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GLOBAL FINANCE & TECHNOLOGY NETWORK

Transformative Technologies to Navigate A World of Black Swans

March 2025

Contents

Introduction

The inaugural Black Swan Summit, set to take place from March 24-26, 2025, in Perth, is **a pioneering foresight and research and development forum** that will bring together the world's boldest thinkers **to shape the frontier of innovation and the next era of human progress, to challenge conventional thinking by exploring the transformative power of disruptive technologies**.

The summit's theme, "**At the Edge of Tomorrow: Machine, Money, and Humanity**," encapsulates its forward-thinking approach.

This groundbreaking event is dedicated to understanding and exploring how emerging technologies can help the world navigate black swan events—rare, unpredictable shocks with a far-reaching, profound impact. The Black Swan Summit is where disruption meets purpose, and where transdisciplinary collaboration becomes a catalyst for resilience, innovation, and positive impact. It will bring together over 1,000 participants from more than 35 countries, including world leaders in FinTech, Web3 technology, green technology, and climate technology.

Why Perth

Perth is rapidly becoming an investment hotspot for green infrastructure, digital assets, and emerging technologies. With its low-cost, sustainable energy investments, strong capital flows, and strategic position in the Asia-Pacific region, Perth is uniquely suited to host the Black Swan Summit, supported by the following factors:

Green Energy & Data Centre Revolution: Western Australia (WA) has the lowest-cost natural gas in Australia, making it a transitional energy powerhouse while rapidly scaling renewable hydrogen and solar energy sources. For example, WA's emerging 70 GW Western Green Energy Hub is among the largest renewable projects globally, aimed to deliver intercontinental sustainable energy for AI, data centres, and blockchain infrastructure.

Government Incentives: The WA Government's Data Centre Prospectus positions Perth as a green cloud hub, attracting global AI and tech firms.

Global Mining & Energy Capital: WA is home to major players in lithium, rare earths, and hydrogen, positioning it as a critical mineral resource leader for green technology.

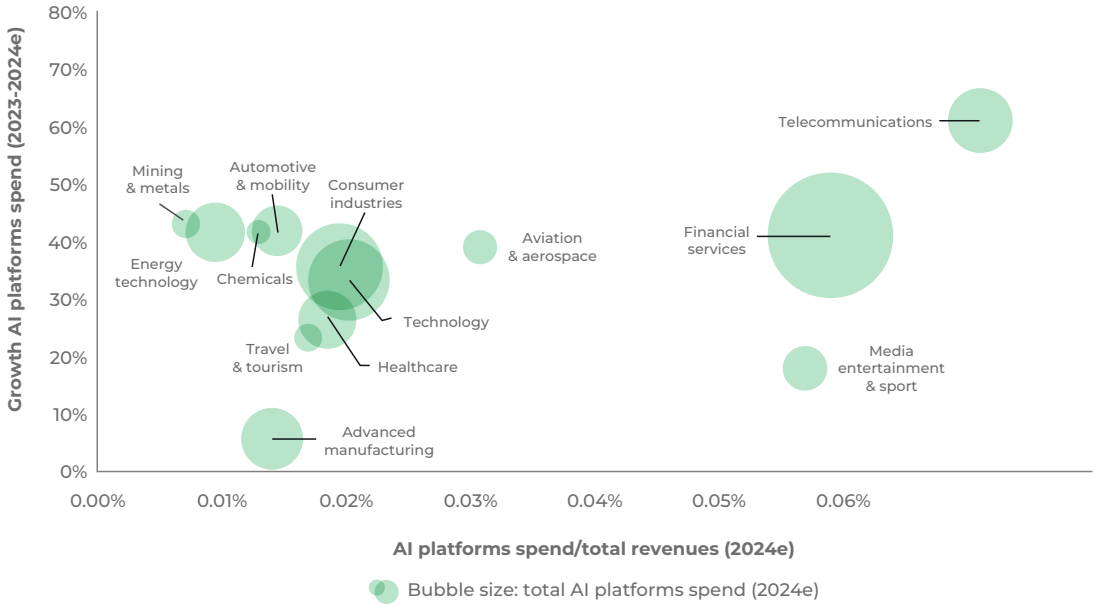
Emerging Tech & Digital Asset Leadership: Perth is a Web3 & FinTech friendly jurisdiction. WA is growing its WEB3 (blockchain, DeFi, and tokenization) ecosystem led by WAWEB3 Association, while aligning with national reforms.

AI & Quantum Computing Growth: WA government and private sector investments in AI compute clusters and quantum labs create unique opportunities for deep-tech companies.

Strong Institutional Support: Collaboration between WA's universities, industry, and government fosters commercialisation of new technologies.

Talent Magnet: Perth's liveability, top universities, and industry partnerships make it a global talent hub for tech, green energy, and finance.

Figure 1: AI Investments by Industry



Source: Accenture Research, Data from Accenture's G2000 list. AI platforms spend from IDC (2023-2024e). Revenue from Capital IQ S&P (2023-2024e)

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A Closer Look at the Transformative Powers of AI, Quantum Computing, and Blockchain

Artificial Intelligence (AI), Quantum Computing, and Blockchain are emerging as fundamental transformative and disruptive technologies due to their ability to address complex challenges, enhance efficiencies, and create new possibilities across industries. Their convergence is amplifying their collective and individual impact, driving innovation at an unprecedented scale.

Artificial Intelligence (AI)

AI is revolutionising decision-making processes through advanced machine learning algorithms, enabling systems to analyse vast datasets, recognise patterns, and make predictions. It is widely applied in healthcare, finance, logistics, and autonomous systems. AI's adaptability allows it to optimise operations in real-time, improving productivity and reducing costs.[1] When integrated with other technologies like quantum computing, AI's capabilities are further enhanced, allowing faster training of algorithms and better handling of massive datasets.[2]

As of August 2024, the global AI market was valued at approximately US$638.2 billion and projected to grow to **US$3.6 trillion by 2034**, i.e., a compound annual growth rate of 19.1%.[3]

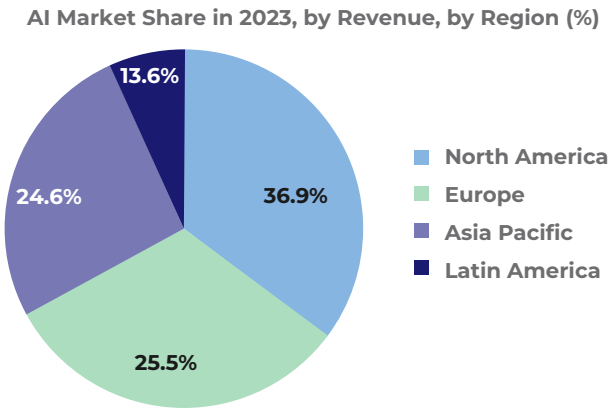
Embracing AI technologies can lead to several significant outcomes, including increased profitability, enhanced personalisation at scale, unique omnichannel experiences, and accelerated innovation cycles.

Public and Private Investments in AI

UBS's Global Wealth Management unit estimates global AI spending (excluding China) to approach ÚS$500 billion by 2026, with industry revenues reaching a similar figure. This places the total AI-driven market opportunity at nearly US$1 trillion.[4]

AI adoption, as measured by spending, varies across different industries. Financial services, Telecommunications, and Media lead the way but there is broad-based recognition across industries for the need to adopt AI.

Figure 2: AI Market Share by revenue and region



Source: Prudence Research (2024).

United States

The Trump administration announced **Stargate** in January 2025, a new AI infrastructure project led by OpenAI, Japan's Softbank, Oracle and MGX, a tech investment arm of the United Arab Emirates government. It aims for a total investment of **US$500 billion over the next four years and to create an estimated 100,000 jobs**.

Europe

European Commission President Ursula von der Leyen announced a **€50 billion InvestAI initiative** and an additional €8 billion to AI Factories as a "top-up" to €150 billion EU AI Champions initiative at the AI Action Summit in Paris in February 2025. She promoted EU's AI Gigafactories as the next public computing infrastructure to replicate the success story of CERN.

France has also recently revealed an investment of **€109 billion in data centres and AI projects** "in the coming years," making it the first European country with AI infrastructure on par with the US and China.[5]

China

Alibaba plans to invest **US$53 billion in AI over the next three years**, marking its largest-ever spending spree on AI and cloud-related initiatives.

More than US$833 billion in AI investments announced since the start of 2025

1 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5065889
2 https://www.forbes.com/sites/michellegreenwald/2023/03/20/perhaps-the-most-disruptive-technology-in-history-is-coming-and-its-expected-to-change-everything-businesses-and-marketers-need-to-get-quantum-ready/
3 https://www.elevandi.io/hubfs/Elevandi/Elevandi%20website%202.0/Insights%20-%20Reports%20and%20Videos/Insights/Harnessing%20AI%20Insights%20and%20Innovation%20in%20Financial%20Services/Harnessing%20AI%20%20Insights%20and%20Innovation%20in%20Financial%20Services%20-%20Oct%202024.pdf
4 https://www.ubs.com/global/en/wealthmanagement/insights/chief-investment-office/house-view/daily/2025/latest-19022025.html
5 https://www.euractiv.com/section/tech/news/france-unveils-e109-billion-ai-investment-plan/

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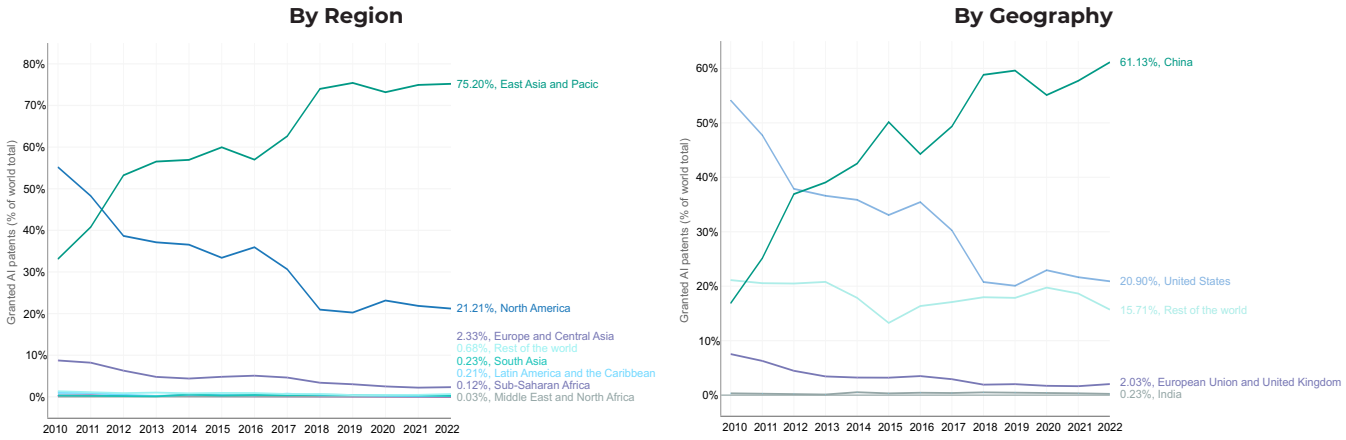
Figure 3: AI patents granted 2010 - 2022

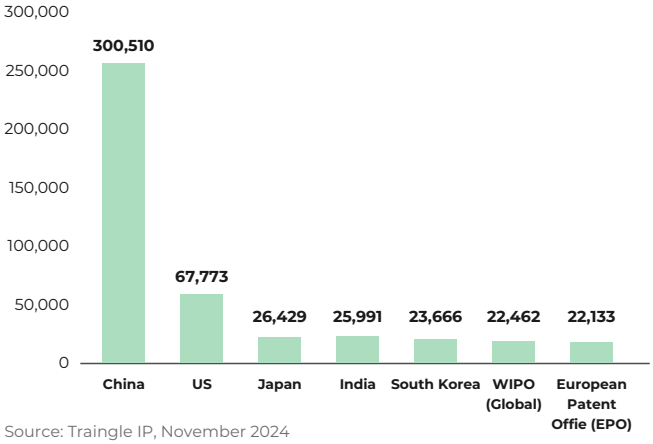


Source: Center for Security and Emerging Technology, 2023

Patents

Patents are also surging. A recent report from Stanford University's AI Index indicates that global AI patent grants surged nearly 63% from 2021 to 2022, while the number of AI patents granted has increased over 31-fold.[6]

Figure 4 : Global distribution of AI related patents



Source: Traingle IP, November 2024

Among the major players in AI regulation, the **United States boasts the highest number of AI startups** across the world; the **European Union is a pioneer of AI regulation,** setting precedence for all other regions; and **China is leading in patents** and generating top AI talents.

Policy Approaches to AI

The recently elected administration in the **United States has pivoted away from heavy AI legislation**, repealing the Biden administration's AI executive order. The European Union (EU) is still working to implement the AI Act, but influential documents such as the Draghi report on EU competitiveness suggest widespread concerns in the EU that its AI regulatory efforts may have gone too far and stifled innovation. These concerns have been carried forward in the **European Commission's** white paper "A Competitiveness Compass for the EU," which **emphasises the necessity of achieving simpler, lighter, and faster regulation**. **Japan is also hitting the brakes on the race to regulate AI.**[7]

AI Preparedness

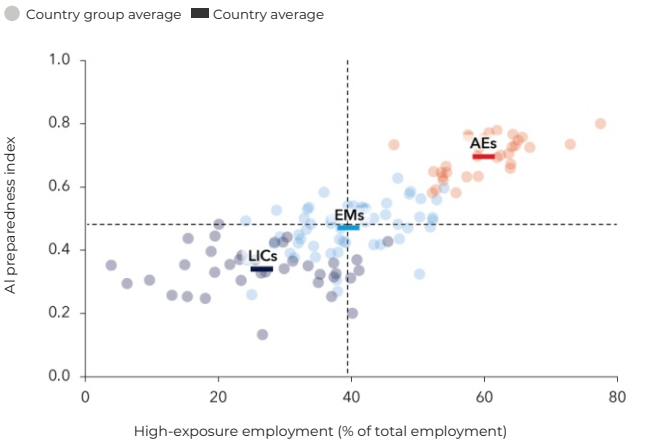
The IMF has developed an **AI Preparedness Index** that measures readiness in four categories **i) digital infrastructure, ii) human-capital and labour-market policies, iii) innovation and economic integration**, and **iv) regulation and ethics**.

An assessment of 125 countries reveals that **wealthier economies**, including advanced and some emerging market economies, **tend to be better equipped for AI adoption than low-income countries**, although with significant disparities between these countries. **Singapore, the United States and Denmark posted the highest scores on the index**, based on their strong results in all four categories.[8]

Figure 5: AI preparedness index

Advanced-economy advantage
Wealthier countries often are better equipped for AI adoption.

AI Preparedness Index and employment share in high-exposure occupations



Source: Fraser Institute, ILO, International Telecommunication Union, United Nations, Universal Postal Union, World Bank, World Economic Forum, and IMF staff calculations.

6 Stanford (2024). Artificial Intelligence Index Report 2024. Stanford University.
7 https://www.csis.org/analysis/new-government-policy-shows-japan-favors-light-touch-ai-regulation
8 https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity

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Latest Development: From GenAI to Agentic AI and its Effects on Society

Generative AI (GenAI) creates original content (text, images, video, audio or software code) in response to a user's prompt or request, **using algorithms that simulate the learning and decision-making processes of the human brain.**[9]

Large language models (LLMs) have also made **significant strides in intelligence and reasoning**. OpenAI's GPT-4 can now pass the **Uniform Bar Examination**, ranking in the **top 10% of test takers**, and **answer 90%** of questions correctly on the **US Medical Licensing Examination**.[10]

Multimodal AI has become the new standard, integrating diverse data sources like images, video, code, and audio alongside text.[11] Major AI platforms like Claude 3.5, Gemini 2.0 Flash, Llama 3.3, Phi-4, and OpenAI's model o1 now offer multimodal capabilities, allowing for more comprehensive AI experiences.

There is increased focus on optimising AI performance and maximising its value. Companies are investing in identifying the best AI models for specific use cases and optimising infrastructure for training and inference. **DeepSeek,** a Chinese open-source AI company founded in July 2023, has **introduced highly efficient AI models** that compete with leading US companies. Their latest model, DeepSeek-R1, offers performance comparable to OpenAI's GPT-4o and o1, but at a fraction of the cost. DeepSeek's key innovations include:

- **Mixture-of-Experts (MoE) technology**, which selectively activates only relevant neural segments, optimising performance and reducing costs.
- **Open-source development** under the MIT License, which encourages global collaboration by providing free access to its code and frameworks. This eliminates licensing fees and makes advanced AI technologies accessible to smaller startups, independent researchers, and developers worldwide.
- **Cost-efficient training**, with DeepSeek-V3 reportedly developed for just US$6 million, significantly less than the estimated US$100 million for GPT-4.

In addition, Nvidia CEO, Jensen Huang, shared a vision in March 2025, outlining a shift from traditional “retrieval computing” to “generative computing,” where AI understands context and generates answers rather than just fetching pre-stored data.

AgenticAI is an advanced form of proactive artificial intelligence that operates autonomously, makes decisions, and adapts to changing environments with minimal human intervention. This technology represents a significant evolution in AI capabilities, offering enhanced autonomy and problem-solving abilities.

AgenticAI can also **adjust its behaviour** based on new information and changing conditions, allowing it to **handle dynamic environments effectively**. These systems can understand and pursue complex objectives, planning and executing multi-step strategies to achieve specific goals.[12]

As AI continues to transform all sectors, the need for **responsible and ethical use of AI practices has become increasingly critical especially as AI systems gain autonomy as part of AgenticAI or Artificial General Intelligence (AGI)**. Responsible AI refers to the development and deployment of AI technologies in a manner that is ethical, transparent, and aligned with societal values.

AI Use in Sciences

The evolution of Large Language Model (LLM) based generative AI techniques, and the currently unfolding Cambrian explosion of novel agentic AI tools (Agents) allow biologists to **bundle AI, biological data, and advanced life sciences technologies into a suite of scientific and engineering capabilities**. Referred to as generative biology, this rapidly expanding field fundamentally redefines our ability to make sense of life from genome to biome.

While these AI technologies can be trained to explain specific aspects of biological systems, such as predicting the 3D structure of proteins from amino acid sequences[13] or genome-scale metabolic modelling[14], verifiable insights remain confined to problems for which suitably large and high-quality data sets are available.

LLMs can perform tasks they weren't specifically trained for by processing large, unstructured data, autonomously answer questions, manage knowledge, and create new information when prompted, aiding scientists in their research.

AI and Human Workforce

Artificial intelligence (AI) is significantly reshaping the labour and employment landscape, with both disruptive and transformative effects.

9 https://www.ibm.com/think/topics/agentic-ai-vs-generative-ai
10 https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/superagency-in-the-workplace-empowering-people-to-unlock-ais-full-potential-at-work
11 https://cloud.google.com/transform/2025-and-the-next-chapters-of-ai
12 https://www.ibm.com/think/topics/agentic-ai-vs-generative-ai
13 https://pubmed.ncbi.nlm.nih.gov/35652912/
14 https://pubmed.ncbi.nlm.nih.gov/38718835/

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Job Displacement

AI is automating routine and repetitive tasks, leading to job losses in roles that involve predictable activities. For example, low-skilled jobs in sectors like manufacturing and data processing are particularly vulnerable to automation.

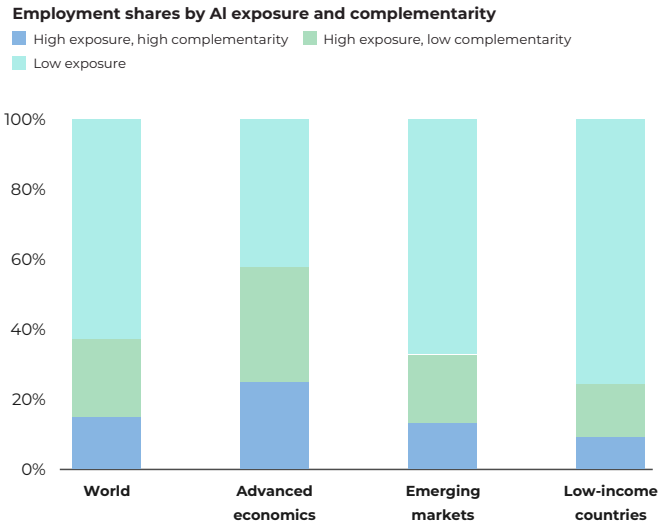
Estimates suggest that AI could displace between 1 and 3 million jobs in the UK alone, accounting for 3% to 9% of the country's total workforce, although these displacements are expected to occur gradually.[15] Globally, AI could replace the equivalent of **300 million full-time jobs** potentially affecting a quarter of work tasks in the US and Europe.[16] The IMF estimates about **40% of jobs** may be affected by AI, either through replacement or transformation.[17]

AI could affect the equivalent of 300 million or 40% of full-time jobs globally.

The speed of **AI adoption may exacerbate skill mismatches**, leaving workers in routine jobs at **risk of long-term unemployment if they cannot adapt or reskill.**[18] AI can also impact high-skilled jobs, thus extending its impact to advanced economies too. That said, AI also affords more opportunities for advanced economies to leverage its benefits, compared with emerging markets and developing economies.

Figure 6: AI Impact on jobs by stage of economic development

AI's impact on jobs
Most jobs are exposed to AI in advanced economies, with smaller shares in emerging markets and low-income countries.



Source: International Labour Organization (ILO) and IMF staff calculations

In advanced economies, about **60% of jobs may be impacted by AI**. Roughly **only half of the exposed jobs may benefit from AI integration, enhancing productivity**. The **other half of jobs could be replaced partly or entirely by AI applications**, leading to lower labour demand, wages and reduced hiring. This necessitates **robust reskilling programs and labour-market infrastructure upgrades to help displaced workers transition into new roles.**[19]

Labour Productivity and Economic Growth

AI enhances productivity by complementing human workers, enabling them to focus on complex and creative tasks while automating mundane, repetitive ones.

Increased productivity can lead to **economic growth**, **higher wages** for some workers, and **lower prices for goods and services**, which in turn boosts demand for labour in other areas.[20]

The Tony Blair Institute of Global Change projects that AI could likely **raise the UK's national income by 11%**, equivalent to more than £300 billion a year.

Despite job losses, AI could potentially increase global GDP by 7% (nearly US$7 trillion) and boost productivity growth by 1.5% over the next decade. [21]

AI could potentially increase global GDP by 7% (~US$7 trillion) and boost productivity growth by 1.5% over the next decade

Financial Sector Impact

Singapore-based DBS Bank has recently announced cuts of 4,000 contract jobs, or about half of its temporary and contract workforce over the next three years via attrition due to the impact of AI. CEO Piyush Gupta acknowledged **the challenges of job creation in an era increasingly shaped by AI**, saying it is the first time in his 15-year tenure that he has **struggled to identify new roles.**[22]

A recent Bloomberg Intelligence report projects that the banking industry may see as many as **200,000 job cuts in the next three to five years globally,** as AI continues to reshape the sector.[23] Chief information and technology officers suggest a projected net workforce reduction of

15 https://institute.global/insights/economic-prosperity/the-impact-of-ai-on-the-labour-market
16 https://www.goldmansachs.com/insights/articles/generative-ai-could-raise-global-gdp-by-7-percent.html
17 https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanity
18 https://www.emerald.com/insight/content/doi/10.1108/jebde-10-2023-0021/full/html
19 https://www.emerald.com/insight/content/doi/10.1108/jebde-10-2023-0021/full/html
20 https://www.nature.com/articles/s41599-024-02647-9
21 https://www.chicagobooth.edu/review/ai-is-going-disrupt-labor-market-it-doesnt-have-destroy-it
22 https://www.straitstimes.com/business/banking/dbs-ceo-piyush-gupta-sees-job-cuts-of-4000-temp-staff-as-ai-replaces-roles
23 https://www.bloomberg.com/news/articles/2025-01-09/wall-street-expected-to-shed-200-000-jobs-as-ai-erodes-roles

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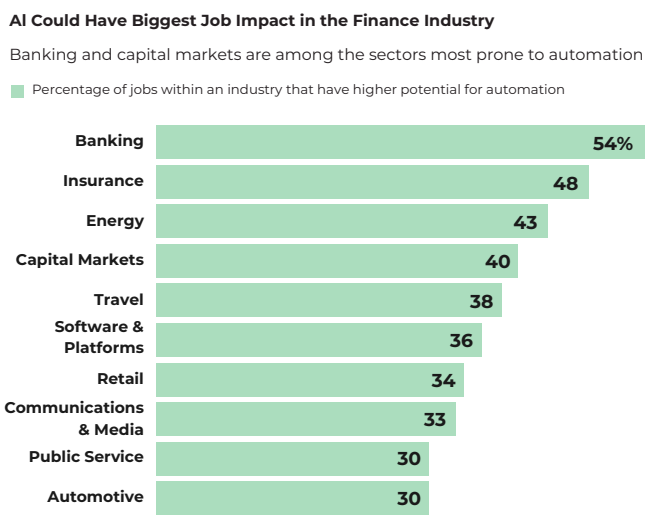
about 3% due to automation, especially for back office, middle office and operations roles. Nearly a quarter of the 93 respondents predict **a steeper decline of between 5% and 10% of total headcount**.

A Citi report cites that **54% of jobs across banking have a high potential to be automated, with an additional 12% of roles across the industry potentially being augmented.**

All these point to far-reaching changes in the financial industry - Bloomberg intelligence predicts that by 2027, banks could see pretax profits grow 12% to 17% higher - adding as much as US$180 billion to their combined bottom line - as AI powers an increase in productivity.

Figure 7: AI Impact on Jobs by Industry



Source: Citi, GPS

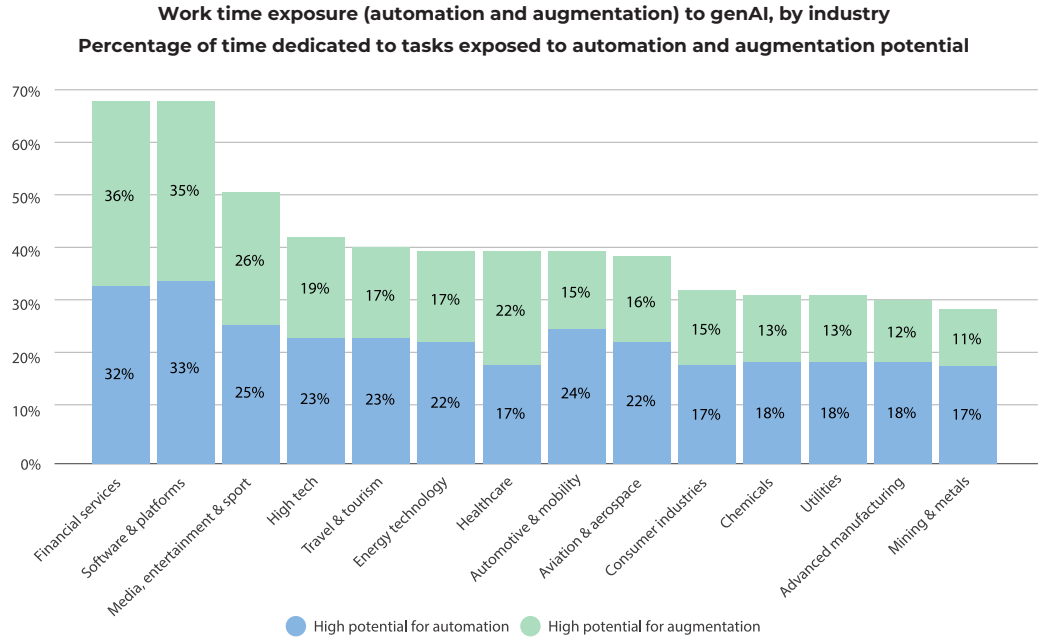
Yet, many banks have maintained that the net result is more of a workforce transformation with roles being changed by technology, rather than replaced altogether. The actual extent of labour impact would likely boil down to the level of augmentation vis-à-vis automation that GenAI brings to each industry, as shown by Accenture's study in the figure 8 below.

Exacerbating Inequality but also Enabling Social Levelling

AI adoption has the potential to widen income inequality, as high-skilled workers who can leverage the technology stand to benefit, while low-skilled jobs may face displacement. This could further deepen the gap between advanced and developing economies, with AI-driven growth favouring those with the necessary skills**. IMF Managing Director Kristalina Georgieva has noted that AI could likely worsen overall inequality.** However, **AI-enabled education might help mitigate this** by providing significant benefits to lower-performing students, potentially equalising access to opportunities. As these AI-educated individuals enter the workforce, they could contribute to higher productivity, adding around **6% cumulatively to GDP over the next 60 years**.

At the same time, the future of AI holds the possibility of more advanced systems like Artificial General Intelligence (AGI), which could surpass current AI limitations by being adaptable and capable of performing a range of tasks. Predictions about **AGI's development suggest a 40% chance by 2070, with the possibility of humanity facing challenges in controlling such technology**. Further in the future, **Artificial Super Intelligence (ASI) or even the**

Figure 8: Projection of tasks potential automated or augmented by GenAI, by Industry



Note: Analysis of over 19,000 individual tasks across 867 occupations and 22 countries, assessing the potential exposure of each task to LLM adoption, classifying them as tasks that have high potential for automation (shown), high potential for augmentation (also shown), low potential for either or are unaffected (non-language tasks).

Source: Accenture

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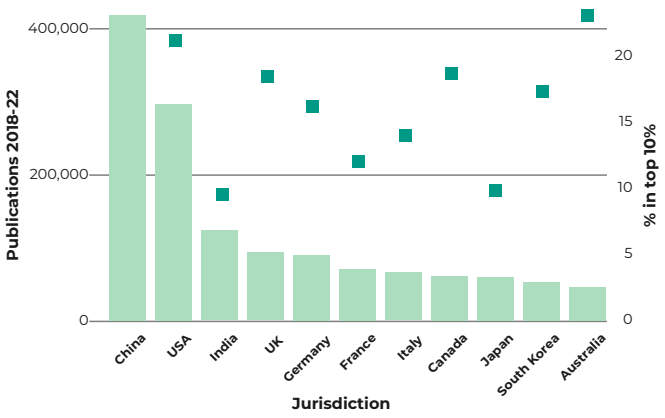
Singularity—AI systems far smarter than humans—could emerge. These advancements carry both **potential benefits and risks, with a 6% chance of humanity facing severe consequences from AGI by 2200**.

AI in Australia

Australia's National AI Centre (NAIC) was established to enhance AI capabilities with a focus on ethical development and is receiving substantial government funding to bolster its initiatives.

Figure 9: Australia AI research rankings



Source: Department of Industry Science and Resources

68% of Australian businesses integrated AI into their operations

Generate A$315 billion in economic benefits for Australian businesses by 2030

There are **544 AI companies in Australia**, a figure that is on par with other global AI leaders like Canada. Australia's AI companies show patterns of geographic clustering with 8 hotspots across Sydney, Melbourne, Brisbane, Adelaide, and Perth with 54% (296) of AI companies are in these hotspots.

Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Data61 is recognised for advancements in AI applications across energy, health, and agriculture.

Australia also boasts high business adoption as of 2023. NAIC estimates that **68% of Australian businesses across diverse industries have already integrated AI** into their operations. AI adoption is expected to generate around A$315 billion in economic benefits for Australian businesses by 2030.[24]

Quantum Revolution

The **United Nations has declared 2025 as the International Year of Quantum Science and Technology**[25], and the advent of the quantum technologies has drawn closer than many have prepared for.

Quantum computing leverages quantum states like superposition and entanglement to perform computations exponentially faster than classical computers. Its ability to solve optimisation problems, simulate molecular structures, and enhance cryptographic systems positions it as a game-changer in industries such as drug discovery, materials science, and financial modelling.[26, 27] Quantum computing also addresses computational challenges that traditional systems cannot handle, making it essential for future advancements.

Public and Private Investment in Quantum

Governments and the private sector are investing heavily in this rapidly advancing technology. For instance, China has invested more than US$15 billion in quantum technology, while the US has invested over US$3 billion.[28] Please see figure 10 on pg 12.

Latest Developments in Quantum

In the last few years, the technology surrounding quantum computing has seen tremendous progress. The research is continuously focusing on bringing down complexity through quantum computing, which classical computing is unable to address. **Quantum computing is expected to reach mass adoption in the early 2030s.**[29] The transformative power of the technology lies in its ability to increase the performance of a computational unit exponentially, explained Dr. Alessandro Curioni during the Point Zero Forum (PZF) 2024. Please see figure 11 on pg 12.

24 https://www.csiro.au/-/media/D61/AI-Ecosystem-Momentum-Report/23-00010_DATA61_REPORT_NAIC-AustraliasAIEcosystem_WEB_230220.pdf
25 https://quantum2025.org/
26 https://hyscaler.com/insights/the-impact-of-quantum-ai-on-blockchain/
27 https://www.gbm.hsbc.com/en-gb/insights/global-research/quantum-computing-age
28 McKinsey. (2024). Quantum Technology Monitor: April 2024. McKinsey & Co.
29 https: www2.deloitte.com/xe/en/insights/industry/financial-services/financial-services-industry-predictions/2023/quantum-computing-in-finance.html

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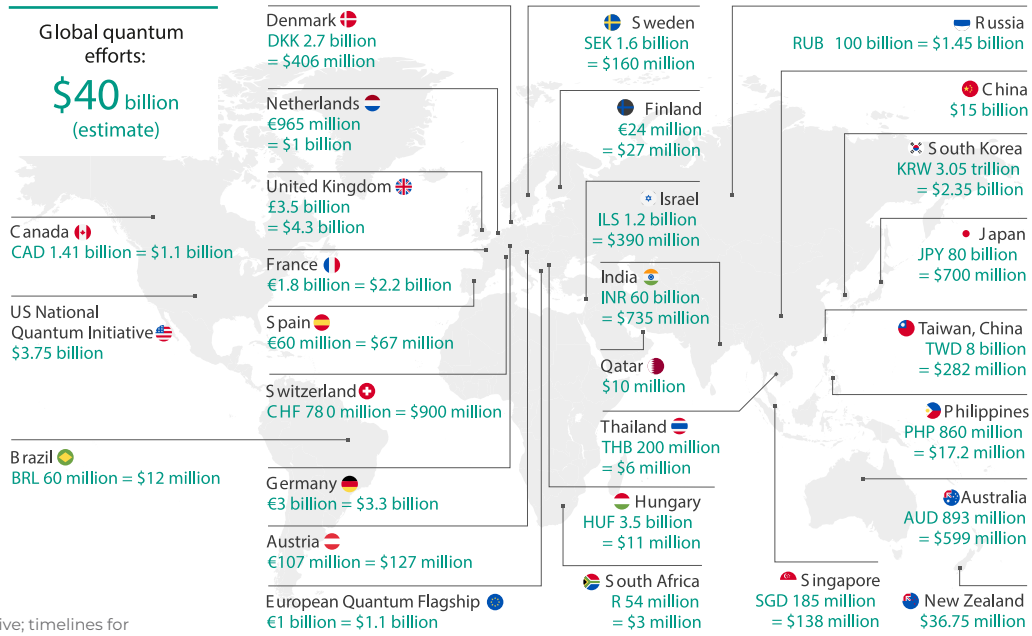
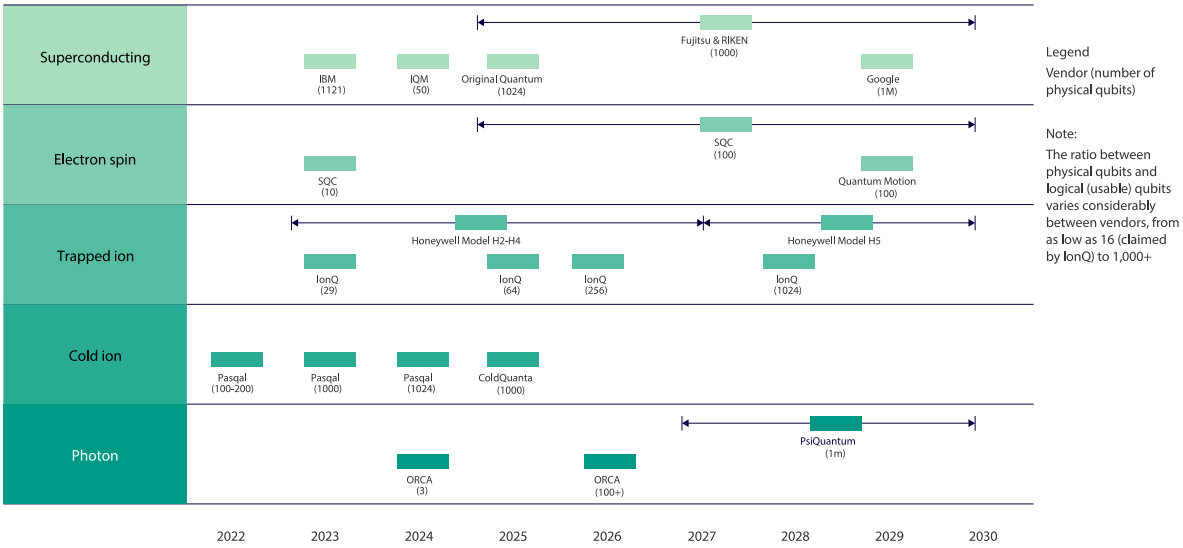
Figure 10: Public Investments in Quantum



Note: Not exhaustive; timelines for funding vary by country.

Sources: "Overview of Quantum Initiatives Worldwide 2023", QURECA, 19 July 2023, https://qureca.com/overview-of-quantum-initiatives-worldwide-2023/; Department of Industry, Science and Resources, Australia; ETH Domain (ETH Zurich, EPFL, PSI).

Figure 11: Quantum computer prototypes by technology



Sources: Arthur D. Little

IBM has recently announced that the world has entered the **'era of quantum utility'. This marks a transition from quantum computing research being predominantly academic to becoming a valuable and usable technology in industries**, where quantum computing hardware and algorithms are applied to solve meaningful and practical largescale problems.

Microsoft unveiled the Majorana 1 chip, **the world's first quantum processor using topological qubits**. **The topoconductor, or topological superconductor, is a special category of material that can create an entirely new state of matter – not a solid, liquid or gas but a topological state**. This is harnessed to produce a more stable qubit that is fast, small and can be digitally controlled, without the trade-offs required by current alternatives.

These qubits leverage Majorana particles to **inherently resist decoherence, enabling error-resistant quantum computation**. The chip integrates a novel indium arsenide-aluminium materials stack and achieves precise microwave-based readout, detecting electron differences as small as 1 in 1 billion.

Condor Processor - IBM broke the 1,000-qubit barrier with a 1,121-qubit superconducting processor, addressing scalability via high-density cryogenic wiring.

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Figure 12: Quantum patents granted by country

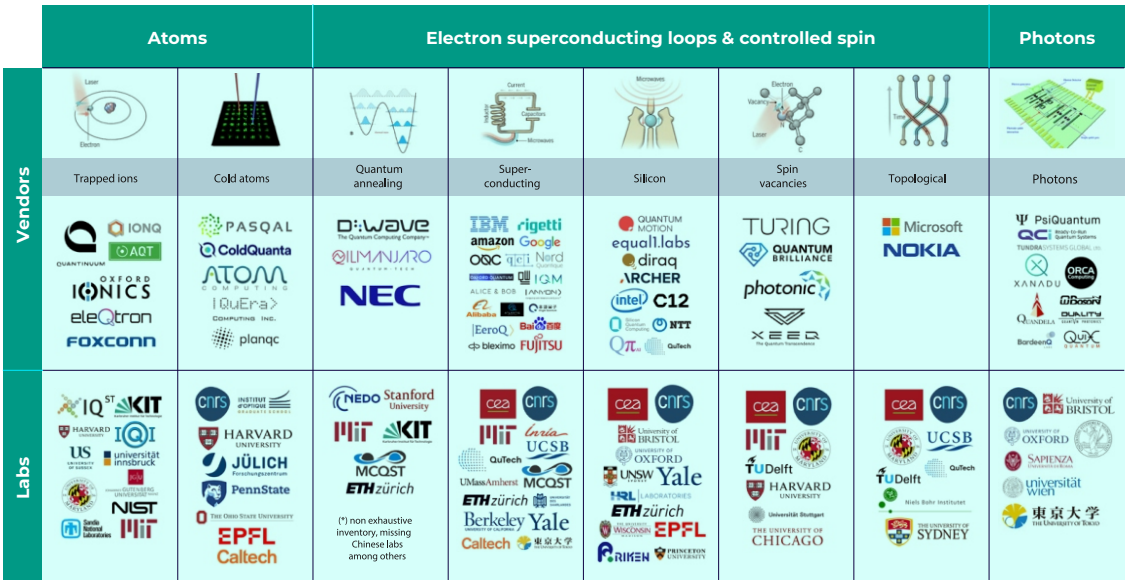
QT patents granted, by HQ location, 2000–2023

Preliminary

	Total QT	QC	QComm	QS
United States	15,927	10,716	4,899	312
Japan	8,601	7,597	906	98
Germany	7,040	6,792	198	50
China	6,793	4,948	1,805	40
France	6,696	6,379	307	10
Switzerland	1,844	1,691	147	6
Great Britain	1,693	1,208	440	45
South Korea	1,635	1,342	272	21
Canada	1,480	866	566	48
Italy	1,293	1,215	64	14

Source: McKinsey Digital, Quantum Technology Monitor, Apr 2024

Figure 13: Landscape of Quantum Computing players



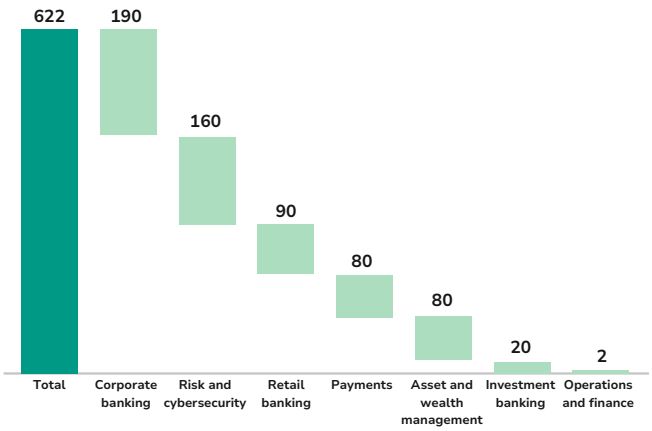
Source: Arthur D. Little

Quantum System Two - A **modular architecture supporting parallel quantum-classical hybrid workflows**, laying groundwork for utility-scale applications.

Quantum Machine Learning - Frameworks like TorchQC **optimise quantum dynamics using deep learning, accelerating algorithm development.**

"Quantum computing is no longer a distant dream but an emerging reality. Its integration into financial services promises to reshape the industry, enhancing efficiencies and unlocking possibilities once deemed unimaginable." **Prof Jingbo Wang.**

Figure 14: Projected value of Quantum Computing use cases



Note: Assumes that 50% of the full potential in the finance industry will be realised by 2035.
Source: McKinsey & Company, 2023.

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Applications of Quantum Computing in FinTech and Financial Services

McKinsey estimates that applications of a quantum computer in financial services could generate more than US$622 billion in economic value by 2035.[30] The technology holds immense potential to revolutionise the financial sector. ***"There is anticipation of tech convergence at the infrastructure level, wherein specific tasks will be run on quantum computers while others will still run on classical computers. Ultimately, graphics processing units, central procession units, and quantum processing units will coexist to enhance efficacy and productivity in the financial sector"*** said Kelly Richdale at PZF 2024.

Experts believe that a full-scale fault tolerant quantum computer could be in operation by 2035.[30]

Current Applications

1. **Blockchain**: Blockchain's integration with quantum computing introduces **quantum-resistant cryptography** for enhanced security and scalability while improving consensus mechanisms.[31]
2. **Portfolio Optimisation:** Quantum computing is already transforming investment portfolio management. JPMorgan Chase and Amazon Quantum Solutions Lab have introduced a 'decomposition pipeline' that reduces problem sizes by 80%, enabling more efficient large-scale calculations.[32]
3. **Risk Analysis:** Quantum computers are enhancing risk assessment capabilities by simulating numerous scenarios with quadratic speed-up compared to traditional methods.[31]
4. **Fraud Detection:** Advanced pattern recognition capabilities of quantum computing are lowering false positives and reducing fraud-related losses in financial transactions.[31]

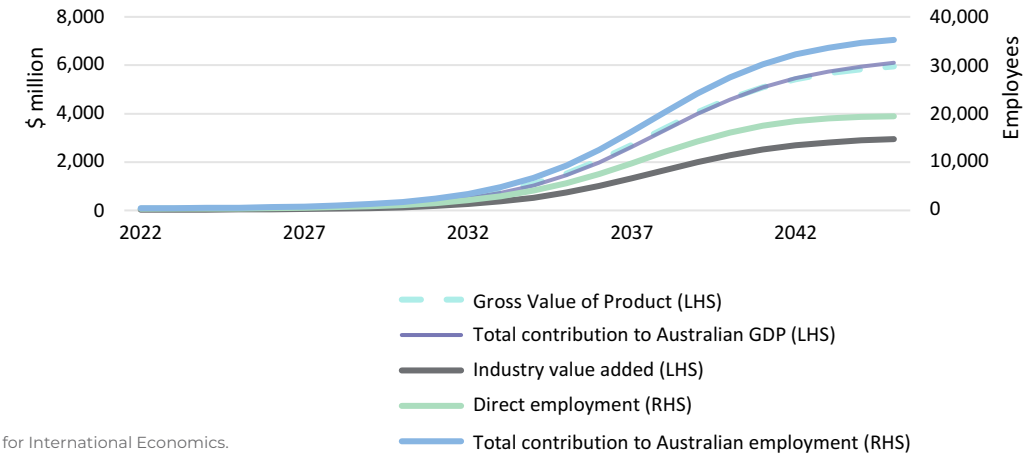
Future Applications

1. **Real-time Data Processing: Quantum AI is expected to revolutionise real-time data processing in financial services**, enabling faster and more accurate uncovering of patterns and trends.[33]
2. **Enhancing Customer Engagement:** Quantum AI could revolutionise customer engagement by **leveraging advanced predictive analytics to tailor offerings to individual customer needs.**[34]
3. **Accelerating Cybersecurity Systems:** Quantum computing has already caused a stir in the cybersecurity community. Consider RSA-2048, a seemingly unbreakable encryption standard that would take current-day classical computers trillions of years to pierce. Meanwhile, quantum computers are predicted to contain enough computing power to crack the code within hours. **Y2Q**[35] refers to the day when quantum computing becomes capable of breaking most of the public encryption keys used today.

Quantum in Australia

Australia is one of the leaders in quantum research and applied technology. It launched the **National Quantum Strategy**, an ambitious vision for Australia in 2030 to be recognised as a leader of the global quantum industry and for quantum technologies to be integral to a prosperous, fair and inclusive Australia.

Figure 15: Projected economic contribution of quantum technologies to the Australian economy by 2045



Source: Centre for International Economics.

30 https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/tech-forward/quantum-technology-use-cases-as-fuel-for-value-in-finance
31 The Impact of Quantum AI on Blockchain Technology
32 https://datafloq.com/read/5-real-world-applications-of-quantum-computing-in-2025/
33 https://opengovasia.com/2025/02/12/exclusive-quantum-momentum-ais-quiet-force-behind-the-next-financial-evolution
34 https://www.sganalytics.com/blog/future-of-AI-in-customer-engagement-strategies/
35 https://www.weforum.org/stories/2023/10/y2q-cybersecurity-cyberattack-quantum-computing/

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Australian quantum companies already attract significant venture capital investment compared to our international competitors, capturing a **3.6% share of global venture capital for quantum from 2017 to 2021**.[36]

Quantum computing, communications and sensing could add A$6.1 billion to Australia's GDP by 2045. Quantum could also create sustainable, inclusive and well-paid jobs. By 2030, the Australian quantum sector could create around **8,700 jobs, rising to 19,400 by 2045**. The growth of the sector would also support employment across the wider economy, with a total **investment impact of over 35,000 jobs by 2045**.[37]

Australia has also launched the **"Economic Accelerator"**, a new A$1.6 billion grant program to fund translation and commercialisation in national priority areas. This is in addition to the **Trailblazer Universities Program**, which will provide A$362.5 million from 2021 to 2026 to 6 selected universities, boosting prioritised research and development and driving commercialisation outcomes with industry partners.

University of Western Australia (UWA) has its **Quantum Information, Simulation and Algorithms (QUISA) research centre** and had launched Australia's first undergraduate quantum computing major in 2023. UNSW is a leader at developing atomic-scale quantum integrated circuits. The Australian government also recently awarded A$18.4 million to the University of Sydney to establish a new national centre called Quantum Australia, aimed at enhancing the national quantum industry. This initiative seeks to foster collaboration between universities and the industry, promoting growth of quantum startups and advancing research in quantum technologies expected to revolutionise computing and materials science. Curtin University also has the Pawsey Supercomputing Centre, the most powerful research supercomputer in the Southern Hemisphere and one of two Tier-1 High-Performance Computing facilities in Australia. Its primary function is to accelerate scientific research for the benefit of the nation.

Australia invests A$940 million in Quantum technology

Australian and Queensland governments recently each invested A$470 million in PsiQuantum (US-based quantum-startup founded by 5 UK-based Physicists) for a total of A$940 million (via equity-based investment as well as grants and loans). The amount represents half of the budget that was allocated by the government last year to boost Australia's quantum industry over a seven-year period, until 2030.

PsiQuantum is to build its regional headquarters in the Queensland capital Brisbane and operate the to-be-developed quantum computer, which aims to position Australia at the forefront of global quantum computing advancements.

Blueprint for Digital Assets

Blockchain technology enables the creation of immutable records of ownership and transactions, significantly reducing the risk of fraud while enhancing security. Furthermore, **smart contracts —** self-executing contracts with terms embedded directly in code — can **streamline processes, automate and enforce contractual terms, reduce reliance on intermediaries, and lower operational costs.**

Policy Approaches to Digital Assets

The Trump administration has significantly **shifted United States' policy on digital assets and cryptocurrencies**, aiming to position the **US as a global leader and "crypto capital of the world"**. In January 2025, it has issued an executive order "Strengthening American Leadership in Digital Financial Technology" to support the responsible growth and use of digital assets, blockchain technology, and related technologies across all sectors of the economy. Federal agencies were required to review and potentially rescind or modify regulations affecting the digital asset sector, prohibited the establishment or issuance of a US central bank digital currency (CBDC) affirms support for USD-backed stablecoins by commercial issuers and emphasised protecting fundamental blockchain activities such as self-custody, mining, and permissionless transactions.

US Strategic Bitcoin Reserve and Digital Asset Stockpile announced by US

In March 2025, an executive order to create a **US Strategic Bitcoin Reserve and Digital Asset Stockpile** was signed. This will treat **Bitcoin as a national reserve asset** and includes **Ether, XRP, Solana, and Cardano as national digital assets,** becoming the first major economy to do so. As a result, this could potentially have huge implications to

36 https://techcouncil.com.au/newsroom/turning-australia-into-a-regional-tech-hub/
37 https://www.industry.gov.au/publications/national-quantum-strategy/australias-quantum-opportunity

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the adoption of digital assets in traditional financial markets and real-world economy.

In Europe, European Central Bank President Christine Lagarde predicted that **no European Union country will choose to add Bitcoin to its monetary reserves**.
"I think there is a view around the table of the Governing Council, and most likely the General Council as well, that reserves have to be liquid, that reserves have to be secure, that they have to be safe, that they should not be plagued by the suspicion of money laundering or other criminal activities," Lagarde said.[38]

Latest Development in Digital Assets

Programmable money in a digital era

The digital asset ecosystem could potentially facilitate **more efficient transactions, enhance financial inclusion, and unlock economic value. Central bank digital currencies (CBDCs), tokenised bank liabilities and potentially well-regulated stablecoins**, together with a set of well-designed smart contracts, could **serve as the medium of exchange for this new digital asset ecosystem**.

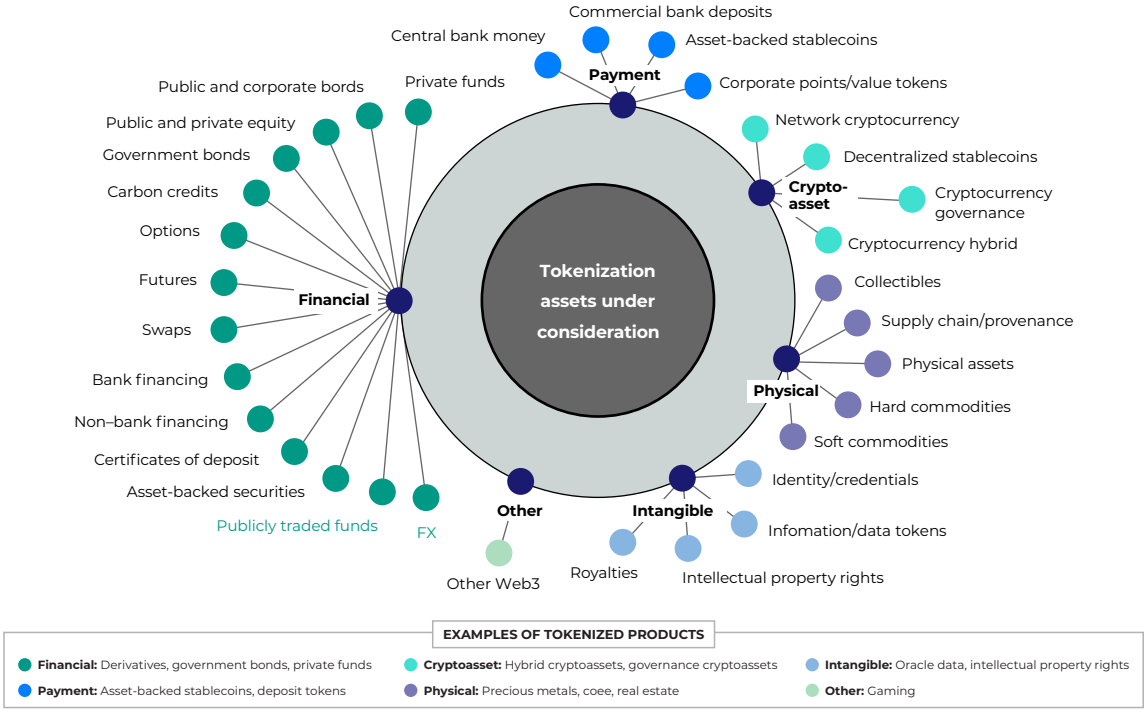
A touted benefit of digital money is its ability to support programmability features - the possibility of **embedding rules within the store of value itself that defines or constrains its usage**. For example, rules could be defined such that the store of value could only be sent to whitelisted wallets or transferred upon completion of transaction-level screening. Programmable money implementations include tokenised bank liabilities and CBDCs. Unlike programmable payment, whereby the programming logic and the value itself are decoupled, programmable money is self-contained and contains both programming logic and serves as a store of value. When programmable money has been transferred to another party, the logic and rules are moved as well.[39]

The summit would further explore the future of money and payments through the lens of technological, economic, and philosophical shifts.

Tokenization

Asset tokenization has emerged as a **transformative force** in the financial industry, **fundamentally reshaping how assets are structured, owned, and exchanged**. By converting real-world assets —such as real estate, stocks, and fixed income— into digital tokens on a blockchain, tokenization provides **unprecedented efficiency, transparency, and accessibility**. It enables **fractional ownership**, allowing investors to participate in markets that were traditionally restricted to high capital barriers. This approach has opened opportunities for broader investor participation and has increased liquidity across markets. Furthermore, tokenization leverages smart contracts to streamline processes, reduce the need for intermediaries, and enhance security, ultimately driving down costs and enabling seamless transactions across digital platforms.

Figure 16: Potential universe of asset instruments under consideration for tokenization



Source: Oliver Wyman, Shaping Tomorrows Digital Asset Landscape Together 2023.

38 https://www.bloomberg.com/news/articles/2025-01-30/lagarde-is-confident-eu-central-banks-will-shun-bitcoin-reserves
39 https://www.mas.gov.sg/-/media/mas-media-library/development/fintech/pbm/pbm-technical-whitepaper.pdf

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We performed an in-depth review of the transformative impact of tokenization and digital assets in our previous report **Transforming Financial Services: The Impact of Asset Tokenization.**

Post Quantum Cryptography

As quantum computing advances, it will be crucial in developing new cryptographic methods to protect financial systems from potential quantum-based attacks.

The National Institute of Standards and Technology (NIST) in August 2024 released a set of three encryption standards advising to be adopted as early as possible to withstand the attack of a quantum computer.[40]

Digital Assets in Australia

"Australia's financial services regulatory regime is broad and technology neutral. Many digital assets and related products are financial products under the current law." said Australian Securities and Investments Commission (ASIC) Commissioner Alan Kirkland.[41]

This marks an important shift — **Australia is treating digital assets not as a parallel system but as part of its established financial ecosystem. ASIC's existing approach to financial services licences will also apply to digital assets**

ASIC's expanded guidance includes 13 practical examples demonstrating how the country's financial product definitions apply to digital assets, including wrapped tokens and stablecoins. The proposal emphasises that digital asset businesses will need to adhere to the same licensing standards as traditional securities platforms.[42]

Convergence of AI, Quantum Computing, and Blockchain

"Four or five years ago, the focus was on quantum computing enhancing AI. Now, AI is also driving quantum advancements, creating a cycle of progress that accelerates both fields." said Jonas Tan, APAC R&D Lead at SoftServe.

The synergy between these technologies creates transformative opportunities:

- **Enhanced Efficiency**: Quantum AI accelerates data analysis and pattern recognition while optimising blockchain transaction validation processes.[43]
- **Security**: Quantum-resistant cryptography safeguards blockchain networks against future quantum threats.[44]
- **Innovation**: The combination enables breakthroughs in predictive analytics, decentralised organisations, and privacy-preserving techniques for various applications.[45]

These technologies are reshaping industries by addressing limitations of traditional systems and fostering a secure, intelligent future. Their transformative potential lies not only in their standalone capabilities but also in their ability to work together to solve complex global challenges.

The Quantum Artificial Intelligence Lab is a team effort by NASA, Universities Space Research Association, and Google. They aim to explore how quantum computing can assist in tricky computer science puzzles, especially in machine learning. This special lab operates at NASA's Ames Research Center, where scientists dive into the possibilities of merging quantum computing with AI. Their mission is to uncover how these futuristic technologies can team up, opening doors to new ways of solving complex problems and making significant strides in the world of artificial intelligence.[43]

Quantum Artificial Intelligence merges the power of quantum computing and artificial intelligence, resulting in enhanced computational abilities. This integration plays a pivotal role in optimising the efficiency of blockchain by expediting transaction validation and verification processes, particularly in critical sectors such as finance and supply chain management.

The combination of quantum AI and blockchain brings about an increased level of security through the implementation of quantum-resistant cryptography, which safeguards against potential threats. Additionally, it enhances consensus protocols, resulting in more scalable and energy-efficient blockchain networks. Quantum AI introduces privacy-preserving techniques that bolster confidentiality in the digital world. This integration holds great potential for faster transactions, heightened security, and advanced privacy, thereby paving the way for transformative advancements across various industries.[43]

40 https://www.nist.gov/news-events/news/2024/08/nist-releases-first-3-finalized-post-quantum-encryption-standards
41 ASIC 24-266MR ASIC invites feedback on proposed updates to digital asset guidance
42 Australia Prepares Major Regulatory Overhaul for Digital Assets
43 The Impact of Quantum AI on Blockchain Technology
44 https://www.databank.com/resources/blogs/quantum-computing-and-its-potential-disruption-to-data-centers/
45 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5065889

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The future of these foundational transformative technologies is indeed exciting and challenging. Hopefully we are able to harness them for good in the way we have overcome black swan events in the past.

Climate Tech for Sustainable Development

In the early 2000s, venture capital played a role in advancing Clean Tech 1.0, with a surge of investment in clean energy startups and innovative technologies. VC firms began to see the potential for lucrative returns in the clean tech sector, leading to a flurry of investments in solar, wind, biofuels, and energy efficiency companies. However, there were challenges and setbacks, including long technology development cycles, high R&D costs, and intermittent government support. [46]

Clean Tech 1.0 laid the foundation for today's climate tech, accelerating the development of technologies like cheaper solar panels, wind turbines, efficient heat pumps, and low-carbon biofuels. Today, renewable energy powers more of the grid, homes and buildings use heat pumps for heating and cooling, and biofuels power vehicles and industrial processes.

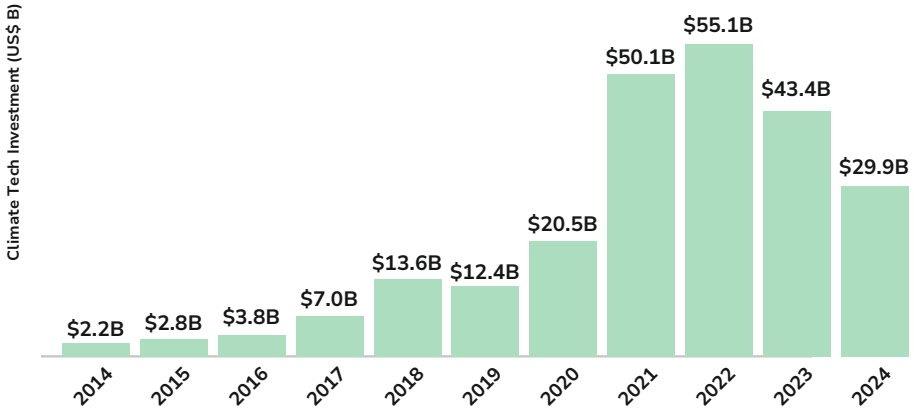
Public and Private Investments in Climate Tech

VC investment in Climate Tech has steadily increased, with a record **US$178 billion invested over the last 4 years.**

Germany's Bundestag just passed a constitutional amendment to set up a €500 billion infrastructure and climate fund with an aim to reach climate neutrality in 12 years. **€100 billion has been earmarked for emissions reduction and other climate measures and put the target of reaching climate neutrality by 2045 into the constitution**.[47]

Climate Tech is on a clear trajectory despite recent policy changes, especially in the US. Clean energy investment hit $2 trillion in 2024, nearly double the fossil fuel investment, with solar and battery technologies leading the transition forward.

Figure 17: Global VC funding in Climate Tech



A record US$178B invested in Climate Tech over the last 4 years

Source: Pitchbook, GFTN Analysis

Latest Development in Climate Tech

A key inflection point is fast approaching for Climate Tech. **The Levelized Cost of Electricity (LCOE) for utility scale photovoltaic solar and wind power has plummeted by up to 90%, making it competitive with fossil fuels in many regions.**[48] This shift is driven by advancements in technology efficiency, manufacturing costs, economies of scale, and supportive government policies. These technologies were at the plateau of productivity phase, but are now considered mainstream.

The present era of Climate Tech 2.0 builds upon the foundation of Clean Tech 1.0. It tackles a broader range of climate challenges across sectors, expanding to transportation, agriculture, and carbon capture. **This holistic approach recognises that climate change demands solutions beyond clean(er) energy generation. A series of interconnected climate technologies are in development to build on and enhance the decarbonisation effect.**

46 Primer on ClimateTech: The Urgency of Action & Why Climate Technology Matters Now
47 https://www.cleanenergywire.org/factsheets/qa-germanys-eu500-bln-infrastructure-fund-whats-it-climate-and-energy
48 IRENA (2023), Renewable power generation costs in 2022, International Renewable Energy Agency, Abu Dhabi

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Figure 18: Global LOCE of renewable energies

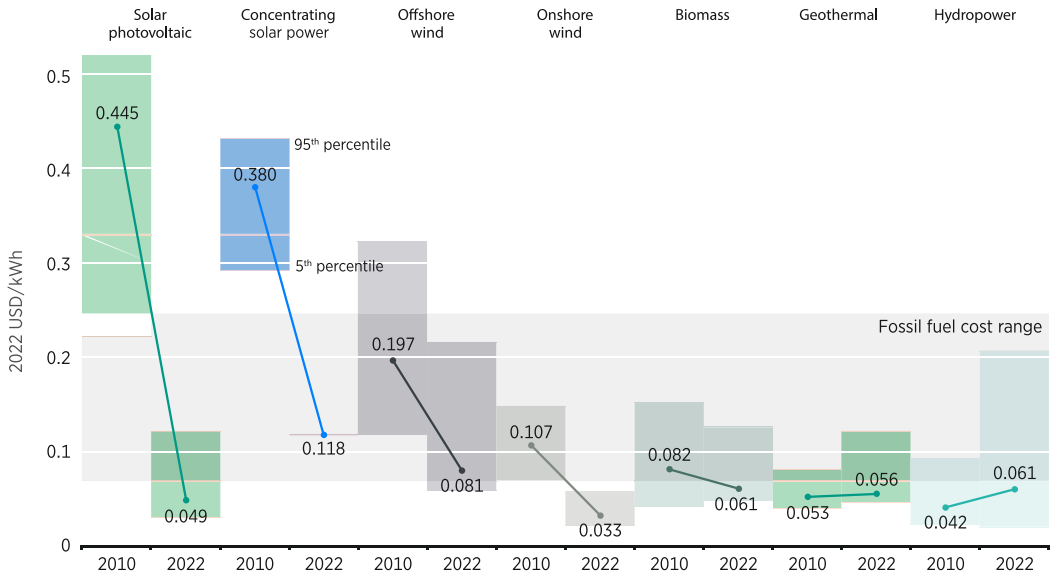
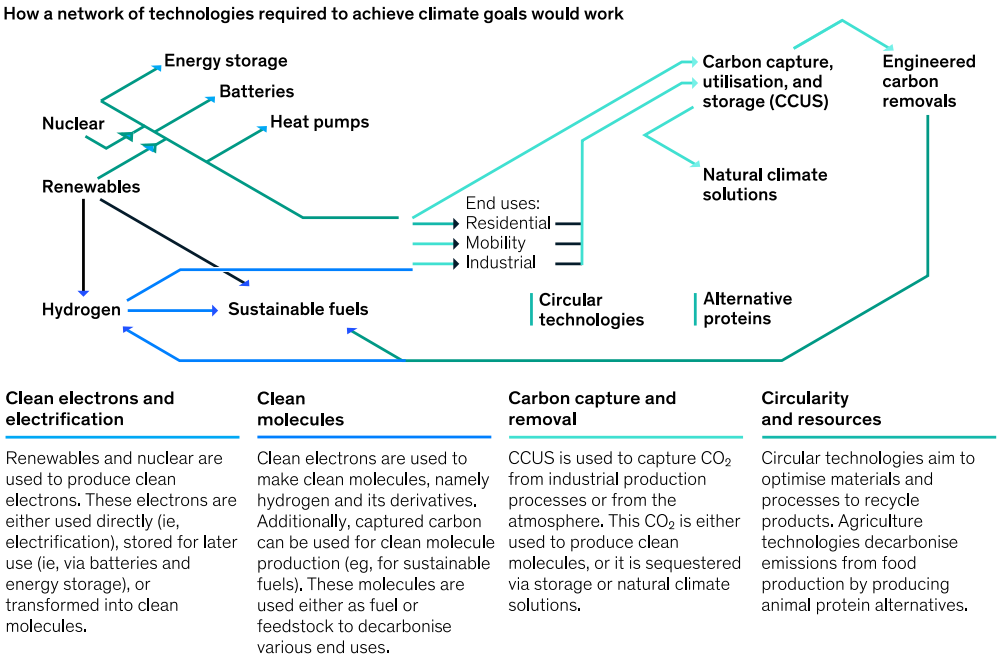


Figure : Global LCOE from newly commissioned utility-scale renewable power technologies, 2021 and 2022
Source: International Renewable Energy Agency

Figure 19: Network of technologies to achieve climate goals



Source: McKinsey & Company

AI is playing a dual role in climate tech. It is increasing energy demand, potentially consuming up to 11.7% of US power demand by 2030. This soaring demand risks prolonging fossil fuel reliance if renewables and low-carbon baseload can't scale fast enough. However, it is also driving scientific breakthroughs in materials science and biotechnology for climate solutions.

Applications of AI, Quantum Computing, and Blockchain in Climate Tech

Current Applications

1. **Energy Optimisation:** AI and Quantum computing are being used to **improve energy allocation and grid optimisation**, crucial for reducing the 73% of greenhouse gas emissions stemming from energy production.[49]

49 https://www.weforum.org/stories/2019/12/quantum-computing-applications-climate-change/

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2. **Climate Modelling:** Advanced **quantum and AI-based climate modelling and prediction are enabling better adaptation to climate change** and more accurate forecasting of extreme weather events.[50]

3. **Blockchain:** The core strengths of blockchain transparency and immutability translate to **secure, verifiable records for ESG data**. This empowers companies to meticulously track their environmental footprint, source materials ethically, and provide trusted and verifiable credentials. Stakeholders like investors and consumers gain access to this verifiable information, fostering trust and enabling informed decisions.

   Trusted credentials serve as digital passports, verifying the identity and qualifications of participants like independent auditors. Sustainable palm oil solution provider Musim Mas and Mitsubishi UFJ Financial Group (MUFG) Bank collaborated on a proof-of-concept to trial Web3 application in establishing.[51]

4. **Artificial Intelligence:** AI has the widest opportunity for application, with use cases ranging from optimising current processes to generating new and unique insights. This empowers businesses to make data-driven decisions that contribute to real sustainability gains.

   NovA! is a platform designed for financial institutions to assess borrowers and issue Sustainability Linked Loans (SLLs) in the real estate sector. It aims to address challenges in the SLL market, including a lack of comprehensive environmental data, inconsistencies in ESG scoring, and a lack of industry guidelines for sustainability targets. It uses a proprietary AI engine called the Autonomous Documentation Insights Engine to analyse a borrower's disclosure documents and monitors that against selected Sustainability Performance Targets to provide a comprehensive insight on borrowers.

Future Applications

1. **Carbon Capture Innovation:** Quantum computing could help design new catalysts for carbon capture that are cheaper and more efficient than current models.[52]

2. **Renewable Energy Forecasting:** Quantum machine learning algorithms are expected to significantly enhance forecasting capabilities for solar and wind resources, potentially saving tens of millions of dollars in grid operations.[53]

3. **Material Science** Breakthroughs: Quantum computing is poised to revolutionise material science, potentially creating new methods to decrease the environmental impact of manufacturing and advancing carbon capture and sequestration technologies.[54]

4. **Agricultural Optimisation:** Future quantum applications could contribute to more sustainable agricultural practices by designing new systems, optimising crop yields, and minimising land usage.

Climate Tech in Australia

Australia's climate tech industry is experiencing significant growth and momentum, positioning the country as a potential leader in climate innovation. As of 2024, the sector comprises over **170 companies valued at A$4.2 billion**, with strong potential for future expansion.[55]

The 2024 Australian Climate Tech Industry Report reveals a thriving sector driven by global regulations and increasing customer demand.[56] The industry has seen a **30% growth in jobs, contributing to the new economy.**[57]

Leading areas in Australian climate tech include data and finance (21.1%), circular economy (19.9%), agrifood (17%) and carbon market (11%).[56]

Data and Finance: This sector often utilises sophisticated climate data and AI modelling, with demand expected to increase due to stricter global policy and regulation reporting requirements.

Circular Economy: Focusing on redesigning the economy, including waste and recycling practices, this sector offers a broad range of products for various customer groups across consumer, business, and government.

Agrifood: Given Australia's strong agricultural roots, this sector is significant and includes 'new food' companies developing alternative protein sources as meat/dairy substitutes.

Carbon Markets: This sector has seen growth from 7% in 2022, reflecting increased focus on climate policy and regulation.

50 https://www.forbes.com/sites/jenniferturliuk/2024/05/07/the-future-of-climate-could-be-in-quantum-computing/
51 https://gftn.co/insights-pzf/primer-on-climate-tech-the-urgency-of-action-why-climate-technology-matters-now
52 https://www.weforum.org/stories/2019/12/quantum-computing-applications-climate-change/
53 https://thequantuminsider.com/2024/05/07/study-spotlights-7-ways-quantum-computers-could-help-solve-climate-change/
54 https://www.forbes.com/sites/jenniferturliuk/2024/05/07/the-future-of-climate-could-be-in-quantum-computing/ https://www.forbes.com/sites/jenniferturliuk/2024/05/07/the-future-of-climate-could-be-in-quantum-computing/
55 https://international.austrade.gov.au/en/news-and-analysis/news/australian-startups-harness-climate-tech-momentum
56 https://www.cefc.com.au/insights/market-reports/2024-australian-climate-tech-industry-report/
57 https://www.climatesalad.com/climate-tech-industry-report

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