PJM
Economic Demand Resource in Energy Market

PJM State & Member Training Dept.

Disclaimer:

PJM has made all efforts possible to accurately document all information in this presentation. The information seen here does not supersede the PJM Operating Agreement or the PJM Tariff both of which can be found by accessing: http://www.pjm.com/documents/agreements/pjm-agreements.aspx

For additional detailed information on any of the topics discussed, please refer to the appropriate PJM manual which can be found by accessing: http://www.pjm.com/documents/manuals.aspx

Agenda

- Introduction
- Economic Registrations
- On-Site Generation
- Customer Baseline and CBL Certification
- Dispatch Groups
- Economic Participation
- Economic Settlements
- Appendix

PJM Demand Side Response

Demand Response is a consumer's ability to reduce electricity consumption at their location when wholesale prices are high or the reliability of the electric grid is threatened.

Common examples of demand response include:

- raising the temperature of the thermostat so the air conditioner does not run as frequently
- slowing down or stopping production at an industrial operation or dimming/shutting off lights

Basically any explicit action taken to reduce load in response to short-term high prices or a signal from PJM.

PJM Demand Side Response

Demand Response can participate within the various PJM markets:

- Energy
  - Day Ahead
  - Real Time
    - Dispatched
- Ancillary Services
  - Synchronized Reserve
  - Day Ahead Scheduling Reserve
  - Regulation
- Capacity
  - Offer into auction up to 3 years in advance

Demand Response in Ancillary Service Markets

- **Day ahead scheduling reserves (30 minute spin)**
  - Must reduce net load within 30 minutes if dispatched by PJM
  - Hourly market price (DASRMCP)
- **Synchronized Reserves (10 minutes spin)**
  - Reduce load during reserve shortage, must reduce net load within 10 minutes.
  - Hourly market price (SRMCP)
- **Regulation – real time load change (increase or decrease) based on real time system conditions**
  - Hourly market price (RMCP)

Reliability service - must be there when system operator needs it.

Request Ancillary Service Participation in eLRS

- DSR resources must be approved by PJM prior to participating in any of the Ancillary Service Markets.
- There must be a confirmed Economic registration in eLRS prior to requesting Regulation participation
- **Mandatory Training for DR participation in Regulation and/or Synchronized Reserve in PJM LMS**
  - Also see Economic Demand Resource in Ancillary Service Market training on Training Material page:
  - http://www.pjm.com/~/media/training/core-curriculum/ip-dsr/dsr-in-the-ancillary-service-markets.ashx

Mandatory Training for Reg and/or SR Participation

- Demand Response Resources must complete an initial training module on the requirements and business rules of the Regulation and Synchronized Reserve markets and the PJM All-Call responses. This training module is available online, through the PJM Learning Management System (LMS) and must be completed within 3 months of the individual beginning participation in Demand Response.

- Anytime during this 3 month period that a Demand Response Resource individual is interacting with the PJM Regulation and Synchronized Reserve markets without having completed the requirement outlined above, he/she must work under the direct supervision of another individual who has met the requirement, either in person or via an on-call arrangement.

Mandatory Training Requirement

CSP's that have resources participating in Synchronized Reserves and/or Regulation, need to designate the individuals at their company that interface with these markets and have them take a mandatory annual training. The following is the procedure for a company to "sign-up" each individual for the mandatory training.

The first step is for the company to designate a Training Liaison (point person in charge of monitoring that individuals have completed the initial training and subsequent refresher training).

a) Send the Training Liaison Identification Form (DOC) found on the Member Training Liaison webpage http://pjm.com/training/member-training-liaison.aspx to trainingsupport@pjm.com
   - Select CSP for Company Type on the form.

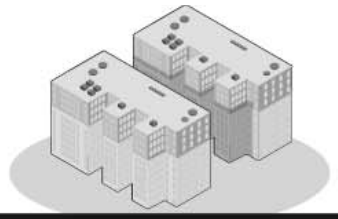
b) PJM will send the designated Training Liaison a spreadsheet to populate the company's roster with the information on the individuals who will be interfacing with the Regulation and/or Synchronized Reserve Markets.

The second step is to send the populate spreadsheet to trainingsupport@pjm.com. Those individuals will be added to the company roster and given access to the mandatory training.

PJM Market Participants in Demand Response

Load Serving Entity (LSE)

PJM Member, including load aggregator or power marketer, that serves end-users in PJM Control Area to sell electric energy to end-users in PJM Control Areas.

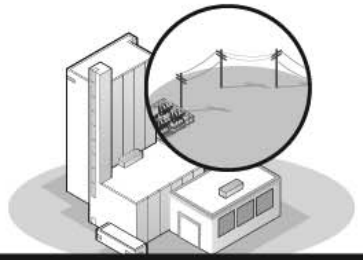


End Use Customer

Cannot directly participate unless it is a PJM Member (e.g. as an LSE or CSP).

Curtailment Service Provider (CSP)

PJM Members that act on behalf of end-use customers who wish to participate in PJM Load Response opportunities.



Electric Distribution Company (EDC)

PJM Member that owns, or leases, electric distribution facilities used to provide electric distribution service to electric load in PJM Control Areas.

Who can be a CSP?

- **Any LSE**
- **Any EDC**
- **Any third party** *(PJM member)* **specializing in Demand Response**

System Scope

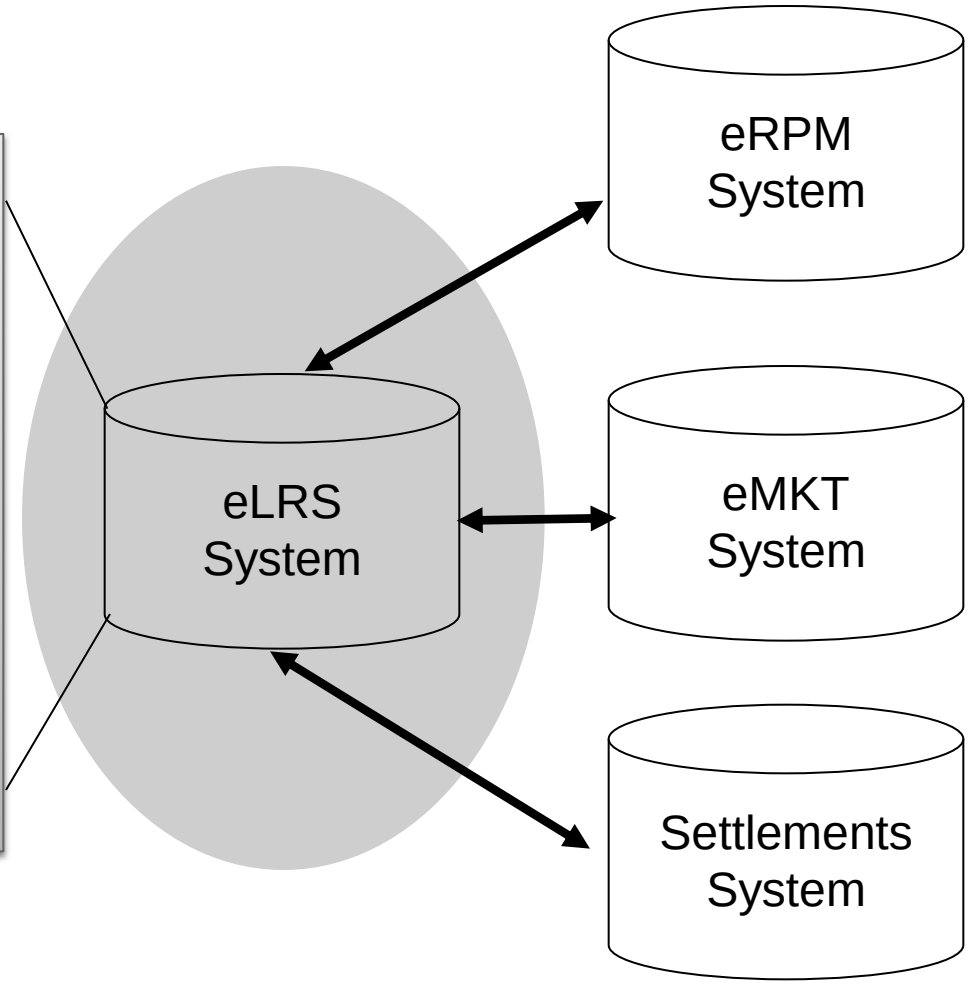
Gateway to DR participation in the PJM markets

-Registration

-Event notification

-Validation

-Settlements



Demand Side Response

Demand Side Response can participate in which Markets ?

a) Day-Ahead Market
b) Real-Time Market
c) Ancillary Services Market
d) Reliability Pricing Model
e) All of the above

Demand Side Response

An LSE can be a CSP?

a) True
b) False

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Business Rules - Economic

- **The intent of Economic DSR is for participants to *respond to price (RT and DA LMP)***
- End Use customers must have interval meters
  - Exception for Direct Load Control
  - Customer or CSP can provide interval meter provided it meets the PJM criteria
- The CSP, EDC, PJM and the PJM Market Monitor will monitor DSR market behavior
  - Registration & Settlement issues

PJM Demand Side Response

- Like a generator, a DSR resource participates in the Day Ahead and Real-Time energy markets
- Unlike a generator that is a capacity resource, DSR participation in the energy market is voluntary
  - Subject to Operating Reserve Charges
- After a DSR either clears in the Day-Ahead market or is dispatched in the Real-Time market, a settlement is created and a reduction needs to be calculated in eLRS.
  - Reduction = CBL – metered load

Creating Locations and Registrations

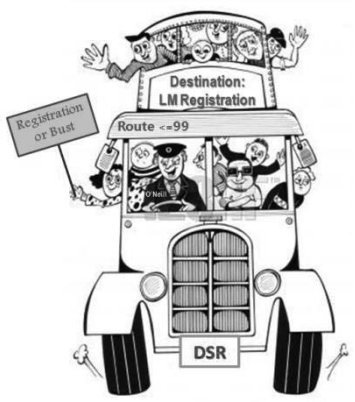
- Locations are created in eLRS and represent the Customer Site at the EDC Account Number level.
  - The EDC Account Number is a unique number assigned by the EDC to the metering at the customer site.

- Economic and Emergency Registrations are created in eLRS from the Locations.
  - A registration can be created from a single location.
  - An aggregate registration can be created from multiple locations per the business rules for aggregate registrations.

- Registrations are required for Market participation

Business Rules for Creating Aggregate Registrations

- All Locations in the aggregate must have the same EDC
- The aggregate will be created using functionality in the eLRS software
- All registrations must total >=100kW
  - multiple Locations will need to be selected in eLRS to form one (1) single registration >= 100kW
- Only one (1) individual location in the aggregate can be >=100kW
- All Locations in the aggregate must meet all other requirements for market participation
- There is no limit to the number of Locations in an aggregate



Metering Requirements

- Metering requirements shall meet:
  1) Electric Distribution Company requirements for accuracy or,
  2) Have a maximum error of two (2) percent over the full range (end-to-end) of the metering equipment (including Potential Transformers and Current Transformers)
    - For pulse data recorders (PDR), this includes the PDR error plus EDC meter error

- Metering equipment can be either:
  1) The metering equipment used for retail electric service
  2) Customer-owned metering equipment
  3) Metering equipment acquired by the CSP for the customer

Rules are outlined in Manual 11, section 10 - Interval Meter Equipment and Load Data Requirements

Implementation of Metering Rules

- CSP submits quality assurance plan
  - Indicate how CSP ensures installation is correct and that meter equipment & load data remain accurate overtime.
- CSP indicates "customer owned" meter on eLRS location that is part of a registration
- CSP submits "DSR customer owned meter qualification form" to dsr_ops@pjm.com
  - http://www.pjm.com/markets-and-operations/etools/~/media/etools/elrs/20090904-dsr-customer-ownder-meter-qualification-form.ashx
- PJM reviews registration & contacts CSP as necessary
  - Registration must be approved by PJM
- CSP uploads 90 consecutive days of hourly load data on an annual basis near effective date of registration (if new) or termination date (if renewal) to eLRS
  - **Meter data is required upon PJM request**
  - Use eLRS "daily file format" for meter data upload
  - LSE / EDC may download meter data as needed for additional review

Registration Process – Types of Registrations

Types of Registrations that can be created in eLRS:

1. Economic
2. Economic Only
3. Economic Regulation Only
4. DR Full Emergency
5. DR Capacity Only
6. Emergency Energy Only

Registration Scenarios

Registration Scenarios for same location (EDC account number)

Scenario	Economic (Energy, SR, DASR, Reg)	Economic (Energy Only)	Economic Regulation Only	Emergency Capacity Only	Emergency Full (Capacity and Energy)	Emergency Energy Only
CSP1	Yes	na	na	No	Yes	No
CSP1	Yes	na	na	Yes	No	Yes
CSP1 CSP2	Yes No	Na na	Na na	No Yes	No No	Yes No
CSP1 CSP2	No No	No Yes	Yes No	No No	No Yes	No No
CSP1 CSP2	No No	Yes No	Yes No	No Yes	No No	Yes No
CSP1 CSP2 CSP3	No No No	No Yes No	Yes No No	No No Yes	No No No	No Yes No

RERRA Restrictions

1. **If EDC is large (>4 million MWh) then by default the Demand Resource may participate in Demand Response unless there is Relevant Electric Retail Regulatory Authority (RERRA) evidence that prohibits participation.**

2. **If EDC is small (=<4 million MWh) then by default the Demand Resource may not participate in Demand Response unless there is Relevant Electric Retail Regulatory Authority (RERRA) evidence that allows participation.**

RERRA Evidence

Relevant Electric Retail Regulatory Authority (RERRA) evidence includes:

Large EDC (>4 million MWh)

- an order, resolution or ordinance of the RERRA prohibiting or conditioning end-use customer participation, or

- an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation, or

- an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation

RERRA Evidence

Relevant Electric Retail Regulatory Authority (RERRA) evidence includes:

Small EDC (<=4 million MWh)

- an order, resolution or ordinance of the RERRA permitting or conditionally permitting end-use customer participation, or

- an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation, or

- an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation

Registration Process – EDC Responsibilities

EDC Responsibilities in Registration Process

Once a registration is submitted by the CSP, the EDC has up to 10 business days to verify the information listed below. If the information is correct, then the EDC is expected to confirm the registration. If the EDC and LSE take no action then the registration will auto confirm after 10 business days.

1. Interpret the RERRA evidence to determine participation eligibility
2. Verify EDC Account Number(s)
    a) Corresponding to address of facility
        - addresses if an aggregate
3. Verify Loss Factors
    a) Used for Economic participation
    b) Used for Load Management participation
4. Peak Load Contribution (PLC)
    a) Used for Load Management participation

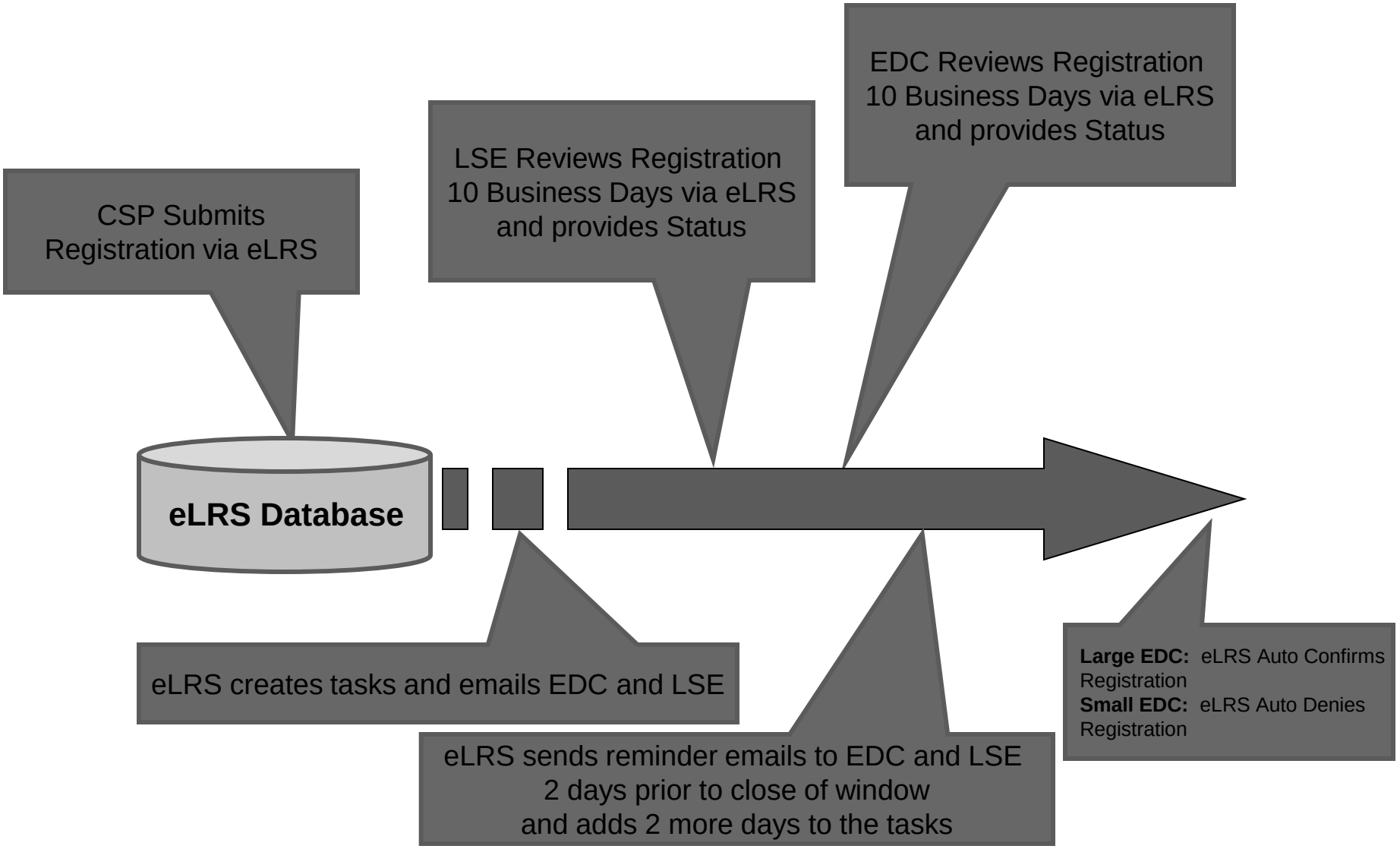
Registration Process – LSE Responsibilities

LSE Responsibilities in Registration Process

Once a registration is submitted by the CSP, the LSE has up to 10 business days to verify the information listed below. If the information is correct, then the LSE is expected to confirm the registration. If the EDC and LSE take no action then the registration will auto confirm after 10 business days.

1. Verify that the LSE has a contract with the customer
2. Verify that there are no contractual obligations that would preclude the customer from Demand Side Response participation

Registration Process Timeline



Creating Locations and Registrations in the eLRS

- The eLRS User Guide is a comprehensive document on the eLRS covering:
  1. Locations
  2. Registrations
  3. Events
  4. Settlements
  5. Compliance
  6. Tasks
- Please refer to the eLRS User Guide for creating Locations and Registrations.
  - From the PJM Web Page select:

    market & operations/PJM Tools/eLRS/eLRS User Guide

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On–Site Generation

- CSP should notify PJM if on-site generation will be used to reduce load.
  - Option 1: If generation will be solely used for economic DR and would not have otherwise operated then it can participate as economic DR.
  - Options 2: If generation is NOT solely used for economic DR then it can only participate if PJM can adequately quantify incremental on-site generation and approves.
    - Only load reductions from generation that would not have otherwise been operating is permitted.
- CSP may only submit registration if CSP has all appropriate environmental permits. By virtue of submitting a registration, CSP represents that CSP has validated that customer has all appropriate environmental permits.
  - Necessary permits must be in place before effective date on registration – if the CSP has not received the necessary permits prior to indicated effective date, then CSP must terminate such registration before effective date.

RRMSE score below 20% does not mean location may participate

On–Site Generation (cont'd)

	DR Source	Example	Permitted Participation as Economic DR Resource
1.	Generation	On-site backup generation – does not run except for emergency to supply power or for normal routine testing. Historic output shows only used during routine test .	Yes. Normal operational generator test do not qualify. Only time test would qualify is if test is NOT scheduled and then unit is used to support RT or DA instructions.
2.	Generation	Cogen/CH&P (Central Heat and Power). Unit runs as part of normal production process and output will remain comparable whether or not there is participation in PJM economic DR .	No.
3.	Generation	Cogen/CH&P or unit that operates historically to reduce electricity cost but will operate for more hours or higher MW per hour because of PJM economic DR revenue.	Maybe – can only participate if PJM can quantify the incremental load reductions.
4.	Generation	Cogen/CH&P or unit that operates to shaves peak each month.	No unless there is incremental MW or MWh that will occur.

On–Site Generation that normally runs but has incremental capability based on DR payment

- PJM will need to evaluate each registration to determine if feasible to quantify incremental output.
  - Historic on-site generation output variability will determine if incremental output is predictable.
- CSPs to provide the following information:
  - Registration List of Economic DR that uses generation
    - Registration ID
    - Type of Generation
      - "PJM Only" - generation only (has not run historically and will only run if PJM dispatches or clears in the market)
      - "Incremental Generation" – additional output from generation that normally operates that would like to participate as economic DR
  - For "Incremental Generation", the CSP should send PJM 1 year historic generation output, cost and any other supporting information
- CSP may propose method to quantify incremental output.

Example of supporting information that should be provided to PJM by CSP

2) Generation historic output and cost data

1) Registration list of Econ DR that uses Generation

CSP (Org ID)	Registration ID	GenerationType
JOECSP	R23232	PJM Only
JOECSP	R410098	Incremental Generation

				A	B	A+B
RegID	Date	HE	Gen Ouput (MW)	Fuel Cost ($/mwh)	Maintenance Adder ($/mwh)	Cost ($/mwh)
R410098	11/1/2011	1	-	$49.00	$2.00	$51.00
R410098	11/1/2011	2	-	$49.00	$2.00	$51.00
R410098	11/1/2011	3	-	$49.00	$2.00	$51.00
R410098	11/1/2011	4	-	$49.00	$2.00	$51.00
R410098	11/1/2011	5	-	$49.00	$2.00	$51.00
R410098	11/1/2011	6	-	$49.00	$2.00	$51.00
R410098	11/1/2011	7	-	$49.00	$2.00	$51.00
R410098	11/1/2011	8	-	$49.00	$2.00	$51.00
R410098	11/1/2011	9	-	$49.00	$2.00	$51.00
R410098	11/1/2011	10	3.200	$49.00	$2.00	$51.00
R410098	11/1/2011	11	3.200	$49.00	$2.00	$51.00
R410098	11/1/2011	12	4.000	$49.00	$2.00	$51.00
R410098	11/1/2011	13	4.000	$49.00	$2.00	$51.00
R410098	11/1/2011	14	5.200	$49.00	$2.00	$51.00
R410098	11/1/2011	15	5.200	$49.00	$2.00	$51.00
R410098	11/1/2011	16	5.200	$49.00	$2.00	$51.00
R410098	11/1/2011	17	5.200	$49.00	$2.00	$51.00
R410098	11/1/2011	18	5.200	$49.00	$2.00	$51.00
R410098	11/1/2011	19	5.200	$49.00	$2.00	$51.00
R410098	11/1/2011	20	4.000	$49.00	$2.00	$51.00
R410098	11/1/2011	21	4.000	$49.00	$2.00	$51.00
R410098	11/1/2011	22	3.200	$49.00	$2.00	$51.00
R410098	11/1/2011	23	-	$49.00	$2.00	$51.00
R410098	11/1/2011	24	-	$49.00	$2.00	$51.00

Process to administer On-Site Generation PJM approval

- eLRS
  - Location
    - CSP should properly designate Load Reduction method for DR capability as Generation (allows PJM to know which resources will use Generation to reduce load)
  - Registration
    - CSP to Select CBL and conduct RRMSE test
    - If On-Site Generation will be solely used for economic DR and would not have otherwise operated then it can participate as economic DR – please note in Comment "On-site Generation = PJM Only"
    - CSP to Submit CBL review (even if CBL passes RRMSE test)
      - Select "Other" for reason and include comment "On-Site Generation = Incremental Generation "
    - For Incremental Generation the CSP should send PJM 1 year historic generation output and cost information and any other supporting information to help with decision process
    - PJM to review registration and approve if load reductions can be appropriately quantified, otherwise registration will be denied

Please email dsr_ops@pjm.com if you have questions or would like to discuss associated details.

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Customer Baseline Calculation

A Customer Baseline Load (CBL) is a proxy for what the load would have been absent the load reduction. A CBL is calculated for the following timeframes:

Average Day CBL for Weekdays

Average Day CBL for Saturdays

Average Day CBL for Sundays/Holidays

Detailed CBL language found in the PJM Operating Agreement, Section 3.3A

Average Day CBL for Weekdays

Step # 1: Weekday CBL Basis Window

Monday	Tuesday	Weds	Thursday	Friday	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
Prior Event 20	21	22	*Prior Event* 23	24	25	26
27	***Event*** 28	29	30	31		

1. ***Select 5 most recent non-event day***
   - ***Event days are submitted settlements that are not denied or***
     - ***All location from a corresponding Emergency Full registration is dispatched during a Load Management event***
2. ***Exclude the following day-types:***
   - ***NERC holidays***
   - ***Weekend Days***
   - ***Event Days***
3. ***Replace excluded days with next valid day***
4. ***Final <u>Weekday CBL Basis Window</u> contains <u>5 days</u>*** (unless 45 day look-back window is reached)

Average Day CBL for Weekdays

Step # 2: Weekday CBL Basis

Monday	Tuesday	Weds	Thursday	Friday	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
Prior Event 20	21	22	Prior Event 23	24	25	26
27	***Event*** 28	29	30	31		

1. ***For each of the 5 Days in <u>Weekday CBL Basis Window</u> calculate:***
   - ***Average daily event period usage* = simple average of the participants usage over the event hours in the day**
2. ***For all 5 Days in <u>Weekday CBL Basis Window</u> calculate:***
   - ***Average event period usage level* = simple average of 5 average daily event period usage values**
3. ***Exclude any day which the day's average daily event period usage is less than 25% of the average event period usage level (25% rule) and replace***
4. ***Rank all remaining 5 days, and eliminate 1 day with lowest average daily event period usage***
5. ***<u>Weekday CBL Basis</u> contains <u>4 days</u>*** (unless look-back window is reached)

Average Day CBL for Weekdays

"Look-back" Window

Monday	Tuesday	Weds	Thursday	Friday	Sat	Sun
		1	*Prior Event* 2	*NERC Holiday* 3	4	5
Prior Event 6	*Prior Event* 7	*Prior Event* 8	*Prior Event* 9	*Prior Event* 10	11	12
Prior Event 13	*Prior Event* 14	*Prior Event* 15	*Prior Event* 16	17	18	19
Prior Event 20	*Prior Event* 21	*Prior Event* 22	*Prior Event* 23	24	25	26
27	***Event*** 28	29	30	31		

1. ***CBL "Look-back" Window is limited to 45 days***
   a) *If 5 days can not be selected within the look-back window, then:*
      - *Use only 4 days*
      - *If there are not 4 eligible days, then event days will be used. The event days with the highest loads will be used.*

2. ***Saturdays and Sundays/Holidays : use "High 2 of 3" criteria rather than "High 4 of 5"***

CBL Business Rules

Symmetric Additive Adjustment

The purpose is to adjust the CBL to current load conditions prior to the load reduction event.

Starting on the event day:

- Skip one hour prior to the start of the event
- Counting back, average the next three hours (Basis Average)
- Use this Basis Average to compare to the CBL for the same hours
- The difference is used to ratchet up (or down) the CBL value

	HE9	HE10	HE11	HE12	HE13	HE14	HE15	HE16
Event Day	600	700	800	900	900	950	1000	1050
CBL	450	550	650	750	850	950	1050	1150
Additive Adjustment					150	150	150	150
Adjusted CBL					1000	1100	1200	1300
Calculated Load Reduction					100	150	200	250

Additive Adjustment Period

Hours curtailed during event day

Example:
In this scenario, usage is much higher than normal on event day. Using the Additive Adjustment will result in a positive (higher) adjustment to the CBL.

CBL Certification Process

- **CBL Certification Process**
- The CBL Certification process will identify variable load customers. All customers must use a CBL with an error (RRMSE) no greater than 20% unless otherwise approved by PJM.
- If a customer's CBL error is greater than 20% then the customer is considered to be a variable load customer and another CBL must be used.
- If an alternate CBL with an error less than 20% (unless otherwise approved by PJM) cannot be found then the registration will be terminated by PJM.
- All new Economic DR registrations require CBL Certification.
- Registration extensions will not require CBL Certification. Once the registration goes through the CBL certification once, subsequent Registration extensions will not be required to go through the CBL certification process.
- **Exception**
    - CSPs shall inform PJM of any significant operational changes that affect the load which in turn require an evaluation of the existing CBL.
    - Registrations with significant operation changes require CBL Certification.
- PJM may review and request accuracy of registration CBL on a periodic basis

CBL Certification Process – Submit Meter Data

Meter data must first be submitted in order to run the CBL test.

1. Need Registration ID and EDC Account Number(s) to submit hourly meter data
   - **Registration ID from Saved and not Submitted Registrations**
2. The meter data can be uploaded from the registration screen or from the Meter Data Management screen.
   a) Only meter data for the registration location(s) can be uploaded from the registration screen
   b) Meter data for either a single registration location(s) or all registration locations can be uploaded from the Meter Data Management screen
      - Bulk Upload

CBL Certification Process – Submit Meter Data

- Submit enough hourly load data in order to calculate RRMSE for at least 30 days
- Load Data used must be contiguous where most current date of load data is <= current date minus 60.
- 24 hours of meter data must be submitted for each day
- Templates for uploading Meter data is posted on the PJM website under:

  markets & operations> PJM Tools > eLRS > eLRS Meter Data Management (non web services)

  1. Meter Data Example EconEnergy
  2. Meter Data Example EconEnergy Aggregate

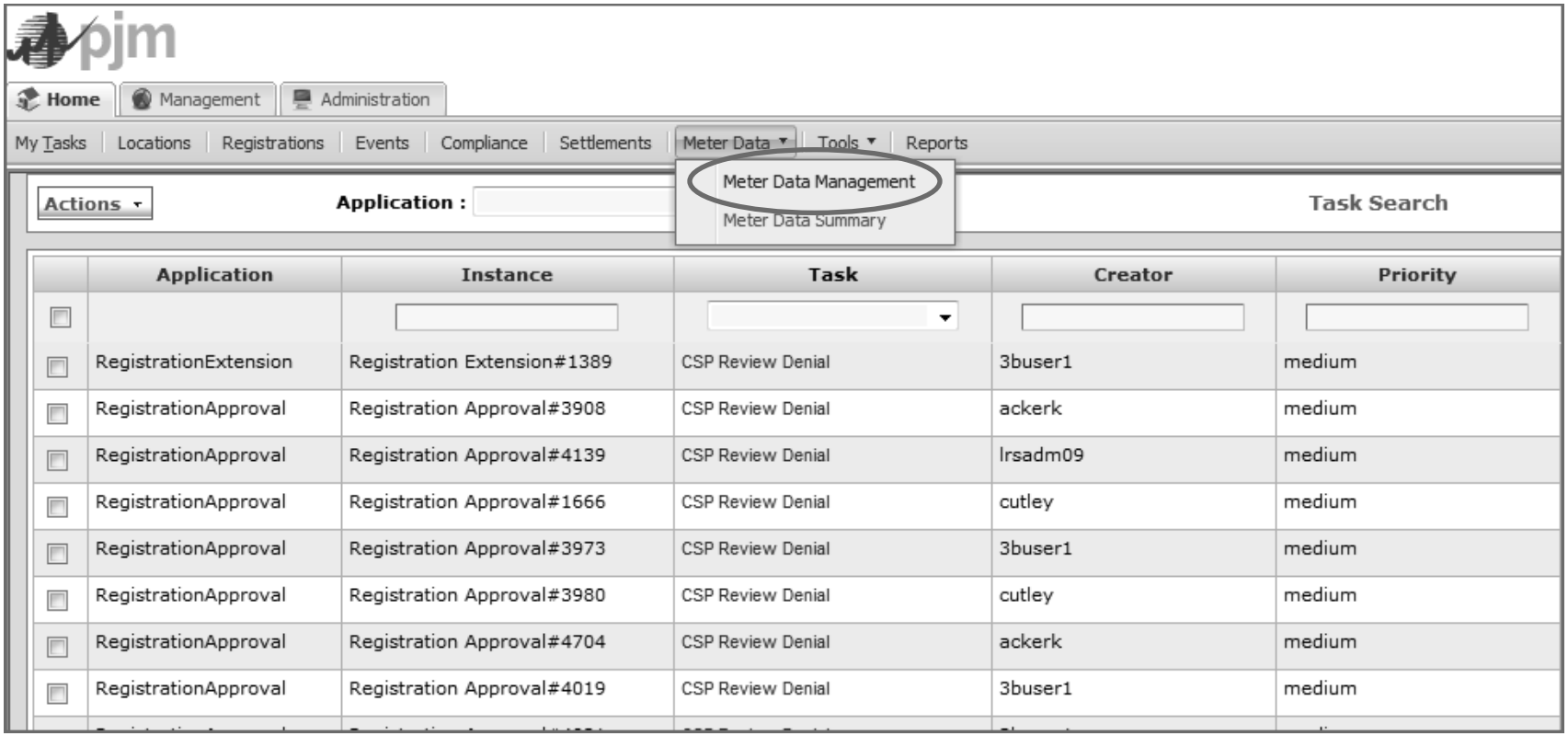
Example of file format for EconEnergy Aggregate

Registration	Account	Date	Type	UOM	HE1	HE2	HE3	HE4	HE5	HE6
R7271	01234567891	5/10/2012	HourlyLoad	KW	4617	4443	4370	4289	4186	4452
R7271	01234567892	5/10/2012	HourlyLoad	KW	2309	2222	2185	2145	2093	2226
R7271	01234567891	5/9/2012	HourlyLoad	KW	200	200	200	200	200	200
R7271	01234567892	5/9/2012	HourlyLoad	KW	100	100	100	100	100	100

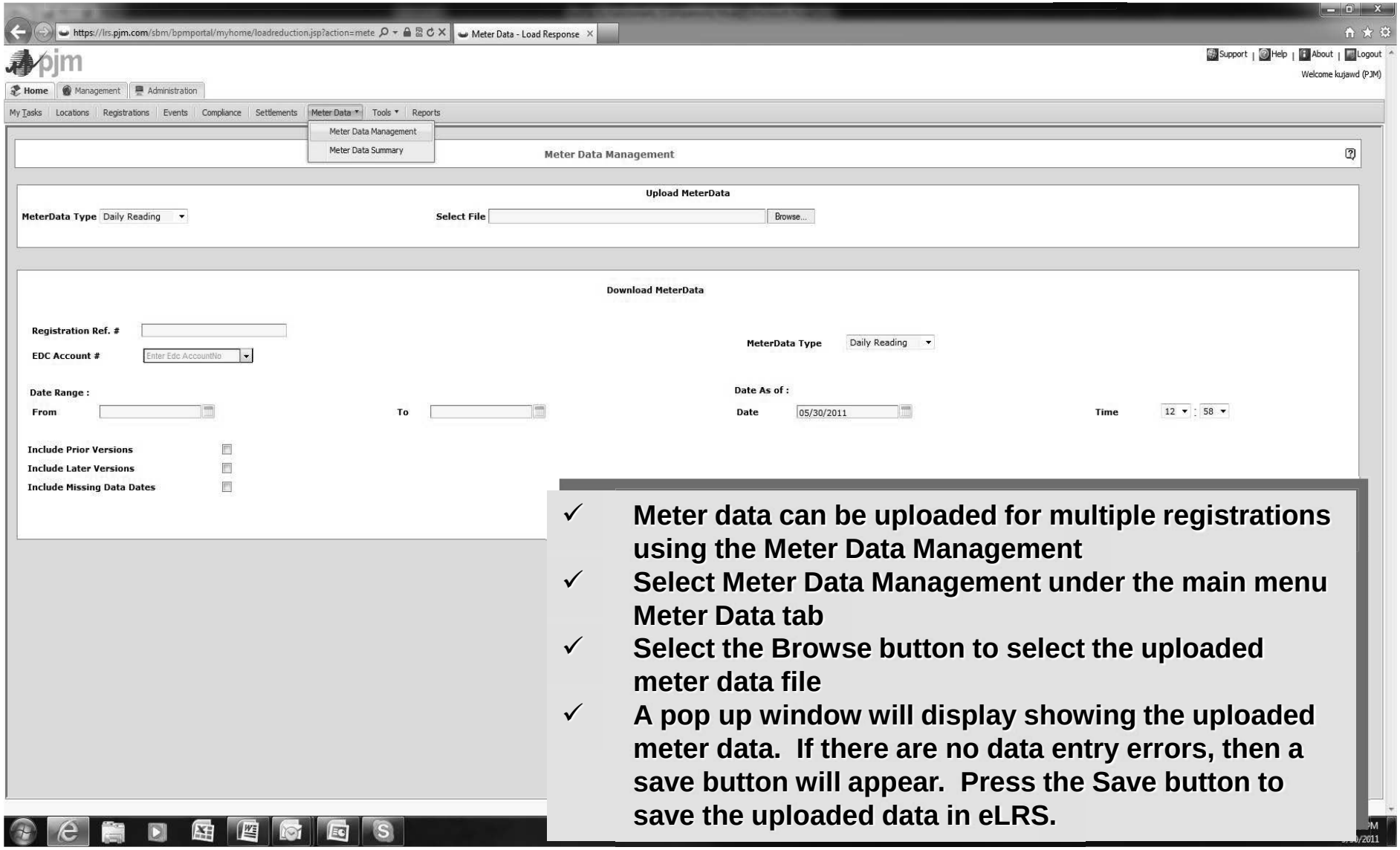
Submit Meter Data Using Meter Data Management

Meter data must first be submitted in order to run the CBL test.

1. Need Registration ID and EDC Account Number(s) to submit hourly meter data
   - **Registration ID from Saved and not Submitted Registrations**
2. Select Meter Data Management under the Meter Data tab to upload meter data



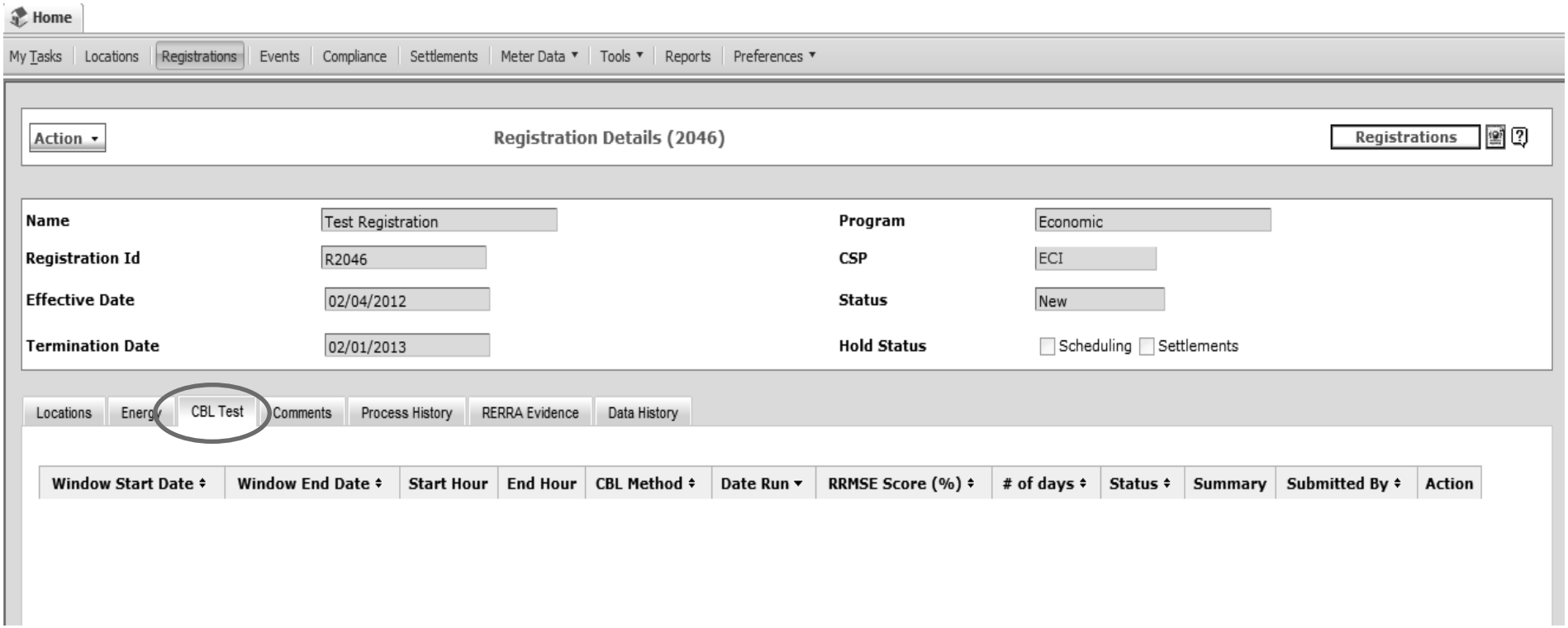
Submit Meter Data Using Meter Data Management



- ✓ **Meter data can be uploaded for multiple registrations using the Meter Data Management**
- ✓ **Select Meter Data Management under the main menu Meter Data tab**
- ✓ **Select the Browse button to select the uploaded meter data file**
- ✓ **A pop up window will display showing the uploaded meter data. If there are no data entry errors, then a save button will appear. Press the Save button to save the uploaded data in eLRS.**

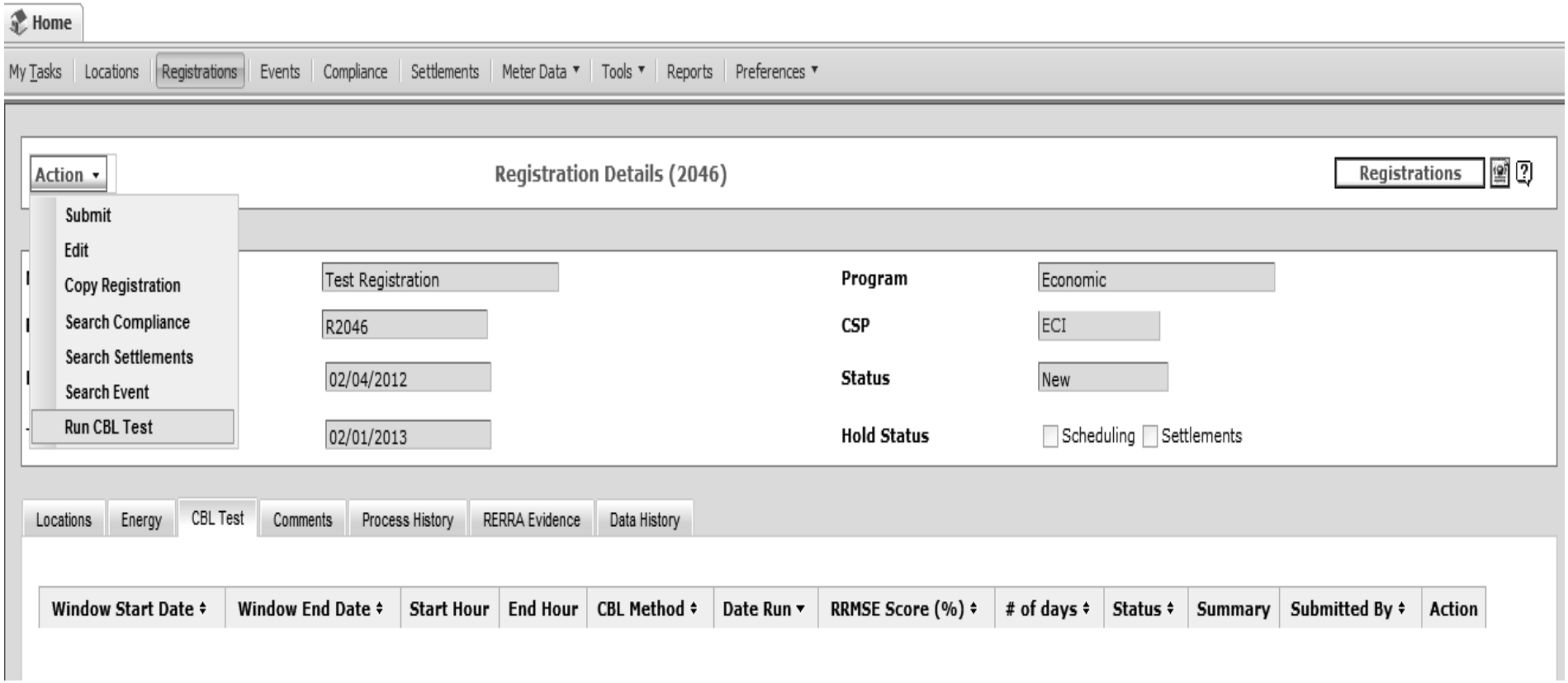
CBL Certification Process – CBL Test

1. Open the Saved registration and go to the CBL Test tab

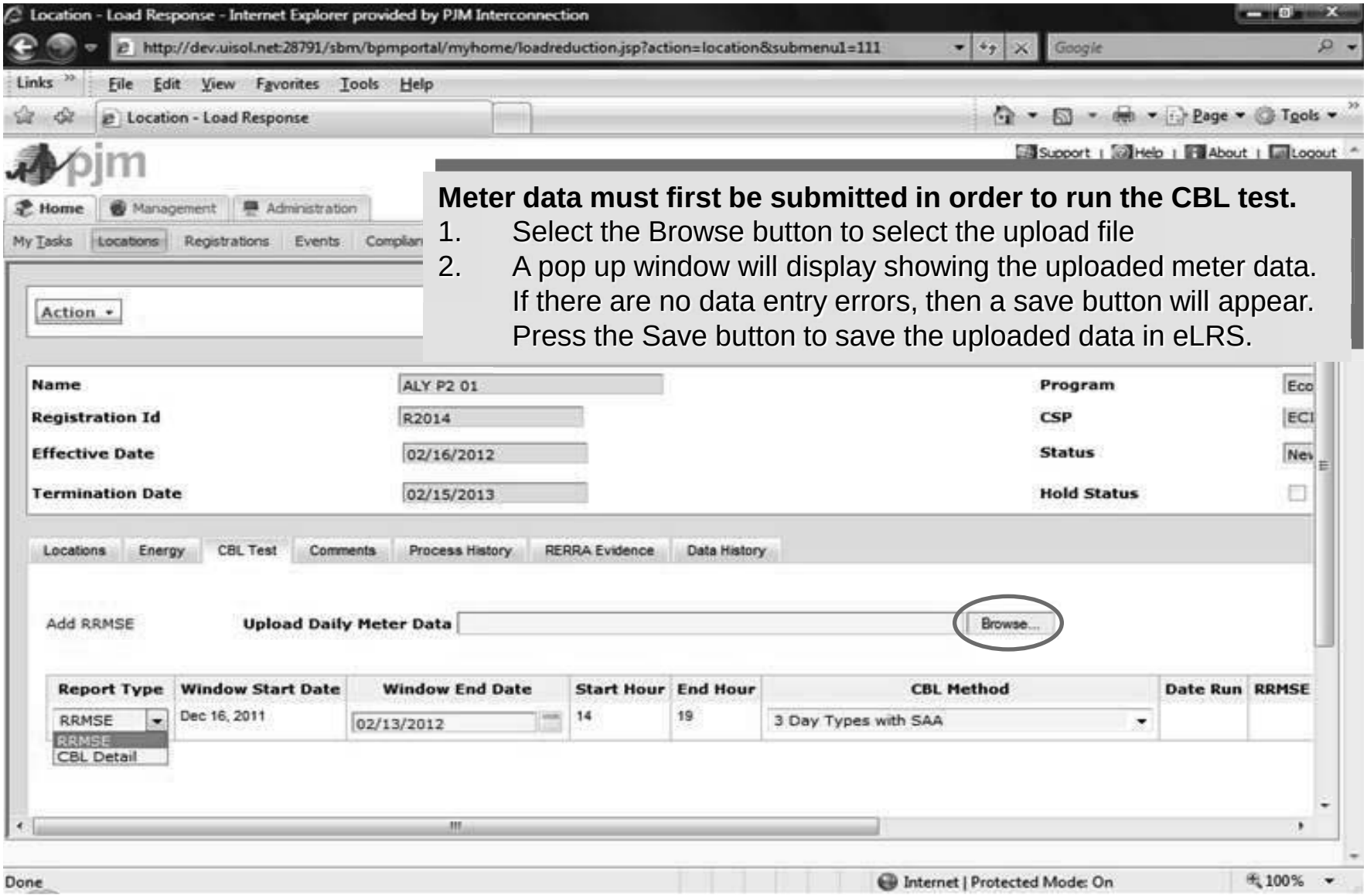


CBL Certification Process – CBL Test

2. Select Run CBL Test under the Action button.



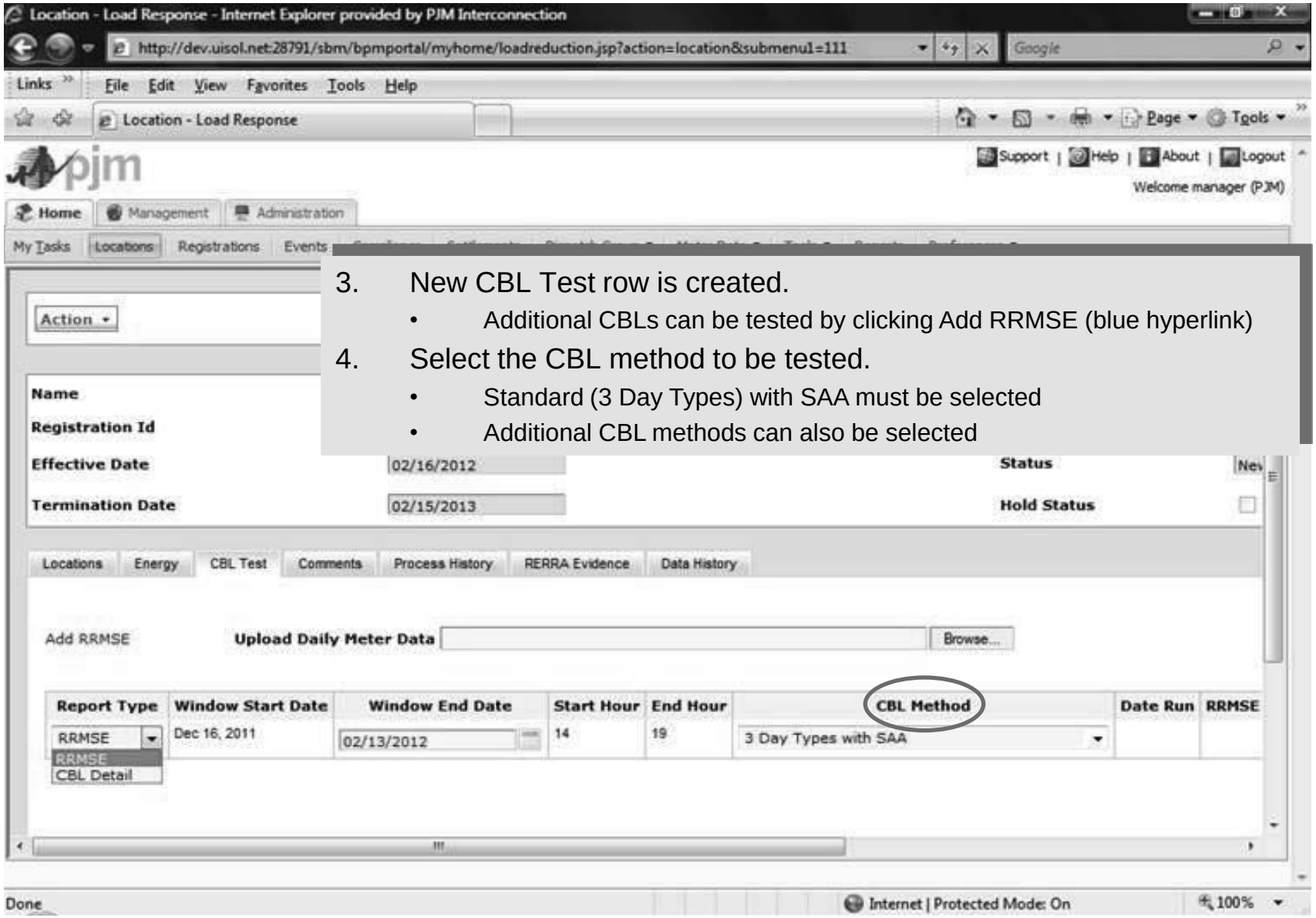
Submit Meter Data From Registration Screen



Meter data must first be submitted in order to run the CBL test.

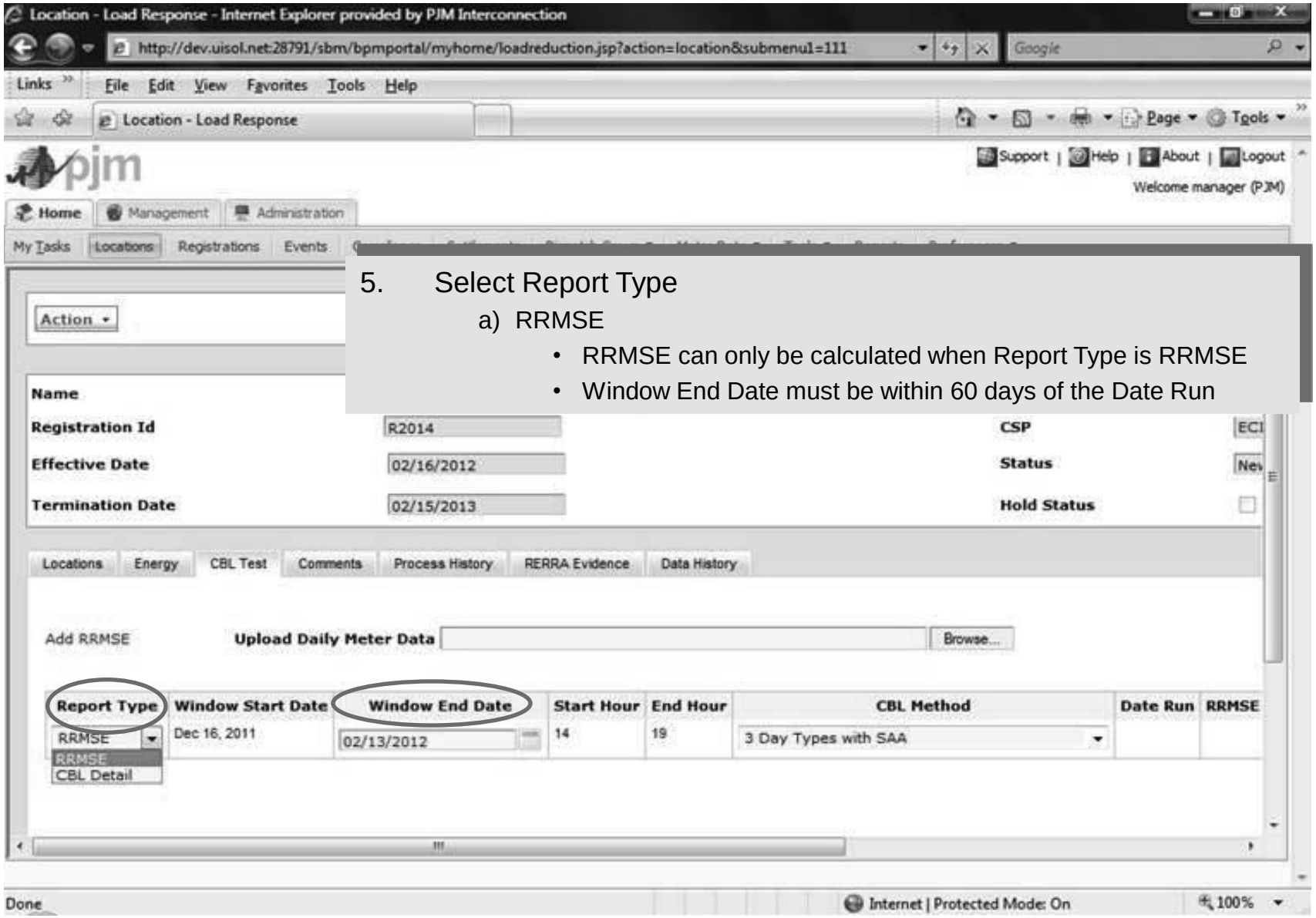
1. Select the Browse button to select the upload file
2. A pop up window will display showing the uploaded meter data. If there are no data entry errors, then a save button will appear. Press the Save button to save the uploaded data in eLRS.

CBL Certification Process – CBL Test



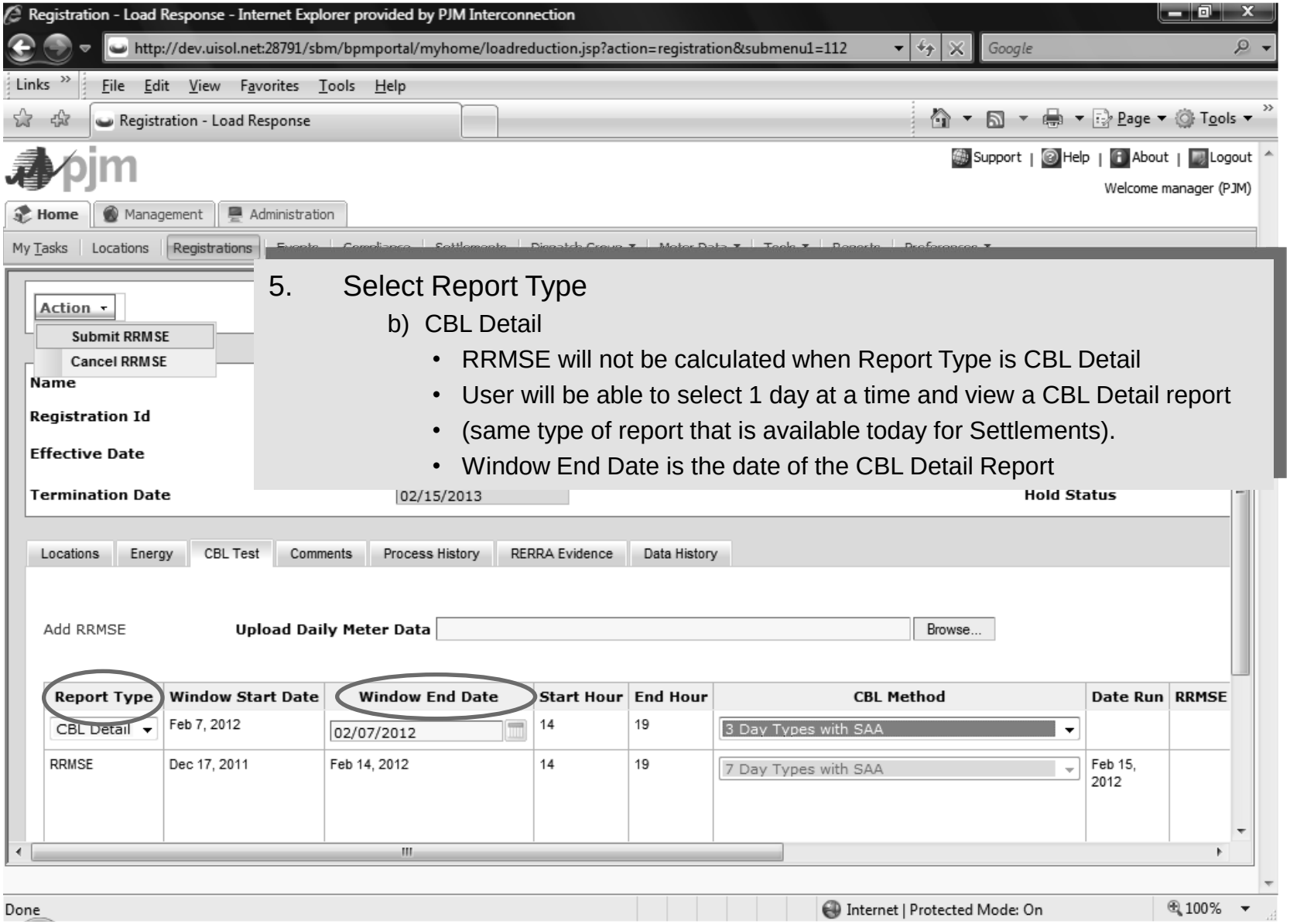
3. New CBL Test row is created.
   - Additional CBLs can be tested by clicking Add RRMSE (blue hyperlink)
4. Select the CBL method to be tested.
   - Standard (3 Day Types) with SAA must be selected
   - Additional CBL methods can also be selected

CBL Certification Process – CBL Test – Report Type



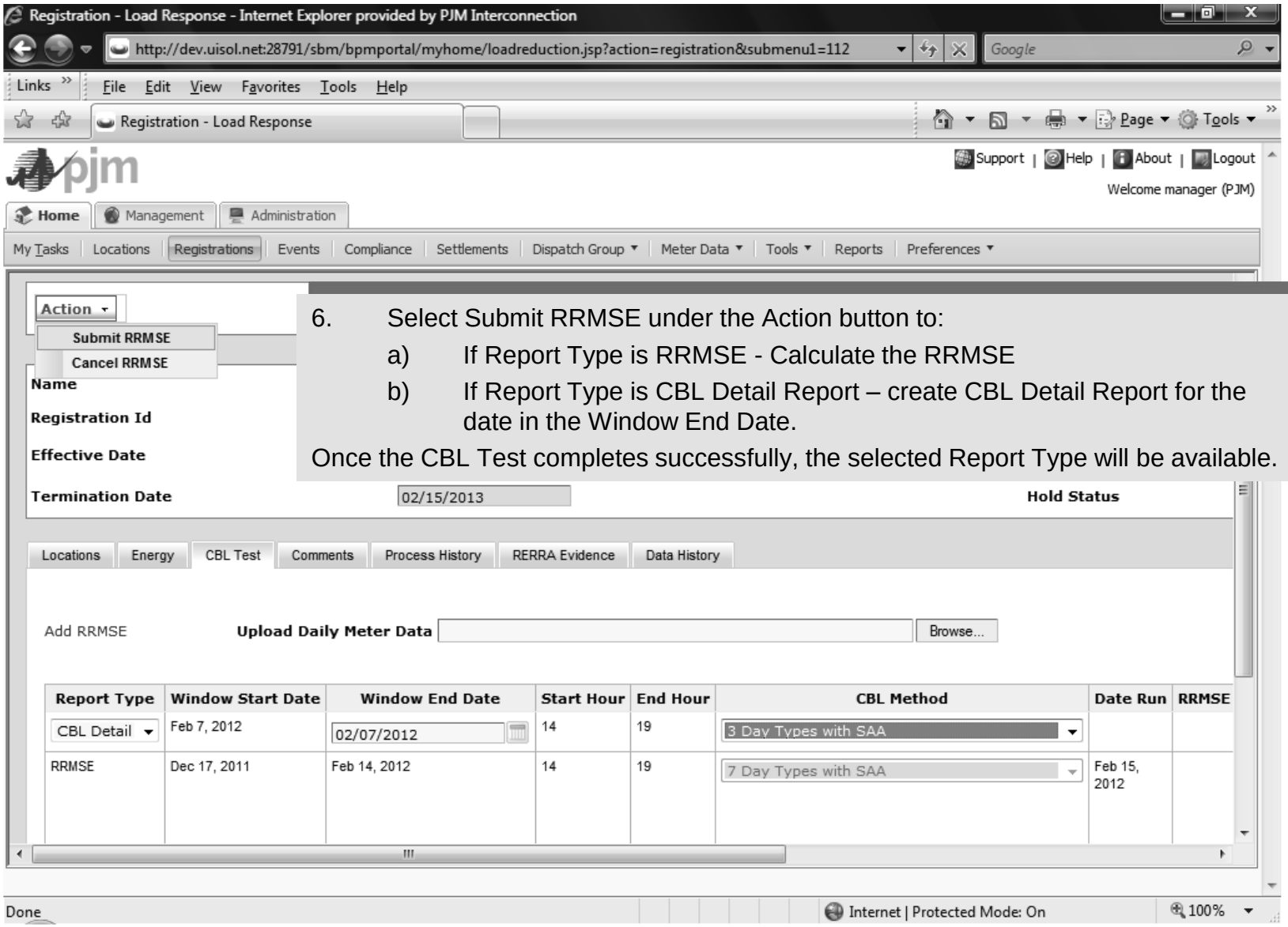
5. Select Report Type
   a) RRMSE
      - RRMSE can only be calculated when Report Type is RRMSE
      - Window End Date must be within 60 days of the Date Run

CBL Certification Process – CBL Test – Report Type



5. Select Report Type
   b) CBL Detail
      - RRMSE will not be calculated when Report Type is CBL Detail
      - User will be able to select 1 day at a time and view a CBL Detail report
      - (same type of report that is available today for Settlements).
      - Window End Date is the date of the CBL Detail Report

CBL Certification Process – CBL Test

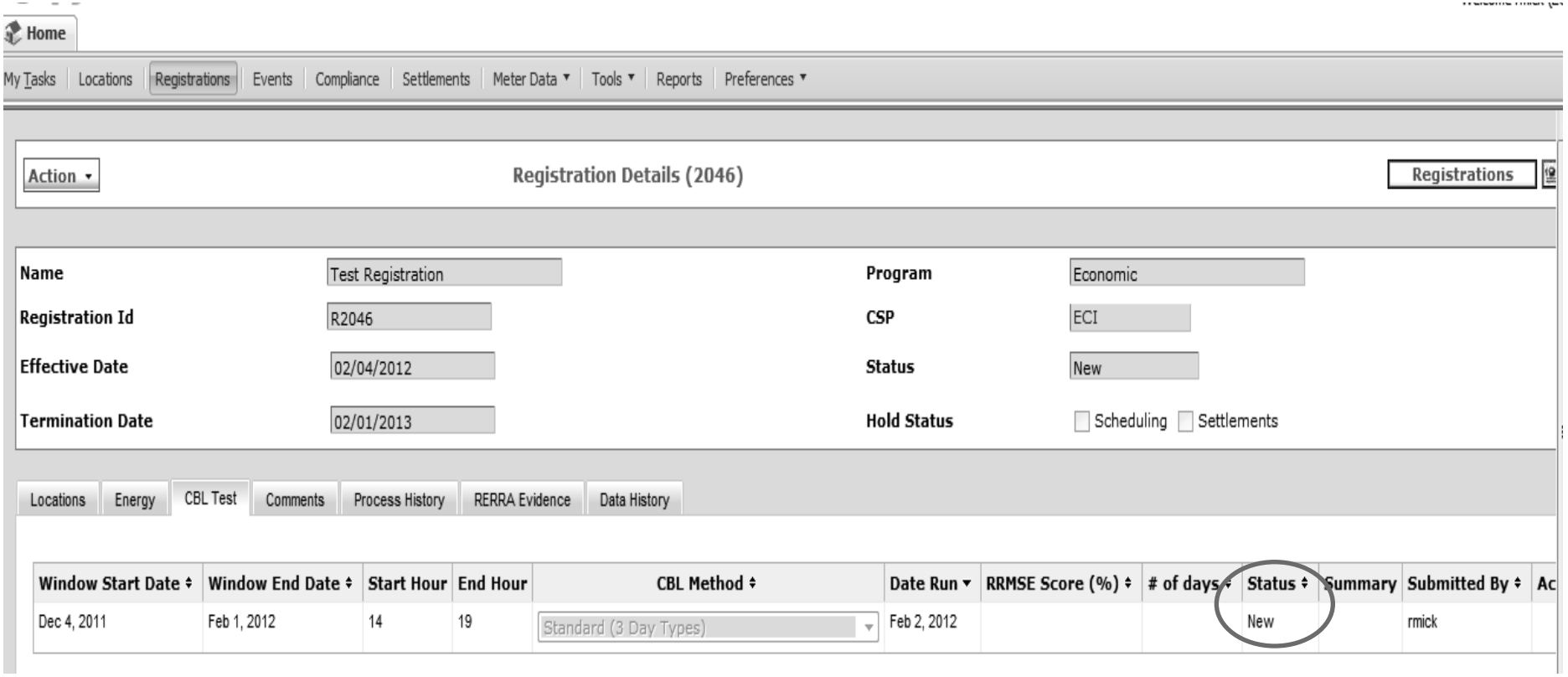


6. Select Submit RRMSE under the Action button to:
   a) If Report Type is RRMSE - Calculate the RRMSE
   b) If Report Type is CBL Detail Report – create CBL Detail Report for the date in the Window End Date.

Once the CBL Test completes successfully, the selected Report Type will be available.

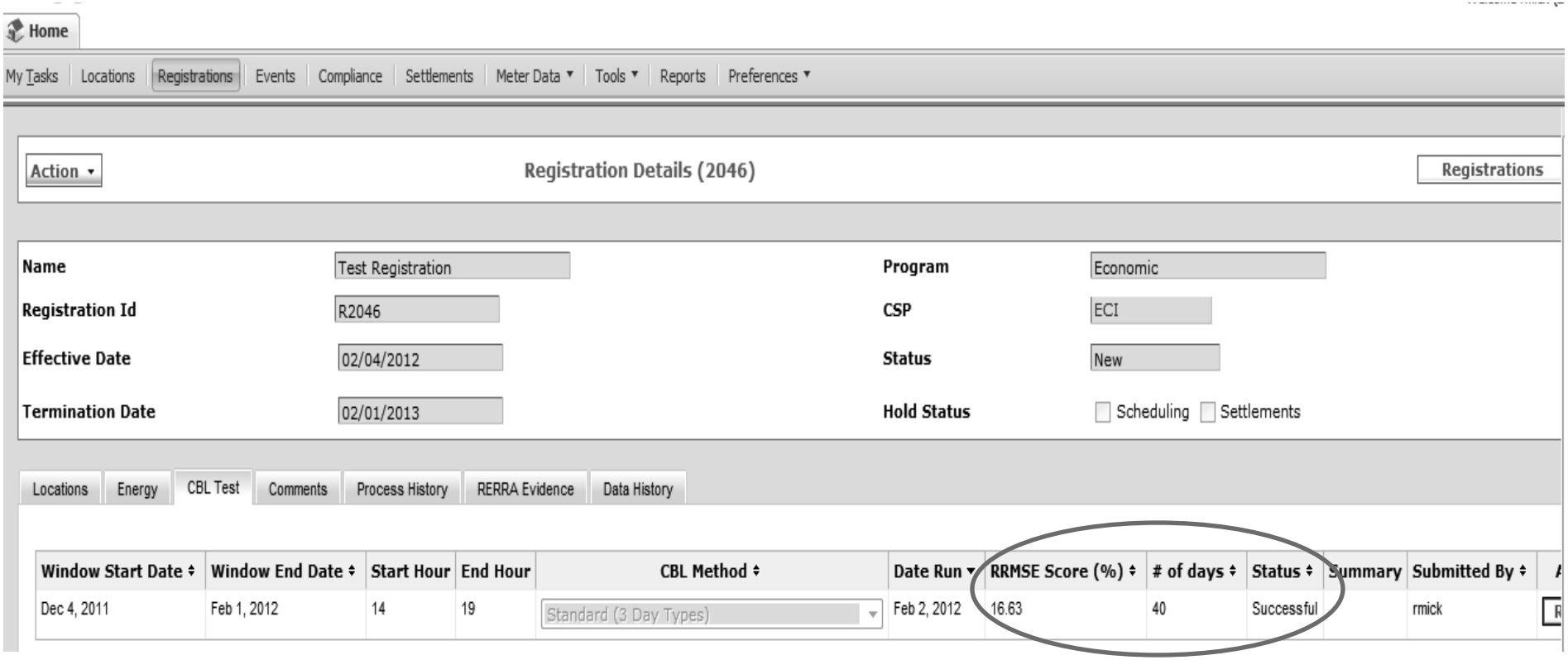
CBL Certification Process – CBL Test

CBL Test Status is New after submission and before the CBL engine picks it up for processing.



CBL Certification Process – CBL Test

- Status is Successful when the calculation finishes without errors.
- RRMSE Score and # of days has been calculated.



CBL Certification Process – CBL Test through Web Services

- Create a new Web Service Noun “cblcalculation”

- **Create CBLCalculation Service:**
  - **Input:** Registration ID, Report type, Start Date, End Date and CBL Method are inputs.
  - **Output:** Success/Unsuccessful – where creation of the request was successful.
  - CSP/OPR with “Manage Registration” or “Manage All” can make this request.
  - StartDate is optional field and is ignored if provided. Start Date is computed as 60 days (configurable) backward from the End Date.
  - Validation:
    - Registration must be economic.
    - User’s Org must be registration’s CSP (or OPR) org
    - User must have manage registration or manage all permission

CBL Certification Process – CBL Test through Web Services

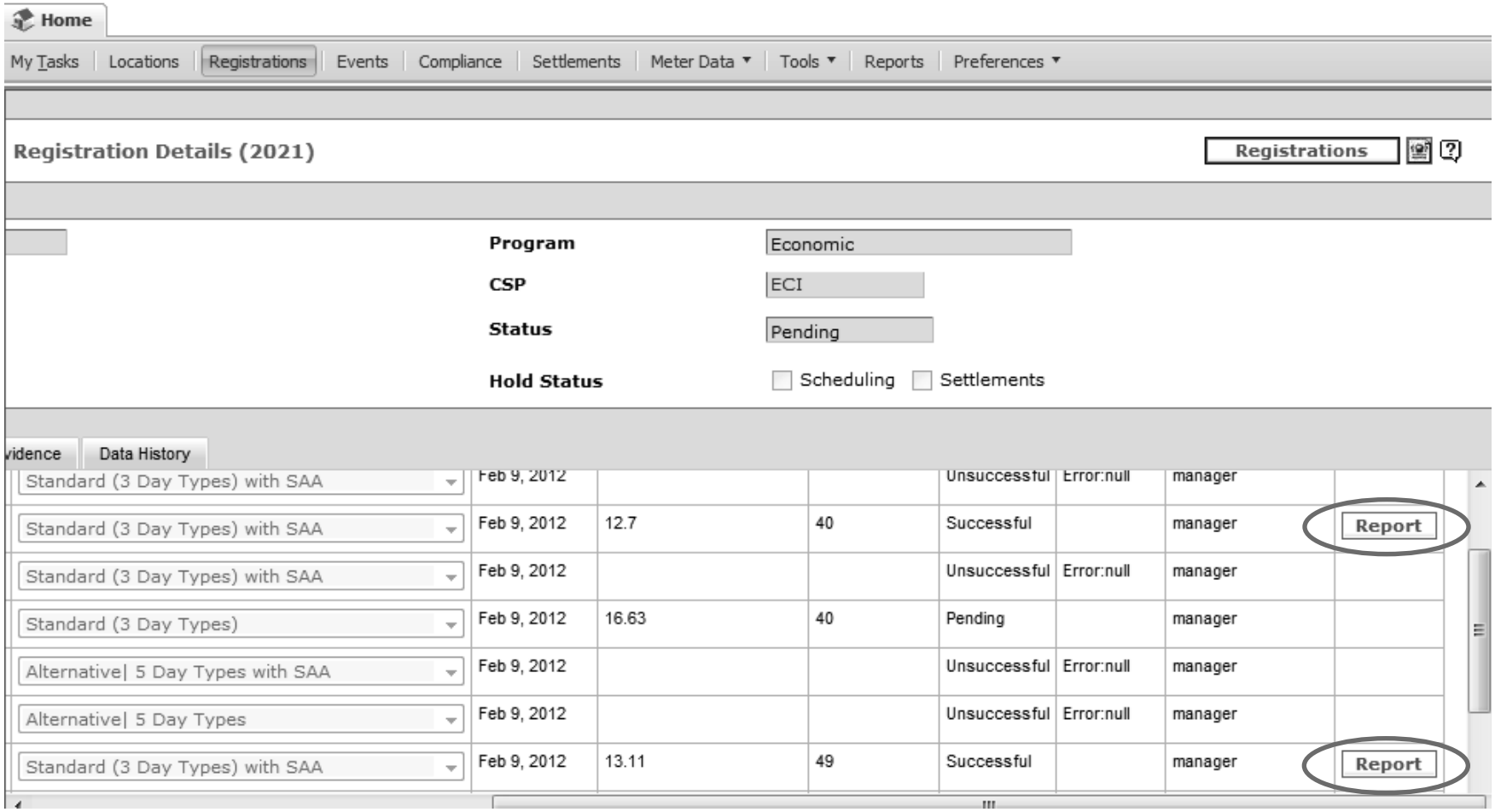
Get CBLCalculation Service:

- **Input:**
  - Registration ID, Report Type (RRMSE or CBL Detail), Status, Start Date, End Date
  - All the input fields are optional.
- **Output: Returns all the CBL Test results.**
  - Report Type, Window Start Date, Window End Date, CBL Method
  - RRMSE, Number of Days, Status,
  - Date Run, Requested By, Summary
- CSP/OPR with "Read Registration" can make this request.
- All the CBL Test requests with Start Date < Window Start Date < End Date

Contact dsr_ops@pjm.com for more details.

CBL Certification Process – CBL Test

- Report types that were previously selected can be viewed by clicking on Report button
- Reports are only generated for Successful CBL Tests



CBL Certification Process – CBL Detailed Report

CBL Detailed Report

User will be able to select 1 day at a time and view a CBL detailed report (same type of report that is available today for settlements).

Summary Tab of CBL Report

Calculated Baseline Report						
RegReference	TestRRMSE23					
Registration	R6648					
Method	Standard3-SAA					
Results	Baseline and reduction calculated successfully					
Updated	4/16/2012 2:52					
Event						
Date	Start HE	End HE		HE1	HE2	HE3
3/16/2012	14	19		N	N	N
Days Evaluated						
Date	Rejection	Note	Type	HE1	HE2	HE3
3/16/2012	Event Day		Fri	135.75	137.85	138.6
3/15/2012	High/Low D		Thu			
3/14/2012	Included		Wed	119.04	120.66	133.68
3/13/2012	Included		Tue	129.66	129.99	138.6
3/12/2012	Included		Mon	151.29	165.06	168.24
3/11/2012	Wrong Day	DST Day	Sun			
3/10/2012	Wrong Day		Sat			
3/9/2012	Included		Fri	147.03	148.89	161.52
Results						
Date	Name			HE1	HE2	HE3
3/16/2012	RawBaseline			136.755	141.15	150.51
3/16/2012	Adjustments			0	0	0
3/16/2012	Baseline			136.755	141.15	150.51
3/16/2012	Measurement			135.75	137.85	138.6
3/16/2012	Reduction			0	0	0

HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21
N	Y	Y	Y	Y	Y	Y	N	N
HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21
540.57	450.84	423.63	281.52	213.21	166.83	148.62	138.42	132.96
515.43	469.35	441.03	315.15	246.78	196.68	179.76	151.86	142.02
533.7	485.46	466.17	319.59	258.03	226.83	201.9	156.15	141.81
515.73	462.93	447.21	341.13	267.75	222.24	204.06	167.01	158.13
539.13	487.98	444.57	329.52	273.75	253.56	236.34	181.41	168.78
HE13	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21
525.9975	476.43	449.745	326.3475	261.5775	224.8275	205.515	164.1075	152.685
0	25.92993	25.92993	25.92993	25.92993	25.92993	25.92993		
525.9975	502.3599	475.6749	352.2774	287.5074	250.7574	231.4449	164.1075	152.685
540.57	450.84	423.63	281.52	213.21	166.83	148.62	138.42	132.96
0	51.51993	52.04492	70.75745	74.29744	83.92743	82.82492	0	0

CBL Certification Process - RRMSE Report

RRMSE Report

RegID	Customer	Date	HOUR Ending	Type	Baseline Hourly Loads (kW)	Actual Hourly Loads (kW)	Error	Square Error
1123	Jones Hospital	5/1/11	14	Sun	508	492	16	256
1123	Jones Hospital	5/1/11	15	Sun	520	494	26	676
1123	Jones Hospital	5/1/11	16	Sun	517	500	17	289
1123	Jones Hospital	5/1/11	17	Sun	506	502	4	16
1123	Jones Hospital	5/1/11	18	Sun	488	502	-14	196
1123	Jones Hospital	5/1/11	19	Sun	461	481	-20	400
1123	Jones Hospital	4/30/11	14	Sat	83	64	19	361
1123	Jones Hospital	4/30/11	15	Sat	82	59	23	529
1123	Jones Hospital	4/30/11	16	Sat	72	38	34	1156
1123	Jones Hospital	4/30/11	17	Sat	53	47	6	36
1123	Jones Hospital	4/30/11	18	Sat	47	5	42	1764
1123	Jones Hospital	4/30/11	19	Sat	35	5	30	900
1123	Jones Hospital	4/29/11	14	Fri	349	326	23	529
1123	Jones Hospital	4/22/11	14	Fri	6397	7165	-768	589824
1123	Jones Hospital	4/22/11	15	Fri	6377	7098	-721	519841
1123	Jones Hospital	4/22/11	16	Fri	6322	7047	-725	525625
1123	Jones Hospital	4/22/11	17	Fri	6308	6918	-610	372100
1123	Jones Hospital	4/22/11	18	Fri	6411	6799	-388	150544
1123	Jones Hospital	4/22/11	19	Fri	6343	6820	-477	227529
							Average Pct Error	-2%
							RRMSE	16.36%

CBL Certification Process – Submit CBL Review

CSP can initiate a "CBL Review Task" for PJM to review CBL exception for one of the following reasons and then be able to submit the registration for approval:

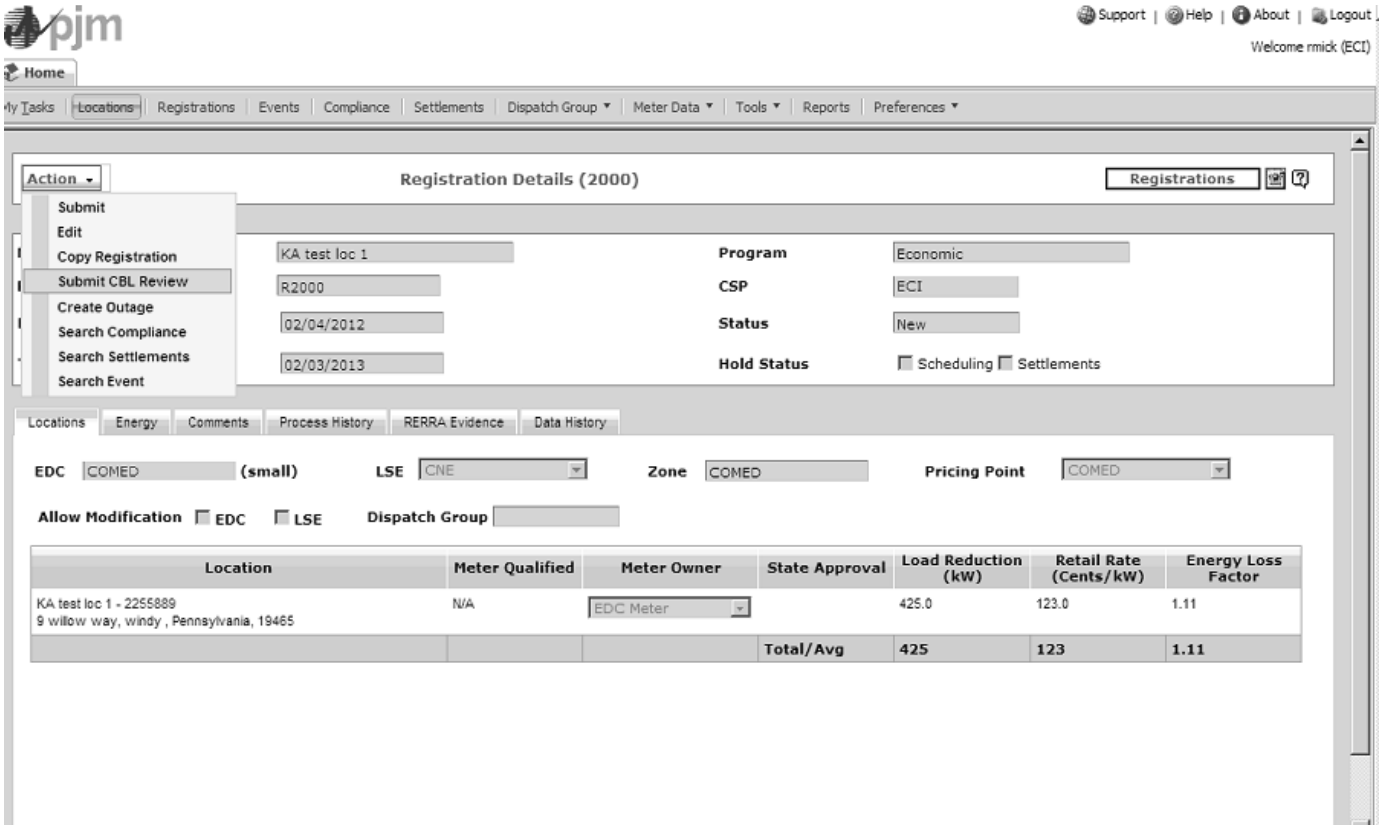
i. RRMSE >20%

ii. Alternative CBL RRMSE > Default CBL RRMSE

iii. Insufficient load data (not able to get 30 CBL Test Days)

iv. Outdated load data (most current load data is older than 60 days from current date)

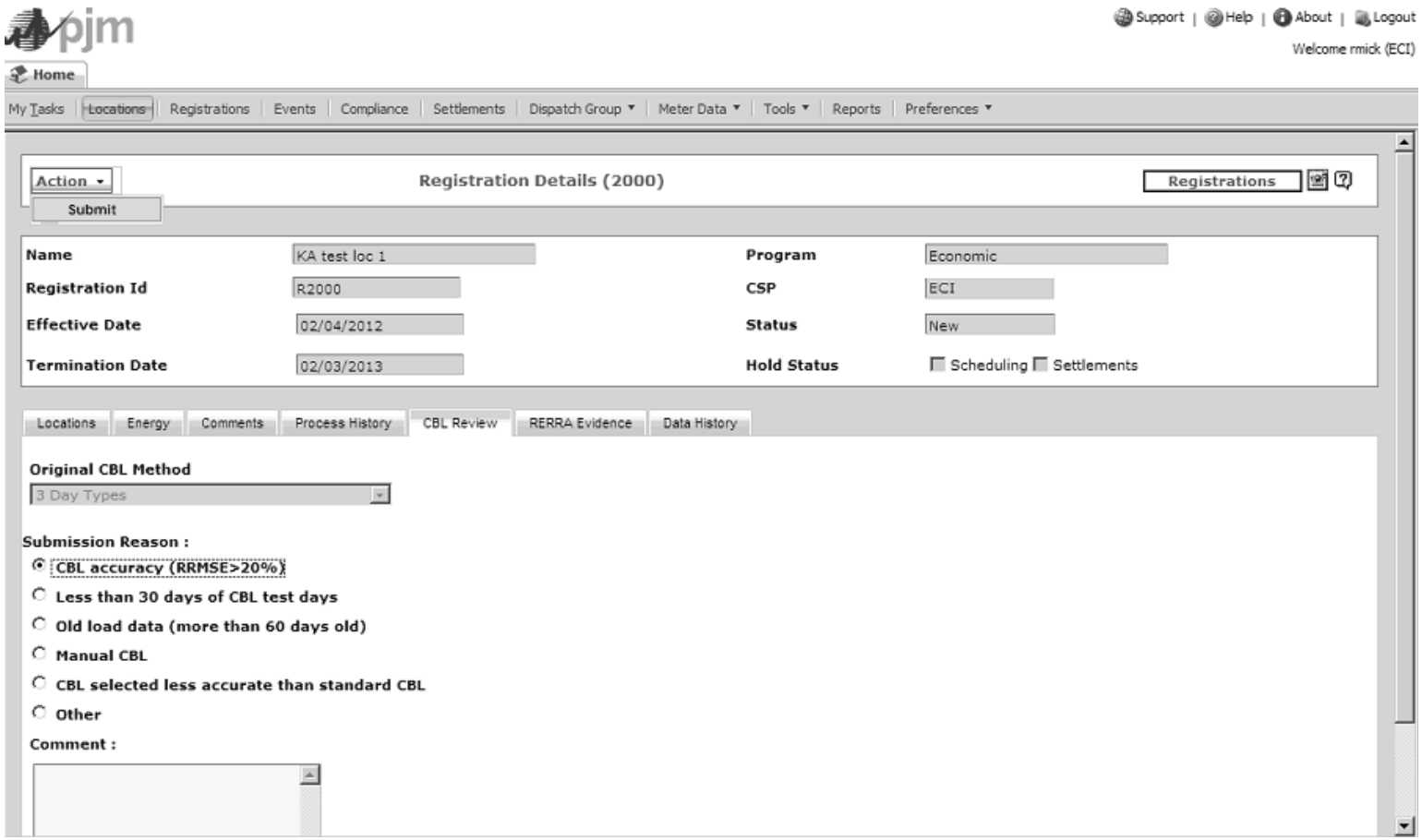
v. Use of Manual CBL.



CBL Certification Process – Submit CBL Review

CSP should only request an exception to the Standard CBL if the exception more accurately reflects what the load would have been absent the reduction.

1. Select the radio button under the Submission Reason and add an optional comment.
   - Adding a comment will aid Demand Response personnel in the analysis
2. Select Submit under the Action button.

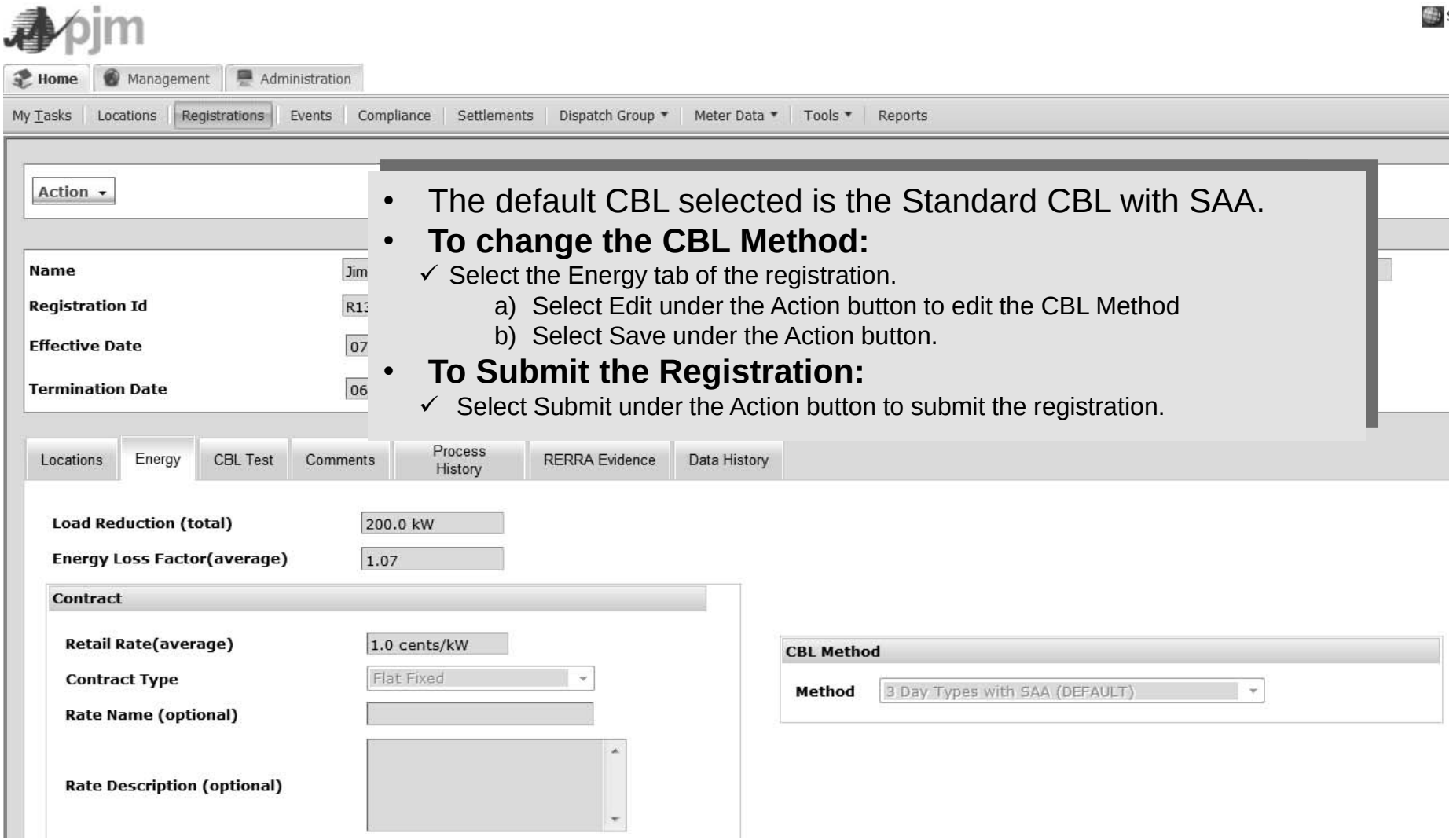


CBL Certification Process – Submit Registration

- When there are multiple CBLs tested, the CSP may select the CBL used for the registration as long as the RRMSE of the selected CBL is <= 20% with 30 CBL test days **AND** the RRMSE of the selected CBL is less than the RRMSE for the Standard CBL with SAA.

- If CBL Exception is approved by PJM then the CSP may submit the registration.

Change CBL Method and Submit Registration



- The default CBL selected is the Standard CBL with SAA.
- **To change the CBL Method:**
  - ✓ Select the Energy tab of the registration.
    a) Select Edit under the Action button to edit the CBL Method
    b) Select Save under the Action button.
- **To Submit the Registration:**
  - ✓ Select Submit under the Action button to submit the registration.

CBL

A CBL is a proxy for what the load would have been absent the load reduction. How much load data is required to calculate the CBL?

- ❑ 1 Day
- ❑ 5 Days
- ❑ It depends

Demand Side Response Question

The purpose of the SAA is to adjust the CBL to current load conditions prior to the load reduction event?

a) True
b) False

Agenda

- Introduction
- Economic Registrations
- On-Site Generation
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- Dispatch Groups
- Economic Participation
- Economic Settlements
- Appendix

Dispatch Groups

- **Dispatch Groups**
- Dispatch Groups can be created in eLRS for Economic participation in eMKT.
- The Dispatch Groups allows the CSP to create a single offer for a group of registrations for economic participation.
  - Day-Ahead Market
  - Balancing Market
  - Both

Dispatch Groups

Rules for creating Dispatch Groups in eLRS:

1. Same CSP, Zone and Pricing Point.
2. Registrations participating in Ancillary Services (SR, DASR, Regulation) will not be permitted in Dispatch Group.
3. Registration cannot be in a Dispatch Group and as a standalone registration. This will ensure that each registration is only available to bid once in the market and avoid duplications.
4. PJM will create LSE negative Load Response bids for DR that clears in DA market for Dispatch Group based on registration DR load reduction capability.
5. Registrations must be confirmed before they may be added to a Dispatch Group.
6. Registrations may not be added to a Dispatch Group if they have an open OPR CBL Review task.
7. Registration that clears in DA market is not allowed to be assigned to Dispatch Group on same day it cleared in DA market. If CSP does try to assign to Dispatch Group on such day then PJM will remove (because this may create conflict between single registration that cleared in DA market and Dispatch Group that may be dispatched in RT for same Operating Day)

Dispatch Groups

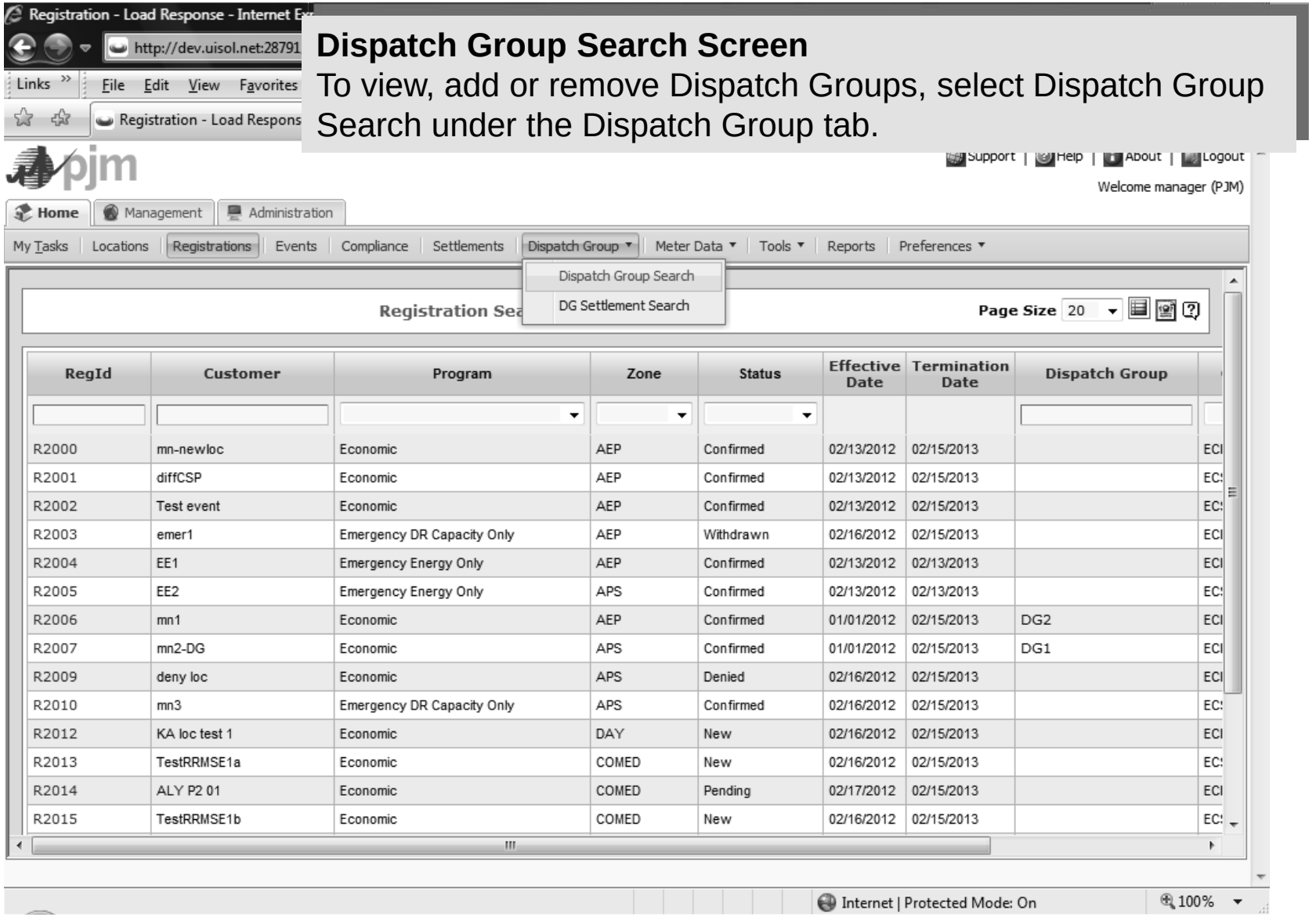
Dispatch Groups are bridged from eLRS to eMKT

1. Dispatch Groups must still be assigned to Portfolios
2. Use a single Schedule and all associated Schedule parameters to represent the Dispatch Group
3. DSR Schedules cannot be changed when the Market is closed
4. Use a single DSR Hourly Updates and all associated DSR Detail to represent the Dispatch Group
5. The CSP is responsible for ensuring that at least 1 registration is in a Dispatch Group when they bid in eMKT
6. **Dispatch Groups should not be changed while Dispatch Group is in active dispatch**

Dispatch Group Notification when Dispatched by PJM

1. Dispatch notification is on the Dispatch Group level. The registrations that comprise the Dispatch Group will not be part of the notification

Dispatch Groups

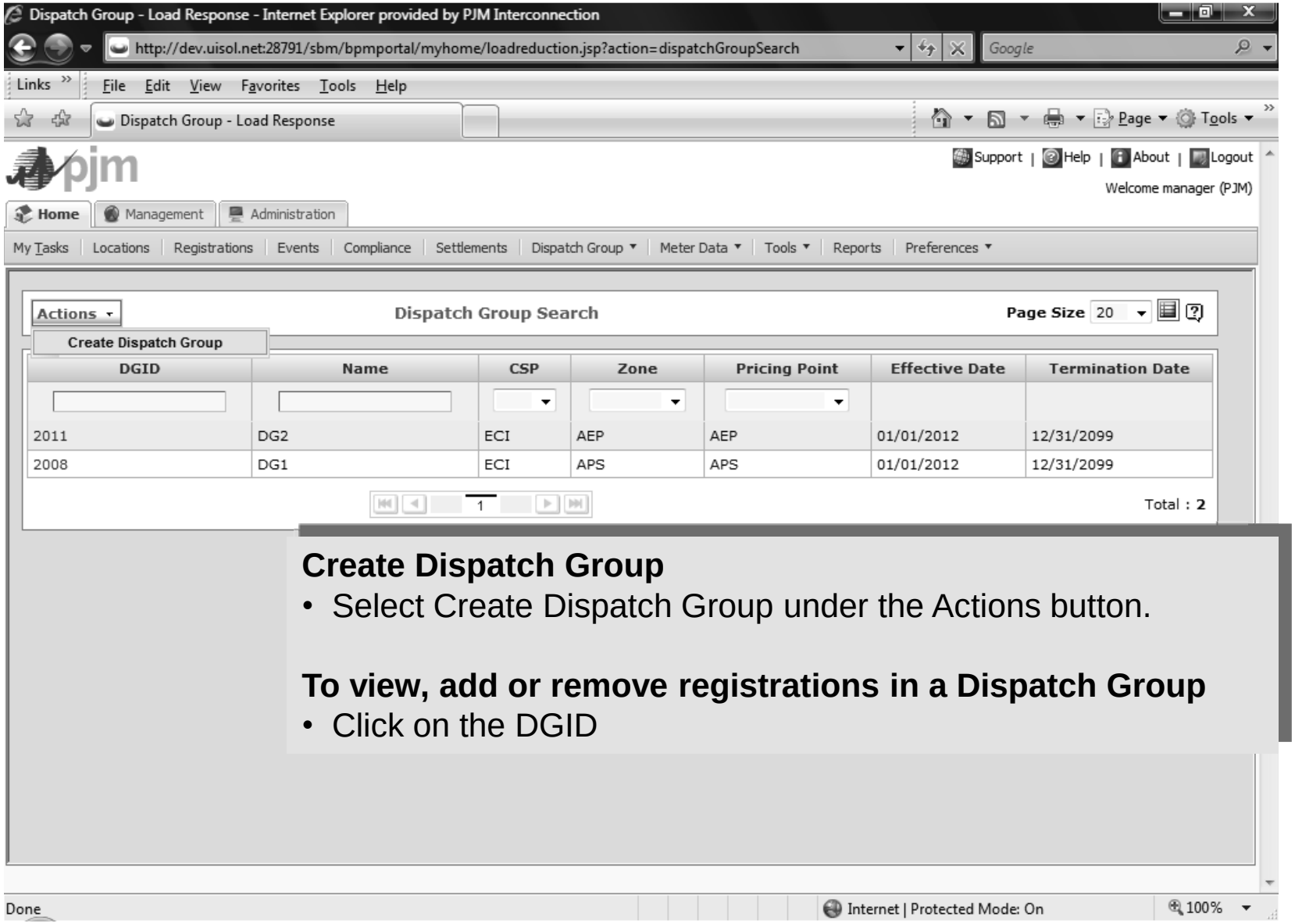


Dispatch Group Search Screen

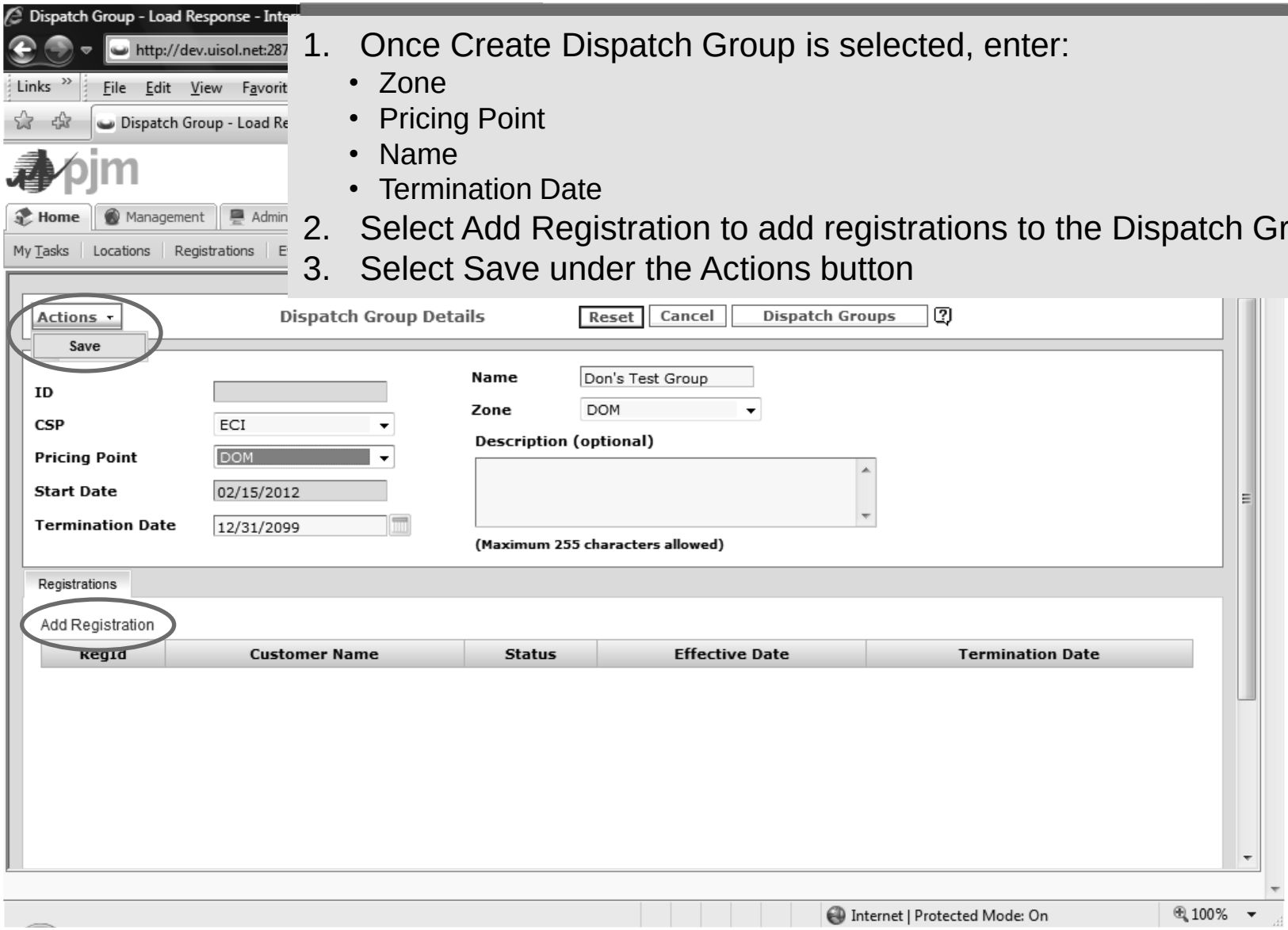
To view, add or remove Dispatch Groups, select Dispatch Group Search under the Dispatch Group tab.

RegId	Customer	Program	Zone	Status	Effective Date	Termination Date	Dispatch Group
R2000	mn-newloc	Economic	AEP	Confirmed	02/13/2012	02/15/2013	
R2001	diffCSP	Economic	AEP	Confirmed	02/13/2012	02/15/2013	
R2002	Test event	Economic	AEP	Confirmed	02/13/2012	02/15/2013	
R2003	emer1	Emergency DR Capacity Only	AEP	Withdrawn	02/16/2012	02/15/2013	
R2004	EE1	Emergency Energy Only	AEP	Confirmed	02/13/2012	02/13/2013	
R2005	EE2	Emergency Energy Only	APS	Confirmed	02/13/2012	02/13/2013	
R2006	mn1	Economic	AEP	Confirmed	01/01/2012	02/15/2013	DG2
R2007	mn2-DG	Economic	APS	Confirmed	01/01/2012	02/15/2013	DG1
R2009	deny loc	Economic	APS	Denied	02/16/2012	02/15/2013	
R2010	mn3	Emergency DR Capacity Only	APS	Confirmed	02/16/2012	02/15/2013	
R2012	KA loc test 1	Economic	DAY	New	02/16/2012	02/15/2013	
R2013	TestRRMSE1a	Economic	COMED	New	02/16/2012	02/15/2013	
R2014	ALY P2 01	Economic	COMED	Pending	02/17/2012	02/15/2013	
R2015	TestRRMSE1b	Economic	COMED	New	02/16/2012	02/15/2013	

Create a Dispatch Group



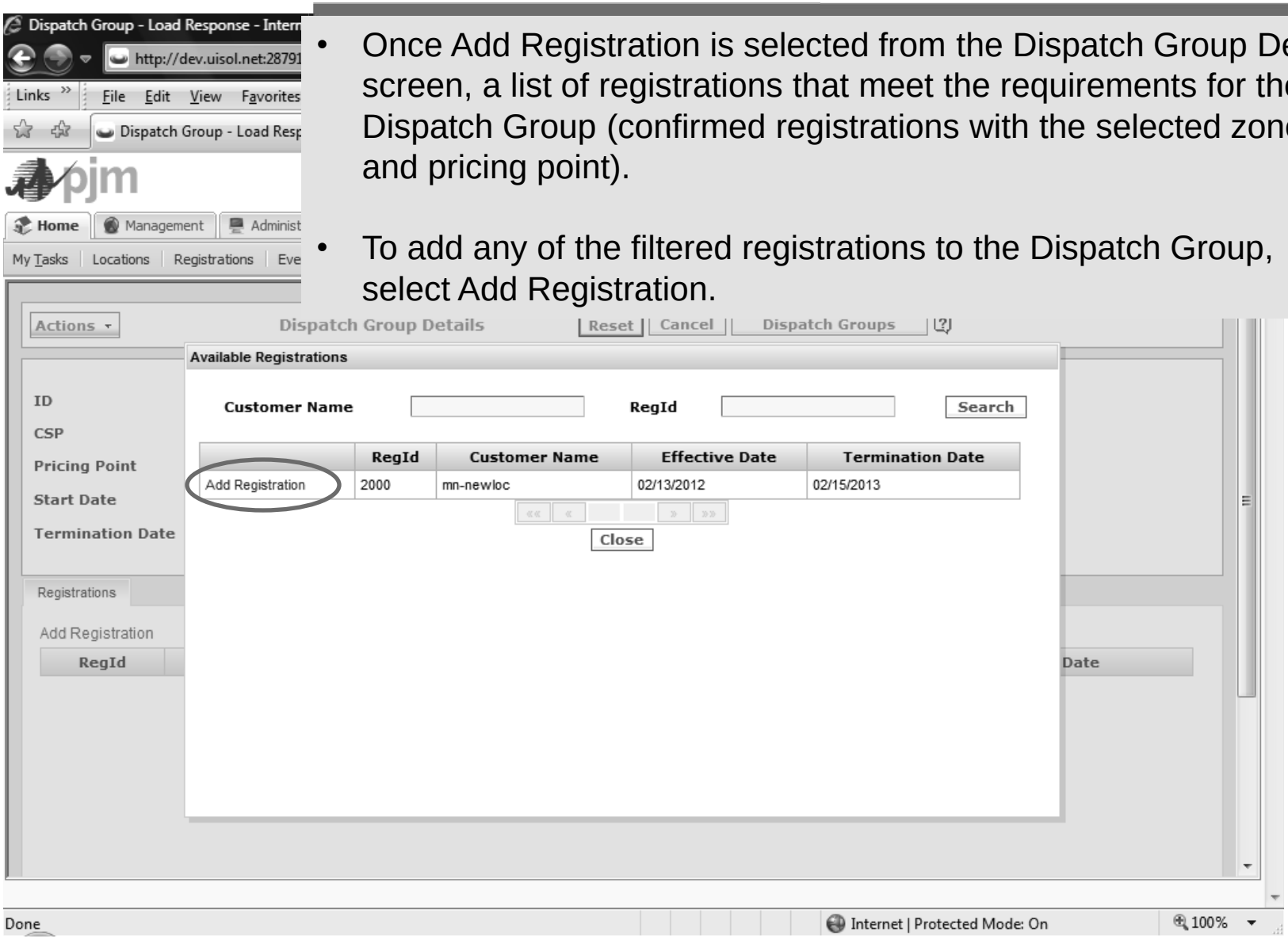
Create a Dispatch Group



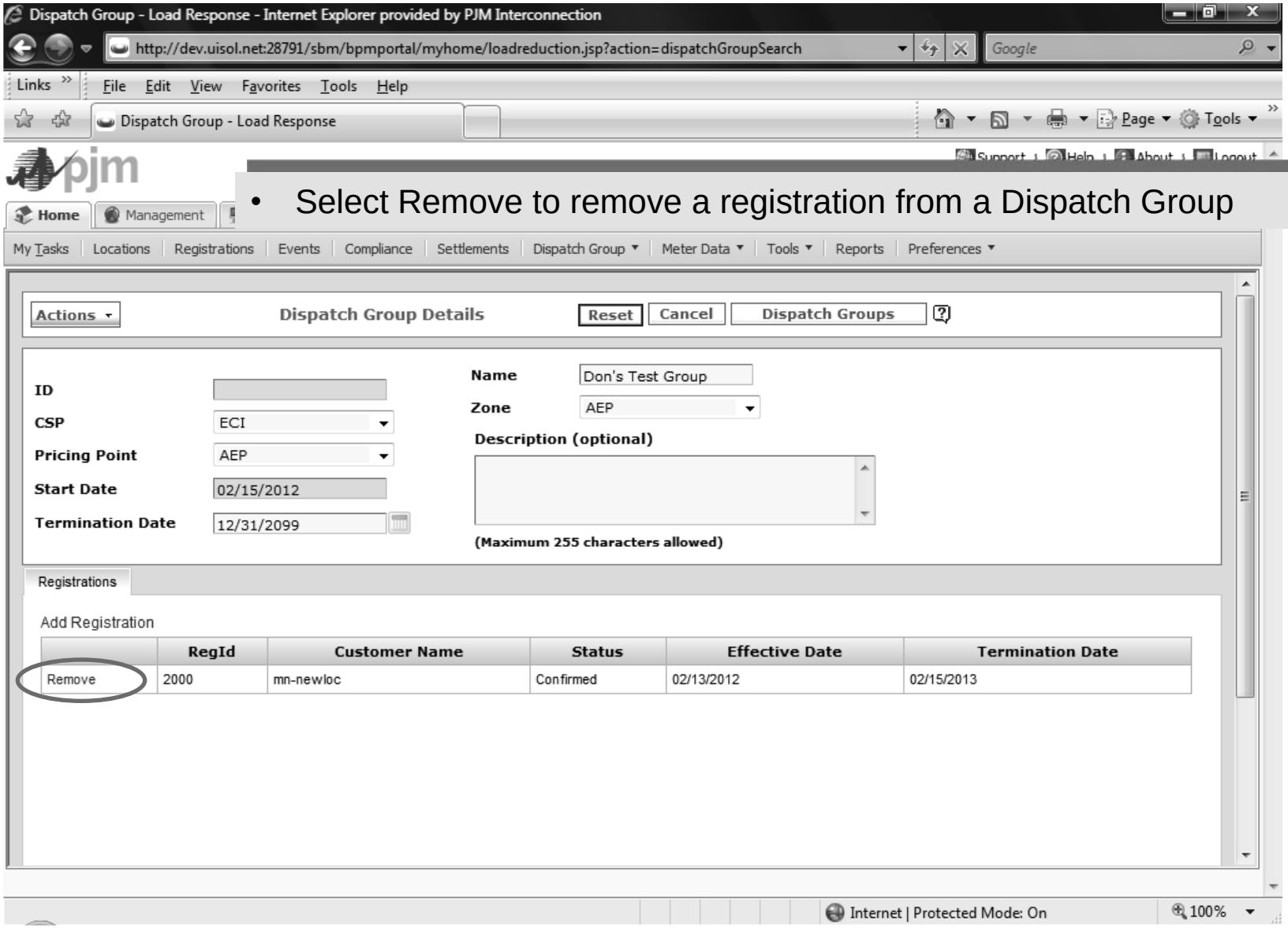
1. Once Create Dispatch Group is selected, enter:
   - Zone
   - Pricing Point
   - Name
   - Termination Date
2. Select Add Registration to add registrations to the Dispatch Group
3. Select Save under the Actions button

Add Registrations to a Dispatch Group

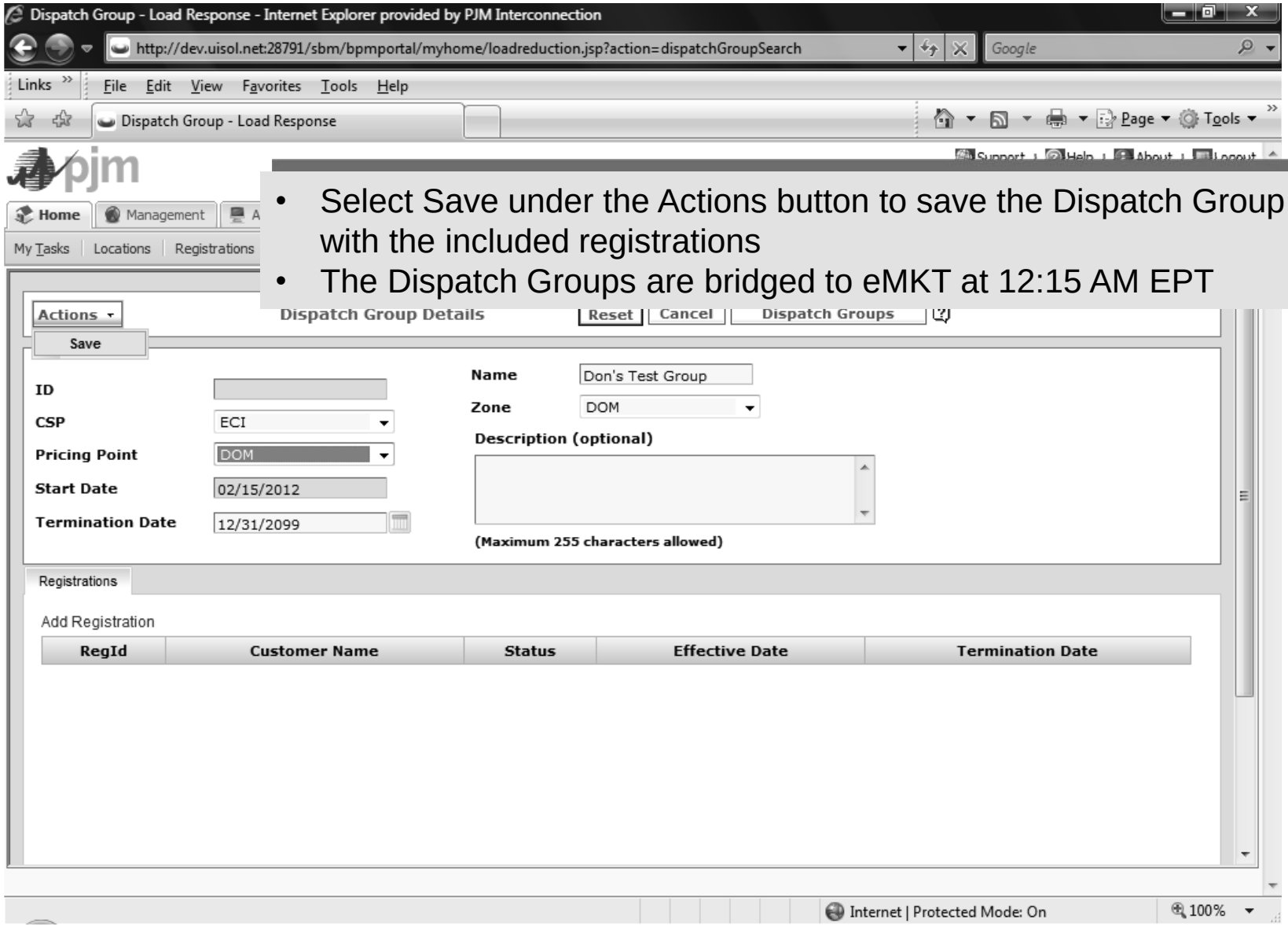
- Once Add Registration is selected from the Dispatch Group Details screen, a list of registrations that meet the requirements for the Dispatch Group (confirmed registrations with the selected zone and pricing point).
- To add any of the filtered registrations to the Dispatch Group, select Add Registration.



Remove Registrations from a Dispatch Group



Save a Dispatch Group



- Select Save under the Actions button to save the Dispatch Group with the included registrations
- The Dispatch Groups are bridged to eMKT at 12:15 AM EPT

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Refer to Demand Response Offer Administration in eMKT training

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Economic Load Response – General Rules

1. Payments to CSP
   a) Reduction * LMP (when LMP at pricing point >= Net Benefits Price)

2. When the LMP at the pricing point is greater than or equal to the Net Benefits Price then the cost of Economic Demand Response settlements will be allocated to all of the Market participants with real-time exports from PJM and LSE's within a zone that has an LMP greater than or equal to the Net Benefits Price.

3. No requirement to participate in the Day-Ahead Market
   a) If cleared, then Balancing Operating Reserve charges will be assessed based on deviations greater than 20% between real time curtailments and cleared day ahead MW.

4. No requirement to participate in the Real-Time Market
   a) If dispatched, then Balancing Operating Reserve charges will be assessed based on deviations greater than 20% between real time curtailments and dispatched MW.

Net Benefits Test

DR is compensated at full LMP when two conditions are met:

1. DR has the capability to balance supply and demand; and
2. Payment of LMP to DR is cost effective.

Cleared or dispatched DSR resources balance supply and demand. Payment of LMP to DR is cost effective when the LMP of the cleared or dispatched DSR is greater than or equal to the Net Benefits Price.

The net benefits test to define a threshold point on the PJM Supply curve where the net benefit exceeds the cost to load. The net benefit is the point where elasticity is equal to 1.

- *Generally, an "elastic" variable is one which responds "a lot" to small changes in other parameters. Similarly, an "inelastic" variable describes one which does not change much in response to changes in other parameters.*

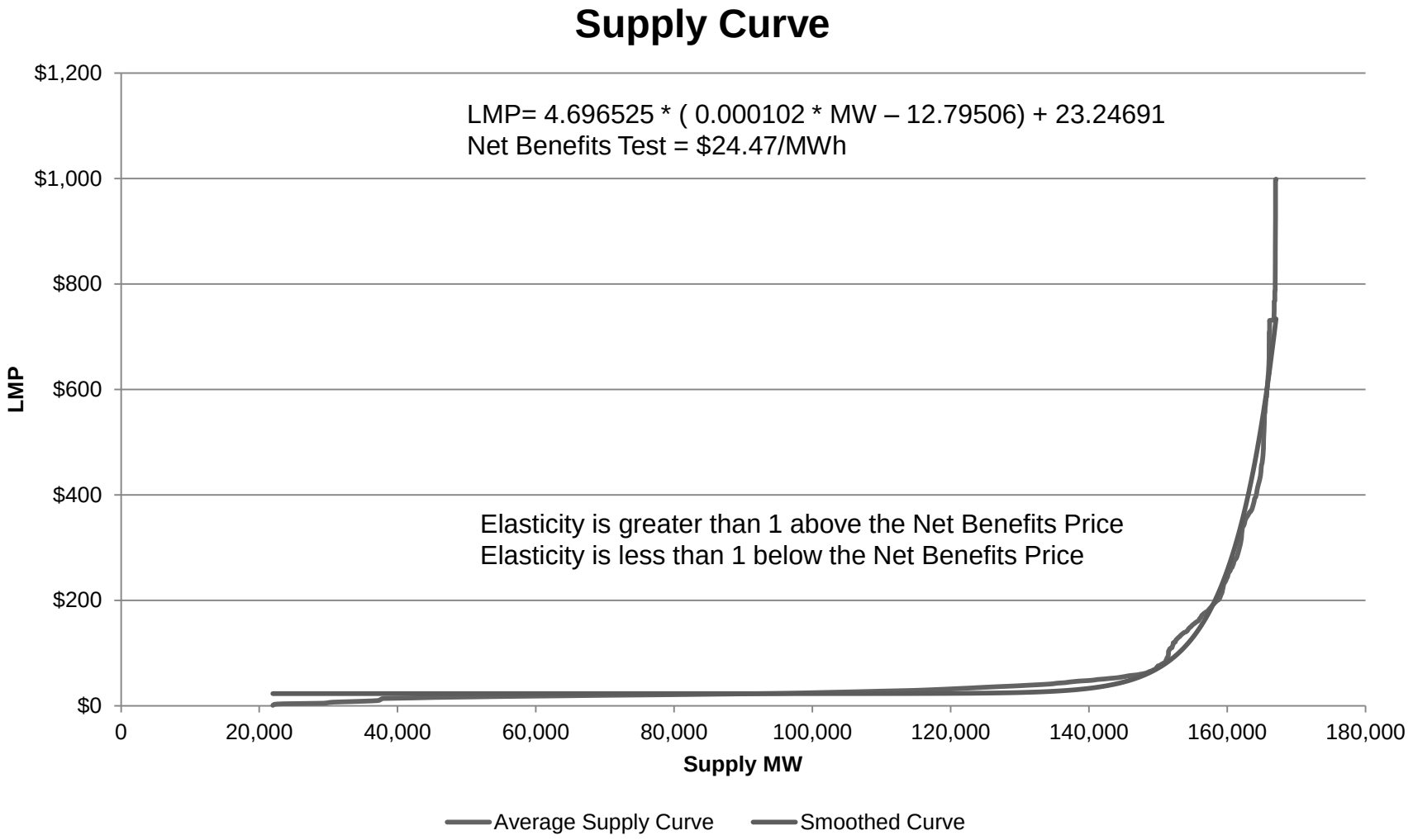
Net Benefits Test – Supply Curve

To create the curve:

- Use a Supply Curve representative of the study month using the prior year's curve
- Adjust for resource availability
- Adjust for fuel prices
- Smooth the curve using numerical methods
  - PJM staff has developed a methodology that results in a curve fit that it believes correlates well to the general shape of the PJM supply curve.
  - $LMP = a(b * mw - c) + d$

  The constants *a, b, c, and d vary for each month's solution.*

Net Benefits Test

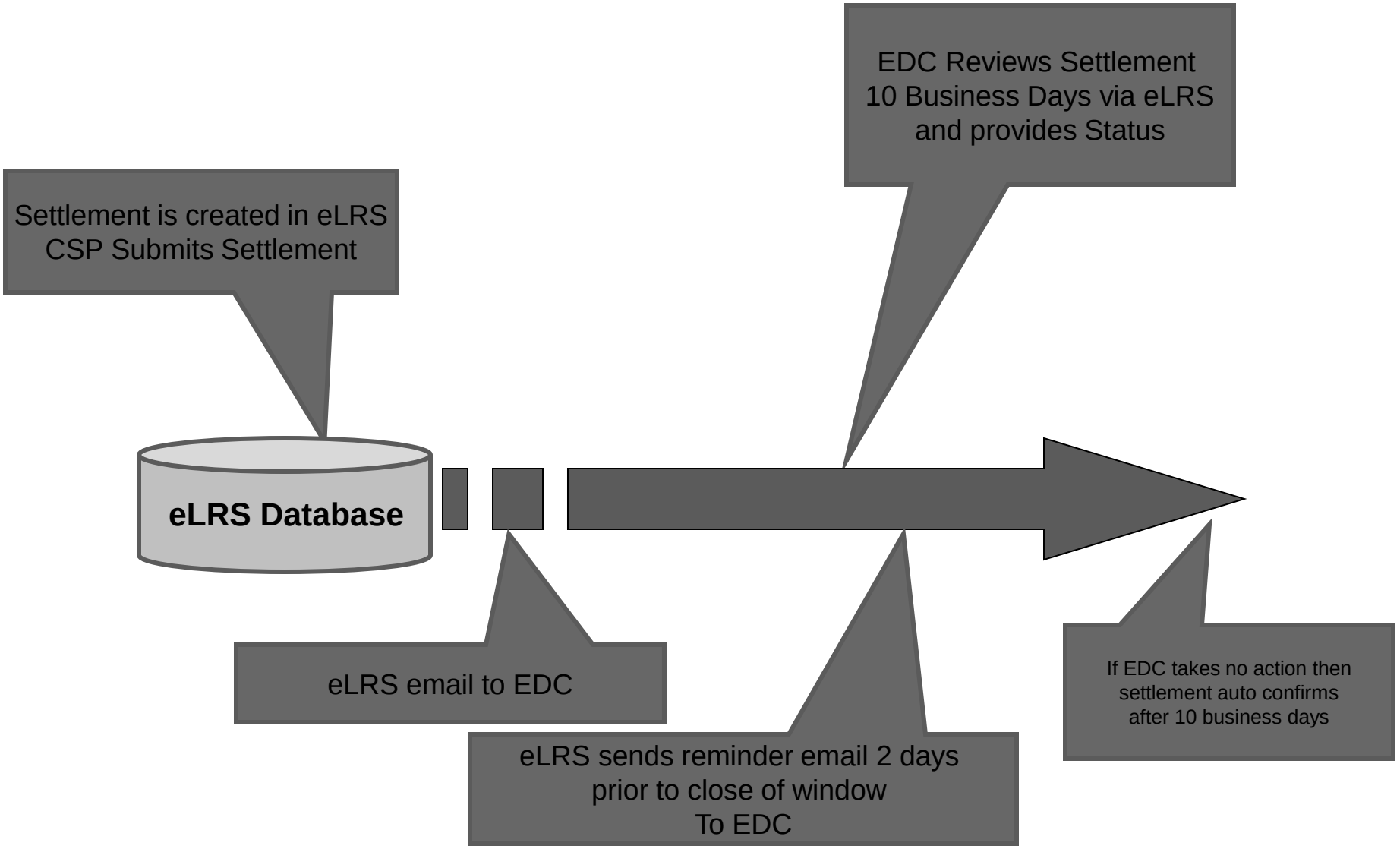


Net Benefits Test Results

The Net Benefits Test results are calculated monthly and published by the 15th of the prior month, per FERC Order.

The Net Benefits Test results can be found on the PJM website by selecting:
markets & operations / Demand Response / Net Benefits Test Results

Settlement Process Timeline



Settlement Revenue

CSPs are eligible to be paid full LMP for the Registration's or Dispatch Group's reductions, provided that the LMP at the pricing point is at or above the Net Benefits Price.

1. All Registrations or Dispatch Groups must either clear in the Day-Ahead Market or be Dispatch by PJM in order to be eligible for settlement revenue.

2. All Registrations or Dispatch Groups are eligible for Make Whole payments.

3. All Registrations or Dispatch Groups are subject to Balancing Operating Reserve (BOR) charges for deviations greater than 20% from the PJM Day-Ahead or Real-Time Dispatch instructions.

4. Registrations that are cleared or dispatched will be evaluated at the registration level to determine load reductions.

Settlement Revenue Cont.

5. DR resources may submit offers that are less than the Net Benefits price but will only be paid if appropriate LMP is greater than or equal to NBT.

6. All settlements that are not submitted within 60 days of the economic event will be sent to Market Settlements by PJM with 0 kW hourly reductions. BOR will be assessed based on the deviations of the stand alone settlement or Dispatch Group settlement.

7. All settlements that are still pending, denied or withdrawn after 75 days from the economic event will be sent to Market Settlements. These settlements will be assessed 0 kW hourly reductions. BOR will be assessed based on the deviations of the stand alone settlement or Dispatch Group settlement.

Dispatch Group Settlements

To calculate the reductions achieved by the Dispatch Group after an economic event, individual settlements are created in eLRS.

1. The CBL needs to be calculated in order to calculate the reductions for the individual registrations

2. Individual settlements are created in eLRS based on the registration level events. The individual settlements are submitted by the CSP and the meter data and loss factors are verified by the EDC

Dispatch Group Settlements Cont.

3. The total reduction for the Dispatch Group is calculated once each individual settlement within the Dispatch Group reaches the final state. The final State for a an individual settlement is defined as:
    i. Settlement is confirmed or expired
    ii. On or after the 61st day after the event and the settlement is withdrawn
    iii. On the 75th day after the event has been reached and the settlement is denied

The Dispatch Group Reduction is bridged to Market Settlements for billing. Disputed settlement will prevent the Dispatch Group from being bridged to Market Settlements.

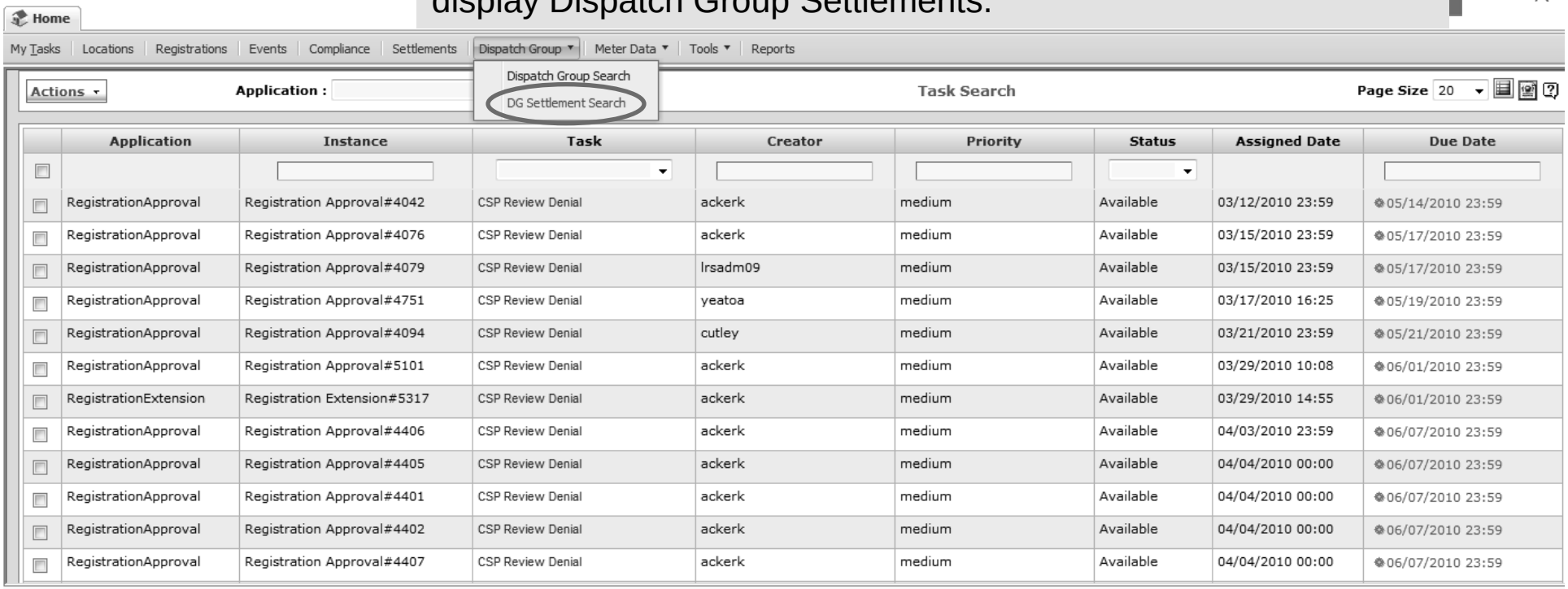
Dispatch Group Settlements Cont.

4. Dispatch Groups that are cleared or dispatched will be evaluated at the Dispatch Group level when evaluating BOR. Deviations and BOR will be assessed based on the reduction of the Dispatch Group.

5. Market Settlements will only provide settlement reports based on Dispatch Group(s) and not by registrations.

Dispatch Group Settlement Search

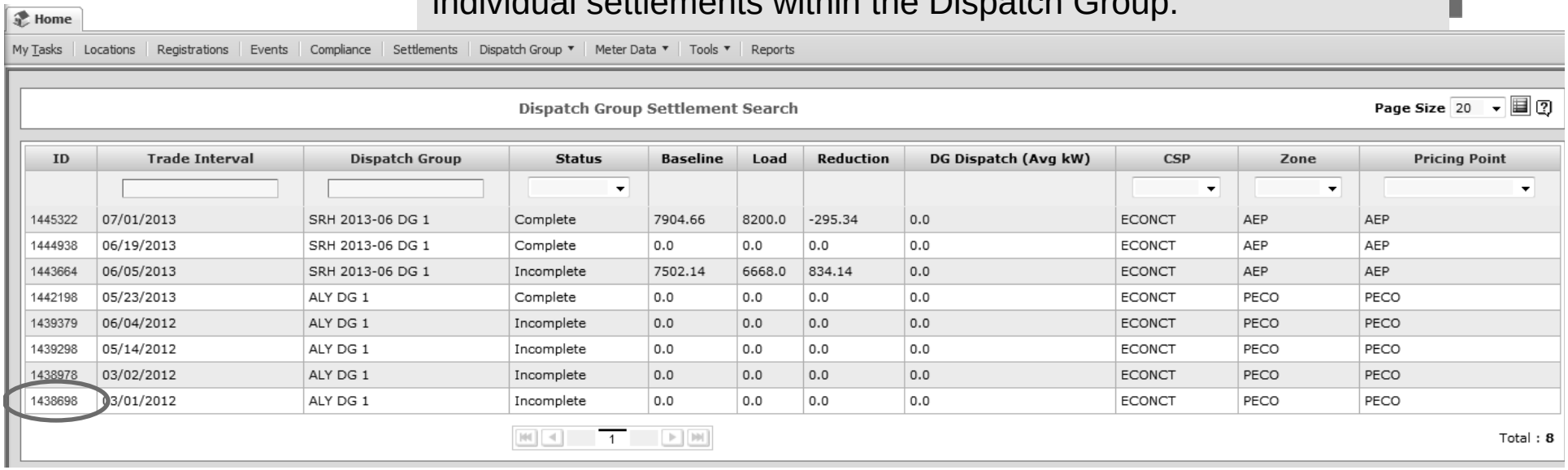
Select DG Settlement Search located under Dispatch Group to display Dispatch Group Settlements.



Application	Instance	Task	Creator	Priority	Status	Assigned Date	Due Date
RegistrationApproval	Registration Approval#4042	CSP Review Denial	ackerk	medium	Available	03/12/2010 23:59	05/14/2010 23:59
RegistrationApproval	Registration Approval#4076	CSP Review Denial	ackerk	medium	Available	03/15/2010 23:59	05/17/2010 23:59
RegistrationApproval	Registration Approval#4079	CSP Review Denial	lrsadm09	medium	Available	03/15/2010 23:59	05/17/2010 23:59
RegistrationApproval	Registration Approval#4751	CSP Review Denial	yeatoa	medium	Available	03/17/2010 16:25	05/19/2010 23:59
RegistrationApproval	Registration Approval#4094	CSP Review Denial	cutley	medium	Available	03/21/2010 23:59	05/21/2010 23:59
RegistrationApproval	Registration Approval#5101	CSP Review Denial	ackerk	medium	Available	03/29/2010 10:08	06/01/2010 23:59
RegistrationExtension	Registration Extension#5317	CSP Review Denial	ackerk	medium	Available	03/29/2010 14:55	06/01/2010 23:59
RegistrationApproval	Registration Approval#4406	CSP Review Denial	ackerk	medium	Available	04/03/2010 23:59	06/07/2010 23:59
RegistrationApproval	Registration Approval#4405	CSP Review Denial	ackerk	medium	Available	04/04/2010 00:00	06/07/2010 23:59
RegistrationApproval	Registration Approval#4401	CSP Review Denial	ackerk	medium	Available	04/04/2010 00:00	06/07/2010 23:59
RegistrationApproval	Registration Approval#4402	CSP Review Denial	ackerk	medium	Available	04/04/2010 00:00	06/07/2010 23:59
RegistrationApproval	Registration Approval#4407	CSP Review Denial	ackerk	medium	Available	04/04/2010 00:00	06/07/2010 23:59

Dispatch Group Settlement Search

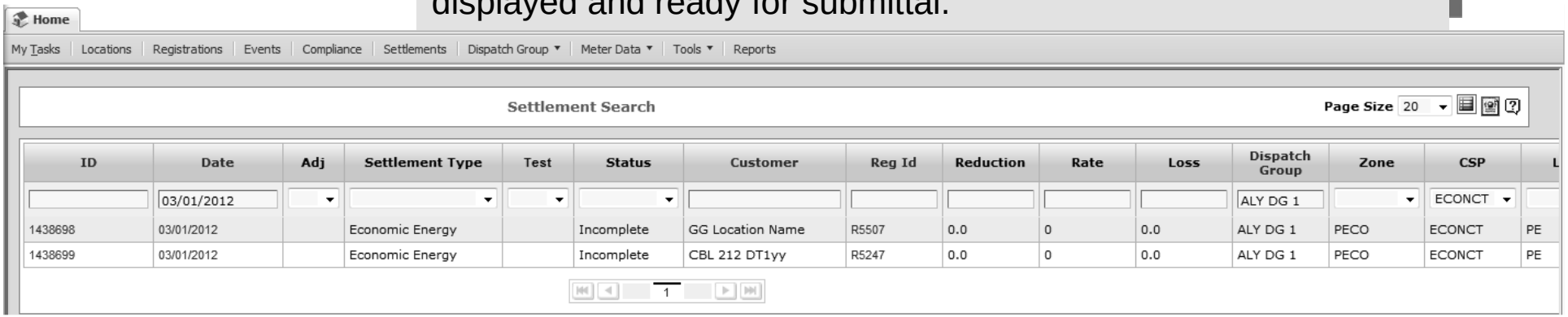
Select the ID for the Dispatch Group Settlements to display the individual settlements within the Dispatch Group.



ID	Trade Interval	Dispatch Group	Status	Baseline	Load	Reduction	DG Dispatch (Avg kW)	CSP	Zone	Pricing Point
1445322	07/01/2013	SRH 2013-06 DG 1	Complete	7904.66	8200.0	-295.34	0.0	ECONCT	AEP	AEP
1444938	06/19/2013	SRH 2013-06 DG 1	Complete	0.0	0.0	0.0	0.0	ECONCT	AEP	AEP
1443664	06/05/2013	SRH 2013-06 DG 1	Incomplete	7502.14	6668.0	834.14	0.0	ECONCT	AEP	AEP
1442198	05/23/2013	ALY DG 1	Complete	0.0	0.0	0.0	0.0	ECONCT	PECO	PECO
1439379	06/04/2012	ALY DG 1	Incomplete	0.0	0.0	0.0	0.0	ECONCT	PECO	PECO
1439298	05/14/2012	ALY DG 1	Incomplete	0.0	0.0	0.0	0.0	ECONCT	PECO	PECO
1438978	03/02/2012	ALY DG 1	Incomplete	0.0	0.0	0.0	0.0	ECONCT	PECO	PECO
1438698	03/01/2012	ALY DG 1	Incomplete	0.0	0.0	0.0	0.0	ECONCT	PECO	PECO

Settlement Search

The individual settlements within the Dispatch Group are displayed and ready for submittal.



ID	Date	Adj	Settlement Type	Test	Status	Customer	Reg Id	Reduction	Rate	Loss	Dispatch Group	Zone	CSP	L
	03/01/2012										ALY DG 1		ECONCT	
1438698	03/01/2012		Economic Energy		Incomplete	GG Location Name	R5507	0.0	0	0.0	ALY DG 1	PECO	ECONCT	PE
1438699	03/01/2012		Economic Energy		Incomplete	CBL 212 DT1yy	R5247	0.0	0	0.0	ALY DG 1	PECO	ECONCT	PE

Settlement Compensation
Balancing Operating Reserves

1. Make Whole is hourly and based on lesser of offer volume or actual volume delivered
   i. Make whole is only eligible for hour if load reductions is within +/- 20% of dispatch amount
   ii. Make whole compensation is based on offer price if offer price => NBT
   iii. Shutdown cost will **not** be paid if any hour in segment is outside 20% volume deviation
   iv. Shutdown cost is paid once for all contiguous hours
   v. Segment make whole is sum of hourly make whole (ie: negative make whole will offset positive make whole)
2. BOR charge applied to all deviations outside +/-20%

Settlement Cost Allocation

The cost of Economic Demand Response settlements will be allocated to all of the Market participants with real-time exports from PJM and LSE‟s within a zone that has an LMP greater than the Net Benefits Price.

1. Market Participant with real-time exports
   - ratio-share basis based on their real-time exports (where PJM LMP >= NBT)
2. LSEs
   - ratio-share basis based on their real-time loads in the zone

Settlement reports are available in MSRS

Real Time Performance within 20%

Real Time Market Parameters	**Values**			
Net Benefits Price ($/MWh)	35.00			
Real Time Offer (MW)	1.0			
Real Time Offer Price ($/MWh)	90.00			
Shutdown Cost ($)	100.00			
Minimum Down Time (Hours)	2.00			
Notification Time (Hour)	0.17			
Retail Rate (G&T) (c/KWh)	2.50			
Real Time Market Dispatch	**HE 14**	**HE 15**	**HE 17**	**HE 18**
RT Dispatched MWh	1.00	1.00	1.00	1.00
Real Time LMP ($/MWh)	100.00	75.00	50.00	30.00
Real Time Market Performance	**HE 14**	**HE 15**	**HE 17**	**HE 18**
Real Time Reduction including Losses (MWh)	0.90	1.10	1.05	0.95
Settlements				
Balancing Load Response Credit = If RT LMP >= Net Benefits Price THEN RT Load Response MWh * RT LMP ($) If RT LMP < Net Benefits Price THEN 0	$90.00	$82.50	$52.50	$0.00
Deviations (Calculated hourly)				
PJM Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
East Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
West Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
RTO Bal Operating Reserve for Deviations Rate ($/MWh)	2.983259	2.983259	2.983259	2.983259
East Bal Operating Reserve for Deviations Rate ($/MWh)	2.450656	2.450656	2.450656	2.450656
West Bal Operating Reserve for Deviations Rate ($/MWh)	0	0	0	0
RTO Balancing Operating Reserves Deviations Charges = Deviations * RTO Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
East Balancing Operating Reserves Deviations Charges = Deviations * East Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
West Balancing Operating Reserves Deviations Charges = Deviations * Westt Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
	Segment 1		**Segment 2**	
Make Whole	**HE 14**	**HE 15**	**HE 17**	**HE 18**
RT Load Response Bid = Lesser(Real Time Offer,Real Time Reduction) * Real Time Offer Price	$81.00	$90.00	$90.00	$85.50
Bal Sync Reserve Revenue Above Cost	$5.00	$5.00	$0.00	$0.00
RT Load Response Credits	$90.00	$82.50	$52.50	$0.00
Hourly BAL Operating Reserve For Load Response =				
(RT Load Response Bid - Bal Sync Reserves Revenue Above Cost - RT Load Response Credits)	-$14.00	$2.50	$37.50	$85.50
Segment Total Bal Operating Reserve for Load Response		-$11.50		$123.00
Shutdown Cost		100.00		100.00
Bal Operating Reserve for Load Response Credit = MAX(Segment Total Bal Operating Reserves for Load Response + Shutdown Cost,0)		$88.50		$223.00

Real Time Performance within 20% and Bid < NBT

Real Time Market Parameters	Values			
Net Benefits Price ($/MWh)	35.00			
Real Time Offer (MW)	1.0			
Real Time Offer Price ($/MWh)	30.00			
Shutdown Cost ($)	100.00			
Minimum Down Time (Hours)	2.00			
Notification Time (Hour)	0.17			
Retail Rate (G&T) (c/KWh)	2.50			
Real Time Market Dispatch	**HE 14**	**HE 15**	**HE 17**	**HE 18**
RT Dispatched MWh	1.00	1.00	1.00	1.00
Real Time LMP ($/MWh)	100.00	75.00	50.00	27.00
Real Time Market Performance	**HE 14**	**HE 15**	**HE 17**	**HE 18**
Real Time Reduction including Losses (MWh)	0.90	1.10	1.05	0.95
Settlements				
Balancing Load Response Credit = If RT LMP >= Net Benefits Price THEN RT Load Response MWh * RT LMP ($) If RT LMP < Net Benefits Price THEN 0	$90.00	$82.50	$52.50	$0.00
Deviations (Calculated hourly)				
PJM Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
East Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
West Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
RTO Bal Operating Reserve for Deviations Rate ($/MWh)	2.983259	2.983259	2.983259	2.983259
East Bal Operating Reserve for Deviations Rate ($/MWh)	2.450656	2.450656	2.450656	2.450656
West Bal Operating Reserve for Deviations Rate ($/MWh)	0	0	0	0
RTO Balancing Operating Reserves Deviations Charges = Deviations * RTO Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
East Balancing Operating Reserves Deviations Charges = Deviations * East Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
West Balancing Operating Reserves Deviations Charges = Deviations * Westt Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
	Segment 1		**Segment 2**	
Make Whole	**HE 14**	**HE 15**	**HE 17**	**HE 18**
RT Load Response Bid = Lesser(Real Time Offer,Real Time Reduction) * Real Time Offer Price	$27.00	$30.00	$30.00	$28.50
Bal Sync Reserve Revenue Above Cost	$5.00	$5.00	$0.00	$0.00
RT Load Response Credits	$90.00	$82.50	$52.50	$0.00
Hourly BAL Operating Reserve For Load Response =				
(RT Load Response Bid - Bal Sync Reserves Revenue Above Cost - RT Load Response Credits)	$0.00	$0.00	$0.00	$0.00
Segment Total Bal Operating Reserve for Load Response		$0.00		$0.00
Shutdown Cost		0.00		0.00
Bal Operating Reserve for Load Response Credit = MAX(Segment Total Bal Operating Reserves for Load Response + Shutdown Cost,0)		$0.00		$0.00

Real Time Performance not within 20%

Real Time Market Parameters	Values			
Net Benefits Price ($/MWh)	35.00			
Real Time Offer (MW)	1.0			
Real Time Offer Price ($/MWh)	30.00			
Shutdown Cost ($)	100.00			
Minimum Down Time (Hours)	2.00			
Notification Time (Hour)	0.17			
Retail Rate (G&T) (c/KWh)	2.50			
Real Time Market Dispatch	**HE 14**	**HE 15**	**HE 17**	**HE 18**
RT Dispatched MWh	1.00	1.00	1.00	1.00
Real Time LMP ($/MWh)	100.00	75.00	50.00	30.00
Real Time Market Performance	**HE 14**	**HE 15**	**HE 17**	**HE 18**
Real Time Reduction including Losses (MWh)	0.75	1.25	0.5	2
Settlements				
Balancing Load Response Credit = If RT LMP >= Net Benefits Price THEN RT Load Response MWh * RT LMP ($) If RT LMP < Net Benefits Price THEN 0	$75.00	$93.75	$25.00	$0.00
Deviations (Calculated hourly)				
PJM Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.25	0.25	0.50	1.00
East Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.25	0.25	0.50	1.00
West Deviations = If RT Disp MWh * 0.8 > RT Reduction MWh > RT Disp MWh *1.2 then ABS(RT Reduction MWh - RT Disp MWh) else 0 (MWh)	0.00	0.00	0.00	0.00
RTO Bal Operating Reserve for Deviations Rate ($/MWh)	2.983259	2.983259	2.983259	2.983259
East Bal Operating Reserve for Deviations Rate ($/MWh)	2.450656	2.450656	2.450656	2.450656
West Bal Operating Reserve for Deviations Rate ($/MWh)	0	0	0	0
RTO Balancing Operating Reserves Deviations Charges = Deviations * RTO Bal Rate ($)	$0.75	$0.75	$1.49	$2.98
East Balancing Operating Reserves Deviations Charges = Deviations * East Bal Rate ($)	$0.61	$0.61	$1.23	$2.45
West Balancing Operating Reserves Deviations Charges = Deviations * Westt Bal Rate ($)	$0.00	$0.00	$0.00	$0.00
	Segment 1		**Segment 2**	
Make Whole (When Deviation by 20% or more of Dispatch, no make-whole credits will be paid for the hour)	**HE 14**	**HE 15**	**HE 17**	**HE 18**
RT Load Response Bid = Lesser(Real Time Offer,Real Time Reduction) * Real Time Offer Price	$22.50	$30.00	$15.00	$30.00
Bal Sync Reserve Revenue Above Cost	$5.00	$5.00	$0.00	$0.00
RT Load Response Credits	$75.00	$93.75	$25.00	$0.00
Hourly BAL Operating Reserve For Load Response =				
(RT Load Response Bid - Bal Sync Reserves Revenue Above Cost - RT Load Response Credits)	$0.00	$0.00	$0.00	$0.00
Segment Total Bal Operating Reserve for Load Response		$0.00		$0.00
Shutdown Cost (When Deviations occur, no longer eligible for Make-whole to Shutdown Cost)		0.00		0.00
Bal Operating Reserve for Load Response Credit = MAX(Segment Total Bal Operating Reserves for Load Response + Shutdown Cost,0)		$0.00		$0.00

Cleared Day Ahead with Real Time Performance within 20%

Day Ahead Market Parameters	**Values**	
Net Benefits Price ($/MWh)	35.00	
Day Ahead Offer (MW)	1.0	
Day Ahead Offer Price ($/MWh)	90.00	
Shutdown Cost ($)	100.00	
Minimum Down Time (Hours)	2.00	
Notification Time (Hour)	0.17	
Retail Rate (G&T) (c/KWh)	2.50	
Cleared Day Ahead Bid	**HE 14**	**HE 15**
Day Ahead Load Response MWh	1.00	1.00
Day Ahead LMP ($/MWh)	101.00	30.00
Real Time Market Performance	**HE 14**	**HE 15**
Real Time Reduction including Losses (MWh)	0.90	1.10
Real Time LMP ($/MWh)	110.00	25.00
Settlements		
Day Ahead Load Response Credit ($) = IF DA LMP >= Net Benefit Price THEN DA Load Response MWh * MAX(0, DA LMP) IF DA LMP < Net Benefit Price THEN 0	$101.00	$0.00
Balancing Load Response Credits ($) = (RT MWh - DA MWh) * RT LMP	-$11.00	$2.50
Deviations (Calculated hourly)		
PJM Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
East Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
West Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
RTO Bal Operating Reserve for Deviations Rate ($/MWh)	2.983259	2.983259
East Bal Operating Reserve for Deviations Rate ($/MWh)	2.450656	2.450656
West Bal Operating Reserve for Deviations Rate ($/MWh)	0	0
RTO Balancing Operating Reserves Deviations Charges = Deviations * RTO Bal Rate ($)	$0.00	$0.00
East Balancing Operating Reserves Deviations Charges = Deviations * East Bal Rate ($)	$0.00	$0.00
West Balancing Operating Reserves Deviations Charges = Deviations * West Bal Rate ($)	$0.00	$0.00
Make Whole		
DA Load Response Bid = DA Load Response MWh * Day Ahead Offer Price	$90.00	$90.00
DA Load Response Credits	$101.00	$0.00
Hourly DA Operating Reserve For Load Response =		
(DA Load Response Bid - DA Load Response Credits)	-$11.00	$90.00
Daily DA Operating Reserve for Load Response		$79.00
Shutdown Cost (Receive a shutdown cost for each non-contiguous block during the day)		$100.00
DA Operating Reserve for Load Response Credit = MAX(Daily DA Operating Reserve for Load Response + Shutdown Cost,0)		$179.00

Cleared Day Ahead with Real Time Performance within 20% and Bid < NBT

Day Ahead Market Parameters	**Values**	
Net Benefits Price ($/MWh)	35.00	
Day Ahead Offer (MW)	1.0	
Day Ahead Offer Price ($/MWh)	30.00	
Shutdown Cost ($)	100.00	
Minimum Down Time (Hours)	2.00	
Notification Time (Hour)	0.17	
Retail Rate (G&T) (c/KWh)	2.50	
Cleared Day Ahead Bid	**HE 14**	**HE 15**
Day Ahead Load Response MWh	1.00	1.00
Day Ahead LMP ($/MWh)	101.00	30.00
Real Time Market Performance	**HE 14**	**HE 15**
Real Time Reduction including Losses (MWh)	0.90	1.10
Real Time LMP ($/MWh)	110.00	25.00
Settlements		
Day Ahead Load Response Credit ($) = IF DA LMP >= Net Benefit Price THEN DA Load Response MWh * MAX(0, DA LMP) IF DA LMP < Net Benefit Price THEN 0	$101.00	$0.00
Balancing Load Response Credits ($) = (RT MWh - DA MWh) * RT LMP	-$11.00	$2.50
Deviations (Calculated hourly)		
PJM Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
East Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
West Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
RTO Bal Operating Reserve for Deviations Rate ($/MWh)	2.983259	2.983259
East Bal Operating Reserve for Deviations Rate ($/MWh)	2.450656	2.450656
West Bal Operating Reserve for Deviations Rate ($/MWh)	0	0
RTO Balancing Operating Reserves Deviations Charges = Deviations * RTO Bal Rate ($)	$0.00	$0.00
East Balancing Operating Reserves Deviations Charges = Deviations * East Bal Rate ($)	$0.00	$0.00
West Balancing Operating Reserves Deviations Charges = Deviations * West Bal Rate ($)	$0.00	$0.00
Make Whole		
DA Load Response Bid = DA Load Response MWh * Day Ahead Offer Price	$30.00	$30.00
DA Load Response Credits	$101.00	$0.00
Hourly DA Operating Reserve For Load Response =		
(DA Load Response Bid - DA Load Response Credits)	$0.00	$0.00
Daily DA Operating Reserve for Load Response		$0.00
Shutdown Cost (Receive a shutdown cost for each non-contiguous block during the day)		$0.00
DA Operating Reserve for Load Response Credit = MAX(Daily DA Operating Reserve for Load Response + Shutdown Cost,0)		$0.00

Cleared Day Ahead with Real Time Performance not within 20%

Day Ahead Offer (MW)	1.0	
Day Ahead Offer Price ($/MWh)	90.00	
Shutdown Cost ($)	100.00	
Minimum Down Time (Hours)	2.00	
Notification Time (Hour)	0.17	
Retail Rate (G&T) (c/KWh)	2.50	
Cleared Day Ahead Bid	**HE 14**	**HE 15**
Day Ahead Load Response MWh	1.00	1.00
Day Ahead LMP ($/MWh)	101.00	70.00
Real Time Market Performance	**HE 14**	**HE 15**
Real Time Reduction including Losses (MWh)	0.30	2.00
Real Time LMP ($/MWh)	110.00	25.00
Settlements		
Day Ahead Load Response Credit ($) = IF DA LMP >= Net Benefit Price THEN DA Load Response MWh * MAX(0, DA LMP) IF DA LMP < Net Benefit Price THEN 0	$101.00	$70.00
Balancing Load Response Credits ($) = (RT MWh - DA MWh) * RT LMP	-$77.00	$25.00
Deviations (Calculated hourly)		
PJM Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.70	1.00
East Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.70	1.00
West Deviations = If DA MW * 0.8 > RT MW > DA MW *1.2 then ABS(RT MW - DA MW) else 0 (MWh)	0.00	0.00
RTO Bal Operating Reserve for Deviations Rate ($/MWh)	2.983259	2.983259
East Bal Operating Reserve for Deviations Rate ($/MWh)	2.450656	2.450656
West Bal Operating Reserve for Deviations Rate ($/MWh)	0	0
RTO Balancing Operating Reserves Deviations Charges = Deviations * RTO Bal Rate ($)	$2.09	$2.98
East Balancing Operating Reserves Deviations Charges = Deviations * East Bal Rate ($)	$1.72	$2.45
West Balancing Operating Reserves Deviations Charges = Deviations * West Bal Rate ($)	$0.00	$0.00
Make Whole		
DA Load Response Bid = DA Load Response MWh * Day Ahead Offer Price	$90.00	$90.00
DA Load Response Credits	$101.00	$70.00
Hourly DA Operating Reserve For Load Response =		
(DA Load Response Bid - DA Load Response Credits)	$0.00	$0.00
Daily DA Operating Reserve for Load Response		$0.00
Shutdown Cost (Receive a shutdown cost for each non-contiguous block during the day)		$0.00
DA Operating Reserve for Load Response Credit = MAX(Daily DA Operating Reserve for Load Response + Shutdown Cost,0)		$0.00

Day-Ahead Cost Allocation

Day Ahead Market Parameters	**Values**				
Net Benefits Price ($/MWh)	$ 25.89				
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	
Day Ahead Zonal LMP ($/MWh) for HE 14	$ 50.00	$ 55.00	$ 22.00	$ 22.00	
Cleared DR for the HE 14 (MWh)	10.0	0.0	0.0	0.0	
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	**Total RTO**
Total Day Ahead Load Response Charges ($) for HE 14	$500.00	$0.00	$0.00	$0.00	$500.00
Real Time Market Parameters	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Total RTO**
Real Time Zonal Load (MW) for HE 14	1,000.0	1,500.0	2,000.0	2,500.0	7,000.0
Benefited Zonal Load (MW) for HE 14?	Yes	Yes	No	No	
Total Benefited Zonal Load for HE 14	1,000.0	1,500.0	-	-	2,500.0
Real Time Exports (MW) for HE 14	50.0				
Total Benefited Zones Load + Exports (MW) for HE 14	2,550.0				
Zonal Settlements	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**RT Exports**
Zonal DA Load Response Charge Allocation ($) = If NBP <= DA LMP Zonal Real Time Load for HE 14 / (Total Benefited Zones Load + Exports) for HE 14 * Total Day Ahead Load Response Charges for HE 14 If NBP > DA LMP then 0	$196.08	$294.12	$0.00	$0.00	$9.80
LSE Settlements	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**RT Exports**
LSE A's RT Zonal Load (MW) for HE 14	50.0	150.0	5.0	-	2.0
LSE A's Share of RT Zonal Load (MW) for HE 14	0.0500	0.1000	-	-	0.0400
LSE A's Share of DA Load Response Charge Allocation ($) for HE 14 =	$ 9.80	$ 29.41	$ -	$ -	$ 0.39

Real-Time Cost Allocation

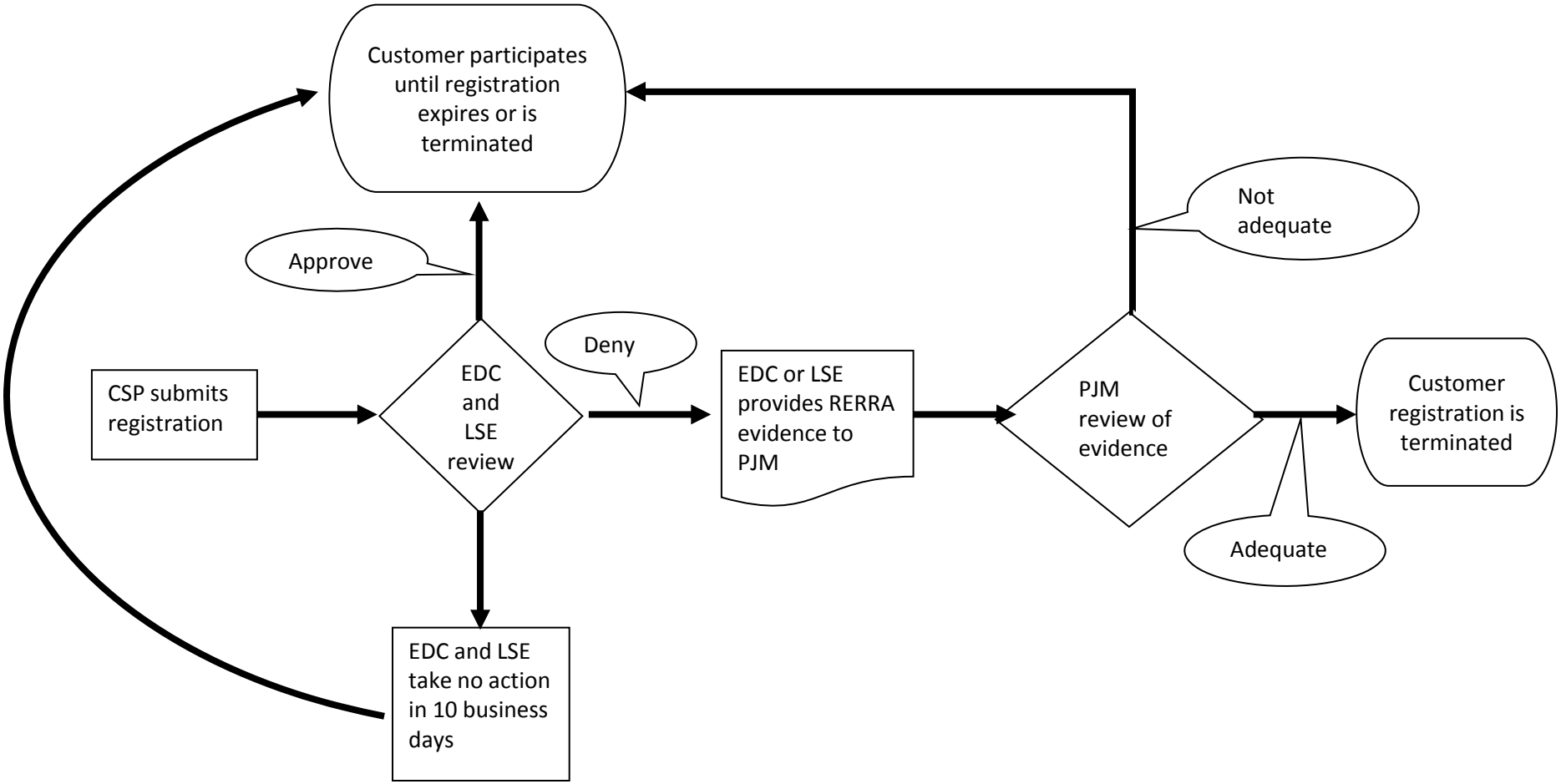
Real Time Market Parameters	**Values**				
Net Benefits Price ($/MWh)	$ 25.89				
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	
Real Time Zonal LMP ($/MWh) for HE 14	$ 50.00	$ 55.00	$ 22.00	$ 22.00	
Dispatched DR for HE 14 (MWh)	10.0	30.0	0.0	0.0	
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	**Total RTO**
Total Real-Time Load Response Charges ($) for HE 14:	$500	$1,650	$0	$0	$2,150
Real Time Market Parameters	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Total RTO**
Real Time Zonal Load (MW) for HE 14	1,000.0	1,500.0	2,000.0	2,500.0	7,000.0
Benefited Zonal Load (MW) for HE 14?	Yes	Yes	No	No	
Total Benefited Zonal Load for HE 14	1,000.0	1,500.0	-	-	2,500.0
Real Time Exports (MW) for HE 14	50.0				
Total Benefited Zones Load + Exports (MW) for HE 14	2,550.0				
Zonal Settlements	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**RT Exports**
Zonal RT Load Response Charge Allocation ($) = If NBP <= RT LMP Zonal Real Time Load for HE 14 / (Total Benefited Zones Load + Exports) for HE 14 * Total Real-Time Load Response Charges ($) for HE 14	$843.14	$1,264.71	$0.00	$0.00	$42.16
LSE Settlements	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**RT Exports**
LSE A's RT Zonal Load (MW) for HE 14	10.0	30.0	5.0	-	2.0
LSE A's Share of RT Zonal Load (MW) for HE 14	0.0100	0.0200	-	-	0.0400
LSE A's Share of RT Load Response Charge Allocation ($) for HE 14 =	$ 8.43	$ 25.29	$ -	$ -	$ 1.69

Agenda

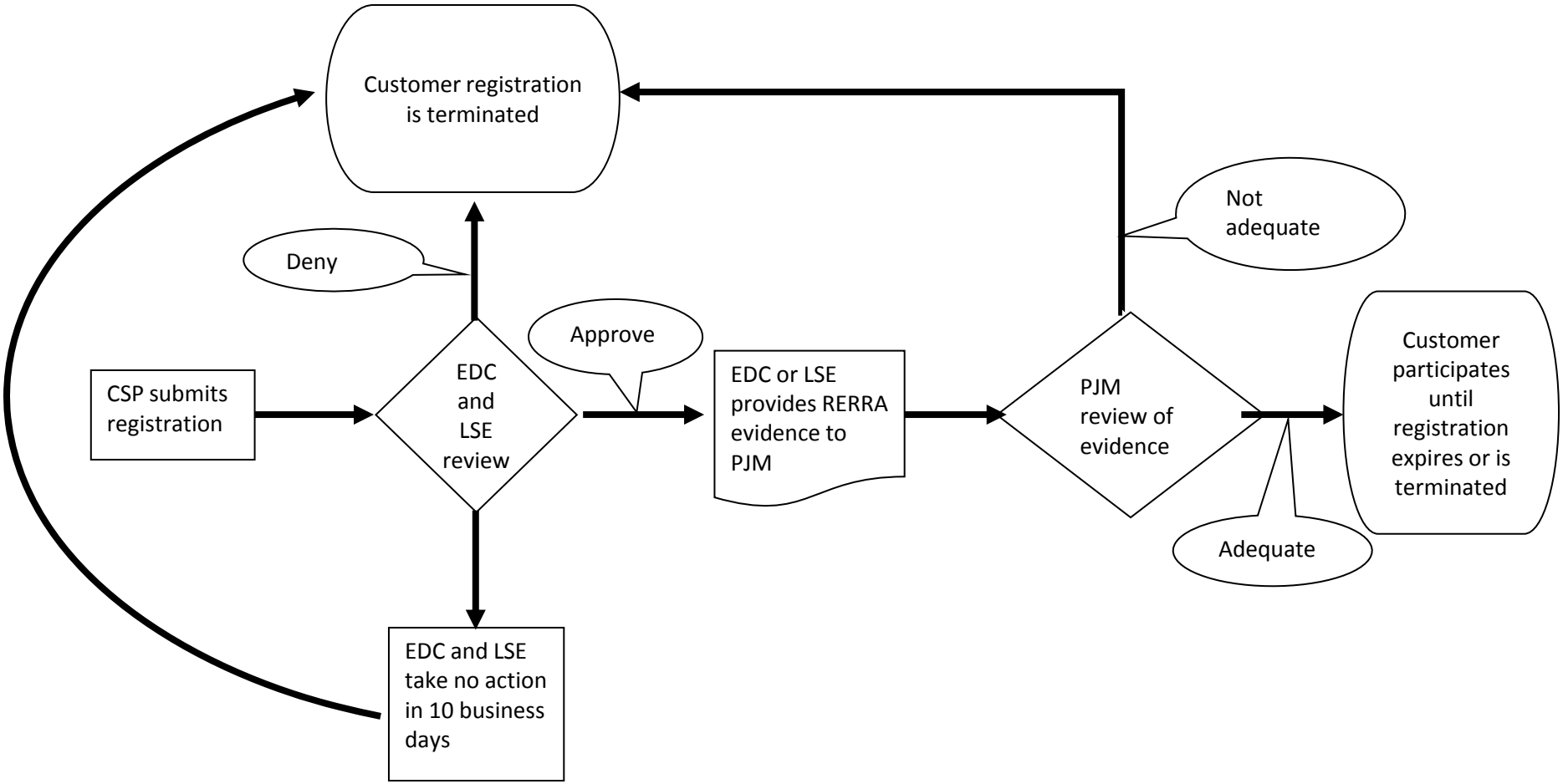
- Introduction
- Economic Registrations
- On-Site Generation
- Customer Baseline and CBL Certification
- Dispatch Groups
- Economic Participation
- Economic Settlements
- Appendix

Appendix

Large EDC (>4 million Mwh) – illustration only



Small EDC (=<4million Mwh) – illustration only



Economic Registrations – Large EDC (>4 million MWh)

- If RERRA prohibits or conditions participation then:
  - New Registrations: PJM expects that EDC or LSE would deny registration as part of the normal registration review process (10 business days) where necessary and provide reference to one of below types of "evidence" in eLRS comments for denial reason AND send copy of evidence to PJM
    - an order, resolution or ordinance of the RERRA prohibiting or conditioning end-use customer participation, or
    - an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation, or
    - an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation
  - Existing Registration: EDC/LSE should notify and provide evidence to PJM if previously approved registrations should now be terminated by PJM due to new RERRA regulation or law that prohibits or qualifies participation
  - CSP may resubmit registration upon approval by RERRA subject to all other PJM registration requirements, including verification by the EDC/LSE
    - Include reference to RERRA approval, where required in eLRS comments
  - CSP may still settle any activity that occurred prior to registration termination date according to PJM rules.

Economic Registrations – Small EDC (<= 4 million MWh)

- If RERRA permits participation then:
  - New Registrations: PJM expects that the EDC or LSE would approve registration as part of the normal registration review process (10 business days) and provide reference to one of below types of evidence in eLRS comments for acceptance reason AND send a copy of evidence to PJM. If RERRA does not permit participation then PJM expects that the EDC or LSE would deny registration.
    - an order, resolution or ordinance of the RERRA permitting or conditionally permitting end-use customer participation, or
    - an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation, or
    - an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation
  - Existing Registrations: All registration will be terminated by PJM unless the RERRA permits or conditionally permits participation and EDC or LSE provides evidence to PJM
    - PJM will terminate existing registrations by 12/18/09 at 1pm EPT if EDC or LSE does not provide PJM evidence (order, resolution or ordinance) as indicated above
  - CSP may resubmit registration upon approval by RERRA subject to all other PJM registration requirements, including verification by the EDC/LSE
    - Include reference to RERRA approval in eLRS comments
  - CSP may still settle any activity that occurred prior to registration termination date according to PJM rules.

Emergency Registrations|DR – Large EDC (>4 million MWh)

- If RERRA prohibits or conditions participation then:
  - New Registrations: PJM expects that EDC or LSE would deny registration as part of the normal registration review process (10 business days) where necessary and provide reference to one of below types of "evidence" in eLRS comments for denial reason AND send copy of evidence to PJM
    - an order, resolution or ordinance of the RERRA prohibiting or conditioning end-use customer participation, or
    - an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation, or
    - an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation
  - Existing Capacity Commitments (10/11 DY and forward):
    - If RERRA prohibits before 6/1 then EDC should notify and provide evidence to PJM if previously approved registrations should now be terminated by PJM due to new RERRA regulation or law that prohibits or conditions participation
      - If CSP has executed contract with end use customer dated prior to RERRA evidence that prohibits or conditions participation and CSP cleared in RPM auction prior to RERRA prohibit/conditional approval effective date then CSP registration will remain in effect for such delivery year.
    - If RERRA prohibits on or after 6/1 then registration remains in effect for the delivery year.
  - CSP may resubmit registration upon approval by RERRA subject to all other PJM registration requirements, including verification by EDC/LSE
    - Include reference to RERRA approval in eLRS comments

Emergency Registrations|EnergyOnly – Large EDC (>4 million MWh)

- If RERRA prohibits or conditions participation then:
  - New Registrations: PJM expects that EDC or LSE would deny registration as part of the normal registration review process (10 business days) where necessary and provide reference to one of below types of "evidence" in eLRS comments for denial reason AND send copy of evidence to PJM
    - an order, resolution or ordinance of the RERRA prohibiting or conditioning end-use customer participation, or
    - an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation, or
    - an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law prohibiting or conditioning end-use customer participation
  - Existing Registration: EDC/LSE should notify and provide evidence to PJM if previously approved registrations should now be terminated by PJM due to new RERRA regulation or law that prohibits or qualifies participation
  - CSP may resubmit registration upon approval by RERRA subject to all other PJM registration requirements, including verification by EDC/LSE
    - Include reference to RERRA approval, where required in eLRS comments
  - CSP may still settle any activity that occurred prior to registration termination date according to PJM rules.

Emergency Registration|DR – Small EDC (<= 4 million MWh)

- If RERRA allows participation then:
  - New Registrations: PJM expects that the EDC or LSE would approve registration as part of the normal registration review process (10 business days) and provide reference to one of below types of evidence in eLRS comments for acceptance reason AND send a copy of evidence to PJM. If RERRA does not permit participation then EDC or LSE would deny registration.
    - an order, resolution or ordinance of the RERRA permitting or conditionally permitting end-use customer participation, or
    - an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation, or
    - an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation
  - CSP may resubmit registration upon approval by RERRA subject to all other PJM registration requirements
    - Include reference to RERRA approval in eLRS comments
  - Existing Capacity Commitments (10/11 DY and forward):
    - CSP registration will be approved if CSP has executed agreement the earlier of August 28, 2009 or the date the Demand Resource cleared the applicable Reliability Pricing Model Auction

Emergency Registrations|EnergyOnly – Small EDC (<= 4 million MWh)

- If RERRA permits participation then:
  - New Registrations: PJM expects that the EDC or LSE would approve registration as part of the normal registration review process (10 business days) and provide reference to one of below types of evidence in eLRS comments for acceptance reason AND send a copy of evidence to PJM. If RERRA does not permit participation then PJM expects that the EDC or LSE would deny registration.
    - an order, resolution or ordinance of the RERRA permitting or conditionally permitting end-use customer participation, or
    - an opinion of the RERRA's legal counsel attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation, or
    - an opinion of the state Attorney General, on behalf of the RERRA, attesting to the existence of a regulation or law permitting or conditionally permitting end-use customer participation
  - Existing Registrations: All registration will be terminated by PJM unless the RERRA permits or conditionally permits participation and EDC or LSE provides evidence to PJM
    - PJM will terminate existing registrations by 12/18/09 at 1pm EPT if EDC or LSE does not provide PJM evidence (order, resolution or ordinance) as indicated above
  - CSP may resubmit registration upon approval by RERRA subject to all other PJM registration requirements, including verification by the EDC/LSE
    - Include reference to RERRA approval in eLRS comments
  - CSP may still settle any activity that occurred prior to registration termination date according to PJM rules.

Net Benefits Test - Elasticity

Net Benefits Test - Elasticity

The elasticity is computed for each point along the fit Supply Curve. The price where the elasticity equal one is the threshold price of the Net Benefits Test.

To calculate Elasticity:

The elasticity is generally computed as follows (where *p is price and q is quantity):*

$$Elasticity = \frac{1}{\frac{dp}{dq}} * \frac{p}{q}$$

To compute elasticity, we need the derivative of the fitted Supply Curve:

$$\frac{dp}{dq} = \log_e(a) * b * a^{(b*mw-c)}$$

Therefore elasticity is

$$Elasticity = \frac{1}{\log_e(a) * b * a^{(b*mw-c)}} * \frac{lmp}{mw}$$

The supply curve analysis will be updated monthly, by the 15th day of the preceding month in advance of the effective date, to allow demand response providers as well as other market participants to plan, while still reflecting current supply conditions.

Relative Root Mean Square (RRMSE)

Relative Root Mean Squared Error (RRMSE)

1. To perform the RRMSE calculation, daily CBL calculations are first performed for each CBL method using hours ending 14 through hours ending 19 as the simulated event hours for each of the 30 non-event days according to each CBL method rules.

2. Actual Hourly errors are calculated by subtracting the CBL hourly load from the actual hourly load for each of the simulated event hours of the non-event day.

3. The Mean Squared Error (MSE) is calculated by summing the squared actual hourly errors and dividing by the number of simulated event hours.

4. The Average Actual Hourly Load is the average of the actual hourly load for each of the simulated event hours.

5. The Relative Root Mean Squared Error (RRMSE) is calculated by taking the square root of the quantity (MSE/Average Actual Load).

RRMSE Example

Example of RRMSE calculated over 10 day period

1. Daily CBL calculations are first performed for each CBL method using hours ending 14 through hours ending 19 as the simulated event hours for each of the 30 non-event days according to each CBL method rules.

		Baseline Hourly Loads (kW)						Actual Hourly Loads (kW)					
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
customer	Date	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM
R2001	18-Aug-11	508	520	517	506	488	461	492	494	500	502	502	481
R2001	19-Aug-11	83	82	72	53	47	35	64	59	38	47	5	5
R2001	20-Aug-11	349	342	287	267	237	196	326	322	313	301	294	222
R2001	21-Aug-11	3,482	3,468	3,843	3,606	3,556	3,445	3,771	3,761	3,730	4,023	3,487	3,361
R2001	22-Aug-11	439	445	446	416	425	404	383	382	383	381	387	391
R2001	23-Aug-11	386	397	394	370	229	194	353	386	375	312	235	178
R2001	24-Aug-11	92	92	92	93	92	92	82	85	83	85	84	86
R2001	25-Aug-11	3,204	3,229	3,257	3,208	3,185	3,115	2,964	2,964	2,961	2,386	2,833	2,770
R2001	26-Aug-11	660	625	568	532	493	482	613	583	566	551	535	499
R2001	27-Aug-11	6,397	6,377	6,322	6,308	6,411	6,343	7,165	7,098	7,047	6,918	6,799	6,820

RRMSE Example Cont.

Example of RRMSE calculated over 10 day period

2. Actual Hourly errors are calculated by subtracting the actual hourly load from the CBL hourly load for each of the simulated event hours of the non-event day.
3. The Mean Squared Error (MSE) is calculated by summing the squared actual hourly errors and dividing by the number of simulated event hours.
4. The Average Actual Hourly Load is the average of the actual hourly load for each of the simulated event hours.
5. The Relative Root Mean Squared Error (RRMSE) is calculated by taking the square root of the MSE/Average Actual Load.

		Actual Hourly Error (kW)						MSE	Average Actual kW	Relative RMSE
		(u)	(v)	(w)	(x)	(y)	(z)	(s)	(n)	(t)
								$\Sigma e^2/n$	= average(g:l)	=SQRT(s)/(n)
customer	Date	1-2PM	2-3PM	3-4PM	4-5PM	5-6PM	6-7PM	65,443	1,564	16%
R2001	18-Aug-11	16	26	17	4	(14)	(20)			
R2001	19-Aug-11	19	23	34	6	42	30			
R2001	20-Aug-11	23	20	(26)	(34)	(57)	(26)			
R2001	21-Aug-11	(289)	(293)	113	(417)	69	84			
R2001	22-Aug-11	56	63	63	35	38	13			
R2001	23-Aug-11	33	11	19	58	(6)	16			
R2001	24-Aug-11	10	7	9	8	8	6			
R2001	25-Aug-11	240	265	296	822	352	345			
R2001	26-Aug-11	47	42	2	(19)	(42)	(17)			
R2001	27-Aug-11	(768)	(721)	(725)	(610)	(388)	(477)			