



California Energy Commission Energy Storage Workshop

Comments submitted by:

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Safe Harbor Statement



Barriers and Obstacles to Scale



Market Status for Frequency Regulation



Market	Average MW Market Size	Average Pricing*	Market Developments and Status
ISO NE	130	\$48	<ul style="list-style-type: none"> • Pilot program unanimously approved August 5, 2008, Began on November 18, 2008
NYISO	220	\$62	<ul style="list-style-type: none"> • Tailored market rules approved by stakeholders • Approved by FERC March 2009 • Market and software expected to be effective in May 2009
PJM	1000	\$61	<ul style="list-style-type: none"> • Market open
MISO	Est. 1000 (new open market)	N/A (new open market)	<ul style="list-style-type: none"> • FERC ordered new tariff for Energy Storage Resources • MISO filed tailored tariff in May 2008, approved Dec08 • Expect open market by June 2009
CAISO	360	\$37	<ul style="list-style-type: none"> • California is market closed to fast-response storage • Stakeholder process to develop market rules for Energy Storage Resources derailed by MRTU priorities • Inability and/or unwillingness to comply with Order 890
ERCOT	Approx 100 and growing	N/A	<ul style="list-style-type: none"> • Not FERC regulated – less transparent • Highest wind penetration

Regulation and Ramping Impacts

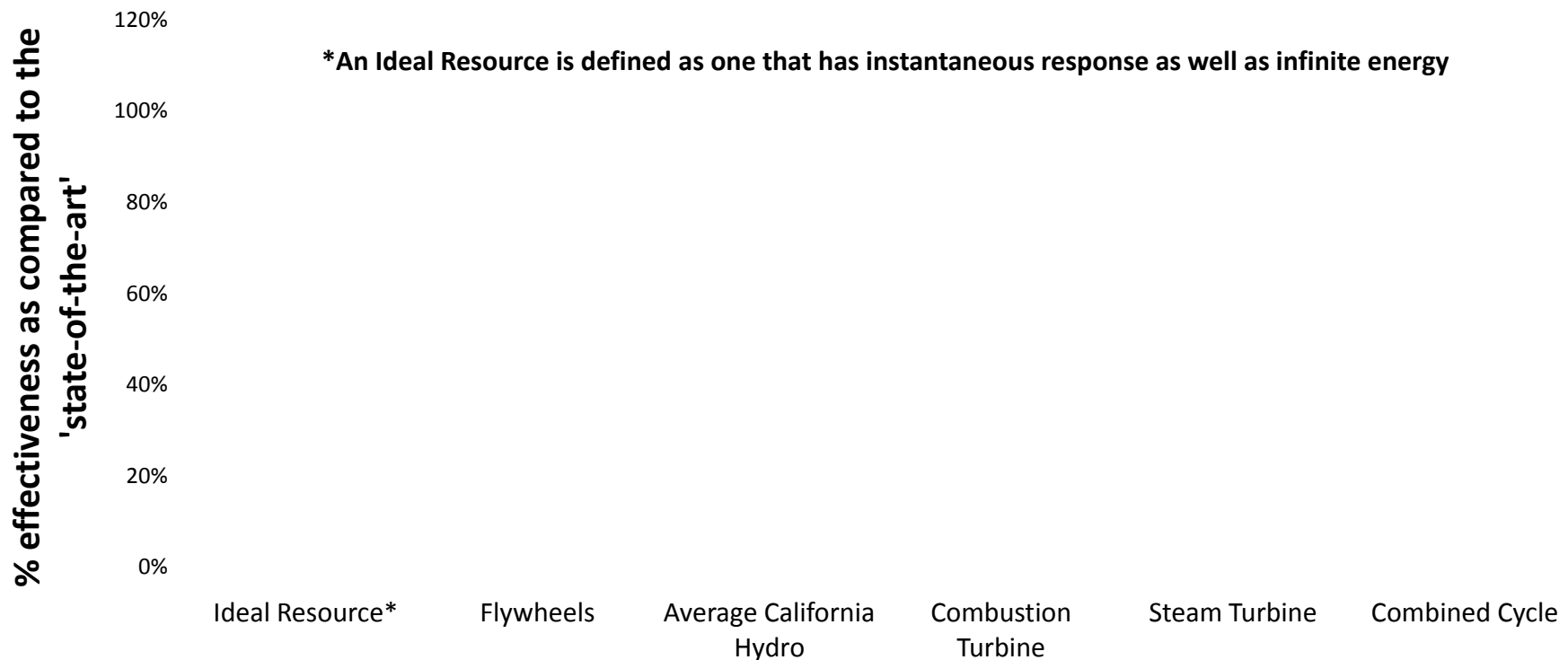


System Benefits of Fast Regulation



Regulation Effectiveness

As compared to an 'Ideal Resource'



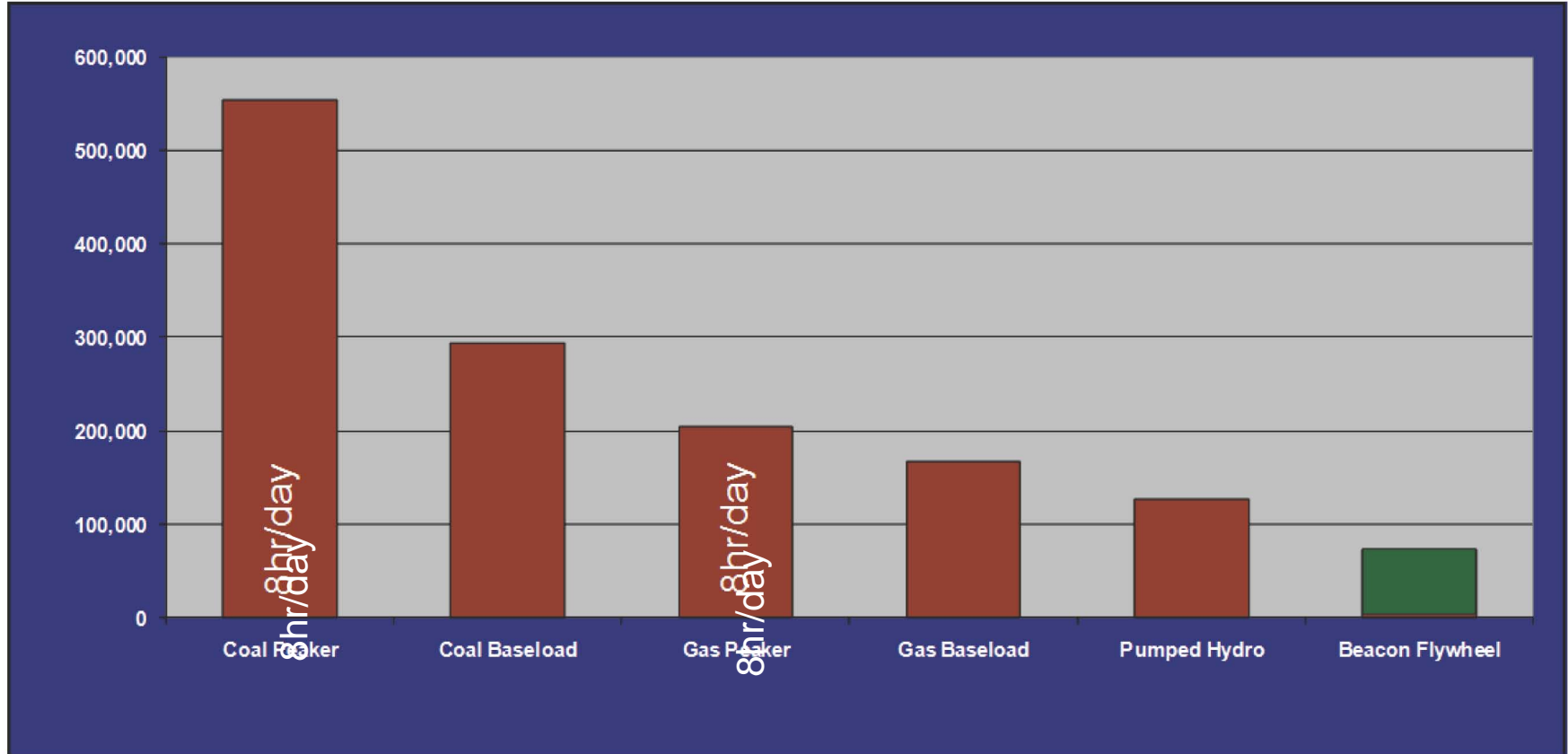
PNNL: Fast-response energy storage can reduce the amount of regulation procurement required by up to 40% in CAISO

Renewable Integration Value



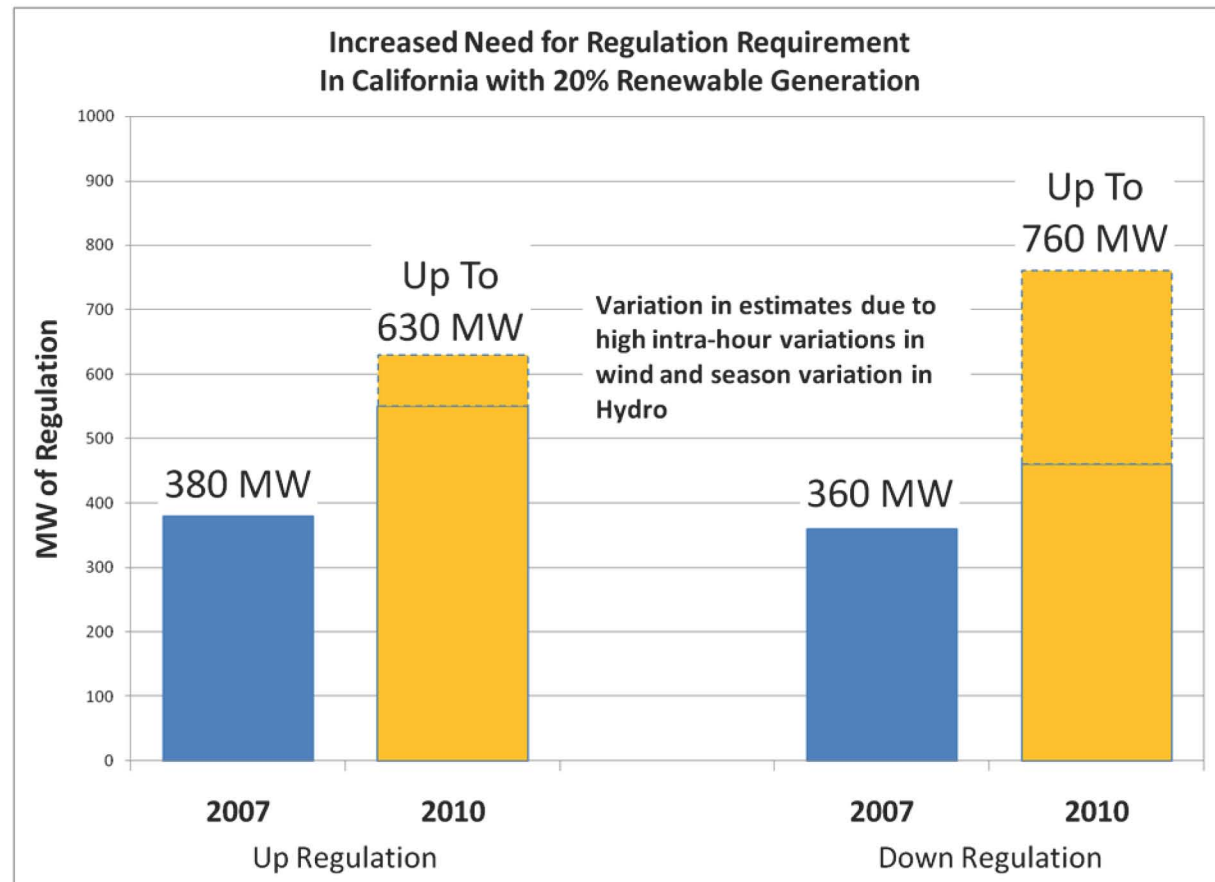
Frequency Response Reserve VAR control
Angular Stability Control

Fast Storage CO₂ Emission Advantage



Up to 80% reduction in CO₂ emissions vs. fossil generation

Intermittent Resources Increase the Need for Regulation and Ramping



Fast-response energy storage can help fill this growing gap

Best Location for Storage



Storage Cost / Benefits of Ownership



*

* Does not reflect added payment for superior “2 X” performance

Allocating Benefits and Costs



These conditions call for sound policy to socialize benefits and costs in simple, expedient, and justifiable ways

Incentive and Stimulus Programs (a)



*Tax incentives for storage should be at parity with wind and solar
since they enable both!*

Incentive and Stimulus Programs (b)



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Incentive and Stimulus Programs (c)



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Research Needed



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