

A revenue model to charge consumers based on ampere-hour expended while driving an Electric Vehicle

ABSTRACT

Unification Energy Corporation (UEC) will create value for owners of electric vehicles by lowering the ownership cost of the vehicle, by providing next generation refueling infrastructure and by generating the energy that power up their cars from the sun to help the people of the planet breathe fresh air.

The next generation refueling infrastructure consists of Battery Replacement Units (BRU) and Charge Replenishment Units (CRU) which UEC consumers have access to. This model pertains to a unique way UEC customers are charged for the service provided by UEC. UEC uses an electronic chip which samples current expended by the customer every sub-seconds while driving his EV and mathematically integrates it over time to arrive at the total ampere-hour expended by the customer. Every time a customer replaces a battery pack or a module or the entire battery system or any other storage device being used in his EV at a BRU, the last value of total ampere-hour expended by his storage device he was using until replacement, is stored in memory of the chip. As soon as he replaces his storage device with another storage device and start to drive the ampere-hour expended by this current storage device is recorded and added to the value of the total amp-hour expended by his previous storage device. In this way every time he replaces his storage device at a BRU, UEC records the total ampere-hour he expended in all his drives before replacement for each billing cycle. The customer gets charged for the total ampere-hour he expends in each billing cycle without regards to the storage system he used to expend that total ampere-hour.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention relates to a revenue model for owners of Electric Vehicles with replaceable storage devices who uses a refueling service of Battery replacement only or Battery replacement in conjunction with re-charging infrastructure at one or multiple BRU or CRU locations from UEC and businesses providing similar services.

Description of prior art

Electrification of transport is set on the premise of a revolution on the horizon; a wide spread transformation of the world economy and ways of life. This new industrial revolution holds an important promise: securing the world against the dangers of global warming. It had been developing amid the political, economic and technological environment an equivalent of the perfect storm. The movers of this revolution have directed focus to a major contributor to this problem: The way energy is produced and used in the transportation sector. It is well known that localized and inefficient generation of energy by explosion of fossil fuels in today's IC engine automobiles is a major contributor to the problem of global warming and our dependence on foreign oil.

The power storage device in an EV is one of the most important areas of research. Most of the research done so far had been focused on improvement and reduction in the cost of the storage devices and re-charging time of storage devices. Not enough focus and attention is devoted to the option of battery pack swap to increase the range of an EV.

Recently there were some developments in that area with Tesla Motors talking about easy replacement of battery packs in their Model S.

Because of the direction of research and business in the EV industry, the vehicles are mostly seen as short range vehicles because the miles that the EV can go on one charge are significantly lower than a gasoline car can go on a full tank of gasoline before it needs refueling. This has led to the development in NEV (Neighborhood Electric Vehicles). However the recent developments in this area with Tesla Motors' Model S, which can go over 200 miles (under certain defined experimental conditions) the EV market is seeing some movement in long range vehicles.

In spite of the developments the cost of the storage device in an EV makes the vehicle cost-prohibitive. The cost increases with the size of the storage device (a lithium ion battery pack in case of Model S and most EVs) and also adds to the weight of the vehicle. It is very difficult to manufacture an EV with comparable (to gasoline cars) power and driving range within the limit of the cost of a gasoline car because of the limitations of the energy storage device. Tesla Motors announced that it manufactured the Model S with option of easy replacement of the battery pack with fully charged one to enhance driving range.

A few emerging businesses are trying to fill the gap of inconvenience in refueling an Electric Vehicle by providing either charging facilities or charging and battery swap facilities where the EV driver can quickly swap his charge drained EV storage device with a charged storage device. Some business charge their consumers based on number of miles driven on the car. However, depending on the EV driver's driving habits the actual

energy he expends can vary from one driver to another even if they drive the same number of miles.

SUMMARY OF THE INVENTION

It is the object of the present invention to measure the total ampere-hour a consumer of UEC or of a similar service provider spends in a billing cycle and charge the consumer an amount proportional to the expended ampere-hour. This is accomplished by using an electronic chip which samples current expended by the customer every sub-second while driving his EV and mathematically integrating it over time to arrive at the total ampere-hour expended by the customer. Every time a consumer replaces the energy storage device of his EV at a BRU, the last value of total ampere-hour expended by his storage device he was using until replacement is stored in memory of the chip. As soon as he replaces his storage device with another storage device and start to drive the ampere-hour expended by this current storage device is recorded and added to the value of the total amp-hour expended by his previous storage device. In this way every time he replaces his storage device at a BRU, UEC records the total ampere-hour he expended in all his drives before replacement for each billing cycle. The customer gets charged for the total ampere-hour he expends in each billing cycle without regards to the storage system he used to expend that total ampere-hour.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A business which provides owners or users of Electric Vehicles with Battery replacement service or both battery replacement and battery charging services at one or multiple locations for refueling his EV. A customer of such a business who is an Electric Vehicle owner or user and chooses to replace batteries at battery swap stations and gets charged a fees for one or more services provided by this business. An electronic chip used to record ampere-hour expended in each drives before replacement and adds subsequent values to come up with the total amp-hour expended in each billing cycle.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.