Toward a more open BMS and its impact on the return, reuse, redeploy or recycle decision-making process - a technology and market perspective.

Dr. Kenneth P. Dudek
CEO, CAR Technologies LLC
Adjunct OSU-CAR Fellow – The Ohio State University Center for Automotive Research
1305 Kinnear Road, Suite 180
Columbus, OH 43212
248-805-3163
car.technologies@gmail.com

Advanced battery (Lithium ion) costs – for mobile or stationary applications - remain high and current approaches to optimizing cost and life of those batteries have been hampered by a lack of robust data, models, and standards for high-accuracy battery aging prognostics.

It takes 60-600 channels (depending on the scope of validation) of expensive battery test equipment and 18-24 months to perform a full validation of one cell chemistry from one supplier. Many vehicle OEMs have multiple validation programs underway (hybrid, PHEV, BEV programs) and each program usually has one or more potential supplier. In addition, internal R&D and advanced engineering organizations may also be concurrently evaluating multiple cell chemistries for future potential R&D programs. New cell chemistries - and especially new formulations of existing cell chemistries - are being developed at a much quicker pace than the typical automotive development or the utility infrastructure deployment cycle.

If left with current battery standards and current battery economics, a sustainable future for fully electrified vehicles remains a question mark. Several strategies could help, including battery downsizing, battery standardization, battery leasing, and battery re-use. All of these strategies require a

much better understanding - and ultimately certification - of the life and health of these advanced batteries across their use, repurposing, and re-use.

The successful commercialization of high accuracy battery life/health estimation - sometimes called "a battery odometer"- would help facilitate:

- the orderly downsizing of batteries for automotive vocations,
- the potential repurposing of batteries for automotive vocations into stationary energy storage use for home energy storage, alternative energy "micro-grids" or grid stabilization and support vocations,
- third-party or other non-conventional ownership, such as battery leasing and other "battery as a service" models, and
- the net present value (NPV) of battery re-use and recycling services to be brought forward into the initial transaction as "residual value."

If a battery odometer is so valuable - What does it take to create one? Why should the automotive and stationary energy storage industry care about its development? Why is it so hard to create standards at this stage of the development of the advanced automotive and stationary storage industries? What can the industry learn from the most recent efforts in battery aging prognostics from the automotive (and battery) industry? What could be implemented in battery systems today to facilitate future efforts to optimize the battery "return, redeploy, reuse or recycle" decision and to enable new market and services?

Contact CAR Technologies for answers to the questions posed above. We can help highlight actual OEM best practice processes for testing and modeling battery aging mechanisms for in-vehicle applications, along with the challenges that current practice pose for post-manufacturing process and market optimization. CAR Technologies sees and is working to fulfill the need for more open OEM battery management system (BMS) diagnostic and prognostic interfaces and review essential BMS data that, if collected and presented in an open-standard format, could be a game-changer for industry "return, redeploy, reuse or recycle" decision-making processes.