

**Table of Contents**

ACRONYMS AND ABBREVIATIONS ..... 5

INTRODUCTION ..... 6

SUMMARY ..... 8

OVERVIEW OF ELECTRIC ENERGY STORAGE ..... 9

    Energy Storage and the Electric Industry ..... 9

    Electric Industry Applications for Energy Storage ..... 11

    Current Status of Energy Storage ..... 12

ELECTRIC ENERGY STORAGE TECHNOLOGIES ..... 14

    Pumped Hydro ..... 14

    Lead-Acid Batteries ..... 15

    Nickel-Cadmium Batteries ..... 16

    Lithium-Ion Batteries ..... 16

    Sodium Sulfur Batteries ..... 16

    Flow Batteries ..... 16

    Flywheels ..... 17

    Compressed Air Energy Storage ..... 17

    Superconducting Magnetic Energy Storage ..... 18

    Electrochemical Capacitors ..... 18

THE IMPACT OF COMBINING WIND POWER AND ENERGY STORAGE ..... 20

    The Benefits to Wind Power from Energy Storage ..... 20

    Energy Storage Technologies for Use with Wind Power ..... 22

    Using Energy Storage to Enable Baseload Wind Power ..... 25

THE ECONOMICS OF COMBINING WIND POWER AND ENERGY STORAGE ..... 28

    Revenue from Energy Storage ..... 28

    Analysis of Combined Wind Power and Energy Storage Systems ..... 31

WIND ENERGY STORAGE PROJECTS ..... 33

    Auwahi Wind ..... 33

    California Wind Integration ..... 33

    Dogo Island ..... 33

    Eagle Mountain ..... 34

Futamata .....	34
Huxley Hill.....	34
Kaheawa Wind Power II .....	34
Kahuku Wind .....	35
Kotzebue .....	35
Laurel Mountain.....	35
Minwind .....	35
Miura Wind Park.....	36
Notrees Windpower .....	36
Palmdale MicroGrid .....	36
PG&E.....	37
Sorne Hill .....	37
Tomamae Wind Hills .....	38
Wind Spirit .....	38
GLOSSARY .....	39