**Redox Flow Battery Systems:**

**Current Status and Future Prospects**

Mike L. Perry

United Technologies Research Center (UTRC)

East Hartford, CT, 06108, USA

Grid-scale energy storage systems with large energy capacities will be required to maximize the integration of large-scale variable electric-generation resources (*e.g*., utility-scale solar and wind). Some uses of electrical-energy storage (EES) are currently economically attractive relative to conventional alternatives, such as regulation of the power grid (*e.g.,* frequency response). However, more transformational scenarios, such as the widespread conversion of renewable energy resources to baseload/dispatchable generation requires EES systems with long discharge durations and capital costs that are lower than current battery prices [1]. A detailed techno-economic study conducted by DOE’s Joint Center for Energy Storage Research (JCESR) has shown that redox flow batteries (RFBs) have the potential to meet the challenging cost requirements for EES applications with 5-hour discharge times at rated power [2]. However, one would also like to assess if this future potential can actually be realized and, if so, the likely timing of the additional technical developments required. Therefore, the focus of this talk will be to compare the current state of deployed RFB systems to the Future State of JCSER’s techno-economic model. There are many research opportunities that can enable substantial cost reductions in future RFB systems, such as the development of advanced RFB materials, especially cell-stack components (*e.g*., membranes and electrodes) and RFB active materials [3]. Some of UTRC’s recent and ongoing work will be presented, with an emphasis of our work with local partners that include: Vionx Energy (Woburn, MA), MIT, Harvard and Advent Technologies (Cambridge, MA).

1. Lazard’s Levelized Cost Of Storage, V2.0 (2016)
2. R. Darling, *et.al*., *Energy & Environmental Science*, **7**, 3459 (2014)
3. M. Perry and A. Weber, *J. Electrochemical Society*, **163**, A5064 (2016)