AI AND ITS IMPACT

WHAT SRI INVESTORS NEED TO KNOW

CLEAN YIELD
ASSET MANAGEMENT

AI AND ITS IMPACT: WHAT SRI INVESTORS NEED TO KNOW

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As Artificial Intelligence (AI) reshapes industries and economies worldwide, it brings transformative opportunities for innovation, efficiency, and growth while presenting tough ethical, environmental, and social questions.In truth, AI has already become a part of our daily news cycle, tied to our present socio-political development, and integrated into our daily lives. In this thought piece, we set out to review how our client's investment portfolios can incorporate ethical AI implementation in line with Clean Yield's social and environmental screening process.

AI's potential extends far beyond financial markets and productivity gains, with the power to tackle some of the world's most pressing environmental and social challenges when harnessed responsibly. From optimizing energy consumption and reducing waste to driving inclusion and transforming healthcare, AI is uniquely positioned to help industries adopt more environmentally conscious practices and foster social good.

However, the evolution of AI technology also brings with it a range of environmental and social challenges that Socially Responsible Investing (SRI) investors must carefully consider. These include privacy violations, job displacement, and environmental strain from data centers. While AI has the potential to drive positive change, its development and deployment also raise critical ethical concerns that align directly with the principles of SRI. Discover what SRI investors need to know when evaluating AI investments by exploring both its potential to drive positive change and possible environmental and social concerns.

In the following pages, we explore the complex and multifaceted impact of AI, discussing its potential innovations and concerns through examples of companies that demonstrate both its positive and negative environmental and social impacts. The companies mentioned in this piece are not necessarily stocks that Clean Yield invests in, but are mentioned for illustrative purposes.

"From optimizing energy consumption and reducing waste to driving inclusion and transforming healthcare, AI is uniquely positioned to help industries adopt more environmentally conscious practices and foster social good."
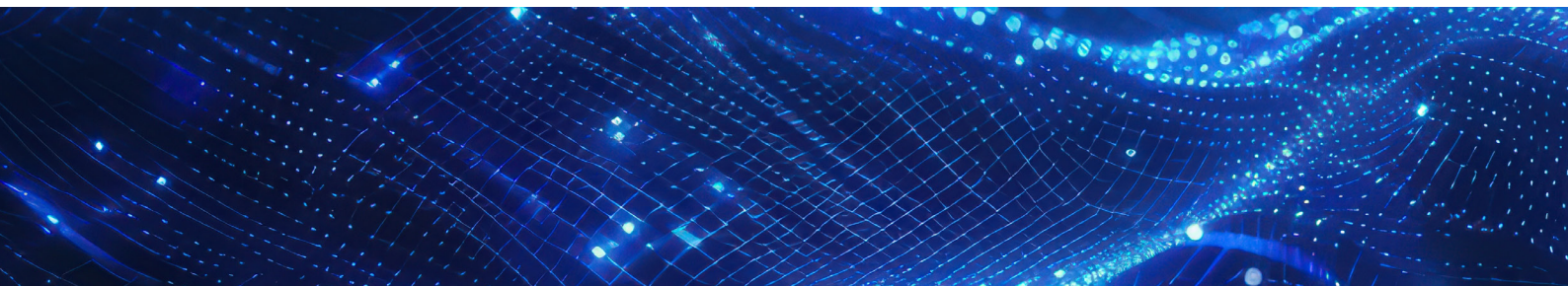
TABLE OF CONTENTS

ENVIRONMENTAL PROS AND CONS

High Energy & Water Consumption of Data Centers

AI models, especially those used in large-scale applications, require massive amounts of data to function effectively. Processing and storing this data typically occur in data centers, which are known for their high energy consumption. According to estimates, data centers contribute to approximately 2% of global greenhouse gas emissions, a figure expected to rise as AI technologies become more widespread. As SRI investors, we must consider the sustainability practices of companies developing AI technologies, particularly their energy sources and efforts to minimize their carbon footprint.

The following chart highlights power consumption across three types of data center providers: enterprises, which operate smaller, company-owned data centers for internal IT needs; co-location companies, which rent space and resources in shared data centers to multiple businesses, offering flexibility and efficiency; and hyperscalers, such as AWS, Google Cloud, and Microsoft Azure, which run massive, highly optimized facilities to support cloud computing and AI workloads. Hyperscalers consume the most power due to their scale but often invest heavily in renewable energy and efficiency technologies to mitigate their environmental impact.

U.S. Data Center Demand is Forecast to Grow by Some 10 Percent a Year Until 2030

Data center power consumption, by providers/enterprises,[1] gigawatts
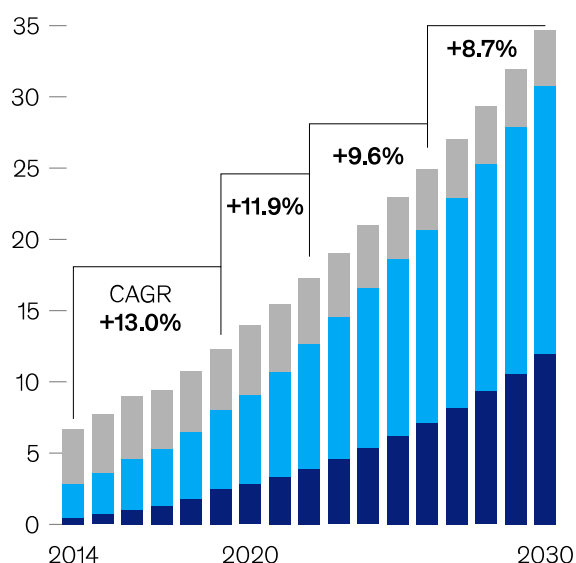
**Data center power consumption, by providers/enterprises,[1] % share**
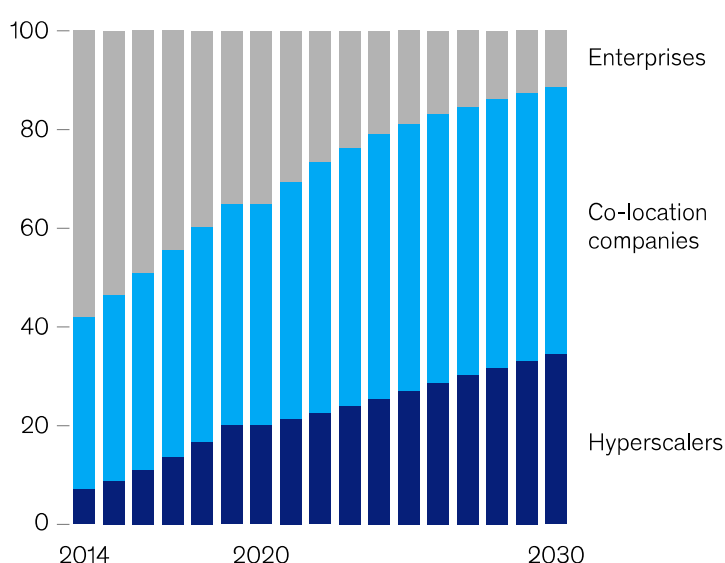
Source: McKinsey – US Data Center Demand

OpenAI, the company behind models like GPT-3 (and now GPT-4), has been criticized for the immense computational resources required to train its large-scale AI models. A study found that training a single AI model like GPT-3 for a single task can emit as much carbon dioxide as five cars do over their entire lifetimes. OpenAI's energy demands highlight the significant environmental cost of training cutting-edge AI models, especially when powered by non-renewable energy sources.

OpenAI, with the support of Microsoft, has made some efforts to reduce its carbon footprint by using Microsoft's Azure cloud infrastructure, which is increasingly powered by renewable energy. Microsoft has pledged to become carbon-negative by 2030, and OpenAI benefits from this transition by hosting its AI models on Azure. OpenAI has also expressed its intention to research more energy-efficient algorithms that would require less computational power to achieve similar results, which could reduce energy usage in future models.

## Microsoft's Pathway to Carbon Negative by 2030
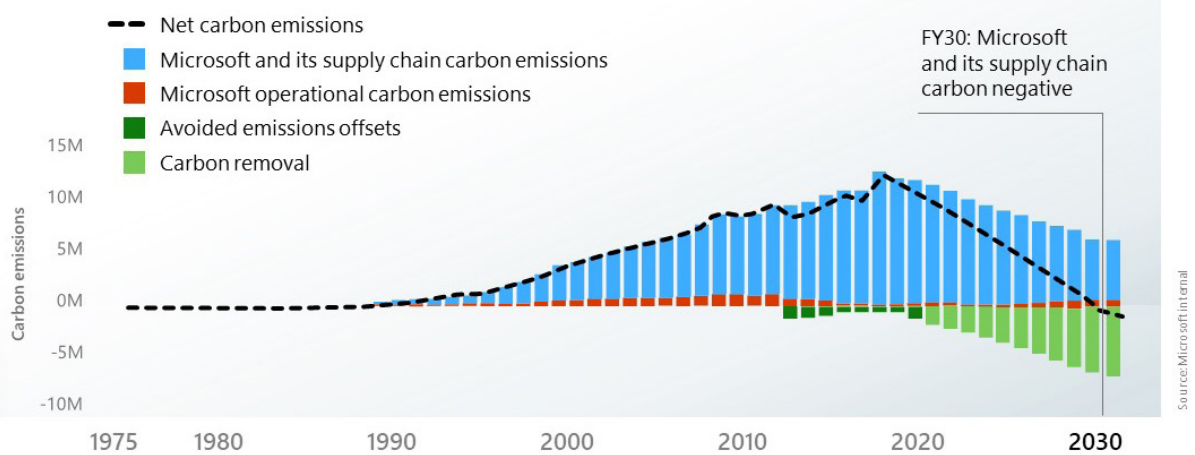
Source: Microsoft – Carbon Negative by 2030

Amazon's AWS is a leading provider of cloud services, which are integral to running AI applications. However, the vast energy consumption of its data centers has raised environmental concerns. Despite efforts to move toward renewable energy, many AWS data centers still rely on fossil fuels. Additionally, AWS's heavy water consumption for cooling has been criticized, particularly in water-scarce regions, where its data centers may exacerbate local water stress.

The company set a goal in 2019 to power its global infrastructure, including data centers, corporate buildings, grocery stores and fulfillment centers, with 100% renewable energy by 2030. Last year, the company announced that it met this goal seven years early, with all the electricity consumed by its operations, including data centers, matched with 100% renewable energy in 2023. In terms of water use, Amazon is exploring the use of innovative cooling systems that are less dependent on water. The company has also committed to water stewardship programs in regions where water scarcity is a concern and is increasingly reporting on its water usage.

Impact on Carbon Footprint of Optimizing Workloads on AWS

Source: Amazon – Preparing for the energy needs of the future
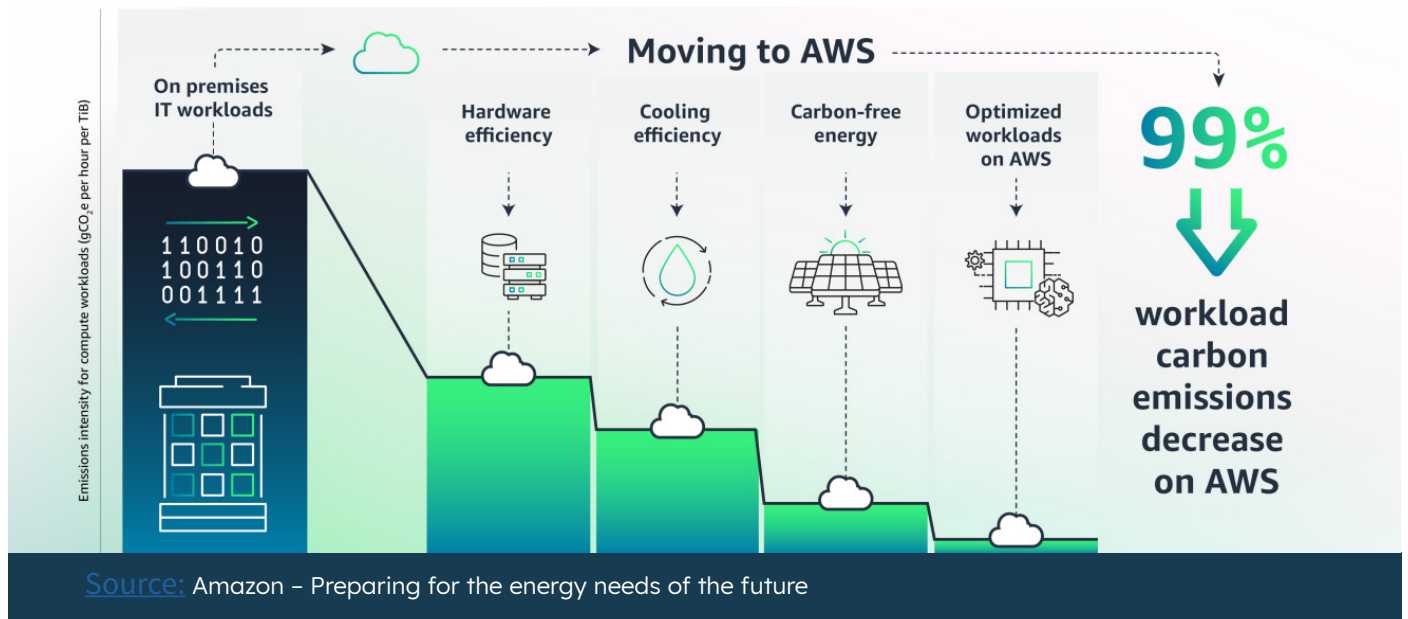
Energy Efficiency and Conservation

AI can significantly enhance energy efficiency by optimizing energy consumption across industries, buildings, and transportation systems. For instance, AI algorithms can analyze energy usage patterns in real-time, identifying inefficiencies and suggesting adjustments to reduce consumption. This is especially valuable for smart grids, where AI can balance energy supply and demand, integrate renewable energy sources more effectively, and minimize energy waste.

Google is leveraging AI through its DeepMind technology to improve the energy efficiency of its data centers. Using machine learning, Google reduced the cooling energy usage in its data centers by up to 40%, making its operations significantly more energy efficient. This AI system continuously adjusts cooling based on real-time data, optimizing energy consumption and helping reduce carbon emissions.

Machine Learning Impact on Data Center Cooling
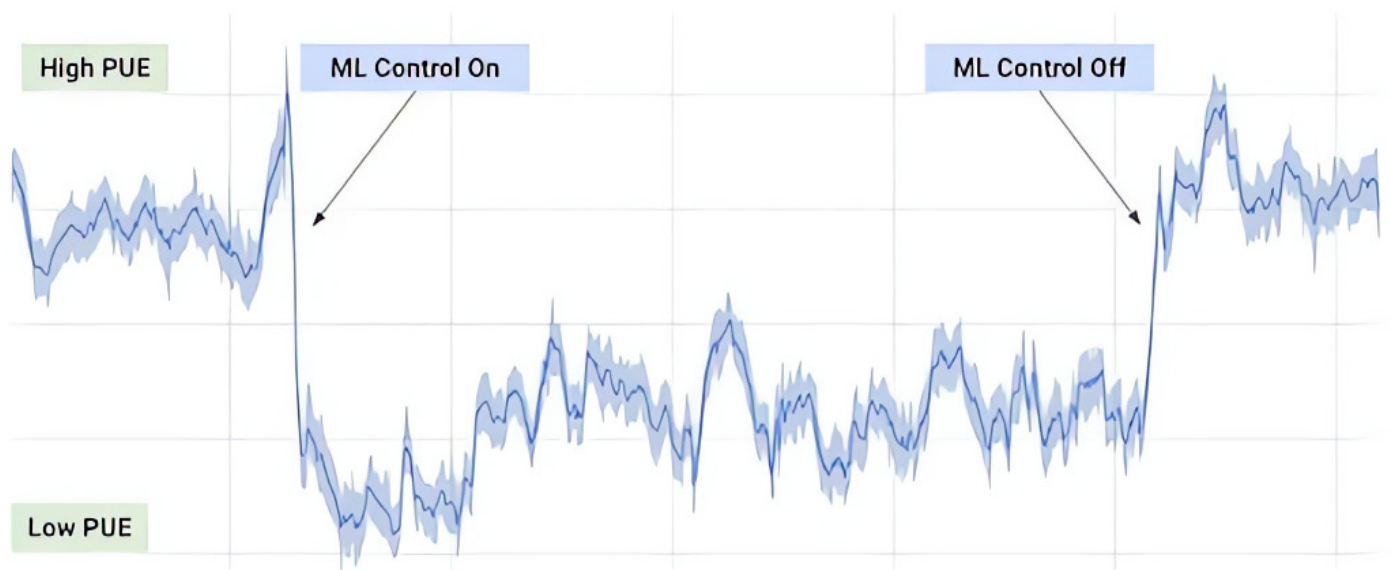
Source: Google DeepMind – Machine Learning (ML) impact on Data Center Cooling

Climate Change Mitigation and Adaptation

AI is increasingly being used to monitor, model, and predict climate patterns, enabling better forecasting of extreme weather events and long-term climate trends. By analyzing vast amounts of climate data, AI can help policymakers, scientists, and organizations develop more effective strategies for mitigating climate change and adapting to its impacts. For example, AI-driven insights can guide the development of more resilient infrastructure, optimize agricultural practices, and improve disaster response planning.

IBM's Environmental Intelligence Suite integrates AI and weather data to help organizations plan for and adapt to climate change. AI models predict and analyze extreme weather patterns, enabling companies and governments to better manage natural disasters and climate risks. IBM also offers AI tools to support environmental compliance and sustainability initiatives, helping organizations reduce their carbon footprint and improve resource management.

PROS AND CONS OF RESOURCE USE AND WASTE

Resource-Intensive Hardware: E-Waste and Lifecycle Impacts of AI Hardware

The hardware required to run AI systems, including specialized processors like GPUs and TPUs, also has a considerable environmental impact. The production of these components involves the extraction of rare earth metals and other resources, which can lead to environmental degradation and human rights abuses in mining regions. Additionally, the disposal of outdated hardware contributes to electronic waste, further exacerbating environmental concerns.

Nvidia, a key player in AI hardware, supplies GPUs that power many AI systems. However, the rapid turnover of AI hardware and the increasing demand for newer, faster chips contribute to the growing problem of electronic waste (e-waste). Nvidia's role in producing AI hardware, combined with the limited lifecycle of such technology,

poses challenges related to e-waste disposal and resource depletion due to the extraction of rare earth metals for chip manufacturing.

Nvidia has initiated several programs to address the sustainability of its hardware production. The company has introduced more energy-efficient GPUs, which aim to reduce power consumption during AI processing. Nvidia has also invested in recycling programs for obsolete hardware and is working toward reducing the environmental impact of its supply chain by sourcing materials more responsibly. Additionally, Nvidia partners with companies and research institutions that are focused on using AI to combat climate change, positioning its technology as part of broader environmental solutions.

Waste Reduction and Circular Economy

AI can play a crucial role in reducing waste and promoting circular economy practices. For instance, AI-powered sorting systems can enhance recycling efficiency by accurately identifying and separating recyclable materials. AI can also help manufacturers optimize production processes, reducing material waste and enabling the reuse and recycling of resources. These applications support a more sustainable, resource-efficient economy.

AMP (private company) uses AI to revolutionize recycling processes. Their AI-powered robots accurately identify and sort recyclable materials from waste streams, significantly improving recycling efficiency. By automating the sorting process, AMP reduces contamination in recycling streams, helping promote a circular economy. This technology contributes to waste reduction and more efficient resource use in recycling facilities.

PROS AND CONS OF AI'S SOCIAL IMPACT

Data Privacy and Security

AI systems often rely on vast amounts of personal data to function effectively. This raises significant privacy concerns, particularly when data is collected without informed consent or is used in ways that individuals may not be aware of. Moreover, the risk of data breaches and cyberattacks increases as more data is collected and processed, potentially leading to severe consequences for individuals and organizations. SRI investors should evaluate the data privacy policies and practices of companies involved in AI, ensuring they prioritize ethical data usage and robust security measures.

Facebook (now Meta) has faced significant scrutiny for its use of AI algorithms in user data collection, which raised serious privacy concerns. The Cambridge Analytica scandal is a notable example of how data harvested through Facebook's AI-driven platform was used to manipulate voters,

raising ethical concerns about AI's role in violating user privacy and enabling misuse of personal data. Facebook continues to face backlash for how its AI models process vast amounts of personal data, which is used for targeted advertising and content moderation, often without adequate transparency or consent from users.

In response to the backlash over privacy violations, Facebook has introduced more stringent privacy controls, giving users greater transparency and control over how their data is used. The company has also invested heavily in AI tools designed to detect and prevent privacy breaches, fraud, and harmful content. Facebook's "Privacy by Design" approach aims to integrate privacy features into the development of new AI tools. However, the effectiveness of these efforts is still debated, as ongoing concerns about privacy violations remain.

Algorithmic Bias and Discrimination

AI algorithms are only as good as the data they are trained on. If this data is biased or unrepresentative, the AI systems can perpetuate and even exacerbate existing social inequalities. For example, biased AI algorithms have been shown to result in discriminatory practices in areas such as hiring, lending, and law enforcement. As SRI investors, we need to assess how companies are addressing algorithmic bias and whether they are implementing measures to ensure fairness, transparency, and accountability in their AI systems.

Amazon's AI-powered hiring tool was found to be biased against female candidates, as it favored male-dominated resumes based on historical data that skewed toward hiring men. This highlighted a broader issue of AI models perpetuating existing social biases, leading to discriminatory outcomes. Although Amazon eventually scrapped the tool, this incident raised serious concerns about the ethical implications of using AI in recruitment and other decision-making processes where bias can disproportionately affect marginalized groups.

Following the controversy over its biased AI hiring tool, Amazon discontinued the system and has since invested in researching and developing fairer, more inclusive AI models. The company has publicly stated its commitment to minimizing bias in its AI algorithms and has contributed to open-source research on creating ethical AI. The company also adjusted its algorithms to reduce bias in its data and decision-making processes.

Job Displacement and Economic Inequality

"As SRI investors, we should consider how companies are preparing for and managing the social impact of AI-driven automation, including their efforts to reskill and support displaced workers."

The automation capabilities of AI have the potential to disrupt labor markets significantly. While AI can create new jobs, it is also likely to displace many existing ones, particularly in industries reliant on routine tasks. This shift could exacerbate economic inequality, as those who lose their jobs may struggle to find new employment in an increasingly automated world. As SRI investors, we should consider how companies are preparing for and managing the social impact of AI-driven automation, including their efforts to reskill and support displaced workers.

Tesla's use of AI-driven automation in its manufacturing processes, while enhancing efficiency, has also led to concerns about job displacement in the automotive industry. As Tesla and other companies increasingly rely on AI to automate tasks, many workers, particularly in lower-skilled positions, face the threat of losing their jobs to machines. While AI-driven automation improves productivity, it can exacerbate economic inequality by eliminating jobs without adequately preparing workers for the shift to more automated workplaces.

Tesla has acknowledged the disruptive nature of its AI-driven automation and has made efforts to reskill workers and provide training for roles that involve working alongside AI technologies. The company is also investing in education and vocational programs to equip workers with the skills needed for a more automated future. However, these efforts have been somewhat limited, and critics argue that Tesla could do more to mitigate the social impacts of its automation technologies.

Unethical Surveillance and Human Rights Violations

Clearview AI, a facial recognition technology company, has been criticized for scraping billions of images from the internet without consent and using AI algorithms to identify individuals. Its technology has been used by law enforcement agencies worldwide, raising serious concerns about mass surveillance, privacy violations, and potential misuse for targeting and discriminating against marginalized groups. This technology could arguably lead to wrongful arrests and infringements on human rights, particularly in authoritarian regimes.

Clearview AI made some changes in response to global criticism of its privacy practices, including reducing access to its facial recognition software and restricting its use to law enforcement agencies in certain regions. The company also expressed a commitment to improving the accuracy of its technology to reduce misidentifications, which could help mitigate some human rights concerns. However, many human rights organizations argue that these efforts do not go far enough, and as a result the company continues to face lawsuits and regulatory scrutiny.
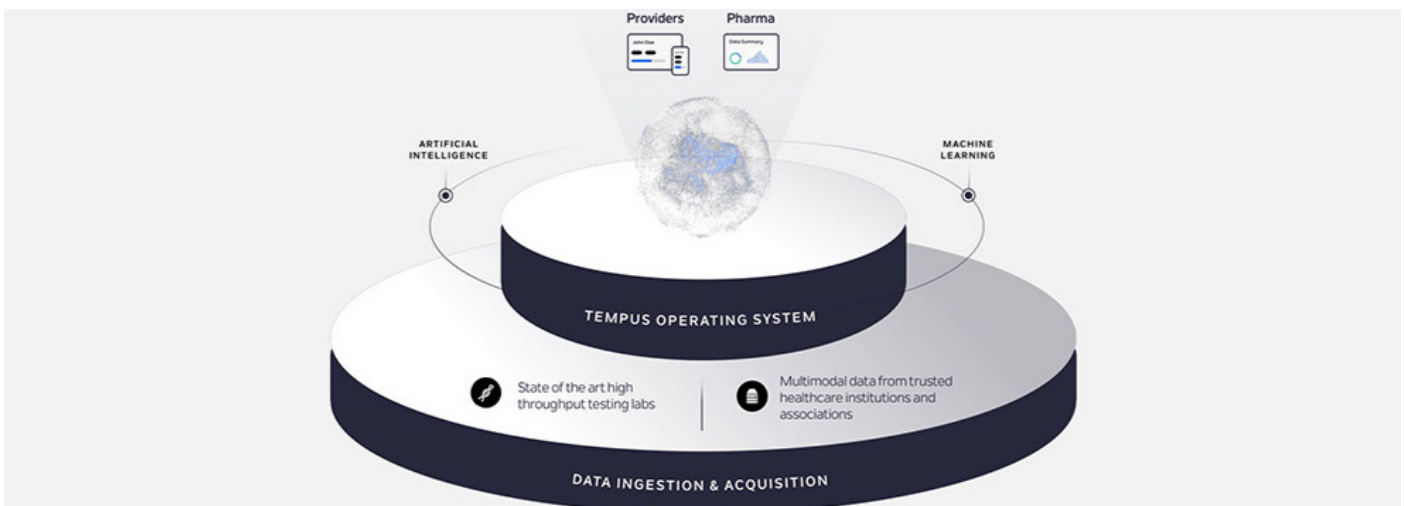
Improved Healthcare and Medical Research

AI has the potential to revolutionize healthcare by improving diagnostic accuracy, personalizing treatment plans, and accelerating medical research. AI-driven tools can analyze medical images, detect diseases at earlier stages, and provide real-time assistance to healthcare professionals. This can lead to better health outcomes, especially in underserved communities with limited access to medical expertise. Moreover, AI's ability to analyze vast datasets can accelerate the discovery of new treatments and drugs, ultimately improving public health.
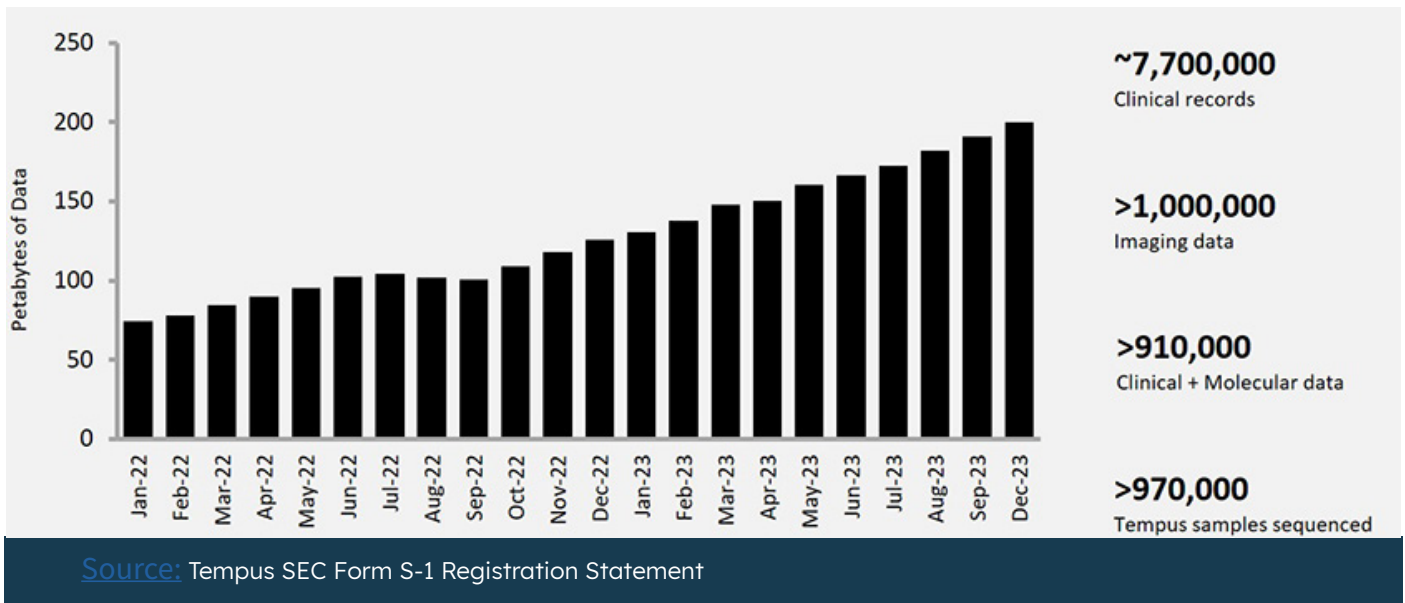
Tempus AI (stock symbol: TEM) is a healthcare technology company that uses AI to advance precision medicine. Its platform analyzes vast amounts of clinical and molecular data to help doctors make more informed decisions about cancer treatment.

By leveraging AI, Tempus aims to improve diagnostic accuracy and tailor treatments to individual patients, leading to better health outcomes. Tempus is also accelerating drug discovery by using AI to analyze clinical trial data and genetic information, through partnerships with pharmaceutical companies like GSK and Pfizer.

Clinically Intelligent Healthcare Applications

Source: Tempus SEC Form S-1 Registration Statement

Growth in Data Within Tempus Cloud Environment

~7,700,000
Clinical records

>1,000,000
Imaging data

>910,000
Clinical + Molecular data

>970,000
Tempus samples sequenced

Enhanced Accessibility and Inclusion

AI technologies can break down barriers for individuals with disabilities, promoting greater accessibility and inclusion. For example, AI-powered speech recognition and natural language processing enable more effective communication for people with hearing or speech impairments. AI-driven tools can also assist individuals with visual impairments by providing real-time descriptions of their surroundings. These advancements contribute to a more inclusive society, where technology supports people of all abilities.

Microsoft (stock symbol: MSFT) is at the forefront of using AI to improve accessibility for individuals with disabilities. Their AI-powered Seeing AI app helps people with visual impairments by narrating the world around them, from reading text to recognizing faces. Additionally, Microsoft's AI for Accessibility initiative funds projects that use AI to empower people with disabilities, furthering social inclusion and accessibility.

Education and Skill Development

AI has the potential to transform education by personalizing learning experiences and improving access to quality education. AI-powered learning platforms can adapt to individual students' needs, offering customized content and support to enhance learning outcomes. This is particularly valuable in addressing educational disparities, as

AI can provide tailored resources to students in underserved communities. Additionally, AI-driven training programs can support skill development and workforce retraining, helping individuals adapt to the changing job market.

Coursera (stock symbol: COUR), an online learning

platform, uses AI to [personalize education and enhance student outcomes](). AI algorithms on the platform analyze a learner's performance and recommend tailored content to improve learning. Coursera also uses AI to offer flexible, accessible education to people worldwide, bridging educational gaps in underserved communities. By democratizing access to education and skill development, Coursera helps individuals adapt to the evolving job market.

Social Good and Humanitarian Efforts

AI is increasingly being used to address social issues and support humanitarian efforts. For example, AI can help identify and respond to human trafficking by analyzing patterns in online data, enabling faster detection and intervention. In disaster response scenarios, AI-powered tools can analyze satellite imagery to assess damage, prioritize relief efforts, and coordinate rescue operations more effectively. These applications demonstrate AI's potential to contribute to social good and improve outcomes for vulnerable populations.

Microsoft's AI for Humanitarian Action program leverages AI to support disaster response, protect displaced people, and address humanitarian challenges. For example, [Microsoft partnered with the United Nations]() and other organizations to develop AI tools for analyzing satellite imagery, enabling faster damage assessments during natural disasters. This helps prioritize aid distribution and streamline relief efforts. Additionally, Microsoft's AI solutions are used to support refugee resettlement programs by analyzing data to optimize resource allocation and improve outcomes for displaced populations.

NAVIGATING AI'S RISKS WITH RESPONSIBLE INVESTING

AI holds tremendous potential to drive innovation and address some of the world's most pressing challenges. However, as its development and deployment accelerate, Socially Responsible Investors (SRI) must remain cautious, ensuring that the ethical, environmental, and social implications of AI are not overlooked.

The examples of companies highlighted above demonstrate the potential negative environmental and social impacts of AI. While these companies have made some efforts to address the negative environmental and social impacts of their AI technologies, there is often a gap between their public commitments and the actual effectiveness of their initiatives. It is essential to critically assess these mitigation efforts and determine whether they align with long-term ethical, environmental, and social goals. Active engagement and advocacy can encourage companies to continue improving their sustainability and ethical practices in the AI space.

SRI and AI: Key Considerations

Given the complex and multifaceted impact of AI, we must take a proactive approach when evaluating AI investments.

Here are some key considerations:

01

Assess Environmental Impact

- Evaluate the energy consumption and carbon footprint of AI companies.
- Consider the sustainability of data centers and the lifecycle of AI hardware.
- Support companies that are committed to reducing their environmental impact through renewable energy, efficient resource use, and responsible e-waste management.

02

Examine Social Practices

- Review the data privacy and security policies of AI companies to ensure they prioritize ethical data usage.
- Investigate how companies are addressing algorithmic bias and promoting fairness and transparency.
- Consider the social implications of AI, particularly in terms of job displacement and economic inequality.

03

Prioritize Ethical AI Development

- Support companies that demonstrate a commitment to ethical AI practices, including the responsible use of AI and respect for human rights.
- Engage with companies to encourage transparency and accountability in AI development and deployment.
- Advocate for the integration of ethical considerations into the design and implementation of AI technologies.

04

Engage in Active Stewardship

- Use shareholder activism and proxy voting to influence AI companies toward more sustainable and socially responsible practices.
- Collaborate with other investors and stakeholders to push for industry-wide standards on ethical AI.

In Conclusion

At Clean Yield, we are dedicated to helping our clients invest in a way that aligns with their values while also supporting responsible innovation. As AI continues to evolve, we must remain vigilant, ensuring that its benefits are maximized while its potential harms are minimized. We are committed to asking the tough questions, holding companies accountable for the impact of their technologies, and advocating for ethical AI practices. Clean Yield will continue to focus on these important aspects, guiding our clients toward investments that not only deliver financial returns but also contribute to positive, lasting change for society and the planet.

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