

A Relatively Simple Explanation of the Greenhouse Effect

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Publication date: April 30, 2014.

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What this article reported

> From the University of California San Diego - a simple explanation on how the atmosphere works and hence what the increased levels of CO₂ causes global warming

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Global Warming

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What is the greenhouse effect and why is it important to understand?

The greenhouse effect is a natural atmospheric process where gases like carbon dioxide, methane, and water vapor trap outgoing heat radiation, maintaining Earth's temperature within a range suitable for life. Understanding this mechanism is essential for distinguishing between the natural greenhouse effect—which is beneficial—and its intensification due to increased atmospheric greenhouse-gas concentrations from human activities. This distinction matters because it clarifies why emissions reduction and carbon management have become critical business and environmental considerations. Organizations increasingly need to quantify their greenhouse-gas contributions to establish baselines, set reduction targets, and report emissions across Scope 1, 2, and 3 categories.

How do greenhouse gases trap heat, and what makes CO₂ significant?

Incoming sunlight passes through the atmosphere and warms Earth's surface, which then radiates heat back toward space as infrared radiation. Greenhouse gases absorb this outgoing heat and reflect much of it back to the surface, intensifying atmospheric warming. Carbon dioxide is particularly significant

because it persists in the atmosphere for centuries and is produced at scale by fossil-fuel combustion, industrial processes, and agriculture. Increased CO₂ concentrations enhance the natural greenhouse effect beyond historical balance. For businesses, this means CO₂-equivalent emissions from energy consumption, transportation, and operations directly contribute to atmospheric warming, making energy audits, efficiency improvements, and carbon accounting essential for understanding and managing organizational impact.

What is meant by 'CO₂-e' or 'CO₂-equivalent' in emissions reporting?

CO₂-e expresses all greenhouse gases on a common carbon-dioxide-equivalent basis using a stated methodology. This standardization allows organizations to compare and aggregate emissions from different sources—methane from biogas, nitrous oxide from agriculture, and carbon dioxide from energy use—on a single scale. The conversion reflects each gas's global warming potential relative to CO₂. When we conduct emissions inventories or carbon-management diagnostics, it quantifies organizational emissions in CO₂-e to establish a clear baseline, support reporting compliance under frameworks like NGER or ASRS, and enable meaningful comparison of reduction opportunities across diverse activities and technologies.

Why is distinguishing between natural and enhanced greenhouse effects relevant for business decisions?

The natural greenhouse effect maintains a habitable climate; the problem is its intensification through increased atmospheric greenhouse-gas concentrations from human activities. For businesses, this distinction clarifies that emissions reductions are not about eliminating a natural phenomenon but about moderating human-caused intensification. This understanding supports strategic decisions: energy efficiency reduces operational emissions without sacrificing functionality; renewable-electricity procurement addresses Scope 2 emissions under market-based accounting; and transition planning identifies pathways to lower-carbon operations. Our carbon advisory services help organizations establish this distinction through emissions diagnostics, opportunity assessment, and transition pathways that align business performance with climate-risk management and stakeholder expectations.

How does understanding the greenhouse effect inform an organization's carbon-management strategy?

Understanding how greenhouse gases intensify atmospheric warming provides the scientific foundation for carbon-management strategy. It clarifies why measurement matters: organizations must quantify their emissions across Scope 1 (direct), Scope 2 (purchased electricity), and Scope 3 (value-chain) sources to understand their contribution. This informs prioritization—energy efficiency and renewable energy address major sources; supply-chain engagement addresses Scope 3 intensity. Our carbon-advisory services, including emissions inventories, gap-analysis diagnostics, and transition planning, translate this understanding into practical action. A carbon-management diagnostic clarifies organizational strengths and gaps; an opportunity assessment identifies which reductions are technically and commercially viable; and transition pathways develop sequenced implementation with assigned ownership and financial implications.

What practical steps can a business take to reduce its contribution to greenhouse-gas intensification?

Practical steps span energy, procurement, and operational domains. Energy efficiency—through audits, equipment upgrades, and management systems—reduces consumption and associated emissions. Renewable-electricity procurement addresses Scope 2 emissions through certificates or contracts; Our moREnewable100 service supports multi-site renewable sourcing. Transition planning identifies options like electrification feasibility, biogas utilization, or process-heat improvements. Supply-chain engagement reduces Scope 3 emissions. Implementation requires measurement and verification to confirm savings, funding assessment to identify support mechanisms, and ongoing

performance monitoring. A comprehensive approach begins with an emissions inventory or carbon-management diagnostic, progresses through opportunity assessment and feasibility analysis, and sustains through energy management systems and periodic reporting.

How does Northmore Gordon help organizations measure and manage their greenhouse-gas emissions?

We provide integrated carbon and energy services connecting emissions measurement with operational improvement. Its carbon advisory services include emissions inventories across Scope 1, 2, and 3; diagnostic workshops to clarify gaps and priorities; opportunity assessment to identify viable reductions; transition planning with sequenced pathways and financial implications; and environmental-attribute due diligence for renewable and offset procurement. For energy, it conducts audits, feasibility studies, and measurement-and-verification projects that quantify savings. Its moreData platform supports data collection, NGER reporting, performance-indicator tracking, and portfolio planning. This integrated approach ensures that emissions reduction is grounded in operational reality, connected to investment decisions, and sustained through ongoing management and performance review.

Why is the difference between emission avoidance and carbon removal important for carbon strategy?

Emission avoidance is the physical outcome of avoiding an emission—for example, through energy efficiency or renewable electricity. Carbon removal is the physical outcome of storing carbon, typically through reforestation or direct air capture. These have different mechanisms, timescales, and permanence characteristics. In a carbon-management strategy, emission avoidance through operational efficiency is typically faster and more cost-effective; carbon removal through offsets or credits addresses residual emissions that cannot be avoided. Our transition planning and opportunity assessment distinguish these pathways, helping organizations prioritize emission avoidance—supported by energy audits, efficiency projects, and renewable procurement—while identifying where carbon credits or offsets provide additional assurance for remaining emissions. This clarity prevents double-counting and ensures credible carbon claims.

What reporting frameworks require organizations to quantify and disclose greenhouse-gas emissions?

Multiple frameworks apply in Australia depending on organizational size, structure, and activity. The National Greenhouse and Energy Reporting (NGER) scheme requires facilities and corporate groups meeting emissions or energy thresholds to report Scope 1 and 2 emissions annually, with a 31 October deadline. Sustainability reporting obligations under the ASRS framework apply to listed entities and large private companies with separate financial-year applicability tests. Licensed premises in New South Wales must develop Climate Change Mitigation and Adaptation Plans (CCMAPs) addressing emissions and climate risk. Product-level disclosure may be required by customers or voluntary commitments. We provide emissions-inventory support, NGER reporting functionality through moreData, CCMAP assessment and planning, and ASRS transition planning. These services help organizations identify applicable obligations, gather and reconcile data, and prepare compliant reporting.