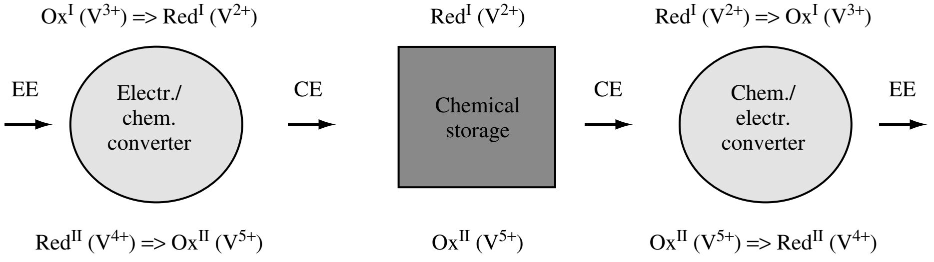

Figure 18.26 General concept of a redox-flow battery with two electrolyte/active mass circulations. The circulation in the upper row is equivalent to the negative electrode, the lower row denotes the positive electrode. In brackets, the vanadium battery is given as an example. The figure is based on an idea from [29] (EE: electrical energy, CE: chemical energy)

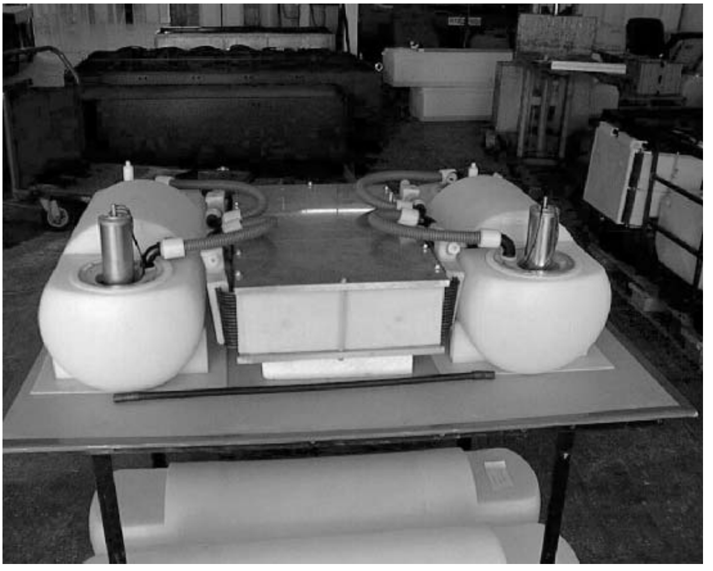

Figure 18.27 Prototype of a vanadium redox-flow battery with 32 cells and 14 Ah (Picture Courtesy by ZSW [29])

and Figure 18.28 shows a schematic of a redox-flow battery in the megawatt hour. As there have been no commercial products in operation for a long time, data on lifetimes are hardly available. Theoretically, long lifetimes can be expected as no part of the system undergoes structural changes as they occur in most other battery technologies. In literature, data for a vanadium battery with more than 13 000 cycles have been reported [30]. In any case, a regeneration of the electrolyte/active mass is possible. The influence of vanadium batteries on the environment is described in [31]. No material loss or "down cycling" of the electrolyte including the vanadium occurs.

What is true for the lifetime is also true for the costs. Rough estimations show, for the vanadium battery, costs of approximately 200 €/kWh for batteries with more than