

The goal of the project was to provide feasible alternatives for replacement of the battery pack in the Ford Ranger EV. Several options were evaluated and discarded, and the final result yielded two useable options.

One option is to obtain a refurbished battery pack from BatteryMD. This company will take your Ford Ranger, remove the existing battery pack and install a refurbished battery pack. While in their shop, they will also perform a complete diagnostic test of the truck. Due to liability constraints, the company must perform all work itself, requiring delivery of your inoperative vehicle to their facilities in Sacramento, CA. The refurbished battery pack is guaranteed to have a 30 mile range on a full charge when it leaves the company, but there is no guarantee as to how long the pack will last. This is the least desirable of the two options for several reasons. First, the performance of the refurbished battery pack is significantly reduced. Additionally, the reliability is a concern. Economic analysis indicates that the refurbished battery pack would have to last 4.4 years to be cost competitive with the Optima design. Further, the decreased range of the battery pack will result in approximately 50% higher annual operating costs in terms of the electricity necessary to charge the pack.

The preferred option is the manufacture of a new battery case capable of holding 26 12-V Optima d31a batteries. The manufacture of the case can be accomplished by a novice welder, with the fiber-glassing contracted to a local supplier. The new battery case fits into the existing space of the truck, and utilizes the same mounting points. The estimated range of the Optima design is 60 miles per charge, resulting in performance similar to the original pack and far superior to the alternative option. The estimated life of this battery pack is 5 years, making it economically more advantageous than the BatteryMD option. The main drawback to this design is the issue of the controller. A controller must be designed and wired to communicate between the truck and our new battery pack, since the number of batteries and the individual battery voltage has been changed.