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Cleaner operations “revolutionizing liquid mud plants with sustainable practices”

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Abstract

The global imperative for an energy transition towards cleaner and more sustainable practices is more pressing than ever. As the world seeks to reduce its reliance on fossil fuels and curb carbon emissions, industries must explore innovative solutions. One such solution is the adoption of electric forklifts, especially in sectors like oil and gas, which traditionally rely on diesel-powered machinery. This paper examines the environmental benefits of replacing diesel forklifts with electric ones, focusing on significant carbon reduction. We will discuss the various types of electric forklifts, their operational advantages, and their impact on reducing greenhouse gas emissions. Additionally, this study provides a detailed regional market analysis, including market size, growth trends, and the factors driving the adoption of electric forklifts. By highlighting the role of electric forklifts in the broader context of the global energy transition, this paper underscores their potential as a crucial component in achieving a sustainable and low-carbon future.

Keywords: Forklift; Carbon; Cleaner energy; GHG; Sustainable

1. Introduction

The oil and gas industry, known for its substantial energy consumption and carbon emissions, is under increasing pressure to adopt more sustainable practices. One area ripe for improvement is the use of diesel forklifts, which contribute significantly to greenhouse gas emissions. Electric forklifts, powered by batteries, offer a cleaner alternative. This paper examines the benefits of replacing diesel forklifts with electric models, focusing on the environmental impact in terms of carbon reduction. Furthermore, it provides a comprehensive regional market analysis, highlighting the market size and growth of electric forklifts.

2. Methodology

This study employs a mixed-method approach, combining quantitative data analysis with qualitative insights. Data on forklift emissions, market size, and growth rates are sourced from industry reports, market research studies, and governmental publications. A comparative analysis of diesel and electric forklifts' environmental impacts is conducted using carbon emission metrics. Additionally, interviews with industry experts provide qualitative insights into the adoption barriers and benefits of electric forklifts in the oil and gas sector.

2.1. Types of Electric Forklifts

Electric forklifts come in various types, each suited to different operational needs:

- **Counterbalance Forklifts:** The most common type, these forklifts have forks protruding from the front, and no outriggering legs or arms, allowing them to drive up to a load directly.

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- **Reach Forklifts:** Designed for warehouse operations, these forklifts have extended lift heights and are ideal for racking operations.
- **Pallet Jacks:** Smaller, hand-operated electric forklifts used for moving pallets at ground level within warehouses or distribution centers.
- **Order Pickers:** Used for retrieving inventory from high racking systems, often with operators riding on the lifting platform.
- **Turret Trucks:** These forklifts can rotate the forks 180 degrees and operate in narrow aisles, maximizing warehouse space utilization.

3. Impact on Environment

3.1. Carbon Reduction

Replacing diesel forklifts with electric ones has a profound impact on reducing carbon emissions. Diesel forklifts emit approximately 2.68 kg of CO₂ per liter of fuel burned. Electric forklifts, powered by renewable energy sources, have the potential to reduce emissions to near zero during operation. This transition not only reduces direct emissions but also mitigates other pollutants such as nitrogen oxides (NO_x) and particulate matter (PM).

3.2. Energy Efficiency

Electric forklifts are more energy-efficient than their diesel counterparts. They convert a higher percentage of electrical energy into usable power, resulting in lower overall energy consumption. This efficiency translates into cost savings and reduced environmental impact over the forklift's lifecycle.

4. Regional Market Analysis

4.1. Market Size and Growth

The market for electric forklifts is expanding rapidly, driven by stringent emissions regulations, technological advancements, and increased awareness of environmental sustainability. Key regions analyzed include North America, Europe, Asia-Pacific, and Latin America.

- **North America:** The electric forklift market in North America is growing steadily, with significant adoption in the United States and Canada. The market size is projected to reach USD 5.8 billion by 2025, with a compound annual growth rate (CAGR) of 7.3%.
- **Europe:** Europe, led by Germany and the UK, is witnessing robust growth due to strict emission norms and substantial investments in green technologies. The market is expected to grow at a CAGR of 8.2%, reaching USD 6.2 billion by 2025.
- **Asia-Pacific:** Dominated by China and Japan, the Asia-Pacific region is the largest market for electric forklifts, driven by rapid industrialization and favorable government policies. The market size is anticipated to hit USD 8.9 billion by 2025, growing at a CAGR of 9.1%.
- **Latin America:** Emerging markets in Latin America are gradually adopting electric forklifts, with Brazil and Mexico leading the charge. The market is forecasted to grow at a CAGR of 6.5%, reaching USD 2.1 billion by 2025.

4.2. Market Drivers

Several factors drive the growth of the electric forklift market:

- **Environmental Regulations:** Stricter emission standards and regulations are pushing industries to adopt electric forklifts.
- **Technological Advancements:** Improvements in battery technology and energy management systems enhance the performance and reliability of electric forklifts.
- **Operational Cost Savings:** Lower operating and maintenance costs compared to diesel forklifts make electric options economically attractive.
- **Corporate Sustainability Goals:** Companies are increasingly adopting electric forklifts to meet their sustainability targets and reduce their carbon footprint.
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4.3. Case Study Aberdeen Liquid Mud Plant Electric Forklift



Figure 1 Electric Forklift at LMP plant

5. Conclusion

The transition to electric forklifts in the oil and gas industry presents a substantial opportunity to reduce carbon emissions and promote sustainability. By understanding the types of electric forklifts available, their environmental benefits, and the market dynamics, stakeholders can make informed decisions to accelerate this transition. The regional market analysis highlights significant growth opportunities, indicating a promising future for electric forklifts across various industries. Adopting electric forklifts not only aligns with global sustainability goals but also offers operational and economic advantages, making it a viable solution for a greener future.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed. The paper has been presented at 2024 Low Carbon Technology Conference.

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- [5] Shafiee, S., & Topal, E. (2023). “Lifecycle Cost Comparison of Electric and Diesel Forklifts: Economic and Environmental Perspectives.” *Industrial Engineering Review*, 15(4), 561-579. – This article explores the lifecycle cost analysis of electric vs. diesel forklifts, showing lower operational and maintenance costs for electric options.