Comparison of Three Battery Storage Systems to Aid in Energy Efficiency Within Residential Buildings

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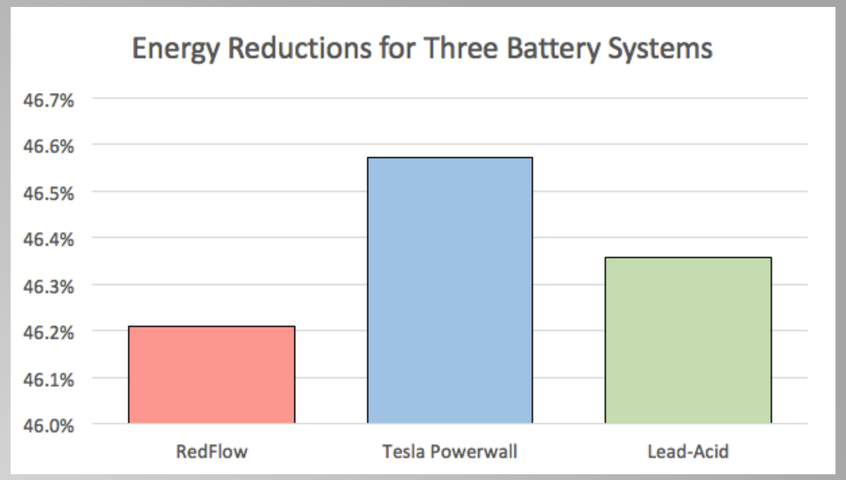
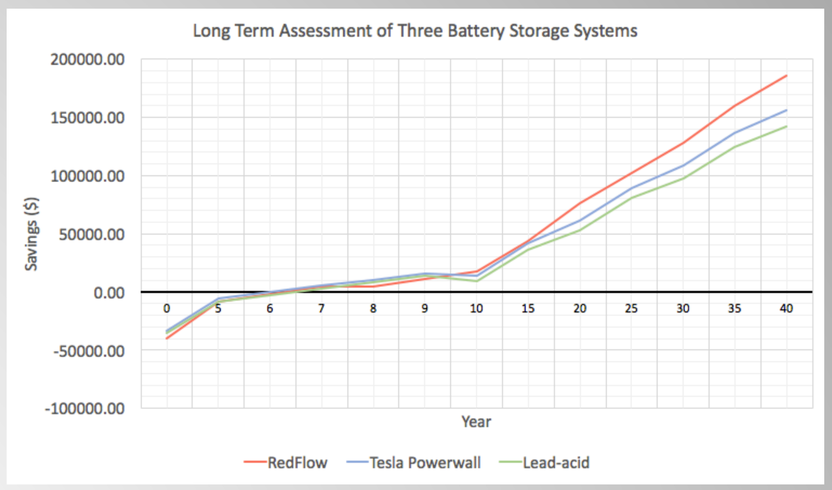
Introduction

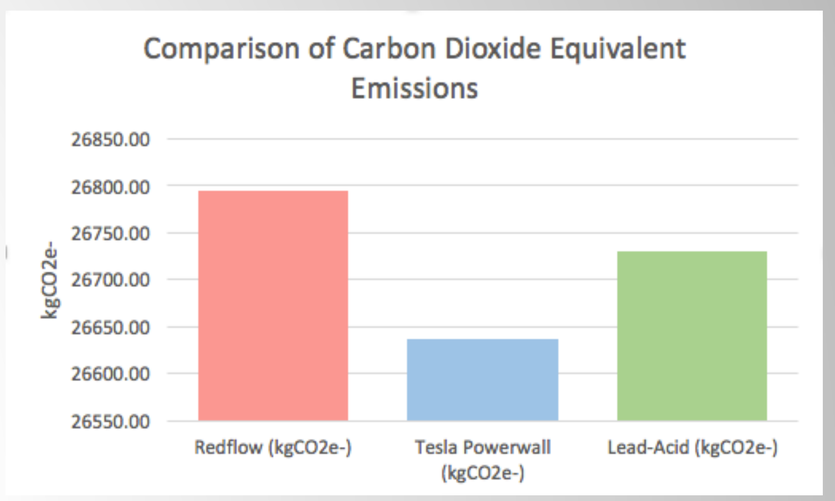
Wattblock is an energy efficiency company who focus on reducing the common area energy bill of residential buildings. The reduction occurs from proposing possible energy saving projects ranging from energy optimization to renewable energy systems such as; photovoltaic (PV) solar and battery systems. The project conducted at Wattblock was to compare three battery storage systems and their economic, environmental and social feasibility for implementation in residential buildings. A model was constructed to compare the economic and environmental viability of a lithium-ion, lead-acid, and a zinc-bromide battery. Specifically, a Tesla Powerwall, Lifeline GPL-4DL, and a RedFlow, respectively. The social analysis of the battery storage systems was conducted externally to the model as a qualitative analysis.

Project Objectives

- Develop a model that calculates the yearly savings, return on investment (ROI) and economic feasibility of the three battery storage systems. Using these specific values to compare the economic aspects of the different battery storage systems.
- Develop a model that effectively compares the three battery storage systems environmentally. The environmental comparison should exemplify the reduction in emissions of using one of the proposed systems against the original source of electrical energy.
- Develop a qualitative analysis that will compare the social feasibility of the three battery storage systems. The comparison will have to use a set of criteria relevant to the social issues that would arise from implementation.







Results

Economic:

Battery	Savings	ROI	40-year Analysis
Tesla Powerwall	$6,981.09	4.80 Years	$168,043.55
Lifeline GPL-4DL	$6,948.83	5.53 Years	$140,253.23
RedFlow	$6,926.54	5.88 Years	$189,361.63

Environmental:
Tesla Powerwall – 26,637.61 $kgC_{O2}e$-
Lifeline GPL-4DL – 26,731.00 $kgC_{O2}e$-
RedFlow – 26,795.55 $kgC_{O2}e$-

Social:

Battery	Weight	Dimensions	Availability	Installer	Replacement
Tesla Powerwall	Most Feasible	Feasible	Feasible	Feasible	Feasible
Lifeline GPL-4DL	Least Feasible	Least Feasible	Most Feasible	Most Feasible	Least Feasible
RedFlow	Feasible	Most Feasible	Least Feasible	Least Feasible	Most Feasible

Conclusions

Therefore, by unanimous decision the Tesla Powerwall is the clear winner when compared to the RedFlow and the Lifeline GPL-4DL. In saying this, all three battery storage systems are economically, environmentally, and socially feasible. Thus, the Tesla Powerwall, RedFlow and Lifeline GPL-4DL are all viable battery storage systems to implement into residential buildings to aid in energy efficiency.

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