Direct Participation of Demand Response Resources in ISO Electricity Markets

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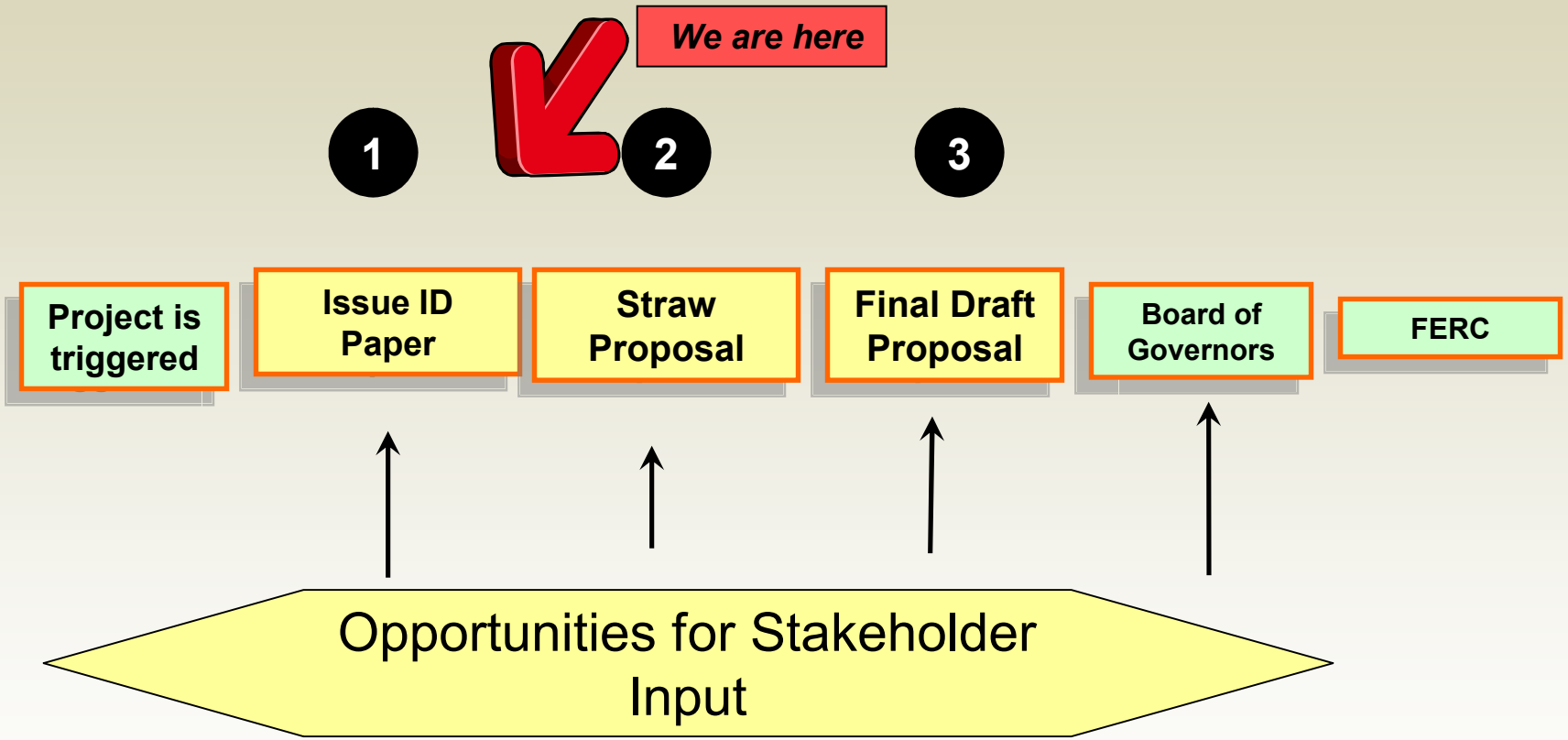
Demand Response Stakeholder Meeting
January 15, 2009

Demand Response Working Group and Stakeholder Meeting Agenda – January 15, 2009

Time	Topic	Presenter
11:00 – 11:10	Introduction & Meeting Objective	Tom Cuccia
11:10 – 11:40	Working Group Discussion: MRTU Release 1 Participating Load User Guide	John Goodin/ Farrokh Rahimi
11:40 – 12:00	Working Group Discussion: PDR Implementation Detail	Jim Price
12:00 – 12:45	Lunch	
12:45 – 2:15	FERC Order on Competition Adds to Requirements for Demand Response - Project Time Line - Addition of Direct Participation to the two DR Models for Post- MRTU Market Enhancements - Design Features and Issues	Jim Price
2:15 – 2:30	Break	
2:30 – 3:30	Cash Flow Model and Settlements Issues	Margaret Miller
3:30 – 4:30	Alternate Proposal for Proxy Demand Resource	Muir Davis
4:30 – 5:00	DR Process Framework; Wrap up	John Goodin

ISO Stakeholder Process – Demand Response



Several Design Features and Issues Must Be Resolved

- Goals for today:
  - Understand previously-identified issues
  - Identify issues not already identified
  - Start to identify alternative solutions
- Topics of discussion:
  - Background of Direct Participation in Demand Response (DR)
  - DR Business Process Issue Framework
  - Issues for resolution for implementing Direct Participation
- Please submit written comments, to directparticipation@caiso.com

Topic: FERC Order on Competition Adds to Requirements for Demand Response

FERC Order 719 (issued 10/17/2008) promotes direct participation by Demand Response providers in wholesale electricity markets. Order 719 requires ISOs and RTOs to:

- Accept bids from demand response resources in their markets for ancillary services comparable to any other A/S capable resources (¶¶ 47-63)
- Allow demand response units to specify limits on frequency, duration, and the amounts of their service in bids to provide ancillary services (¶¶81-89)
- Eliminate, during a system emergency, a charge to a buyer in the energy market for taking less electric energy in the real-time market than purchased in the day-ahead market (¶¶ 111-121 and ¶127)
- **Permit a DR aggregator to bid demand response on behalf of retail customers directly into the organized energy market, unless local regulatory authorities do not allow participation (¶¶ 154-164)**
- **Study and report on whether further reforms are necessary to eliminate barriers to demand response in organized markets. (¶¶ 274-276)** *(ISO will address through future meetings)*
- Requires ISOs to assess, through pilot projects, the technical feasibility and value to the market of using ancillary services from small demand response units. (¶97)

ISO Will Add Direct Participation to the Two DR Models for Post-MRTU Market Enhancements

- MRTU Release 1 includes core Participating Load features: Custom LAP for DA energy scheduling, and pseudo-generator to bid non-spinning reserve.
  - Replacement planned within 12 months. Changes within ISO markets seem better suited to Post-MRTU Release 1 enhancements.
- Post-MRTU Release 1 market enhancements provide two DR models:
  - Dispatchable Demand Resource (DDR) adds to MRTU PL: RT as well as DA energy, co-optimization of energy & AS, market functionality for spinning reserve & regulation, and recognition of operating characteristics (min. and max. durations of load adjustments, start-up times, minimum curtailment, min. & max. energy limits, etc.).
    - Also, ISO is exploring option for Partial Participation to allow Participating Load to be a fraction of total end-use load.
  - Proxy Demand Resource (PDR) simplifies administration of Custom LAPs in initial DR integration into MRTU and migration of small loads, by scheduling load at Default LAP and dispatch Proxy Generators at local levels.
- ISO anticipates incorporating Direct Participation in both DDR and PDR.

Looking Ahead at Schedule for Stakeholder Process

- FERC Order 719 requires compliance filing 6 months after its publication: due April 27, 2009
- ISO is integrating Direct Participation with DDR and PDR, which are targeted for implementation 12 months after MRTU Go-Live
  - Enhanced DR seen as essential for implementing Scarcity Pricing, ordered by FERC 12 months after MRTU Go-Live
- Strategy: Phased design of DR features
  - Conceptual design in Order 719 compliance filing (4/27/09)
  - Elaboration of design in Business Practice Manual and User Guide, after initial conceptual design (tariff updates if needed)
  - Retail market issues to be addressed in CPUC proceedings

ISO is Coordinating Stakeholder Processes and Timelines for DR and Energy Storage

	Direct Participation	Energy Storage
Issue/Discussion Paper Posted	12/22/08	1/15/09
Stakeholder Conference Call	1/5/09	1/20/09 Meeting
Stakeholder Comments	1/9/09	2/03/09
Stakeholder Meeting	1/15/09	2/27/09
Stakeholder Comments	1/22/09	TBD
Straw Proposal	1/27/09	3/20/09
Stakeholder Meeting	2/3/09	4/07/09
Stakeholder Comments	2/10/09	TBD
Final Draft Proposal Paper	2/24/09	4/27/09
Stakeholder Meeting	3/3/09	TBD
Stakeholder Comments	3/6/09	TBD
MSC Opinion	TBD	TBD
Board Meeting	3/25/09	May 09
FERC Compliance Filing	4/27/09	Jun 09

SCE's (and others') Alternative PDR Proposal Moves Process Forward for Issue Resolution

- As acknowledged in SCE's proposal, alternative has few differences from ISO's PDR structure:
  - Settlement process:
    - Default LAP vs. Custom LAP/ Sub-LAP
    - ISO settlement through Curtailment Service Provider (CSP) vs. Load Serving Entity (LSE): one of multiple options
  - Performance requirements for price-responsive energy, with additional data requirements
- Some other issues discussed in alternative PDR proposal are mischaracterizations of ISO's PDR model, including:
  - Inconsistent recognition that ISO decouples DR from load scheduling
  - No sunset of adjustment to RUC target for DR using non-participating load
  - Partial Participation in DDR not new product – simply adds flexibility
  - DDR & PDR recognize but don't require energy use limits
  - ISO capacity products (AS, RUC, RA) subject to performance requirements
  - Generators not subject now to performance penalties for energy

One Issue in PDR Alternative is Separate from Direct Participation: Settlement Location

- In "Comments on the California ISO MRTU LMP Market Design" (Attachment C to 5/13/05 amendments to MRTU comprehensive design, at http://www.caiso.com/docs/2005/05/13/20050513141755188804.pdf), the ISO's consultant LECG identified six issues that were the most critical to address in the MRTU conceptual design at that time. The sixth issue pointed out potential market manipulation (p. 62 in LECG comments):
  - "Since demand response buys power at the zonal/LAP price in the DAM and sells power back at the nodal price, demand response at nodes within constrained regions have a money machine whenever their actual load is less than their allowed maximum demand response offer. The LSE providing demand response would merely buy power equal to its demonstrated dispatch capability at the LAP price in the DAM and bid demand response at a low enough price to ensure it is dispatched nodally down to its planned consumption in real time, earning the difference between the nodal price and the zonal price for doing nothing. This would be equivalent to the effect of virtual demand purchases at zonal prices in the DAM that are settled at nodal pricing in real-time."
- This concern delayed implementation of the planned Participating Load features until after MRTU, and remains a fundamental issue to the ISO.

To Identify the Range of Issues, ISO has Examined a DR Business Process Issue Framework

1. Qualification
   - *Program definition, participant and resource qualification*
2. Registration
   - *Resource characteristics, enrollment, transfers, testing & auditing*
3. Scheduling
   - *System and resource forecasting, resource scheduling & bidding*
4. Notifications
   - *Market schedules & awards, real-time dispatch, outages*
5. Metering & Telemetry
   - *Data availability, data exchange, data type & granularity*
6. Settlement
   - *Calculation of load changes, calculation of credits & charges*
7. Performance Management
   - *Resource, participant, program, and system performance*

Issue Paper Highlighted Key Open Issues in DR Business Process Issue Framework

Issue Framework	Section in Issue Paper	Highlights of Issues
1: Qualification	3.1: Terminology, roles, & responsibilities of ARC; 3.7: Credit requirements	▪ CSP as market participant ▪ CSP as Supply or Demand resource
2: Registration	3.2: Relationship among involved parties	▪ Tracking resources by location ▪ Tracking resources by CSP & LSE
3: Scheduling		▪ Aggregation, forecasting, bidding
4: Notifications		▪ Dispatch, outages
5: Metering & Telemetry	3.3: Existing tariff; 3.4: Specification for metered data	▪ ISO-polled vs. SC metering ▪ Data management responsibility ▪ Metering for energy vs. capacity
6: Settlement	3.5: Settlement issues	▪ Baseline usage calculation ▪ CSP vs. LSE allocation of savings
7: Performance Management	3.6: Determining performance	▪ Resource & program monitoring ▪ Response to non-performance

Issues: Qualification

- Terminology, roles & responsibilities of "Aggregator of Retail Customers"
  - Terminology: "Curtailment Service Provider" (CSP) is used in some organized markets
  - CSP as market participant
  - CSP as Supply or Demand resource
- What are implications if CSP manages price-responsive increases in load?
- Credit requirements?
  - Preliminary ISO analysis: CSP subject to same credit requirements as other Supply resources

Issues: Registration

- Relationship between the end-use customer, LSE/ESP, UDC, SC, ISO and ARC, and required registration & notification processes among involved parties
  - Registration functions
  - Rules to ensure integrity of registering and scheduling DR resources
  - Tracking of customer migration between LSEs and CSPs
- Tracking resources by location
- Tracking resources by CSP & LSE
  - Does ISO need to actively track end-use customers' migration between CSPs and LSEs, as is done for CRR allocation?
  - What are implications if multiple CSPs were allowed for same end-use customer?

Issues: Scheduling

- Basic functions of aggregation, forecasting, bidding seem unaffected by Direct Participation
- CAISO sees no significant change to PDR product definition due to Direct Participation
  - Load scheduling and DR bidding already use separate resources
- Minor change to DDR:
  - Originally, DDR design used single, integrated energy bid curve
  - With Direct Participation, need separate load and DR bids, like PDR. CAISO will merge bid curves in order of bid price, and track bid segments by CSP and LSE.

Issues: Notifications

- ISO sees little if any change in mechanisms for communicating schedules and dispatch due to Direct Participation
  - Does LSE need a copy of schedule changes and dispatches resulting from CSP's bids, sent by ISO?
  - Does CSP need a copy of LSE's scheduled energy, sent by ISO?
- ISO sees no need to track outages for DR, other than unavailability of awarded AS capacity – no change due to Direct Participation

Issues: Metering & Telemetry

- Existing tariff impediments
  - "One SC one meter" is actually a need to define conditions of Direct Participation
  - Definition of CAISO Metered Entity includes Participating Load (without further qualification) – needs clarification regardless of Direct Participation
- Metering for energy vs. capacity
- Specification for metered data
- Required situations for ISO-polled vs. SC metering
- Responsibility for data management
- Data access and availability needs of LSE and CSP

Issues: Settlement

- Multiple alternatives for CSP vs. LSE allocation of savings:
  - To simplify implementation, CAISO's PDR structure allocates DR savings as reduced LSE demand, i.e., allocated savings to LSE.
    - CSP earns capacity payments. (May only require existing telemetry & simple baseline calc.)
    - If CSP sells RA capacity to LSE, CSP and LSE can agree to split energy savings.
  - Alternate PDR proposal allocates savings to CSP, and calculates LSE's final demand as metered demand plus DR response.
  - Some ISOs split the savings using retail rate: see Margaret Miller's presentation.
    - Implementation is complex. Cash flow seems unrelated to CAISO market.
  - Alternative: Reimburse LSE for DA schedule at DA price, then credit CSP with RT LMP minus DA LMP. Avoids double-payment of savings, fits CAISO market, implementation avoids complexity.
- Settlement requires baseline usage calculation – discussed in Performance Management.
- CSP vs. LSE dispute resolution

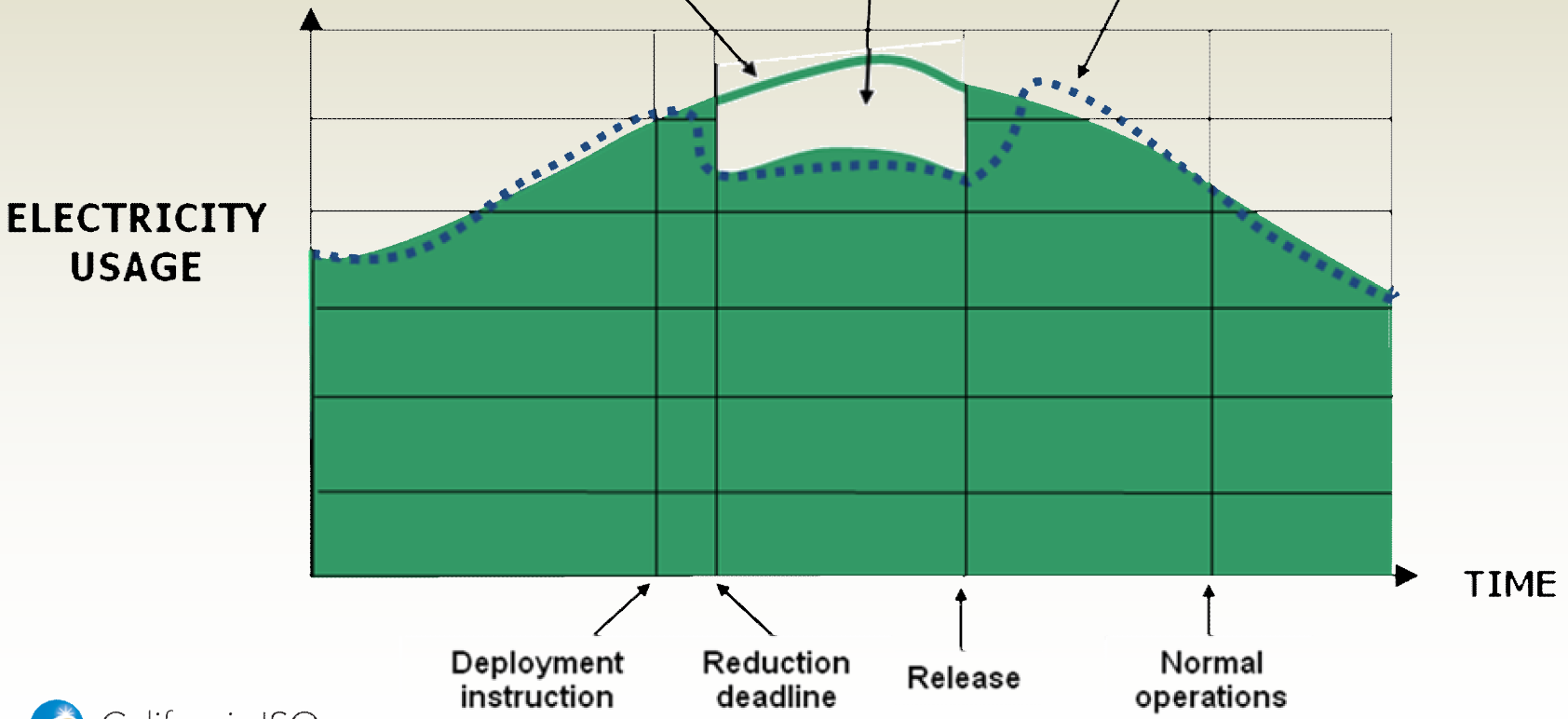
How Should Settlement of CSP's Demand Response be Separated from LSE's Demand Schedule?

- Determining performance - measurement & verification (M&V) approaches
  - What MW value applies to DR managed by CSP? Multiple methodologies are in use. Selection can depend on type of end use.
- NAESB standard development:
  - NAESB is addressing standards, but time needed for completion
  - NAESB work addresses what affected parties should include in practice, but does not prescribe methodology.
- Protocols being developed by CPUC are for impact of programs, not event-specific compliance

Concept of Baseline Calculation is to Estimate What Usage would have been without DR operation

Not unusual for Stage emergencies to last 3 to 8 hours, transmission emergencies 12+ hours.

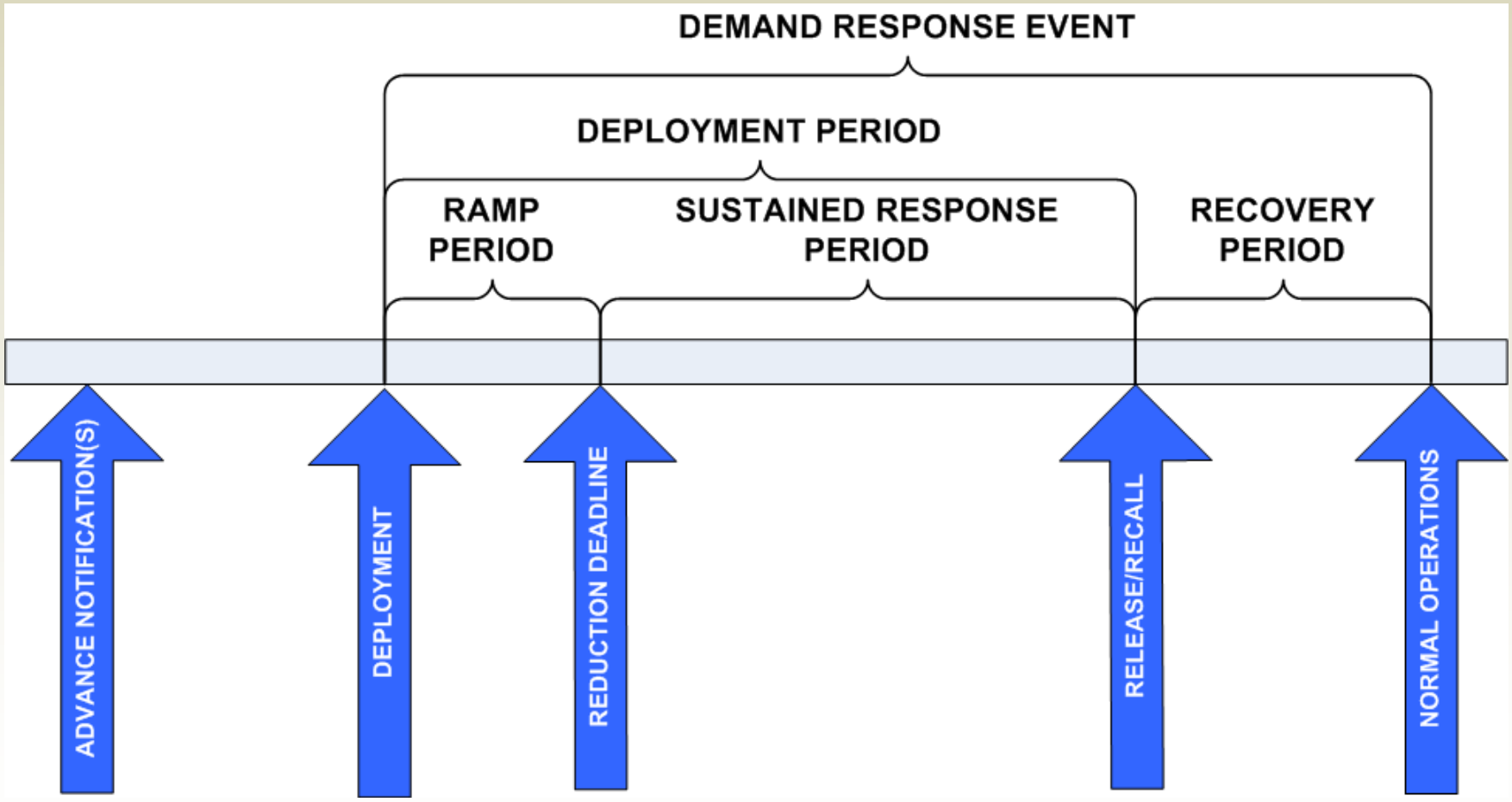
Increase in electricity usage during event does not mean non-compliance.



Applying a Baseline Calculation Requires Choice among Alternative Methodologies

- Determining performance - measurement & verification (M&V) approaches
  - Meter Before / Meter After
    - Metering Before Deployment vs. Metering After Reduction Deadline is a performance evaluation methodology where electricity consumption or demand over a prescribed period of time prior to Deployment is compared to similar readings during the Sustained Response Period.
  - Estimated Baseline
    - Type 1 (Interval Metered): A Baseline model based on a Demand Resource's historical interval meter data which may also include but is not limited to other variables such as weather and calendar data.
  - Maximum Base Load
    - A performance evaluation methodology based solely on a Demand Resource's ability to reduce to a specific level of electricity consumption or demand, regardless of its electricity consumption or demand at Deployment.
  - Others?

Baseline Calculation Must Consider Several Attributes of Resource Performance



Can Baseline Calculation be Gamed?

- Illustrative example:
  - DR resource observes that price spikes sometimes occur during higher-than-average temperatures, but not always
  - DR resource submits high-priced DR bid to ISO, to decrease demand back to normal level.
  - DR resource increases load on 5 days with above-average temperatures
    - On first four days, RT energy price = $50/MWh. Apparent baseline consumption on hot days increases.
    - On fifth event, RT energy price = $500/MWh. ISO dispatches curtailment of DR resource, and DR resource complies.
  - Resulting settlement: $500/MWh for DR response – (4 events * $50/MWh for increase when not dispatched) = $300/MWh profit for returning to normal demand level (i.e., not increasing demand on final day).
- Conclusion: Although example is simplistic, formulation of valid baseline calculations is not trivial, needs careful evaluation.

Potential for Using Baseline Calculations in Energy Settlements

- Timing is short for developing conceptual filing for FERC Order 719 compliance, and implementing DR enhancements. Complex issues exist for baseline calculations.
- Simpler methodology might be acceptable for capacity resources, compared to allocating savings to CSP at cost to LSE.
- Can a process be designed for getting past unresolved issues, to simplify ISO implementation?
  - For example, if CSP and LSE have contrary interests in calculated value, and can agree on the result, maybe the result is acceptable.

Issues: Performance Management (Response to Non-performance)

- ISO's DDR and PDR models include no-pay provisions for ancillary services and RUC, and compliance requirements for resource adequacy
  - Requirements already developed for other Supply resources, and apply equally to DR programs
- ISO tariff defines Uninstructed Deviation Penalties (UDP) for energy from generation, but not currently active – would require FERC order
- Given explicit UDP exemption to all loads already in ISO tariff, and FERC requirement for Convergence Bidding 12 months after MRTU Go-Live, are non-compliance penalties needed for price-responsive energy dispatched from DR resources?
  - If so, why?

ISO Invites Inputs for Issue Resolution

- Please submit written comments concerning issues for resolution and potential solutions, to directparticipation@caiso.com
- FERC Order 719 compliance filing 6 months due 4/27/09. DR enhancements also needed for FERC requirements 12 months after MRTU Go-Live.
- Strategy: Phased design of DR features
  - Stakeholder process on Direct Participation: Straw Proposal 1/27/09, Draft Final Proposal 2/24/09, with meetings & comments
  - Conceptual design in Order 719 compliance filing (4/27/09)
  - Elaboration of design in Business Practice Manual and User Guide, after initial conceptual design (tariff updates if needed)
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DR Settlements Methodology in other ISO Markets

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Market Design & Regulatory Policy

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Within different ISO markets there are alternative approaches to settlement of Demand Response

PJM

- Utilizes the Retail Rate and the Day-Ahead and Real-Time MCP to settle curtailment
- Retail Rate represents the Generation and Transmission portion of bill (cents/kWh)

ISO New England

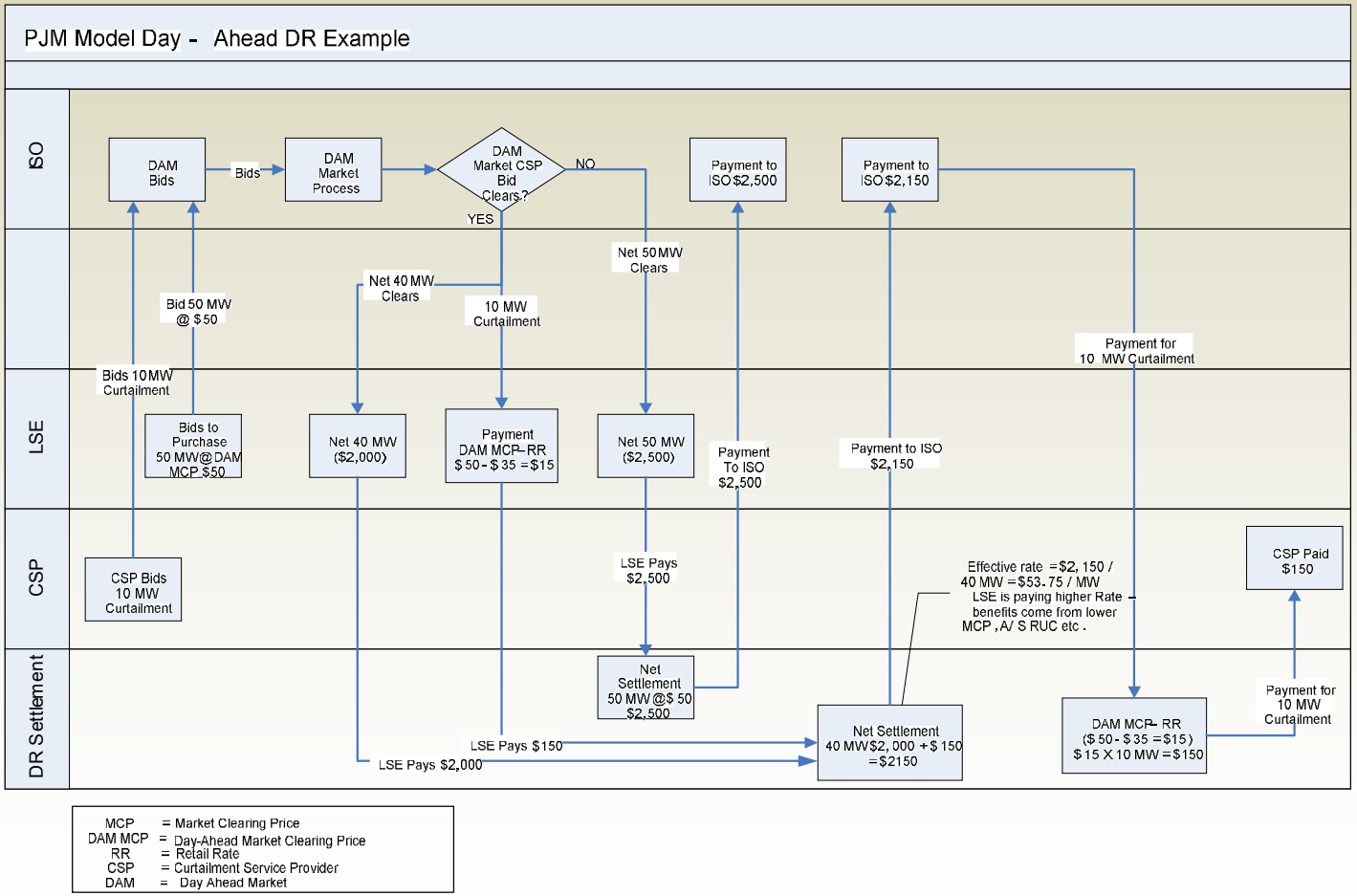
- DR MWs are paid for twice; once as the uninstructed energy component and once as the Instructed energy

Risks to Load Reducers in PJM include the following:

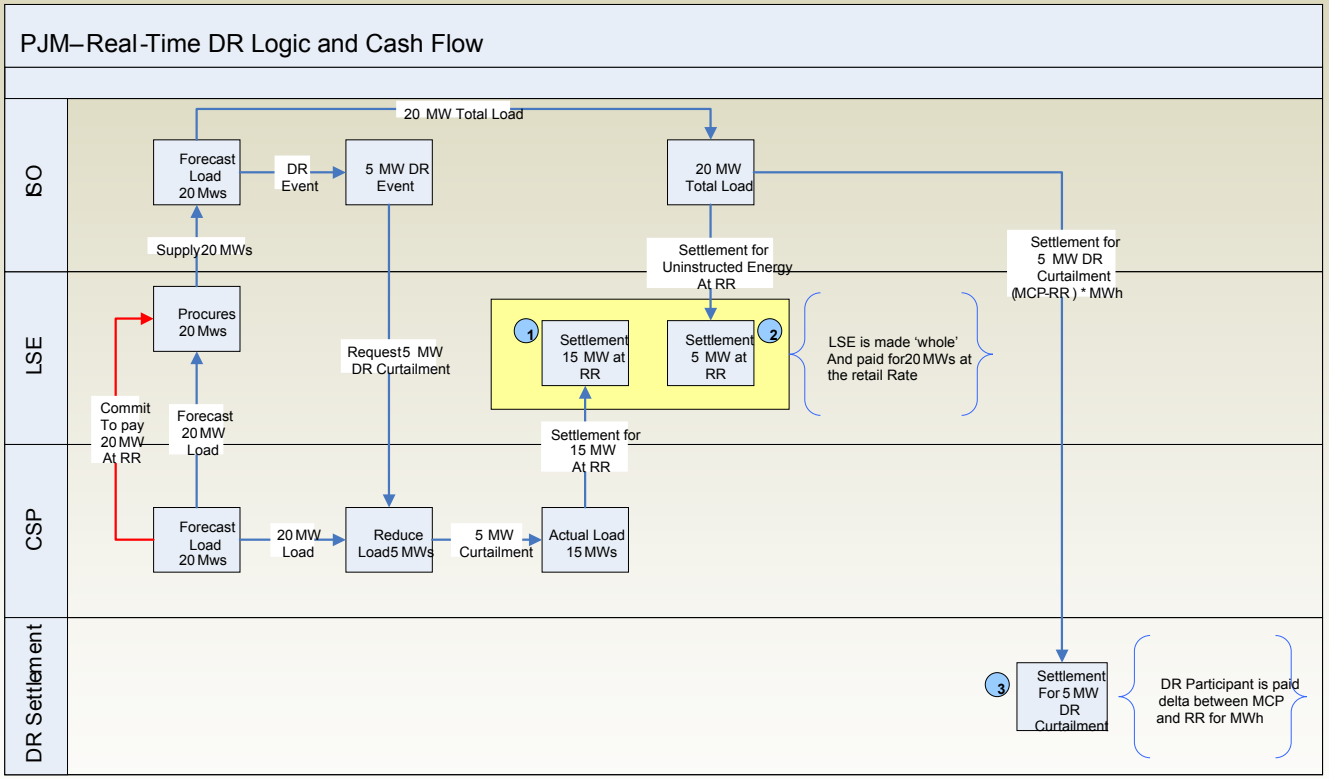
If load reduction is committed in the Day-Energy Market and does not perform in Real-Time

- Charged Real-Time LMP * Shortfall + Balancing Operating Reserve Charges
- No penalty for non-performance in Real-Time

PJM Day-Ahead DR Example



PJM-Real-Time DR Cash Flow Example



1	Settlement for CSP 'Consumed energy– 15 MW X $35 / MW	$525
2	Settlement for Uninstructed energy – 5 MW X $35 / MW	$175
3	Settlement for Instructed energy (DR Event) – 5 MW X ($50-$35) / MW	$75

Note:
Retail Rate (RR) = $ 35 / MWh
Real Time MCP (MCP) = $ 50 / MWh
DR Payment = (MCP-RR) X MWh

ISO New England DR Cash Flow Example