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AI's Role in Achieving Net Zero

2024 CIBSE ANZ Seminar Series | The Need for Speed
SESSION 2 | AI tools to help us reach net zero

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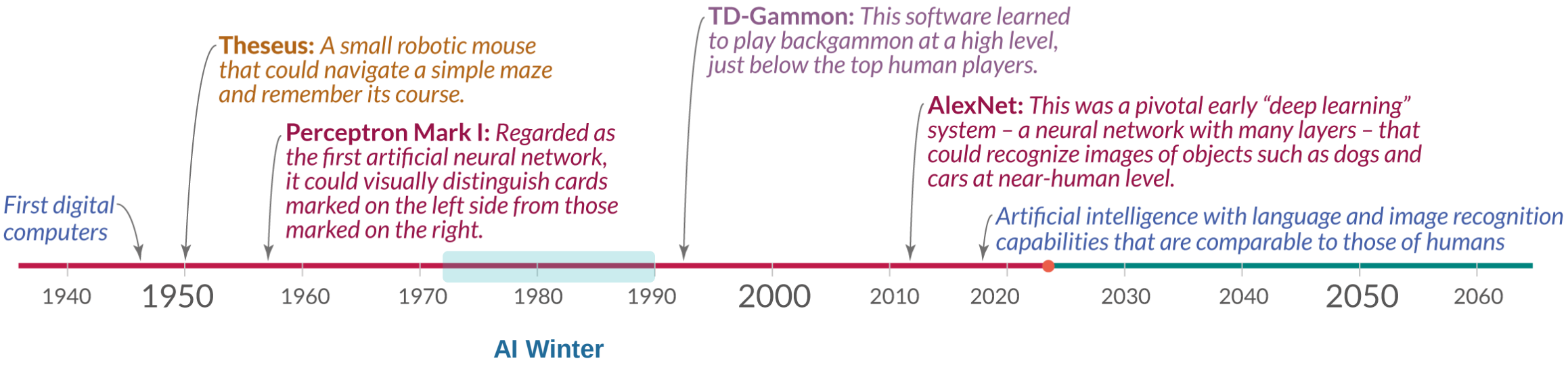
The most disruptive force in history

Elon Musk

A timeline of notable artificial intelligence systems



Source: OurWorldinData.org

This is the first AI technology that has caught fire with regular people

Sam Altman

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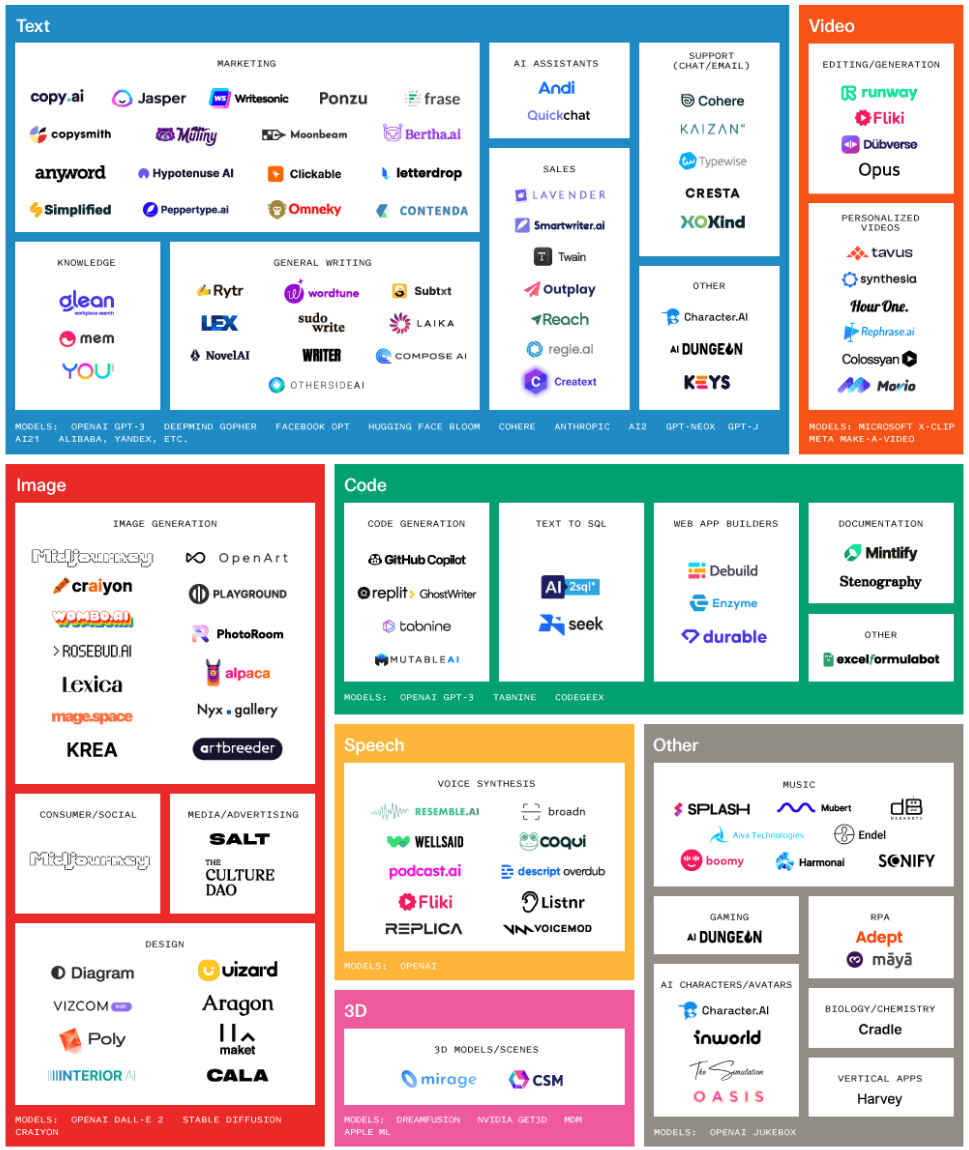
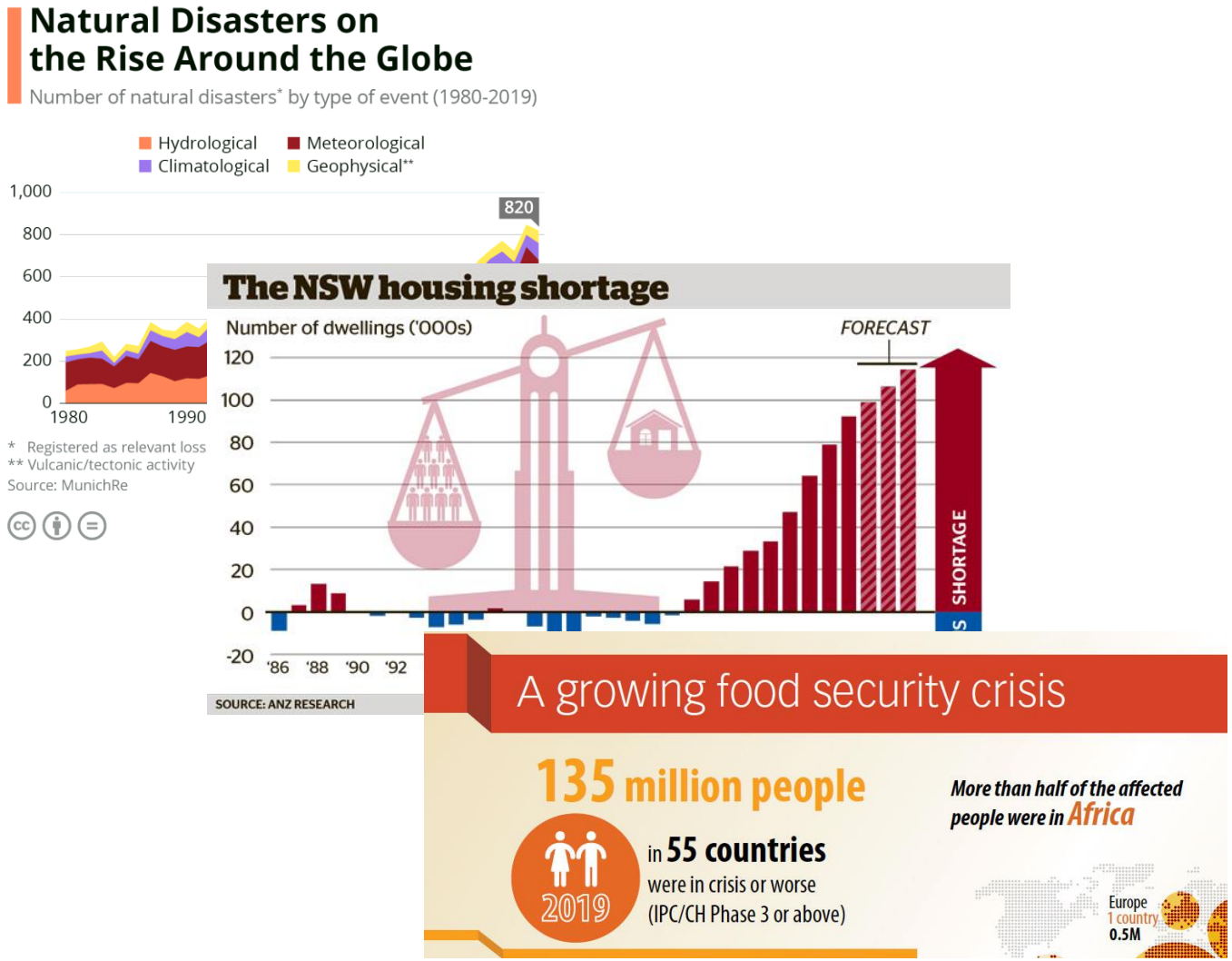
The Generative AI Application Landscape v2

A work in progress



Source: Sequoia Capital (right); Statista (left)



How can AI help us get to net zero?

1

Carbon Emissions Measurement

AI lightens the load with knowledge graphs and natural language models, enabling granular analysis beyond human capability.

2

Climate Change Resilience

AI can enhance climate modelling capabilities, and our ability to get insights that help businesses, communities, and policymakers take proactive measures to address climate-related risks and build resilience.

3

Circular Economy

AI can optimise circular material flows in the AEC industry, enhancing the reuse and recycling of construction materials and providing architects, engineers, and designers with sustainable material and design options.

4

Embodied Carbon

Engineers and designers play a crucial role in reducing embodied carbon in buildings by choosing the right materials and systems and using them efficiently.

5

Cleaner Energy

AI and IoT technologies can improve the integration of renewables into the existing grid, making renewable energy more reliable and modernizing the overall grid.

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How can AI help us get to net zero?

Carbon Emissions Measurement

1

Carbon Emissions Measurement

AI lightens the load with knowledge graphs and natural language models, enabling granular analysis beyond human capability.

40% of a sustainability professional's time is spent collecting and cleaning data for carbon emissions measurements

Only 1 in 20 of those asked were 70% confident in the accuracy of their emissions calculations

AI can lighten the burden on sustainability professionals through knowledge graphs and natural language models

Source: World Economic Forum, These new technologies will accelerate the transition to net zero

How can AI help us get to net zero?

Climate Change Resilience

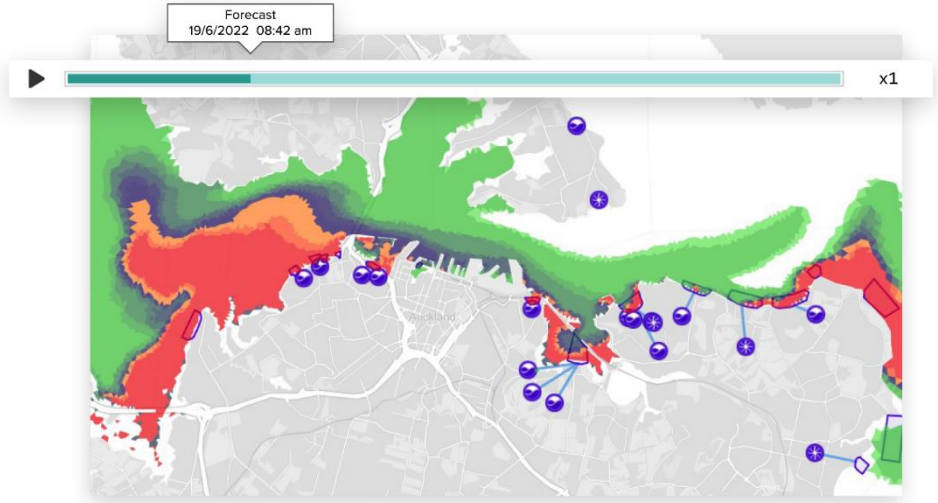
2

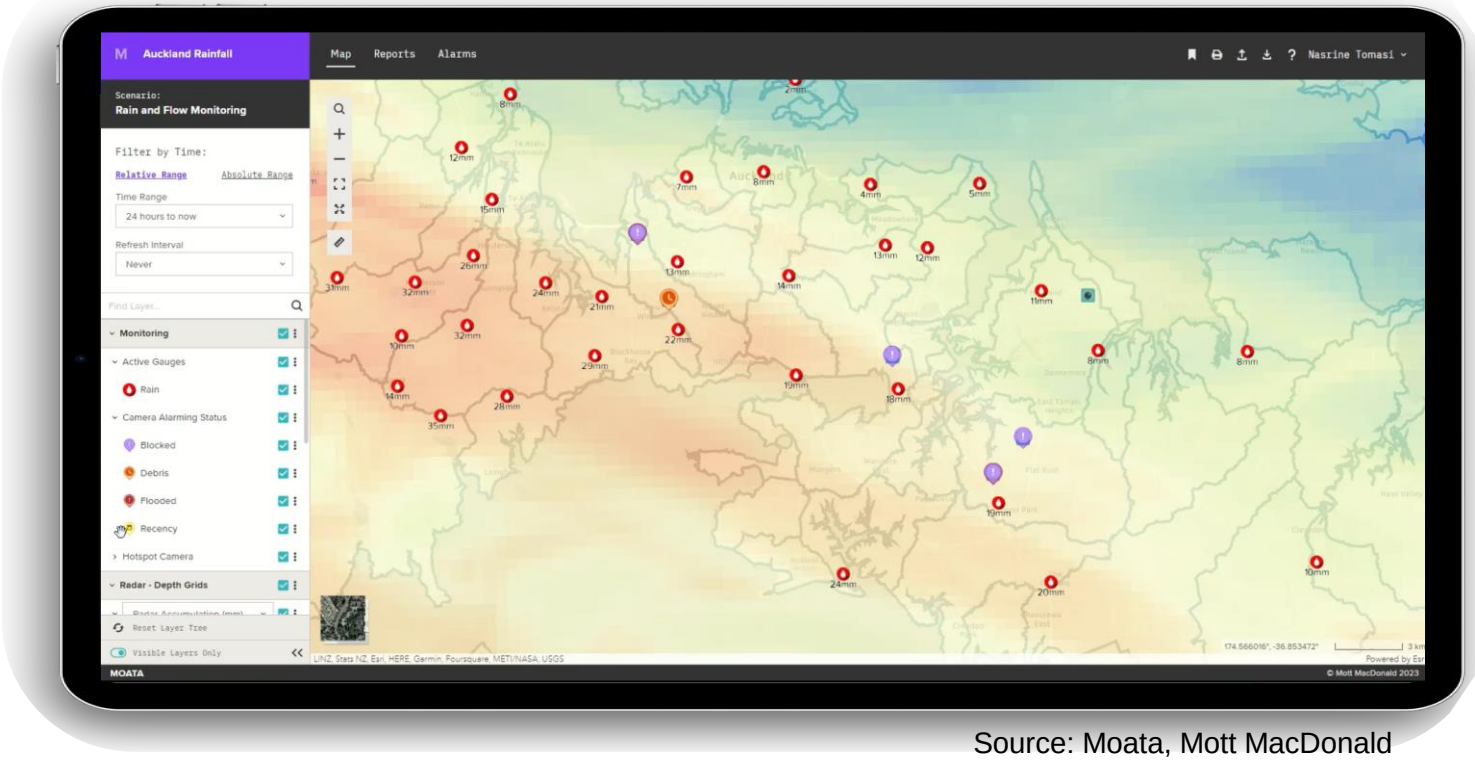
Climate Change Resilience

AI can enhance climate modelling capabilities, and our ability to get insights that help businesses, communities, and policymakers take proactive measures to address climate-related risks and build resilience.

Faster, more reliable flood management with neural networks

Using AI to predict and better manage stormwater flooding improving resilience to climate change.





Source: Moata, Mott MacDonald

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How can AI help us get to net zero?

Circular Economy

3

Circular Economy

AI can optimise circular material flows in the AEC industry, enhancing the reuse and recycling of construction materials and providing architects, engineers, and designers with sustainable material and design options.

“Intelligent robotic systems can process almost any given waste stream, and sorting capabilities can be redefined for every new market situation—even on a daily basis.”

WASTE MANAGEMENT WORLD

ARTIFICIAL INTELLIGENCE AND THE CIRCULAR ECONOMY
AI AS A TOOL TO ACCELERATE THE TRANSITION

Source: Ellen MacArthur Foundation, Artificial intelligence and the circular economy

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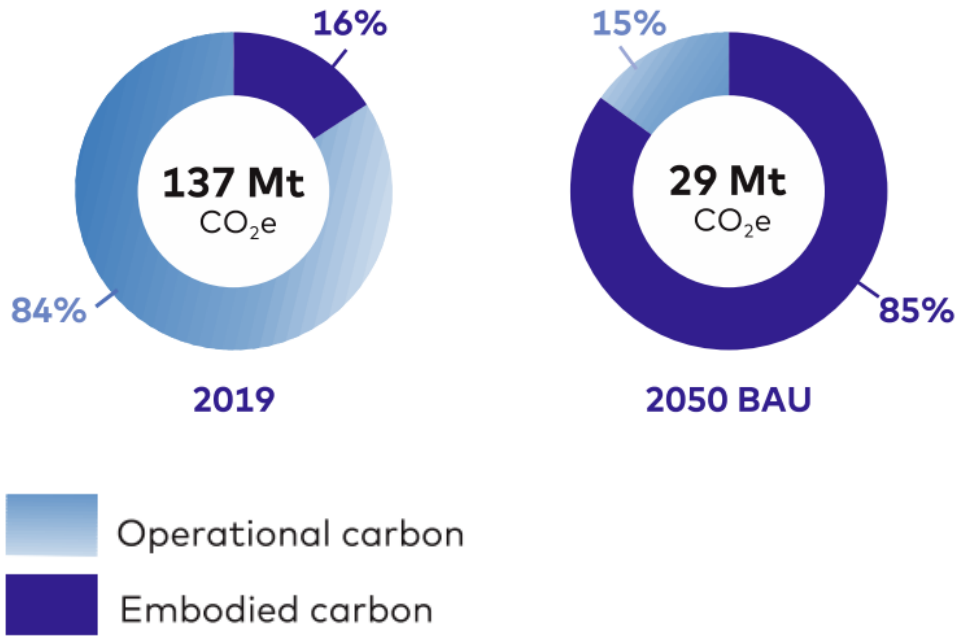
Embodied Carbon

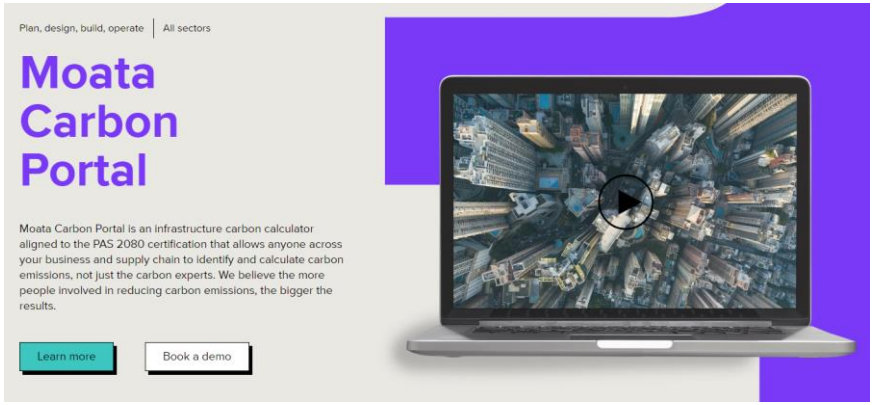
4

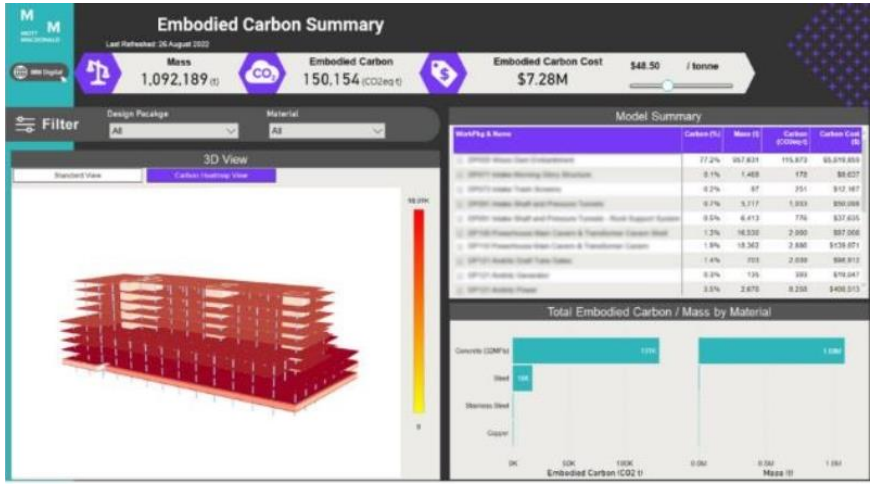
Embodied Carbon

Engineers and designers play a crucial role in reducing embodied carbon in buildings by choosing the right materials and systems and using them efficiently.

Estimated embodied carbon in Australia's building stock







Source: Green Building Council Australia - Embodied Carbon & Embodied Energy in Australia's Buildings (July 2021); Moata, Mott MacDonald

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How can AI help us get to net zero?

Cleaner Energy

5

Cleaner Energy

AI and IoT technologies can improve the integration of renewables into the existing grid, making renewable energy more reliable and modernising the overall grid.

GPT-3 consumes…

- 285,000 CPU cores
- 10,000 NVIDIA GPUs
- Training: 10 GWh
- Daily queries: 1 GWh each day
- **52,000 NZ households daily**

GPT-? estimates by 2027

- Estimated that AI sector could consume between 85 - 134 TWh each year by 2027.
- 233 - 367 GWh each day.
- **12 – 19 million households daily.**

What does this mean?

Source: https://www.newswise.com/articles/qa-uw-researcher-discusses-just-how-much-energy-chatgpt-uses

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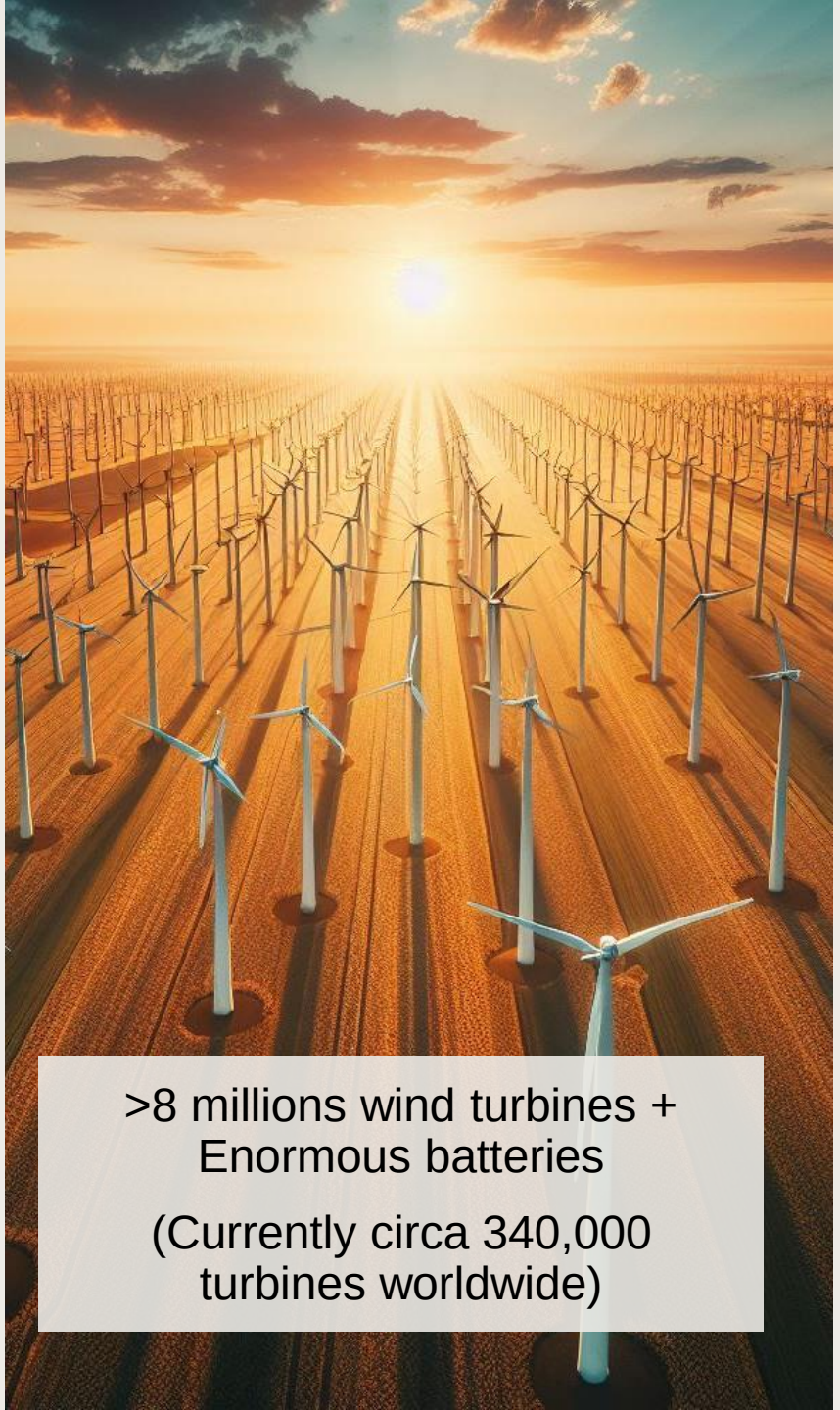
4x area of NZ +

Enormous batteries

(67 times 2024 PV capacity)



>8 millions wind turbines +
Enormous batteries

(Currently circa 340,000 turbines worldwide)

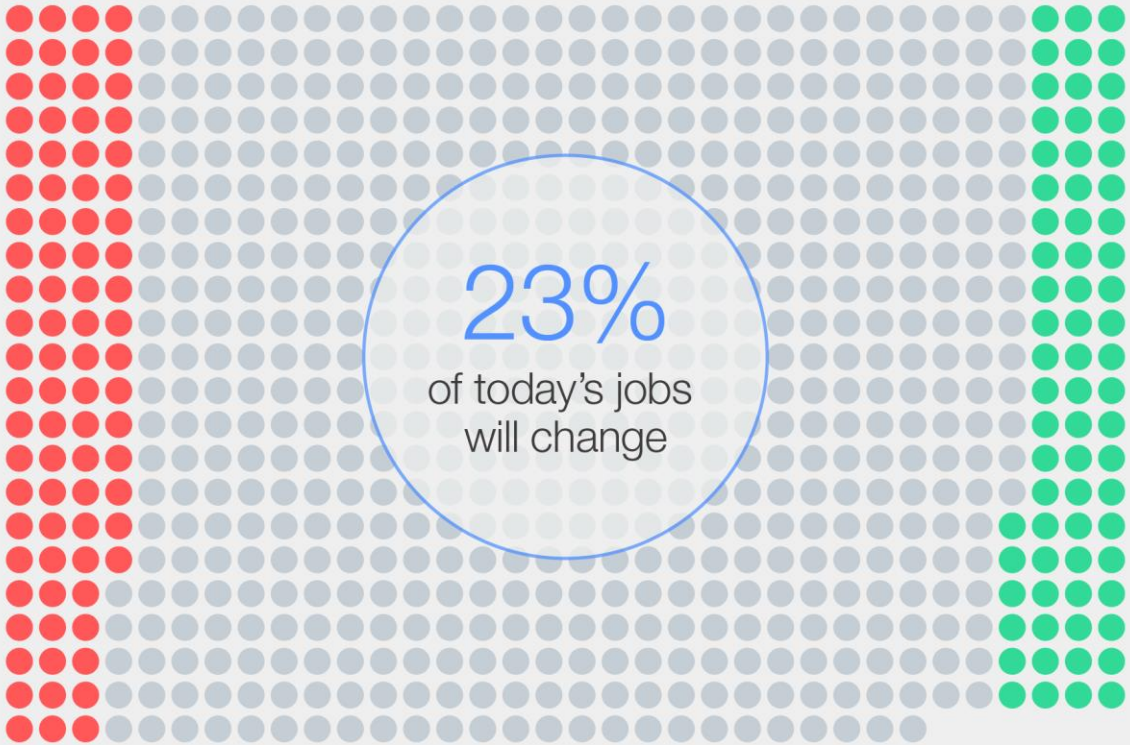
Fusion: ?

Sam Altman invested $375 million

poll on chat

Future of Jobs

Total job growth and loss



One million: Lost jobs Stable jobs New jobs

Source: World Economic Forum, *Future of Jobs Report 2023*.

Future of Jobs

Reskilling needs

44%

of workers' core skills are expected to change in the next five years

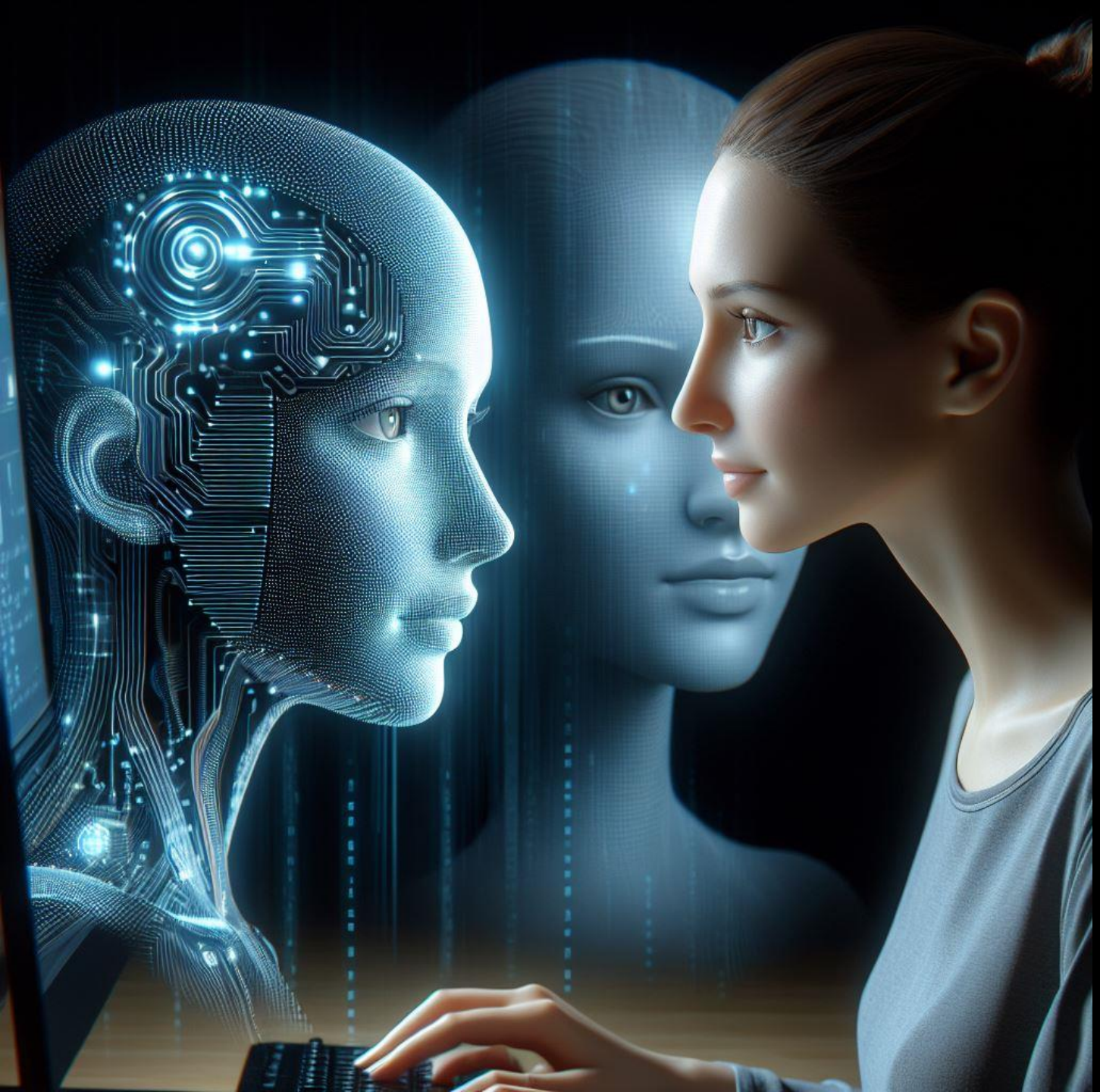
Source: World Economic Forum, *Future of Jobs Report 2023.*

Jobs emerging from the adoption of large language models

WORLD ECONOMIC FORUM

Large language models (LLMs) will transform collaboration between humans and AI, reshaping job roles. While outcomes remain uncertain, potential new job areas could emerge with LLM adoption.

Trainers	AI Model and Prompt Engineers
Explainers	Interface and Interaction Designers
Sustainers	AI Content Creators
	Data Curators and Trainers
	Ethics and Governance Specialists



Prompt Engineering

Source: Created Image Creator by Designer, powered by DALL-E 3, prompts by Maria Mingallon.

Closing remarks

If Not Us, Who?
If Not Now, When?

John F. Kennedy (attributed)

Originally peened by Rabbi Hillel The Elder:
“If I am not for myself, who will be for me? But when I am only for myself, what am I? And if not now, when?” (Pirkei Avot 1:14)

Source: DALL-E via Bing Enterprise Chat

Questions

Key Resources

Key Resources

- "These new technologies will accelerate the transition to net zero" by the World Economic Forum (https://www.weforum.org/agenda/2023/06/these-new-technologies-will-accelerate-the-transition-to-net-zero/).
- "Future of Jobs Report 2023" by the World Economic Forum (https://www.weforum.org/publications/the-future-of-jobs-report-2023/)
- "AEC AI Hub" (https://stjepanmikulic.com/) and AI in AEC: The Fundamentals) both by Stjepan Mikulic.
- "Artificial intelligence and the circular economy" by the Ellen MacArthur Foundation (https://www.ellenmacarthurfoundation.org/artificial-intelligence-and-the-circular-economy)
- "Embodied Carbon & Embodied Energy in Australia's Buildings, July 2021" by the Green Building Council Australia: (https://www.thinkstep-anz.com/assets/Whitepapers-Reports/Embodied-Carbon-Embodied-Energy-in-Australias-Buildings-2021-07-22-FINAL-PUBLIC.pdf)
- AI Forum NZ, AI Knowledge Hub (https://aiforum.org.nz/knowledgehub/) and AI for the Environment (https://aiforum.org.nz/2021/07/30/environmental-ai-for-a-greener-aotearoa/)

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