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ATTACHMENT D

Tackling Barriers to Entry in Energy Storage

Recommendations for Regulatory Policy & Action

Prepared for the CPUC Storage OIR Workshop
Tuesday, June 28, 2011
San Francisco, CA

CESA Overview

Steering Committee

General Members

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Fundamental Intent of AB 2514

Put more storage into California's electric power system via establishment of procurement targets

"This bill would require the CPUC, by March 1, 2012, to open a proceeding to determine appropriate targets, if any, for each load-serving entity to procure viable and cost-effective energy storage systems and,

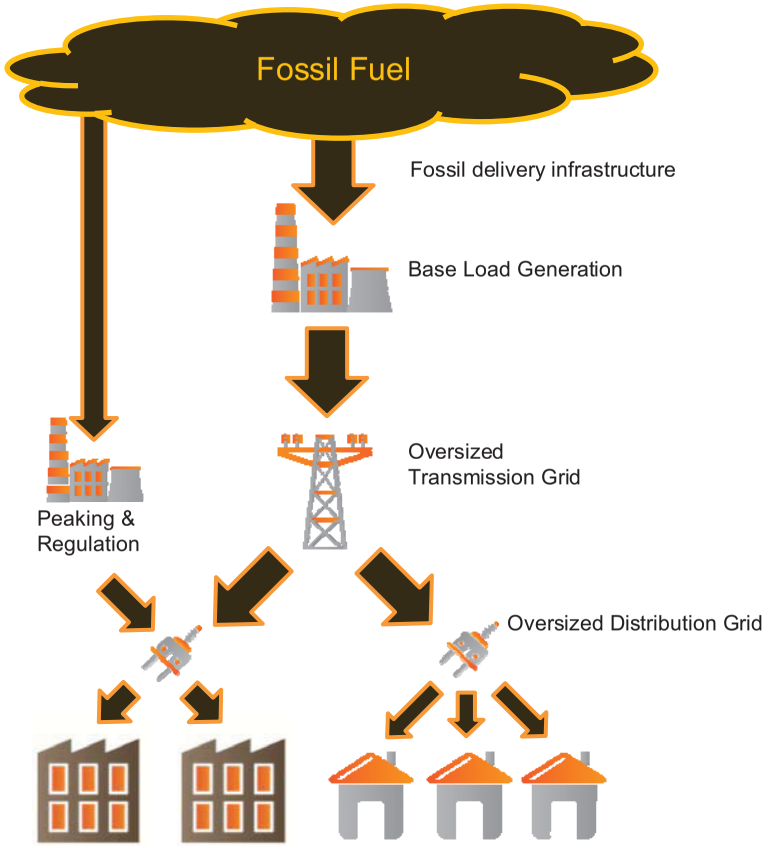
by October 1, 2013, to adopt an energy storage system procurement target, if determined to be appropriate, to be achieved by each load-serving entity by December 31, 2015, and a 2nd target to be achieved by December 31, 2020."

AB 2514 explicitly identifies many key applications of energy storage

Energy storage enables greater overall system efficiency

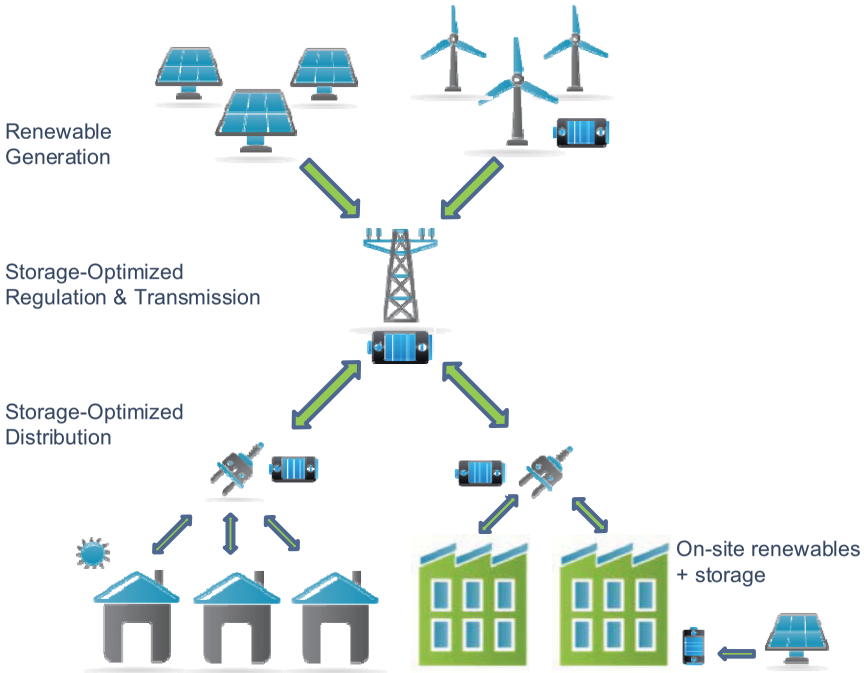
Current Grid Infrastructure

- Built for load and generation peaks that occur only a few times per year
- Massive fossil storage required



Future Grid Infrastructure

- Strategic buffers level generation and load, reducing Mura (unevenness) and Muri (overburden)[1]
- Result: more efficient & reliable electrical system



1. The approach is similar to Heijunka in the Toyota Production System, which levels production schedules in order to reduce overall waste

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Key principles that should be the foundation of this OIR

- More storage is needed in the system – procurement targets are a great vehicle for making it happen quickly.
- Learn by doing; accelerate progress in existing rulemakings
- Avoid analysis paralysis – we will need quick field deployments to inform this OIR!
  - New applications
  - New business/ownership models
- Consider the importance of project financing - the regulatory framework should attract an infusion of project capital to California
- Diversity is of utmost importance in building a healthy and robust market for grid storage in California.
  - Applications & Technology choices
  - Ownership models

Recommended Public Policies

- Develop procurement targets (per AB 2514)
- Implement incentives (SGIP, PLS)
- Develop storage friendly tariff structures (eg. Tariff rider)
- Allow storage to participate in existing markets (eg. RA, RPS, Transmission...)
- Add storage to the loading order, on par with DR
- Ensure holistic and comprehensive view of all benefit streams, including system benefits (e.g. reliability) for cost benefit methodology development

Procurement Targets Should Be Application-Focused

- CESA endorses SCE's definition of application:
  - "All the operational uses a storage device can provide when sited at a specific place and managed in a particular way".

- Energy storage is a broad asset class, as broad as 'generation'. Thus, any procurement targets need to be at application-level.

- Ownership model can affect application! For example, distributed customer owned is very different from distributed utility owned

- Prioritizing Applications – A Suggested Methodology
  - Applications that are under CPUC control
  - Potential impact/benefit for California electric power system (market size)
  - Ease of implementation/timing – get results/deployments quickly
  - Encourages healthy market development, in particular, diversity and competition

Market Sizing Approach

Market applications of energy storage can be sized based on current and forecasted spending for the same services

Collect current market pricing data

- Current spending on market services (e.g. frequency regulation market)
- Current spending for equipment upgrades (e.g. transformers)

Forecast market trends

- Market growth estimates
- Fuel trends (coal, gas, etc..)
- Wholesale & retail electricity price forecasts and equipment price trends

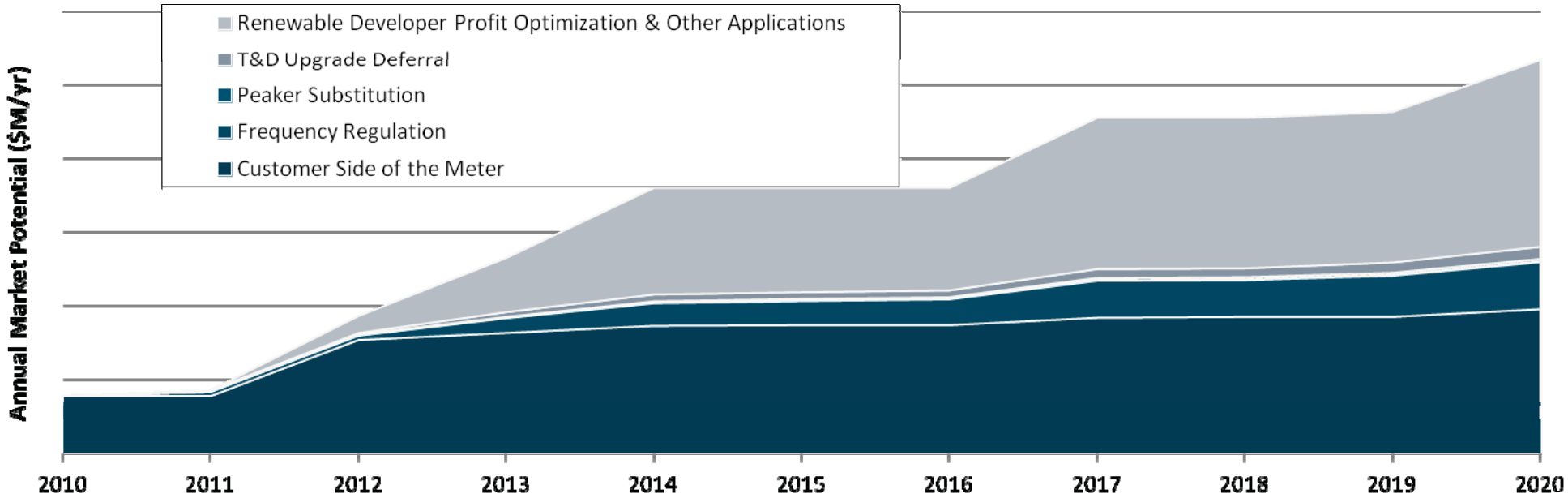
Estimate addressable market for storage

- Target highest-value benefits
- Bundle value streams into applications
- Apply storage system technical constraints to perform required services

Apply market adoption rates

- Regulatory drivers & milestones
- Status quo market trends

California Energy Storage Market Outlook: A Scenario



Now to end 2012

- Customer Side of the Meter adoption with SGIP (SB 412)
- ARRA- Funded Utility Demo Projects
- SCPPA 52MW Project currently underway (peaker substitution)

2012-2014

- CAISO established REM and pay for performance
- SGIP incentives for customer side of the meter (AB 1150)
- PLS Shifting part of DR Budget 2012-2014

2014-2016

- 33% RPS increases A/S and peaker needs, utilizing storage
- Wider-spread adoption of customer side of the meter with SGIP

Beyond 2016

- Storage FITC enacted with utility participation
- Utility-owned centralized and distributed storage peaker substitution
- Utility T&D Upgrade deferral using storage

Sources: Strategen industry knowledge and analysis; CAISO 33% RPS Renewable Integration Study Results; Jim Eyer and Garth Corey, *Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide*, Sandia Report SAND2010-0815, February 2010

Note: T&D Deferral estimate excludes capture of anticipated $12 Billion incremental spending on Transmission due to RPS. Renewable Developer profit optimization & other applications includes new value streams for renewable developers, ramping, smoothing, voltage support, transmission congestion relief

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Enhancing the value of renewable generation

Storage can also be used to firm/shape renewable energy procurement to optimize project profits

- Allow energy storage to be used with renewables participating in renewable RFOs
- Allow energy storage to be used for renewable generation firmed, shaped or dispatched under higher time of delivery factors
- Allow capacity value for renewable generation that is firmed, shaped or dispatched using energy storage
- Explore the interconnection value (eg. T&D deferral) storage can provide for renewable generation projects, especially in grid-constrained areas

This application should be a priority, as developers are likely early adopters for wholesale renewable integration … near term workshop?

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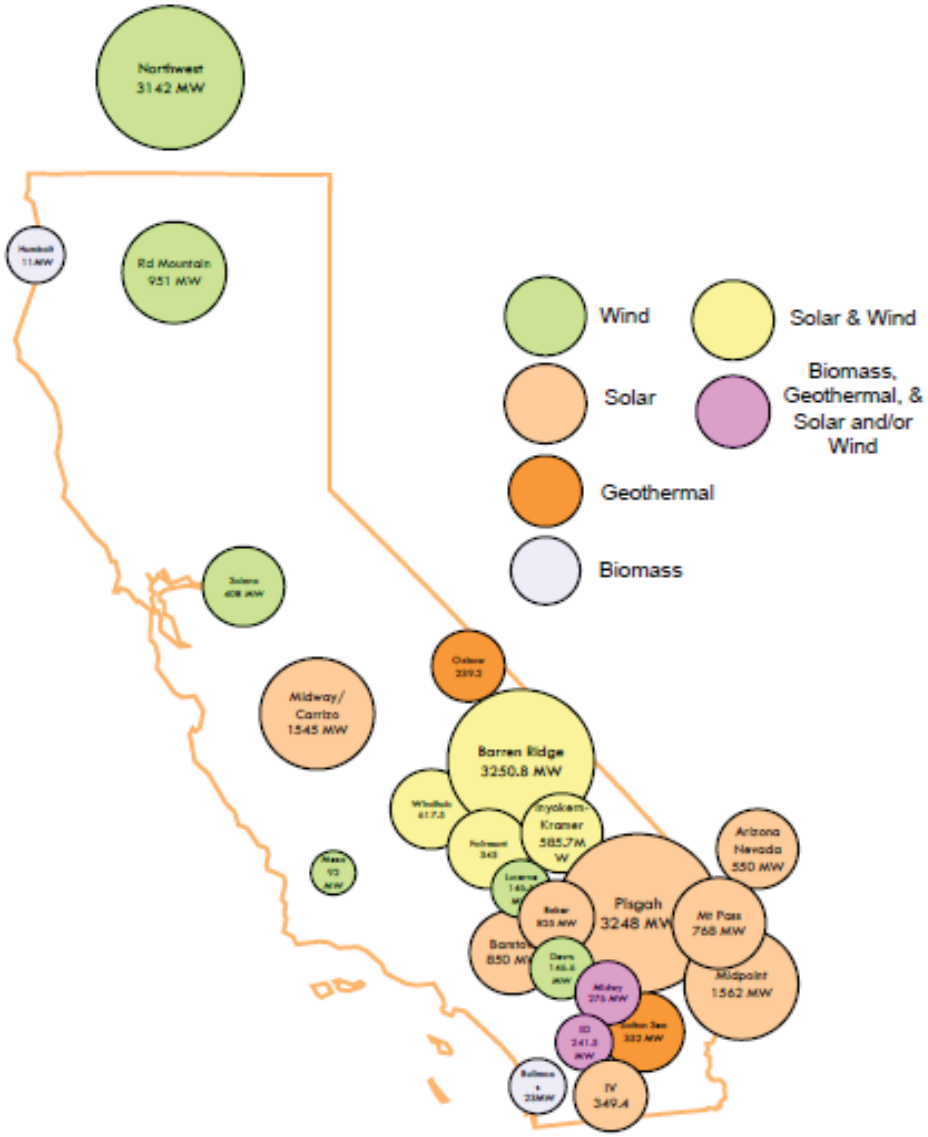
Planned CA Renewable Generation has significant transmission planning impacts



Source: 2010 California Transmission Planning Group Statewide Transmission Plan, Final Report. February 9, 2011. http://www.ctpg.us/public/images/stories/downloads/2011-02-02_draft_final_statewide_transmission_plan.pdf

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New Required Transmission for 33% RPS will cost ~$12 Billion

Exhibit A: Renewable Resource Zones That Need New Transmission for 20% and 33% RPS Reference Cases

Resource Zone	MW	GWh
Included in 20% and 33% RPS Reference Cases		
Tehachapi	3,000	8,862
Solano	1,000	3,197
Imperial North	1,500	9,634
Riverside East	1,350	3,153
Included in 33% RPS Reference Case Only		
Riverside East (Incremental)	1,650	3,869
Mountain Pass	1,650	4,041
Carrizo North	1,500	3,306
Needles	1,200	3,078
Kramer	1,650	4,226
Fairmont	1,650	5,003
San Bernardino - Lucerne	1,800	5,020
Palm Springs	806	2,711
Baja	97	321

Exhibit B: Renewable Generation and Transmission Needed in 2010

20% RPS Reference Case would require…	33% RPS Reference Case would require…
35 TWh of new renewable electricity in 2020	**75 TWh** of new renewable electricity in 2020
4 New Major Transmission Lines at cost of **$4 Billion**	**7** Additional Major Transmission Lines at cost of **$12 Billion**

Source: California Public Utilities Commission's 33% Renewables Portfolio Standard Implementation Analysis Preliminary Results. http://docs.cpuc.ca.gov/PUBLISHED/GRAPHICS/102354.PDF

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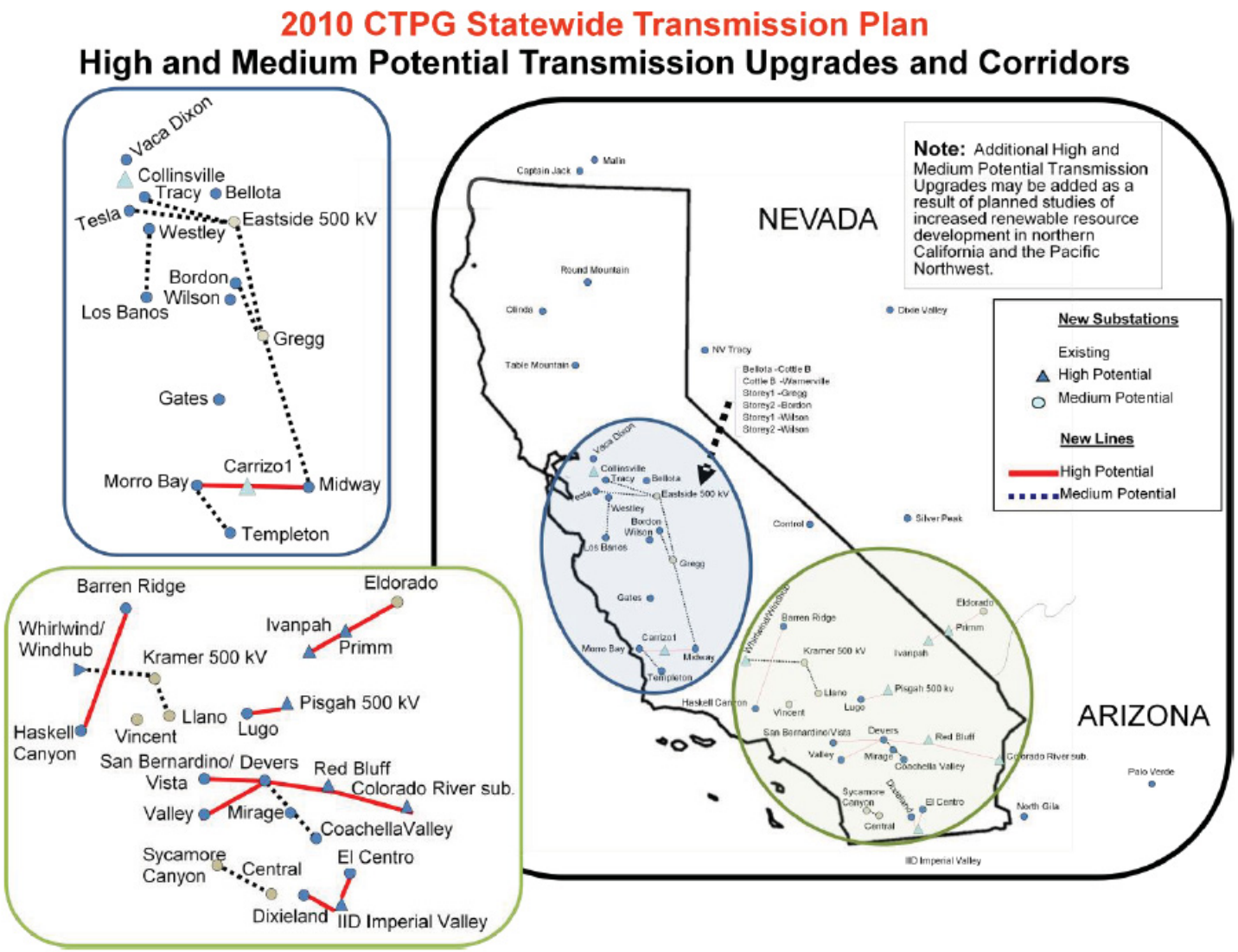
Closer examination may identify areas where storage can provide cost effective T&D Deferral benefit



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T&D Upgrade Deferral Application Description

Value Streams Included	Status Quo Solution and Dominant Stakeholder	Program and Jurisdiction Governing Solution	Can Storage Participate Today?
T&D Deferral	T&D Procurement by Utilities	Grid System Planning, CPUC, CAISO	Yes
Electric Energy Time Shift	Tariff rate design. Utilities, IPPs third party aggregators, large customers	DSM, Grid Operations, CPUC, CAISO	Yes
Electric Supply Capacity	Generation construction by Utilities, IPPs	Long-term procurement (R.10-05-006) and Resource Adequacy (R.09-10-032) programs, CPUC	Yes
Area Regulation	Utilities, IPPs	CAISO	Yes, as non-traditional generators
Electric Energy Reserve Capacity - Spinning	Utilities, IPPs	CAISO	No
Electric Energy Reserve Capacity – Non-Spinning	Utilities, IPPs	CAISO	No
Voltage Support	Utilities, IPPs	CAISO	Yes, in principle but not in practice
Transmission Congestion Relief	Utilities, IPPs	CAISO	Yes, in principle but not in practice

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T&D Upgrade Deferral
Regulatory Barriers & Mitigation Strategy

Value Stream Included	Regulatory Barrier	Recommended Mitigation Strategy	Targeted Jurisdiction	Approximate Timing
T&D Deferral	No cost-effectiveness methodology exists for storage as an alternative to investment in T&D	Implement Phase 2 of Storage OIR (R.10-12-007)	CPUC	3-5 years
Area regulation	Fast storage not compensated for superior performance No long term procurement	REM Implementation and Phase 2 of Market and Product Simulation	CAISO	12-24 months
Electric Energy Reserve Capacity - Spinning	Resource Adequacy Net Qualifying Capacity Requirements	Gain experience operating under new program rules (DR can participate now, storage also can indirectly)	CPUC	0 to 3 months (Q4 2011)
Electric Energy Reserve Capacity- Non-spinning	Resource Adequacy Net Qualifying Capacity Requirements	Advocate for less restrictive NQC requirements, participate in Resource Adequacy Proceeding	CPUC	9 to 12 months (Q2 2012)

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Customer-Owned Bill/Load Management Application Description

Understanding each application's value streams and barriers will help prioritize near-term CPUC activity.

Value Streams Included	Status Quo Solution and Dominant Stakeholder	Program and Jurisdiction Governing Solution	Can Storage Participate Today?
Retail Customer Bill Management	Utility DR, EE, DSM, and Tariff Programs. Third party DSM aggregators (e.g. EnerNoc) and facility energy bill managers.	Utility programs. CPUC and governing bodies of POUs.	Yes, in principle, as part of a customer strategy, but not specifically called out.
Wholesale Demand Response (price-driven proxy DR)	Third party aggregators direct access energy service providers and their customers	Parallel CPUC and CAISO proxy demand response programs. FERC, CAISO, CPUC	Yes, but not yet permitted for bundled retail utility customers.
Area Regulation	Utility and IPP generators.	FERC, CAISO and other California balancing authorities (e.g., IID) under tariff.	Yes, as non-traditional generators.
Wholesale Reliability Demand Response (event driven DR)	Third party aggregators, direct access energy service providers, and their customers	Parallel CPUC and CAISO emergency demand response program.	No. CAISO proposed tariff amendment pending at FERC.
UPS Replacement	Lead Acid battery manufacturers	EPA, CARB and local Air Quality Management Districts	Yes
Emergency Backup	Diesel generator manufacturers	EPA, CARB, and Local Air Quality Management Districts	Yes

Customer-Owned Bill/Load Management Regulatory Barriers & Mitigation Strategy

Value Stream Included	Regulatory Barrier	Recommended Mitigation Strategy	Targeted Jurisdiction	Approximate Timing
Retail Customer Bill Management	Eligibility to participate in utility Permanent Load Shifting programs. (A.08-06-001) and SGIP	Advocate for expanded PLS and SGIP (R.10-05-004) program implementation and funding.	CPUC and governing bodies of POUs	6-9 months (Q1 2012)
Retail Customer Bill Management	Guaranteed long term utility tariff design (differential between peak and off-peak)	Propose new dynamic tariff designs in utility general rate cases.	CPUC and governing bodies of POUs	Indefinite
Wholesale Demand Response (price-driven proxy DR)	Divided CAISO/CPUC responsibility	Advocate for closer real-time CPUC and CAISO collaboration (	FERC, CAISO, CPUC	3-6 months (Q2 2012) (6 mos for allowing bundled utility customers to participate)
Wholesale Reliability Demand Response (event-driven DR)	Divided CAISO/CPUC responsibility	Advocate for closer real-time CPUC and CAISO collaboration	FERC, CAISO, CPUC	6-9 months (Q3 2012)

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Customer-Owned Bill/Load Management Regulatory Barriers & Mitigation Strategy (Continued)

Value Stream Included	Regulatory Barrier	Recommended Mitigation Strategy	Targeted Jurisdiction	Approximate Timing
Area Regulation	CAISO tariffs are not designed for fast storage	Participate in CAISO's Regulation Energy Management Simulation Pilots	FERC Frequency Regulation Rulemaking. CAISO and other California balancing authorities.	12-18 months
Area Regulation	Real-time and day-ahead tariff rates do not reflect true value of fast storage	Advocate for pay-for-performance (mileage rate) payments for fast storage	FERC Frequency Regulation Rulemaking. CAISO and other California balancing authorities	18-24 months
Area Regulation	No long term merchant ancillary service procurement mechanism	Advocate for long term merchant purchase requirement in utility procurement planning at the CPUC	CPUC	Indefinite

Recommended Next Steps for the CPUC

- Accelerate SB 412 implementation, ensure that energy storage is included
- Implement PLS and increase budget size and incentive level
- Issue a ruling directing the utilities to submit "strawman" tariff design proposals with multi-year fixed terms to incent storage within 180 days
- Consider ways to amend current renewable procurement to reward developers for renewable energy firmed/shaped with storage
- Consider energy storage as a means of T&D deferral; additional T&D required from load growth and renewables
- Work with CAISO to implement pay for performance and long term procurement of ancillary services
- Issue a ruling directing the utilities to procure high priority energy storage application services on a workable scale for learning purposes
- Update EAP II so that Storage will be on par with DR on the loading order

Questions?

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For more information about CESA membership, public filings, and other energy storage educational documents, please visit us online at:

www.storagealliance.org

End of Presentation

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Appendix

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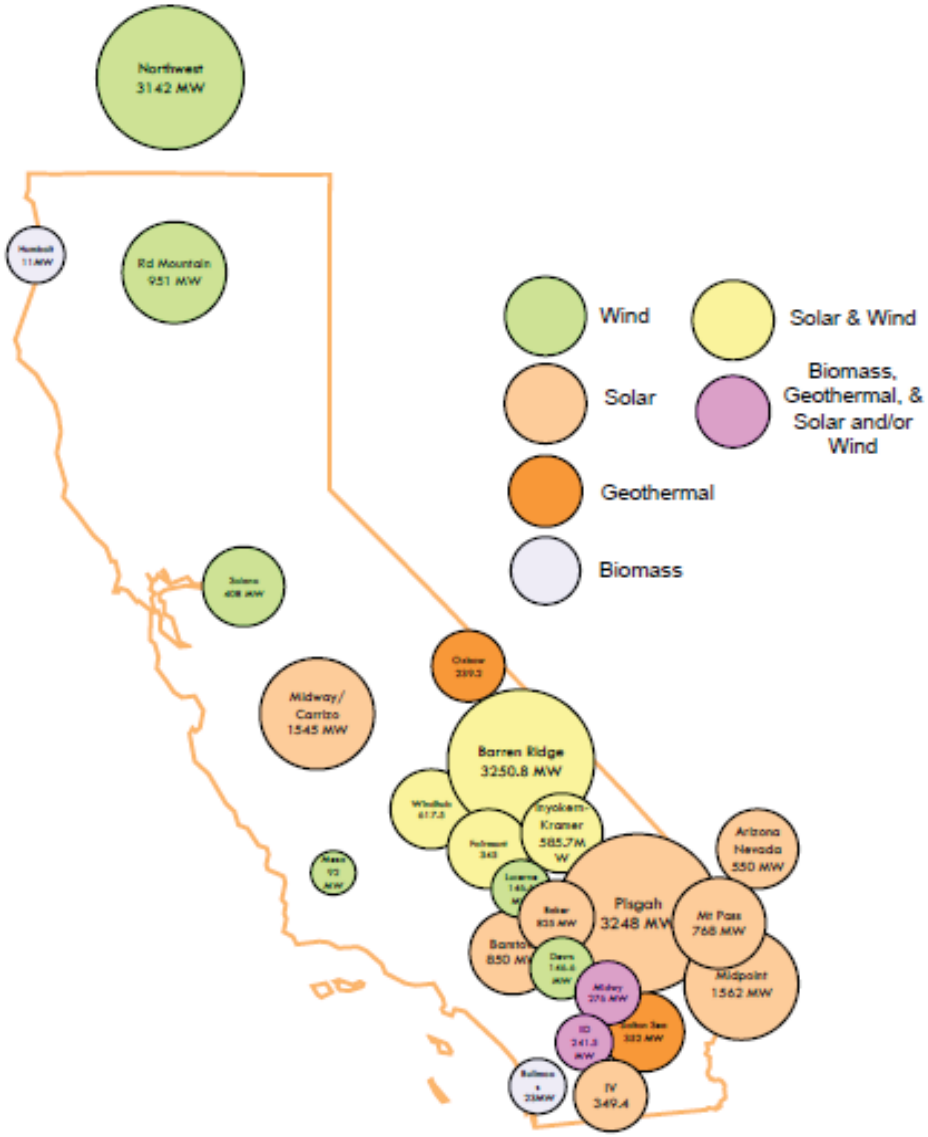
Planned CA Renewable Generation has significant transmission planning impacts



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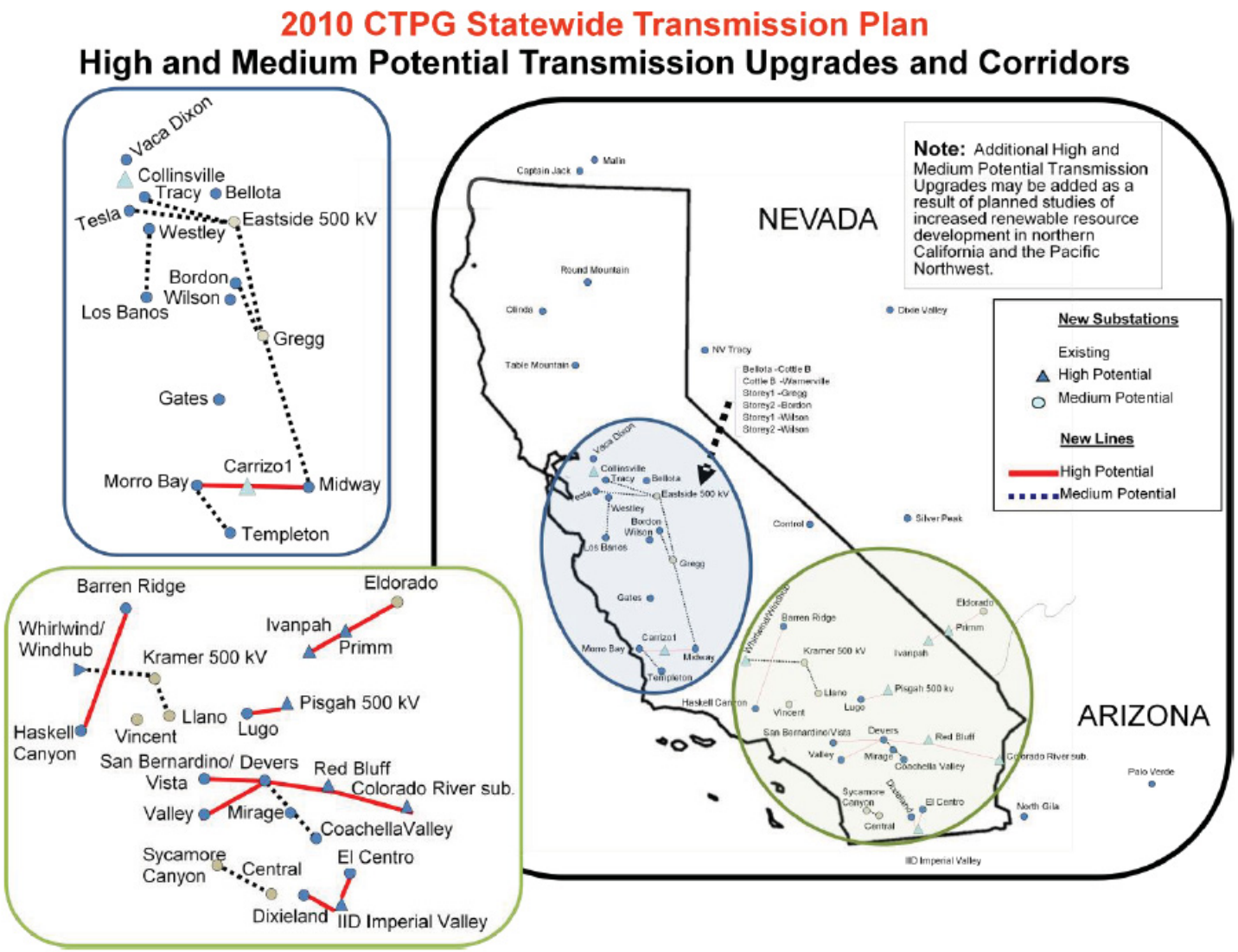

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T&D Upgrade Deferral
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Renewable Supply Side T&D Deferral Application Description

Value Streams Included	Status Quo Solution and Dominant Stakeholder	Program and Jurisdiction Governing Solution	Can Storage Participate Today?
Renewable Energy Integration – T&D deferral	Generation and Transmission resource planning, procurement and operations, CPUC and CAISO (utilities and merchant providers build/own transmission lines)	FERC Integration of Variable Resources NOPR, New-Participant Funded Transmission Technical Conference, CAISO Participating Intermittent Resource Protocol, CPUC Renewables Portfolio Standard.(R.11-05-005)	Yes, in principle
Ramping/firming	CT Plant, CAISO	CAISO Day-ahead market vs. real-time market	Yes

Renewable Supply Side T&D Deferral Regulatory Barriers & Mitigation Strategy

Value Stream Included	Regulatory Barrier	Recommended Mitigation Strategy	Targeted Jurisdiction	Approximate Timing
Renewable integration - T&D Deferral	No cost-effectiveness methodology exists for storage as an alternative to investment in T&D	Implement Phase 2 of Storage OIR	CPUC	3-5 years
Renewable Energy Integration- T&D deferral	Lack of incentives for merchant renewable development with storage. Current procurement process rewards least cost, not highest value.	Change renewable procurement process to provide higher value to renewables firmed or shaped with storage	CPUC	3-5 years
Renewable Integration – T&D deferral	Undeveloped federal and state interconnection processes for storage and renewables	Clarify CPUC jurisdiction over interconnection at the distribution system level	CPUC, CAISO	6 to 12 months (Q4 2012)

Peak Shifting Application Description

Distributed or Centralized, Merchant or Utility Owned

Value Streams Included	Status Quo Solution and Dominant Stakeholder	Program and Jurisdiction Governing Solution	Can Storage Participate Today?
Electric Energy Time Shift	Utilities, IPPs, merchants, aggregators	CPUC	Yes
Area Regulation	Utility and IPP generators.	FERC, CAISO and other California balancing authorities (e.g., IID) under tariff.	Yes, as non-traditional generators.
Wholesale Reliability Demand Response (event-drivenDR)	Third party aggregators, direct access energy service providers, and their customers	Parallel CPUC and CAISO emergency demand response programs.	No. CAISO proposed tariff amendment pending at FERC.

Peak Shifting
Regulatory Barriers & Mitigation Strategy

Value Stream Included	Regulatory Barrier	Recommended Mitigation Strategy	Targeted Jurisdiction	Approximate Timing
T&D Deferral	No cost-effectiveness methodology exists for storage as an alternative to investment in T&D	Implement Phase 2 of Storage OIR	CPUC	3-5 years
Area regulation	Fast storage not compensated for superior performance No long term procurement	REM Implementation and Phase 2 of Market and Product Simulation	CAISO	12-24 months
Electric Energy Reserve Capacity - Spinning	Resource Adequacy Net Qualifying Capacity Requirements	Gain experience operating under new program rules (DR can participate now, storage can too indirectly)	CPUC	0 to 3 months (Q4 2011)
Electric Energy Reserve Capacity- Non-spinning	Resource Adequacy Qualifying Capacity Requirements	Advocate for less restrictive NQC requirements, participate in Resource Adequacy Proceeding	CPUC	9 to 12 months (Q2 2012)
T&D Deferral	No cost-effectiveness methodology exists for storage as an alternative to investment in T&D	Implement Phase 2 of Storage OIR	CPUC	3-5 years

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FERC Update – "Global Energy Storage Notice of Inquiry"

Notice of Inquiry on Third Party Provision of Ancillary Services and Financial Reporting for New Electric Storage Technologies

Description

- This NOI seeks comment on (i) ways in which FERC can facilitate the development of robust competitive markets for the provision of ancillary services from all resource types, and (ii) issues unique to storage devices in light of the role they can play in providing multiple services.

Storage Market Implications

- FERC will address global questions as to the role that electric storage may play in a competitive market, including how electric storage should be compensated for the full range of services it provides under the Federal Power Act, and transparency issues regarding the Commission's current accounting and reporting requirements as applied to electric storage.
- Identification of existing restrictions on third-party provision of ancillary services, irrespective of the technologies used for such provision.
- Determination of the adequacy of current accounting and reporting requirements as they pertain to the oversight of jurisdictional entities using electric storage devices.

Next Steps

- Written comments are due on August 22 2011. FERC will review comments received and issue a Notice of Proposed Rulemaking that discusses comments received and propose new rules of general application.

NOI on Third-Party Provision of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies
Docket No. RM11-24-000, Issued June 16, 2011

FERC Update – Notice of Inquiry on Promoting Transmission Investment Through Pricing Reform

Description

- Review FERC's experience to date applying Order 679 and ongoing need to ensure that incentive regulations are encouraging the development of transmission infrastructure in a manner consistent with section 219 of the Federal Power Act.

Storage Market Implications

- Identification of changes in the past five years resulting from implementation of transmission planning processes, adoption of mandatory and enforceable reliability standards, increasing diversity of the generation fleet, and increasing investment in the development of smart grid technologies.
- Possible changes to the current rebuttable presumptions that projects (i) result from a fair and open regional planning process that considers and evaluates projects for reliability and/or congestion and is found to be acceptable to the FERC, or (ii) have received construction approval from an appropriate state commission or state siting authority and (iii)show that there is a nexus between the incentive sought and the investment being made.
- Possible changes to current incentives, such as (i) incentive adders to a base return on equity, (ii) recovery of 100 percent of prudently incurred costs of transmission facilities that are cancelled or abandoned due to factors that are beyond the control of the public utility, (iii) inclusion of 100 percent of construction work in progress in rate base, (iv) hypothetical capital structures, accelerated depreciation for rate recovery, and (v) recovery of prudently incurred pre-commercial operations costs.

Next Steps

- Written comments are due on August 25, 2011. FERC will review comments received and issue a Notice of Proposed Rulemaking that will discuss comments received and propose new rules of general application.

Docket No. RM11-26-000, Issued May 19, 2011

FERC Update – Notice of Proposed Rulemaking on Frequency Regulation Compensation in Organized Wholesale Markets

Description

- Seeks comment on requiring a uniform price for regulation capacity made paid to all cleared resources and a performance payment for provision of frequency regulation, with such payments reflecting a resource's accuracy of performance.

Storage Market Implications

- Determination of whether reforms are necessary to ensure that wholesale energy tariffs are not impeding elimination of identified barriers.
- Ensuring that market rules do not present unnecessary barriers to the participation of all resource types in the wholesale ancillary services markets.

Next Steps

- CESA submitted written comments on May 2, 2011. FERC will review comments received and issue a Final Rule that will discuss comments received in the form of an Order of general application.

Docket No. RM11-07-000, Issued February 17, 2011

FERC Update Notice of Inquiry on Integration of Variable Energy Resources (VERs)

Description

- Seeks comment on the extent to which barriers may exist that impede the reliable and efficient integration of variable energy resources into the electric grid, and whether reforms are needed to eliminate those barriers.

Storage Market Implications

- Requiring public utility transmission providers to offer intra-hourly transmission scheduling
- Incorporating provisions into the pro forma Large Generator Interconnection Agreement requiring interconnection customers whose generating facilities are variable energy resources to provide meteorological and operational data to public utility transmission providers for the purpose of power production forecasting.
- Adding a generic ancillary service rate schedule through which public utility transmission providers will offer regulation service to transmission customers delivering energy from a generator located within the transmission provider's balancing authority area.

Next Steps

- CESA submitted written comments on March 3, 2011. FERC will review comments received and issue a Notice of Proposed Rulemaking that discusses comments received and propose new rules of general application.

Docket No. RM10-11-000, Issued January, 21, 2011