

# Iron Based Flow Battery

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OFFICE OF  
ELECTRICITY DELIVERY &  
ENERGY RELIABILITY

## Electrochemistry:

Positive:  $\text{Fe}^{+2} \rightleftharpoons \text{Fe}^{+3}$  +0.77V

Negative:  $\text{Fe}^{+2} \rightleftharpoons \text{Fe}^0$  -0.44V

Cell:  $3\text{Fe}^{+2} \rightleftharpoons \text{Fe}^0 + 2\text{Fe}^{+3}$  1.21V

## Project Goals:

Whr Efficiency: 80% @ 0.1 A/cm<sup>2</sup>

- 2015 70% @ 0.1 A/cm<sup>2</sup>

Cost: \$250/kW, \$125/kWh

- 2015 est. \$100/kW, \$25/kWh

## Advantages:

Low Cost Active Element (Iron)

High Current Density (> 0.1 A/cm<sup>2</sup>)

Inexpensive Porous Separators

similar electrolyte for

positive/negative electrodes

Safety

non-toxic materials, moderate pH

## Challenges / Approaches:

Hydrogen Evolution

- Electrolyte chemistry
- Novel H<sub>2</sub> Rebalance

Coupled Power & Energy

- Fe plating > 400 mAh/cm<sup>2</sup>
- V.E. vs Energy Storage