# Cost-Benefit Analysis of the conversion to a low-emission construction site: a sustainability approach

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SSM1100 – Research Paper

## RESEARCH QUESTION:

**What is the financial, social, and environmental rationale for the conversion of fossil-fueled construction machinery and vehicles to hybrid & electric alternatives?**

## INTRODUCTION

**GHG emissions are a significant concern in the building and construction industry**

**Industry Issue**
- Lack of action towards GHG reduction during the construction phase

**Two focus areas**
- Equipment & Transportation

**Primary Barrier:** High capital cost associated with low emission alternatives (electric and hybrid)

**Gap:** Lack of quantitative industry research to justify capital expenditure on low-emission alternatives

## METHODOLOGY

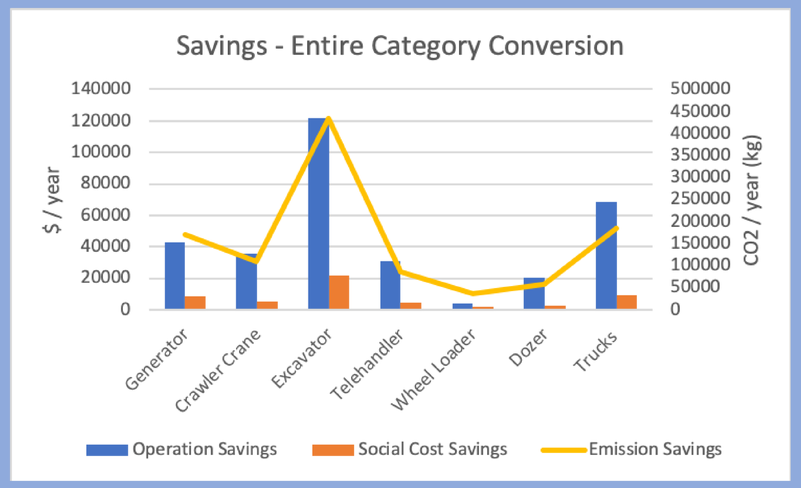
**Analyzed case study utilization data for following**:
- Generator
- Dozer
- Crawler Crane
- Pickup Truck
- Telehandler
- Wheel Loader

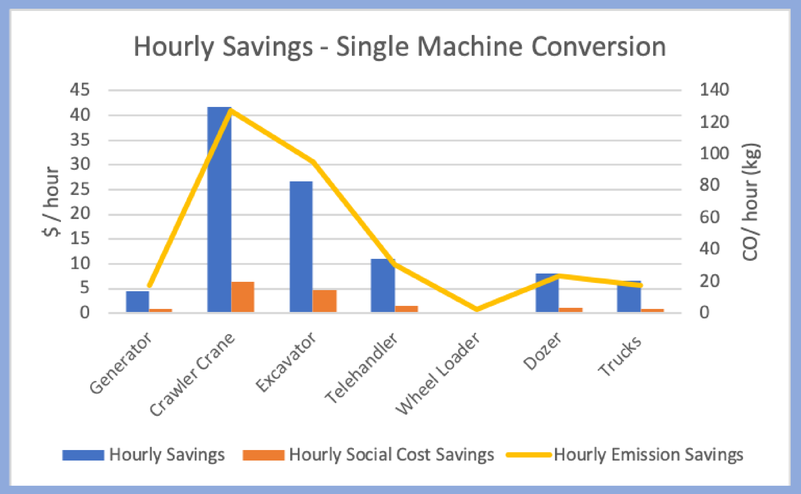
**Cost-Benefit Comparison**

| Fuel powered | Electric |
|---|---|
| Fuel price | Electricity price |
| Emissions from combustion | Emissions from electricity generation |
| Social cost of emissions | Social cost of emissions |

**Net Conversion Benefit**

## RESULTS

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## DISCUSSION

**Conversion to a low emission construction site has economic, environmental, and social benefits**

**Considering results and external factors - priority for conversion**
- Generators and on-road fleet vehicles

**Trends in sustainability and construction are expected to amplify benefits predicted in the study**

**Considerations for achieving a low-emission site:**

**Company:** Modified project planning and training

**Industry:** Increased supply chain collaboration

**Government:** Subsidization of sustainability initiatives

## KEY TAKEAWAYS

1. Sustainability in the construction industry requires effort and collaboration by all stakeholders
2. Equipment and vehicle conversion is a beneficial first step for construction companies – starting with generators and trucks
3. Continued research, theoretical and on-site, is necessary to build a strong business case