Grid Storage Systems

Since some renewable sources are intermittent (e.g., wind and solar energy), grid storage systems provide the capability to: 1) mitigate the issues associated with such intermittency, such as frequency or voltage transit variations, surges or dips, and other generation and distribution disruptions; 2) to smooth out such intermittency through peak shaving or other ancillary services; and 3) to increase efficiency of energy utilization by load shifting and leveling. Rather than wasting or not utilizing such energy by conventional grid distribution management, grid storage systems store this energy for use at later times when it is needed. Two possible methods that we are interested in are: 1) the use of batteries for energy storage, and 2) using the excess electricity to operate electrolyzers for producing hydrogen, which can be stored and subsequently utilized for running fuel cells to produce electricity when needed.

Details concerning each of these two methods can be viewed by clicking on the titles below. Each of these items links to different sections of our website and present HNEI activities in the subject matter.

- Batteries for Grid Management[1]
- Grid Management Using Hydrogen[2]
- Fuel Cells for Grid Support [3]

Other aspects of battery technology include research on advanced batteries for use in a variety of applications. HNEI researchers are also active in this area -- for details, see the Electrochemical Power Sources [4] section of our website. The utilization of excess electricity to generate hydrogen for storage and subsequent use to produce electricity when needed is one of the possible elements of HNEI?s Hawai?i Hydrogen Power Park [5].

HNEI is also involved in other considerations of grid systems and our efforts in these areas can be seen in the Grid Modeling and Analysis [6] and Smart Grids [7] portions of our website.

For other general information relating to this subject area, see the Fuel Cells [8] and Hydrogen [9] sections of our website.

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Links:
[1] http://www.hnei.hawaii.edu/projects/batteries-grid-management

[2] http://www.hnei.hawaii.edu/projects/grid-management-using-hydrogen
[3] http://www.hnei.hawaii.edu/research/fuel-cells/fuel-cells-grid-support
[4] http://www.hnei.hawaii.edu/research/electrochemical-power-sources
[5] http://www.hnei.hawaii.edu/research/hawaii-hydrogen-power-park
[6] http://www.hnei.hawaii.edu/research/grid-systems/grid-modeling-and-analysis
[7] http://www.hnei.hawaii.edu/node/217
[8] http://www.hnei.hawaii.edu/research/fuel-cells
[9] http://www.hnei.hawaii.edu/research/hydrogen
[10] http://www.hnei.hawaii.edu/term/grid