

AI Emissions and AASB S2: A Practical Guide for Australian Boards

Cetus AI — White Paper

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Executive Summary

Climate-related financial disclosures are now mandatory for large Australian entities under AASB S2, which came into effect for financial years beginning on or after 1 January 2025. For most large organisations, the focus of AASB S2 compliance has been on physical climate risks and transition risks associated with their core business operations. What many boards have not yet considered is that their AI workloads generate measurable greenhouse gas emissions — and that those emissions may be material to their AASB S2 disclosure obligations.

This white paper explains how AI workloads generate Scope 3 Category 1 emissions, what the AASB S2 materiality thresholds mean for director liability, and how Songlines Control automates the entire disclosure workflow — from token-level CO₂e measurement to a ready-to-lodge AASB S2 disclosure report — so that boards can meet their obligations without building a separate emissions accounting infrastructure.

1. The Regulatory Context

1.1 AASB S2 — Climate-related Financial Disclosures

The Australian Accounting Standards Board Standard S2, *Climate-related Financial Disclosures*, was issued in 2024 and is mandatory for large Australian entities for financial years beginning on or after 1 January 2025. AASB S2 is aligned with the International Sustainability Standards Board (ISSB) IFRS S2 standard and requires entities to disclose:

- Climate-related risks and opportunities and their expected financial effects
- Greenhouse gas emissions across Scope 1, Scope 2, and material Scope 3 categories
- Governance arrangements for climate-related risk
- Targets and progress against those targets

The mandatory disclosure regime was established by the Treasury Laws Amendment (Financial Market Infrastructure and Other Measures) Act 2024, which amended the Corporations Act 2001

to require climate-related financial disclosures from large entities.

1.2 Who Is Affected

The mandatory disclosure requirements apply in three tranches:

Tranche	Criteria	First Reporting Year
Group 1	Listed entities or large unlisted entities with ≥ 500 employees, $\geq 1B$ total assets, or $\geq 500M$ revenue	FY2025
Group 2	Entities with ≥ 250 employees, $\geq 500M$ total assets, or $\geq 200M$ revenue	FY2026
Group 3	Entities with ≥ 100 employees, $\geq 25M$ total assets, or $\geq 50M$ revenue	FY2027

Financial services entities regulated by APRA are subject to additional requirements under APRA's climate vulnerability assessment framework.

1.3 Director Liability

Directors of entities subject to AASB S2 have personal liability for the accuracy of climate-related financial disclosures under section 180 of the Corporations Act. A director who approves a climate disclosure that materially understates the organisation's emissions — including by failing to account for material Scope 3 emissions categories — may face enforcement action by ASIC. ASIC has identified climate disclosure as a priority enforcement area and has indicated that it will take action against entities that make misleading or incomplete disclosures.

2. How AI Workloads Generate Emissions

2.1 Scope 3 Category 1 — Purchased Goods and Services

AI compute is classified as a Scope 3 Category 1 emission under the GHG Protocol Corporate Standard. When an organisation uses a cloud-based AI model — such as Azure OpenAI, AWS Bedrock, or Google Vertex AI — it is purchasing a service that requires significant energy consumption to deliver. The emissions associated with that energy consumption are attributed to the purchasing organisation as Scope 3 Category 1 emissions.

This is the same classification that applies to the energy embedded in physical goods an organisation purchases. Just as a manufacturer must account for the emissions embedded in

the raw materials it buys, an organisation using AI services must account for the emissions embedded in the compute it consumes.

2.2 The Scale of AI Emissions

The emissions intensity of AI workloads varies significantly by model. Large language models with hundreds of billions of parameters require substantially more compute per inference than smaller, more efficient models. The following table shows representative emissions factors for commonly used models, expressed in grams of CO₂ equivalent per million tokens processed:

Model	gCO ₂ e per Million Tokens	Source
GPT-4o	520	Devera AI, 2025
Claude 3.5 Sonnet	480	Devera AI, 2025
Gemini 1.5 Pro	350	Devera AI, 2025
GPT-4o Mini	120	Devera AI, 2025
Llama 3.1 70B (self-hosted, renewable energy)	85	arXiv:2505.09598

Sources: Devera AI AI Emissions Report 2025; arXiv:2505.09598 (Luccioni et al., 2025); DCCEEW National Greenhouse Accounts Factors 2024.

For a large enterprise processing 500 million tokens per month across its AI workloads — a moderate volume for an organisation with several hundred AI-enabled workflows — the annual emissions at GPT-4o rates would be approximately 3.1 tonnes of CO₂e. This falls within the range where voluntary disclosure is strongly recommended and where the trajectory toward mandatory disclosure thresholds should be monitored.

2.3 Materiality Assessment

AASB S2 requires entities to disclose Scope 3 emissions categories that are material to their emissions profile. Materiality is assessed relative to the entity’s total emissions and the significance of the emissions category to its climate-related risk profile. For organisations that are significant users of AI services — financial services firms, technology companies, government agencies, professional services firms — AI-related Scope 3 Category 1 emissions may be material even if they are small in absolute terms, because they represent a growing and strategically significant portion of the organisation’s emissions footprint.

The Director Liability Assessment in the Songlines Control Sustainability module applies the following materiality thresholds based on the AASB S2 guidance and GHG Protocol:

Annual AI CO ₂ e	Risk Level	Recommended Action
Below 1 tonne	Low	No mandatory disclosure triggered; voluntary disclosure recommended for completeness
1–10 tonnes	High	Voluntary disclosure strongly recommended; trajectory monitoring required
Above 10 tonnes	Critical	Mandatory AASB S2 disclosure triggered; board-level governance required

3. The Measurement Challenge

3.1 Why Standard Emissions Accounting Doesn’t Work for AI

Traditional Scope 3 Category 1 emissions accounting relies on spend-based or activity-based methods applied to procurement categories. For AI workloads, neither method produces accurate results without additional instrumentation.

Spend-based methods apply an emissions factor to the dollar amount spent on a category of goods or services. For AI, this produces highly inaccurate results because the emissions intensity of different AI models varies by a factor of six or more (as shown in the table above), and the spend on AI services does not correlate reliably with the compute consumed.

Activity-based methods require direct measurement of the activity that generates emissions — in this case, the tokens processed by each model. Without instrumentation at the AI workload level, organisations have no reliable way to measure token consumption by model, and therefore no reliable way to calculate emissions.

3.2 Token-Level Measurement

The only accurate method for measuring AI emissions is token-level instrumentation: recording the number of input and output tokens processed by each model for each AI request, and applying the model’s emissions factor to calculate the CO₂e attributable to that request.

This is precisely what Songlines Control does. Every telemetry event ingested by the platform includes the model name, input token count, and output token count. The platform multiplies these by the model’s gCO₂e per million tokens factor to calculate the emissions for each

request, and aggregates these into monthly totals, workflow-level breakdowns, and supplier-level summaries.

4. The Songlines Control Sustainability Module

The Songlines Control Sustainability module provides the complete infrastructure for AI emissions measurement, reporting, and governance — integrated directly into the AI observability platform that organisations are already using to manage their AI costs and compliance.

4.1 Emissions Dashboard

The emissions dashboard provides a real-time view of the organisation's AI emissions footprint, including:

- Total CO₂e for the current period and year-to-date
- Monthly trend with 24-month trajectory
- Model-by-model emissions breakdown
- Emissions intensity metrics — CO₂e per workflow, with trend analysis
- Year-on-year comparison with efficiency delta

4.2 Supplier Emissions Ledger

The supplier ledger shows CO₂e and spend broken down by AI provider — OpenAI, Anthropic, Azure, Google, AWS — with year-on-year delta. This enables procurement teams to factor emissions intensity into vendor selection decisions and to demonstrate to auditors that the organisation has considered the emissions implications of its AI provider choices.

4.3 Emissions Budgets and Alerts

Organisations can set CO₂e emissions budgets at the organisational level, with alerts that fire when usage approaches or exceeds the configured threshold. Budget alerts use the same notification channels as cost budget alerts, ensuring that emissions governance is integrated into the same operational workflow as cost governance.

4.4 Director Liability Assessment

The Director Liability Assessment module calculates the organisation's 12-month AI CO₂e trajectory and compares it against the AASB S2 materiality thresholds described above. The assessment produces a colour-coded risk rating — Low, High, or Critical — with four supporting

KPI tiles showing total emissions, trajectory, materiality threshold proximity, and recommended action.

The assessment is designed to be reviewed by the board or audit committee as part of the regular climate governance cycle, providing directors with the information they need to discharge their AASB S2 obligations.

4.5 Regulatory Change Monitoring

The Regulatory Change Monitoring section tracks updates from ASIC, AASB, Treasury, and the GHG Protocol that may affect the organisation's AASB S2 obligations. Each alert includes an impact level (Low, Medium, High, Critical), a plain-English summary, and a link to the source document. Administrators can acknowledge alerts to record that they have been reviewed.

4.6 AASB S2 Disclosure Report

The AASB S2 disclosure report is a ready-to- lodge PDF generated from live telemetry data. It includes:

- Cover page with entity name, reporting period, and preparer details
- Scope 3 Category 1 disclosure statement with total CO₂e and methodology
- Model-by-model emissions breakdown table
- Data source citations (Devera AI, arXiv:2505.09598, DCCEEW 2024)
- Preparer attestation section

The report is generated from the same data that underpins the emissions dashboard, ensuring that the disclosed figures are consistent with the organisation's internal records.

4.7 Executive Board Pack

The board pack PDF is a multi-section executive document designed for presentation to the board or audit committee. It includes an executive summary, year-on-year comparison, top models by emissions, budget status, regulatory alerts, and recommended actions. The board pack is generated on demand and can be regenerated at any time to reflect the current state of the organisation's AI emissions footprint.

5. Practical Steps for Boards

Boards that have not yet addressed AI emissions in their AASB S2 governance programme should take the following steps:

Step 1 — Establish a baseline. Instrument your AI workloads with Songlines Control to begin measuring token consumption by model. Without a baseline, it is impossible to assess materiality or prepare a credible disclosure.

Step 2 — Assess materiality. Use the Director Liability Assessment to determine whether your current AI emissions trajectory triggers mandatory disclosure obligations. If you are in the High or Critical range, escalate to the audit committee immediately.

Step 3 — Prepare the disclosure. Generate the AASB S2 disclosure report and have it reviewed by your external auditors as part of the annual financial reporting cycle. The report is designed to be audit-ready, with full data source citations and a preparer attestation section.

Step 4 — Set emissions budgets. Establish CO₂e emissions budgets and configure alerts so that the board is notified before emissions approach material thresholds. This demonstrates active governance and reduces the risk of a surprise disclosure obligation.

Step 5 — Monitor regulatory changes. Use the Regulatory Change Monitoring module to stay informed of changes to AASB S2, GHG Protocol, and related frameworks. The regulatory landscape for climate disclosure is evolving rapidly, and boards need to be informed of changes that may affect their obligations.

Conclusion

AASB S2 has made climate-related financial disclosures mandatory for large Australian entities, and AI workloads are a material and growing component of many organisations' Scope 3 emissions footprint. The combination of token-level measurement, automated AASB S2 reporting, and director liability assessment in the Songlines Control Sustainability module gives Australian boards the tools they need to meet their disclosure obligations without building a separate emissions accounting infrastructure.

The organisations that act now — establishing a measurement baseline, assessing materiality, and integrating AI emissions governance into their existing climate governance programme — will be better positioned than those that wait for an enforcement action to force the issue.

About Cetus AI

Cetus AI is an Australian AI governance company. Songlines Control® is the enterprise AI observability and governance platform built for Australian enterprise and government — delivering real-time cost control, sovereign compliance, and complete auditability across every AI interaction.

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