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Attachments

Schneider Electric - National AI R-D Strategic Plan RFI Response

Subject: Schneider Electric Response to RFI on the Development of the 2025 National Artificial Intelligence (AI) Research and Development Strategic Plan
Submitted by: Schneider Electric (Amanda Corrado, Federal Policy Manager)
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About Schneider Electric
Schneider Electric has been a leader in energy innovation in the United States for nearly two centuries. With a workforce of over 22,000 across more than 20 U.S.-based factories, facilities, and distribution centers, we are deeply embedded in the nation's industrial and energy landscape. In just the past decade, we have committed over $1 billion in U.S. investments to expand domestic capacity—strengthening the American manufacturing base and fortifying the supply chain for critical grid and energy technologies, including those essential to supporting the rapid growth of AI and data centers. Guided by market demand, an all-of-the-above energy strategy, and a dynamic policy environment, Schneider Electric is proud to contribute to America's energy independence, economic competitiveness, and skilled workforce development.

Schneider Electric is also uniquely positioned across the entire AI value chain. We power semiconductor fabrication facilities, manufacture essential data center infrastructure, and deploy AI internally to optimize our own industrial operations. Most critically, we develop and deliver AI-enabled solutions for our customers—spanning smart grids, microgrids, manufacturing, data centers, and federal facilities. Our technologies enable predictive maintenance, autonomous energy optimization, and real-time operational intelligence, helping to modernize infrastructure and enhance resilience. As a trusted partner to both industry and government, Schneider Electric brings deep technical expertise and experience to the national conversation on AI.

Schneider Electric appreciates the opportunity to contribute to the development of a National AI R&D Strategic Plan and to help shape a future where AI strengthens America's energy systems, industrial leadership, and global competitiveness. As a developer and deployer of AI solutions, our AI R&D initiatives are led through an AI Hub comprised of over 350 subject matter experts. The AI Hub serves as a global center of excellence utilizing AI technologies to transform and optimize energy management and industrial automation. Some examples include energy flexibility optimization for microgrids and homes, HVAC optimization for buildings, and predictive maintenance for electrical distribution equipment. When the AI Hub was launched in 2021, GenAI technology was not yet prevalent the way it is today. However, with the emergence of these new tools, we created a dedicated GenAI core team to work closely with internal stakeholders and external partners, like Microsoft and Amazon, to detect early application opportunities that can drive efficiency gains and help achieve sustainable growth. Today, we continue this journey with AI agents that can act as "digital teammates" to human experts, helping to automate complex data analysis and decision-making, thereby augmenting human capabilities and increasing competitiveness.

Additionally, last year we invested $2.4 billion globally to support R&D efforts, including the establishment of new data center and microgrid testing labs at our Innovation Hub in Andover,

Massachusetts, just outside our U.S. headquarters in Boston.[1] With this added investment, we have over 40 labs in Andover, including a Power Distribution Unit (PDU) lab to test high-powered voltage systems that are designed and developed for the AI data center market. The 1,500-square-foot microgrid laboratory includes four 90kW grid simulators and three 45kW solar simulators, simulating the power demands of roughly 300 homes and solar energy for 110 homes. The lab enables researchers to test fully functioning microgrids under real-world conditions, allowing for the accelerated design and delivery of microgrids for our customers. Advanced solutions like microgrids will continue to be key enablers of efficient and resilient energy systems necessary to support the growth of AI and create a foundation for leadership in AI innovation.

We recognize that partnerships across the private sector and public sector will be critical to the future of AI in the United States, and Schneider Electric is particularly well-positioned to share how AI R&D efforts in energy management and industrial applications are crucial to America's national security and economic competitiveness.

I. AI for Energy Management and Optimization

As AI becomes a cornerstone of economic and technological progress, it is simultaneously emerging as a major driver of electricity demand particularly through energy-intensive applications like large-scale model training and data center expansion. However, AI also holds unparalleled potential to optimize and reduce energy consumption, enhance grid reliability, and reduce energy costs for American homes and businesses. Below are key technology areas that merit federal investment:

a. AI for Grid Flexibility and Distributed Energy Resource (DER) Management

Today's grid is increasingly complex as we integrate more distributed energy resources, enable bi-directional power flows, and accommodate the rapid electrification of our aging and outdated power infrastructure. These modern complexities – along with increasingly unpredictable extreme weather events – have made the challenge of balancing power supply and demand exceedingly difficult. As DER penetration increases, AI is essential to avoid system instability and to minimize reliance on costly and time-consuming infrastructure upgrades. R&D efforts in this space should prioritize reinforcement learning for dynamic grid balancing and multi-agent optimization. Schneider Electric is actively contributing to this kind of innovation in a variety of ways, including through our recent announcement of a multi-year initiative to build an integrated agentic AI ecosystem. This ecosystem would enable digital agents, representing a new kind of software designed to work independently or collaboratively with clients and consultants, to anticipate needs and adapt to complex environments in real time, ushering in a new era of automation, energy management, and efficient resource utilization while leveraging

[1] Schneider Electric. (2025, February 27). *Schneider Electric Opens New Data Center and Microgrid Testing Labs at Global R&D Center in Massachusetts* [Press release]. https://www.se.com/us/en/about-us/newsroom/news/press-releases/schneider-electric-opens-new-data-center-and-microgrid-testing-labs-at-global-r-d-center-in-massachusetts-67b4ab53ee870308eb057e31

computational efficiency. The objective is to build systems that use energy more efficiently without compromising performance.

This announcement builds on existing initiatives such as our Resource Advisor Copilot which leverages Large Language Model (LLM) technology through Microsoft Azure OpenAI to equip customers with enhanced data analysis, visualization, decision support, performance optimization, and the ability to seamlessly process intricate industry knowledge and Resource Advisor system information.[2] Furthermore, AI-enabled microgrids continue to be a critical solution for DER management and smart energy consumption. These systems optimize the buying, selling, and storage of energy, enabling them to align their utilization of resources with the most cost-effective decisions while providing reliability benefits that bolster the grid during times of peak demand or instability.[3] Federal investment is essential to accelerate the development and responsible deployment of these applications, ensuring that AI contributes to, rather than undermines, national goals for energy affordability and reliability.

b. Predictive Maintenance and Fault Detection

One of the most impactful applications of AI in energy management is predictive maintenance and fault detection, which entails the use of machine learning and advanced analytics to detect anomalies, anticipate equipment failures, and optimize asset performance before costly disruptions occur. These solutions rely on high-resolution sensor data, digital twin models, and AI algorithms trained to identify subtle deviations in system behavior, enabling operators to act proactively. Platforms that harness cloud-based analytics and AI-driven diagnostics to monitor critical electrical distribution and energy infrastructure help customers reduce unplanned downtime, extend equipment life, and enhance operational safety. At Schneider Electric, solutions such as digital twins and asset advisor systems are doing just that and have been found to cut commissioning time by 60% and reduce time-to-market by 50% by improving the design and build processes.[4] As energy systems grow more complex, the ability to maintain reliability through real-time, AI-powered fault detection becomes mission-critical. Yet many of these AI models require access to large, diverse datasets and robust validation environments, which are often out of reach for small utilities or facilities. Federal investment is essential to improve access to these capabilities through shared testbeds, open data initiatives, and funding for scalable, interoperable AI solutions to help ensure that cost-saving predictive maintenance across America's energy infrastructure becomes the industry standard.

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[2] Schneider Electric. (2023, August 29). *Building Sustainability's Digital Future with EcoStruxure Resource Advisor Copilot: Schneider Electric's Latest AI Advancement* [Press release]. https://www.se.com/ww/en/about-us/newsroom/news/press-releases/building-sustainability%E2%80%99s-digital-future-with-ecostruxure%E2%84%A2-resource-advisor-copilot-schneider-electric%E2%80%99s-latest-ai-advancement-64eca1cf6053e3d1d90ab96e

[3] Rambach, P. (2023, January 30). Store, sell, or consume? AI-powered energy decisions for prosumers. *Schneider Electric*. https://blog.se.com/digital-transformation/artificial-intelligence/2023/01/30/store-sell-or-consume-ai-powered-energy-decisions-for-prosumers/

[4] Schneider Electric. (2022, May 31). *Schneider Electric launches digital twin software solution* [Press release]. https://www.se.com/ww/en/about-us/newsroom/news/press-releases/schneider-electric-launches-digital-twin-software-solution-629597b711e12072551ef656

c. Building Energy Management

According to the Department of Energy's Building Technologies Office (BTO), buildings account for roughly 40% of total U.S. energy consumption and 74% of electricity use.[5] As the U.S. faces unprecedented growth in electricity demand, America's commercial building stock cannot remain an underutilized contributor to grid reliability and energy resilience. AI-enabled building energy management systems are essential to realizing this transformation. These systems leverage real-time data and machine learning to autonomously optimize HVAC, lighting, and power systems, allowing buildings to reduce load during peak periods, respond to grid signals, and avoid unnecessary energy use without compromising occupant comfort or safety. Schneider Electric leads in the development of these capabilities through the EcoStruxure Building Advisor platform, which uses AI-driven analytics and diagnostics to continuously monitor building performance and identify operational improvements. In our R&D programs—including innovation partnerships hosted at Greentown Labs, where Schneider Electric is a founding partner—we are helping to advance next-generation algorithms that enable buildings to behave as dynamic energy assets capable of grid-interactive demand response and self-optimization.[6] Federal investment is critical to scale these capabilities across the nation's diverse building stock, particularly in under-resourced public buildings, rural hospitals, and smaller commercial sites, to ensure that the built environment is supporting rather than straining our evolving energy system. Strategic support for AI R&D in this area will bolster American energy resilience, reduce stress on aging infrastructure, and improve economic productivity by lowering operational costs across sectors.

II. AI in Industrial Automation and U.S. Manufacturing Competitiveness

AI is not just a tool for efficiency, but a critical enabler of reshoring, supply chain resilience, and workforce renewal in the U.S. manufacturing sector. The following areas highlight AI applications in industrial settings that should be incorporated as strategic priorities within the National Roadmap to advance American manufacturing competitiveness:

a. AI for Smart, Flexible Manufacturing Systems

AI-enabled predictive maintenance and fault detection tools are transforming industrial operations by reducing unplanned downtime, increasing asset longevity, and enabling a more resilient and cost-effective manufacturing base. These technologies use machine learning to detect anomalies in equipment behavior and forecast maintenance needs before failures occur, thereby minimizing disruptions and reducing dependence on manual inspections or legacy expertise. These capabilities are integrated into our

[5] Department of Energy. (2023, August 7). *DOE Announces $46 Million to Boost Energy Efficiency and Slash Emissions in Residential and Commercial Buildings* [Press release]. https://www.energy.gov/articles/doe-announces-46-million-boost-energy-efficiency-and-slash-emissions-residential-and

[6] "Schneider Electric R&D collaborative funded projects" Schneider Electric, 2024, https://www.se.com/ww/en/about-us/innovation/r-and-d-projects/ Accessed 27 May 2025

EcoStruxure Asset Advisor platform which synthesizes real-time data from sensors, programmable logic controllers (PLCs), and industrial control systems to deliver actionable insights that optimize uptime and improve service efficiency. These solutions are deployed at our Lexington, Kentucky Smart Factory which serves as a model for advanced manufacturing and is recognized by the World Economic Forum as a Lighthouse Smart Factory for its leadership in an end-to-end digital transformation that included AI-enabled predictive maintenance and industrial analytics.[7] These capabilities are particularly vital for small and mid-sized manufacturers that often lack the engineering bandwidth to monitor and maintain complex systems at scale. Federal investment is necessary to accelerate the development, validation, and accessibility of predictive maintenance AI to achieve widespread adoption across the domestic supply chain. These tools are foundational to reducing the cost and complexity of industrial operations and are essential in supporting the Administration's goals to bolster domestic manufacturing and global competitiveness.

b. Human-AI Collaboration and Workforce Augmentation

AI-enabled tools that augment human workers are emerging as essential solutions to address persistent labor shortages and skills gaps across the U.S. manufacturing base. From real-time decision support systems to generative AI assistants that streamline complex workflows, these technologies empower operators to make faster, better-informed decisions and enable less-experienced workers to perform roles that have historically required a depth of institutional knowledge. Schneider Electric is advancing this frontier through platforms like EcoStruxure Augmented Operator Advisor, which combines AI and augmented reality to guide frontline technicians through maintenance procedures, troubleshoot equipment, and optimize production with contextual digital overlays. Another way that we are driving innovation in this space is through the incorporation of a generative AI co-pilot, embedded directly into our EcoStruxure Automation Expert (EAE) platform. This co-pilot allows engineers to generate PLC code, validate it, simulate it, and even test it, all before deploying any physical hardware. Unlike public LLMs like ChatGPT, this AI model operates in a secure offline environment, which ensures that proprietary code and industrial data remain protected.[8]

These tools are not designed to replace humans, but to enable and elevate them—shifting manufacturing roles away from repetitive tasks and toward supervisory, digital, and systems-level work. This transition is critical as the U.S. manufacturing sector contends with a projected shortfall of 2.1 million skilled workers by 2030.[9] A realization of the Administration's manufacturing growth ambitions will require factories to adopt

[7] Tamoud, M. (2021, March 18). How an unassuming 60-year-old manufacturing plant achieved World Economic Forum Lighthouse Smart Factory status. *Schneider Electric*. https://blog.se.com/supply-chain/2021/03/18/the-story-of-the-lexington-kentucky-manufacturing-plant/

[8] "How Schneider Electric is Transforming Industrial Automation with Generative AI and Digital Twins." (2025, May 20). *Blue Sky Robotics*. https://www.blue-sky-robotics.com/post/how-schneider-electric-is-trans-forming-industrial-automation-with-generative-ai-and-digital-twins

[9] Ashton, H. Reyes, V. Moutray, C. (2021, May 4). "Creating Pathways for Tomorrow's Workforce Today." *Deloitte*. https://www2.deloitte.com/us/en/insights/industry/manufacturing/manufacturing-industry-diver-sity.html

technologies that enable a more advanced, tech-savvy workforce to maintain competitiveness. Federal investment in AI R&D that enhances human capability with these tools is essential to closing the gap, revitalizing interest in modern manufacturing careers, and creating new high-value pathways into the industrial workforce.

c. AI for Predictive Quality and Process Optimization

AI-driven quality control and process optimization systems are transforming how manufacturers achieve efficiency, precision, and cost competitiveness. These systems apply machine learning algorithms to analyze sensor data, process variables, and production outcomes in real time to detect deviations, anticipate quality issues, and recommend process adjustments before defects occur.[10] Our R&D teams are focused on scaling these capabilities through hybrid AI models that blend physical system understanding with data-driven learning, ensuring robust performance even in dynamic, low-data, or edge-constrained environments.[11] As reshoring efforts accelerate and domestic manufacturers ramp up production of semiconductors, batteries, critical infrastructure, and more, AI-enabled quality and process systems will be necessary to meet high product standards without high-cost labor inputs. Federal investment is needed to accelerate foundational research, bridge gaps in education on AI for manufacturing systems, and to ensure small and mid-sized manufacturers can access and adopt these innovations. These tools are not just productivity enhancers, but prerequisites for restoring America's industrial base at scale and speed.

III. Federal Role and Recommendations

The private sector alone cannot address the data, computational infrastructure, and validation requirements for many of the use cases discussed above. As such, the federal government can be an effective partner in these efforts by:

- Funding open-source tools and shared data platforms such as DOE's ARPA-E Grid Optimization Challenge model to ensure the accessibility and utilization of these resources.
- Launching AI-for-energy testbeds in collaboration with national labs, utilities, technology providers, and system operators.
- Prioritizing funding for consortium partners that are driving innovative partnerships to advance the development, demonstration, and implementation of advanced AI solutions for effective energy management. This may include targeted efforts around strategic priorities such as the control systems and software that enable data center flexibility in an effort to support the growth of AI and data centers in the U.S.

Likewise, federal investment in AI for industrial automation should be considered foundational to national security and economic competitiveness. Federal R&D investments should prioritize:

[10] Schonfub, B. (2024, October 25). "How AI is transforming the factory floor." *World Economic Forum*. https://www.weforum.org/stories/2024/10/ai-transforming-factory-floor-artificial-intelligence/

[11] Schneider Electric / AVEVA. (2024, August 7). Can the Industrial Sector use digital and AI integration as a competitive advantage? *Schneider Electric*. https://blog.se.com/industry/2024/08/07/can-the-industrial-sector-use-digital-and-ai-integration-as-a-competitive-advantage/

- Support of AI R&D for U.S.-based manufacturing testbeds, especially for small and medium enterprises (SMEs).
- Inclusion of AI-enabled manufacturing and workforce augmentation in CHIPS and Science Act implementation and Manufacturing USA programs.
- Funding public-private consortia that address validation, standards, and cybersecurity for industrial AI, including through ongoing efforts led by the National Institute of Standards and Technology (NIST).

AI can and should be a force multiplier for American energy resilience and industrial growth, and Schneider Electric stands ready to support these efforts through continued R&D, public-private partnerships, and scalable deployment of trustworthy AI solutions. We believe there are many opportunities to partner on R&D with the USG to advance mutual goals for AI innovation including via existing or future R&D tax credits, grants, or associated programs. We will continue proactive outreach on the programs that we believe can strengthen our common mission and solve key problems facing the nation.
