

Artificial intelligence for energy transition

How AI can support sustainability today

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the energy transition



Introduction

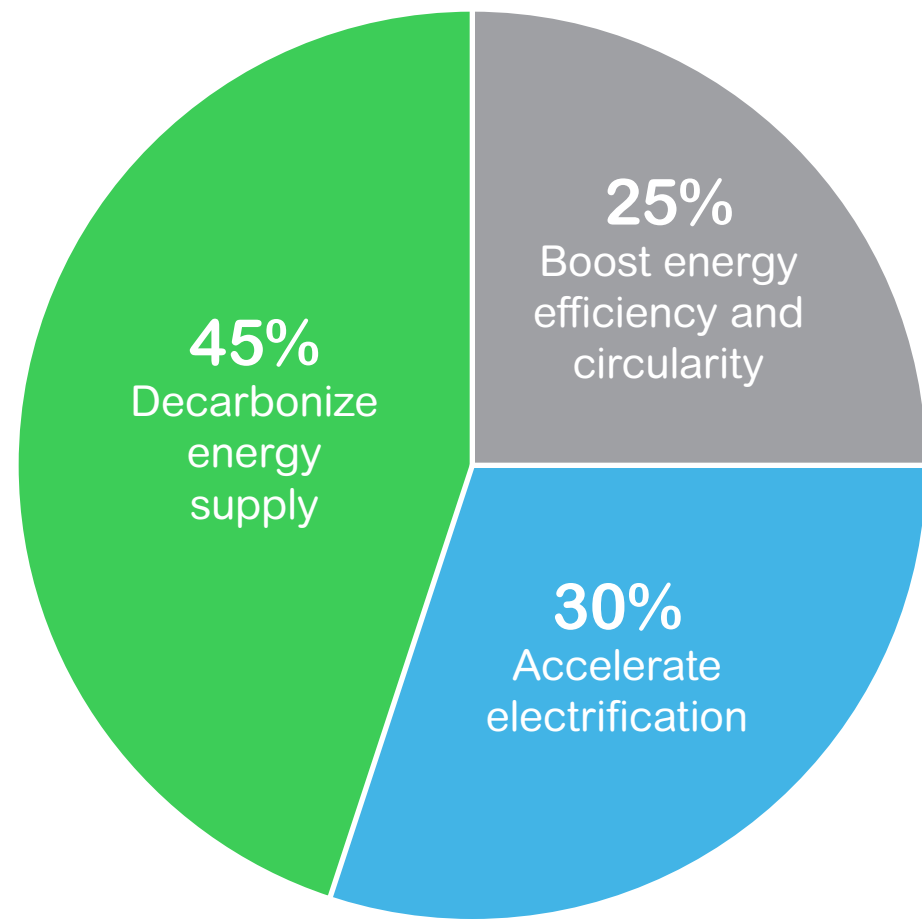
Transitioning toward sustainable, low-carbon energy is now a necessity, not a choice.

As we face the challenges of extreme weather events, resource scarcity, and environmental risks, it's crucial to reassess our approach to sustainability and energy consumption.

The Earth Overshoot Day and the IPCC's warnings about rising global temperatures emphasize the urgency of the situation. To tackle climate change, it's essential to cut down greenhouse gas emissions and adopt sustainable business practices.

Organizations and governments worldwide are now actively pursuing cost-effective and innovative methods to transition to cleaner energy sources and reduce carbon emissions, relying on both existing and new technologies to drive this change.

By using existing technologies, we can reduce 70% of CO2 emissions and save 10-15Gt CO2 annually.



Source: [Schneider Electric Sustainability Research Institute](#)



The role of AI is growing, becoming an inseparable part of our life and work

Meanwhile, considered to be as disruptive as PCs and the Internet in the past, AI continues to gain traction.¹ It is becoming an integral part of businesses across various industries - revolutionizing operations and strategies.

This growth is additionally driven by generative AI, which seems to be entering many business domains. As stated by McKinsey, in 2023, 79% of respondents who took part in the survey had had at least some exposure to gen AI, and 22% said they had been using it in their work.²

Even though AI is yet to be widely adopted by businesses, AI-powered solutions based on data, algorithms, and machine learning techniques are seen by companies as a gateway to streamlined processes, enhanced customer experiences, and unprecedented levels of efficiency.³



Can we use AI to solve sustainability challenges?

AI brings more benefits than just productivity gains and time savings. AI can be of the crucial accelerators of the energy transition. **It is not a technology that can solve all challenges alone, but one without which other technologies and the people who use them for sustainability, are unable to act as effectively.** Why? Simply put, AI makes decision-making smarter, faster, and more precise. Through AI capabilities like monitoring, analyzing, and forecasting based on big data, concrete actions such as responsible and thoughtful use of resources can be made easier and more automated.

Can we use AI to address sustainability challenges? Yes - AI can help identify decarbonization solutions. For example, it can help reduce the carbon emissions of buildings, allowing organizations to get closer to their net-zero objectives.



Three ways AI can support the energy transition

We firmly believe that AI has an important role to play in enabling the energy transition. While AI presents numerous possibilities, our primary focus lies in addressing the demand side of the energy equation. When used responsibly, **AI solutions have the potential to reduce carbon emissions.**

In this paper, you will learn how **AI can be used today to empower** decision-makers to **accelerate sustainability efforts:**



AI

for efficient energy use



Optimizing energy to reduce CO₂ emissions

The first way to reduce carbon emissions is to reduce energy consumption.

Most processes, either industrial processes like manufacturing, or building processes, such as heating or cooling, need to be modeled to be optimized. By creating a model of a process, one can understand key drivers of energy consumption, detect and fix consumption anomalies, and elaborate several scenarios to reduce the energy needs for the same or similar outcome.

Manually constructing a complete energy model of a building is a daunting challenge that would require a significant amount of human and financial resources. **With AI, and especially machine learning, we can build a predictive model much faster, based on the data measured by a variety of sensors.**



Use Case: Revolutionizing underground fault location accuracy with AI

Consolidated Edison operates one of the world’s largest energy delivery systems providing energy for the 10 million people in New York. Quickly locating underground faults in peak seasons like hot summers helps prevent widespread outages, reducing the environmental impact and air pollution from backup diesel generators used during outages.⁴

Goal: Con Edison used physics-based equations to calculate distance-to-fault, which worked well for single-phase faults but not for multi-phase faults. They wanted to improve accuracy in locating single- and multi-phase underground faults, also known as reactance-to-fault (RTF), on their medium-voltage feeder cables (13, 27, and 33kV).

Solution: Con Edison and Schneider Electric found that AI models could provide better estimates for distance-to-fault for both single- and two-phase faults. They selected a subset of substations that provided diverse characteristics to test this in a proof-of-concept (PoC).

Results: This improved accuracy can save 570 annual hours in locating the correct structure and avoiding high potential tests for single- and two-phase faults, as well as 380 hours for each recalculation of scaling factors for the substations.



Con Edison compared the accuracy of the processes through predicted and actual distance-to-faults in 0.1 ohm intervals from 0-0.1 to over 1 ohm. The single-phase fault results showed a 9% improvement in the 0-0.1 interval using a single AI model for all stations and a 14% improvement using an AI ensemble model. Meanwhile, the two-phase faults in the data sample are all in the greater than 1 ohm interval—58% in the 0-0.1 ohm interval, 25% in the 0.1-0.2 interval, 13% in the 0.2-0.3 interval, and 4% in the 0.3-0.4 interval.



Optimizing energy
demand and mix

with AI



Optimizing the use of electricity... and decarbonizing the mix

The only abundant source of energy that can potentially be decarbonized is electricity. However, during the peak of demand, electricity is often generated by burning fossil fuels, contributing to carbon emissions and global warming.

By using AI-based optimization techniques, we can contribute to:

- 1. Reducing the peak of consumption and help to reduce the overall carbon footprint of electricity.**
- 2. Maximizing the usage of locally generated, renewable energy.**

Using AI models, we can develop forecasts for both the energy needs and the production of green energy. Then, by using AI we can manage the energy storage capacity and shift energy consumption in time, reducing the peak of consumption, the use of fossil energy sources, and the overall carbon footprint of electricity.

In a world where millions of homes are equipped with solar panels, electrical vehicles, and batteries, and where distributed renewable energy is everywhere, **AI is needed. It will enable us to operate the grid smarter and to minimize carbon emissions.**



“For electrification, the grid is much more difficult to manage. We believe that we need data and AI to optimize and operate grid energy management at the level of country, building, or factory. That is why we invest in AI and believe it is a key to sustainability.”

— **Philippe Rambach**
Chief AI Officer at Schneider Electric



Use Case:

Fully optimized microgrid making an impact on 24/7 care

The Daughters of Mary of the Immaculate Conception runs four vital care facilities for people of all ages in Connecticut. To cut energy costs in 2015, they installed a large solar energy system followed by a microgrid system by Schneider Electric and Citizens Energy in 2022 to boost the campus' renewable energy capabilities.

Goals: Work with and expand upon previously installed solar arrays to optimize renewable energy capabilities, save on energy costs, and boost the resiliency of four separate critical care facilities.

Solution: A custom solar-powered microgrid system plus battery energy storage connects the four buildings. The Energy Control Centers manage operations, together or independently. EcoStruxure™ Microgrid Operation and EcoStruxure Microgrid Advisor provide the potential for advanced cloud-based energy management.

Results: They achieved sustainable, uninterrupted power across four critical care facilities. This system includes the option to view energy consumption patterns to optimize efficiency and integration of third-party solar arrays and lithium-ion battery energy storage systems. Over the next 20 years they expect to save \$1.3 million from the combined solar and microgrid energy cost savings.



[Watch the video](#)



Use Case:

Machine learning accelerates EV charging

Friendly Chevrolet, an automotive dealer in Texas, recognized that it's time to incorporate EVs as a key part of its business strategy. They aimed to create a unique charging experience for EV drivers, setting a new standard in the Dallas EV charging landscape.

Goal: The dealer wanted to establish a premium, full-service charging park that could differentiate itself in a market with inconsistent charging quality and limited fast-charging options, especially at car dealerships.

Solution: Friendly Chevrolet's EVHQ Charge Park, in partnership with EV Connect, a subsidiary of Schneider Electric, features eight covered 120kW fast charging ports and comprehensive amenities. EV Connect's software enabled efficient fleet management, streamlined operations, and most importantly, identified and resolved issues before drivers became impacted, ensuring optimum uptime and reliability.

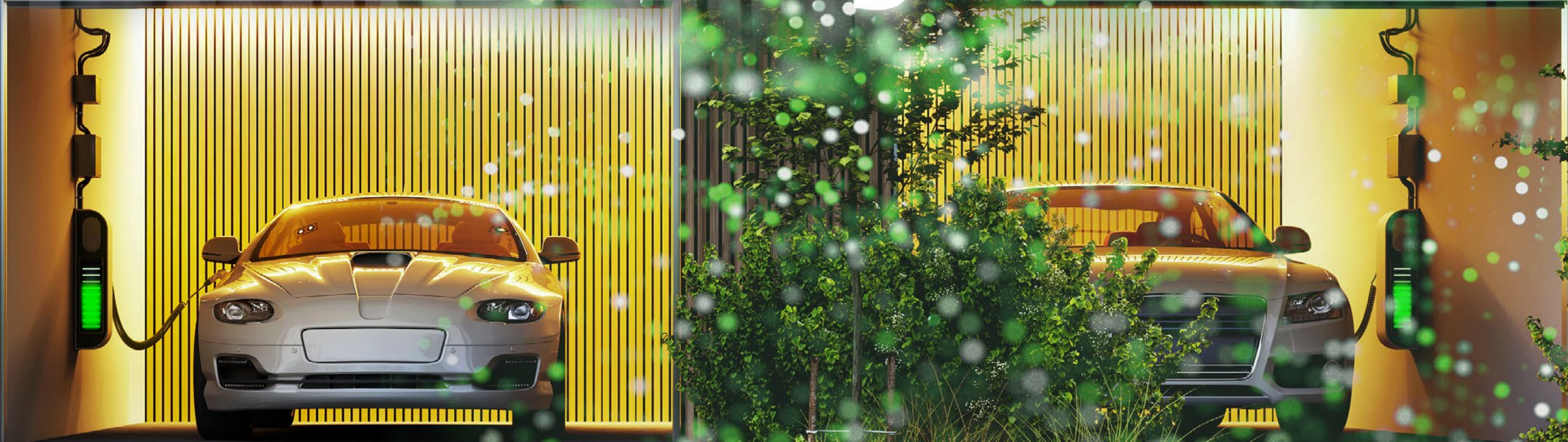
Results: The EVHQ Charge Park's offering attracted a growing community of EV drivers, leading to substantial financial success. Within six months, the park achieved 55% monthly revenue growth, with charging revenues exceeding \$59,000 per month and a station utilization of nearly 40%.

The park also attracted major fleet charging clients like GM's Cruise and Avis Car Rental, demonstrating its appeal to commercial customers.



Breaking down

the barriers
to sustainability *at scale*



Accelerating sustainability with AI

Many obstacles hinder the adoption of the sustainability-focused solutions mentioned in the previous two chapters of this e-guide. Besides the cost of AI solutions alone, the main barriers are the shortage of skilled technicians and the required investment in foundational technologies such as automation of plants, buildings and homes, or integration of renewable energy sources.

The good news is that AI can help overcome these hurdles. For example, **AI-powered tools** can enable home and building owners to access grid topology, panel insights, and electric equipment AI-based services, thereby **facilitating the seamless integration of sustainable solutions at scale.**



The world could be installing **1 TW of solar annually** by the end of this decade – hitting up to **800 GW per year** already in 2027.⁹



Automate savings, efficiency, and resiliency with Schneider Home

The growth of home electrification has just begun. Consumers demand greater energy efficiency while government incentives reduce the cost of going electric and powering it all with renewables. But homeowners don't want to manage this increase in complexity.

Schneider Home is a simple, all-in-one solution that connects a home's entire electric ecosystem with a single app. This integration of a smart electrical panel, backup battery, solar inverter, and connected light switches, dimmers and outlets simplifies control for the homeowner. Using machine learning, Schneider Home continuously improves real-time, granular insights to provide remarkable control.

- Automated savings with energy-saving pre-sets
- Extended battery life powering essential loads during an outage
- Renewable power modes that switch from grid to solar battery at night

With Schneider Home, homeowners have the power of control.



Use Case: Faster, safer, and more accurate estimates

Simplifying the acquisition of home EV charging for prosumers to widen adoption of clean energy.

Schneider Electric and Qmerit, a top installer of home and business EV chargers in North America, teamed up to create Panel Insights. This smart tool, powered by advanced AI, quickly checks your electrical panel setup by analyzing just one photo. It looks at things like available circuit space, tandem breakers, and total electrical capacity to make things easier for you.

Solution: This AI-enabled solution was specifically developed for home EV charging installations. The centerpiece of Qmerit's AI solution suite is the Load Capacity Recommendation Engine, which takes the results from Panel Insights to calculate the available capacity in the breaker panel for EV chargers.

Results: Panel Insights has bridged the needs of both electricians and EV buyers. The simplified electrical upgrade process helps homeowners reduce costs and improve their satisfaction. Panel Insights improves the accuracy of automatic quotations and results in higher adoption rates of EV installations.

The logo for Qmerit, featuring the word "Qmerit" in a bold, blue, sans-serif font. The letter "Q" is stylized with a thick stroke and a small tail.

The other side of the AI equation



Use Case:

Ensuring responsible and sustainable AI

When talking about AI we should not forget about the other side of the equation. Artificial intelligence is indeed placing a huge demand on data centers because AI computing has high power density and generates more heat. To meet the rising demands for digital bandwidth and electricity, the industry must adopt a comprehensive and standardized approach to environmental sustainability.

Compass Datacenters designs and constructs data centers for some of the world's largest cloud and genAI providers.

Problem: Compass Datacenters needed a tailored supply chain that would support the increasing demand from their clients for prefabricated modular data centers.

Solution: They partnered with Schneider Electric to bridge uptime, efficiency and sustainability and built a standardized and optimized state-of-the-art integration facility in Dallas, Texas.

Results: Through a partnership with Compass Datacenters, we delivered data center solutions to help Compass reach a 4x faster speed-to-market to meeting the growing demand.



Balancing digital demand and sustainability

It's up to each individual business to adapt to the need for technological advancement while minimizing their environmental impact.

In AI applications aimed at reducing energy consumption and greenhouse gas emissions, the savings must outweigh the energy needed for the development and use of AI models.

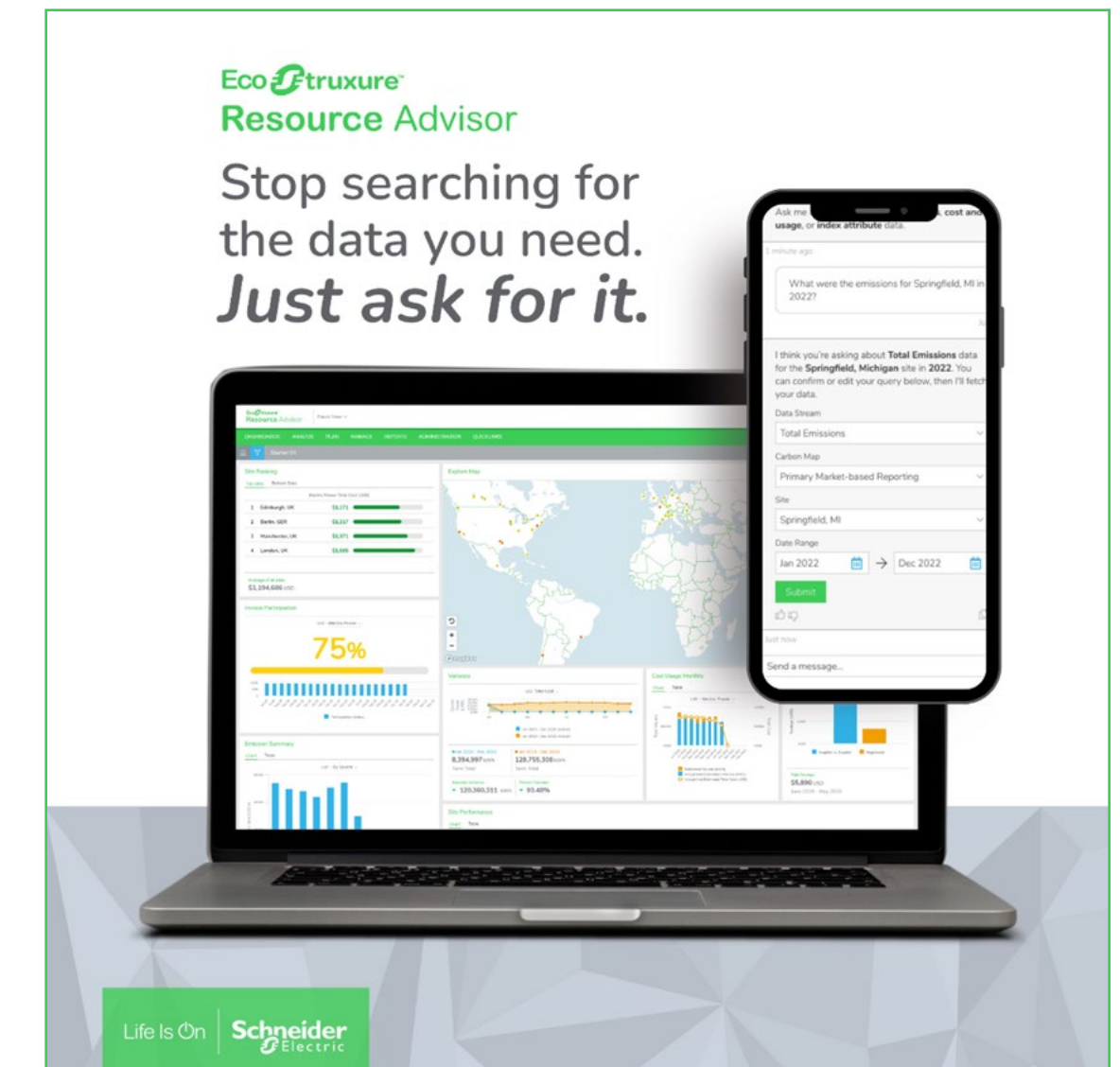
For applications aimed at other objectives, the benefits brought by the application must be weighed against the energy needed for (and emissions resulting from) the development and use of AI models.

Consistently, Schneider Electric closely monitors and adds sustainability metrics to the usage of AI in our solutions. **In that way, we will bridge sustainability and technology together, ensuring our usage of the technology is responsible, ethical, and serves a meaningful purpose.**

What about generative AI?

Generative AI can provide a natural interface for the user to interact with a large amount of data, effortlessly. This is particularly useful for **managing ESG reporting, sustainability, and energy data in one place.**

Our Resource Advisor Copilot reduces the need for manual navigation and data analysis, allowing every facility manager to simply ask the chatbot a question through natural language and retrieve data. It makes it simpler to track and interpret data, report out, and identify areas of opportunity, strength, and improvement across an increasingly complex resource landscape.



Leverage the strength of partnerships



Answer the call to action

If you take away one lesson from this paper, let it be this:

Bridging digital with sustainability can create a positive impact both for businesses and the planet. Artificial intelligence is one of the crucial accelerators of the energy transition in 3 main areas:

- 1** Optimizing energy use in buildings and industrial processes;
- 2** Reducing the peak of consumption and helping to reduce the overall carbon footprint of electricity;
- 3** Removing barriers to the implementation of sustainable solutions.

Schneider Electric is bringing its domain expertise and technology innovation in all three of these areas. As a trusted partner for efficiency and sustainability, our 350+ AI and data specialists around the world are innovating to create sustainable IMPACT with AI. Discover the Schneider Electric AI Hub today.

[Visit AI Hub](#)

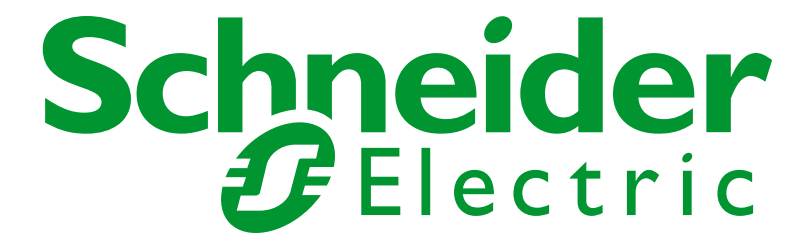


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