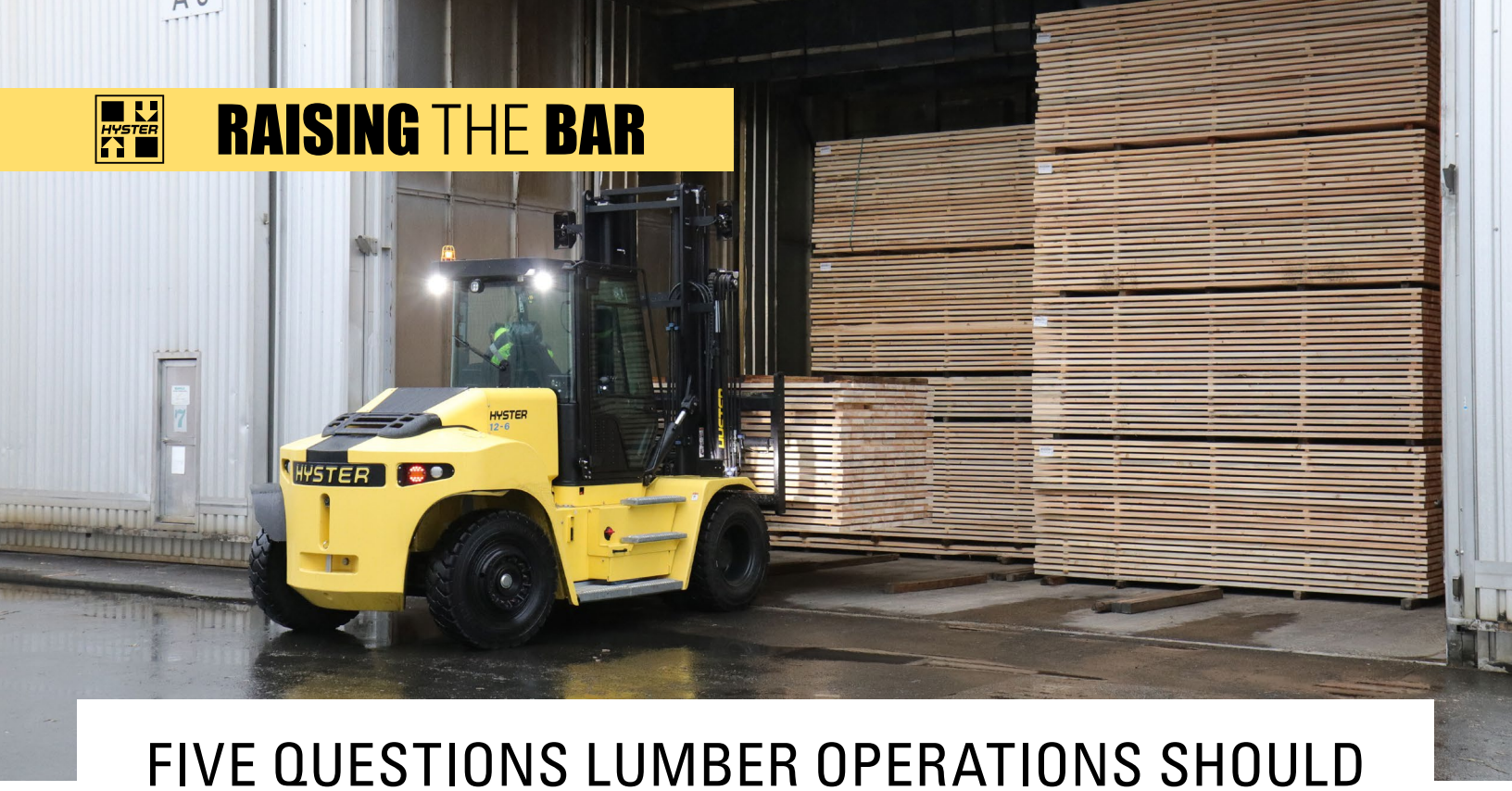


FIVE QUESTIONS LUMBER OPERATIONS SHOULD BE ASKING ABOUT FORKLIFT ELECTRIFICATION

Operations in the lumber industry like sawmills and lumber yards have long relied on internal combustion engine (ICE) power for their forklift fleets to keep product moving. But as electric options advance and expand, delivering performance comparable to diesel-powered material handling equipment, lumber operations have new questions to ask about clean power and its ability to deliver the productivity that they need.

1 // WHICH APPLICATIONS AT LUMBER MILLS HAVE THE GREATEST POTENTIAL FOR FORKLIFT ELECTRIFICATION?

Shipping and receiving – that's where the greatest opportunity is currently. For production workflows, the shift from diesel to electric forklifts is on the more distant horizon. That's because the production departments at mills typically require forklifts to run more continuously than shipping and receiving operations. In production, it's not uncommon for heavy-duty forklifts with a 36,000-pound lift capacity to be used to push 500,000 pounds of lumber into kilns. While electric trucks are available in this capacity range, the duty cycles for these mill applications aren't usually compatible with the charging cadence required to keep the trucks powered. Forklifts pushing lumber into kilns are often running 4,000-plus hours per year. Operators typically all take their break at the same time, and it's a challenging cultural change to move operators to staggered breaks, so mills considering electric for these workflows would likely need one charger per truck so that operators could opportunity charge their batteries simultaneously during the break. At this point, the business case usually does not favor the cost of both charger and electric truck relative to an ICE alternative.

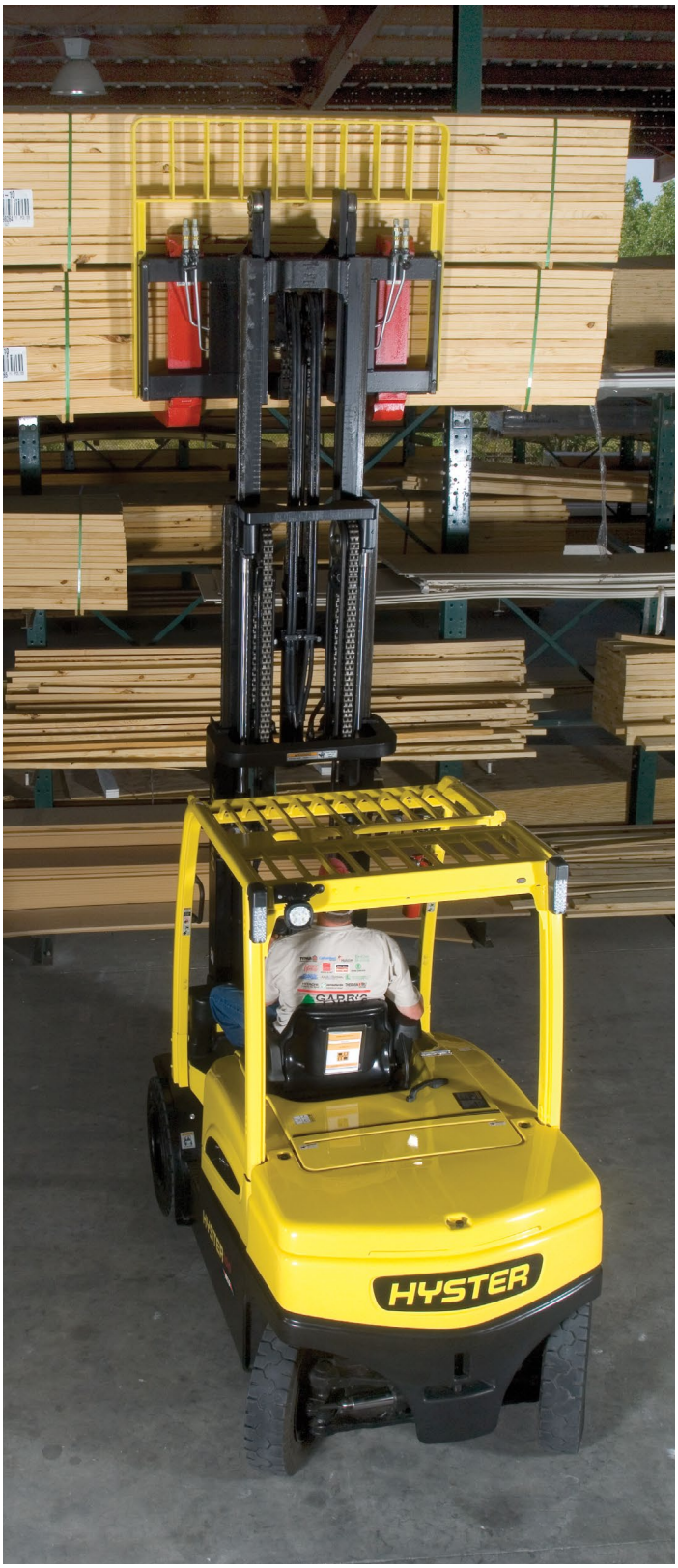
But, for shipping and receiving operations, the story changes. These mill applications typically have their forklifts, often with lift capacities of around 15,500 pounds, operating for about a shift and a half per day, or 1,500 to 1,800 hours annually. Because these trucks are running for only 12 hours per day, the battery for electric trucks can be charged while the truck is already out of use anyway, enabling a shift to electric equipment without impacting productivity.

2 // WHAT CAN WE EXPECT OUT OF ELECTRIC-POWERED TRUCKS?

Physically, they are the same rugged, dependable forklifts that mills have long known and trusted. Take as an example the Hyster electric and diesel models in the 15,500-19,000-pound capacity range. With the electric truck, the Kubota motor and Dana transmission of the diesel model are replaced by two motors, one for drive and one for hydraulics. These efficient, high-power electric motors, paired with the high-voltage lithium-ion battery, deliver performance comparable to an ICE and the battery maintains consistent power delivery throughout the full battery charge.

3 // WHAT ELSE SHOULD WE KNOW ABOUT THE BATTERY?

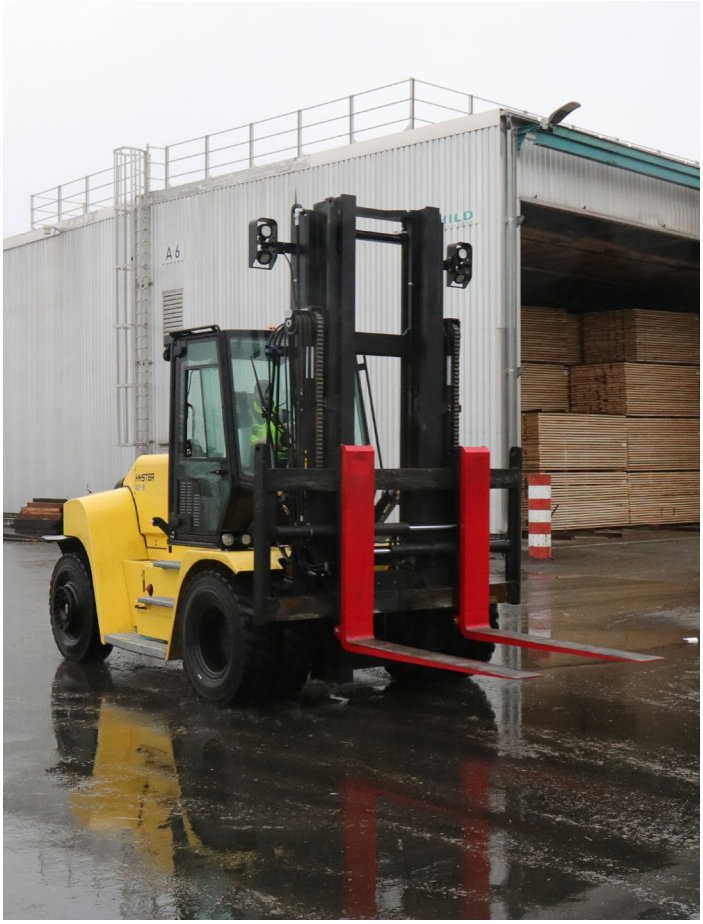
If your mill is considering an electric forklift, ask whether the truck arrives with a lithium-ion battery already integrated by the factory, or if it requires a battery box replacement to convert from lead acid to lithium-ion power. Some manufacturers offer high-capacity electric forklifts that are powered by lead acid, even for models with lift capacities up to 36,000 pounds. While lead acid is a well-established power source and a strong fit for some applications, in trucks of these capacities, the lead acid battery would be so large and so heavy that it can require another forklift just to remove it for cleaning, watering, cool down and charging. Because of the time required for battery maintenance and charging, multi-shift operations using lead acid typically need more than one battery per truck, and in turn, battery maintenance and storage space. Lithium-ion batteries, on the other hand, are smaller and lighter, and do not demand the same intense battery maintenance and cooling requirements of lead acid, enabling a 1-1 ratio of batteries to trucks that can alleviate the high cost associated with dedicated storage space for batteries.



4 // WHAT ARE THE CLEAREST BENEFITS?

For one, electric forklift options can help businesses reach emission reduction goals, whether those are self-imposed or required through government regulation. One major advantage is that an advanced electric option like lithium-ion produces zero harmful emissions while in operation or charging.

But electrification brings more to the table, particularly when it comes to the maintenance and longevity of equipment. While all forklifts require maintenance, the maintenance requirements associated with particular power sources vary. Electric drivetrains have fewer components and less complexity than ICE, and therefore fewer serviceable parts that require periodic maintenance. Aside from maintenance, power source can have a major effect on the useful life of equipment. An average, moderately used ICE truck has an economic life for the first owner of about 10,000-12,000 hours, whereas similarly maintained lithium-ion trucks could surpass this mark, potentially reaching 20,000 hours.



POWERING HEAVY-DUTY FLEETS WITH… VEGETABLE OIL?

Battery electric is not the only mechanism operations are exploring to enable a shift to clean power. In some parts of the world, industrial trucks are being powered by hydrotreated vegetable oil (HVO) 100, a bio-based, renewable liquid fuel diesel alternative that can eliminate up to 90% of net greenhouse gas emissions, such as carbon dioxide. Some industries are also leveraging hydrogen fuel cells (HFCs) to power heavy-duty equipment like container handlers. Hydrogen fuel cells produce zero harmful emissions in operation and refueling, emitting only water and heat as byproducts.

5 // WHAT CONSIDERATIONS DOES THE INDUSTRY NEED TO ADDRESS?

Grid stability remains an important factor that mills must consider when evaluating a shift to electric equipment. Most mills run about six to eight high-capacity forklifts. The amount of power required for charging eight electric trucks is significant - about a megawatt of power. To put that in perspective, the average U.S. house uses about 30 kilowatts per day. That means the megawatt of power required each day to charge this fleet of trucks would power an entire house for more than a month. Many mills are in very remote locations, where grid stability can be a challenge with an energy draw of this magnitude – and material handling applications are not the only ones with growing demand for utility infrastructure and reliability. According to the State of Sustainable Fleets 2023, a market brief on commercial on-road vehicles, government and industry committed hundreds of billions of dollars to infrastructure development in 2022 to bridge the gap, but grid capacity must grow by 60% before 2030 to meet national electrification goals.

Green energy is another area currently in development. While a growing portfolio of electric forklifts produce zero tailpipe emissions, not all electric power is from green or renewable sources. Fossil fuels remain the largest source of energy for electricity generation in the United States. In 2022, 21.5% of electricity was generated from renewable sources like wind, hydro, solar, biomass and geothermal. While significant opportunity for growth remains, the share of electricity coming from renewables has expanded steadily – up from only about 12% of utility-scale electricity generation in 1990.

For more information on electrifying your fleet, talk to your local Hyster® dealer or contact an electrification expert.

US ELECTRICITY GENERATION BY MAJOR ENERGY SOURCE, 1950 - 2020