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Application Priorities – Strawman

Date: April 30, 2012 (With Aloke Gupta and CESA redline comments)

The following application priorities and definitions are based on informal input/discussion between CPUC Staff, CESA, SCE, PGE, SDGE on April 12, 2012. They are for discussion purposes only; the numbering is not in order of priority.

Basis for Prioritization

1. Magnitude of direct benefits to utilities, end users
2. Magnitude of societal benefits, including emissions reductions, market development, system flexibility etc.
3. Renewables integration (key California policy priority)
4. Fit with CPUC jurisdictional control
5. Availability of commercially ready energy storage technologies
6. Ability to be deployed quickly and achieve 'quick wins'

Key Definitions to Standardize in our Language:

1. Benefit = 'a single value (that is typically an avoided cost and/or revenue but maybe a non-financial value) which maybe captured by an energy storage system in the context of the grid. Benefits may come from a market revenue (direct market participation), a reduced or deferred cost relative to the status quo or an environmental benefit
2. End Use = 'operational use (SCE)' = specific targeted operational use for energy storage in the field, may result in capture of one or more benefits.
3. Application = combination of end uses (and benefits) that an energy storage system may capture when sited at a specific place and managed in a particular way (consistent with SCE and CESA's definition)

New Terms that Need Definitions

1. Bulk Storage – large-scale energy storage that is interconnected to the grid at transmission-level voltage, and is used primarily for electric supply capacity. Can be generator co-located (storage onsite combustion turbines) or stand alone (CAES, pumped hydro) or aggregated (large-scale aggregated battery storage interconnected at transmission level).
2. Generation Storage – category of energy storage solutions that are co-located with large-scale generation (vs. distributed generation). Includes molten salt (co-located with concentrated solar thermal) and storage co-located with natural gas combustion turbines.

Proposed Next Steps:

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1. Obtain feedback from informal group participants on this document
2. CPUC Procedural next steps – CPUC can consider issuing an Assigned Commissioner's Ruling to formally close out Phase 1 and kickoff Phase 2 – target by ????
3. Conduct public workshop regarding application framework, basis for prioritization, definitions and strawman application priorities) – target by end of May???
4. Complete Phase 2 ASAP! Certainly sooner than what is called for in AB 2514 (October 2013) especially given that the CPUC made this OIR a priority by launching efforts a year ahead of schedule!

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#	Application (use case)	Description/ Problem Solving	Potential Compensation or Ownership	Likely Siting	Primary End Uses	*Conventional Solutions vs.* Commercially Available Energy Storage Solutions	Energy Storage Case Study Example
1	Distribution Expenditure Deferral	Defers distribution upgrades. (For Example: overloaded wire, transformers , capacitor – not a load modifier!) Use energy storage in lieu of sub transmission capacity (for 1-4 years)	• Utility Ratebased • Third party • End User	• Either side of the meter • At or down-stream from overloaded equipment • Substation • Circuit	• Upgrade Deferral* • Replacement Deferral* • Equipment life extension • Service reliability • T&D congestion • Transportabilit y	• *Conventional Capacity (trans-formers, wires, capacitors)* • State-of-the-art lead acid • Advanced lead acid • NiMH • LIon • Various flow batteries • Thermal Storage (for A/C) • Above ground CAES	• SDG&E primary distribution storage

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2	Community Energy Storage@	Improve local service reliability. In-lieu of peaking electric supply resources. Avoid/defer adding distribution capacity	• Utility Ratebased • Third Party under contract	• Adjacent to loads, on utility 'easement'	• Service Reliability* • D Deferral* • T Congestion* • Electric Supply* • Ancillary Services* • Transportability	• *Conventional Capacity (generation, transformers, wires, capacitors* • State-of-the-art L/A • Advanced L/A • NiMH • LIon • Various flow batteries	• AEP CES • Detroit Edison CES • SMUD Solar Smart RES/CES Project • SDG&E secondary storage projects

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3	Distributed Peaker[@] (Load Modifier)	Distribution Substation level Energy cycling to address peaking needs (part year operated by utility, part year operated by CAISO) (note, this application is being considered primarily in lieu of electric supply capacity)	• Market revenue • Utility Ratebased • Third Party	• Subtransmission • Substation	• Electric Supply* • Ancillary Services* • T Congestion* • Service Reliability* • D Deferral* • Transportability	• *Conventional Generation (CT, CC)* • *PPA* • *DR* • *Critical Peak Pricing (CPP)* • *EE* • State-of-the-art L/A • Advanced L/A • NiMH • LIon • Various flow batteries • Above-ground CAES • Thermal storage (operating as virtual distributed peaker)	• Modesto Irrigation District • Raleigh, NC (TAS Energy)

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4	VER-sited (renewables)	Variable RE Generation Integration	• Market/ higher PPA values • Third party	• At or near RE Generation ✓ Subtransmission ✓ Substation ✓ Distribution	• Variable RE Generation Integration ✓ energy time-shift ✓ capacity-firming ✓ ramping ✓ Volt/VAR support • Curtailment capture • Responsive reserves • Transportability • Mitigating imbalance penalties • Interconnection • Ancillary services/regulation	• *Additional Sub-T or D Infrastructure* • *Static VAR Compensator* • *Switched Capacitor Banks* • State-of-the-art L/A • Advanced L/A • NiMH • LIon • Various flow batteries • Flywheels • Above ground CAES • Generation storage technologies(see definition and examples at beginning of this document)	• SMUD Solar Smart RES/CES Project • Xtreme Power - various • Bulk Solar Thermal • TAS Generation Storage™

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5	Bulk Storage	Electric Supply Capacity/ Resources	• Market • Utility Ratebasing • Third Party	• Transmission • Generator co-located • Regarding size: can also include distributed, aggregated storage connected at the transmission level to achieve same end uses (also we feel its premature to set size limitations)	• Electric Supply* • Ancillary Services* • Transportability	• *Conventional Generation (CT, CC)* • *PPA* • *DR* • *Critical Peak Pricing (CPP)* • *EE* • Pumped Hydroelectric • Bulk CAES • Generation storage technologies (see definitions, above) • Redox Flow Batteries • Advance lead acid batteries	• Utility-owned Pumped Hydro-electric • Alabama CAES • TAS Energy Generation Storage™ Case Study

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6	Demand Side Manage-ment	End-use Customer Bill Management System load modification	• Customer savings • Market (for ancillary services) • End-user • Third-party	• Customer-side of Meter	• TOU Energy Cost Management • Demand Charge Management • Reliability (back-up power) • Power Quality • Ancillary Services * • Transportability	• *Energy Efficiency* • *Combined Heat and Power (CHP)* • *Combined Cooling Heat and Power (CCHP)* • State-of-the-art L/A • Advanced L/A • NiMH • LIon • Various flow batteries • Thermal Storage • Above-ground CAES	• Alameda County Santa Rita Jail • Various SGIP funded projects • Various thermal storage solutions installed on the customer side of the meter (TAS case study)

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7	'Behind the Meter 'Community Energy Storage	Service Reliability/ Quality System load modification End-use customer bill management	• Utility Ratebased • Third party owned with service contract to utilities • End user owned with service contract to utilities	• Customer-side of Meter	• Electric Supply* • Ancillary Services* • Service Reliability* • D Deferral* • T Congestion* • Transportability	• *Conventional Generation (CT, CC)* • *PPA* • *DR* • *Critical Peak Pricing (CPP)* • *EE* • State-of-the-art L/A • Advanced L/A • NiMH • LIon • Various flow batteries • Above-ground CAES	• SCCPA (Ice Energy) • TAS Case Study

Notes
#Heavily loaded transformers and underground cables with slow or no load growth.
*Responds to utility and/or ISO signals.
@Includes resource adequacy in the form of supply capacity and reserves.