RECENT SODIUM SULFUR BATTERY APPLICATIONS IN JAPAN

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by

Tomio Tamakoshi

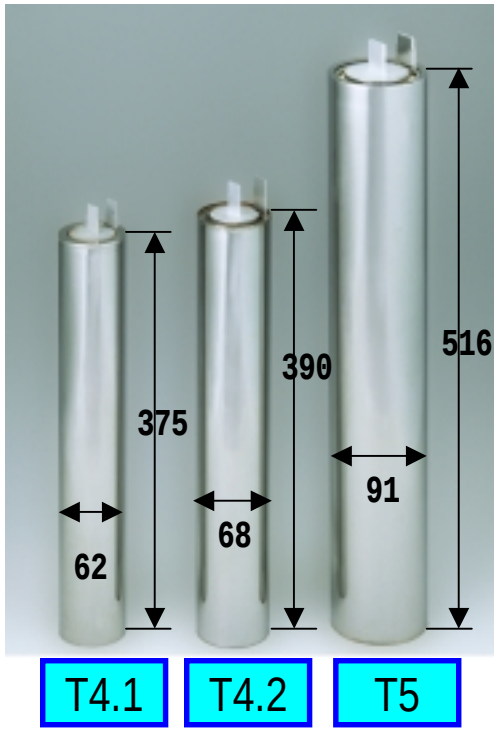
NGK INSULATORS, LTD.

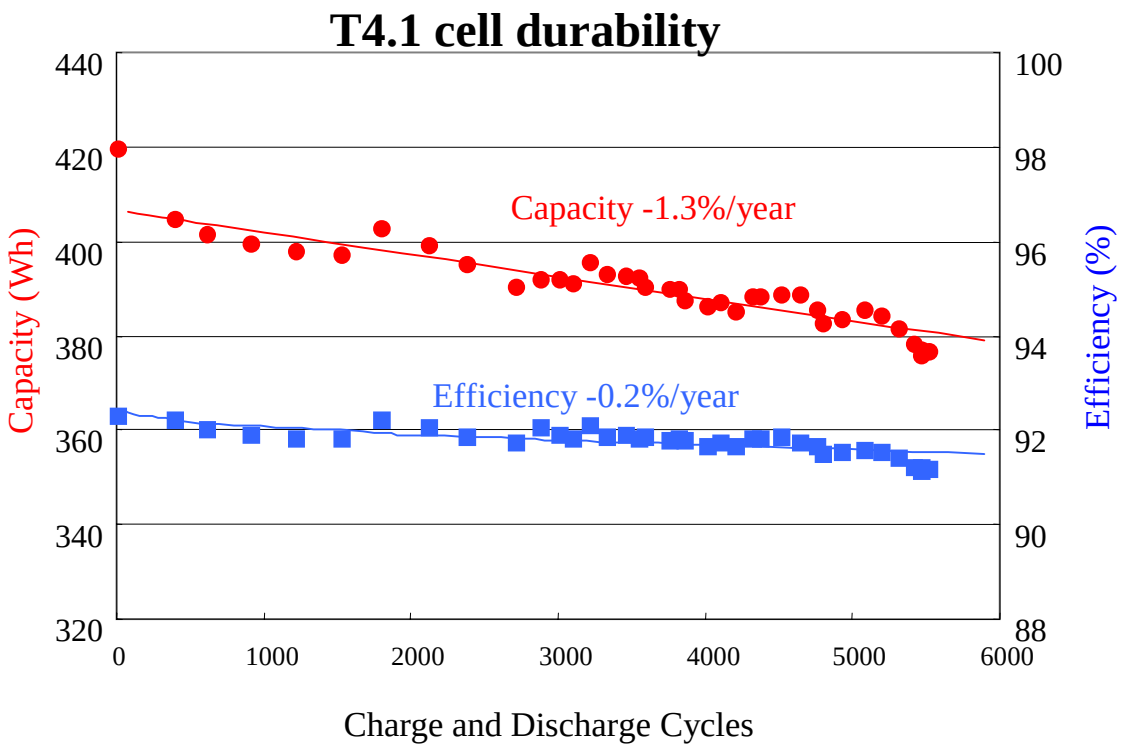
➔ **NAS BATTERY PERFORMANCE**

- **Long term durability**
- **High power capability**
- **Transient response**

- **NAS BATTERY APPLICATIONS**
  - **Load Leveling or Peak shaving**
  - **Integrated system with wind generator**
  - **DC power source**

Stabile Performance

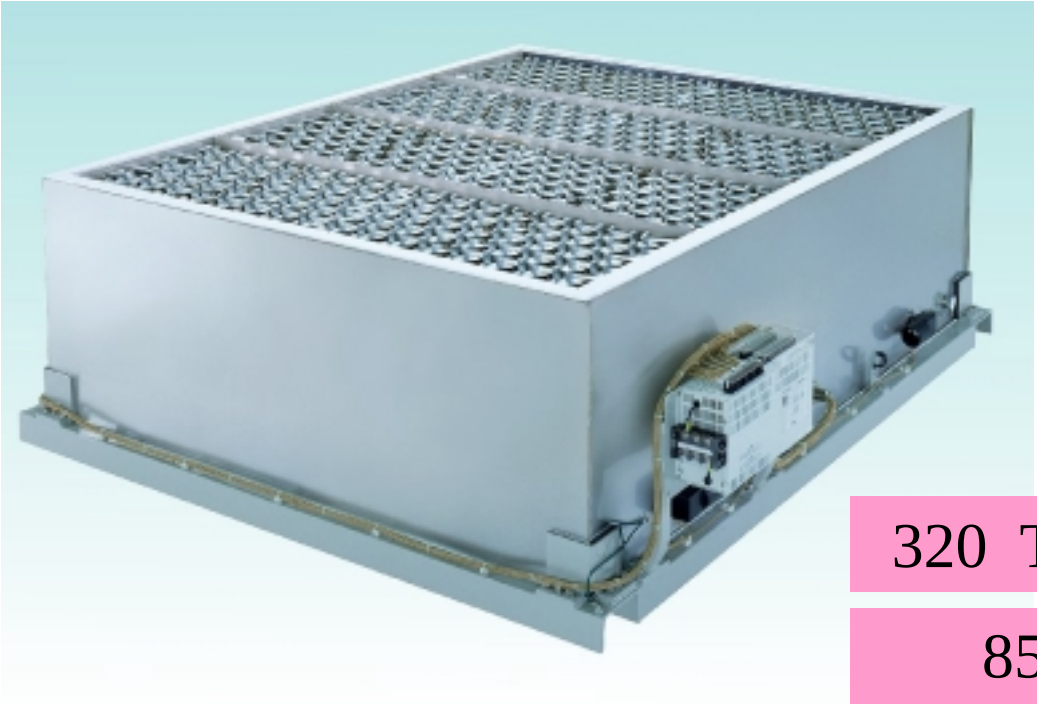




Module Specification

	50kW Module		12.5kW Module
	TYPE 1	TYPE 2	TYPE 2
Application	Load-Leveling or Peak-Saving	Power Quality or Spinning Reserve	Power Quality or Spinning Reserve
Nominal Output DC Power, kW	52.1	52.1	13.4
Average Discharge Voltage, Vdc	59.7	597	132
Energy, kWh	375	375	80.4
NAS T5 Cell Connections S – series P – parallel	[8Sx10P]x4S	320S	72S
Size WxDxH, Millimeters (inches)	2170x1690x640 (85x67x25)		680x1400x640 (27x55x25)
Weight, Kilograms (pounds)	3400 (7496)	3400 (7496)	750 (1653)
High Power, % nominal	NA	500	500

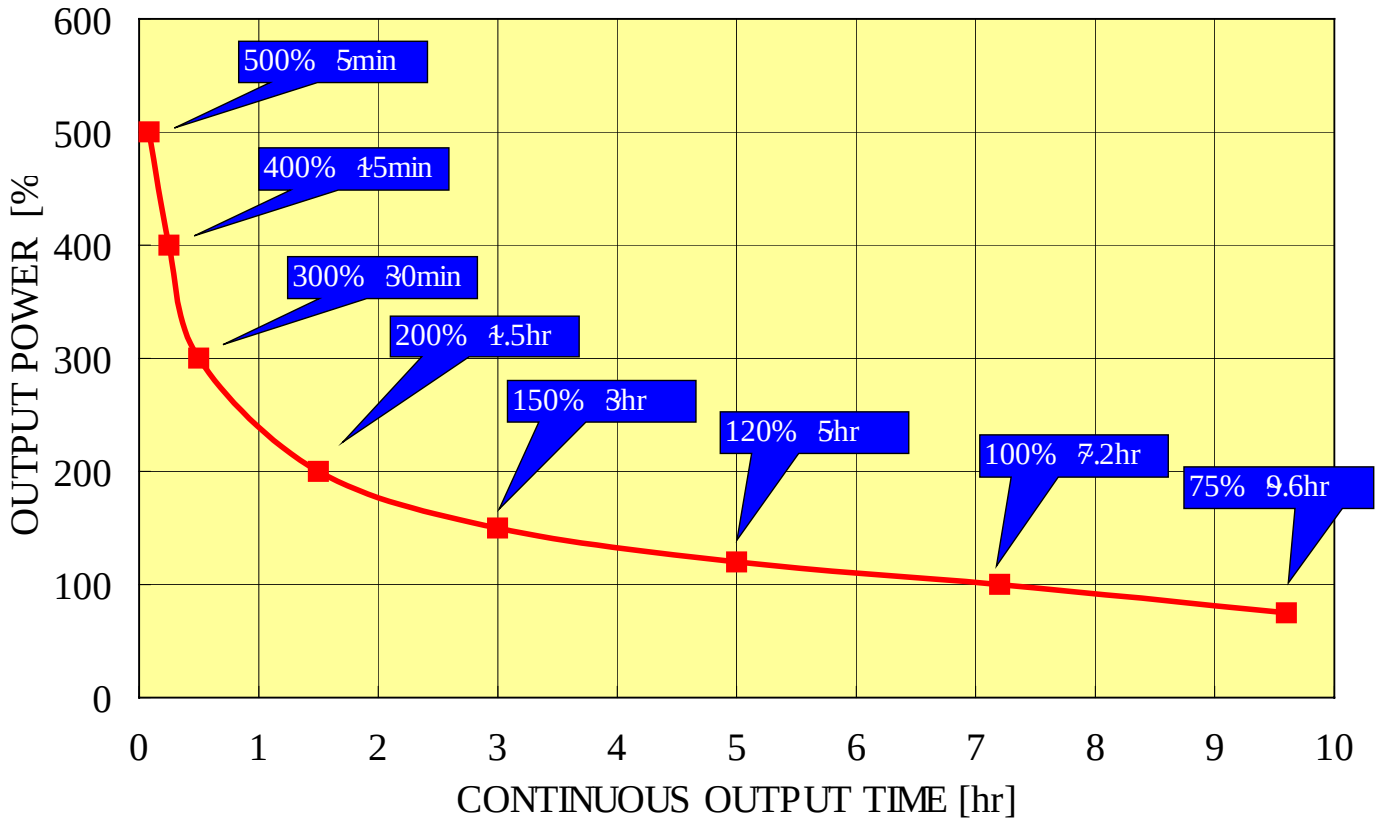
G50kW Module



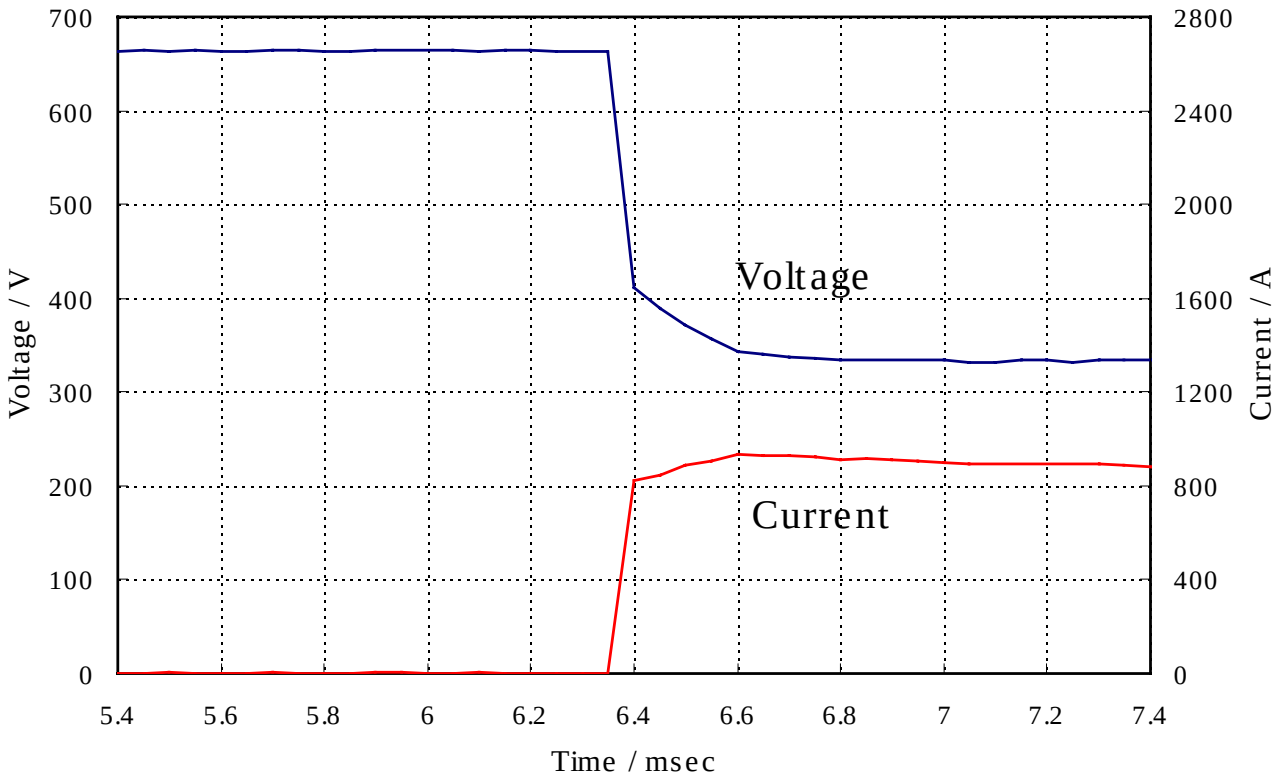
320 T5 cells

85×67×25 inches

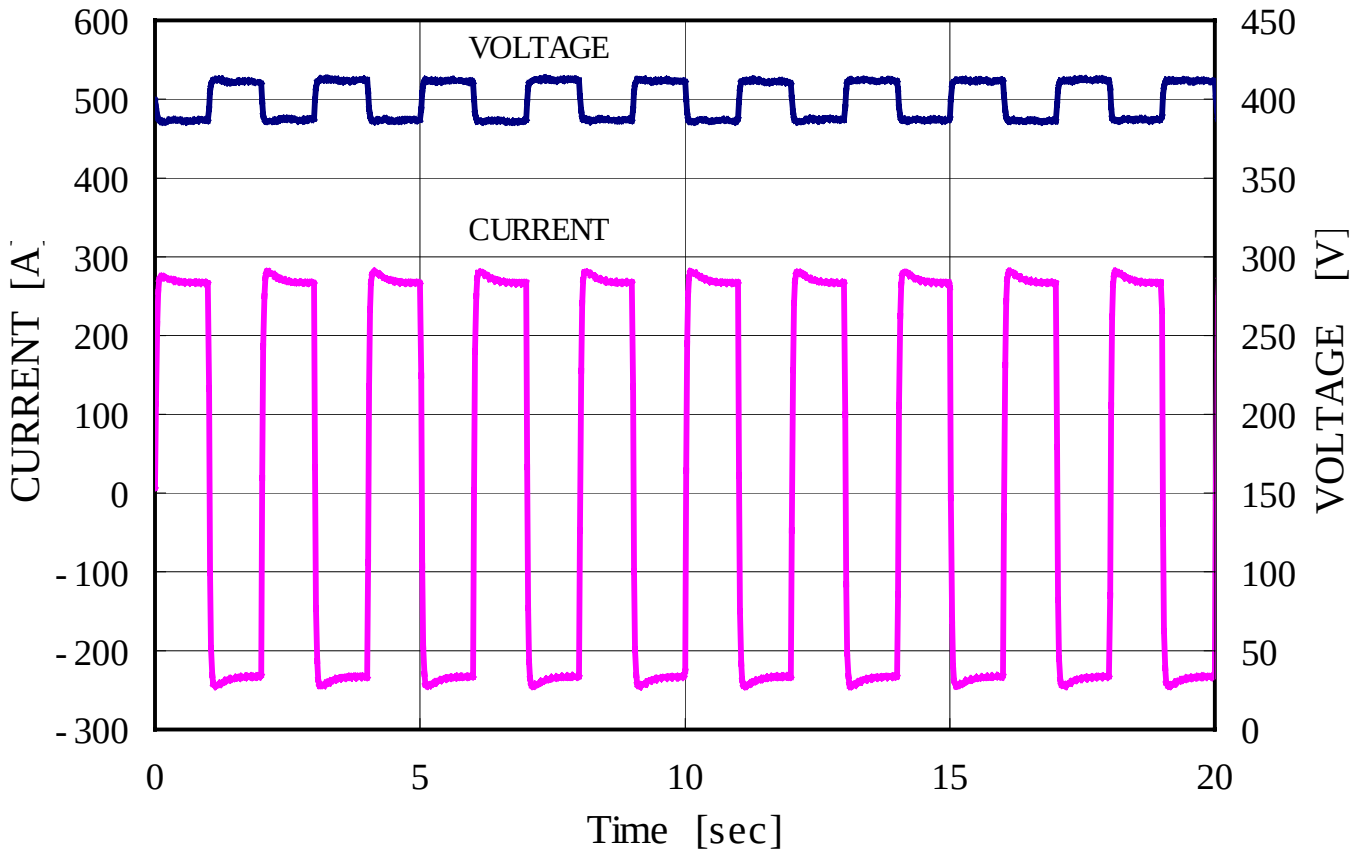
Pulse Power vs Duration Capability



Response to 500% Transient



Response to Cyclic Charge/Discharge



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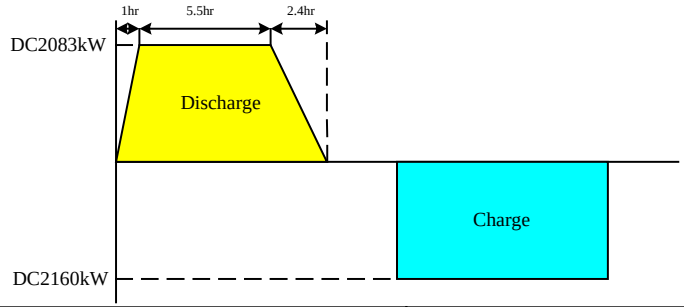
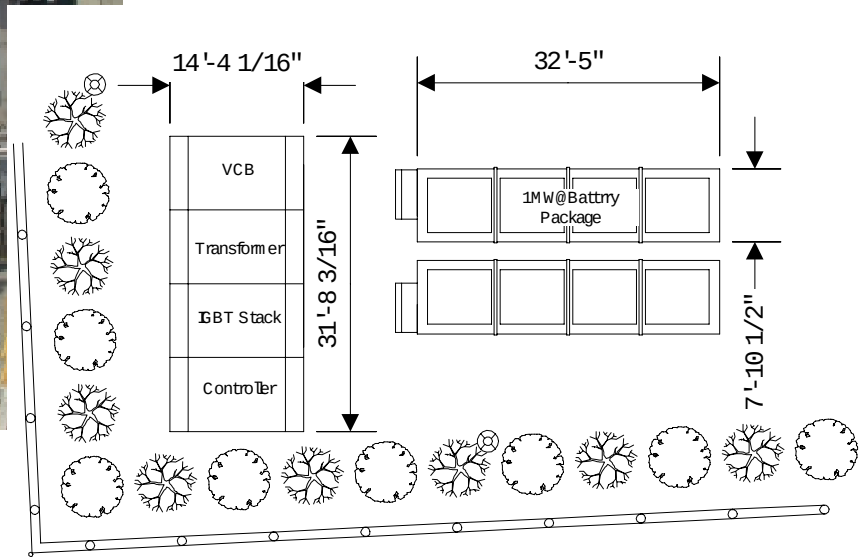
➔NAS BATTERY APPLICATIONS

  - Load Leveling or Peak shaving
  - Integrated system with wind generator
  - DC power source

2MW NAS BATTERY SYSTEM SPECIFICATION

	Tsunashima Substation	Shinagawa Substation
Nominal Output DC Power, kW	2083	
Average Discharge Voltage, Vdc	1165	
Energy, kWh	15,000	
Module Type	50kW Module (TYPE 1)	
Module Connections	20series 2parallel	
Load-Leveling Operating Profile		
Start Date	November 27, 2000	March 28, 2001
DC Efficiency, %	81.2	80.7

SHINAGAWA 2MW NAS BATTERY SYSTEM



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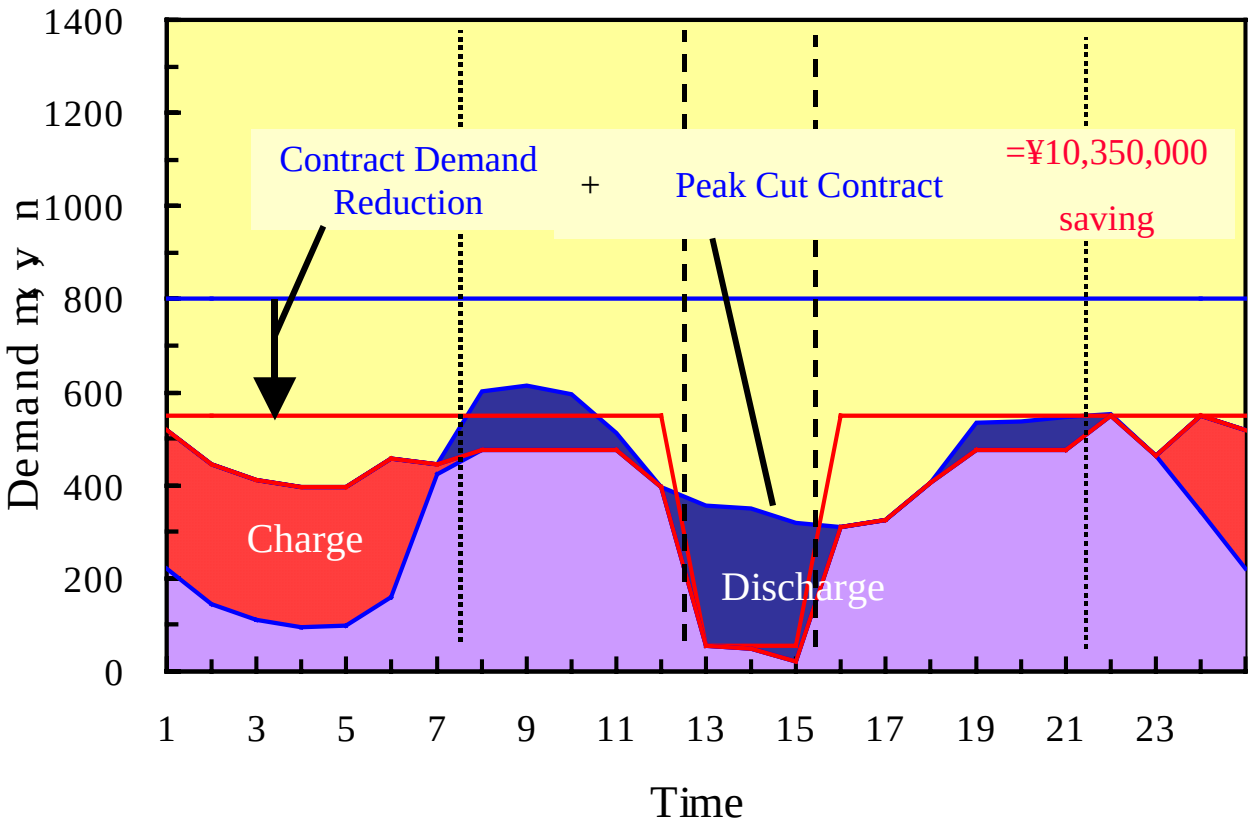
250kW NAS BATTERY SYSTEM

AT WATER TREATMENT PLANTS



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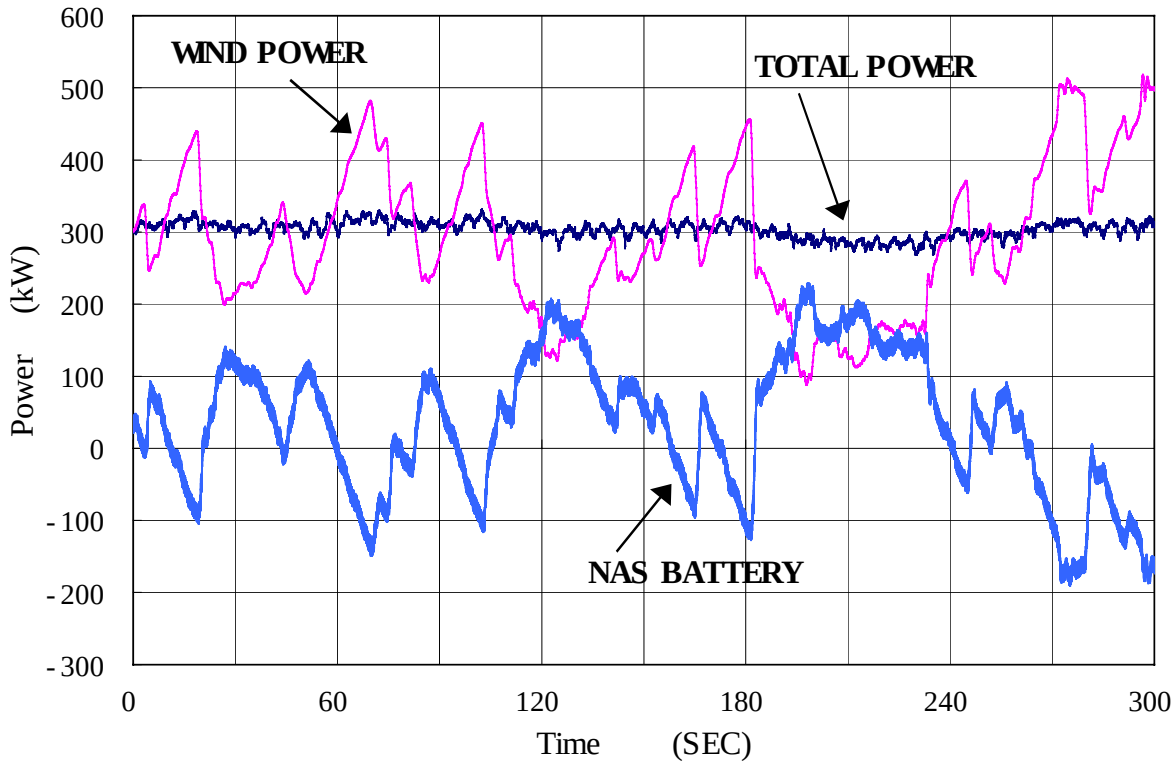
DYNAMIC RESPONSE DEMONSTRATION

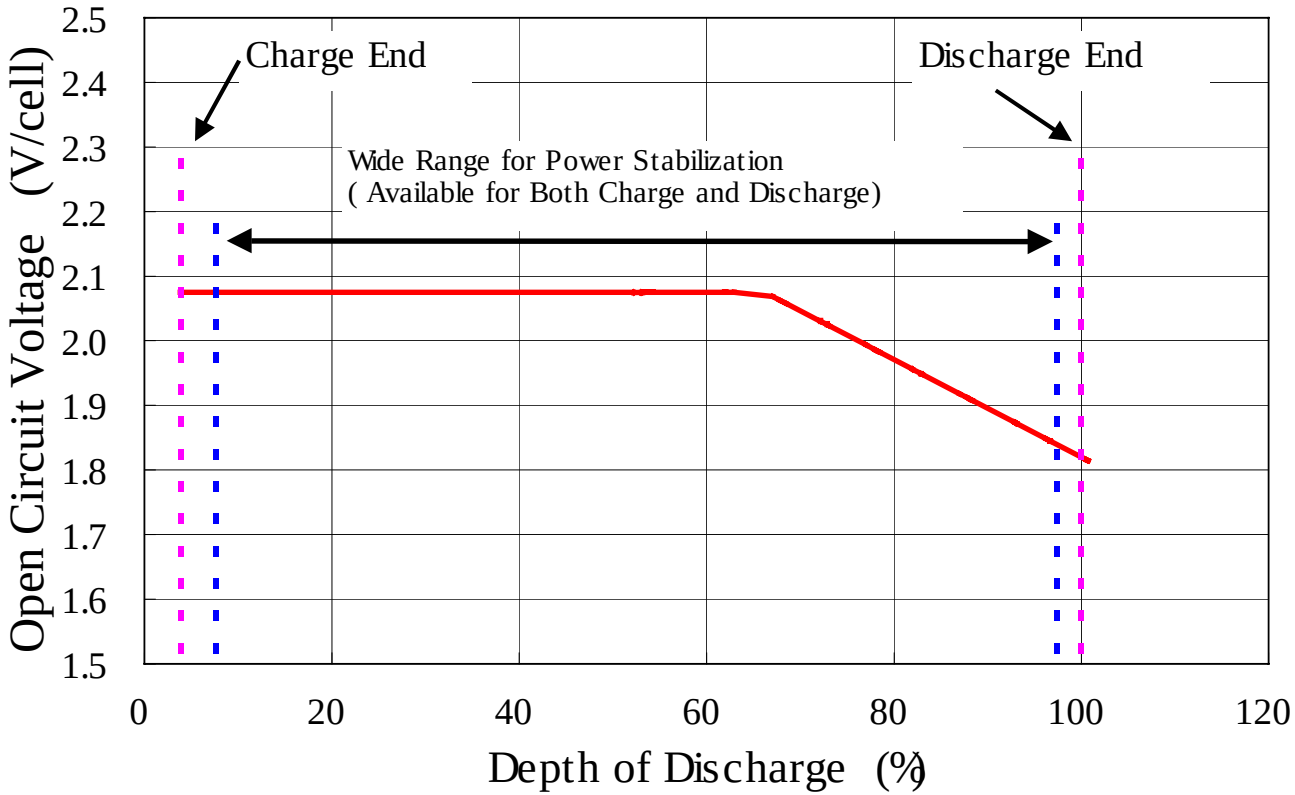
400kW NAS Battery

500kW Wind Generator

NAS Stabilized Wind Generation



Depth of Discharge Control

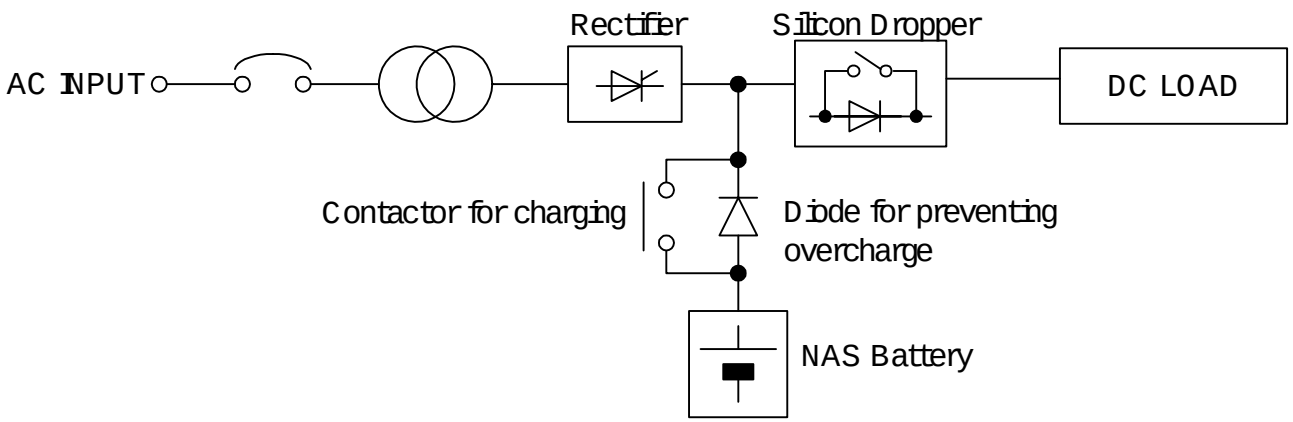
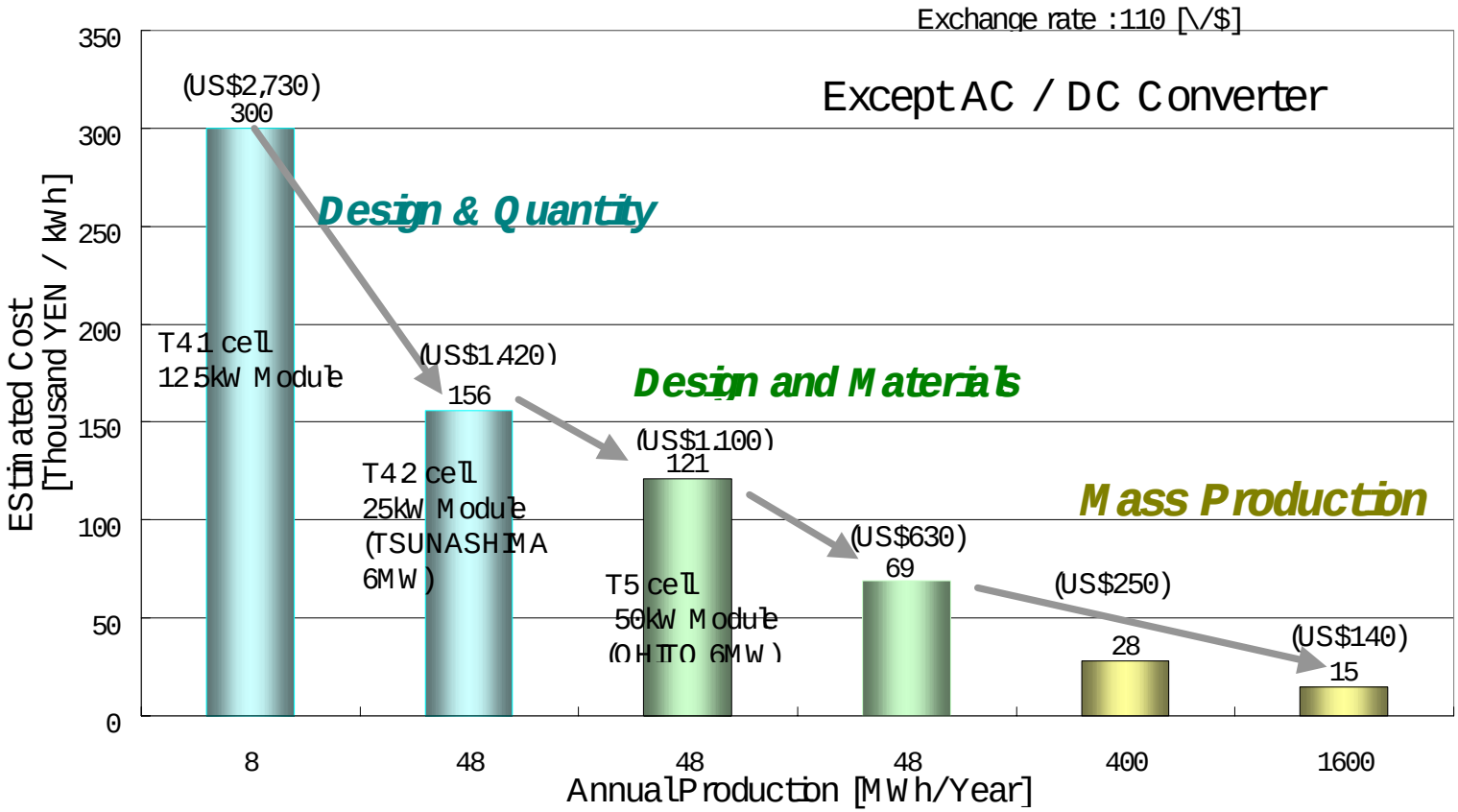


DC Emergency Power Application

Fire-resistive Cubicle

DC110V NAS Battery

- **Attractive NAS attributes for emergency DC power applications include:**
  - High energy density, efficient space utilization
  - Insensitivity to ambient temperatures
  - Minimal required maintenance
  - No self-discharge
  - 15-year life



Projected NAS Battery Costs with Mass Production