Environmental Benefits of Forklift Battery Handling Equipment

The environmental advantages of electric forklifts have been well documented. Compared to their internal combustion (IC) counterparts, electric industrial trucks have extremely low emissions, and make virtually no contribution to global climate change at point-of-use. According to a recent report published in the International Journal of Life Cycle Assessment, eco-indicators (including carcinogens, respiratory inorganics, and carbon emissions) were nearly 48 times higher for LPG trucks than for electric forklifts.

However, when analysts study electric forklifts on their own — without comparing them to carbon-heavy IC vehicles — it becomes evident that there is still room for improvement. Without renewable electricity flowing from power plants, no energy usage that depends on the grid can be considered completely green. The best way to limit environmental impact, then, is to use less energy.

In this article, we will discuss the environmental hazards of electric forklifts, limited as they are. Then we will describe ways to address these challenges, reducing an electric forklift fleet's effect on the environment as much as possible — while still running a profitable, efficient material handling operation.

Some operations may even see profits increase when they dial down environmental impact in the ways we will suggest.

Essentially, the treatment of the fuel source is the most successful intervention for limiting harmful byproducts of fleet operation. For electric forklifts, this means that battery handling, maintenance, and rotation are the keys to going from simply "greener than an IC truck" to truly green.

Environmental Benefits of the BHS Battery Room*

- Reduces energy consumption through right-sizing of fleet
- Extends forklift battery life by simplifying maintenance procedures
- Prevents loss of battery investments through breakage
- Harmlessly vents hydrogen during charges
- Collects and neutralizes electrolyte spills and drips
- Reduces battery room footprint, requiring less energy on lighting, heating, and cooling
- Improves operational efficiency, slashing waste

* Including Operator Aboard Battery Extractor, System Stands with Drip Pans and Acidsorb Pillows, Fleet Management Software, Battery Wash Cabinets, Wastewater Recycling System, Hydrogen Ventilation System, and Battery Spill Kits

Environmental Hazards of Electric Forklifts

Most energy usage that depends on the U.S. electrical grid creates carbon emissions, because the bulk of the United State's electricity comes from burning fossil fuels. In 2015, 67 percent of the electricity generated by U.S. power plants came from coal, natural gas, and petroleum.

For every 0.33 kWh of electricity generated, 0.115 mg of harmful aromatic hydrocarbons escape into the nation's waterways, while 29.06 µg join the atmosphere. In a 2016 environmental life cycle assessment of forklifts, researchers found that electric forklifts carrying loads of just over a ton (1,000 kg) expend an average of 0.33 kWh of electricity just by travelling 0.621 miles (1 km).

Multiply that energy usage by every forklift in the fleet, and all the miles traveled in a single shift, and it becomes hard to make the argument that electric forklifts are completely carbon-neutral.

In addition to energy usage, the following environmental hazards are associated with electric forklifts:

- **Ecotoxicity** - Driving 0.621 miles (1 km) with a 2,204 pound (1,000 kg) load, electric forklifts were found to be responsible for an average aquatic toxicity level of 14.28 kg TEG water. Terrestrial ecotoxicity was measured at an average of 5.34 kg TEG soil under the same conditions.

  These harmful effects are generated entirely upstream, meaning they come from the power plant, not the point-of-use. Still, they must be considered in any honest reckoning of environmental impact.

- **Disposal of Batteries** - The current generation of forklift batteries lasts about 2,000 charge/discharge cycles, or roughly five years under typical conditions. After that, they need to be replaced.

  Forklift batteries contain many toxic components, including lead, other heavy metals, and sulfuric acid. However, the presence of lead actually makes lead-acid batteries one of the most renewable sources of motive power available. More than 98 percent of the lead used in forklift batteries is recycled, reports industry journal Food Logistics.

- **Electrolyte Spills** - Sulfuric acid is a regulated substance under the Environmental Protection Agency's (EPA) Risk Management Plan (RMP). This requires facility managers to control the amount of sulfuric acid released into the environment.

  Forklift batteries sometimes drip, though, and they can even spill. When electrolyte escapes the battery case, operations must be prepared to contain and neutralize the acidic solution before it escapes into the environment.

- **Forklift Battery Washing Runoff** - Regular cleanings are a key part of forklift battery maintenance. The water generated by washing batteries becomes contaminated with fragments of lead and heavy metals, traces of sulfuric acid, and flakes of debris.

  The runoff from battery washes contains toxic pollutants, and cannot be allowed to enter the groundwater.

Making Forklift Fleets Truly Green with Forklift Battery Handling Equipment

These environmental effects of electric forklifts all have one thing in common: They can be traced back directly to forklift batteries. Therefore, to obtain the greatest environmental benefits from a fleet of electric forklift trucks, changes must be made in the battery room.

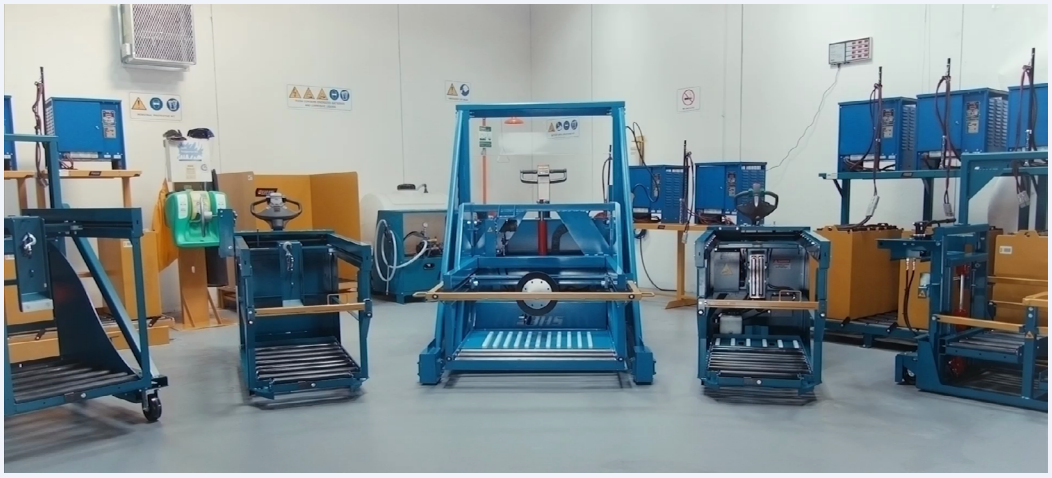

Figure 1. BHS provides a Total Solution for Forklift Battery Handling to include battery changers, battery storage, drip pans, spill kits, wash equipment, wastewater recycling, cable management, fleet management, ventilation, eye & safety stations, and more. The BHS Total Solution is comprised of the tools necessary to maintain a safe, efficient, and environmentally friendly forklift battery charging area.

The following tools and best practices were designed to control the environmental hazards listed above. Implementing them can reduce the ecological footprint of a fleet of electric lift trucks substantially.

- **Right-Sizing** - Without usage records, most forklift users will either have too many batteries, or not enough. Both lead to inefficient energy usage.

  Facilities with too many batteries waste energy by charging units that will not be used. Those with too few overuse their batteries, leading to reduced run-times and faster replacement intervals.

  In order to avoid these wasteful practices, managers should implement Battery Fleet Management tools, such as Fleet Tracker (FLT) from BHS. Fleet Tracker collects data on battery usage, allowing managers to determine if they can save both money and energy by reducing battery stock — or if more batteries would lead to more efficient energy usage.

- **Prolonging Battery Life** - Battery Fleet Management software also helps staff keep up with prescribed maintenance tasks. Fleet Tracker keeps maintenance records for every battery in the fleet, and can alert users when it is time to wash, equalize, or water individual units.

  Proper maintenance extends the working lives of forklift batteries, requiring fewer replacements. That prevents the environmental cost of recycling batteries and manufacturing new units.

- **Preventing Battery Spills** - The best way to keep electrolyte safely within battery cases, where it belongs, is to use designated battery handling equipment to change forklift batteries.

  An Operator Aboard Battery Extractor System from BHS prevents spills by containing batteries safely within heavy duty battery beds. Even better, they can speed up battery change-outs considerably. A trained user on an Operator Aboard Battery Extractor (BE) can swap out a battery in as few as two or three minutes.

- **Containing Battery Drips** - The most common source of electrolyte pollution is routine dripping, or the occasional boil-over.

  Prevent electrolyte pollution by equipping all forklift battery stands with BHS Drip Pans (DP-SS). These corner-formed trays are made of pure stainless steel to resist corrosion. For another layer of protection, line Drip Pans with AcidSorb Pillows (ASP), which capture and neutralize sulfuric acid, changing color to indicate full neutralization.

- **Proper Treatment of Forklift Battery Wash Water** - Wastewater from washing forklift batteries is neither safe nor legal for conventional disposal. Facility managers have two choices when the time comes to dispose of their wastewater: They can either hire a third-party disposal service, or they can implement equipment to treat industrial wastewater on-site.

  The Recirculation/Neutralization System (RNS) from BHS collects the runoff from Wash Cabinets. It treats the water to bring its pH level back into balance, then sends the filtered water back into the Wash Cabinet, creating a closed-loop system for battery wash water.

  To prepare wastewater for conventional disposal, battery users can install Wastewater Recycling Systems (WRS). These single-structure devices remove all toxic particles from wastewater, sealing them away in a non-leachable bentonite clay lump. The output from the WRS is certified as safe for municipal sewer systems.

Getting the Most out of Environmentally Beneficial Forklift Investments

In 2004, the Environmental Protection Agency (EPA) sparked a mass exodus toward electric forklifts by calling on IC engines to reduce emissions. Under the new EPA rules, truck manufacturers would have to reduce the release of nitrogen oxide from engines by 45 percent. They would have to slash particulate-matter production by 90 percent.

Lift truck manufacturers responded by redesigning diesel engines to meet EPA tier 4 requirements — but many consumers felt safer switching to electric forklifts. By 2015, electric forklifts made up more than 63 percent of the United States market.

This expansion is terrific news for environmentalists, but it points to the global importance of tackling what little ecological impact remains associated with electric forklifts. Damage to the planet, after all, is a cumulative phenomenon.

It is true that forklift users are bound to the electrical supply in their regions; there is not much they can do to limit upstream pollution. However, they can reduce energy usage and control harmful byproducts of the industry at their own facilities. An up-to-date battery room is the key to running electric forklifts as cleanly, efficiently, and responsibly as possible.

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P.O. Box 28990 • St. Louis, MO 63132 USA • 1.800.BHS.9500 • Fax: 314.423.6444 • Email: sales@bhs1.com • Web: BHS1.com