Battery Storage Applications in Power Grid Systems

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Introduction

Micro grid and “off grid” battery storage have only ever been used on the micro scale. Networking the micro scale projects can amount to a macro scale application. Macro scaling microgrid technologies takes the interaction of several kinds of the preexisting sciences. This could be used as distributed battery bank rather than a large distantly located bank.

With the intersection of innovations in battery health monitoring, battery materials development and internet of the things and microcontroller controls the possibility of this application. As well as the federal rebates and discounts of the solar panels and batteries.

The internet controlled infrastructure would never put energy on to the grid or take it off it would only ever be providing the house with power or charging. If the solar panel on the house fills that battery and the houses requires no more it would then put power onto the grid as normal residential solar panels do through their inverters.

Ideas and Discussion

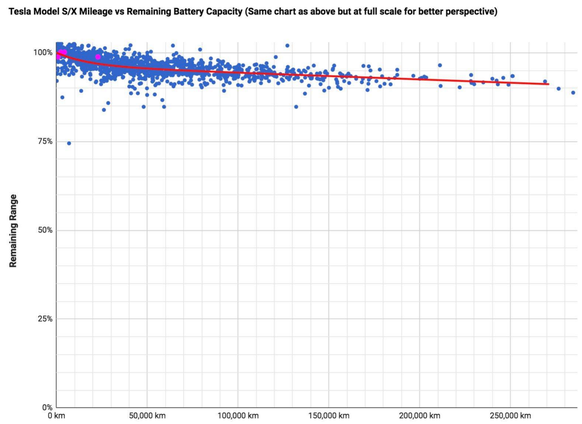
The challenge with renewables have always been that the power is not there all the time and the way to store it. Having a Internet controlled and monitored battery resource that switches on only when the need arises.

A network based algorithm that seeks a measurable value with a priority of maintaining battery health can be rank with a simple matrix and the inputs would be delivered though battery sensors and a microcontroller at each unit.

This infrastructure shows the alternative to the large battery banks that are more often thought of as the way to store power. This is a different way to have a buffer between the supply and demand gaps that fluctuate. A compute controlled system that can measure the second to second changes and adjust smarter and faster than a human could.

Proof and results

The application of large Lithium Ion batteries with intermittent use has be researched in the Tesla vehicles. Seen in the figure below even though regular use the battery degradation plateaus at 90% degradation after 5 years of regular intermittent use. That being that it is not always being used and not always charging.



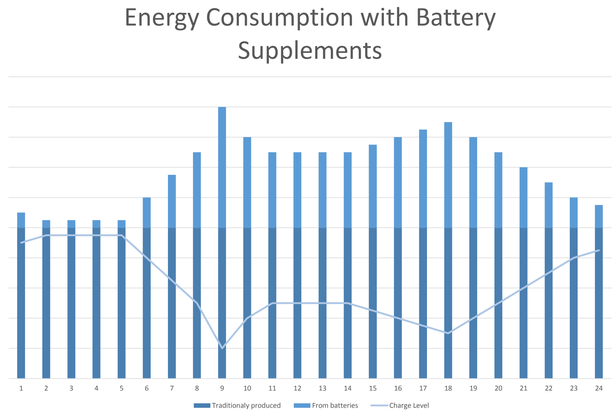
This is an improvement over regular large scale storage that degrades to 70% because of the constant charging and discharging of the power. The never ending draw shortens the life of the larger units even with a higher energy density it is not use the constant on off states it fluctuates between. Large batteries are also more remoting located and as a result have to deal with line loss and losses from transferring DC to AC.

Computers can determine the health and charge level to keep all batteries in the best range and at the greatest health. Not choosing to discharge batteries unless it is to benefit the system and maintain the greatest average battery capacity across the systemwide.

Conclusion and future works

The power to control demand as well as supply on the grid would increase the efficiency and decrease the dependence on not renewable resources as the demand can be held constant.

Below the graph illustrates the batteries can take care of the inconsistent fluctuations in power while traditional power production serves the bulk of the need



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