

1. Record Nr.	UNINA9910583485603321
Autore	Menictas Chris
Titolo	Advances in batteries for medium and large-scale energy storage // Chris Menictas, Maria Skyllas-Kazacos and Tuti Mariana Lim
Pubbl/distr/stampa	Sawston, [England] : , : Woodhead Publishing, , [2015] ©2015
ISBN	0-08-101414-7 1-78242-022-3
Edizione	[First edition.]
Descrizione fisica	1 online resource (616 pages) : illustrations
Collana	Woodhead Publishing Series in Energy ; ; Number 67
Disciplina	621.31042
Soggetti	Electric machinery Electric batteries Electric vehicles Energy storage
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index at the end of each chapters.
Nota di contenuto	Front Cover; Advances in Batteries for Medium- and Large-scale Energy Storage; Copyright; Contents; List of contributors; Woodhead Publishing Series in Energy; Part One: Introduction; Chapter 1: Electrochemical cells for medium- and large-scale energy storage: fundamentals; 1.1. Introduction; 1.2. Potential and capacity of an electrochemical cell; 1.2.1. Theoretical potential; 1.2.2. Actual cell potential; 1.2.2.1. Ohmic overpotential; 1.2.2.2. Activation overpotential; 1.2.2.3. Concentration overpotential; 1.2.3. Capacity; 1.2.3.1. Theoretical capacity and actual capacity 1.2.3.2. Capacity decay in secondary battery systems1.2.4. Other important parameters of electrochemical cells; 1.3. Electrochemical fundamentals in practical electrochemical cells; 1.3.1. Electrochemical fundamentals of the lithium-ion battery; 1.3.2. Electrochemical fundamentals of the redox flow battery; 1.3.3. Electrochemical fundamentals of the sodium battery; References; Chapter 2: Economics of batteries for medium- and large-scale energy storage; 2.1. Introduction; Case study1-small scale; Case study2-large scale; 2.2.

Small-scale project; 2.2.1. Simulation inputs  
2.2.1.1. Primary load data; 2.2.1.2. Solar resource and photovoltaic module; 2.2.1.3. Wind resource and turbine; 2.2.1.4. Energy storage systems; 2.2.1.4.1. Lead-acid battery: Surrrette S4KS25P; 2.2.1.4.2. Vanadium redox flow battery; 2.2.1.5. Diesel generator; 2.2.1.6. Additional considerations; 2.2.2. Simulation results and discussion; 2.2.2.1. Energy storage system vs. diesel generator; 2.2.2.2. Flow-type battery (VRB) versus lead-acid battery; 2.3. Large-scale project; 2.3.1. Simulation inputs; 2.3.1.1. Primary load data; 2.3.1.2. Solar resource and photovoltaic module  
2.3.1.3. Wind resource and turbine; 2.3.1.4. Energy storage system and additional considerations; 2.3.2. Simulation results and discussion; 2.3.2.1. Energy storage system (VRB) vs. diesel generator; 2.3.2.2. Vanadium redox flow battery vs. lead-acid battery; 2.4. Conclusions; References; Part Two: Lead, nickel, sodium, and lithium-based batteries; Chapter 3: Lead-acid batteries for medium- and large-scale energy storage; 3.1. Introduction; 3.2. Electrochemistry of the lead-acid battery; 3.3. Pb-acid battery designs; 3.4. Aging effects and failure mechanisms; 3.5. Advanced lead-acid batteries  
3.6. Applications of lead-acid batteries in medium- and long-term energy storage; 3.7. Summary and future trends; References; Chapter 4: Nickel-based batteries for medium- and large-scale energy storage; 4.1. Introduction; 4.2. Basic battery chemistry; 4.2.1. Ni-Cd battery; 4.2.2. Ni-MH battery; 4.3. Battery development and applications; 4.3.1. Ni-Cd; 4.3.1.1. Positive and negative electrodes; 4.3.1.2. Classification; 4.3.1.3. Application; 4.3.2. Ni-MH battery; 4.3.2.1. Negative electrode; 4.3.2.2. Electrolyte and separator; 4.3.2.3. Construction; 4.3.2.4. Ni-Cd versus Ni-MH batteries  
4.3.2.5. Low self-discharge Ni-MH batteries

---

## Sommario/riassunto

As energy produced from renewable sources is increasingly integrated into the electricity grid, interest in energy storage technologies for grid stabilisation is growing. This book reviews advances in battery technologies and applications for medium and large-scale energy storage. Chapters address advances in nickel, sodium and lithium-based batteries. Other chapters review other emerging battery technologies such as metal-air batteries and flow batteries. The final section of the book discusses design considerations and applications of batteries in remote locations and for grid-scale storage. Reviews advances in battery technologies and applications for medium and large-scale energy storage Examines battery types, including zing-based, lithium-air and vanadium redox flow batteries Analyses design issues and applications of these technologies

---