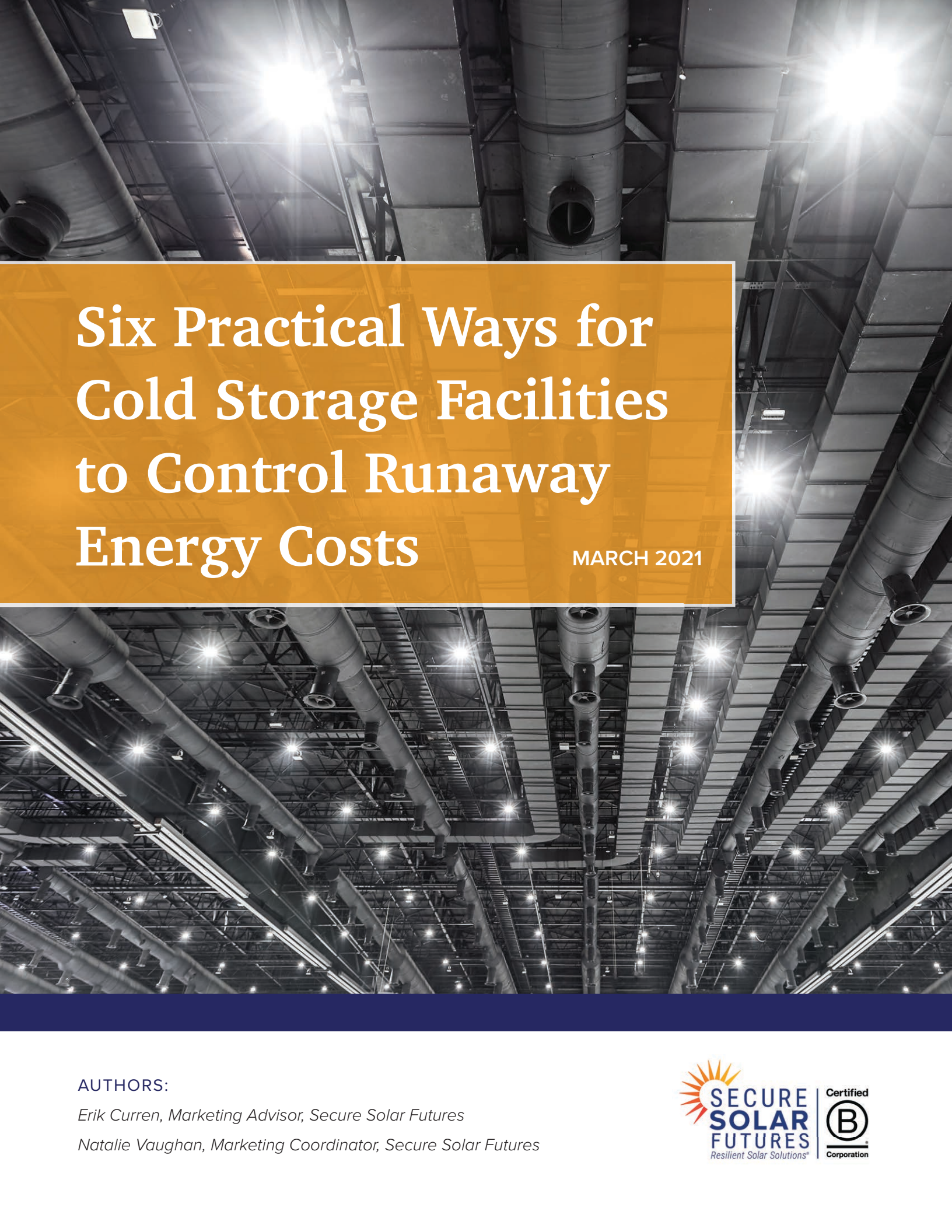




Six Practical Ways for Cold Storage Facilities to Control Runaway Energy Costs

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The Competitive Market & Rising Costs

You're responsible for running a cold storage facility -- Congratulations! Whether you're with a producer, distributor or retailer in food and beverage or pharmaceuticals, the industry is growing like never before, driven by an exploding demand for refrigerated and frozen storage across the American economy.

The good news is that a growing market offers new opportunities to expand your business. The bad news is that the vibrant cold storage industry is attracting intense competition. To win market share, it's not enough to be competitive on traditional measures of price and value. You now have to stand out from an increasingly crowded field of players who can match or beat your pricing while offering benefits like "going green" that consumers and investors increasingly demand from big brands, whether that means offering organic or using clean energy.

This consumer demand for sustainable business practices, carbon neutrality and use of clean energy has started to reverberate through the cold chain, requiring even the most inside industry players in food and beverage and even pharmaceuticals logistics to take notice.

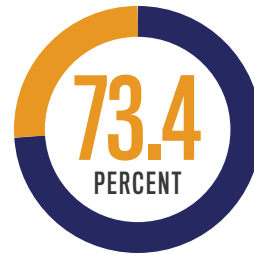
Demand has been strong and pricing has moved up. However, rising construction costs for building new facilities is a challenge to make pricing work against existing facilities. Meanwhile, rising costs to operate cold storage facilities have made it harder to keep pricing competitive while maintaining acceptable profit margins. Whether you're new to the industry or are just getting started, you know that controlling rising costs to operate your facility, especially rising energy costs, is a constant battle.

Competitive Market Getting Even More Competitive

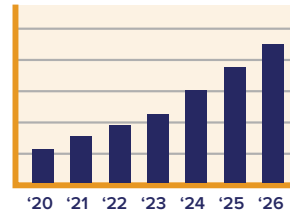
With only four companies currently in control of 73.4% of all refrigerated warehouse space in North America according to the Commercial Real Estate Development Association, it is even harder gaining a customer's trust - let alone their business.¹

At the same time, the size of the global frozen foods market is expected to increase by over 40% from 2020 to 2026. In 2018, the market was valued at \$260.8 billion. By 2026, the market for frozen food is forecast to grow to \$366.3 billion.

Brick Meets Click/Shopper Kit survey found that 46% of shoppers plan to continue purchasing goods online, including groceries, post-COVID-19.² CBRE suggested that over the next five years, an additional 75 to 100 million square feet of industrial freezer or cooler space will be needed to meet the increased demand generated by online grocery sales as a result of the coronavirus pandemic.³



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the global frozen foods market is expected to increase by over 40% from 2020 to 2026.

75–100
MILLION SQUARE FEET

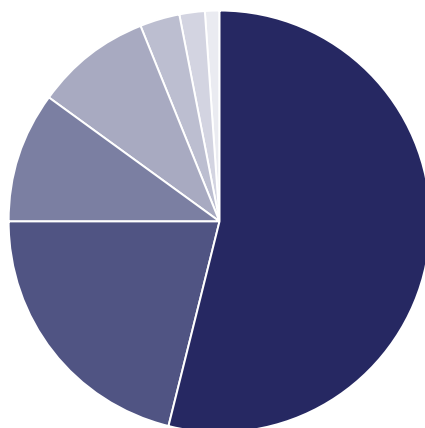
of industrial freezer or cooler space will be needed to meet increased demand of the next 5 years.

Cold Storage Plagued by Uniquely High Energy Costs

Second only to labor costs, energy accounts for the majority of operating costs for cold storage facilities. While energy costs typically account for 15% or more of the operating budget, refrigeration makes up about 70—80% of the average facility's electricity bill.⁴

ENERGY USE PROFILE FOR A TYPICAL COLD STORAGE FACILITY

Exhaust Fans - 1%
Office Equipment - 2%
Battery Chargers - 3%
Office HVAC - 9%
Lighting - 10%
Electric Defrost - 21%
Refrigeration - 54%



6

According to Supply Chain Drive, for cold storage operators, after personnel, energy is their second highest operating expense.⁵ To maintain stable temperatures 24 hours a day and protect their inventory of frozen food requires massive amounts of energy to run refrigeration equipment nearly non-stop. These facilities have the highest energy demand of any industrial category overall and are the third highest commercial energy consuming category per cubic foot, consuming over \$30 billion of power every year.

According to Coulomb and the International Institute of Refrigeration, refrigeration (including air conditioning) currently accounts for about 17% of worldwide electricity use across all sectors of the economy including homes, offices, and industrial facilities.⁷ Cold storage operators would be well advised to consider energy efficiency and renewable energy applications widely adopted by other industries.



Refrigeration accounts for about **17% of worldwide electricity use**

Compared to dry goods facilities, operators of cold storage are faced with unique challenges:



Operators must ensure that their facility is cold enough for the goods they handle, often determined by government regulations. Cooling equipment and controls have gotten more complex, coming with varying up-front costs, upkeep, and expenses.



Meanwhile, products ranging from frozen and refrigerated fruits and vegetables, to seafood and meats, to pharmaceutical drugs are subject to an ever-stricter regulatory landscape, unlike those for non-food goods.



Outsourcing more of their cold storage to third-party logistics providers (3PLs) has helped producers and manufacturers focus on their core business, creating new efficiencies that add value and cut costs. But the flip side is that the marketplace has become more complex and with more choices for big brands of how much, if any, of their cold storage to handle in-house.



Automation has also increased efficiencies and helped control rising labor costs. A main goal of automating more and more tasks is to save money down the line but high upfront cost can be a barrier initially.

According to statistics from E-Source, a research company that works with major utilities across North America, refrigerated warehouses consume an average of 24.9 kilowatt-hours of electricity per square foot each year.⁸ By comparison, traditional dry warehouses use an average of 6.1 kilowatt hours of electricity per square foot each year.

Energy Set to Get More Expensive in the Future

At 15% of operating costs, electricity is already a large proportion of the expenses needed to run a cold storage facility. Historically, over the last 20 years nationwide, utility rates have increased just ahead of the general rate of inflation. But that period was marked by historically low power rates tied to a glut of cheap natural gas in the energy market.

In coming years, experts predict that utility rates could increase faster, as natural gas supplies deplete and costs rise accordingly. Also, regulators will require electric utilities to make significant investments to upgrade aging infrastructure on the electric grid, costs that utilities will pass along to ratepayers. As utility costs increase in the near future, energy's piece of the expense pie will likely grow.

Innovation is taking place in refrigeration that is helping deliver the cold that facilities need with fewer energy inputs. For example, the ALTA Expert system uses freon technology very effectively to compete with traditional low-energy-cost ammonia systems without the safety hazard and handling requirements of ammonia. Yet, for the foreseeable future, keeping spaces refrigerated and frozen is likely to require a lot of energy. In that case, even a small increase in power costs will have a disproportionately large impact on the bottom line. Cold storage facilities that can't successfully rein in energy costs may find it more challenging to compete against providers with lower operating costs.

Lessons from Texas and the Northeast: Weird Weather, Grid Failure, Blackouts

Resilience is becoming more of a concern too with an aging grid hit by increasingly weird weather combining to create the perfect storm for blackouts and brownouts in the future. The failure of the electric grid in Texas in February 2021 due to unusually cold winter storms imposed days-long blackouts on homes and businesses across the state just when indoor spaces required extra power to keep the heat on. With 45 gigawatts of power offline, largely due to frozen natural gas pipelines, nearly 3 million Texans were left in the dark.

“Texas’ energy crisis will likely create a new challenge for the state, as companies evaluate whether the energy grid failure was an isolated incident. The state has already seen massive increases in population in the past several years, and the unexpected effects of climate change aren’t expected to slow any time soon,” wrote Fortune.⁹

Authorities were caught unprepared for the severity of the cold snap in a state that normally enjoys mild winters. Operators of the Texas electrical grid were taken by surprise at the sudden decline in power supply from frozen pipelines, thermal power plants and wind turbine blades – all at the same time that power demand spiked from consumers turning up the heat.

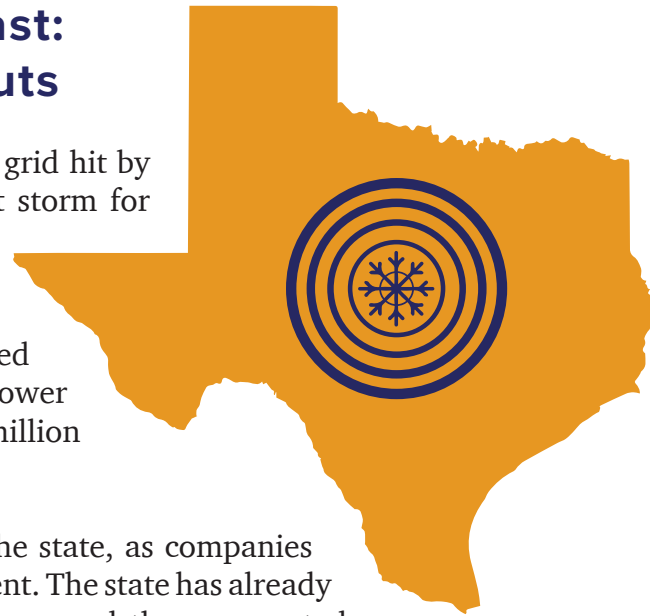
Failure to plan for extreme weather is a problem shared by grid operators across the United States. Scientists say that climate change will only make weather more unpredictable in the coming years.

But Texans should not have been surprised by the cold in 2021. Previous winter storms nearly as severe hit the city of Houston alone in January 2018, February 2011, December 1989 and December 1983 according to Space City Weather.¹⁰ It’s wrong to think that winter has never gotten really cold in Texas – it’s just that after it warmed up again, everybody soon forgot how cold it got before. This led to a tragic lack of planning.

Texas also had some unique issues. Underestimating the likelihood of severe cold snaps in the Lone Star State, equipment operators skimped on investments to weatherize power generation assets, a standard practice in more northerly climes. Also, by design, the Texas grid was essentially walled off from other power grids in North America through regulations and business practices as to make sourcing power from spot markets outside the state difficult.

But a failure to plan for extreme weather is a problem shared by grid operators across the United States. And that’s bad news for businesses that count on the authorities to plan effectively to protect the electric grid in the future. Even more concerning, scientists say that climate change will only make weather more unpredictable in the coming years.

Add to that the increasing deterioration of the equipment that generates, transmits, delivers, and manages electricity on the grid. According to the federal government’s Quadrennial Energy Review, the U.S. electricity grid is “aging, inefficient, congested, and incapable of meeting the future energy needs of the information economy without significant operational changes and substantial public-private capital investment over the next several decades.”¹¹



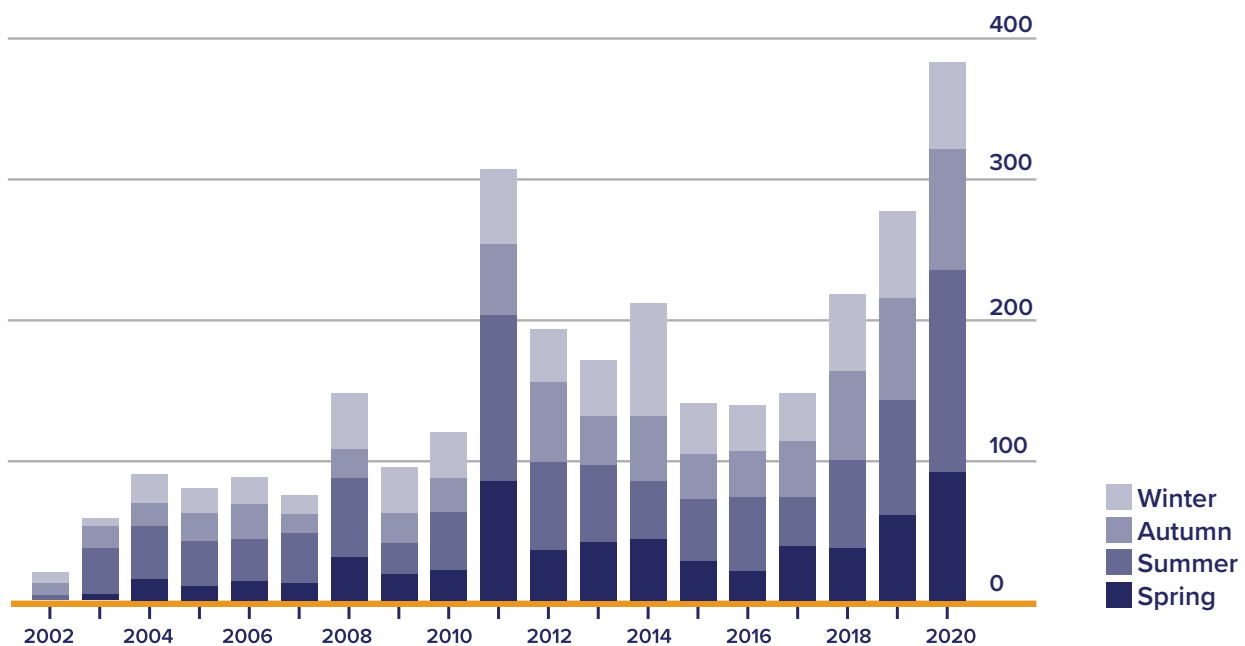
When hit by storms or heatwaves, aging equipment can cause local power failures that cascade across the grid, one power outage triggering others.

Extreme heat, as well as extreme cold, can cause electrical grids to collapse. Before the grid failure in Texas in 2020, the most well-known power failure of this scale was that of the big Northeast Blackout in 2003. In just three minutes on a hot summer day in August, fifty million people lost power across the northeastern United States and parts of Canada. The outage disrupted everything from trains, to elevators, to traffic lights to cellular service.

This is when “politicians took the opportunity to point out major flaws in the region’s outdated power grid.” Only after an investigation took place did they learn that it was all caused by an overgrown tree coming into contact with a power line, causing a chain reaction of outages. This event forever became an embodiment of how much we as a society rely on an outmoded electrical grid that has become dangerously unreliable.

Relying on power to be always on from an electric grid where most plants are over 40 years old becomes a question. Then throw in more destructive storms and floods, heat waves and hurricanes from advancing climate change. You can never be too sure that the skinny lines that supply mission-critical electric power will not once again be taken down by the falling of a large branch.

United States Reported Electrical Disturbances from 2002–2020



Causes of United States Reported Electrical Disturbances - 2020

- Vandalism, attack or sabotage - 16%
- System operations - 19%
- Other 22%
- Weather or natural disaster - 43%



Is Backup Power Worth the Cost?

With a large and growing inventory of refrigerated and frozen food, **you need reassurance that your power will always remain on** – or at least, that if the power does go off, it won't stay off very long.

The most common defense in a power outage without backup power is still to basically shut down – keep the doors closed and keep the cold in. That's sufficient if a blackout lasts only a few hours. But if the power remains out for days, as in some parts of Texas in 2021, then there's a problem.

When it comes to having a plan for backup power, some companies choose to use on-site diesel generators. They are low maintenance, safe to stow away when not in use, outlast gasoline generators, and will run longer than most alternatives.

But anyone who's ever used a diesel generator knows that they have significant drawbacks: noise, pollution, and risk of high fuel costs or lack of supply in an emergency. Diesel generators are also very expensive to purchase for the amount of power needed to keep refrigeration systems functioning.

In theory, batteries can provide a more reliable and manageable source of backup power. In the past, battery technology has not been affordable at scale to power refrigeration systems. Running office lights, computers and HVAC is one thing but refrigeration is a big step.

Recharging batteries with on-site solar power would increase the length of time that a facility can stay cold independent of the power grid. Some facilities already use significant batteries to power equipment such as lift trucks. As battery technology evolves, more facilities will find it cost effective to install battery backup systems not only to run the office but also to maintain cold storage temperatures.

According to Ars Technica, **battery prices have fallen 88% over the last decade:**

“

The average cost of a lithium-ion battery pack fell to \$137 per kWh in 2020, according to a new industry survey from BloombergNEF. That's an inflation-adjusted decline of 13 percent since 2019. The latest figures continue the astonishing progress in battery technology over the last decade, with pack prices declining 88 percent since 2010.¹²

”

In the meantime, using energy more efficiently is often the best place to create resilience in the face of threats to the reliability of grid power.

Along with cutting operating costs, **building your resilience** is another reason why it is in your best interest to alleviate these high energy bills with more energy efficient alternatives. These can range from the very simple -- changing your lightbulbs -- to implementing smart systems to reduce loss of cooled air from opening and closing of doors, to going solar.



Get Smart on Energy by Picking the Lowest-Hanging Fruit

Investments in using energy more efficiently and adopting clean energy must be cost effective. But savings must also contribute enough to the bottom line to make it worthwhile for logistics and cold storage operators to focus on energy.

Across industries, as the Green Business Bureau put it, “practices such as energy conservation, recycling, use of water-saving devices, energy-efficient equipment, solar power and reduced waste help keep costs down, and have proven time and again to be far more efficient and cost-effective than traditional energy use.”¹³

Third-party logistics providers reducing the operating cost of cold storage facilities makes their cost structure more competitive. Going green can also make their own customers among food, beverage, and pharmaceuticals brands happy.

According to a recent survey by Gartner Research, price only ranked fifth most important to manufacturers. While most important was customer service, the only way to distinguish your warehouse from others is with what was ranked as third most important – innovation. Going green may be innovative, and any innovation is always a risk.

But by now, with energy efficiency and green power solutions widely used and proven effective, they’re a pretty safe bet. Indeed, the riskier path might just be doing nothing on energy and hoping that business as usual will be good enough.

As Logistics Management has explained, “the combined pressures of labor needs, efficient operations, and unstable customer base have put cold 3PLs in a tough spot. If they innovate, automate and update, there’s no guarantee the customer will stay with them long enough for those investments to prove worthwhile. If they don’t, there’s an even better chance they will lose business.”



Change Lighting

Having good, reliable lighting is important as without it, you may be looking at reduced work productivity and higher risk of accidents. You also want to avoid flickering lights and have to have bulbs that can withstand freezing temperatures without cracking. If you seem concerned to find these, don't be.

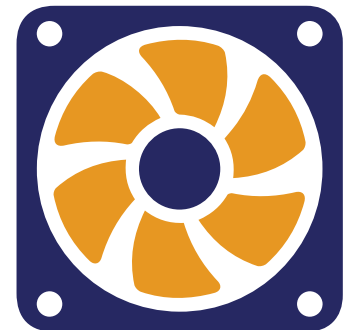
High-efficiency lighting requires less energy to produce the light, while also emitting less heat that must then be removed by refrigeration. LED Lights, or light-emitting diodes, can check off all your needs.¹⁴ These bulbs can last up to 50,000 hours, can operate in rooms as cold as negative 30 degrees Fahrenheit and emit the least amount of UV radiation compared to others on the market. Installing occupancy sensors in intermittently used areas can cut lighting energy up to 75%.¹⁵ Long life fixtures and bulbs greatly reduce maintenance costs but often these lights are hard to reach and take time to change.

Install Modern Ceiling Fans

Like other warehouses, cold storage facilities are susceptible to the “thermal layering” phenomenon, which is when the air settles into various layers that may be only a few degrees apart. If your facility has floor-to-ceiling storage racks or shelves with temperature-sensitive inventory, heat gathering at the upper layers can reduce the shelf life of your inventory on higher shelves and raise your cooling costs overall.

Newer refrigeration systems are optimized for airflow, but older facilities may benefit from installing high-volume, low-speed (HVLS) ceiling fans. They are more energy efficient than regular fans and HVLS fans are able to run for eight hours on only about a dollar's worth of electricity. Plus, these fans can be up to 24 feet in diameter, which means they are big enough to provide the ventilation necessary in even your biggest warehouse.

Additionally, installing these fans does not require significant structural alterations and won't interfere with your facility operation for long. Big Ass Fans, the entertainingly named manufacturer of HVLS products, offers systems specifically designed for the Warehouse and Distribution industry.¹⁶





Secure Doors from Leakage

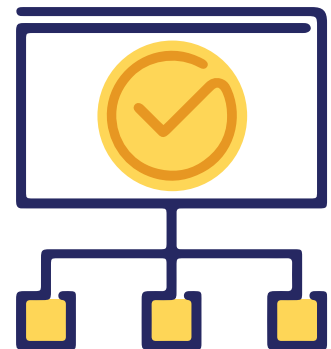
Doors are necessary for your inventory flow in and out of the building. Forklifts and employees going from dry to cold or frozen sections in your facility must have access points. However, you might be surprised to learn how much heat enters these cold or freezing sections through doorways, thus increasing the temperature and requiring more energy to cool the space again. For this reason, some cold storage facilities have reduced the number of doors to their refrigerated or frozen rooms.

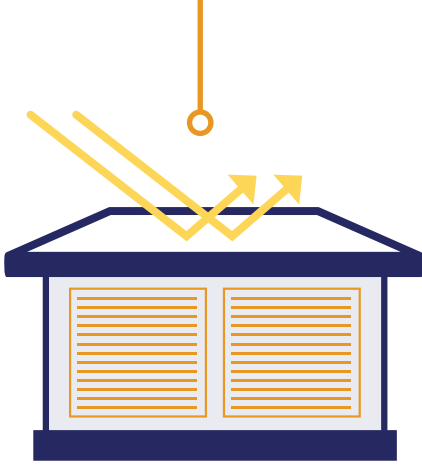
For the remaining entrances, installing the most efficient doors on the market can cut energy use. Minimizing air infiltration through open doors and loading docks is a cost-effective way to improve energy efficiency and bring costs down. [Rite-Hite](#) doors, a high-performance warehouse door manufacturer, improves energy efficiency with fast cycle times that keep your door closed more often.¹⁷ The company's products also incorporate smart controls and improve actionable data with their graphic use interface.

Get Software, Manage Your Energy Demand

Numerous companies provide software and services to help large and medium-size energy users across industries understand their energy usage better and then take steps to reduce energy demand or shift demand to times when electricity costs less.

Services typically include automating utility bill management, generating budget and variance reports, benchmarking properties against industry averages, measuring and verifying energy conservation measures, managing peak load and compiling sustainability reports. Energy management systems vary widely in cost but a type of provider known as an energy services company (ESCO) may offer essentially to work on spec, compensated partially or completely out of energy savings that they are able to achieve in your facility, reducing the risk to the customer. Check out [this link](#) for more information.





Paint or Plant Your Roof

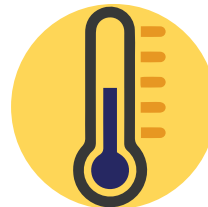
Unlike in dry or air conditioned warehouses, insulation is key to the design of cold storage facilities. It's possible that ceiling insulation already provides enough protection from heat radiating from above. However, there may be situations where protecting the outside of a roof from solar heating can justify the investment of painting or planting a rooftop surface.

Just as people wear light-colored clothing to keep cool from the sun, facility operators can do the same with building roofs. The roof is by far the hottest place of any building and can reach temperatures up to 50 degrees hotter than the ambient temperature outside. A standard dark-colored roof can spike to 150 degrees Fahrenheit in the summer sun and has proven to increase heat inside the building as well.

You can try to insulate your roof to slow the transfer of heat from getting inside, but it is impractical to try to stop all the roof heat from leaking down into a building through insulation alone. If you have a darker roof, you are probably spending more money on extra energy to counteract heat leakage that can be easily avoided in the first place.

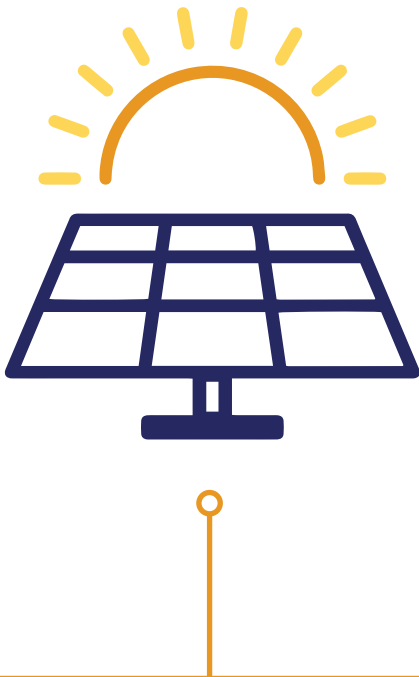


Researchers have seen **10-15% energy savings** from those who have a cool roof.



White paint and reflective coating can make indoor temperatures up to **8 degrees cooler** than a standard roof.

To keep any building cooler, the Department of Energy recommends installing a cool roof, one that is designed to reflect more sunlight and absorb less heat than a standard roof.¹⁸ The typical cool roof is made of materials with what is called high solar reflectance -- a material that reflects rather than absorbs sunlight. Researchers have seen 10-15% energy savings from those who have a cool roof. Another alternative is simply painting the rooftop with a white paint and reflective coating, which can cut the heat on the roof and also underneath it, making indoor temperatures up to 8 degrees cooler than a standard roof.¹⁹ A green roof is an eco-aware variation on a cool roof where sun and heat are absorbed by a rooftop garden of grasses, bushes, trees, and other plants. Another way to cool your roof is to install a solar array. We'll talk about that in a bit.



Go Solar

OK, here's the part where we talk about the energy solution for cold storage facilities that we like best, solar power. Not only can solar save you money over the next 35 years or more, but solar is pretty much the most impactful way available today for a business to demonstrate its commitment to going green.

Solar power has gotten much more affordable, with the price of solar panels dropping nearly 80% since 2010.²⁰ According to PV Magazine large-scale renewable energy plants that were commissioned during 2020 produce electricity cheaper than even the lowest-cost fossil fuel alternatives.²¹ No longer “alternative” energy, its low cost and reliability have now made solar power mainstream for electric utilities across the United States.



The price of solar panels has dropped **nearly 80%** since 2010.



About **3.5% of all commercial buildings** have solar.²²

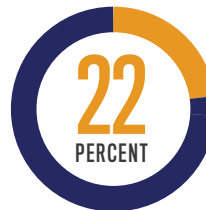
And if a cold storage operator wants to use solar power, then signing up for their utility's “green power” plan is an easy way to get access to clean energy. But buyer beware: utility green power plans vary widely in quality. The best green power plans offer customers electricity from genuinely clean sources like solar and wind facilities recently built and located inside the state as a way to create demand for new clean energy. Less credible green power plans rely on older facilities, like hydroelectric plants built after World War II, creating less demand for new clean energy. Such plans may feature very little solar and wind but instead claim as “clean” such dubious sources of energy as power plants that burn wood.

The biggest problem for most businesses with trying to get solar power from their utility company is that it doesn't usually save them any money. Indeed, most green power plans are actually more expensive than ordinary “brown” power from the electric grid.

The best way to save money on electricity while being sure that you're actually using solar power is to install solar panels right on your own property, either on a suitable rooftop or else on an available piece of land near the buildings that will use the energy.

Most providers to businesses of on-site solar power, which is also called distributed or rooftop solar, will offer a financial structure that allows the customer to save money on energy. Whether a customer buys or leases solar panels and other equipment or gets solar power through a power purchase or solar services agreement, installing a solar power generating system right on site lets a cold storage facility use less grid power, get lower rates per kilowatt hour, shave “peak” demand for grid power and enhance eco-branding.

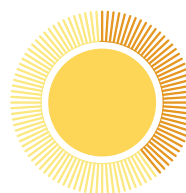
Solar panels can even cool your building by shading its roof. Research conducted by Secure Solar Futures in conjunction with the U.S. Department of Energy has demonstrated that roof shading from solar panels can significantly reduce the outside temperature of the roof surface, which can translate into lower temperatures inside the building as well.



Commercial & non-residential solar accounted for **22% of the market** in 2015.



There is **15 times more** solar capacity installed by American businesses today than a decade ago.



The National Renewable Energy Laboratory predicts that eventually, **40% of US electricity will be solar.**

23, 24, 25

When it comes to rooftop solar, a few questions naturally arise. Is there a big upfront cost? Will the solar equipment put holes in my roof? If my area is windy or gets hit by hurricanes and coastal storms, will solar panels on the roof blow away? Can my roof handle the weight of solar panels? And what if my roof is older and needs repairs – will that stop us from going solar on site?

Answering these questions goes beyond the scope of this guide. Google is a good place to start. You can also get helpful information to get started from the [Solar Energy Industries Association](#).

But at some point, if you're serious about going solar, you should seek out a commercial-scale solar developer qualified to respond to the special needs of businesses and hopefully with experience in cold storage. If you're located in our service area in the Southeast and Mid-Atlantic states, we hope you'll contact Secure Solar Futures. We'll give a free consultation to any reader of this guide.



Case Study: InterChange Group

Consumer activism has driven big power users to cut their carbon emissions.²⁶ Over the past decade, more and more companies have committed to use 100% clean energy. It's not just big tech companies like Amazon, Microsoft and Facebook whose massive server farms draw huge amounts of power from the grid. Demands to go green are also hitting the food and beverage industry. These days consumers, communities, and governments expect producers and their cold chain partners to cut their climate emissions.

Danone, a leading global food and beverage company and the largest B Corp in the world, has made a commitment to generate zero net carbon emissions by 2050. In the United States, the company sells such brands as Dannon Yogurt, Silk Soymilk and Horizon Organic dairy products. "Citizens today want companies to take a leading role in combatting climate change," says the company's website. Danone believes they "can lead an industry-wide transition to a low-carbon economy."

Danone has encouraged their suppliers and partners, including operators of cold storage facilities and third-party logistics providers, to contribute to the effort to cut climate pollution and use clean energy.

InterChange Group, a regional third-party logistics provider based in Harrisonburg, Virginia, that works with Danone took the company's encouragement to go green to heart. After making a variety of energy efficiency improvements, InterChange asked Secure Solar Futures to install a total of 3 megawatts of solar energy in two separate phases on the rooftops of several warehouse locations that are owned and operated by the company on behalf of Danone and other customers. For the facilities in the first phase of solar, their power usage in 2018 versus 2019 only increased by 0.035%, yet their annual electric bill went down by \$136,000 – representing a decline of 32%. Through co-investing in the solar project, InterChange was able to realize a one-time return on its capital of more than 40%, made possible by effectively leveraging federal tax incentives.

"We are pleased to continue our investment in sustainable energy and partnership with Secure Solar Futures," explains Devon Anders, President of InterChange. "Our 2019 investment has proven that we can produce clean energy for our facilities and reduce our carbon footprint. With the amount of energy needed to store frozen food day in and day out, we are confident in deploying enhanced solar and metering technology to further minimize our effect on the environment."



The Easiest Way to Get Started

We hope you've enjoyed this guide. Many of these recommendations you can start acting on right away to save money on energy. Energy experts are available to help you learn about deeper ways to get smart about energy and save even more money, all while reducing your facility's carbon footprint.

And since we're a solar power developer, we hope you'll seriously consider going solar. With their high energy costs only likely to grow in the future, cold storage warehouses are some of the best candidates for on-site solar power in any industry. With the costs of installing solar lower than ever and federal tax incentives for solar available at current high rates through 2022, now is the best time in years for a cold storage facility to start its solar journey.

If you're located in our service area in the Southeast or Mid-Atlantic regions of the United States, [contact Secure Solar Futures](#) for a free consultation on whether your cold storage facility is a good candidate to save money and go green with on-site solar power.

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ENDNOTES

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