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AI Sustainability Outlook

The Challenges, Potential, and Path Forward

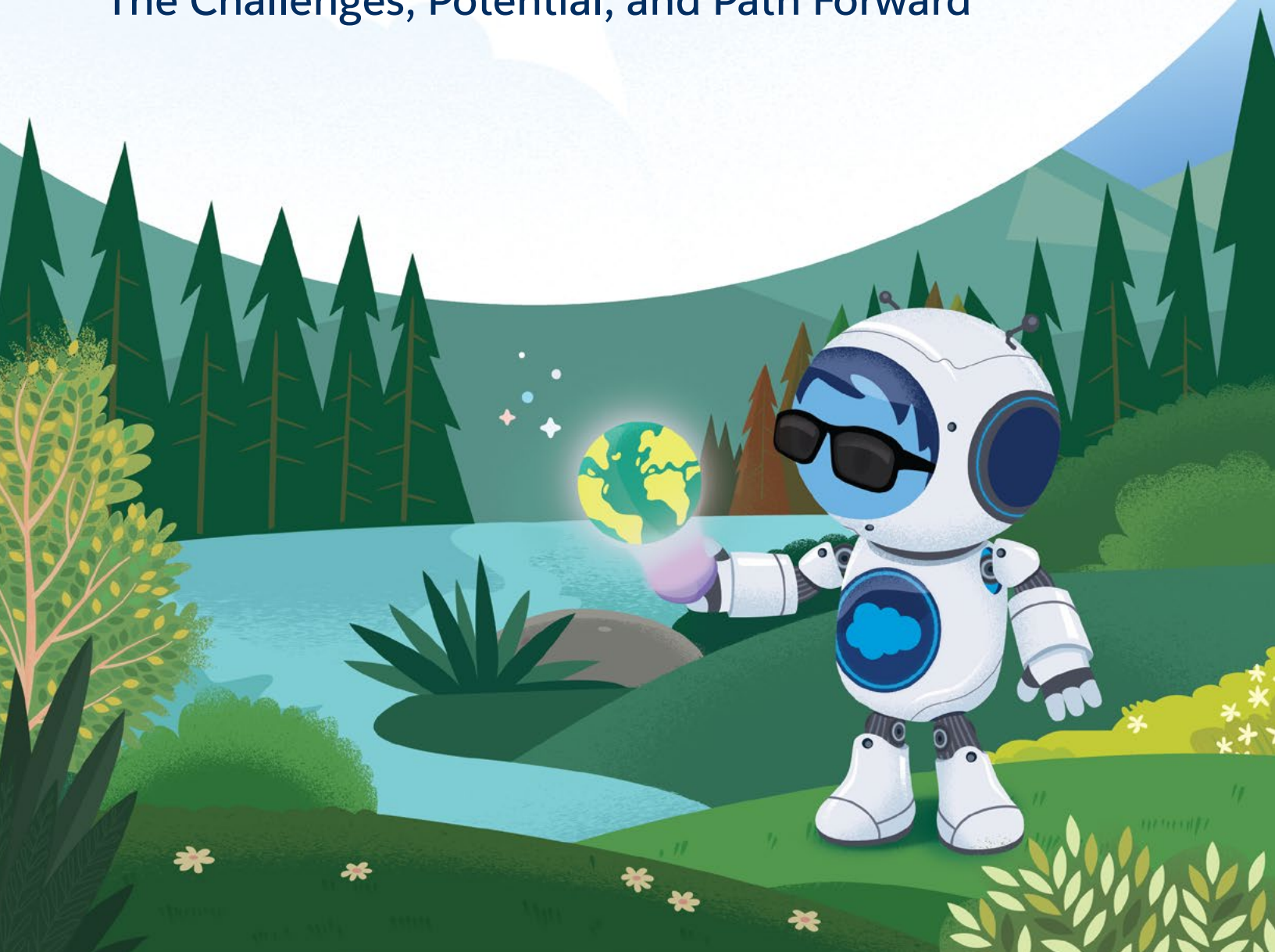


Table of Contents

Introduction	3
---------------------------	----------

Understanding the Landscape: AI and Its Sustainability Implications	4
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• The Environmental Risks of AI	4
• Energy	4
• Water	5
• Other Natural Resources	5
• The Potential of AI for Sustainability	6
• Transforming Sustainability Programs with AI	6
• Accelerating Sustainability Solutions with AI	8

Salesforce's AI Sustainability Journey to Date	9
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Shaping the Future of AI Sustainability	10
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• Our 3-Pillar Framework	10
• Smart Demand	11
• Efficiency	12
• Clean Supply	13

Conclusion	14
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Introduction

Dear Reader,

The potential of artificial intelligence (AI) to transform our world is profound, but it also presents critical challenges. As AI scales, so has its environmental footprint – with potential impacts on energy, water, and other natural resources. We simply cannot afford to build our digital future on the infrastructure of the past. Every company, especially technology companies, must be intentional about the choices we make now to shape our future.

At Salesforce, we've spent over a decade committed to sustainability, working to decarbonize our operations and champion environmental innovation and collective action. This journey has taught us that technology, when harnessed thoughtfully, has the power to accelerate solutions to the world's biggest challenges.

As an agentic AI leader, trusted, reliable, and sustainable AI is not just a priority for Salesforce – it's an imperative. That's why I'm proud to share this AI Sustainability Outlook. This briefing provides a look into our ongoing work to understand and reduce the environmental impact of AI and deliver on its potential for good. In these pages, we offer an overview of the challenge, our initial efforts, evolving learnings, and our preliminary approach to AI sustainability moving forward. You'll also learn how we're using AI to improve efficiency within our own sustainability operations and how it can be a tool for environmental innovation.

By openly sharing our insights, the tools we're developing, and how we're working with others, we aim to spark collective action. We are committed to leading the way, and know we can't do this alone. We believe that together, we can make AI a more positive force for both people and the planet.

We invite you to join us on this journey. The opportunity to shape a truly sustainable future with AI is within our grasp, and I'm optimistic about what we can achieve together.

Onward,



Sunya Norman

Senior Vice President, Impact, Salesforce



Understanding the Landscape: AI and Its Sustainability Implications

Over the past three years, we've seen an unprecedented surge in generative AI adoption and market growth. With this AI boom comes transformative capabilities to accelerate sustainability solutions, but also increased compute and associated energy, water, and natural resource demands.

From [optimizing energy grids](#) to [enabling efficient supply chains](#), AI can empower innovators to tackle global challenges at unprecedented speed and scale. But as AI use and capabilities surge, so does its environmental footprint.

The Environmental Risks of AI

Generative AI is still in its infancy, as is our understanding of its potential impacts on the environment. What follows is not exhaustive, but an illustrative snapshot of some of the most important insights we've gained so far.

Energy

A key factor in the progress of AI capabilities has been the significant increase in compute – the specialized processing power used to develop and deploy AI models.

Since 2010, the compute used to create AI models has been growing [~4.7x/year](#). And there's no sign of this slowing down.

To support this growing demand, data centers need more electricity and more sophisticated cooling systems to keep them from overheating. In fact, by 2030, electricity consumption from data centers could reach just under [3% of global electricity consumption](#).

Even so, analysts warn that [40% of AI data-center projects](#) could hit power bottlenecks in 2027, and [three-quarters of CIOs](#) may face energy constraints by 2030. The gap between AI demand and energy supply threatens delayed AI growth and innovation, higher costs, and power reliability disruptions.

Today, fossil fuels supply the [majority](#) (56%) of data center energy in the world, and are expected to meet 40% of new demand by the end of the decade. As grid constraints persist and data centers demand round-the-clock power, reliance on fossil fuels – and the resulting emissions – is expected to rise. If not transitioned to clean power, the International Energy Agency (IEA) warns that data centers could become one of the [fastest-growing sources](#) of global emissions.

Water

Water consumption from AI is also [increasing rapidly](#). By 2027, the AI boom could require [4-6x the annual fresh water withdrawal of Denmark](#). Water is crucial for data centers in two main ways:

- **Onsite Data Center Cooling:** [Many data centers](#) use water-cooled systems to absorb heat generated by IT equipment, such as servers, and maintain safe operating temperatures. This can involve evaporative cooling or closed-loop systems.
- **Water Use for Electricity Generation:** Power plants – especially thermal plants like coal, gas, and nuclear – use significant water for steam production and cooling. So, even if a data center doesn't directly use much water, its [electricity footprint](#) can cause indirect water withdrawals upstream in the power grid.

Where this water use occurs also matters. [One-fifth of data center servers'](#) direct water footprint comes from moderately to highly water-stressed watersheds, while nearly half of servers are powered by power plants located within [water-stressed regions](#). This can put additional strain on systems that support local communities and other industries, like agriculture, that rely on water.

Other Natural Resources

Building the hardware for AI compute, including accelerators (like GPUs and TPUs), memory chips, servers, and cooling systems, require natural resources. These include...

- [Critical Minerals, such as:](#)
 - Lithium (batteries)
 - Cobalt, nickel, manganese (batteries)
 - Rare earth elements (magnets, motors, and electronics)
 - Copper (wiring and electrical connections)
 - Silicon (semiconductors)
- **Metals and alloys for casings, heat sinks, and structural parts**
- **Plastics and chemicals used in manufacturing**

Mining and refining these materials can involve energy and water-intensive processes, pollution and environmental degradation, water contamination, social impacts in mining regions (i.e. labor conditions, geopolitical tensions), and land use impacts. Overall, while the manufacturing of AI hardware does use energy, its [significantly less](#) than what's used in its operations.



We recognize that there are indications that AI can be used in practices that negatively impact the environment, too – such as increasing extraction of fossil fuels. Our understanding of the environmental impacts of AI is still evolving. But even at this early stage, it's clear that the scale of these potential impacts merits our attention.

The Potential of AI for Sustainability

AI can also be a powerful tool for sustainability – offering transformative capabilities to accelerate progress on some of the world’s most pressing environmental challenges. For example, World Wildlife Fund’s [ManglarIA project](#) protects mangroves in Mexico by leveraging AI and environmental sensors to monitor ecosystem health and enhance conservation efforts. [WeaveGrid](#), part of the Salesforce Ventures Impact Fund, is using AI to weave together automotive and electric grid data to help mitigate costs and enable the shift to electrification.

The IEA estimates that widespread application of existing AI solutions could reduce emissions equivalent to [around 5% of energy-related emissions by 2035](#).

Sustainability professionals must be at the forefront of ensuring that the positive impacts of AI outweigh any potential negative impacts. As practitioners, we must use AI to transform and accelerate our sustainability programs, share best practices with one another, and scale nature and climate solutions with AI.

Transforming Sustainability Programs with AI

Based on Salesforce’s experience, top use cases for AI in sustainability programs include improving energy efficiency, tracking and reducing emissions, and managing water use.

Because AI is particularly good at tackling data-driven tasks, it can be immensely helpful in:



Transforming complex systems



Improving climate and policy modeling



Accelerating discovery and innovation






Enhancing adaptation and resilience



Driving behavioral change

These factors can accelerate...

Sector-specific emissions reductions, including:

-  Methane emissions reductions in oil and gas operations
-  Industry emissions reductions by optimizing manufacturing processes
-  Buildings emissions reductions



Energy efficiency via:

-  Optimized data center cooling systems
-  Predictive maintenance
-  Energy demand response management
-  Integration of renewables
-  Personalized energy insights

Water management, including:

-  Water quality monitoring
-  Water resource management
-  Smart irrigation
-  Water distribution efficiency
-  Wastewater treatment optimization

Agentforce Use Case Highlight

Sustainability teams need reliable insights faster so they spend less time finding data and more time finding sustainable solutions. At Salesforce, our own sustainability team is using [Agentforce for Net Zero Cloud](#) to deliver sustainability insights from our data in natural language – automatically surfacing historical emissions, climate targets, and energy consumption.

As a result, we've seen time savings across our emissions and decarbonization work, and faster response time for employee questions. This allows our team to be more efficient, leading to [improved reporting](#) and data management while also freeing up time for more impactful, strategic actions.

Projected
80%

reduction in time spent building reports and answering emissions data questions.

Projected
50%

reduction in average time spent on employee support requests.



Accelerating Sustainability Solutions with AI

[AI agents](#) also have a range of applications for accelerating sustainability solutions. Ecopreneurs – innovators focused on solving sustainability challenges – are launching use cases to protect the planet and drive sustainability at scale.

A few examples of how ecopreneurs are harnessing AI include:

Climate disaster relief matching:

Automate donation matching and shipment, streamlining disaster relief operations with a single request.

Agentforce Use Case Highlight

As fires, hurricanes, and other natural disasters intensify, getting the right aid to the right people at the right time has never been more critical. [Good360](#), a global leader in product philanthropy, is tackling the challenge with Agentforce. To get goods to disaster-affected communities faster, they're building a resource-matching agent that automates the donation routing process. Agentforce prioritizes communities that could use the donation most while recommending the nearest location, to reduce fuel consumption. With Agentforce, Good360 is routing disaster recovery donations 3x faster and lowering their carbon footprint by up to 20%.

[Read more](#) & [watch the film](#)

Grower engagement and regenerative agriculture:

Streamline localized guidance for farmers to support climate-resilient practices.

Agentforce Use Case Highlight

Smallholder farmers are the backbone of global food systems. To scale the adoption of climate-resilient practices, they need tools that make personalized support accessible. [Rare](#) is launching an AI-powered regenerative agriculture coach that delivers real-time, localized guidance based on crops, agroecological conditions, and weather data. The agent is grounded in behavioral science and tailored to farmers' local realities and cultural norms. It's expected to reduce staff time by 40% and support 5,000 farmers in its first phase.

[Read more](#)

Clean energy program support:

Optimize funding opportunities, improve customer service, and evaluate program performance to increase community resilience.

Agentforce Use Case Highlight

Clean energy programs don't just mitigate environmental impact on our planet; they help cut people's electricity bills and build community resilience. [Groundswell](#), a clean energy nonprofit, is using Agentforce to help scale community solar and support more communities. By augmenting its capacity with AI, Groundswell is tailoring programs, customer service, and funding opportunities to cut household energy burdens in half – helping up to 30,000 households save money while driving increased access to renewable energy.

[Watch on Salesforce+](#)

The future of AI agents for sustainability is promising, and through our [philanthropic efforts](#), [Ventures Impact Fund](#), and [Accelerator – Agents for Impact](#) initiative, we're proud to inspire, enable, and foster new ways for ecopreneurs to scale their work.

Salesforce's AI Sustainability Journey to Date

Our paths toward AI innovation and sustainability leadership have been intertwined since their inception, and sustainability remains a [guiding principle](#) as we enter the agentic AI era. While Salesforce does not have direct operational control over data centers or energy sources, our position in the value chain still provides us with opportunities to drive positive change.

To date, our commitment to AI sustainability has taken shape in various ways – reflecting our initial exploration and evolving understanding of the landscape. These include industry collaboration and leadership, optimized system architecture, and expanded environmental data sharing.

Let's take a closer look at some recent highlights in our AI sustainability journey, which continue to inform our evolving strategy.



Shaping the Future of AI Sustainability

Our 3-Pillar Framework

Today, we're further refining and expanding our approach to AI sustainability. Developed in close partnership across [Salesforce AI Research, Sustainability](#), and the [Office of Ethical and Humane Use](#), our approach focuses on three core pillars: smart demand, efficiency, and clean supply. We are sharing this framework in the spirit of collaboration and welcome others to build upon it. While we have more to learn, we believe that sharing our work will help us all improve and accelerate progress together.

Approach to AI Sustainability

Driving impact through smart use, efficient models, and clean energy

Smart Demand

Using AI wisely

Agentic Architecture

Agentforce

AI Transparency

★ AI Energy Score

Efficiency

Doing more with less

Small, Domain-Specific
Models

Efficient Data & Hardware

 **Data Cloud**

Clean Supply

Low-impact resources

Investing in
clean power



Collaborating to
advance the industry

Smart Demand

AI should be thought of as a precision instrument. Not every AI tool will be the best fit for every task. We should begin each project by asking how much AI, and of what type, is needed for success.

- **Design products wisely:**

Avoid unnecessary AI usage, use simpler techniques or algorithms, default to efficient models, and consider architectural approaches that solve challenges with less AI.

Agentforce is built to deliver high performance while aiming to mitigate environmental impact. Unlike [DIY AI](#) approaches that require energy-intensive model training for each customer, Agentforce is optimized out-of-the-box, potentially eliminating the need for costly, carbon-intensive training.

- **Use right-sized models:**

For many tasks, a compact, specialized model may offer similar accuracy to a frontier-scale system, at a fraction of the energy cost.

Our agentic architecture moves beyond a single, general LLM, enabling the use of smaller, more efficient AI models where possible. Within the Agentforce Trust Layer, we've finetuned efficient models for Toxicity Detection, Personally Identifiable Information (PII) Masking, and Prompt Defence. These models range from 44 to 135 million parameters in size – about 99% more efficient than frontier LLMs.

- **Be transparent and flexible:**

Give users visibility into AI's resource impact and foster flexibility in when and how data centers consume power.

We promote transparency in energy consumption through initiatives like the [AI Energy Score](#), a co-developed, first-of-its-kind benchmarking tool that enables AI developers and users to evaluate, identify, and compare the energy consumption of AI models. We offer educational resources via [Trailhead](#) to foster sustainability across our ecosystem and beyond.

- **Align incentives:**

Align cost structures to encourage efficiency. Usage-based pricing aligns pricing incentives with sustainability. Because costs map directly to compute, customers enjoy immediate financial upside when they reduce emissions.

We have [flexible, usage-based pricing](#) structure for Agentforce. This model creates a direct financial incentive for sustainability – when customers reduce their usage, they lower both their costs and their associated environmental footprint. To support this, analytics in the [Digital Wallet](#) and [Agentforce Command Center](#) empower customers to make data-driven decisions that are economical, and by extension, environmentally less impactful.



Efficiency

Once we know what intelligence is needed, efficiency focuses on how to deliver it. Efficiency techniques can compound: Small savings at the model, code, data, and hardware layers could add up to big reductions in energy, carbon, water, and cost.

- **Develop and deploy efficient AI models:**

Smaller, purpose-built models trained for specific domains can outperform large general-purpose models in both speed and energy efficiency.

Our AI Research team is pioneering domain-specific, efficient AI models, including: [xLAM](#) for function calling, reasoning, and planning, [SFR-Guard](#) for trust and safety, [SFR-RAG](#) for knowledge and intelligence, and [SFR-Judge](#) for evaluation and results improvement. These small models are designed to excel at specific tasks while consuming [less energy](#) than large-scale LLMs.

- **Leverage model optimization techniques:**

Quantization, distillation, and pruning techniques can help streamline models for lower compute without sacrificing quality.

Read about how our AI Research team used these techniques with the [xGen model series](#).

- **Optimize inputs:**

Concise, well-structured prompts use less energy and deliver faster results.

Agentforce leverages deeply integrated, structured data from across the Salesforce Platform, eliminating the inefficiency of searching through massive, unorganized datasets. This ensures high accuracy while minimizing compute.

- **Adopt green software practices:**

Think beyond the model. Optimize code for energy use, reduce idle compute time, and avoid unnecessary layers of abstraction.

See our [Green Code initiative](#) and [Sustainability Guide for Salesforce Technology](#) for more.

- **Consider total data center efficiency:**

Beyond individual components, it's essential to assess the efficiency of the data centers you use.

At Salesforce, we evaluate data centers using key metrics, including Power Usage Effectiveness (PUE) and Water Usage Effectiveness (WUE). These metrics are critical factors in our selection process, helping us ensure we partner with data center suppliers that operate efficiently. Shifting to Hyperforce, our next-generation public cloud infrastructure, has enabled [40% efficiency improvements](#) over collocated data centers.

- **Shift AI to the edge:**

By running smaller, more efficient AI models on smaller devices like laptops and phones, some computational load can be moved away from large data centers – saving energy and improving efficiency.

We're testing new paradigms of AI model usage, enabling small models to run locally, which can avoid energy-intensive cloud data centers while delivering security, speed, and cost benefits.

Clean Supply

While our position in the AI value chain complicates direct leverage over energy sources, there is still much we can do – and must do – to reduce our impacts and manage associated risks. No matter how efficient our systems are, they still need energy, water, and other natural resources. Clean supply focuses on making sure that these inputs come from more sustainable sources.

- **Sourcing from more sustainable suppliers:**

AI supply chains are vast, involving cloud providers, chip manufacturers, infrastructure operators, and software vendors. Embedding sustainability across procurement can drive change far beyond your own footprint.

At Salesforce, we have a robust supplier sustainability strategy. We ask partners [across our supply chain](#) to decarbonize and provide resources like our [Net Zero Toolkit](#) to aid their journey.

- **Invest in clean power and water:**

AI sustainability depends on scaling clean power and resilient watersheds to serve it.

We're investing in the energy transition and embedding sustainability across our operations. This includes procuring [renewable energy](#) or renewable energy certificates that are equivalent to the electricity we use globally on an annual basis, supporting nature-based solutions to protect watershed and ecosystem health and resilience, and actively investing in a clean energy future through initiatives like our [Ventures Impact Fund](#), [philanthropic grants](#), and [Salesforce Accelerator](#).

- **Advocate for systemic change:**

Engage with regulators and industry groups to shape the policies and infrastructure that will govern AI's environmental impact.

We developed and published [Sustainable AI Policy Principles](#) to guide industry legislation and drive collective progress. As early members of industry groups like the [Coalition for Sustainable AI](#), we collaborate with peers and advance the responsible use of AI for shared success.



Conclusion

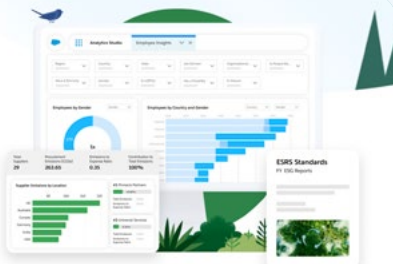
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Sustainability is not a barrier to innovation, but a foundation for it. We believe a holistic AI sustainability strategy that combines smart demand, efficiency, and clean supply can enable AI to help improve the state of the world.

We're proud of the progress we've made at Salesforce, but we know there's more work ahead. We're continuing to evolve and iterate on our approach – baselining and quantifying the sustainability improvements we've made to Agentforce, exploring strategic partnerships with hyperscalers, and more.

We know we can't do it alone – and we invite you to join us. Lean in on collaboration and transparency as we chart a better, more sustainable path for AI.

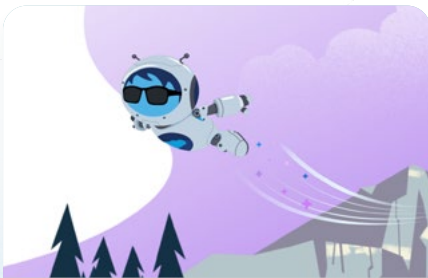
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