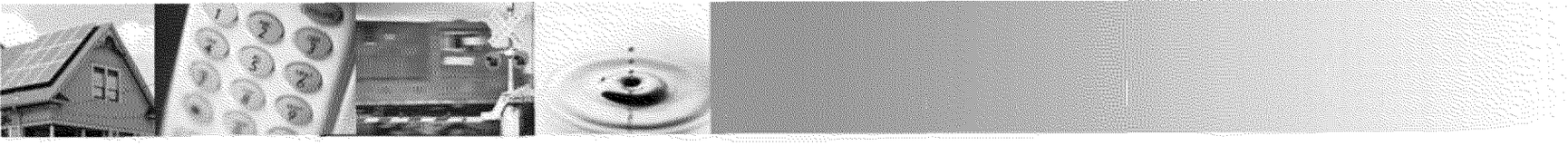
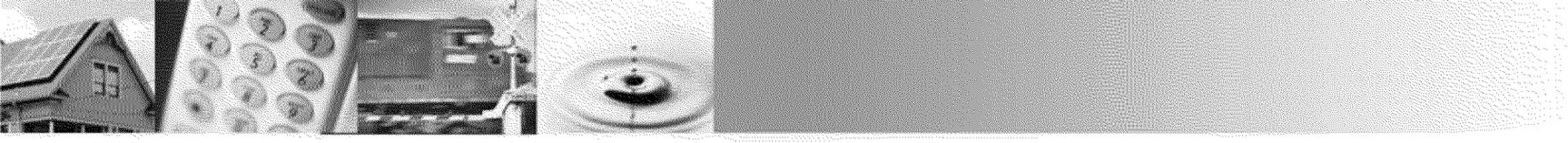


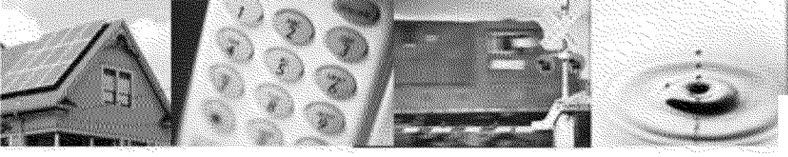
A.14-02-006 Workshop
IOU Energy Storage Procurement Applications
June 2, 2014

Aloke Gupta
Energy Division, **California Public Utilities Commission**
aloke.gupta@cpuc.ca.gov / 415.703.5239

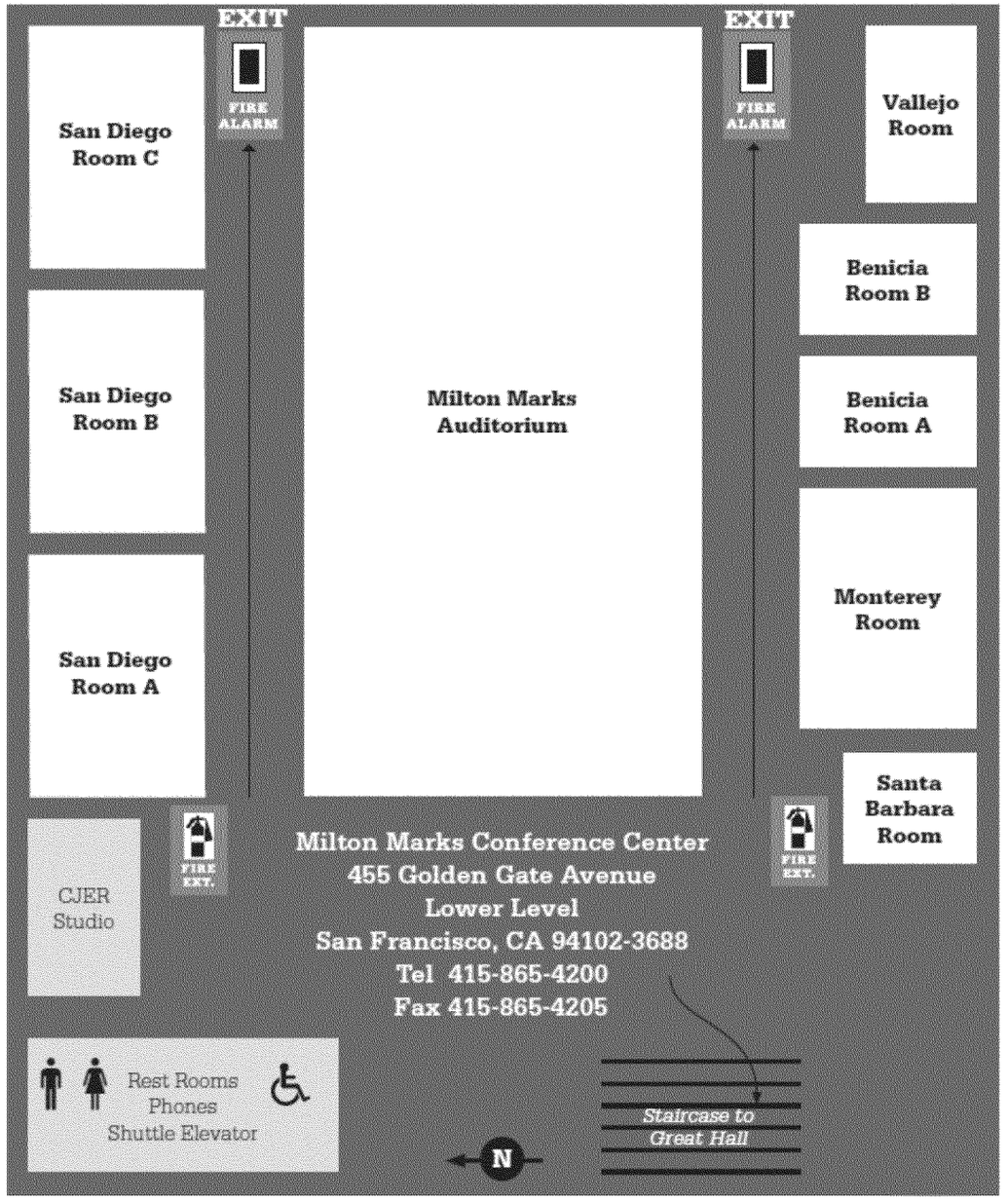


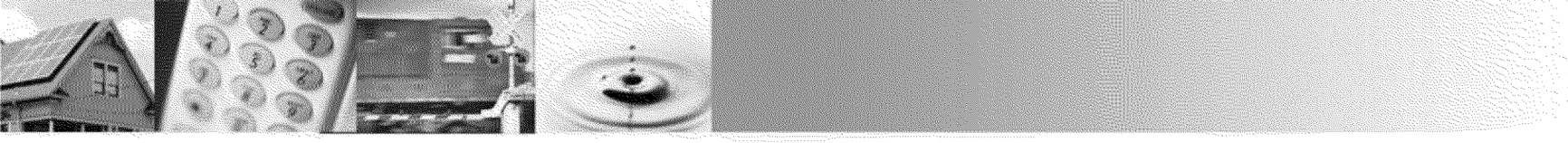
IN AN EMERGENCY…

- **CALL 911 and ...**
  - Say,
    - "I am calling to report an injury/illness/fire/police emergency."
    - "I am calling from **455 Golden Gate Avenue, between Polk & Larkin**, on the lower level."
  - Wait for instructions from the 911 dispatcher.
- **CALL 415-703-3333 to tell building management…**
  - That a 911 emergency call has been made and
  - Where you are so they can escort arriving emergency personnel to your location



- In a **FIRE emergency**, ALSO Activate the nearest fire alarm.
  - Alarm will sound as a loud horn and wall-mounted strobe lights will flash.
- Listen to the PA system for **Announcements and Instructions**
- Note (4) **Fire Extinguisher** locations at beginning & ends of the hallways.
- In the event of an **Evacuation**, persons with disabilities should go to nearest stairwell, wait for assistance.
- Note **Emergency Exit Doors** at the end of both of hallways outside of the Auditorium in back





Workshop Participation

Date: June 2, 2014 **Time: 9:30 am – 5 pm**	**Hiram W. Johnson State Office Building** Milton Marks Auditorium 455 Golden Gate Avenue (Corner of Polk and Golden Gate Avenue) San Francisco, CA 94102

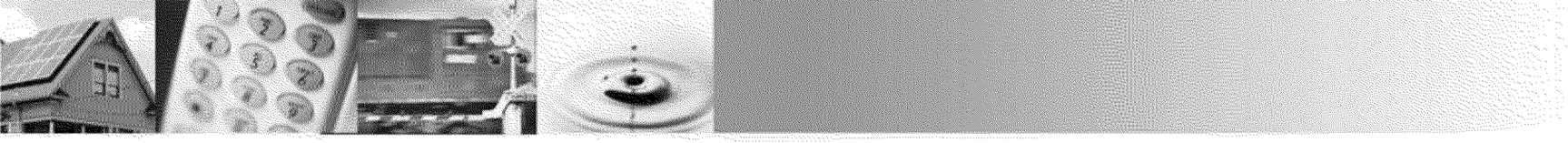
To attend via Teleconference:

*Call-in: **866-687-1443** (This will be a listen-only line)*
*Participant passcode: **1186966#***

To attend via Online Webcast:

***Go to** https://van.webex.com/van/j.php?MTID=m812bd49243b83c7ff3ad40ac405c4513*
*Meeting Number: **747 731 159***
*Meeting Password: **storage***

- **No access to public wifi in auditorium**
- **Cell coverage is poor**



Misc Information & Links

The IOU applications and other filings by parties can be found in the docket archive on the CPUC website at the link below:

http://delaps1.cpuc.ca.gov/CPUCProceedingLookup/f?p=401:56:16969819053830:NO:RP,57,RIR:P5_PROCEEDING_SELECT:A1402006

The applications can also be found the IOU websites on their respective regulatory filings pages.

Highlights of current proceeding & earlier storage rulemaking can be found on the "energy storage" web page on the CPUC website at the link below:

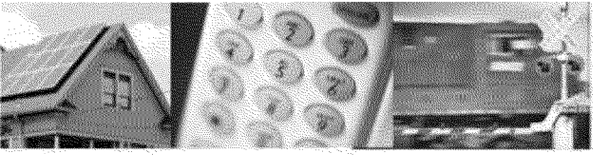
http://www.cpuc.ca.gov/PUC/energy/electric/storage.htm

If you do wish to become a party so that you can advocate policy at the CPUC, please visit the CPUC Public Advisor page and review the CPUC's full Rules of Practice and Procedure (RPP) at:

http://docs.cpuc.ca.gov/published/RULES_PRAC_PROC/70731.htm#P181_10148

If you wish to subscribe to this proceedings so that you can be notified of related filings at the CPUC, please sign up at the following link (subscribe to "A1402006"):

http://subscribecpuc.cpuc.ca.gov/



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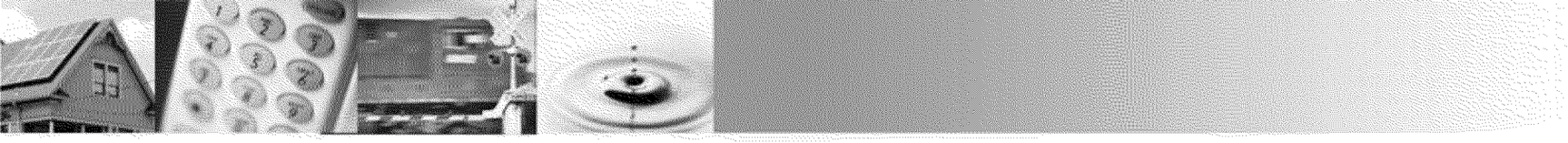
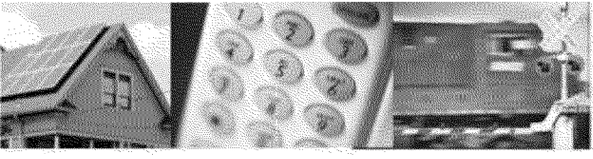


Today's Workshop

- **IOU Storage Procurement Applications Proceeding**
  - A.14-02-006
- **Focused on addressing a subset of issues identified in the scoping memo, released on May 27, 2014**
- **No post-workshop report**
- **Parties can comment on any/all issues in scoping memo, including workshop issues**
  - Filing deadline June 12
  - Replies due June 19
- **Objectives:**
  - Exchange information & viewpoints re pending issues to inform comments
  - Clarify certain aspects of the IOU applications
  - Seek consensus where/if possible

Disclaimers

- **Staff comments / discussion today should not be interpreted as a proposal or recommendation**
- **Parties comments today will NOT be part of the proceeding's "record"**
- **Not a forum to discuss procedural issues**



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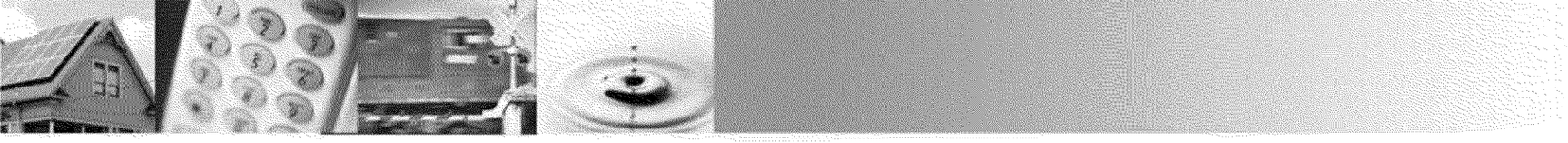


Definition of Storage from PUC §2835(a)

- (1) "Energy storage system" means commercially available technology that is capable of absorbing energy, storing it for a period of time, and thereafter dispatching the energy. …

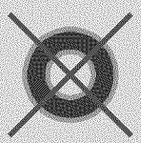
.... **AND**

- (4) An "energy storage system" shall do one or more of the following:
  - (A) Use mechanical, chemical, or thermal processes to store energy that was generated at one time for use at a later time.
  - (B) Store thermal energy for direct use for heating or cooling at a later time in a manner that avoids the need to use electricity at that later time.
  - (C) Use mechanical, chemical, or thermal processes to store energy generated from renewable resources for use at a later time.
  - (D) Use mechanical, chemical, or thermal processes to store energy generated from mechanical processes that would otherwise be wasted for delivery at a later time.

Energy Storage Definition per PUC 2835

Absorb, Store, and Dispatch Energy

Store generated energy via mechanical, chemical, or thermal process for later use
Store thermal energy to avoid heating or cooling load at a later time
Store energy generated from renewable resources for later use
Store energy generated from mechanical process for later delivery



Energy Storage Definition per PUC 2835

Absorb, Store, and Dispatch Energy

- Store generated energy via mechanical, chemical, or thermal process for later use
- Store thermal energy to avoid heating or cooling load at a later time
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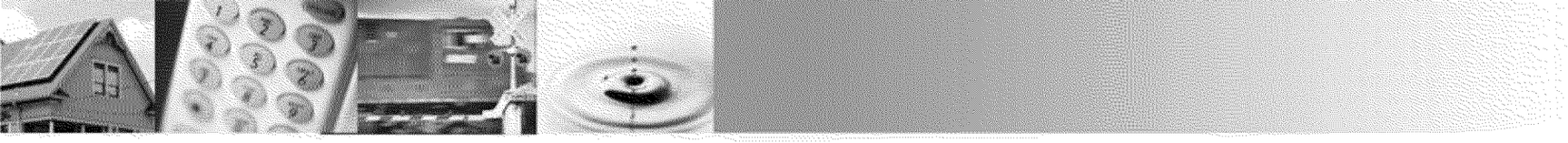
- Store energy generated from mechanical process for later delivery



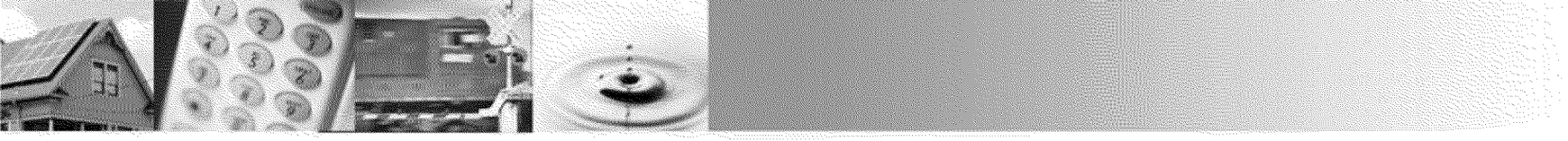
Clarification of Key Terms

- **"Generated energy"**

Broad	Output can be any form of energy via any process
Narrow	Output must be electricity via man-made means

- **Later "use" / "delivery" ("dispatch")**

Broad	Use for any useful activity or function
Narrow	Affect the state of the grid (directly supply, or reduce load) (*in a controllable manner)*



AB 2514 Preamble

SECTION 1. The Legislature finds & declares all of the following:

a) Expanding the use of ESS can assist...in integrating increased amounts of renewable energy resources...

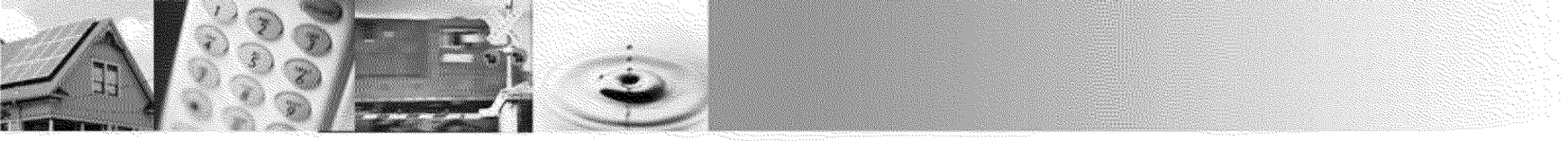
b) Additional ESS can optimize the use of ... electrical generation from wind and solar energy...

c) Expanded use of ESS can ...[avoid] or [defer] the need for new fossil fuel-...power plants and [avoid] or [defer] T&D … upgrades...

d) Expanded use of ESS will reduce the use of electricity generated from fossil fuels ...

e) Use of ESS to provide the ancillary services ...will reduce emissions of carbon dioxide and criteria pollutants.

f) There are significant barriers to obtaining the benefits of ESS…



Potential Clarified Definition of ES Applicable to the Storage Targets?

An energy storage system shall:

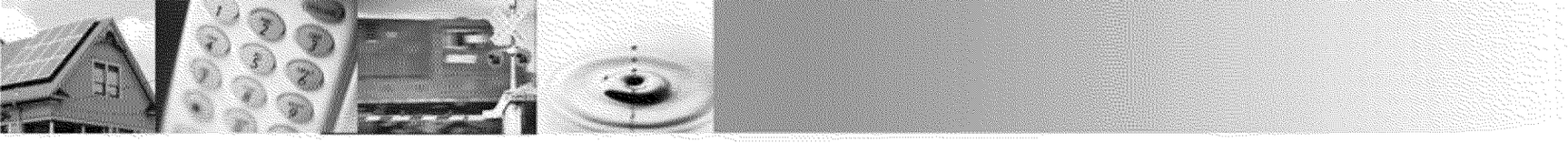
1. Absorb generated energy from:
   1. The grid,
   2. A renewable energy source, OR
   3. A mechanical process,

   AND
2. Store above energy:
   1. Via a mechanical, chemical, thermal process AND
   2. In an asset procured, built, or maintained primarily for:
      1. Function 1 (above) during some time interval AND
      2. Function 3 (below) in some other interval,

   AND
3. Discharge above energy to affect the state of the grid by:
   1. Directly supplying energy to the grid OR
   2. Directly or indirectly reducing the load on the grid.

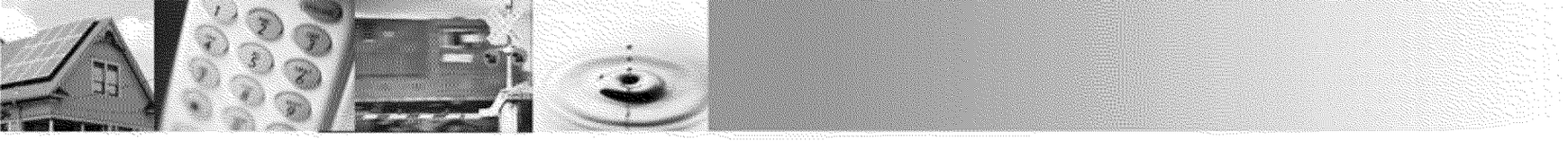
Use Cases vs. Energy Storage Definition (1)

	Use Case	ES?	Fail Test	AKA
1	CSP	No	1	Generator
2	Biogas plant	No	1	Generator
3	Diesel gen	No	1	Generator
4	Off-Grid Storage connected to off-grid PV	No	3	Non-grid asset
5	Rooftop solar thermal (household heating)	No	3	Non-grid asset
6	Hybrid thermal gen + TES	No	3	Enhanced Generator
7	Grid-connected ES charging from / discharging to grid	**Yes**		Storage
8	Grid-connected **backup** ES (discharges only off-grid)	No	3	Load
9	Grid-connected **backup** ES (discharges occasionally to grid)	No	2b	Load
10	EV charging (stored energy used for **transport only** – V1G)	No	3	Load modifier / DR
11	Electric water heaters	No	3	Load / DR



Use Cases vs. Energy Storage Definition (2)

	Use Case	ES?	Fail Test	AKA
12	EV charging (storage energy **discharges into the grid** or to reduce onsite load – V2G)	Yes		Storage
13	TES / PLS	Yes		Storage
14	Grid-connected ES charges **100%** from attached PV and discharges into the grid or to reduce onsite load	Yes		Enhanced Generator
15	" charges **mostly** from attached PV (and sometimes from the grid) and discharges …(as above)	Yes		Enhanced Generator
16	" charges **sometimes** from attached PV (but mostly from the grid) and discharges …(as above)	Yes		Storage
17	Absorb/ store train's braking energy and discharge to grid…	Yes		Storage
18	Pre-cooling	No	2b	Load mgt / DR
19	Irrigation / water pumping (TOU)	No	3	Load mgt / DR



Technology Readiness

"Balances ratepayer protection with the promotion of new energy storage technologies"

- **"Commercially available" & "Viable"**

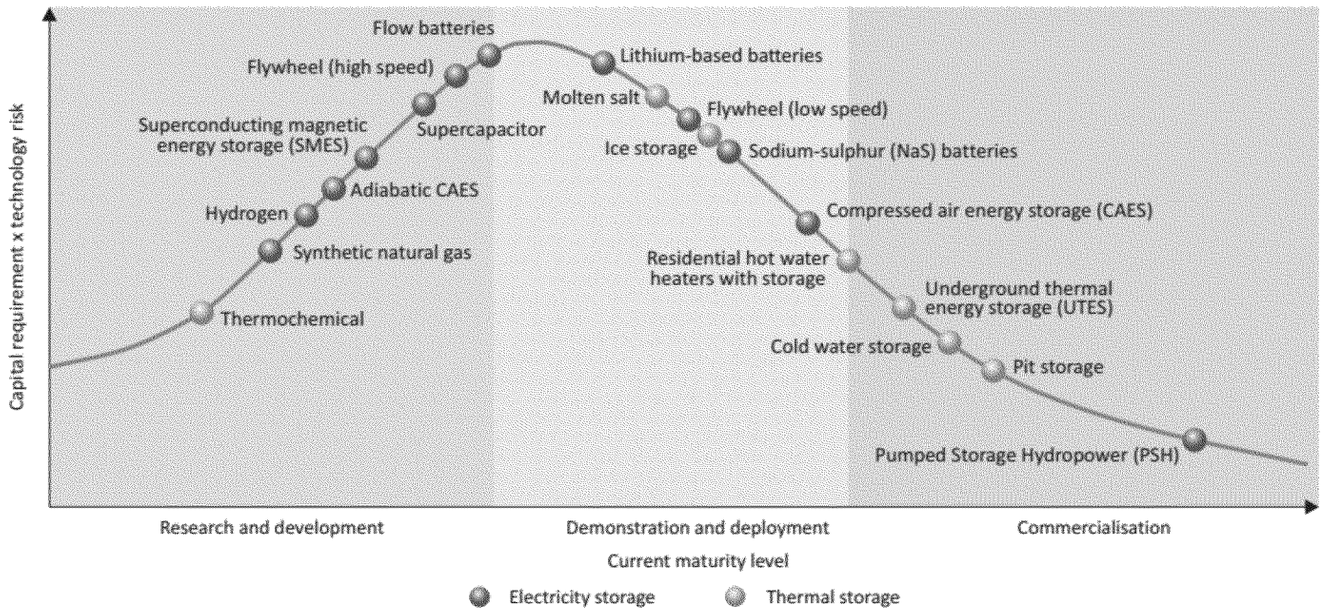
Do these terms need clarification? If so, how?

Risk

- **What is the appropriate level of "risk" for the IOUs to accept**
- **What approaches are / should be considered for**
  - mitigating risks,
  - ensuring project performance, and
  - sharing rewards?
- **To what extent actual operational data and demonstrated track record are prerequisites for procurement consideration?**

"Maturity" of Storage Technologies (1)

Figure 3: Maturity of energy storage technologies



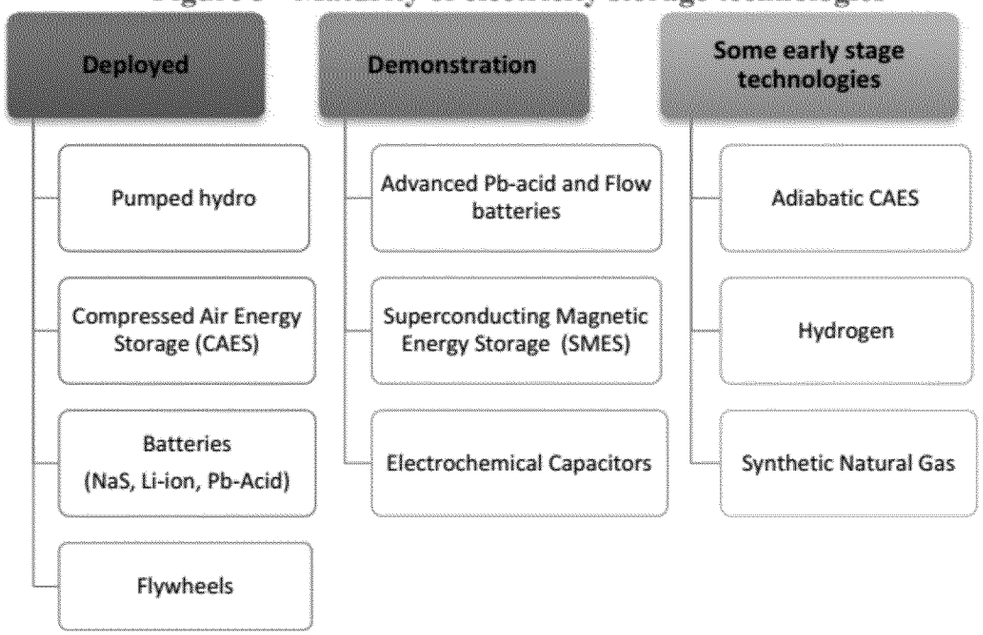
IEA, "Technology Roadmap Energy Storage," 2014

http://www.iea.org/publications/freepublications/publication/TechnologyRoadmapEnergystorage.pdf

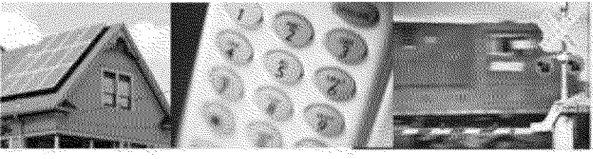
19

“Maturity” of Storage Technologies (2)

Figure 3 - Maturity of electricity storage technologies



USDOE, “Grid Energy Storage” December 2013.
http://energy.gov/sites/prod/files/2013/12/f5/Grid%20Energy%20Storage%20December%202013.pdf



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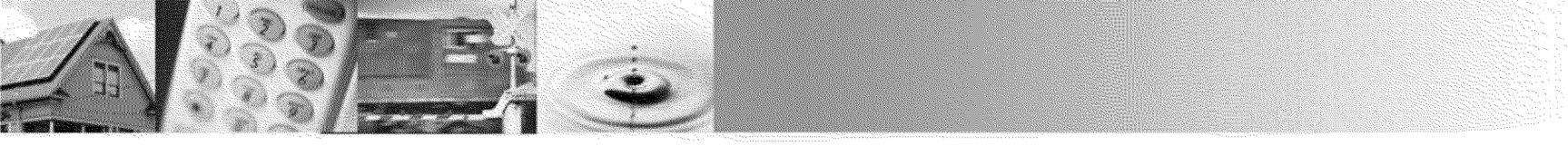
RFO Requirements (1 of 3)

Detail	SCE	SDG&E	PG&E
Location Requirements	• Market function: CAISO (including SCE system) • Customer-side: SCE system • T&D deferral benefit: SCE system	• All domains: Within the SDG&E local reliability area	• Market function: CAISO (including PG&E system) • Customer-side storage will be procured through other methods • T&D deferral benefit: PG&E system
Minimum Offer Size	• 1MW for T- & D-connected • 500kW for Customer-side (aggregated total)	• None specified	• 10 MW for T-connected • 1 MW for D-connected • Specific T&D deferrals may specify smaller minimums
Maximum Offer Size	• None specified	• Transmission: ≤ 10 MW • Distribution (CAISO): ≤ 2 MW; Distribution Reliability: ≤ 4 MW	• None specified
Functions Being Solicited	• Market function storage (e.g. participates in CAISO energy market, A/S, RA, etc) • Customer-connected storage that provides load reduction	• T&D: Market function storage (e.g. participates in CAISO energy market, A/S, Local RA, etc) • Distribution: D-reliability / power quality (utility ownership)	• Market function storage (e.g. participates in CAISO energy market, A/S, RA, etc) • T and/or D system investment deferrals
RFO Process	• Shortlist, then negotiate and execute with a subset of short list • SCE *may* require price refresh	• Shortlist, then negotiate and execute with a subset of short list • LTPP bi-lateral contracting authority may be used, but preference is for RFO process	• Shortlist, then negotiate and execute with a subset of short list • Continuously competitive

RFO Requirements (2 of 3)

Detail	SCE	SDG&E	PG&E
Interconnection Requirements	• Interconnection study required by final offer submission	• Flexible: network upgrade cost estimate may be included as a cap in the contract; must request FCDS	• Interconnection application required by contract execution
Points of Interconnection	• Transmission, Distribution, or Customer-connected	Transmission & Distribution	• Transmission or Distribution connected
Minimum Discharge Duration	• 15 minute minimum	• For CAISO market participation: 4 hours / 3 consecutive days • Dist Reliability & Pwr Quality: none specified	• 15 minute minimum
Contract Terms	• No minimum or maximum duration of contract	• 5 – 20 years	• ESA: 10 years • Amendment to existing Tolling Agreement with PG&E: lesser of 10 years or remaining term of existing agreement • RPS PPA: 20 years • RA Confirm: 10 years.
Contract Execution to Online Date	• Projects must be online by 2024 with a preference for Johanna-Santiago projects that are online within 4 yrs	• Projects must be online no later than 2024	• Projects must be online by 12/31/2024
Site Control	• Not required for Indicative Offer, but necessary prior to submission of Final Offer	• Not specified at this point, but will be when solicitation issued	• Not required at time of bid but bid must identify a specific site.

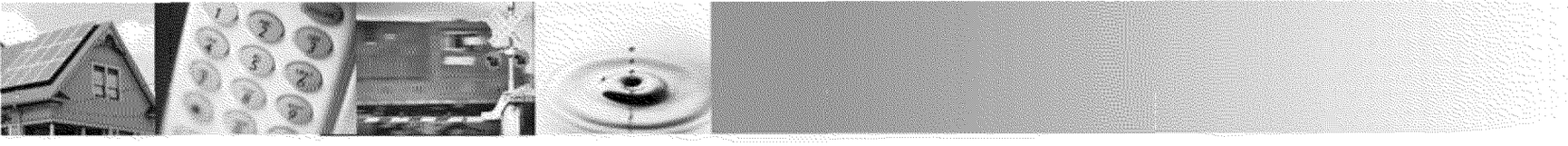


RFO Requirements (3 of 3)

Detail	SCE	SDG&E	PG&E
Deposits	• Bid Deposit: None • Shortlist Deposit: None • $45/kW Delivery Date Security after execution	• Not specified at this point, but will be when solicitation issued	• Bid Deposit: None • Shortlist Deposit: $3/kW • ESA Project Development Security: $15/kW after execution, stepping up to $60/kW after CPUC approval
New vs Existing Storage	• Will consider any existing storage that was installed after Jan 1, 2010	• Will consider any storage projects that were installed after Jan 1, 2010	• Will consider any existing storage that was installed after Jan 1, 2010
Earliest Delivery Date	• January 1, 2017	• Not specified at this point, but will be when solicitation issued	• Negotiable
Contract type	• Energy Storage Agreement • Behind-the-meter Agreement	• Energy Storage System Tolling Agreement (wholesale market participation) • RA Confirm	• Energy Storage Agreement • Purchase and Sale Agreement Term Sheet • RPS PPA • RA Confirm • Existing PG&E Agreement
Other		• Local & flexible capacity requirements: meet RA counting rules	

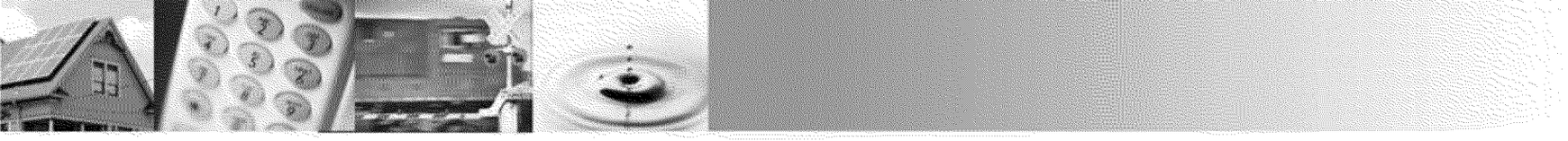
RFO Proposed Schedule

Event	SCE	SDG&E	PG&E
RFO Launch	December 1, 2014	Prior to December 1, 2014	December 1, 2014
Bidders' Conference	December 17, 2014	May conduct 'stakeholder outreach' prior to RFO launch / bidder's conference after	December 18, 2014
Offer deadline	February 16, 2015	Not specified	February 27, 2015
Short-List Notification	April 1, 2015	Not specified	June 30, 2015
Negotiation deadline	August 14, 2015	Not specified	N/A
Final Offer deadline	September 1, 2015	Not specified	N/A
Final Selection	September 20, 2015	Not specified	TBD
Advice Letter or Application Filing	December 30, 2015	Not specified	12 months after shortlist



Function vs. Grid Domain

Function	Grid Domain	SCE	SDG&E	PG&E
Market	Transmission	Y	Y	Y
	Distribution	Y	Y	Y
	Customer	Y (RA)	-	-
T&D Reliability	Transmission	-	-	Y
	Distribution	-	Y	Y
	Customer	-	-	-



IOU Storage Procurement Proposals for 2014

(All figures in MW)

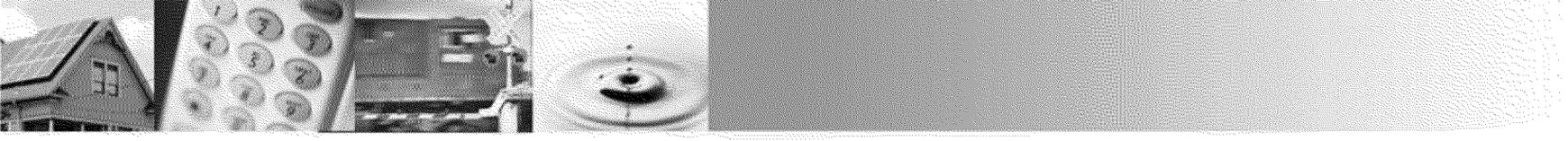
	CPUC 2014 Target	IOU In contract or negotiations	2014 Proposed Procurements			
			Total	Transmission	Distribution	Customer
SCE	90	80^	>16	Open Ended	16.3	0 / [16]
SDG&E	20	51”	16	10	6.0	0 [4.6]
PG&E	90	12*	78	50	21.5	6.5 [3.5]
Totals	200	143	>110	>60	43.8	6.5

*Excludes 150 MW Rice Solar CSP – to be counted in future solicitations

^Includes 50 MW of storage projects under procurement from December 2013 LCR solicitation

“Includes 40 MW Lake Hodges Pumped Hydro

[]Forecasted installations in SGIP and PLS programs



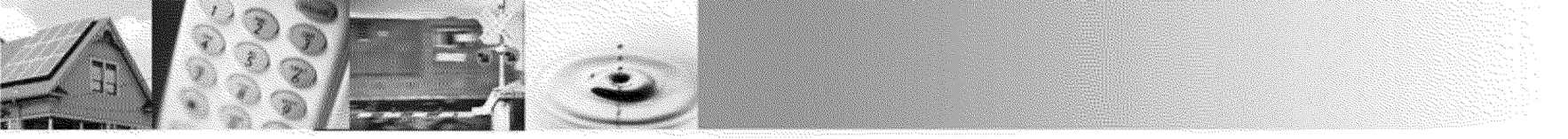
"Existing" Storage vs. 2014 Targets

(All figures in MW)

	2014 Proposed Procurements							
	Transmission		Distribution		Customer		Total	
SCE	-	50	14.0	30	16.0	10	30	90
SDG&E	40	10	6.1	7	4.6	3	51	20
PG&E	-	50	8.5	30	3.5	10	12	90
Totals	40	110	28.5	67	27.2	23	93	200

CPUC set targets

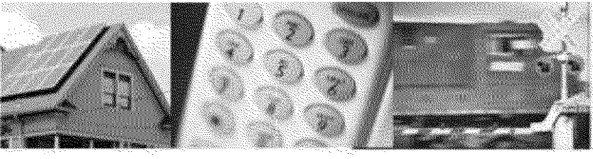
IOU reported existing storage (includes in progress or customer-side expected projects)



Details – "Existing" Storage Deployment (93 MW)

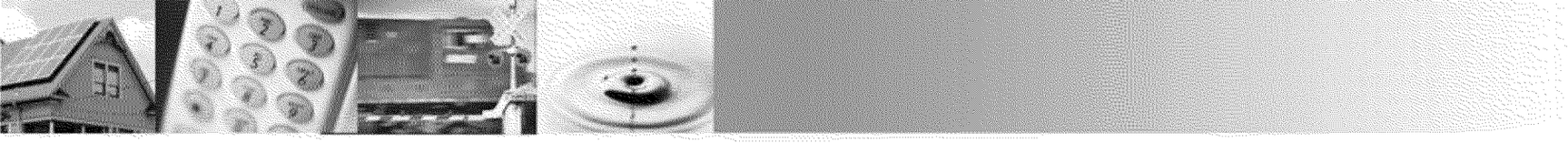
- **Pacific Gas & Electric (PG&E)** **12 MW**
  - Distribution / Vaca-Dixon Substation 4 MW
  - Distribution / San Jose Customer R&D site 2 MW
  - Distribution / Biogas 2.5 MW
  - Customer / Self Generation Incentive Program 3.5 MW
- **Southern California Edison (SCE)*** **30 MW**
  - Distribution / Tehachapi Storage 8 MW
  - Distribution / Irvine Smart Grid 2.081 MW
  - Distribution / Large Storage Test 2 MW
  - Distribution/ Discovery Museum 0.1 MW
  - Distribution / Catalina Island 1 MW
  - Distribution / V2G – LA AFB 0.65 MW
  - Customer / Self Generation Incentive Program 10.9 MW
  - Customer / Permanent Load Shifting 5.3 MW
- **San Diego Gas & Electric (SDG&E)** **51 MW**
  - Transmission / Lake Hodges Pumped Hydro 40 MW
  - Distribution / Borrego Springs Microgrid 0.57 MW
  - Distribution / Reliability Projects (GRC) 5.58 MW
  - Customer / Self Generation Incentive Program 3.36 MW
  - Customer / Permanent Load Shifting 1.0 MW

**Does not include 50 MW expected from LCR procurement*



Workshop Agenda: June 2, 2014

0	**Auditorium Available for Early Arrivals**	**9:00a**
1	**Introduction – Energy Division**	**9:30**
2	**Energy Storage Definitions & Eligibility** - Staff-led Discussion	**10:00**
3	**Lunch**	**Noon**
4	**IOU RFO Requirements** - IOU panel - Open	**1:00**
5	**Break**	**2:45**
6	**IOU Bid Evaluation Protocols** - CESA - Sierra - Clean Coalition - IOUs - Open	**3:00**
7	**Adjourn**	**5:00**



Bid Evaluation Protocols

Q12: Does the consistent evaluation protocol (CEP) need to be augmented? If so, how?

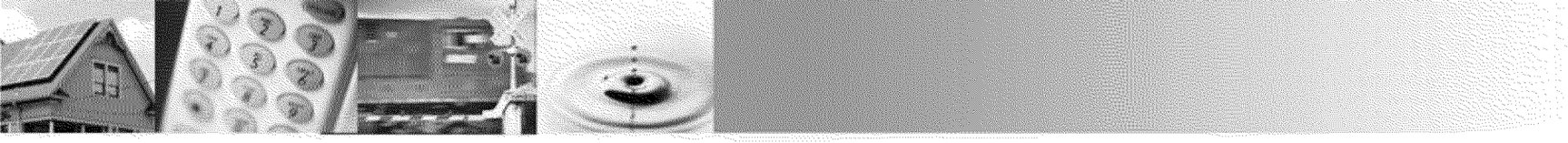
Q13: Is the quantification of benefits adequately addressed in the CEP and proprietary protocols? If not, how should it be improved?

- GHG emissions reduction
- Avoided T&D
- Avoided water use
- Other project level benefits
- System/portfolio level benefits
- Other societal benefits

Q14: Should the standard for deferment of targets be clarified?

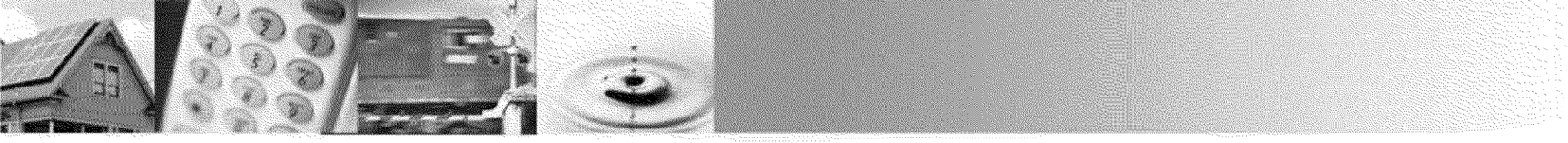
Q15: Should the deadline for requesting deferment change from 3 months after receipt of RFO offers to a longer period?

- e.g., 12 months after the RFO offers have been shortlisted



Today's Workshop

- **IOU Storage Procurement Applications Proceeding**
  - A.14-02-006
- **Focused on addressing a subset of issues identified in the scoping memo, released on May 27, 2014**
- **No post-workshop report**
- **Parties can comment on any/all issues in scoping memo, including workshop issues**
  - Filing deadline June 12
  - Replies due June 19
- **Objectives:**
  - Exchange information & viewpoints re pending issues to inform comments
  - Clarify certain aspects of the IOU applications
  - Seek consensus where/if possible



Thank You!

For further information related to
Energy Storage Proceeding / Procurement,

Please see:

http://www.cpuc.ca.gov/PUC/energy/electric/storage.htm

Or contact:

Aloke Gupta
CPUC
aloke.gupta@cpuc.ca.gov
415-703-5239

www.cpuc.ca.gov