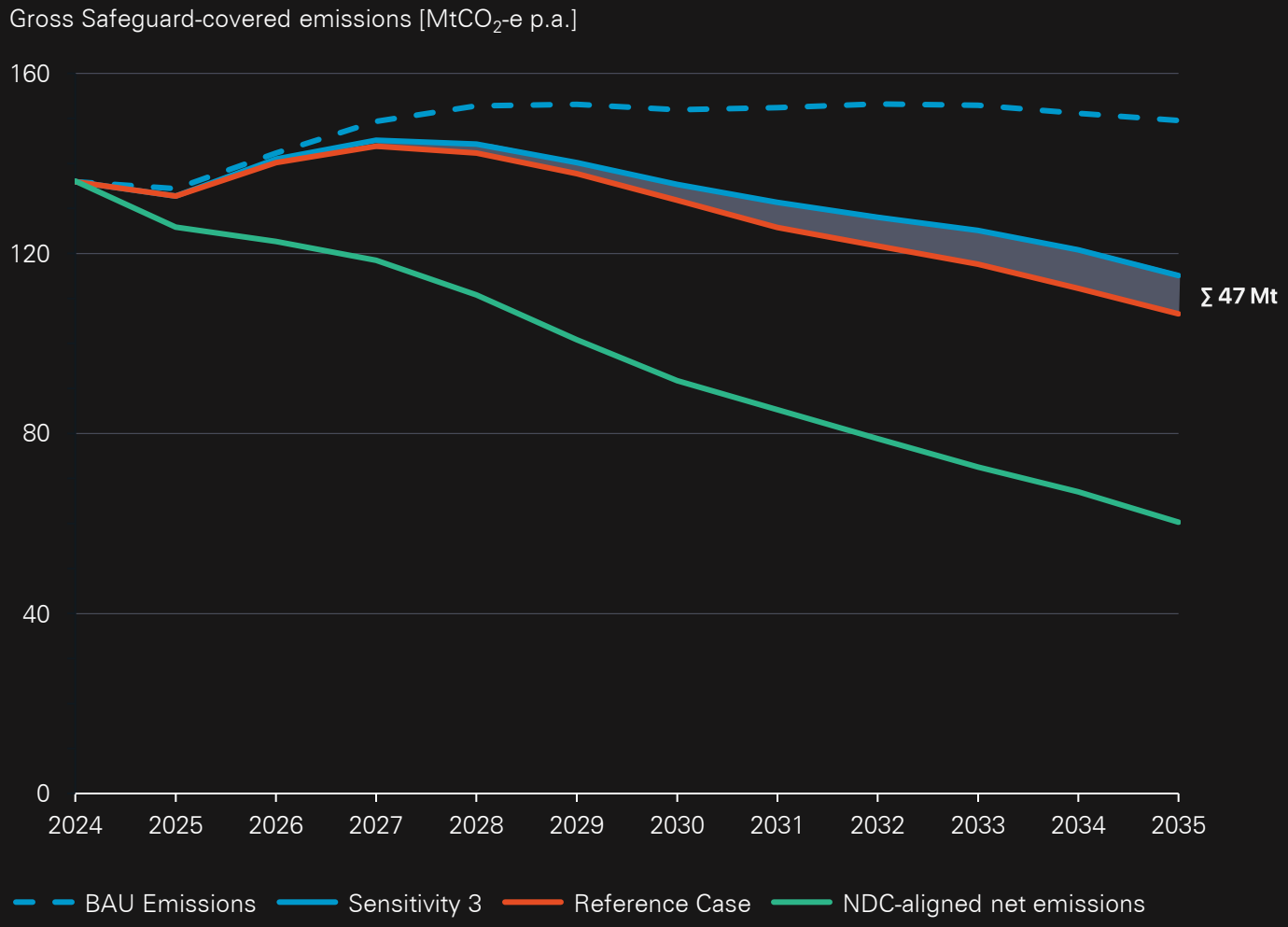
Lower fossil fuel abatement

Impact of lower-than-expected fossil fuel sector decarbonisation

Coal and gas sectors have significant abatement potential, but are reliant on less mature solutions

- While significant onsite abatement is possible within the coal, gas, and LNG sectors, this is contingent on the successful deployment of several non-established technologies, such as Carbon Capture and Storage (CCS) targeting reservoir CO_2, Ventilation Air Methane (VAM) oxidation, and electric mining machinery.
- Within the Reference Case, these technologies are expected to lead to moderate abatement by 2035.
- However, there is uncertainty over the deployment of these technologies:
  - VAM oxidation is not yet proven at scale in Australia, which tends to have lower VAM methane concentrations, with first full-scale trials ongoing at Kestrel Coal mine and Appin Colliery.
  - CCS deployment has been slower-than-expected worldwide and is not yet a mature technology at scale. Furthermore, its largest application in Australia to date (Gorgon CCS) was delayed before deployment and has been operating at one third of nameplate capacity due to technical difficulties.
  - Electric mining machinery deployment is still in its infancy, with timelines for widespread commercial availability still uncertain, with more limited appetite to date for uptake at coal mines relative to metal ore mines.
- Sensitivity 3 models a scenario in which:
  - VAM oxidation technologies are not deployed at Australian mines.
  - No new reservoir CO_2 CCS is developed and existing units fail to reach capacity.
  - Coal mine pre-drainage and electric mining machinery are less widely deployed, while LNG electrification potential is reduced.

Lower-than-expected onsite abatement could see an additional 47 Mt emitted to 2035



- Under a slower/reduced abatement scenario, the acceleration of abatement in the late 2020s onwards is weakened. This results in annual emissions being 8.5 $MtCO_2$-e higher in 2035, and a total of 47 $MtCO_2$-e of additional emissions over FY25-35 compared to the Reference Case.
- This volume of increased emissions would translate to increased compliance demand, and uplift in ACCU prices, tempered by an expected increase in supply and eventual increased decarbonisation at other facilities (subject to scale up speeds).
- To 2035, however, many non-fossil industries are not expected to be able to materially increase onsite emissions reductions due to insufficient lead times (as demand increases occur most materially after 2030) and a modelled lack of abatement options commercially available at scale.
- The development pipeline for these technologies, as well as the pipeline of announced decarbonisation projects, is therefore a key factor driving forecast Safeguard-covered emissions, and the development of the broader carbon market.

Section 3.3

Coal mine methane reporting

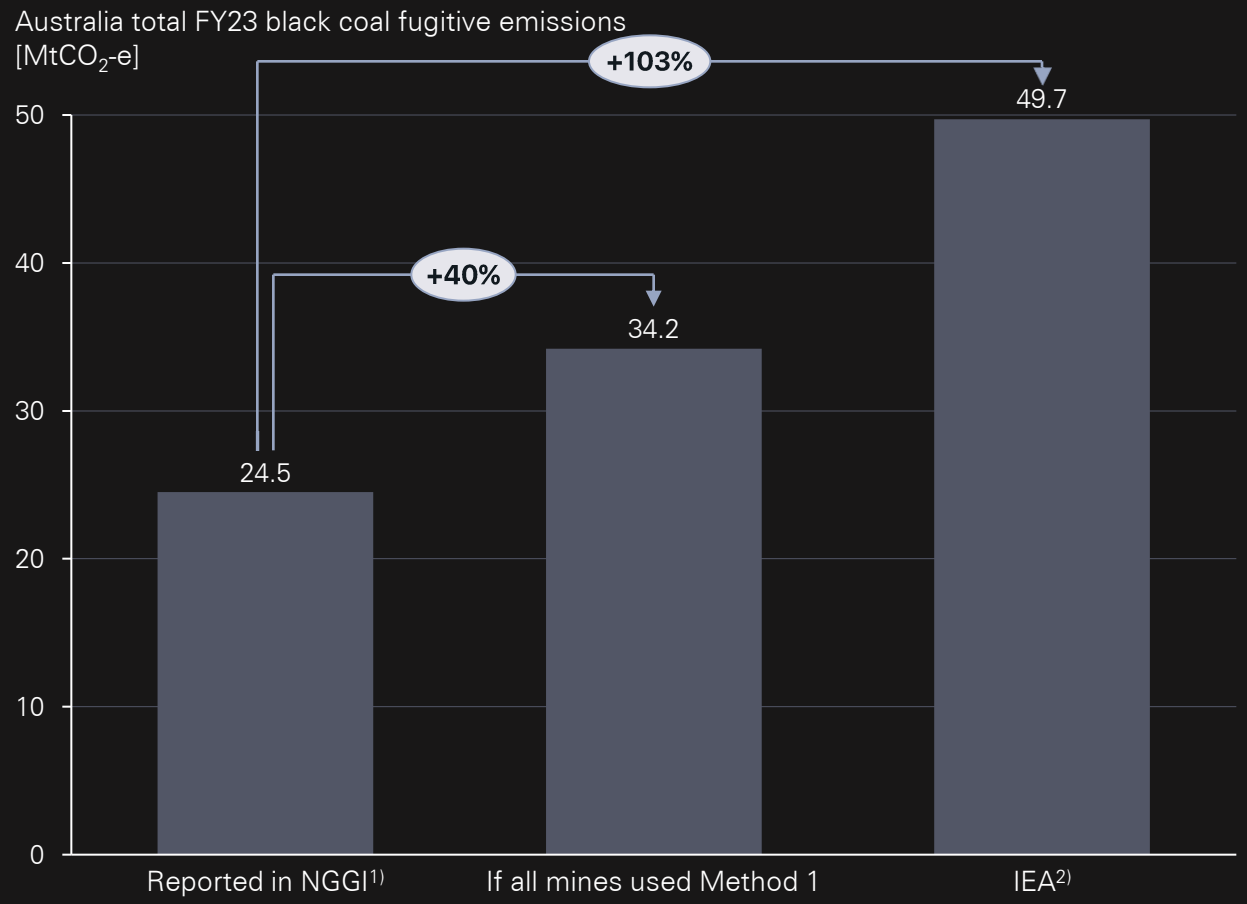
Impact of improved fugitive methane emissions estimation

Empirical Coal Mine Methane reporting methods are being phased out due to low accuracy

- Fugitive emissions make up the majority of coal mining emissions, occurring when methane trapped within coal seams is released during extraction, with additional fugitive emissions from gas drainage activities.
- Due to their enclosed nature, underground mines can directly measure methane emissions, and must do so for safety reasons. Comparably, under current policy, open-cut mines are not required to directly measure methane emissions, and must instead choose between different estimation methods:
  - Method 1: Use of state-specific emissions factors based on the quantity of coal extracted.
  - Methods 2 and 3: Use of a site-specific fugitive emissions model, calibrated by sampling methane and CO_2 contents of all coal-bearing strata.
- Method 2 applies international standards to sample analysis, while Method 3 applies international standards to both sample analysis and sample collection. To date, Method 3 has not been used by any Safeguard-covered facilities.
- In its 2023 NGER Review, the Climate Change Authority (CCA) found that the use of Method 1 is no longer appropriate due to outdated state-specific emissions factors and an inability to accurately capture variability of methane content.
- The CCA therefore recommended the immediate Phase out of Method 1 methodology, "as a matter of urgency", with the Australian Government adopting this recommendation, requiring all Safeguard-covered coal mines to transition to Method 2 or 3 across FY26 and FY27.[1)]
- The Australian Government has appointed an Expert Panel to provide advice on improved fugitive methane emissions estimation, with a final report expected by June 2027.

1) Mines extracting over 10 Mtpa of run-of-mine coal in FY23 transition in FY26, all others by FY27.

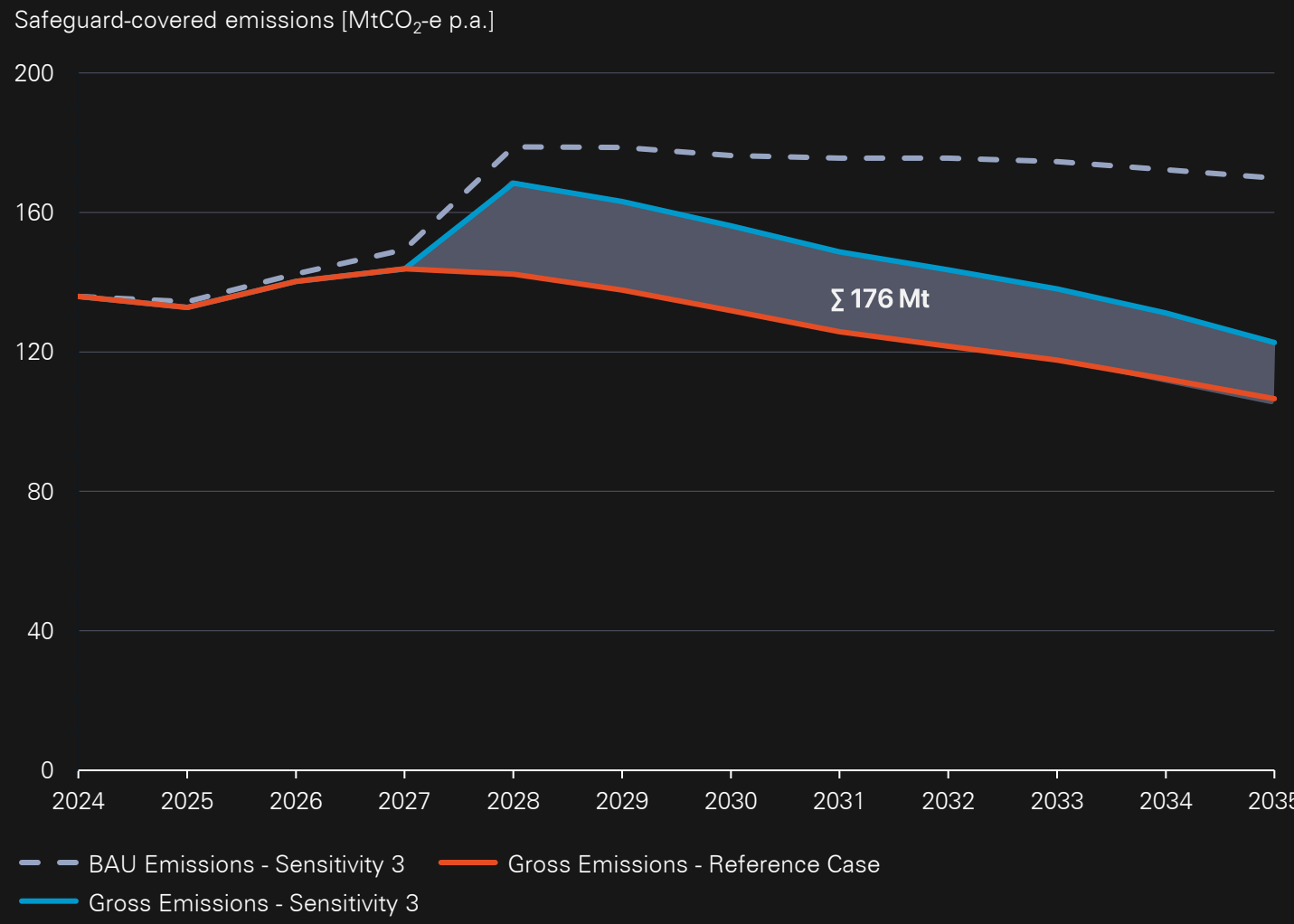
Remaining reporting methods are still thought to be under estimating coal mine methane



- Despite the phase-out of Method 1, several sources have flagged a continuing risk of significant under-reporting of coal mine methane using the Method 2 estimation method.
- In FY23 – with around half of Safeguard-covered mines using Method 2 – reported fugitive methane and CO_2 released during black coal mining accounted for 25 $MtCO_2$-e.
- Multiple independent studies using modelled and satellite measurement data, however, have estimated Australia's coal mine methane emissions to be 64-113% higher, including an IEA estimate of 50 $MtCO_2$-e, around double the FY23 reported figure.
- The CCA has recommended the immediate review of the Method 2 methodology, noting the minimum sampling requirement of 3 boreholes was "inadequate" to capture methane variability.

1) Estimated to account for brown coal emissions; 2) Estimated to account for CO_2 fugitives.

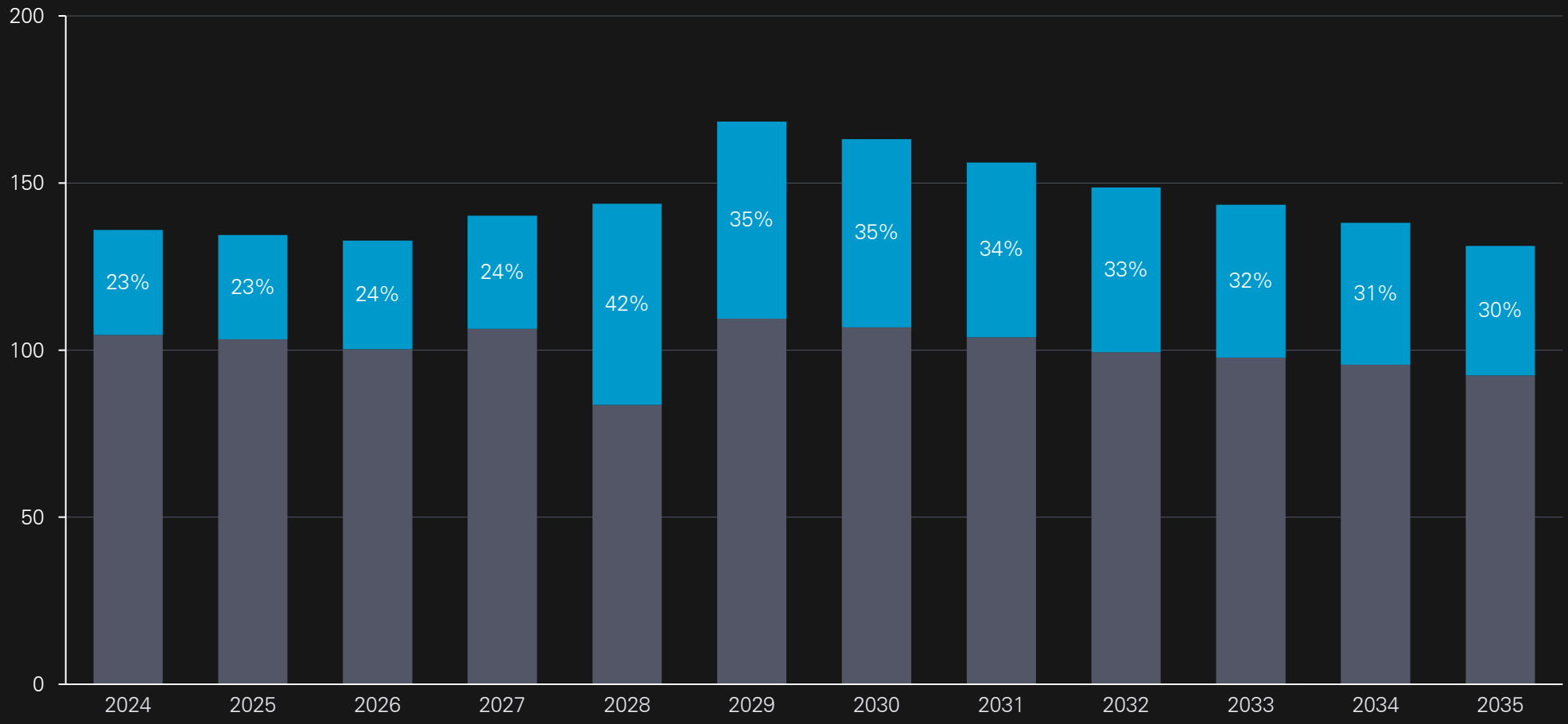
Improved estimation of coal mine methane could add 22 $MtCO_2$-e of gross scheme emissions p.a.



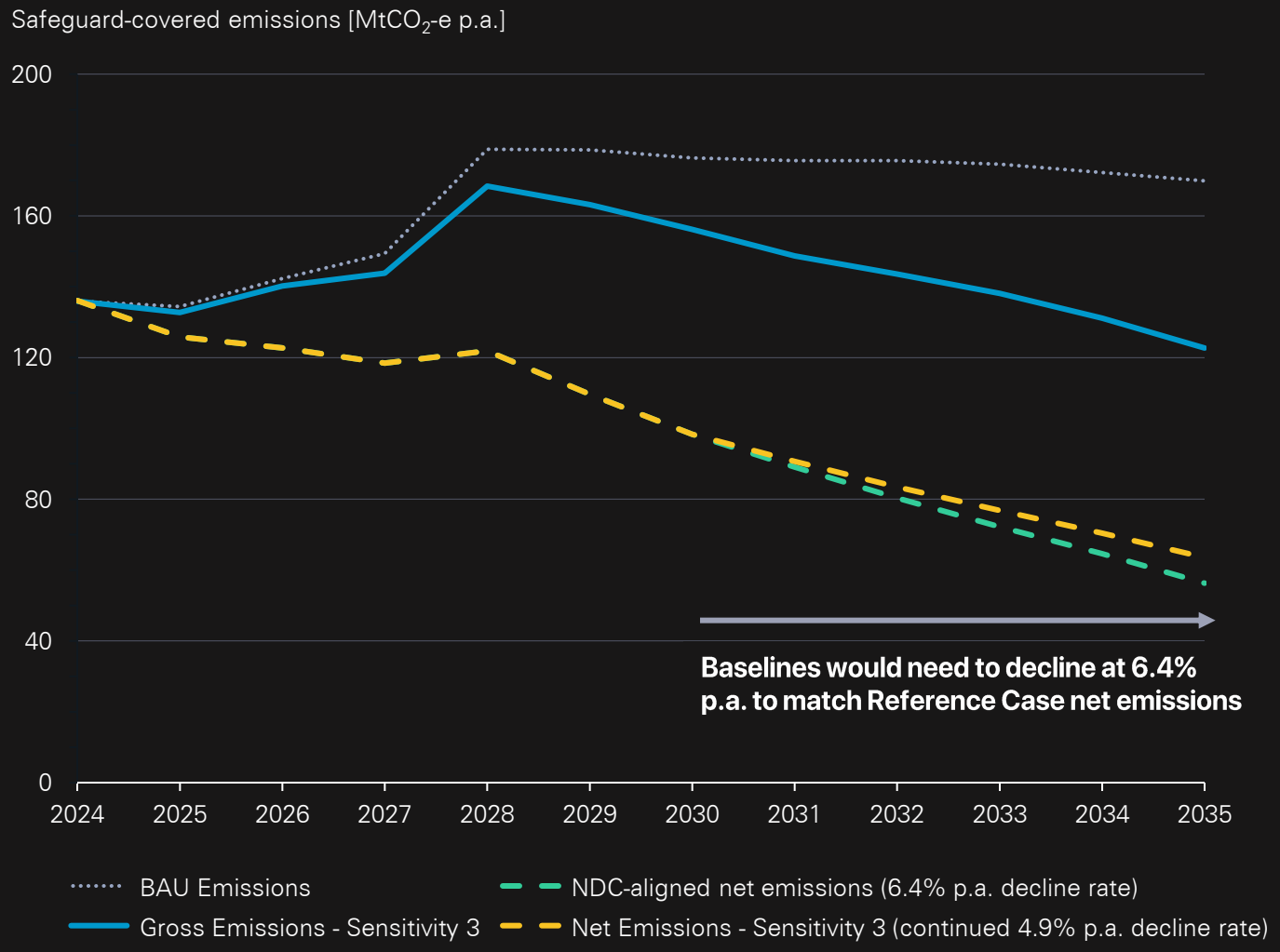
- Sensitivity 3 assumes IEA estimates are accurate, with the discrepancy arising from reporting of fugitives at open-cut mines.
- It is assumed that the Method 2 reporting framework is reformed upon release of the Expert Panel findings in FY28, leading to higher intensity estimates in-line with IEA estimates.
- Aligning to IEA figures, we estimate total reported coal mine methane emissions could increase by around 22 Mt per annum, or 176 Mt over FY28-35 – an 18% increase on total gross emissions under the Reference Case, as currently unreported emissions are added to the Safeguard scheme
- While such a large increase in reported emissions would incentive other sectors to decarbonise due to increased ACCU demand and higher prices, this is not expected to drive a large increase in onsite action from non-fossil fuel sectors by 2035 due to a lack of available abatement options, and the impact of the Cost Containment Measure (CCM) price ceiling limiting compliance costs.
- Larger variations would be expected beyond this horizon, however, due to the structural increase in long-term offset demand from coal mining.

From 2031-35, coal mining would make up 30% of Safeguard Mechanism gross emissions

Gross Safeguard-covered emissions – Sensitivity 3 [$MtCO_2$-e p.a.]



Improved reporting of coal mine methane could therefore be a risk to the emissions budget



- Changes to reported intensities due to method changes currently lead to a corresponding adjustment in site-specific baselines (but not industry average values). A large increase in emissions could therefore be partially attenuated by upward revisions to baselines.
- Improved measurement accuracy of coal mine methane emissions could therefore represent a risk to Australia's 2030 and 2035 NDC emissions budgets and the function of the ACCU market.
- Accounting for the improved measurement of coal mine methane emissions, to meet the same emissions budget as the Reference Case, FY31-35 decline rates would need to increase from 4.9% p.a. to 6.4% p.a. However, this would make all covered entities accountable for improved coal mine methane reporting.
- Alternatively, if site-specific emissions baselines for the coal sector were not revised upwards (to account for higher reported emissions), coal mining entities would be accountable for their own reported methane (not other sectors).

Section 4.
Policy sensitivities

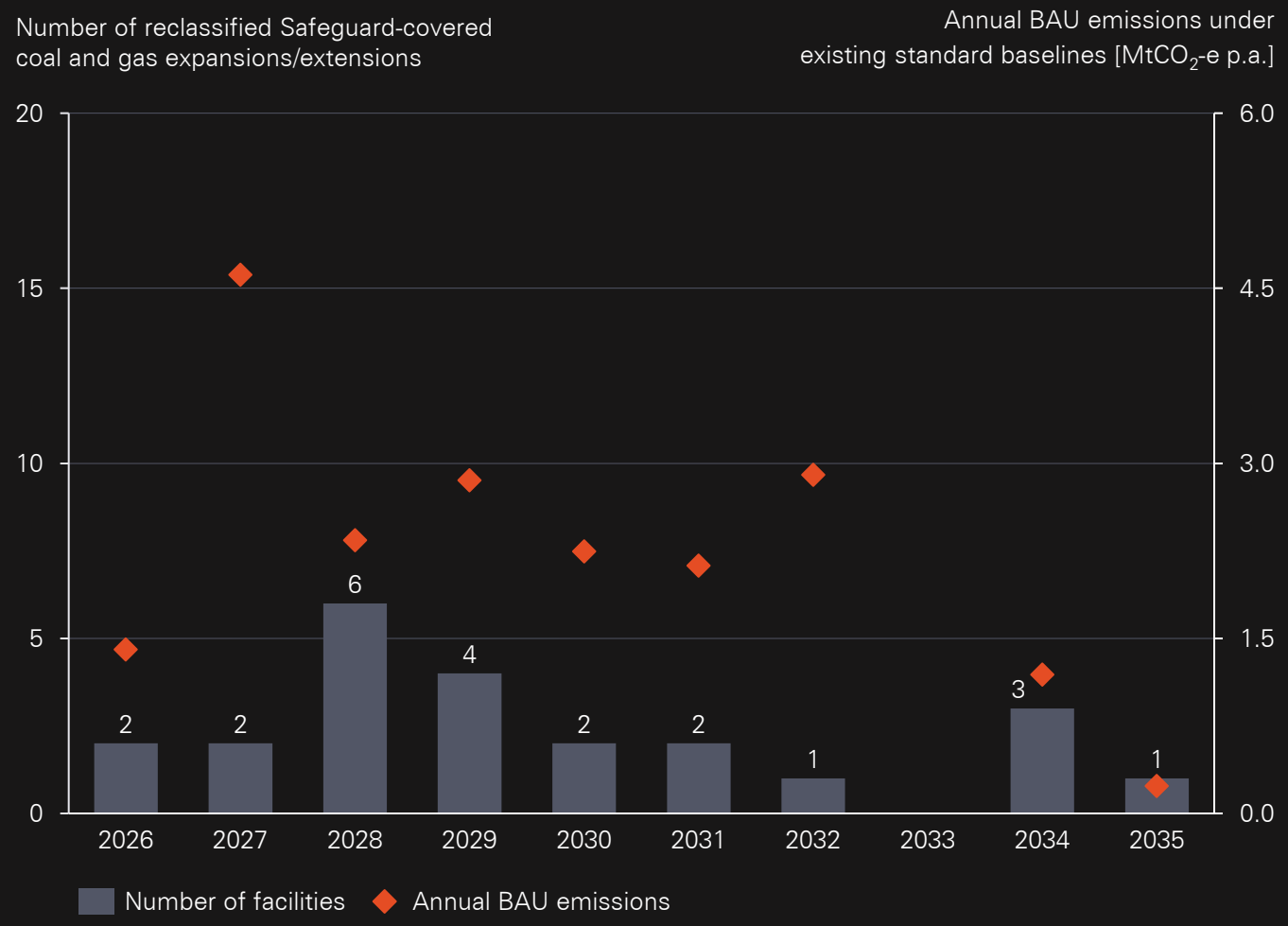
Summary of modelled sensitivities around potential policy changes

Section 4.1

Treatment of new entrants

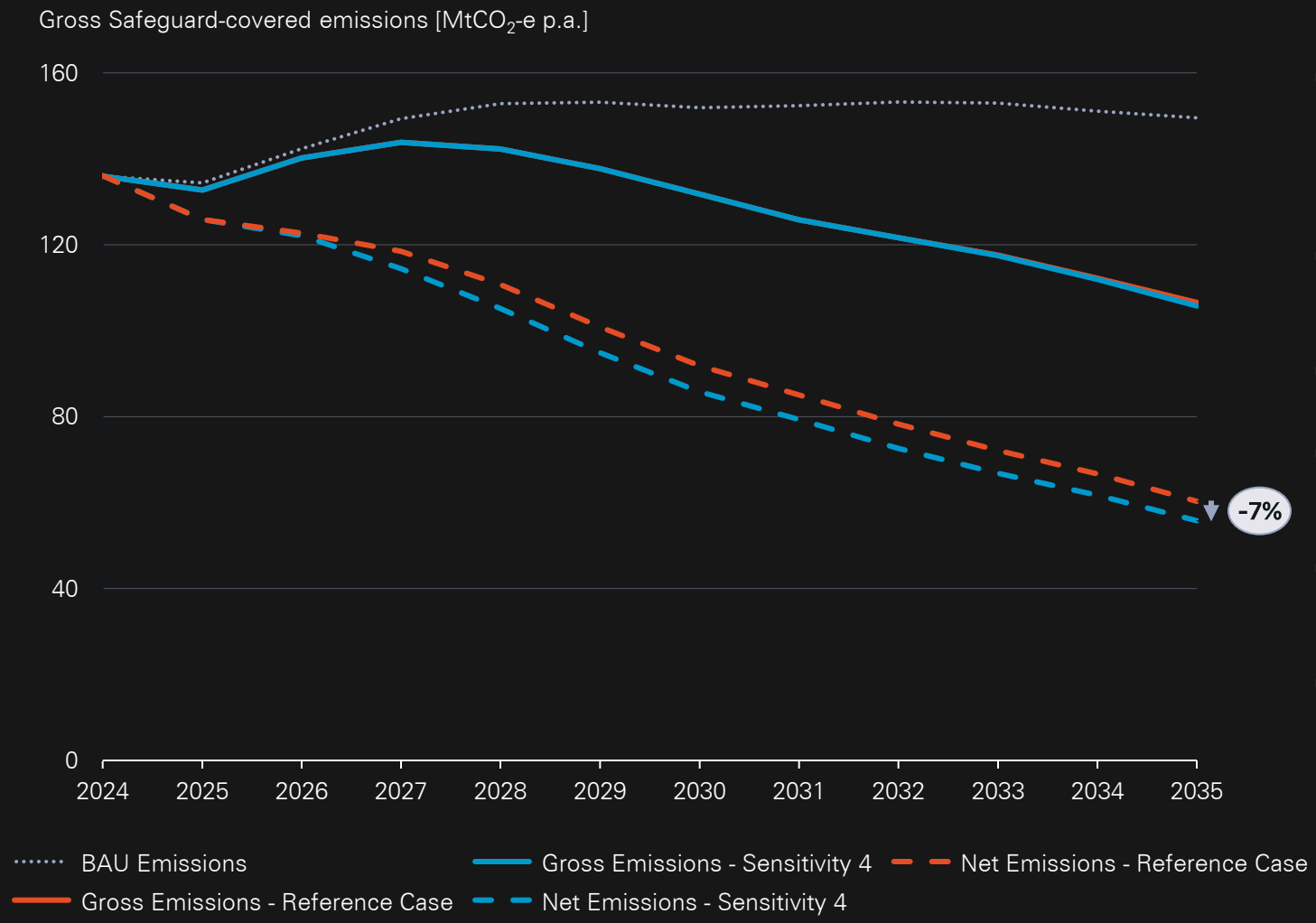
Impact of implementing best practice baselines for “expansions and extensions”

By 2035, 22 extensions and expansions under "standard" baselines account for 20 $MtCO_2$-e p.a.



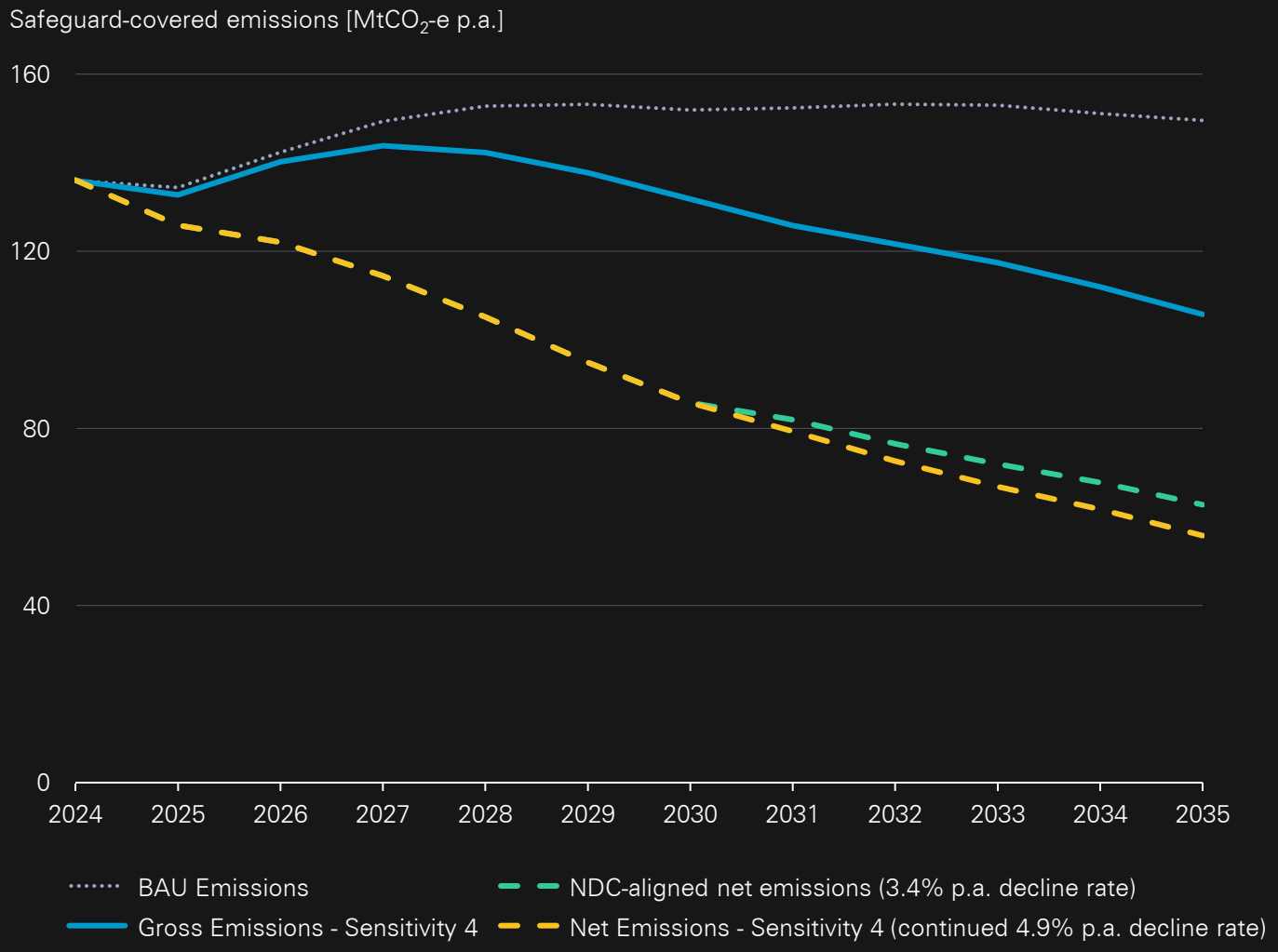
- Under current Safeguard Mechanism rules, emissions from new projects may either be assigned standard baselines or more stringent international best practice baselines.
- Best practice baselines are assigned to new projects at new facilities, with the exception being existing LNG facilities processing gas from new fields (i.e. "backfill"). These facilities are assigned a zero baseline (for reservoir CO2 emissions only), with processing emissions set standard baselines.
- Other than this, standard baselines are assigned to new projects at coal and gas facilities, such as:
  - Extensions, i.e., maintaining production by increasing coal mine footprint or drilling new wells in existing fields; or
  - Expansions, i.e., increasing production by increasing coal mine footprint or drilling new wells in existing fields
- Analysis has identified 22 extensions and expansions at existing facilities, accounting for 20 $MtCO_2$-e p.a. of BAU emissions by 2035.

Reclassification almost triples BAU emissions under best practice, reducing net emissions



- Sensitivity 4 applies best practice baselines to all emissions from "expansions and extensions" at existing coal mines and LNG facilities, aligning these facilities with more stringent requirements currently imposed on new facilities.
- This leads to the volume of BAU emissions under best practice baselines increasing over 2.7x by 2035, from 11 to 31 $MtCO_2$-e p.a..
- This raises the proportion of 2035 BAU emissions under best practice baselines from 8% to 21%.
- Under a continued 4.9% p.a. decline rate, the reclassification of these projects leads to a reduction in net emissions of 7% by 2035.
- The current 100,000 tCO_2-e coverage threshold constrains a further drop in net emissions as baselines cannot decline to below this floor.
- Gross emissions remain similar to the Reference Case despite a higher total abatement task due to interactions with the CCM and the modelled lack of suitably-priced and/or available abatement options for many industries to 2035.

Reclassification therefore allows decline rates to be softened while still meeting 2035 NDCs



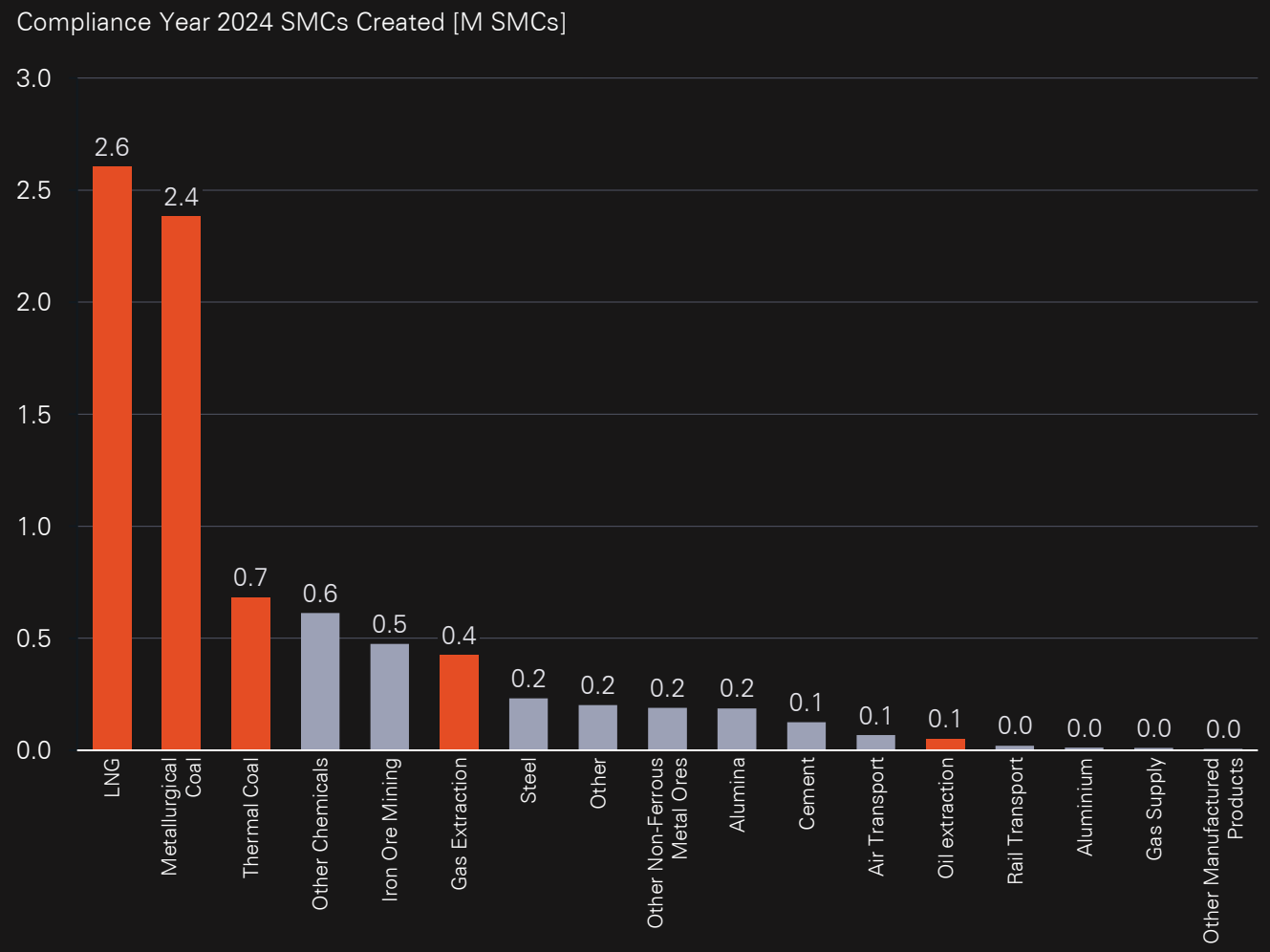
- The classification of these projects as "new" production thus has implications for Safeguard Mechanism net emissions, and the broader national emissions budget.
- Implementing best practice baselines for extensions and expansions at existing coal and gas facilities reduces net emissions, and thus allows for a lower decline rate for all facilities across the scheme to achieve the same volume of total abatement.
- To achieve the same post-2030 emissions budget as the Reference Case, decline rates slow to 3.4% p.a.
- For many hard-to-decarbonise sectors, without commercially available and/or high-cost direct decarbonisations available to them, a reduction in the decline rate would reduce compliance costs and allow more time for abatement technologies to become more accessible.

Section 4.2

Tightening of fossil fuel SMCs

Impact of stronger baseline decline rates for fossil fuel sectors

Sectors linked to fossil fuel extraction accounted for almost three quarters of first-year SMCs

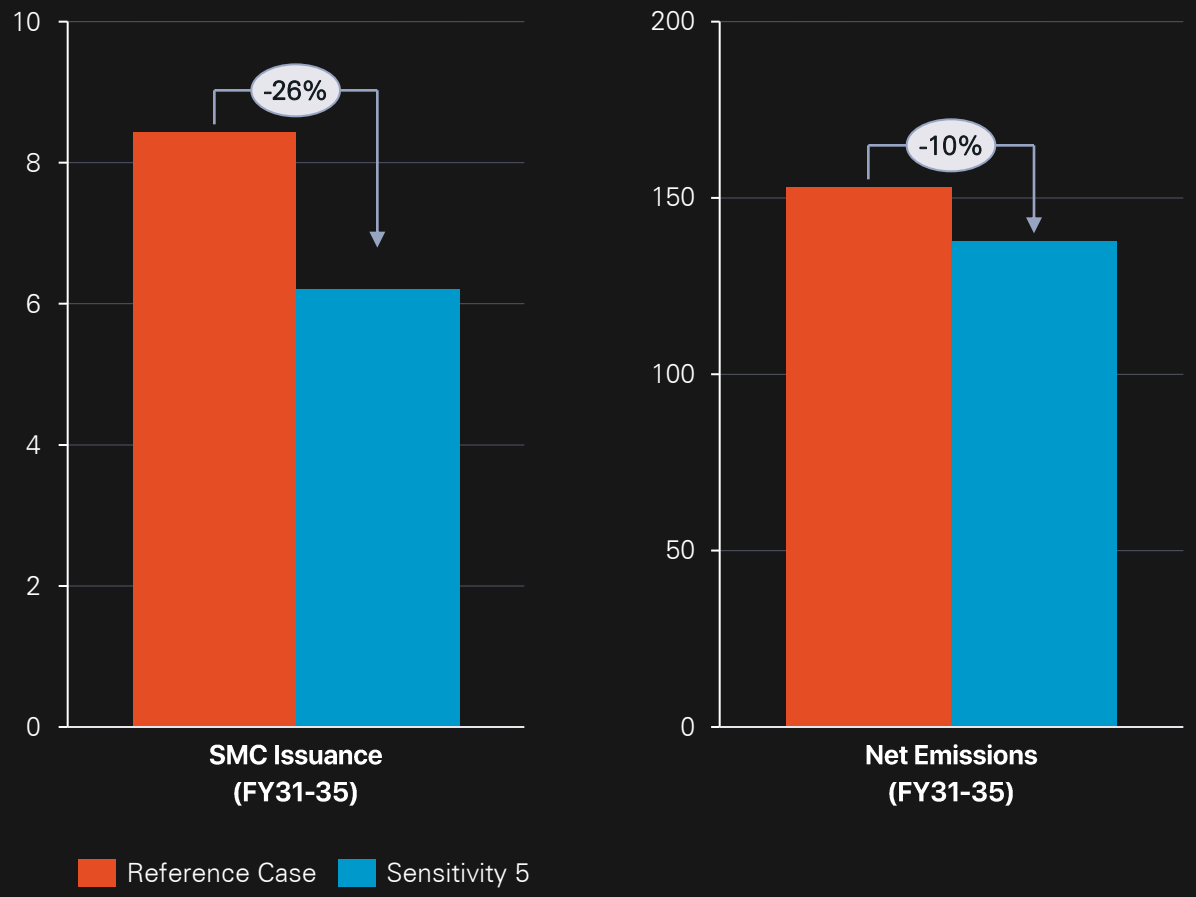


- Fossil fuel sectors received 74% of SMCs in the first year of the reformed Safeguard Mechanism, yet units were generally not linked to on-site abatement.
- Some first-year SMCs were issued due to baseline calibration issues.[1)] However, these facilities will see high effective decline rates as baselines shift to industry average, causing SMC creation to fall away.
- Outside of this, a large volume of SMC issuance to fossil fuel sectors arises from the use of the industry average production variables.
- Within resource extraction sectors, facilities may have very different emissions intensities resulting from site characteristics, e.g., coal seam gassiness, reservoir CO_2 content, or depth of resource. The influence of the industry average on baselines can thus lead to large exceedances for facilities operating at more emissions-intensive locations, and substantial, prolonged SMC issuances for those at less emissions-intensive sites.
- While these counterbalance at scheme level, and favour less emissions intensive facilities, the receipt (and banking) of "free" SMCs – received without any meaningful onsite emissions reductions – can create windfall gains while delaying investment in onsite abatement needed to push gross emissions towards NDC-aligned targets.

1) The baselining period for some facilities aligned with operation start-up.

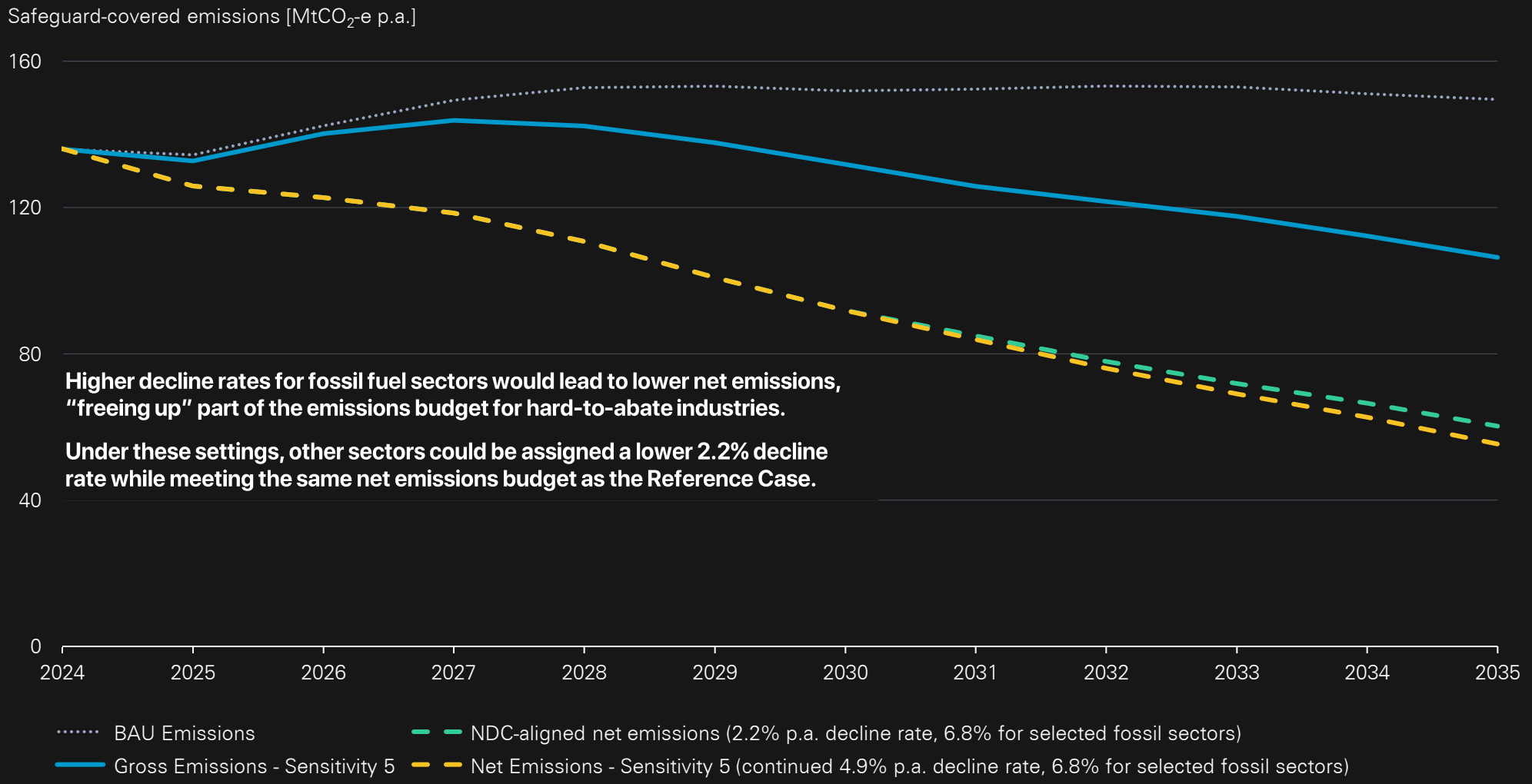
A stronger baseline decline rate for LNG and fossil fuel extraction would reduce “free” SMCs

SMC issuance and net emissions from fossil fuel extraction and LNG processing [$MtCO_2$-e]



- In this sensitivity, a higher decline rate of 6.8% p.a. is applied on coal mining, oil and gas extraction, and LNG facilities – aligned to the upper end of Australia’s national target.
- The use of the higher baseline decline rate in these sectors leads to a substantial reduction in the issuance of low-abatement SMCs, and is estimated to eliminate 67% of annual free SMCs by 2035.
- SMC issuance from these sectors does not drop to zero, due to two factors:
  - SMC creation continues for facilities performing meaningful on-site abatement, such as mines implementing fugitive destruction technologies.
  - The fact that some sites have intensities so far below the industry average mean that eliminating all “free” SMCs is implausible.
- Applying a 6.8% decline rate to fossil fuel extraction and LNG processing, while maintaining a 4.9% decline rate in all other sectors, leads to a 10% reduction in net emissions from these sectors, aligning total scheme net emissions with a higher 2035 emissions target of 68%.

Higher decline rates for fossil fuel sectors could enable reduced rates for other industries

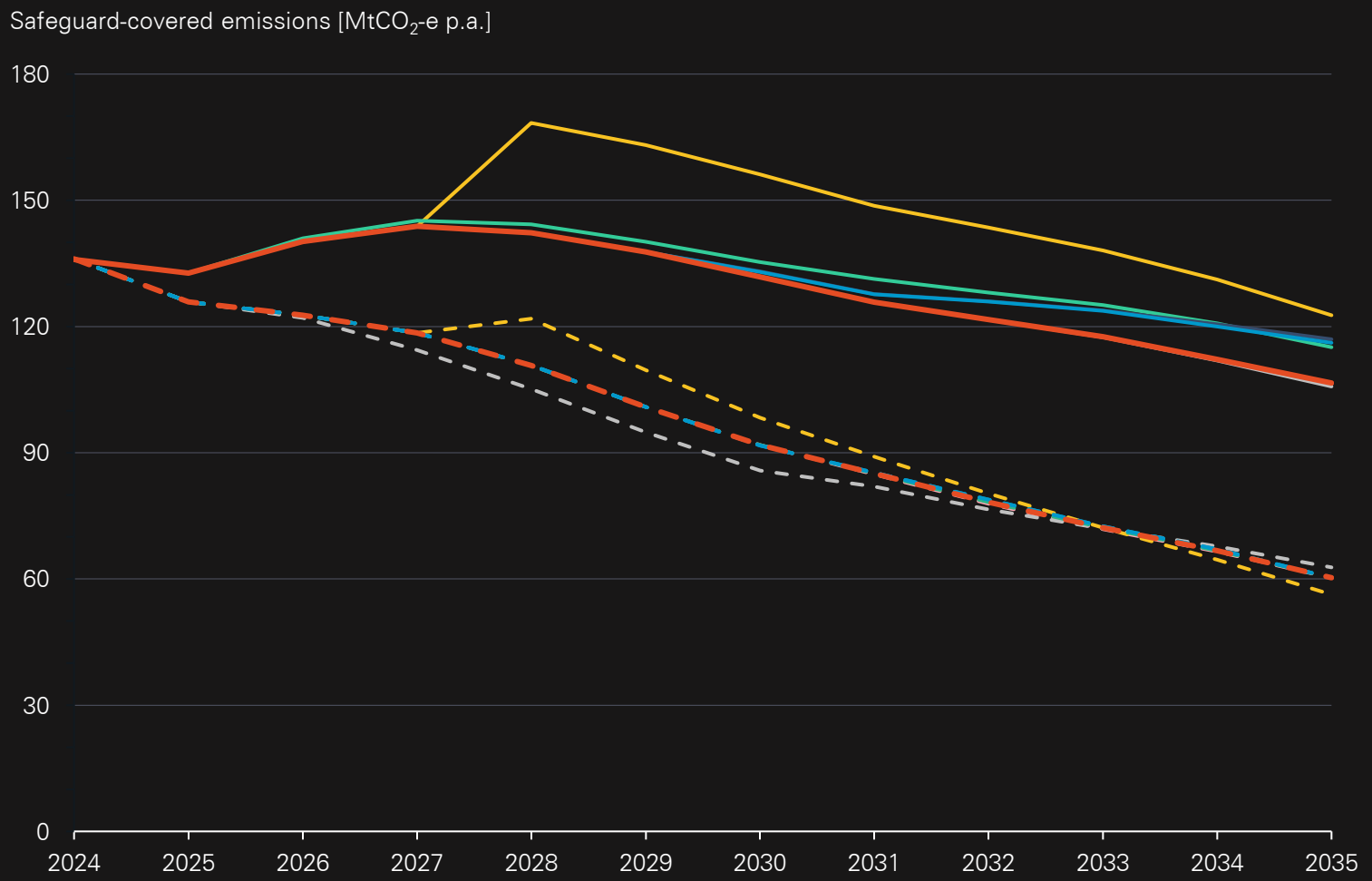


Section 5.

Summary of all sensitivities

Summary of outputs from all modelled sensitivities

To meet the mid-range 2035 target, preliminary baseline decline rates could vary from 2.2-6.4%



— **Gross Emissions**

- - **NDC-aligned net emissions**

Equivalent NDC-aligned FY31-35 decline rates

- - Reference Case	4.9%
- - S1: Higher fossil fuel production	5.6%
- - S2: Slower fossil fuel onsite abatement	4.9%
- - S3: Coal mine methane reporting [1)]	6.4%
- - S4: Treatment of expanding facilities	3.4%
- - S5: Tighter limits on fossil fuel SMCs[2)]	2.2%

1) Depending on whether coal mines are accountable for their own reported methane increases, or if accountability is shared across all covered entities. 2) Excluding LNG and fossil fuel extraction sectors

The Safeguard Mechanism Review will need to account for emissions uncertainties

- Modelled sensitivities are shown to have a material impact on emissions, most notably:
  - **Improved coal mine methane emissions estimation**, which is currently subject to government review.
  - **Higher-than-expected production of fossil fuels**, driven by export demand, should Australia's trade partners fail to decarbonise as rapidly or deeply as initially expected.
  - **Slow and/or unsuccessful roll-out of key abatement technologies in the coal and gas sector**, many of which are not mature or well-established within Australia.
- These would be expected to increase gross emissions, with the former leading to material increases in net emissions under the same decline rate, subject to whether coal mining facilities are accountable for their own reported methane emissions increases, or if all covered entities are made accountable.
- Policy sensitivities modelled in Section 4 could guard against emissions risks eroding the Safeguard Mechanism budget, via the stronger treatment of LNG and fossil fuel extraction facilities, and the stronger treatment of "expansions and extensions" that sustain production at older, more emissions-intensive facilities.
- With no step up in ambition assumed, modelled policy changes would enable a lower post-2030 decline rate while still achieving the same 2035 target as the Reference Case, reducing from 4.9% p.a. to as low as 2.2% p.a.[1)]
- Under the modelled settings, limited further onsite action occurs above the Reference Case due to the timeframes required for implementation, the lack of available low-to-medium cost technologies for many sectors, and the impact of the price ceiling under the current cost containment mechanism, which is not "market aligned" – e.g. responsive to changes in the spot price (Default Prescribed Unit Price) or forward curve – constraining onsite action over time.
- Increased onsite abatement relative to the Reference Case would be expected within modelled sensitivities across longer timeframes, particularly in scenarios with structural increases in demand for offsets.

1) Under Reference Case fossil fuel production forecasts.

Appendix 1.
Our modelling approach

Description of our A-EEM Model and settings

Summary of our modelling process (1/3)

In constructing our forecast scenarios, we use our Australian Energy and Emissions Market (A-EEM) model, consisting of four modules (compliance demand, voluntary demand, supply, and policy), which simulate how changes to overall demand and supply influence price development. These four modules are interdependent and are converged through iteration.

Compliance Demand Module

In calculating future compliance demand for carbon credits, we first characterise all Safeguard-covered facilities (and new entrants) across a range of factors including:

- age and expected asset lifespan;
- location (e.g. likely distance from potential CCS storage locations);
- production capacity, historical output, and current output;
- emissions sources and activities;
- existing targets and planned actions;
- inputs (e.g. processed or unprocessed natural gas);
- potential abatement technologies;
- remaining resources;
- closure date;

Site characterisation enables analysis to consider the emissions intensity of existing facilities as well as their potential abatement pathways.

Facility outputs are projected based on industry production curves, which modulate production up (to nameplate capacity) or down at each facility. By combining output data with facility characterisation data, emissions baselines for each facility may then be modelled.

Pre-abatement emissions (reference case emissions) are calculated by assuming future output is met at present-day emissions intensity.

Within our scenarios, uptake of abatement technology is informed by our regional Marginal Abatement Cost (MAC) model, covering over 250 decarbonisation activities for each year from 2025-2050. Changes in MACs over time are informed by forecast changes in state-specific fuel and electricity prices as well as decreases in CAPEX for unreleased and non-established technologies.

MACs are initially evaluated at an industry Weighted Average Cost of Capital. Barriers to uptake are considered, including Technical, Environmental, Commercial, and Institutional factors (e.g. safety concerns, facility age, location, financial performance, and so on), to reflect real-world decision-making. Decision making around the uptake of each potential technology is then modelled for every facility in each year.

The decision to implement a technology is based on the NPV of abatement vs offsetting over the lifetime of the technology (or remaining lifetime of the facility). If the NPV is greater for internal abatement, facilities are assumed to implement the technology, accounting for a lead time, followed by a linear ramp-up period depending on technology. The Compliance demand module also accounts for existing decarbonisation plans and announced technology deployment at each facility, subject to monitoring and review.

Depending on the project, scenarios are also considered to account for uncertainty in the pace and scale of onsite decarbonisation uptake, and variation in the changing costs of different technologies. Where depicted, these uncertainties are reflected in our core Progressive, Accelerated, and Slow decarbonisation pathways.

Summary of our modelling process (2/3)

ACCU Supply Module

In calculating future carbon credit supply we first consider ACCU issuance from projects that are already registered under the ACCU Scheme, i.e., the existing supply pipeline. Projects are classified:

- "Active": have issued ACCUs within a recent window
- "Inactive": revoked projects

  have not issued ACCUs and begun their crediting periods sufficiently long ago that they are unlikely to issue (based on analysis of similar projects)

  have issued ACCUs but not in a recent window

  have not issued ACCUs and have registered recently enough ago that they are considered possible to begin issuing ACCUs (based on similar projects)

We refer to issuance from "active" projects as "firm", with projects generally assumed to continue issuing at their average annual rate until the end of the crediting period. In the case of Vegetation method types, an S-shaped growth and issuance curve is assumed.

We refer to issuance from "potentially active" projects as "likely" issuance. We first estimate issuance from all such projects, based on average issuance from other projects of the same method or similar methods. To reflect the fact that only a subset of these projects will issue ACCUs, a failure rate multiplier is applied based on the average failure rate of other projects of the same method or similar methods.

Analysis considers expected CAC deliveries. For each CAC, we project the future delivery schedule using data from the CAC register. We then estimate the maximum possible delivery volumes for each CAC based on issuance of the underlying projects, stage of progression through the delivery period, and historical delivery rates. To estimate what portion of these will be delivered to the Commonwealth, we model increasing proportions of CAC exits with increasing spot prices. The exit rate differs between Fixed Delivery and Optional Delivery CACs due to differing effective floor prices.

The final step of the ACCU Supply Module is the modelling of supply from unknown new projects which are not yet registered (termed "future" issuance). Future issuance is modelled as either origination by compliance entities to meet their own compliance needs, or by project developers.

Projects are assumed to be developed under existing methodologies and announced and expected future methods. For each modelled method, we deploy our Long-Run Marginal Cost (LRMC) curve to inform the potential cost and volume of new supply across Australian regions. A method-dependent hurdle rate is applied to inform a Minimum Selling Price (MSP) curve for each method. This reflects real-world inertia and risk tolerance, particularly in land-based methods for which agricultural practices may need to be modified or reduced to develop projects.

Buying demand and spot prices are fed from our ACCU Pricing Module. New projects proceed imperfectly up the MSP curve, with projects more likely to come online at higher sustained price and demand growth rates, and with increasing prices above their MSPs. Further details can be found in our latest Carbon Market Outlook (CMO).

Summary of our modelling process (3 of 3)

Voluntary Demand Module

Voluntary demand for offsets is segmented into four types:Climate Active Carbon Neutral Standard, EPA and other non-Safeguard compliance, water offset requirements, and desalination plants

Total offset demand is determined for each category. Voluntary demand within the Climate Active framework is projected using autoregressive moving average analysis on historical trends. EPA and other non-SGM compliance is estimated based on projected CCS sequestration rates from Gorgon LNG, projected domestic gas consumption from Beetaloo Basin shale gas, and estimated local, state, and territory government requirements to reach relevant targets. Water offset requirements and desalination plant demands are estimated from secondary research into certain governments' mandates for desalination plans and water districts to offset emissions.

Within total voluntary offset cancellations, only a subset is expected to occur through ACCUs. This proportion is estimated based on historical trends in Climate Active cancellations, specific cancellations from certain EPA requirements, as well as broader historical data in the ANREU cancellations database. The resulting ACCU demand forms our "baseline" estimate.

Within these demand sources, entities may use international credits (unlike in the Safeguard Mechanism), creating demand elasticity based on the difference in price between ACCUs and international offsets, while accounting for a broader 'flight to quality'. Using our in-house projections for removal-based international offset prices, our "baseline" estimate for voluntary ACCU demand is modulated up or down based on the difference in price between ACCUs and international credits.

ACCU Pricing Module

In determining future ACCU spot price, we model holdings and ACCU flows between different entity types (project proponents, funds, speculative, compliance entities, voluntary entities). Analysis across the ACCU Pricing Module is performed for different price baskets.

We model the issuance of ACCUs each year using results from the ACCU Supply Module. We assume different purchasing and selling behaviours from each entity type (such hedging and accumulation strategies ahead of future obligations, preference for different types of ACCUs, and market share targets) as well as cancellations using results from the Compliance Demand Module and Voluntary Demand Module. Modelling ACCU flows between participants in this way allows us to determine annual buying demand, as well as projecting holdings changes over time.

Buying demand and end-of-year holdings data are used within the spot price model, in addition to results for the cost of production for new ACCU projects from the ACCU Supply Module. The expected market balance over the next several years is evaluated. Increasing over-supply may push prices below the cost of production of new ACCUs, while increasing tightening may push prices above the cost of production of new ACCUs. Spot price estimates are modulated depending on holdings, with increasing purchasing raising spot prices. ACCU prices are constrained by a price ceiling, accounting for the existing cost containment measure (CCM) to 2030, after which the CCM price is assumed to transition to a market-linked floating price ceiling, operating similarly to the current CCM scheme.

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