LINEAGE LOGISTICS: DATA SCIENCE TEAM DRIVES ENERGY SAVINGS IN COLD STORAGE

SOLUTION OVERVIEW

Lineage Logistics is the world’s largest temperature-controlled industrial REIT and logistics solutions provider with a global network of over 370 facilities, including more than 250 locations in North America. In 2013, the company established a Data Science team to develop innovative data and technology-driven energy management solutions and to serve as a hub for evaluating technology-driven projects to minimize costs. The Data Science team now consists of 21 full-time employees who have backgrounds in mathematics, physics, mechanical engineering, marine biology, operations research, robotics, and systems engineering. Since its inception, the team has evaluated and supported the implementation of energy-saving projects that address racking configuration, warehouse operations algorithms, blast freezing, control system optimization, and rate structure selection.

Lineage Logistics structured the Data Science team to allow members to focus on different operational areas in depth. Although the team is based in San Francisco, they visit Lineage facilities to gain a better understanding of facility operations and investigate new energy-saving opportunities. The team also formed strategic partnerships for R&D with the Massachusetts Institute of Technology (MIT), Stanford University, and the National Renewable Energy Laboratory (NREL). They work with these and other partners to conduct research on industrial operations, automation optimization, and new refrigeration technologies.

ORGANIZATION TYPE
Industrial

BARRIER
Finding and evaluating new energy-saving solutions for cold storage facilities

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SOLUTION
Development of a Data Science team to assess and scale new energy solutions across the company

OUTCOME
Streamlined project evaluation and increased energy-saving technology adoption across Lineage Logistics’ portfolio of cold storage facilities

POLICIES
The Data Science team is set up as Lineage’s innovation center where energy initiatives are driven by extensive analysis of network data to identify potential areas of efficiency improvement. The team’s foundation is rooted in the company-wide values of “Bold” and “Innovation” and they act as a hub to foster an open and collaborative culture of continuous improvement and scalability for portfolio-wide impact. Lineage has placed an additional focus on quantifying the techno-economic impact of initiatives specifically tied to measurable return on investment (ROI). This framework empowers the Data Science team to support projects to meet sustainability and economic goals and improve overall technology, innovation, and profitability outcomes.

PROCESS
The Data Science team was created with three foundational principles:

1. To be the innovation center for the company,
2. To find and empower strong technical talent; and
3. To promote a bottom-up approach and close collaboration with other divisions.

Putting the first principle into practice, the team is the innovation center of the company and drives ideas for energy initiatives. The Data Science team identifies energy efficiency improvements using extensive analysis of network data and drives those innovations with other divisions.

The second principle ensures that the Data Science team is filled with strong technical talent. Lineage Logistics hires subject matter experts from diverse backgrounds, which has become key to the success of the team.

The third and final principle places greater emphasis on relationships with colleagues across the company. From site general managers to construction directors, these colleagues provide the team with input and feedback that helps to identify and field-test new opportunities. With these principles in place, the 21-member Data Science team has a strong foundation for sustained impact across the company.

Organizationally, the Data Science team is split into three divisions: Transportation, Warehouse Algorithms and Design, and Research and Development (R&D). Each division follows a project
evaluation model to remove uncertainties over a project’s potential and enables the team to take risks on emerging energy technologies. In addition, the R&D team employs a pilot project framework for new energy technologies. This framework guides team members as they vet prospective technologies. When they discover a business case, a proof-of-concept project is carried out at a Lineage Logistics site. This approach enables the team to examine product performance while minimizing the potential risk. If a pilot project is successful, then it will be scaled across multiple sites.

MEASURING SUCCESS
The Data Science team has had a track record of success since its inception in 2013. As a Better Plants partner, Lineage Logistics committed to improving their energy intensity by 25% over 10 years, with 2015 as the baseline year. Due to the pace of innovations and collaborations with the Data Science team, the company met its target just two years after setting this goal. As of March 2021, the team has acquired 13 patents in areas that range from blast freezer cell design to optimal tasking algorithms. The team also directly supported numerous improvements to energy operations, including technology adoption, incremental improvements to existing energy infrastructure, and large energy efficiency projects. One recent improvement was the development of algorithms that analyze site load profiles and electricity rates to determine the optimal amount of fixed-rate energy procurement to use in deregulated markets. In 2020, the first iteration of the team’s work on energy procurement and hedging produced energy bill savings of 2-6% at participating sites. Lineage Logistics’ Riverside facility deployed this strategy and was able to earn revenue via grid incentives while continuing normal operations.

The Data Science team has supported the following energy-related projects:

- Redesign of blast freezing cells using computational fluid dynamics (CFD) simulations and extensive testing. As a result, blast times were reduced by as much as 82% in 2020, saving Lineage Logistics millions of kilowatt-hours in energy consumption.
- Collaboration with post-graduate physics researchers to develop and deploy thermal flywheeling to multiple sites. The deployment of thermal flywheeling at the Mira Loma, California, site lowered the site’s annual electricity bill by $1 million in 2019.
- Development of robust energy procurement strategies that proactively purchase power and reduce site energy bills. This action optimized site exposure to electricity spot prices and allowed the R&D team to reduce uncertainty in energy expenditure.
- Launch of portfolio-wide initiatives to install motion sensors on freezer doors, replace traditional lighting with LEDs, and install Variable Frequency Drives on motor-driven systems. At one site in 2020, the LED upgrades alone yielded more than 530,000 kWh in energy savings.

OUTCOMES
Lineage Logistics was one of the first companies in the cold storage industry to embrace a data-driven approach to operational innovation and create a Data Science team. Many of the innovations from the Data Science team have been transformed into company-wide initiatives and implemented throughout Lineage Logistics’ global portfolio. These innovations include optimized site racking configurations, improved labor productivity via efficient tasking, and proactive monitoring of energy consumption. These practices were not common before the team’s inception. The team is also


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engaged in several innovative projects with partners. These projects range from blast freezing optimization to next-generation refrigeration control systems.