

Gemini AI Environmental Impact Study



Google's recent technical paper on Gemini's environmental impact marks an important step toward AI industry transparency, but reveals significant challenges in comparing AI models' true environmental costs. While Google reports impressively low figures (0.24 Wh energy, 0.03 gCO₂e emissions, 0.26 mL water per median prompt), methodological limitations make these numbers difficult to verify and compare with other models.

Key Findings

Google's Reported Metrics

<p>Energy: 0.24 Wh per median Gemini prompt</p>	<p>Emissions: 0.03 gCO₂e (market-based) per prompt</p>
<p>Water: 0.26 mL per prompt</p>	<p>Efficiency Claims: 33x reduction in energy use, 44x reduction in emissions in one year</p>

Critical Limitations

<p>Market vs Location-Based Emissions: Using location-based calculations would triple emissions to ~0.09 gCO₂e</p>	<p>Limited Transparency: Missing total prompt volumes, cumulative impacts, and baseline data</p> <p>Unspecified Prompt Details: No disclosure of prompt length, complexity, or token count</p>	<p>Scope Exclusions: Missing training impacts, hardware manufacturing, networking, and end-user device energy</p>	<p>No Independent Verification: Study lacks external audit or peer review</p>
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Greenly's Estimates

For a comparable 400-token prompt using Gemini 2.5 Pro:

**These figures align more closely with Mistral's results, accounting for model size differences.*

<p>Energy 14.6 Wh per prompt</p>
<p>Emissions: 7.4 gCO₂e per prompt</p>

Industry Context & Urgency

<p>28% Data centers projected to expand 28% by 2030</p>	<p>3-4% AI could account for 3-4% of global electricity consumption by decade's end</p>	<p>2022-2030 AI carbon emissions expected to double between</p>
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What's Needed: Industry Standardization

<p>Common Reporting Frameworks for energy, emissions, and water footprints</p>	<p>Independent Verification through third-party auditing</p>
<p>Lifecycle Transparency covering training, inference, and hardware impacts</p>	<p>Granular Disclosures including prompt specifications and location-based emissions</p>

Practical Tips: Reducing Your Personal AI Footprint

<p>1 Choose smaller models when high complexity isn't needed</p>	<p>2 Write concise prompts and request shorter responses</p>	<p>3 Skip unnecessary pleasantries</p>
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Bottom Line



Google's Gemini study represents progress toward transparency but highlights the urgent need for industry-wide standardization. Without harmonized methodologies and independent verification, AI environmental impact claims remain difficult to validate and compare. The industry must collaborate to establish science-based standards as AI's environmental footprint continues to grow exponentially.

**This analysis is based on Greenly's review of Google's technical paper on Gemini AI environmental impact, published in 2024.*