AI for Sustainable Impact: Opportunities and Limits

Professor Fang Zhao(PhD)
CEO, Strategy&Ops Consultancy
Melbourne, Australia
Email: ceo@strategyandops.net

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The Purpose & the Agenda

Purpose: ***Share my insights on the interface between AI and sustainability from business and strategy perspectives***

Agenda

- **Strategic Framing: Why AI Matters for Sustainability**
- **Opportunity Zones**
- **The Hidden Costs & Regulatory Frontiers**
- **Building Strategic and Ethical AI Literacy**
- **Building Strategic AI Future Together**
- **Q/A and discussions**

Strategic Framing: AI, Sustainability, and the Business Imperative

Position AI as a strategic enabler of corporate sustainability—not merely a technical asset.

88–90% of executives globally expect AI to accelerate sustainability targets and are increasing investments accordingly.

Reference: Mustafa et al. (2025). The Role of Artificial Intelligence in Sustainable Development: Empirical Evidence from a GMM Analysis.

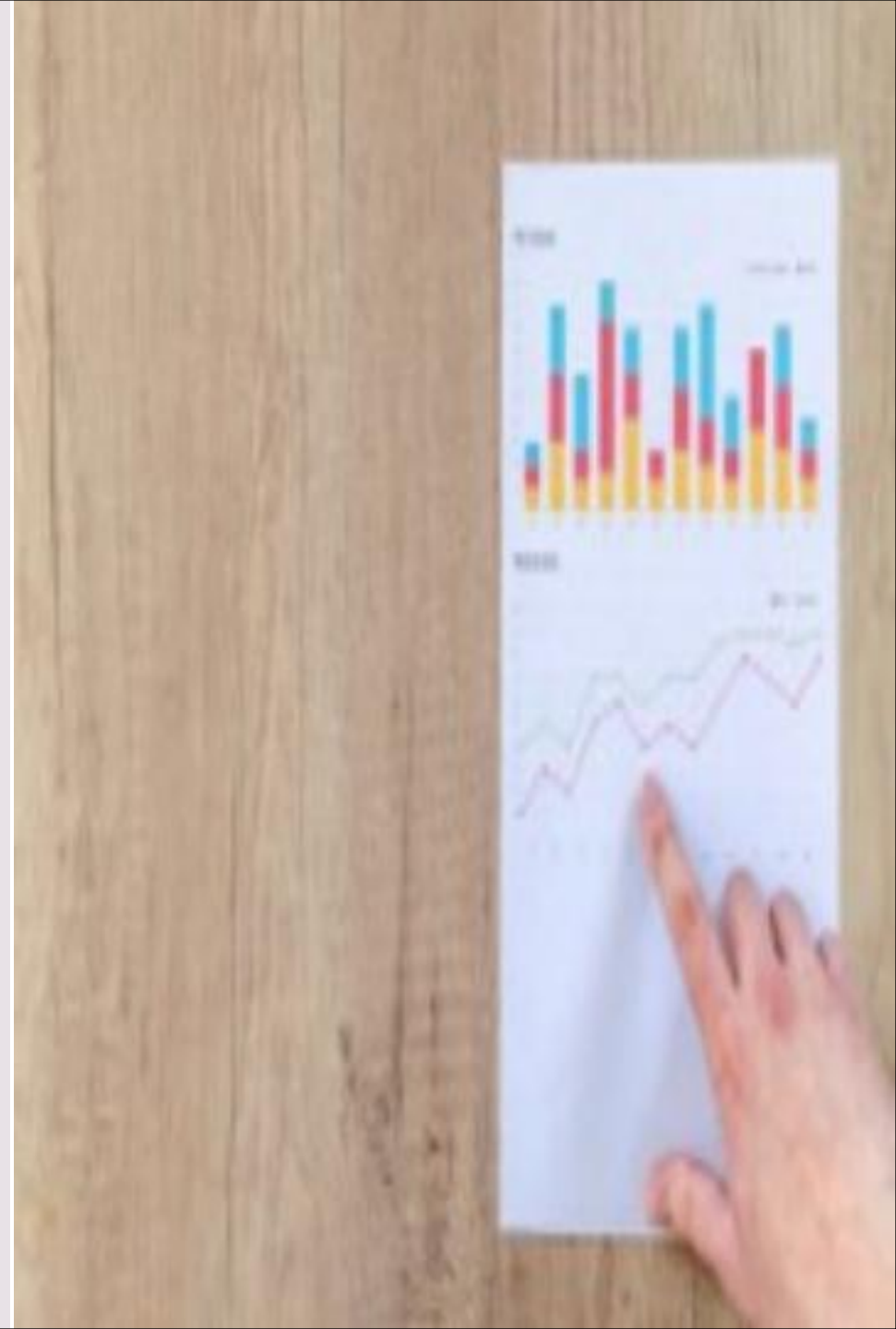
AI Shift - from back-end analytics to front-line sustainability strategy

Today, AI in decision-making processes, product design, and operational strategy—a core driver of sustainability value creation.

Examples

- **AI-guided logistics planning to reduce fuel consumption and emissions in real time (e.g., UPS, DHL).**
- **Real-time water or energy optimization systems that autonomously adjust resource usage (e.g., Amazon FlowMS).**
- **AI-based scenario modeling for compliance and investment planning under regulations like the EU AI Act or ISSB climate rules.**

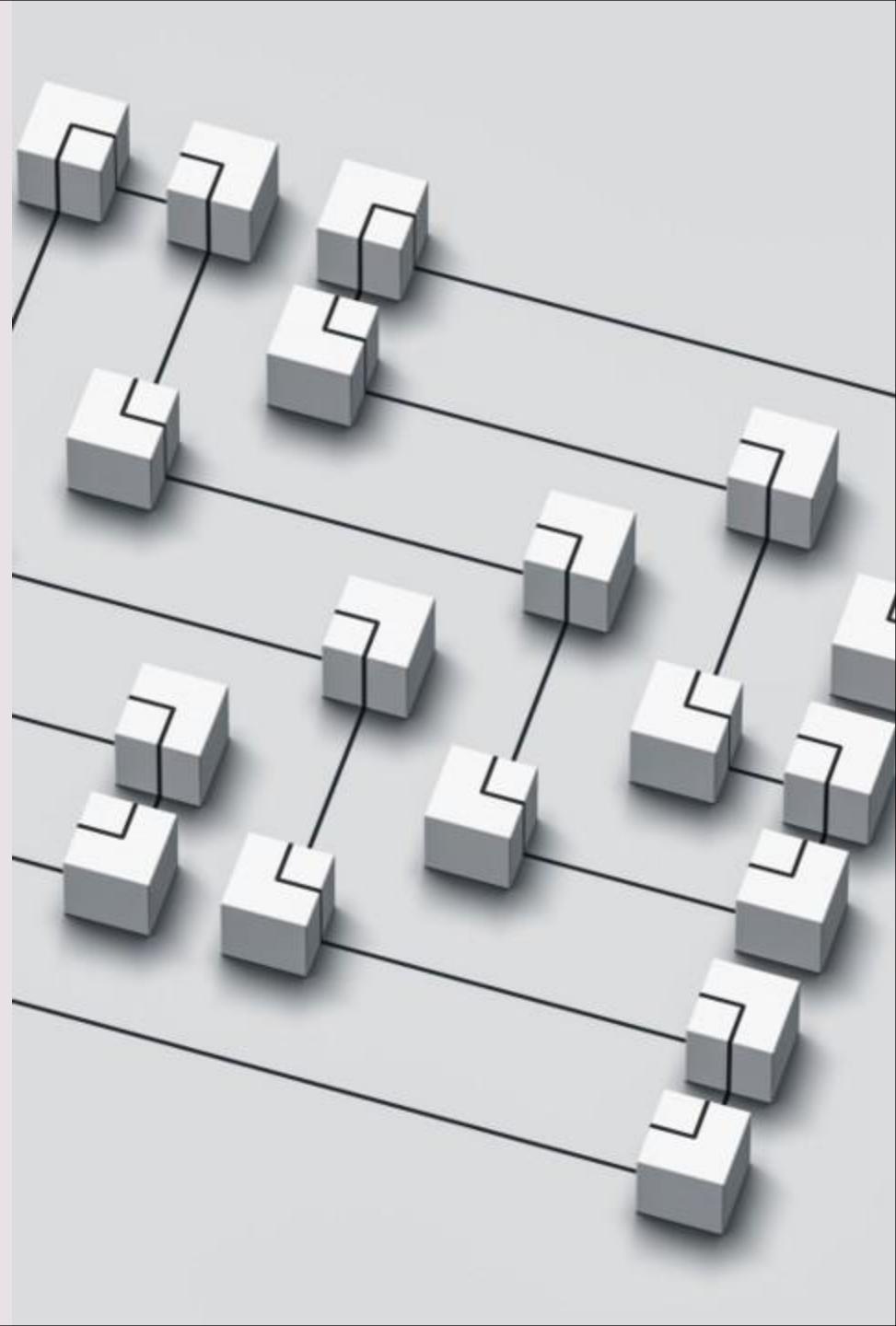
This marks a strategic elevation of AI: it is no longer just supporting sustainability—it is shaping and executing sustainability strategies.



Embedding AI into Core Sustainability Frameworks, KPIs, Governance Models

Examples

- Schneider Electric – EcoStruxure & AI in Operational Sustainability.
- Siemens- Embedded AI into Digital Twin models for energy-efficient building design. Results are directly tied to ESG scoring in annual corporate reporting.



Opportunity Zones: Where AI Is Driving Measurable Impact

- **Scope 3 emissions data validation (AI for audit trails).**

Example: *IBM's AI-powered platform helps large enterprises automatically collect, validate, and report Scope 3 emissions data—especially for complex supply chains.*

- **Predictive analytics for logistics optimization.**

Example: AI models integrate weather data, traffic patterns, and package density to reduce fuel consumption and CO_2 emissions (DHL)

- **Smart energy grid participation and demand-side.**
- *AI system predicts grid energy demand patterns and dynamically adjusts participation in demand-side response programs (Google/UK National Grid)*

The Resource Paradox: Environmental Impact of AI

* Training large AI models (e.g., GPT-3) emits over 284 tons of CO_2 – 5x more than a car's lifetime emissions
* Data centers may use up to 9 liters of water per kWh for cooling
* A single query to a large model can consume 5–10x the energy of a web search
* AI hardware manufacturing depends on rare-earth minerals, adding ecological strain

Ethical and Governance Challenges of AI

- Environmental costs often externalized to vulnerable regions
- AI innovation is concentrated in a few tech giants, raising equity concerns
- Limited transparency in AI systems' energy and water use
- Risk of greenwashing in corporate ESG claims involving AI
- Algorithmic bias in sustainability decisions can exacerbate inequities
- Regulatory oversight is lagging behind the pace of AI adoption

Rethinking Value — Toward a Responsible AI–Sustainability Nexus

- **AI-Informed Circular Economy Models**

Example: HP Inc. uses AI and predictive analytics to manage closed-loop supply chains for its printers and cartridges.

AI + ESG-Driven ROI Frameworks

Example: Salesforce's Sustainability Cloud combines AI with ESG data to help clients model carbon emissions and forecast sustainability ROI.

Rethinking Value: Traditional vs. Sustainability-Integrated ROI

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Traditional ROI Metrics	Sustainability-Integrated ROI Metrics
Cost savings	Carbon reduction per $ invested
Process efficiency	ESG score impact
Revenue growth	Circularity index improvements
Market share	Water and energy efficiency
Speed to market	Social equity & inclusion metrics
Profitability	Lifecycle environmental footprint

Regulatory Frontiers: EU AI Act & ISSB Compliance

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Examples

SAP (Europe): Integrated EU AI Act risk classifications into AI product lifecycle governance.

- **Nestlé (Global): Uses AI to generate ISSB-aligned climate disclosures with Scope 3 automation.**
- **Telstra (Australia): AI-driven energy optimization aligned with TCFD and upcoming ISSB mandates.**

→ Dual readiness for Australia's climate law and EU AI Act governance models.

→ Strategic positioning for investor trust and market compliance leadership.

The Skills Bottleneck: Training Gaps in AI & Sustainability

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- Training programs often lack integration of AI with ESG or sustainability topics
- Limited AI literacy among sustainability leaders—and vice versa
- SMEs struggle with both AI strategy and ESG compliance
- IT programs rarely cover environmental impact, ethics, or regulatory frameworks
    - In Australia, only ~10% of IT/management courses address AI + ESG linkage

Bridging the Gap: Actions for Faculties and Students (1)

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For Faculties:

- Integrate ESG + AI content into IT and business courses
- Encourage co-teaching with industry experts in AI, climate, and policy
- Design internships and projects on AI for sustainability

Bridging the Gap: Actions for Faculties and Students (2)

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For Students:

- Explore electives in climate tech, sustainable finance, and AI ethics
- Promote curriculum integration to include carbon data and responsible AI
- Develop dual fluency in AI and sustainability strategy

Conclusion: Shaping the Strategic AI Future Together (1)

*Interdisciplinary Collaboration

- Business leaders, academics, and policy experts must co-create AI strategies.
- Collaborations across sectors lead to more ethical, impactful, and scalable solutions.

Examples: Public–private AI labs, co-designed curriculum, joint ethics boards.

Conclusion: Shaping the Strategic AI Future Together (2)

*AI as a Tool, Not the Goal

- AI should serve environmental and social goals—not replace them.
- The question is not just 'What can AI do?' but 'What should it do for sustainability?'
- Judge AI by its planetary and ethical outcomes—not just performance metrics.

*Final Thought

AI can help us go faster—but we must ensure we're going in the right direction.

Thank you & Q/A

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