Testimony of Sreedhar Sistu, *Vice President, Artificial Intelligence Offers, Schneider Electric*
Before the House Energy and Commerce Committee
Subcommittee on Energy, Climate, and Grid Security
The Role of Artificial Intelligence in Powering America's Energy Future
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Chairman Duncan, Ranking Member DeGette, Chairwoman Rodgers, Ranking Member Pallone, and members of the Committee, thank you for the opportunity to appear before you today.

I am Sreedhar Sistu, Vice President of Artificial Intelligence Offers at Schneider Electric.

Schneider Electric is a global energy management company and manufacturer of connected products and solutions that help ensure more safe, resilient, and energy-efficient homes and businesses. We employ more than 19,000 Americans and have more than forty manufacturing facilities, R&D centers, sales offices, and distribution centers across the U.S. Our connected products and world-class software work together to increase efficiency, reliability, and sustainability across several use cases and all segments of infrastructure from the grid to industrial facilities, including our own factories. Currently, our products are in one million buildings worldwide, including half of hospitals, over 36,000 water and wastewater installations. We also hold the largest market share in providing secure, uninterrupted, and sustainable power to data centers. In fact, you cannot be online for more than 4 hours without traveling through one of the data centers that Schneider Electric powers – and that is likely to grow exponentially with further adoption of artificial intelligence.

With several years of experience in digital technologies, including machine learning and AI, Schneider Electric is a leader in automation and digital transformation in the energy industry. The topic before us today: the role AI plays in America's energy future, is critically important and I applaud the Committee for scheduling today's hearing. We appreciate the opportunity to testify as leaders in this space. Our customers leveraging Schneider Electric digital and AI products can maximize energy savings. We like to say that electrification plus digitization equals sustainability because we know that it is only by incorporating and leveraging innovative technology – and Artificial Intelligence is at the core of this technology – that we can truly manage our energy in ways we have never done before in this nation, and in ways that will transform our energy use entirely and for the better.

I want to focus my testimony on three main themes for the Committee's consideration:

First, the role of AI in responding to rising grid demand and increasing the resiliency and security of our nation's grid.

Second, the potential for AI to drive decarbonization and emissions reduction efforts.

And, **finally**, the power consumption requirements AI demands and how we can mitigate them.

I will also highlight a few cautionary messages about the use of Artificial Intelligence, namely areas where we will want to ensure a more watchful eye and discerning role for policymakers.

AI's Role in Responding to Rising Grid Demand and Increasing Grid Resiliency and Security

Our modern grid is facing mounting demand that it was not built to meet. The combination of an increasingly complex grid coupled with aging and analog infrastructure is resulting in power outages and

grid disruptions, contributing to rising energy costs, and decreasing grid security. This is exacerbated by increasing extremes in weather events and disasters, but also an incredible growth in demand for electrification. In fact, electricity demand in the U.S. is expected to increase by 38% by 2035 according to the Rapid Energy Policy Evaluation and Analysis Toolkit.[1]

While it may have been easier to track, forecast, and manage power consumption needs two decades ago, new variables have made the grid more diffuse and difficult to manage without the help of digital tools, like AI. Luckily – we have tools now in the space of AI, including Virtual Power Plants (VPPs), that can solve for the challenges to the grid, but they must be deployed at a much more rapid scale. This will rely upon increased incentives, regulatory certainty, and further guidance from the Department of Energy as it oversees approximately $97B in clean energy funding including investments in technologies like microgrids, VPPs, smart meters, and more.[2]

- First, the **renaissance of digital and clean energy transformation** has spurred development and adoption of smart devices and renewable energy, often at the hands of the consumer themselves. We call these consumers "**prosumers**" as they produce, manage, and consume energy created through their own means.[3] A lack of Federal consensus around how best to maximize prosumers has left them to navigate a patchwork of state laws that often fail to consider the digital transformation of energy and create varying levels of consumer uncertainty and ambiguity.
- Second, rising instances of **extreme weather events and natural disasters** have the potential to knock power out for days or weeks and the grid must be prepared to respond to those crises.
- And, finally, more Americans are **working from home**, often splitting days between being in the office and at home, after the COVID pandemic meaning it is more difficult to forecast when energy consumption is at its highest and lowest ebbs.

Instead of the traditional top-down energy distribution landscape we are used to, the grid now must be prepared to deal with bidirectional energy flows that change through the day and night, to bounce back from blackouts and grid disruptions, and to handle intensified energy needs post-COVID and the rise of smart devices, electric vehicles, and other electrified products Americans are eager to adopt.

This shift is not new, but the consequences of failing to adapt to it are becoming sharper. That said, AI is already helping stakeholders better forecast power consumption. For example, electric utilities and microgrid managers can leverage existing AI technologies to forecast short-term energy consumption more quickly and efficiently across the entire geography of their grids. Further, AI-driven models in practice learn from both past energy consumption patterns and from real-time, live situations.[4]

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[1] *See* Rapid Energy Policy Evaluation and Analysis Toolkit (REPEAT), *Data Results*, Princeton University, 2023 at https://repeatproject.org/results?comparison=benchmark&state=national&page=1&limit=25#data.
[2] *See* Department of Energy, *Clean Energy Infrastructure Program and Funding Announcements* at https://www.energy.gov/infrastructure/clean-energy-infrastructure-program-and-funding-announcements.
[3] *See* Khaled Fakhuri and Tracy Price, *How to Fast-track the Rise of the Prosumer*, Schneider Electric, Apr. 7, 2023 at https://blog.se.com/sustainability/2023/04/07/how-to-fast-track-the-rise-of-the-prosumer/.
[4] *See* Olivier Cognet, *Use Smart Digital Solutions Forecasting Tools to Manage Power Grids,* Schneider Electric, Jul. 15, 2020 at https://blog.se.com/energy-management-energy-efficiency/2020/07/15/use-smart-digital-solutions-forecasting-tools-manage-power-grids/.

Leveraging digital grid and AI technology can more accurately and granularly account for changes taking place withing a grid. For example, AI-led technology can account for the installation of new transformers at a certain location or the intricate nuances in energy demand, automatically feeding these new realities into the model on an ongoing basis. Data aggregated and used by AI could include data from transformers, subscriber behavior, and data around weather-related and calendar date-based patterns of consumption. The AI gets smarter as it processes more data, and automatically reconfigures itself as changes occur across the grid.[5]

AI also dispels of the "one-size-fits-all" approach of energy distribution and can account for every locality within a larger grid, ensuring energy use can be optimized based on factors specific to a town in your district rather than an entire state.

Existing AI technologies can better forecast and optimize energy consumption at a local level, allow microgrids to island themselves from the grid in response to grid disruptions, and give consumers the power to keep their lights on. Paving the path for AI to bring our grid into the 21st century is crucial to the future of our nation's energy landscape.

AI's Role in Driving Decarbonization and Reducing Greenhouse Gas Emissions

While maintaining grid resiliency and security will help maintain power in a time of disruption, increasing energy efficiency and sustainability on the front end will reduce costs, reinforce the grid, and encourage consumers to use cleaner energy wisely.

AI can support energy efficiency, sustainability, and decarbonization goals in a variety of use cases including industrial plants, data centers, transportation, schools, homes, and buildings.

The World Economic Forum estimates that digital technologies – including AI-driven solutions, at scale, could deliver one-fifth of the emissions reductions needed to hit net-zero targets by 2050, especially when adopted by the highest-emitting sectors: transportation, materials, and energy.[6] Efforts to encourage the adoption of digital technologies at the Federal and state levels will get the U.S. closer to its climate goals and save taxpayer dollars.

In fact, these technologies and upgrades can – and often do - end up paying for themselves by modeling how consumers can use energy savings to pay for similar improvements and, over time, extend their operational budgets for other sustainability efforts.

Not only can prosumers optimize their energy use leveraging AI, but they also maximize the efficiency of their production and supply. For example, an AI-driven microgrid can enable prosumers to optimize the times at which they buy, sell, or store the energy they've produced, ensuring they choose the cheapest, most climate-friendly times. We use this technology at our own facilities. At our North American R&D hub in Boston, the facility's advanced microgrid includes 1,379 solar modules with photovoltaic inverters for on-sire power generation. By leveraging cloud-based analytics, the facility aggregates data from

[5] *See* Olivier Cognet, *Use Smart Digital Solutions Forecasting Tools to Manage Power Grids,* Schneider Electric, Jul. 15, 2020 at https://blog.se.com/energy-management-energy-efficiency/2020/07/15/use-smart-digital-solutions-forecasting-tools-manage-power-grids/.

[6] *See* Manju George, Karen O'Regan, and Alexander Holst, *Digital solutions can reduce global emissions by up to 20%. Here's how*, World Economic Forum, May 23, 2022 at https://www.weforum.org/agenda/2022/05/how-digital-solutions-can-reduce-global-emissions/.

weather forecasts and other operational information sources to optimize energy performance across the facility's entire energy asset portfolio – from solar to storage to electric vehicle charging. As a result, the hub generates over 520,000 kWh of electricity per year – the equivalent of removing annual greenhouse gas emissions from more than 2,400 passenger vehicles.[7]

Another example is the University of Iowa, which avoided $900,000+ in yearly energy waste by leveraging building management systems and AI. Home to over 30,000 students and dozens of buildings the university generates massive amounts of energy data that can be used to drive sustainability and energy efficiency across the campus. As a result of their investment in AI, the university was able to move from identifying issues based on occupant complaints to detecting faults automatically before they caused issues such as overly warm or cool rooms.[8]

The university has formed an analytics response group that routinely discusses the AI's recommendations and determines which tasks should be prioritized. Their new buildings analytics solution proved a worthwhile investment when it quickly detected an undiscovered fault: over the winter, a mechanical fault was causing the HVAC system to essentially fight against itself. The system had to work overtime but managed to keep the room temperature within a normal range, leaving the issue went unnoticed. The fix – discovered and recommended by AI – prevented the university from incurring thousands of dollars in monthly energy costs.[9]

There are countless additional stories of how consumers can save on their energy bills and operate more sustainably and cleanly leveraging digital technologies and AI, and those stories will only multiply with continued investment and interest in the technology.

AI's Power Consumption Requirements and the Need for Strategic Investment

Finally, it is critical the Committee consider the power consumption needs of America's AI future. We estimate that AI represents 4.3 GW of power demand today, and we project that to grow to 13.5 GW to 20 GW by 2028.[10] With a grid that is already straining to meet existing demand, it is imperative this Committee consider how strategic, future investments in physical infrastructure can support the growth of AI in America, which will – in turn – support the future of our grid.

Today, most data centers can support peak rack power densities of about 10 to 20 KW. Deploying tens or hundreds of racks at greater than 20 KW presents physical infrastructure challenges to data center operations. To fully support the digital transformation and America's AI future, investments must be

[7] *See* Philippe Rambach, Chief AI Officer, Schneider Electric, *Store, sell, or consume? AI-powered energy decisions for prosumers*, Schneider Electric, Jan. 30, 2023 at https://blog.se.com/digital-transformation/artificial-intelligence/2023/01/30/store-sell-or-consume-ai-powered-energy-decisions-for-prosumers/.
[8] *See* Andrew Tanskey, *How AI can find out what's hiding in your building's data*, Schneider Electric, Aug. 12, 2020 at https://blog.se.com/buildings/building-management/2020/08/12/how-ai-can-find-out-whats-hiding-in-your-buildings-data/.
[9] *See* Andrew Tanskey, *How AI can find out what's hiding in your building's data*, Schneider Electric, Aug. 12, 2020 at https://blog.se.com/buildings/building-management/2020/08/12/how-ai-can-find-out-whats-hiding-in-your-buildings-data/.
[10] Victor Avelar, Patrick Donovan, Paul Lin, Wendy Torell, and Maria A. Torres Arango, *The AI Disruption: Challenges and Guidance for Data Center Design*, Schneider Electric – Energy Management Research Center, Sep. 7, 2023, at 2.

made to ensure data centers can retrofit to meet AI power needs, adopt both air- and liquid-cooling to support AI clusters; and leverage software tools and AI to optimize data center operations.[11]

Solutions Available Today

I want to highlight a few examples of how we are conquering today's energy challenges with AI-driven solutions like virtual power plants (VPPs), data historians, and smart electrical panels.

- **Virtual power plants** are aggregated networks of distributed energy resources (DERs) that can be remotely controlled and operated to balance the supply and demand of electricity on the grid. A VPP combines devices that store, generate, and shift electricity to help meet peak demand in place of a conventional power plant.[12] In 2022, Schneider Electric acquired **AutoGrid**, an early pioneer of climate AI and product of DOE investment. AutoGrid is the leader in AI-driven optimization for DERs, providing software that empowers energy consumers, creators, and distributors with a smart orchestration platform giving them access to electric vehicles, batteries, rooftop solar, utility scale wind and other DERs. This software allows consumers to predict, optimize, and control in real-time millions of energy assets at an unprecedent scale. Today, AutoGrid's platform is managing over 6,000 MW of VPPs in fifteen countries.[13]
- **Data historians** allow consumers to capture and store industrial data to power predictive and self-service analytics, optimizing a facilities ability to detect performance issues, optimize processes, and make smarter decisions.[14] This technology makes the invisible consumption of energy visible to the energy management officers who manage Utilities, Mines, Water Wastewater treatment facilities, and other heavy industrial processing factories. **AVEVA**, a company Schneider Electric acquired in 2023, is a leading global industrial software company focused on providing Software-as-a-Service (SaaS) for the industrial sector. AVEVA's AI-based solutions afford facility managers the agility to respond to changing conditions in real-time, increase safety, and optimize energy use.
- **Smart electrical panels** put the power of energy management directly in the hands of homeowners. Schneider Electric's Pulse smart electrical panel empowers homeowners to learn what is increasing their electricity bill, automate their usage to optimize savings, choose what to power during outages, and connect their home more completely. This system leverages AI to maximize energy efficiency, aggregate energy consumption data, and make recommendations directly to the consumer.

With additional investment and deployment, AI could answer many of our most challenging energy questions. As Congress considers AI regulations and strategies, it is critical it safeguards the ability of industry to innovate and aids in spurring research and development and commercialization of AI-driven solutions.

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[11] *Id.* at 5.

[12] Peter Asmus, *What is a Virtual Power Plant (VPP)?*, AutoGrid, Mar. 15, 2023 at https://blog.auto-grid.com/what-is-virtual-power-plant/.

[13] AutoGrid, *Climate-AI Pioneer AutoGrid to be Acquired by Schneider Electric to Accelerate Energy Transition*, May 11, 2022 at https://www.auto-grid.com/news/climate-ai-pioneer-autogrid-to-be-acquired-by-schneider-electric-to-accelerate-energy-transition/.

[14] AVEVA, *AI-based Solutions* at https://www.aveva.com/en/solutions/digital-transformation/artificial-intelligence/.

Risks and Vulnerabilities

The adoption of modern, connected technology is not without risks and it is necessary that Congress consider those potential risks of AI in energy. As a leader in energy automation for over two decades, Schneider Electric has led the pack on ensuring the AI we use and develop is cybersecure, respects users' personal data, and is used ethically.

We must be sure Americans are protected as our world grows increasingly digitized. Consumers must have confidence that they can trust in the system and its technologies, and we believe we can protect consumers while also spurring innovation in the years to come.

Cybersecurity of AI is one of the foremost risks Congress should consider. As a technology provider, we take cybersecurity risks extremely seriously and apply the highest standards of cybersecurity. As industry develops and adopts cybersecurity standards for AI, government should work alongside us to both ensure these standards support the government's goals and are referenced in policy to ensure alignment across all AI-deployment.

Protection of consumer data must also be a critical focus of AI regulation. Industry must apply and exceed standards for data protection and, like cybersecurity standards, should work alongside government to develop meaningful data privacy and protection standards for AI applications.

Finally, as we continue to grapple with supply chain constraints, Congress must consider not only how AI development and deployment may place further demands on America's supply chains, but also how AI can bolster supply chains here in the United States.

For example, Schneider Electric employs a "self-healing" supply chain platform that uses adaptive machine learning, big data, and IoT to optimize performance-related parameters in real-time, suggests ways to improve financial and operational performance, and predicts business outcomes.[15] As we stand up and reinforce U.S. critical supply chains, leveraging AI tools can help ensure critical components and products are available when we need them.

The supply needs of AI are not to be understated. Data requirements associated with AI are driving new chip and server technologies. Power requirements associated with AI will drive new data center needs for uninterruptible power systems and power racks capable of handling AI clusters. Today's data centers are not prepared to manage AI's data and power requirements. To ensure the U.S. remains a leader in AI, Congress must ensure the movement is well-resourced, incentivizing further investments in U.S. supply that will support AI buildout.

Earlier this year, we cut the ribbon on our newest U.S. manufacturing facility in El Paso, Texas, which will bring the total number of Schneider Electric jobs in El Paso to 1,500 and is part of a $300 million + U.S. manufacturing investment we are making to support our customers. Our El Paso plant is our largest manufacturing footprint in the country and will produce medium voltage switchgear serving the data

[15] *See* Gartner, *Schneider Electric Wins 2022 Supply Chain Award*, 2022.

center market segment.[16] Congress can and should work with industry to discern the future needs of the data center market and propel additional investments in supply.

The role of industry in supporting American innovation and leadership in AI cannot be understated and we appreciate the opportunity to continue this dialogue with each of you. Thank you for having me today and I look forward to our discussion.

[16] *See Schneider Electric Unveils Latest Texas Manufacturing Plant as Part of a $300 Million Investment in U.S. Manufacturing,* Sep. 14, 2023 at https://www.prnewswire.com/news-releases/schneider-electric-unveils-latest-texas-manufacturing-plant-as-part-of-a-300-million-investment-in-us-manufacturing-301928481.html.