Thought Leadership
White Paper

Maximizing the ROI of energy infrastructure investments

The energy landscape in America is undergoing a transformation driven by electrification, digitalization, reindustrialization and sustainability megatrends. Soaring energy demand is placing unprecedented strain on existing infrastructure being driven by data centers, manufacturing, artificial intelligence (AI), crypto and increasing electrification of operations. This is creating the need for more enegy and diverse mix of sources from solar to natural gas. At the same time, sustainability has become a business imperative and organizations are investing in new tools and renewable energy sources to reduce costs, enhance competitiveness, accelerate progress toward environmental goals and take advantage of financial incentives. With 70% of U.S. electric grid over 25 years old and the increasing frequency of extreme weather events, the need for resilience is increasing, necessitating more flexible energy systems.

These trends combine to create powerful new opportunities to gain more functionality from energy systems to help mitigate risk, ensure business continuity and control energy costs for the long term. Prioritizing infrastructure projects that maximize these capabilties and total return on investment (ROI) requires a strategic and comprehensive approach to electrical system design. In this paper, we'll explore the necessary steps and best practices businesses and organizations should consider when investing in energy infrastructure for a stronger future.

A strategic approach to energy system investment

To successfully navigate the challenges and capitalize on the opportunities of our current energy transformation, businesses are taking a strategic approach to energy infrastructure investments that is focused upon three core pillars:

- Electrification – Driving new levels of efficiencies that also enhance flexibility and ensure reliable power.
- Sustainability – Implementing renewable energy solutions to take greater control over energy costs, production, and consumption, while reducing carbon emissions.
- Resilience – Strengthening infrastructure to withstand grid disruptions and ensure business continuity.

At Eaton, we've taken an Everything as a Grid approach to the energy transition that reinvents how power is distributed, stored and consumed—unlocking new levels of flexibility in energy infrastructure. When applied to buildings, this strategy creates opportunities to enhance performance, optimize functionality and future-proof electrical systems. We're empowering you to embrace the new power paradigm, better manage existing electrical infrastructure and prepare for evolving energy demands while maximizing the return on energy investments.

Powering Business Worldwide

9 ways to maximize energy infrastructure ROI

It is critical to take a proactive approach to energy infrastructure modernization as energy costs increase, reliability concerns grow, and organizations advance efforts to reap the benefits of more sustainable facilities. By identifying inefficiencies and optimizing energy systems for flexibility, targeted infrastructure investments can provide significant operational benefits.

1. Identify opportunities for continuous improvement

The best energy is the energy you don't use. There are new digital tools at play to use power more efficiently and effectively. These tools remove the complexity from the once arduous task of determining where energy is being wasted and how potential upgrades will impact overall system performance.

Today, there are even digital solutions specifically designed to baseline carbon emissions. Some **electrical power monitoring systems (EPMS)** offer an integrated capability that monitor and trend emissions data to identify possible improvements, develop a carbon reduction plan and lead sustainability efforts. These software platforms also provide real-time power and environmental system monitoring across a single facility or multiple locations throughout the world, helping organizations reduce power consumption, costs and unplanned downtime.

2. Prepare for higher energy demand

As industries and buildings electrify, energy infrastructure must be able to accommodate increased electricity requirements from electric vehicle (EV) charging stations, processes and equipment. Preparing for increased energy demand doesn't necessarily mean adding new capacity. However, it does hinge on increasing efficiencies, adding onsite power and intelligently managing energy use.

How will you prepare your facilities to withstand the new energy dynamics at play? At Eaton, we're putting our Everything as a Grid strategy to work in our own facilities to shore up our energy resilience, advance sustainability and energy affordability. For example, we recently completed a clean energy microgrid project at our Arecibo, Puerto Rico manufacturing facility. The microgrid system incorporates 5 megawatts (MWac) solar PV, approximately 1.1 MW of battery storage and existing onsite generators. The project is now generating more than half of the facility's energy needs to help reduce emissions, offset energy costs and ensure resilience during grid outage events.

3. Maximize energy system flexibility

The ability to dynamically adjust energy consumption in response to real-time local and grid conditions is critical for maximizing reliability and energy affordability. Deploying energy management software and intelligent load management solutions allows businesses to optimize power distribution and demand-side response strategies.

For example, building owners adding EV charging infrastructure (EVCI) should consider the vastly increased power requirements because sufficient electrical capacity may not be available. Optimizing EVCI with EV load management technology enables more installed chargers that deliver the optimal amount of power that the chargers need. Further, when available capacity is reached, load management software limits energy consumption and reduces the available power. This integral approach to load management enables load shedding and avoids exceeding the incoming service capacity. However, if current electrical capacity simply cannot meet expected demand, electrical capacity must be increased at the utility service.

4. Leverage onsite power including renewables and energy storage

An alternative to increasing service entrance upgrades is to incorporate onsite renewables and energy storage. This strategy enables owners and building managers to avoid expensive electrical capacity additions while supporting a more sustainable, low-carbon future. Plus, integrating renewables with energy storage solutions allows businesses to store excess energy for use during peak demand periods, further optimizing cost savings. For example, Eaton's **xStorage™ battery energy storage system (BESS)** allows buildings to store low-cost electricity when demand (and rates) is low and use or sell it back to the grid when prices peak.

The cost-effectiveness of onsite renewables creates a significant opportunity for building energy systems to deliver on energy affordability, resilience and sustainability—directly in the face of soaring energy costs, increasing frequency of extreme weather events and sustainability directives. And according to many industry analysts' levelized cost of energy analyses, renewables have become increasingly cost-efficient year after year, highlighting the long-term value of this strategy.

5. Adopt microgrid technology to create greater flexibility

Microgrids and the intelligent control solutions making them possible are transforming how businesses manage energy. These systems advance energy savings, resiliency and enable facilities to operate independently from or in conjunction with the electric grid. Microgrid systems can incorporate a variety of distributed energy resources (DERs) such as solar, wind, fuel cells, battery storage and any other onsite energy sources. Intellinget and automated control of DERs provided by microgrid systems enable flexibility to keep the power on despite a grid outage and reduce energy costs, while also lowering emissions and increasing onsite energy capacity.

At Eaton, our microgrid solutions provide simplified configurability with preset options as well as fully customizable control. The proven strategies we deploy reflect your energy goals, requirements today and in the future, as well as utility rate and tariff structure.

6. Monetize your energy systems

Businesses can generate additional revenue by participating in demand response programs, selling excess energy back to the grid or using energy storage to capitalize on peak pricing periods – making energy investments more profitable.

By implementing intelligent behind-the-meter technologies, buildings can earn revenue by participating in demand response programs, where they reduce or shift electricity usage during peak demand periods in exchange for financial incentives. Eaton's energy management software offerings can help automate this process by optimizing energy loads in real time, ensuring businesses can capitalize on these opportunities without disrupting operations.

Businesses that generate their own electricity through solar or wind power and energy storage can also monetize excess energy. Eaton's microgrid and energy storage solutions enable you to store excess renewable energy and either use it when grid electricity is expensive or sell it back to the utility via net metering or tariffs, depending on local policies.

7. Strengthen energy resilience

With extreme weather events becoming more frequent, resilient energy systems are critical. The National Oceanic and Atmospheric Administration (NOAA) reported there were 27 confirmed weather/climate disaster events in 2024 with losses exceeding $1 billion each, underscoring the need for more resilient energy infrastructure.

Microgrid controls, battery storage and load management solutions can help businesses mitigate the impact of power outages and stabilize energy costs. By investing in these resilience measures, organizations can safeguard operations, prevent downtime and enhance overall energy security.

8. Strategically structure investments

Energy infrastructure investments require thoughtful financial planning to maximize ROI while minimizing upfront capital expenditures. Businesses can explore financing models such as Power Purchase Agreements (PPAs), which allow organizations to procure renewable energy at fixed rates without the burden of initial capital costs. Additionally, energy-as-a-service (EaaS) models provide flexible payment structures, enabling companies to upgrade infrastructure with minimal financial risk. According to the Rocky Mountain Institute, since PPAs usually last for 10–20 years, an organization with a PPA is insulated from future electricity price increases depending on how much of their consumption the PPA serves.

9. Tap into incentive programs

Incentives can help offset project costs, making energy efficiency upgrades more affordable and attractive to businesses.

When navigating the complexities of incentives, it's important to partner with experienced professionals early in the process. These experts possess the ability to calculate the full potential of financial benefits. Look for firms that have experience with both federally funded projects and federal tax incentives to optimize your ROI. It is equally critical to engage with equipment suppliers that offer the ability to help navigate domestic preference requirements effectively. Collaborating with suppliers early in the project lifecycle enables you to assess the feasibility of meeting domestic preference criteria. Moreover, suppliers should be able assist in designing electrical systems to maximize domestic content, aligning with regulatory mandates and optimizing the opportunity for greater tax returns.

Eaton offers expansive support throughout the funding application process, including grant writing assistance. Additionally, we can review your project scope to identify potential tax credits that may be applicable to your project, ensuring you maximize your ROI.

Energy investments driving affordability, resilience and sustainability

While the strategies outlined here provide a roadmap for maximizing energy infrastructure ROI, real-world projects demonstrate how businesses and institutions are successfully implementing these principles. At Eaton, we're working closely with organizations across all industries to implement flexible energy system solutions that enhance the cost-effectiveness, reliability and sustainability of electrical power. The following case studies highlight how targeted energy investments are transforming operations and delivering long-term value.

Fuel cell microgrid advancing resilient, sustainable healthcare in California

A major medical center in California is enhancing energy resilience and sustainability with a fuel cell microgrid, developed in collaboration with Eaton and Bloom Energy. The project is expected to lower energy costs by up to 20% and cut greenhouse gas emissions by an estimated 25%.

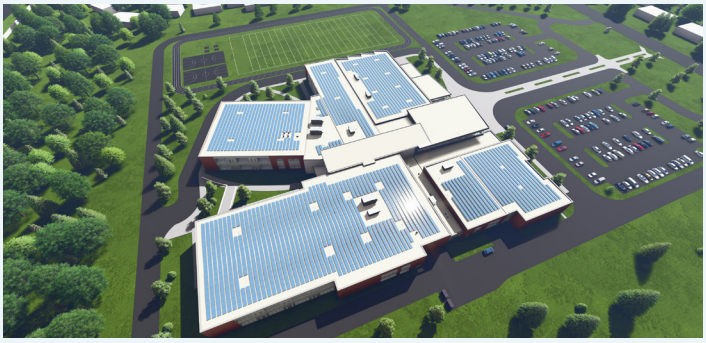
The microgrid was designed to incorporate approximately 1.75 megawatts (MW) of Bloom Energy fuel cells, seamlessly integrated with Eaton intelligent microgrid controls to optimize performance. Eaton also provided turnkey microgrid system design, engineering services and power distribution equipment to maximize energy savings, reliability and environmental benefits.

Off-grid power plant helps quickly energize hyperscale data center in Ohio

Eaton is helping develop a natural gas-fired power plant in Ohio to provide a resilient, off-grid energy source for a hyperscale data center. The facility will help meet the growing energy demands of data centers while reducing strain on the local electric grid.

By co-locating energy production on-site, the hyperscale data center gains greater control over its power reliability, efficiency and quality. This project offers a strategic solution to address electric supply challenges and long interconnection lead times. Eaton is supplying engineering design services, as well as U.S.-manufactured medium-voltage switchgear and circuit protection solutions, to provide centralized control and protection for the energy facility.

Microgrid powering resilient, eco-friendly education in Wisconsin



The Menasha Joint School District recently contracted Eaton to help develop the state's largest renewable energy microgrid of its kind at **Maplewood Intermediate/Middle School.** The project is expected to save the district $190,000 annually while providing a resilient, carbon-friendly electricity.

Eaton's Everything as a Grid approach enabled the school to integrate 1.3 megawatts (MWac) of solar photovoltaic panels, battery energy storage and natural gas generators into a single, cohesive microgrid.

At the core of this solution is Eaton's advanced microgrid controller, which is seamlessly integrated into a switchboard to optimize power distribution and enable real-time decision-making. The district also benefits from Eaton's xStorage battery energy storage system, which allows for strategic energy storage and dispatch to maintain uptime and reduce costs. By investing in a cutting-edge microgrid, Maplewood Middle School has transformed its energy infrastructure into a sustainable, resilient and cost-effective model for other institutions to follow.

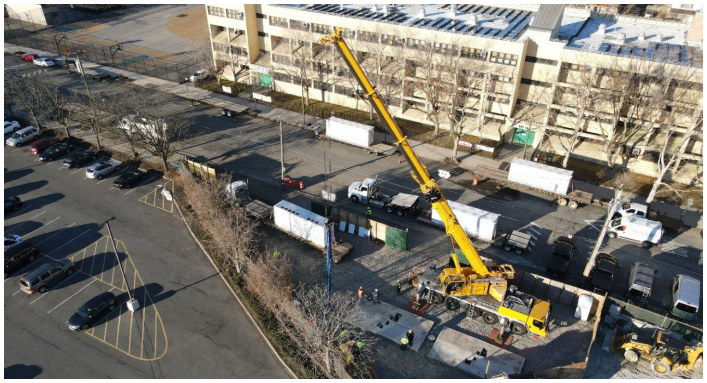
EV Charging Infrastructure for a college campus in Indiana

Seeking to decarbonize fleet operations and support student and visitor EV adoption, the University of Notre Dame called on Eaton to build an intelligent EV charging infrastructure that could support students, faculty and campus operations. This initiative positions Notre Dame at the forefront of sustainable campus mobility while supporting its broader goal of achieving carbon neutrality by 2050.

Eaton's chargers were strategically deployed across campus, including utility and maintenance buildings, commuter and faculty parking lots, and high-traffic areas such as the bookstore and art museum. These chargers are managed using load management software, which provides remote monitoring, access control and load management to ensure efficient energy use. The data generated by the system offers valuable insights into charging demand, allowing Notre Dame to make informed decisions about future infrastructure expansion.

Paul Kempf, assistant vice president for utilites and maintenance at Notre Dame, emphasized the importance Eaton's expertise and solutions: *"The university's relationship with Eaton has existed for over 30 years and has allowed our campus to benefit from a wide range of quality Eaton products, EV chargers and the associated software being just one example in a long line of successes."*

Energy storage strengthens grid stability in New York



As energy demand increases, ensuring grid stability becomes a critical priority. In New York City, Eaton worked with Endurant Energy to deploy 10 battery storage projects designed to enhance the resilience and reliability of the city's power infrastructure. With a combined capacity exceeding 150 megawatt-hours (MWh), these projects provide critical load relief during peak demand periods, reducing strain on the electrical grid in the Bronx and Staten Island.

Rather than requiring costly substation upgrades, these energy storage solutions enable flexible, non-wires alternatives. Eaton played a pivotal role in designing the system, conducting power system studies and supplying essential infrastructure, including switchgear, switchboards and transformers. These components ensure seamless integration with the grid while enabling dynamic energy distribution to meet real-time demand.

By embracing Eaton's Everything as a Grid approach, Endurant Energy is helping New York City transition toward a cleaner, more resilient power network. The deployment of advanced battery storage will not only improve energy reliability but also support the region's long-term sustainability goals by reducing reliance on fossil fuel-based peak power plants.

Powering the future of semiconductor research in New York

In the semiconductor industry, precision and reliability are paramount. The New York Center for Research, Economic Advancement, Technology, Engineering, and Science (NY CREATES) is leading the charge in cutting-edge semiconductor research with its new NanoFab Reflection facility at the Albany NanoTech Complex. Eaton is playing a crucial role in ensuring this 50,000-square-foot cleanroom operates with the highest levels of energy efficiency and reliability.

Supported by funding from New York State, NY CREATES, key industry partners, and the $52 billion U.S. CHIPS & Science Act, the NanoFab Reflection facility will provide state-of-the-art resources for semiconductor innovation. Recognizing the critical need for power quality and stability in semiconductor production, Eaton is supplying low- and medium-voltage switchgear to centralize power control and protection. Additionally, the facility will integrate Eaton's Brightlayer electrical power monitoring software, which provides real-time energy insights, enabling proactive maintenance and efficiency optimization.

Unlock the full potential of your energy investments

Unlocking the full potential of energy investments requires a forward-thinking approach that balances flexibility, resilience and sustainability. As industries face increasing energy demands, regulatory pressures and the need for around-the-clock uptime, it is critical to rethink how power can be more strategically generated, stored and consumed. At Eaton, our Everything as a Grid approach to the energy transition simplifies this complex undertaking – optimizing energy management by seamlessly integrating renewable energy, storage solutions and intelligent controls to optimize performance. With over a century of expertise, a commitment to innovation, global leadership in cybersecurity and one of the industry's most expansive North American manufacturing footprints, Eaton can help organizations of all sizes navigate the complexities of modernizing energy systems to support long-term operational success.

Now is the time to take proactive steps toward upgrading energy infrastructure for the demands of the future. By leveraging our cutting-edge solutions and proven experience, you can not only support uptime and minimize energy bills but also create new revenue streams through power system monetization strategies. A feasibility study is the first step toward identifying the most impactful upgrades, and our expert network of engineers stands ready to provide the insights and tools needed to support data-driven decision-making.

To learn more, visit Eaton.com/StrongerFuture.

Public policy continues to help maximize the ROI of clean energy projects

A variety of federal, state and local programs continue to help reduce upfront costs, improve ROI and encourage the modernization of energy systems to support a more resilient energy future across America. At the national level, businesses can benefit from:

The commercial Investment Tax Credit (ITC), which provides tax credits to qualifying clean energy improvement projects like solar installations, remains applicable to qualifying projects through 2025 and has been expanded to include:

- Energy storage
- Microgrid controllers
- Hydropower environmental improvements

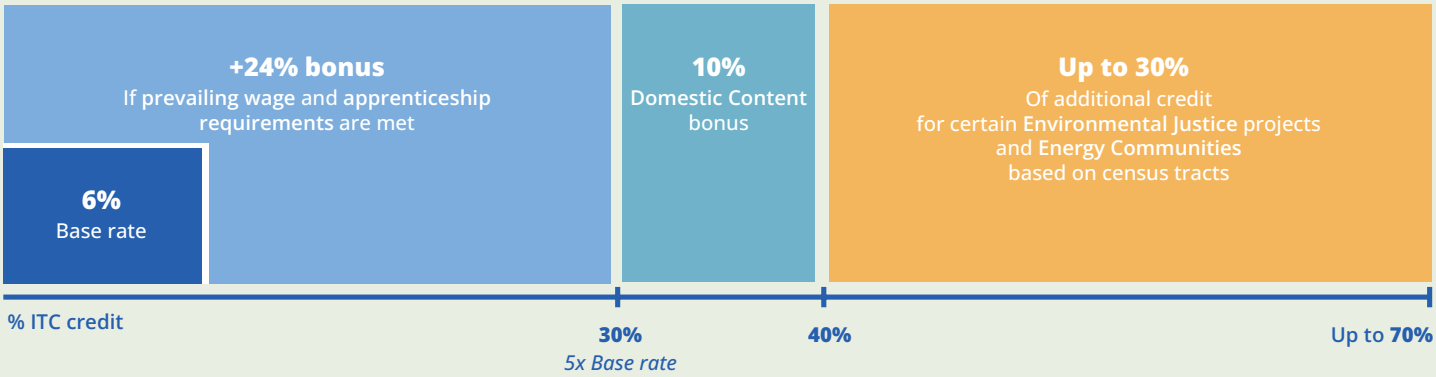
The ITC includes a base credit of 6%, or 30% if certain prevailing wage and apprenticeship requirements are met. Domestic content as well as qualifying environmental justice projects and those located in energy communities may qualify for additional credit increases. For example, there is potential to earn bonus tax credits of up to 10% for qualified clean energy projects that utilize U.S. equipment and materials.

Many states and municipalities also offer additional support through:

- **Rebates and grants** to lower the initial cost of renewable energy and energy efficiency projects.
- **Tax exemptions and reductions** for qualifying energy modernization projects.
- **Utility-based incentives** such as compensation for excess energy generation and demand-side management programs that reward energy efficiency upgrades.

The combination of these programs makes clean energy projects more financially viable while supporting national and regional energy surety goals. Leveraging our vast U.S. and North American manufacturing operations, Eaton delivers solutions that adhere to domestic preference requirements and can help you obtain applicable tax credits.

To learn more, visit Eaton.com/StrongerFuture.



For more information, visit
Eaton.com/StrongerFuture

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

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