

[UNITED THERAPEUTICS PROJECT LIGHTYEAR_COMMERCIAL]

THE PATH TO
NET ZERO
STARTS HERE



MISSION

United Therapeutics (UT) was founded on the mission of saving lives—a goal that has guided the development of multiple facilities with a commitment to environmental stewardship and sustainable design. With the anticipated FDA approval of inhaled Treprostinil—an inhaler used for the treatment of Pulmonary Arterial Hypertension and Pulmonary Hypertension with Interstitial Lung Disease—UT had an urgent need to expand its warehousing and logistics capabilities to support its growing operations.

“At United Therapeutics, we adopted the mindset that we could develop life-saving medicines for patients without harming the planet.”

– Dr. Martine Rothblatt,
CEO, United Therapeutics

OWNER'S GOALS



1. MISSION

Innovate for the unmet medical needs of our patients and benefit our stakeholders

2. FUNCTION

Meet program needs for occupants, process, and organization



3. NET ZERO ENERGY

Design efficient, renewable energy systems with no on-site fossil fuels

4. SCHEDULE

Meet the needs of the project in an efficient and timely manner



5. MATERIALS

Challenge typical construction supply chain to prioritize USA-made, low embodied carbon materials

6. COST

Invest where it matters most for the program, the people, and the planet



7. EMBODIED CARBON

Minimize new materials and construction waste

8. CERTIFICATION

Achieve LEED Gold, LEED Zero Carbon, LEED Zero Energy



PROJECT IMPACTS

Through a collaborative effort, Project Lightyear overcame pandemic-era supply chain challenges, maintained its sustainability goals, and delivered a first-of-its-kind facility that redefines the future of pharmaceutical logistics, with ripple effects felt locally, regionally, and world-wide.

local

PRESERVING COMMUNITY RESOURCES

Project Lightyear was designed with minimal disruption to the existing site, preserving the Frank Harmon Fieldhouse and minimizing impact on the adjacent soccer field.

RESILIENT INFRASTRUCTURE

The facility enhances local infrastructure with its microgrid system, ensuring uninterrupted operations even during electrical grid outages.

regional

ADVANCING U.S. MANUFACTURING

Project Lightyear prioritizes domestic materials and systems, reinforcing national supply chain resilience and energy independence.

ECONOMIC GROWTH & JOB CREATION

The facility's advanced logistics and sustainable operations support workforce development and long-term economic stability in the region.

global

EXPANDING LIFE-SAVING TREATMENTS

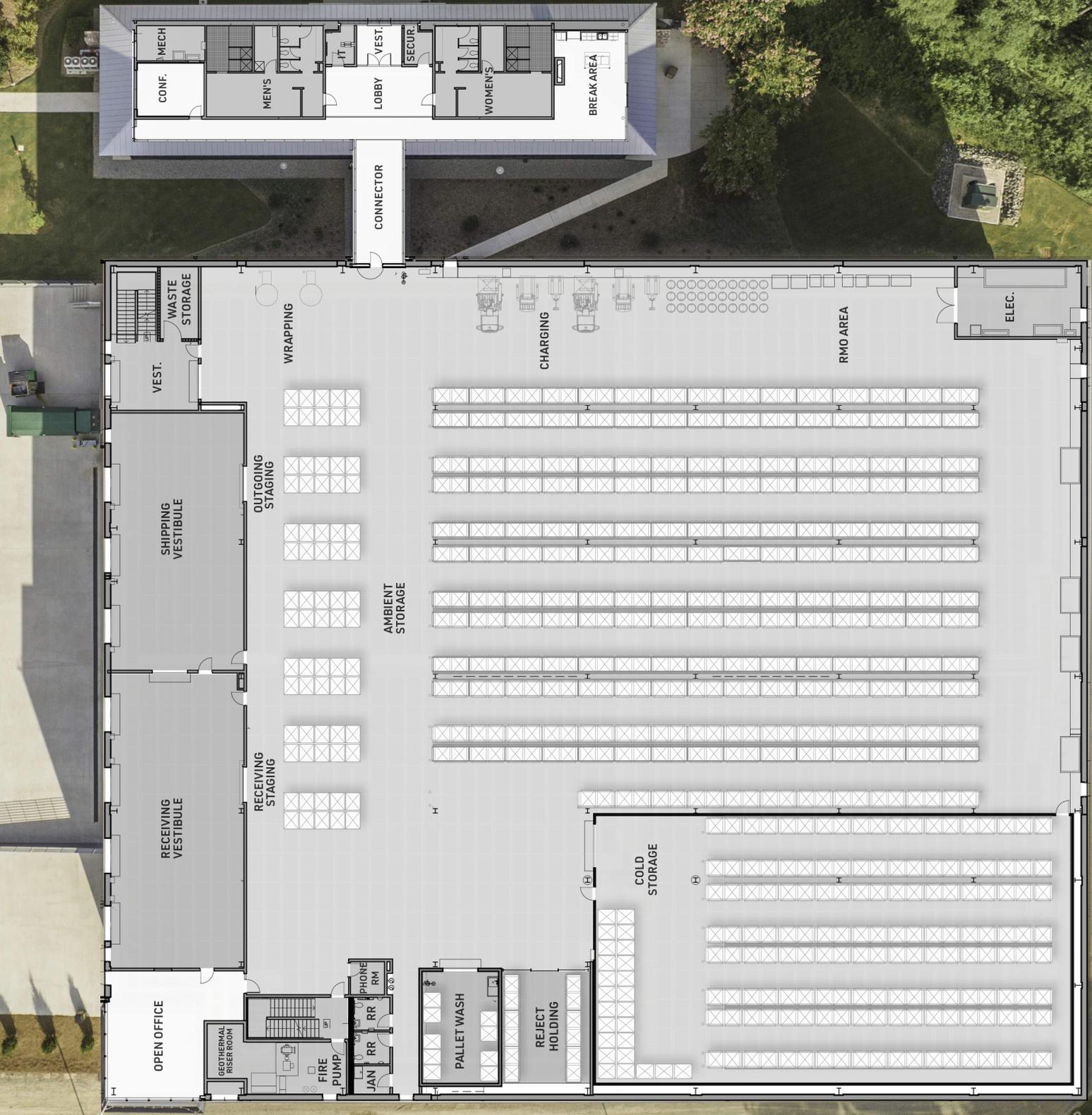
By increasing production capacity for PAH and PH-ILD treatments, the facility ensures more patients worldwide have access to critical therapies.

SETTING A NEW INDUSTRY STANDARD

With Site Carbon Zero and Site Net Zero achievements, Project Lightyear establishes a precedent for sustainable, high-performance biomanufacturing facilities.

SITING

To minimize ecological impact, the building was strategically placed to reduce disruption to wetlands, tree canopy, and natural habitats. Repurposing the existing soccer field further supported this goal, allowing development within an already cleared area rather than disturbing untouched landscapes.





STORYTELLING

New storefront glazing now encloses portions of the repurposed Frank Harmon fieldhouse, framing the structure as both an artifact and a living part of Project Lightyear. The connector showcases experiential graphics within these transparent walls highlighting “the path to NetZero”. This helps tell the story of the building’s evolution, honoring both its past and its new role in a pioneering biotech facility.

CONFERENCE ROOM
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EXIT

THE NATIONAL LIGHT YEAR
1. SUSTAINABLE DESIGN
2. ENERGY EFFICIENCY
3. WATER CONSERVATION
4. WASTE REDUCTION
5. ENVIRONMENTAL QUALITY
6. SOCIAL RESPONSIBILITY
7. ECONOMIC VIABILITY
8. COMMUNITY ENGAGEMENT
9. INNOVATION
10. LEADERSHIP
11. COLLABORATION
12. RESILIENCE
13. ADAPTABILITY
14. FLEXIBILITY
15. SCALABILITY
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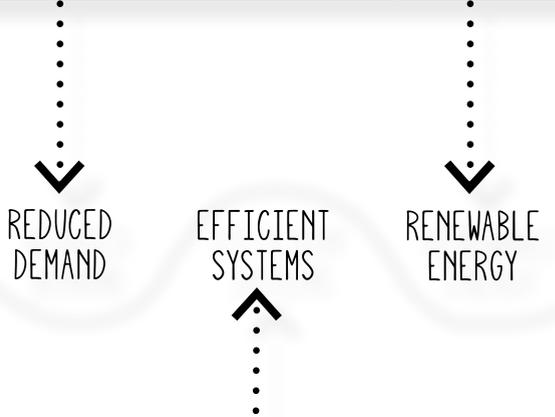
PRESERVING LOCAL LEGACY

The project originally called for the demolition of the existing fieldhouse, winner of a 2013 AIA Triangle Honor Award — a modest yet significant structure designed by renowned architect Frank Harmon. Recognizing its architectural and cultural value, the design team fought to preserve and integrate the fieldhouse rather than erase an important piece of Raleigh’s built heritage.

Integrating an unsprinklered, wood-stud building into a high-performance, code-compliant facility posed technical challenges. However, the architects saw opportunity rather than obstacle, leveraging innovative design solutions to retain the fieldhouse while meeting modern standards. The result is a seamless blend of old and new, where the intimate scale of the fieldhouse acts as a transition between the pedestrian realm and the industrial scale of the new facility.

The re-purposed fieldhouse serves as a collaborative meeting and break area for the users and visitors of Project Lightyear. At the heart of the fieldhouse’s design was Harmon’s signature dog-trot concept, an open-air breezeway that once served as a gathering space for players and visitors. Rather than losing this distinct architectural feature, the team carefully enclosed the structure, repurposing it as a functional security checkpoint for the adjacent cGMP facility. This transformation not only extended the life of the building but also maintained its essence within the new context.

In an era where progress often comes at the cost of history, Project Lightyear proves that preservation and innovation can coexist, creating a richer, more layered architectural experience—one that celebrates sustainability, adaptation, and respect for Raleigh’s architectural legacy.





PHOTOVOLTAIC ARRAY

1,200 ROOF-MOUNTED PANELS PROVIDE RENEWABLE ENERGY, CONNECT TO THE MICROGRID, AND RECHARGE THE BATTERY BACKUP. THE AMOUNT OF SOLAR ENERGY IS OPTIMIZED BY STRATEGIES FOR REDUCED ENERGY DEMAND.



BUILDING ENVELOPE

MODIFICATIONS TO THE WALLS, ROOF, AND ENTRIES REDUCE OVERALL ENERGY DEMAND BY 5 PERCENT. THESE INCLUDE INSULATION, VESTIBULE ENTRIES, AND AIR INFILTRATION MANAGEMENT.



SYSTEMS OPTIMIZATION

MECHANICAL AND ELECTRICAL EFFICIENCIES REDUCE ENERGY DEMAND BY 12 PERCENT. THESE INCLUDE LED LIGHTING, OCCUPANCY SENSORS, VENTILATION SYSTEMS THAT RESPOND TO SCHEDULE AND DEMAND, AND REGENERATIVE TRUCK LIFTS.



GEOHERMAL FIELD

40 GEOHERMAL WELLS, AT 500 FEET DEEP, USE CORE EARTH TEMPERATURES TO REGULATE BUILDING SYSTEMS AND ENVIRONMENTAL CONDITIONS. THESE REDUCE OVERALL ENERGY DEMAND BY AN ADDITIONAL 10 PERCENT.



EMBODIED CARBON

THE FIELDHOUSE STRUCTURE REDUCES THE NEED FOR NEW BUILDING AREA BY NEARLY TEN PERCENT. LESS NEW SITE WORK, NEW MATERIALS, AND CONSTRUCTION WASTE ALL CONTRIBUTE TO A LOWER INITIAL CARBON FOOTPRINT.



MICROGRID SWITCHBOARD

THE INDEPENDENT MICROGRID CONNECTS THE PHOTOVOLTAIC PANELS, BATTERY BACKUP, AND CRITICAL BUILDING INFRASTRUCTURE. THE MICROGRID SYSTEM HELPS ELIMINATE THE NEED FOR FOSSIL FUELS ON SITE.



BATTERY SYSTEM

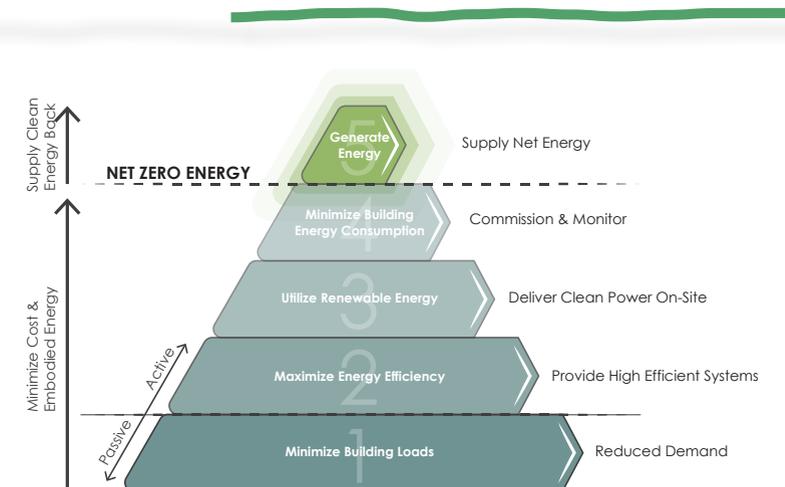
THE 6.2 MEGAWATT-HOUR BATTERY SYSTEM SUPPORTS THE BACKUP OF THE MICROGRID SYSTEM. IT REPLACES A TRADITIONAL GENERATOR AND PROVIDES MORE THAN TWO DAYS OF BUILDING SUPPORT WITHOUT UTILITY POWER OR FOSSIL FUELS.

RENEWABLE ENERGY

The project's success was driven by the integration of a renewable, clean energy supply. The solar PV system was carefully designed to offset the required EUI, considering building massing, orientation, panel degradation, solar yield variability, future capacity needs, and equipment availability.

The system includes seven 62 kW Sunny Tripower inverters and 1,186 Maxison 475W panels, generating 767 MWh annually. Covering nearly the entire roof, the array maximizes available space to achieve site net-zero energy.

The design-build team strategically sized the PV system for future expansion, with inverters capable of supporting an additional ground-mounted array without disrupting operations.





RESILIENT DESIGN

ENVELOPE | Project Lightyear's high-performance thermal envelope includes an R-42 roof, R-21 walls, and U-0.35 windows. The design optimizes insulation, reducing energy demand and HVAC reliance while balancing cost and embodied carbon. The design integrates "fin lights" and a glazed stair tower, enhancing the building's modern aesthetic while providing access to rooftop mechanical systems.

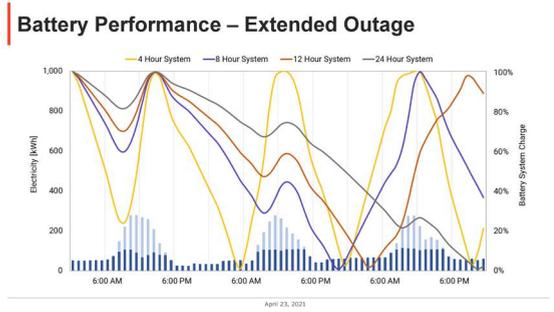
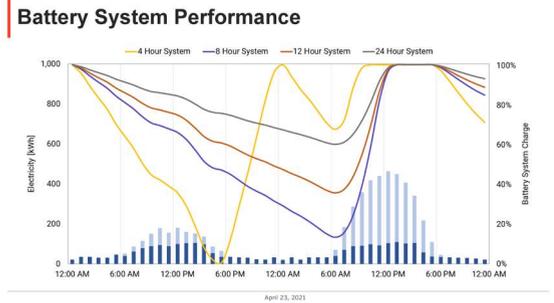
ENERGY MODELING | A comprehensive energy model guided key design decisions, optimizing envelope construction and selecting all-electric mechanical systems for efficiency. It also determined the solar PV array size needed for Net Zero energy, allowing United Therapeutics to offset grid energy use and achieve significant cost savings on energy bills throughout the life of the facility. More importantly, it ensures that this project will offset any energy needed from coal or natural gas-powered utility plants.

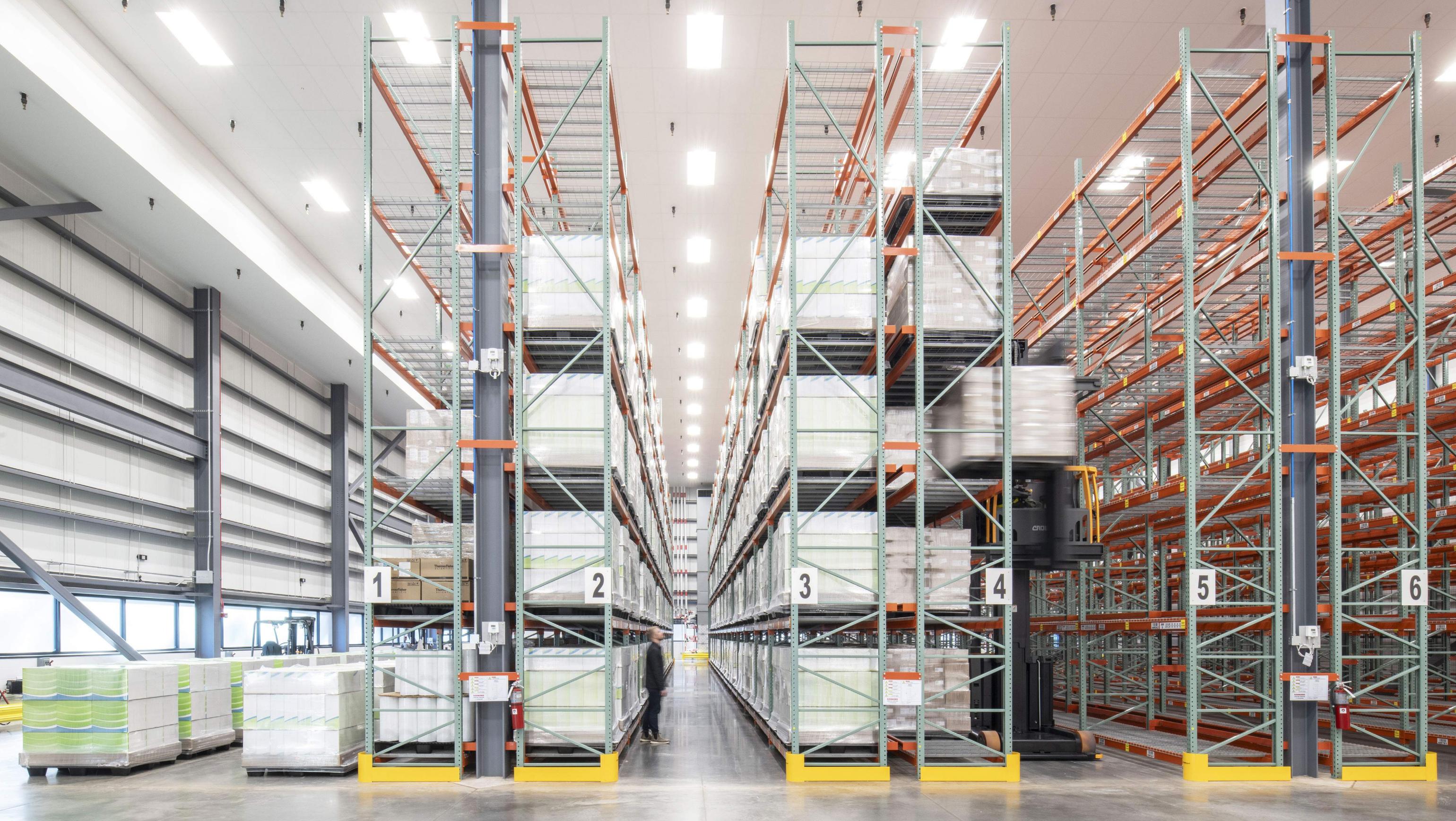
For the large ambient storage area, CFD modeling optimized HVAC performance in the absence of industry baselines for hybrid ambient/cold room cGMP warehouses. With no established benchmarks, the design team collaborated with vendors to pioneer new sustainable strategies, setting a precedent for future high-performance industrial facilities.

NET ZERO DESIGN

ENERGY STORAGE | Tesla Megapacks provide flexible, resilient emergency backup power. Each self-enclosed modular battery delivers 3.1 MWh and 770 kW of capacity, with two units supplying the facility's critical energy needs; **achieving no on-site fossil fuels**. The next-gen Lithium Iron Phosphate chemistry minimizes thermal risk, while an integrated cooling system and inverters ensure efficient operation. A Schneider microgrid control system optimizes energy distribution, integrating the Megapacks with the rooftop PV, emergency lighting inverter, and building electrical network. This automated system **enables the facility to operate independently from the grid for weeks, if not months, during extended outages**, reinforcing Project Lightyear's commitment to energy resilience and sustainability.

ENERGY INTEGRATION | A Schneider microgrid control system integrates Tesla Megapacks, rooftop PV, and the building's electrical network, eliminating fossil fuel use on-site. This automated system **enables the facility to operate independently from the grid for weeks, if not months, during extended outages**. As the first zero-carbon microgrid of its kind in the utility provider's service area, it supports broader carbon neutrality goals by 2050. The facility is on track for LEED Gold, LEED Zero Energy, LEED Zero Carbon, and Energy Star certifications, reinforcing its role as a model for sustainable, resilient design.





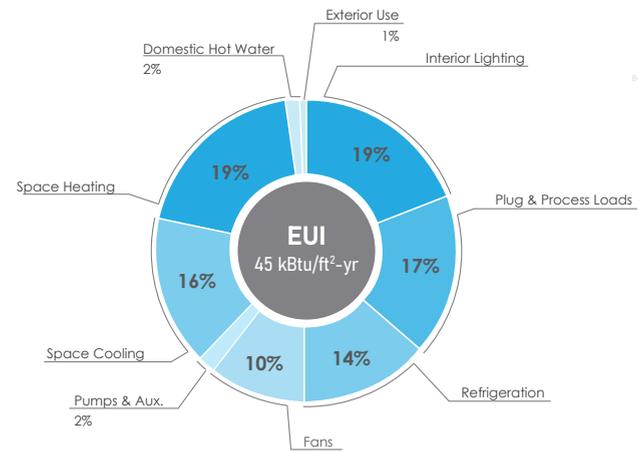
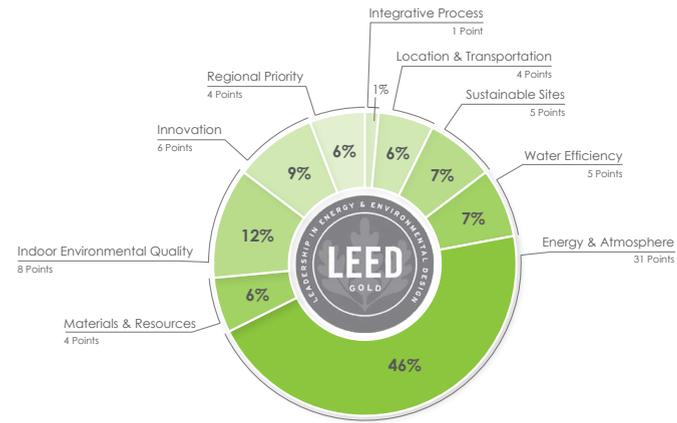
ENERGY REDUCTION

Together, these strategies reduce expected EUI by over 8%, driving the project closer to its Net Zero energy goal.

OPERATIONAL EFFICIENCY | Project Lightyear minimizes energy waste through smart operational strategies. Light occupancy sensors adjust lighting based on use, while temperature setbacks and demand control ventilation optimize HVAC performance in administrative areas during off-hours. EnergyStar-certified equipment reduces plug loads and eliminates standby power drain.

REGENERATIVE CHARGING | A key innovation is the use of regenerative charging electric lift trucks, which capture and store kinetic energy when slowing or stopping, reducing overall energy consumption. This not only lowers peak power demand but also improves charging efficiency, ensuring that battery recharges occur at optimal times to minimize strain on the facility's energy systems.





ENERGY REDUCTION CONTINUED

GEOTHERMAL | A geothermal exchange system, utilizing 40 bores at 500 feet deep, serves as the foundation, leveraging the earth's stable temperature for high-efficiency heating and cooling. This system integrates six-pipe heat recovery chillers and a 20-ton fluid cooler to optimize performance.

HIGH-PERFORMANCE SYSTEMS | A dedicated outdoor air system (DOAS) ensures proper ventilation for cGMP compliance. Strategically placed recirculating air rotation units (pictured at right) maintain highly-efficient and steady ambient conditions in the large open volume. The cold room features air-cooled DX condensing units and a desiccant makeup air AHU for precise temperature and humidity control. The fieldhouse is conditioned with a dedicated VRF system for localized efficiency.

OTHER METHODS | Further energy reductions come from LED lighting, variable speed fans and pumps, premium efficiency motors, and high-performance cold storage equipment.

TOTAL ENERGY REDUCTION | Project Lightyear maximizes energy efficiency through advanced HVAC and building systems, with a focus on reducing the high energy demands of a cGMP facility. Working cohesively, all the energy generation and reduction methods mentioned collectively cut the building's expected EUI by 31% from a baseline building. This is shown visually in the chart below.

