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Feasability of battery storage systems

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RESULT (summary)

This report reviews secondary (rechargeable) batteries, while primary (non-rechargeable) are left out. In addition, emphasize is made on stationary battery energy storage systems, while portable (consumer) electronics and vehicle specific application are not included.

Batteries are very diverse in characteristic and application. Well-known technology like lead-acid and nickel-cadmium are used in large battery energy storages (tens of MWh). Flow batteries (Regenesys, Redox and Zinc/Bromine) are promising for very large-scale storages (>100 MWh). High temperature sodium-sulfur batteries (NaS) are also installed in some MWh-plants. New technology like Li-ion batteries shows promising characteristics, but is not mature for larger energy storage application. Lead-acid is a clear winner on initial cost, followed by NiCd and then NiMH and at last Li-ion. Li-ion is not inherently expensive: Cost is very volume sensitive. (Metal-air batteries are the least expensive alternative, but are not mature for energy storage applications with electrical recharge.) In addition, flow batteries are cost effective in very large-scale energy storages.

Different charging characteristics for lead acid batteries are compared and evaluated. Based on the results, an I-U-(I) characteristic is recommended for a planned battery testing in the laboratory (constant current-constant voltage-constant current).

KEYWORDS

SELECTED BY AUTHOR(S)	Secondary batteries	Characteristics
	Battery storage	Application

TABLE OF CONTENTS

Page

1 SUMMARY

This report reviews secondary (rechargeable) batteries, while primary (non-rechargeable) are left out. In addition, emphasize is made on stationary battery energy storage systems, while portable (consumer) electronics and vehicle specific application are not included. A review of different methods for charging lead acid batteries are done.

Batteries are very diverse in characteristic and application. Well-known technology like lead-acid and nickel-cadmium are used in large battery energy storages (tens of MWh). Flow batteries (Regenesys, Redox and Zinc/Bromine) are promising for very large-scale storages (>100 MWh). High temperature sodium-sulfur batteries (NaS) are also installed in some MWh-plants. New technology like Li-ion batteries shows promising characteristics, but is not mature for larger energy storage application. Lead-acid is a clear winner on initial cost, followed by NiCd and then NiMH and at last Li-ion. Li-ion is not inherently expensive: Cost is very volume sensitive. (Metal-air batteries are the least expensive alternative, but are not mature for energy storage applications with electrical recharge.) In addition, flow batteries are cost effective in very large-scale energy storages.

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