



# Modular Home Manufacturer Reduces Costs by Right-Sizing its Lithium-ion Batteries for Each Forklift's Power Needs

## Summary

A manufacturer of mobile and modular homes wanted to convert its fleet of forklifts to lithium-ion batteries, which met its strict demands for high safety standards and lower total cost over the life of the batteries. The manufacturer planned to install large, 80-volt 35.7-53.5 kWh lithium-ion batteries into all its sit-down counterbalance forklifts and reach trucks, regardless of their application or total operating hours. EnerSys® conducted a power study to compare the performance and costs of several different sized NexSys® iON lithium-ion batteries, ranging from 25.7 kWh to 53.5 kWh. The study revealed that some forklifts would be just as productive and more energy efficient if they were powered by NexSys® iON batteries whose capacity was sized for their applications at a lower cost. The company has adopted a more customized approach to its lithium-ion forklift batteries and will save \$1.5 million by right-sizing their batteries instead of standardizing on a single lithium-ion battery with oversized capacity.

## Situation

As people look for more affordable housing, the manufactured home industry has grown steadily in recent years. In fact, one out of every nine new homes constructed in the U.S. is a manufactured home. One of the leading manufacturers of mobile and modular homes has built many of those new houses, and demand has helped the company expand from one location to more than 350 home centers nationwide.

The modular home manufacturer distributes building supplies to its manufacturing facilities from 50 supply centers. Over one shift, six days a week, a fleet of 250 forklift trucks continuously move tons of lumber, hardware, siding, windows, doors and all the other materials needed to build complete houses.

## The Challenge

The company decided to convert its forklift equipment from diesel and liquid propane (LPG) to electric powered by lithium-ion batteries because they are safer to use around highly flammable materials like lumber and are more environmentally sustainable in terms of carbon emissions and waste chemicals from combustion-powered equipment.

Assuming that bigger is always better, the manufacturer planned to change over to all 62.4 kWh lithium-ion batteries with 10-year warranties to ensure long life and lower costs over the life of the batteries. However, the fleet was comprised of a variety of forklift models, ranging from reach trucks to 6,000-lb, 8,000-lb and 10,000lb sit down counterbalance trucks. The forklifts were used for different applications throughout the facility, so their actual power consumption and total time of operation varied greatly. Their oversized battery approach would have far more energy capacity than many of their forklifts would need over the course of their single shift, six days per week operation.

## Defining Energy Needs

To find the ideal lithium-ion batteries that would optimize performance across their entire fleet of forklift equipment, EnerSys® helped the modular home manufacturer identify its actual power needs for all the trucks by measuring the average energy (amp hours) used. This would help optimize the fleet's energy usage in terms of efficiency and cost.

To identify the actual power needs, EnerSys® conducted a power study using typical use data for each forklift provided by the operation manager at one distribution center.

EnerSys® processed the power study data with its proprietary EnSite™ modeling software – applying an application-specific operating parameters and power requirements to assess the feasibility of battery solutions and generate reports comparing battery and charger sizing and costs.

## Solution

Based on the unique energy demands of each truck, EnerSys® recommended multiple NexSys® iON battery capacities for each forklift to meet specific power needs at the lowest cost.

For example, the 8,000 lb forklifts were best matched with the power capacity of the 44.6 kWh NexSys® iON battery for one of its single shift operations, which is 35% less costly and takes less energy to fully recharge than the largest 62.39 kWh NexSys® iON battery.



Plus, EnerSys® recommended a life expectancy in line with the expected life of their equipment, thus saving unnecessary costs from purchasing more expensive batteries that would last longer than the equipment they powered.

## Results

Over multiple years, the modular home manufacturer is switching over its combustion-powered lifts to right-sized NexSys® iON batteries – reducing emissions as well as energy costs. All the batteries are covered under a 7-year warranty.

By using custom sized NexSys® iON batteries for each forklift application, the manufacturer will avoid overspending on the largest battery, with a projected savings of more than \$1.5 million over the life of the batteries.

## Power Study Data Overview

Operating Summary	Lift Truck Information
One shift daily	Reach Trucks: Avg. 300-600 AH daily, 2,000 hours/year
6 operating days/week	6,000-lb sit-down counterbalance trucks: Avg. 400-700 AH daily, 2,500 hours/year
	8,000-lb sit-down counterbalance trucks: Avg. 550-900 AH daily, 2,500 hours/year
	10,000-lb sit-down counterbalance trucks: Avg. 550-900 AH daily, 2,500 hours/year

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