



CASE STUDY

World's leading cold storage company reduces Energy Intensity more than 30%

Enabled by Ndustrial, Lineage Logistics has avoided the equivalent of nearly 250,000 homes' annual electricity use.

In just over 10 years, Lineage Logistics has become one of the world's largest and most dynamic cold storage companies. They now handle over 150 billion pounds of food a year – and that comes with a big energy bill.

Since the company's inception, Lineage has focused on reimagining the food logistics industry, including their approach to technology and energy management. Key to those efforts has been their partnership with Ndustrial™.

"Ndustrial is one of our closest technology partners and is integral to our technology vision including our data, engineering and energy management strategies" says Eric Ristow, VP of Product Management at Lineage.

"They help us ensure that our programs are running efficiently across the world."

Small beginnings

Lineage originally contacted Ndustrial in 2013 to help manage high energy bills in their Tar Heel, NC facility. The local utility charges for something called Coincident Peak, which applies an unpredictable penalty to large energy users during periods of high demand on the grid.

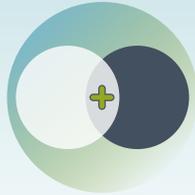
To date, Ndustrial has been able to predict Coincident Peak periods with 85% accuracy, giving Lineage enough time to adjust their production accordingly – and see significant savings using basic communication protocols and process controls.

Another early project tackled food spoilage by gaining better visibility into blast freezing cycles and product location. This led to the integration of legacy controls, WMS data and EMS data into a common platform, Contxt™, which serves as the system of record for Lineage's digital twins today.



Tracking Energy Intensity requires not just energy data, but operations data too.

That means two things:



**disparate data sets
must be combined**



**it must be done
in real time.**

Given the incredible savings from early efforts, Lineage asked Industrial for help managing energy across their growing portfolio of temperature-controlled warehouses. For a large industrial operation, managing energy also means managing production.

Production-first Energy Intensity

Lineage and Industrial have worked together over many years to refine not only the monitoring and analytics technology, but also the metrics used to measure performance at each facility and across the portfolio.

Over time, Energy Intensity has emerged as a key metric. Energy Intensity measures not just energy used, but the amount used per unit of production – in this case, per pound of food stored. That helps normalize the data despite an ever-changing baseline.

Critically, it also centers the company's efficiency efforts on what's most important: the safe storage and transportation of food. This mindset leads to initiatives that get to the very heart of Lineage's operations, rather than peripheral loads. For example, space optimization has allowed them to pack more product into each warehouse, reducing the need for new capacity as the company grows.

A related KPI is Energy Cost Intensity (also called Throughput Energy Cost), which accounts for the timing of electricity use. This captures the effects of load shifting and demand response efforts that save money by avoiding peak times. One facility saves roughly \$2,000 a month just by shifting one process to off-peak hours.

Of course, carbon emissions are a key metric as well. Reporting on carbon is key to Lineage's net zero strategy, and it's also

important for their investors. In fact, one debt issuer offers a discount on their loan rate for meeting milestones that help reduce greenhouse gas emissions – which means their carbon accounting must be based on accessible, auditable data.

A complex challenge

These KPIs may seem simple, and that's the point. But there's a fundamental challenge lurking underneath. Tracking Energy Intensity requires not just energy data, but operations data too. That means two things: disparate data sets must be combined, and it must be done in real time.

Energy data, operations data and revenue data sit in entirely separate systems. In fact, they exist in different worlds – the people who manage them don't typically talk to each other. Bringing these worlds together requires a team that can speak multiple languages – and can then aggregate, normalize and analyze very disparate things.

Moreover, monthly data is not adequate for making production-related decisions. Real-time meters and sensors are a must. Industrial now processes over 100 million data points every day to help optimize operations across more than 200 facilities in the US and, increasingly, all over the world. Some facilities also have two-way communications that allow for automated load control.

These efforts are well above and beyond the work of a typical software team. Success in a complex industrial environment requires integrating with legacy IT and OT systems, and it requires working across boundaries. It requires a partnership grounded not only in expertise, but in trust. When that happens, the results speak for themselves.

Transformative results

From 2014 to 2021, Lineage reduced their Energy Intensity by 32%. That means nearly one-third less electricity is required to process and store each pound of food.ⁱ This is the result of energy management efforts as well as space optimization and process optimization. Carbon Intensity reductions are commensurate with Energy Intensity.ⁱⁱ

Energy Cost Intensity also decreased by 30% over the same period. This is the result of various efforts including demand management, demand response, and even utility rate negotiation and bill verification

In total, Lineage has avoided the equivalent of nearly 250,000 homes' annual electricity use. To put it another way, it's like eliminating over 16,000 tanker trucks full of gasoline – more than 6 trucks per day for 7 years.ⁱⁱⁱ

The investment in energy monitoring has also produced a number of side benefits. In one facility, Ndustrual's meters showed that incoming grid voltage was above the specified limit, which was causing drives to overheat and fail every 4-6 weeks. The team was able to work with the utility to correct the issue.

Other project ideas have been discovered across the portfolio, including 3 sites identified as good candidates for power factor correction. One Regional Maintenance Manager initiated a project that wasn't getting buy-in until he could show his team the results in real time. Ndustrual's Nsight™ software showed an immediate 35% Energy Intensity improvement, which helped others get on board.



Looking to the future

The energy sustainability journey is just beginning. Lineage has set a company-wide goal of net-zero carbon emissions by 2040, including a commitment to measure and report on greenhouse gas emissions every year.^{iv} This requires constant monitoring, which Ndustrual enables by equipping facilities around the world with real-time, auditable data that can serve the reporting needs of Lineage and its investors, customers, and suppliers.

Ndustrual helps Lineage to not only monitor and evaluate energy performance, but also to implement a wide variety of projects that reduce Energy Intensity and save money. These include:

- Blast freezing process optimization,
- Demand response automation, and
- Data disaggregation down to the level of each customer and each SKU.

The transition to net-zero will also include further energy efficiency improvements, renewable energy, logistics optimization, and other emissions reduction efforts for which Ndustrual will continue to serve as an advisor. ☺

It's like eliminating over 16,000 tanker trucks full of gasoline – more than 6 trucks per day for 7 years.

ⁱ Across all facilities for which complete data are available over the full time period (66 facilities). This figure does not control for the effects of processes such as blast freezing that may have been added during the analysis period. If these changes were controlled for, reported Energy and Carbon Intensity would have declined further.

ⁱⁱ Assuming a constant emissions factor of 0.98 pounds of CO₂ per kWh. This excludes the effects of carbon intensity reductions from grid-supplied electricity over the analysis period. If included, grid improvements would further improve reported Carbon Intensity.

ⁱⁱⁱ Avoided energy consumption is the difference between actual consumption in a given year and the expected consumption given the Energy Intensity in the baseline year (methodology verified by The Carbon Trust). Total avoided consumption from 2014-2021 across the 66 facilities for which complete data are available equals 1,764,092,952 kWh. This was converted to avoided emissions using the EPA GHG equivalencies calculator on May 5, 2022. If additional facilities were included, total avoided emissions would be substantially higher.

^{iv} <https://www.lineagelogistics.com/news-stories/lineage-logistics-joins-climate-pledge-and-commits-achieving-net-zero-carbon-emissions>