

The Monetary Value of Energy Resilience: The Cost of Power Outages and Their Impact on Your Organization



Every organization requires clean, dependable electrical power to run its facilities. Whenever power outages occur, they result in added costs due to lost production, interrupted operations, and reduced employee productivity.

All of us have experienced major electrical power outages due to infrequent weather events, such as storms or summer heat waves. However, sporadic outages, occurring at any time, can be even more costly and damaging to businesses, manufacturers, campuses, and health care facilities.

U.S. Businesses and Organizations Lose Billions Each Year Due to Electrical Power Outages

The cost of power outages to businesses, campuses, manufacturers, hospitals, and other facilities is significant. Nationwide, commercial enterprises experience over 1.97 million power outages each year across the U.S., according to the American Council for an Energy-Efficient Economy (ACEEE). The cost of these outages is \$79 billion annually, according to a 2006 Lawrence Berkeley National Laboratory study. Other sources estimate these losses reach well beyond \$100 billion each year.

Commercial businesses in Ohio, for example, experience on average 2.5 electrical utility outages every year, with each outage lasting 64 minutes. The cost of each downtime event for a large commercial or industrial business nationwide is \$17,804 per hour, with added costs of \$10,000 or more for each additional downtime hour (according to analysis by the Lawrence Berkeley National Laboratory).



The Costs of Each Utility Power Outage Can Be Significant to Medium and Large Commercial and Industrial Facilities

	MOMENTARY	30 MINUTES	1 HOUR	4 HOURS	8 HOURS	16 HOURS
COST PER EVENT	\$12,952	\$15,241	\$17,804	\$39,458	\$84,083	\$165,482

SOURCE: AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY STUDY, "VALUING DISTRIBUTED ENERGY RESOURCES: COMBINED HEAT AND POWER AND THE MODERN GRID," (PAGE 32) 2018.





Discovering The True Hidden Costs of Utility Power Outages

Aside from the obvious power-outage costs due to the initial losses in productivity and revenue, the hidden financial costs of these events are far higher than most business owners and facility managers realize:

- **Lost production and additional production reboot time for manufacturers:** A significant power outage results in lost production, which in itself is a major cost. However, the additional time required to restart production machinery and processes after power is restored, the cost of wasted raw materials or in-progress parts that must also be cleared from this machinery, and the potential for damage to sensitive electronics and equipment after sudden drops in voltage, represent significant added costs.
- **Disrupted operations for colleges and universities:** Colleges and universities experience a range of disruptions during outages, including interruptions in class schedules, and loss of heating, cooling, lighting and electrical power to dormitories, administrative offices, and dining halls. Additional hidden costs include potential liability risk for students and staff, and food spoilage losses due to refrigeration failures in dining facilities.
- **Limited backup power fails to provide needed power for hospitals and health care facilities:** Loss of electrical power can literally be a life-and-death matter for patients. While these facilities do operate diesel generators to supply emergency power, these systems fail 15% of the time due to lack of use, according to the Electric Power Research Institute (EPRI). And while a functioning diesel backup system will restore power to life-critical hospital functions, such as surgical suites and life support equipment, power is not usually provided to many essential support activities, such as the hospital's lab or radiology units, which can severely hinder operations and the facility's financial performance.
- **Hidden employee productivity losses:** Without electricity, employees have no lighting, no power for computers or phones, and no access to the Internet or WiFi. In addition, building access is compromised when power for elevators and security systems is lost. And, depending on the weather, the lack of heating or air-conditioning makes the building uninhabitable. All this leads to a significant slowdown in productivity, causing a potential impact on revenue.
- **Disrupted operations and potential equipment damage due to "brownouts" and momentary line voltage drops:** Data centers and IT businesses are sensitive not only to outages, but to smaller voltage drops and poor power quality that can damage computers, storage, and networking equipment. Many other types of businesses are also affected by "brownouts", causing momentary line voltage drops that can interrupt or damage sensitive electronic control units in machinery and other systems.

These additional hidden costs are different for each type of organizations, and they often add significant costs to the more immediate and visible financial costs of lost productivity, lost plant production or revenue. When these total costs are considered, they can substantially worsen the economic impact of power outages to your operations.

Hidden costs of power outages include lost employee productivity, and the additional time and costs required to re-start operations, re-configure equipment, and clear equipment of in-process raw materials.



On-Site Power: Achieving Energy Resilience and Eliminating Utility Outage Costs

On-Site Combined Heat and Power (CHP) systems provide a cost-effective solution to eliminating the costs of electrical power outages for your building, campus, plant, or other facility.



CHP systems utilize compact, low emission, dependable microturbine units, fueled by natural gas delivered by highly reliable gas pipelines. When installed at your facility, a CHP system can provide all or part of your building's electrical power during a power outage. Additionally, CHP systems operate on a full-time basis to provide a portion of your facility's total energy needs, offsetting a portion of your organization's utility costs.

CHP SYSTEMS:

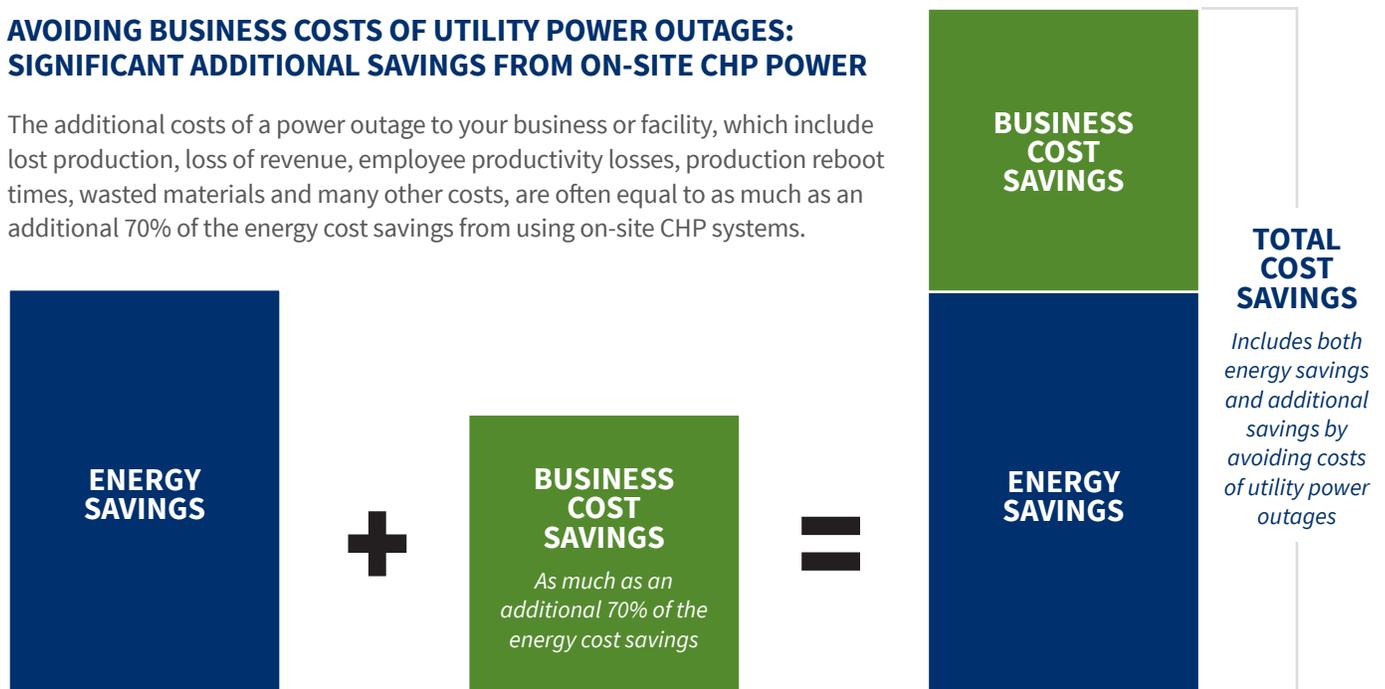
- Are highly efficient, delivering up to 80% of the fuel energy they consume, compared to the 45% efficiency of utility-delivered power, according to the ACEEE.
- Generate both on-site electricity and thermal energy that can be configured to operate during power outages.
- Allow facilities to capture waste heat to produce chilled water, hot water, and steam for daily use and to provide additional energy savings.
- Overall can offset 20-50% or more of a company's energy use, providing significant savings compared to utility-generated power.

Eliminating All Costs Associated With Power Outages: An Important CHP System Benefit

In addition to energy savings, eliminating all of the costs associated with power outages can often provide substantial additional savings, adding as much as 70% to the energy savings provided by the CHP system itself. This additional savings, due to avoided downtime costs, significantly enhances the value of a CHP system to your facility.

AVOIDING BUSINESS COSTS OF UTILITY POWER OUTAGES: SIGNIFICANT ADDITIONAL SAVINGS FROM ON-SITE CHP POWER

The additional costs of a power outage to your business or facility, which include lost production, loss of revenue, employee productivity losses, production reboot times, wasted materials and many other costs, are often equal to as much as an additional 70% of the energy cost savings from using on-site CHP systems.



Consider Your Hidden Costs to Assess the True Cost of Electrical Power Outages to Your Business

Given the negative effect of power outages on every business, it's important to consider all of the cost aspects of any interruption to operations, manufacturing, processes, and life-critical care caused by loss of power to a building, plant, campus, or healthcare facility. These cost impacts will, of course, be different for each type of organization, and only by documenting each of these costs can the true total cost of this downtime be accurately measured.

TYPE OF ORGANIZATION	INITIAL DOWNTIME COST	ADDITIONAL HIDDEN COST ELEMENTS
Manufacturing	<ul style="list-style-type: none"> • Lost production time • Lost personnel time 	<ul style="list-style-type: none"> • Additional start-up time required to reach full, pre-outage production rates • Time to clear/clean production equipment • Time required to re-start production equipment • Wasted raw materials • Potential damage to electronics in plant machinery
Hospitals and Health Care Facilities	<ul style="list-style-type: none"> • Risk to patients • Reduced patient care • Lost productivity 	<ul style="list-style-type: none"> • Potential patient liability risk • Lost revenue and lowered productivity from ancillary department shutdowns (labs, radiology, etc.) during outages
Colleges and Universities	<ul style="list-style-type: none"> • Disrupted classes • Lost productivity for staff 	<ul style="list-style-type: none"> • Potential student and staff liability risk • Additional time required for staff and students to return to class • Food spoilage loss due to lack of refrigeration in dining facilities
Corporate Office / Multi-Tenant Buildings	<ul style="list-style-type: none"> • Lost productivity 	<ul style="list-style-type: none"> • Additional time required for staff to return and resume normal operations • Lowered productivity from staff leaving building due to lack of AC, heat, lighting, and Internet/phones

Capturing the Value of Energy Resilience to Your Company: Talk to the Experts at GEM Energy

With an on-site, low emission CHP power system providing backup emergency power, you can avoid the major costs of utility outages, plus gain the ongoing advantage of lower energy costs by using your CHP system to offset your organization's utility power and heating fuel needs on a continuous basis.

For more information, contact GEM Energy's on-site power team to discuss your facility's energy requirements and to examine how CHP can help gain energy resilience and reduce overall energy costs.



For more information or to talk with an on-site energy solution expert, contact:

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