

# Making Energy Storage, Pay for itself

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IMRE GYUK, CHIEF SCIENTIST,  
ENERGY STORAGE RESEARCH, U.S. DOE

# Metlakatla, AK: Island System with Hydro

Hydro: 4.9 MW *Due to frequent brownouts:*  
 Load following Diesel: 3.3 MW

*Increasing fuel costs (\$400K/yr) prompted GNB/GE/DOE-Sandia study*

Retrofit L/A Storage: 1.0 MW (GNB, Exide)

Operating Costs \$K	w/o BESS	with BESS
Fuel Oil	4,864	184
Island Delivery	2,039	78
Diesel Maintenance	1,100	400
Replacement	N/A	682
Diesel Operation during Maintenance	N/A	21
<b>Total 1997-2008</b>	<b>8,003</b>	<b>1,364</b>



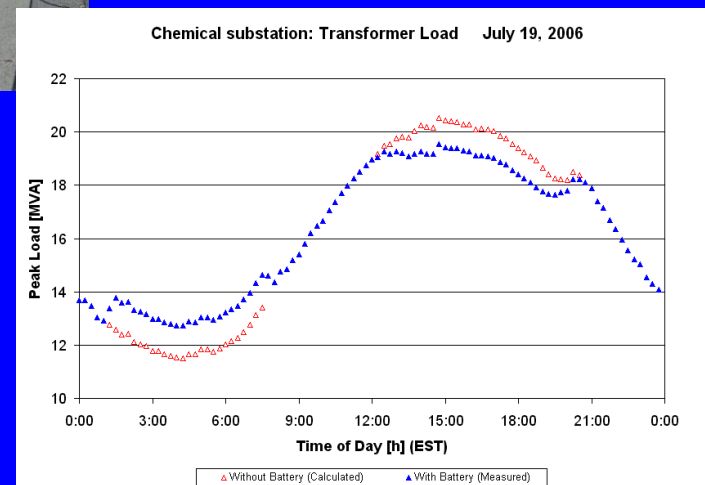
1MW / 1.4MWh Feb. 1997

# Storage for Substation Upgrade Deferral

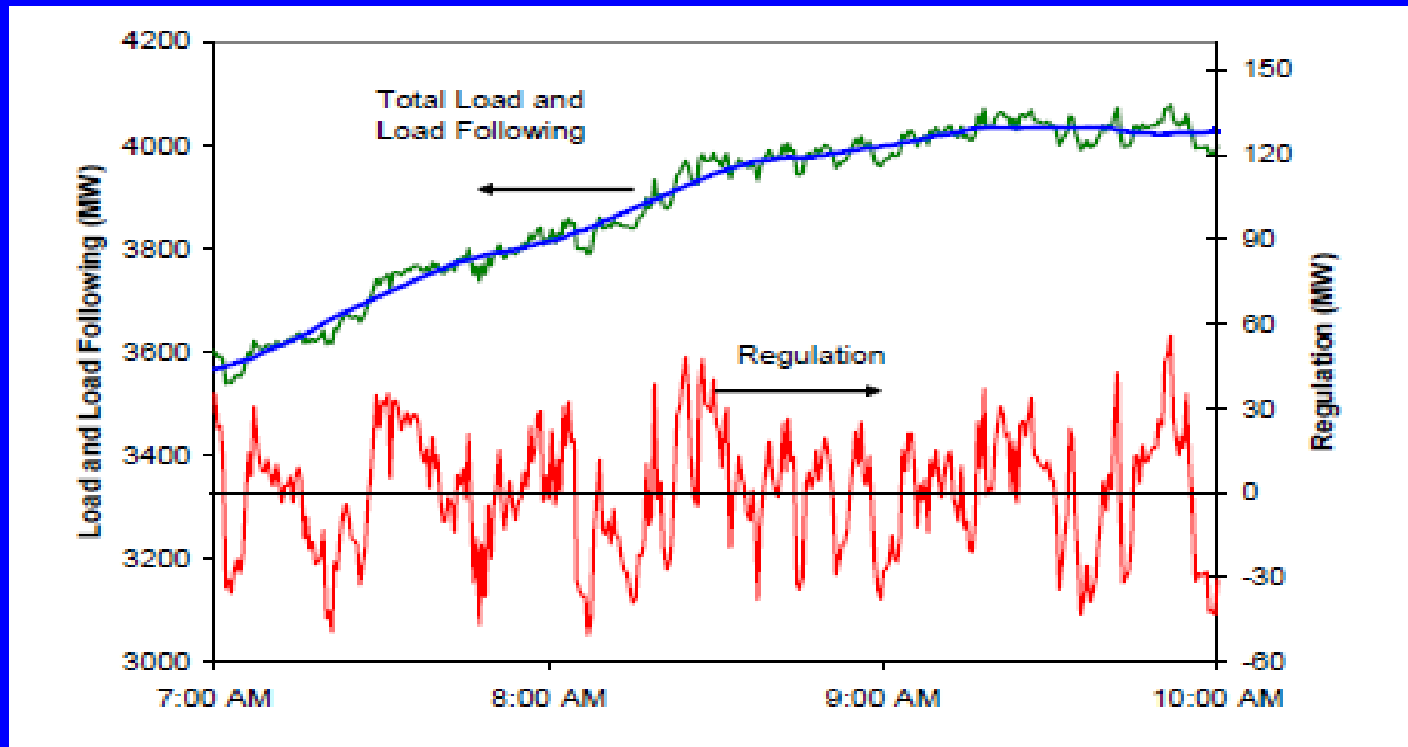


AEP / DOE Project, Indiana  
2MW, 14.4 MWh NaS

2006, first MW scale  
Installation.



# Frequency Regulation



**Old solution:** Fossil fuel generator keeps 5-10% reserve – gets paid for capacity. Response time  $>$  duration of fluctuation.

# 2005-2006, Frequency Regulation



- CEC / DOE PROJECT:
- NYSERDA / DOE PROJECT:

Beacon Power 100 kW Installation  
2 Flywheel Systems in CA and NY

DOE Loan Guarantee  
20MW Flywheel Storage for  
Frequency Regulation in NY-ISO  
Commissioned July 2011



This project provided the basis  
for FERC to establish  
“PAY FOR PERFORMANCE”!

Innovation  
and Regulatory Framework  
must go Hand in Hand!