




Business Requirements Specification

Energy Storage and Distributed Energy Resources Phase 3 (ESDER 3)

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1 Introduction

1.1 Purpose

The energy storage and distributed energy resource (ESDER) initiative aims to identify and mitigate barriers that hinder effective market participation of storage and distributed energy resources. The presence of renewables and storage continues to increase and evolve, and therefore so does the integration of these resources into the CAISO markets. The multi-phase ESDER initiative allows these resources to participate more efficiently, thus allowing for more robust market solutions while reducing carbon emissions.

1.2 References


All references represent external requirements documents or stakeholder requests developed and submitted by the Business Units.

Information for this initiative can be found on the following CAISO web page at:

http://www.aiso.com/informed/Pages/StakeholderProcesses/EnergyStorage_DistributedEnergyResources.aspx

Information for this initiative also can be found under the fall 2019 Release on the following CAISO web page at:

<http://www.aiso.com/informed/Pages/ReleasePlanning/Default.aspx>

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2 Intellectual Property Ownership

Intellectual property covers a broad array of information and materials, including written works, computer programs, software, business manuals, processes, symbols, logos, and other work products. Determining ownership of intellectual property is very important in preserving rights of the California ISO and helps to avoid intellectual property infringement issues. In considering the business requirements or service requirements to be performed, the business owner of the project must determine intellectual property Ownership.

The CAISO retains all intellectual property rights for the content of this Business Requirements Specification.


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2.1 Guidelines

Intellectual property ownership must be considered by all applicable stakeholders before the services are performed. The level of analysis is two-fold. One, the business owner must determine if the intellectual property necessary to perform the services is owned by the California ISO or whether it must be obtained from a third party. Once it has been determined that the California ISO has secured the proper intellectual property rights to perform the services (i.e., the intellectual property is owned by the California ISO or we have licensed it from a third party), then the second step in the analysis is to consider whether new intellectual property will be created as a result of the business requirements or service requirements to be performed and how that intellectual property will be owned and protected by the California ISO. In order to assist the business owner in the analysis previously described, refer to the California Intellectual Property Policy available at <http://www.caiso.com/rules/Pages/LegalPoliciesNotices/Default.aspx>, which provides a brief tutorial on what Intellectual Property is and how the California ISO can go about protecting its intellectual property. Contact the Legal Department if you have any questions regarding intellectual property.


2.2 Checklist

Intellectual Property created per this BRS will be owned by the CAISO in accordance with existing contract provisions with the software developer.

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3 Acronym Definition

Acronym	Definition
ADS	Automated Dispatch System
BCR	Bid Cost Recovery
BTM	Behind The Meter
CMRI	Customer Market Results Interface
DLA	Default Load Adjustment
DLAP	Default Load Aggregation Point
DRP	Demand Response Provider
DRRS	Demand Response Registration System
ED	Exceptional Dispatch
EVSE	Electric Vehicle Supply Equipment
FMM	Fifteen Minute Market
LMP	Locational Marginal Pricing
LSE	Load Serving Entity
MGO	Metered Generator Output (Methodology)
NBT	Net Benefits Test
NQC	Net Qualifying Capacity
PDR	Proxy Demand Resource
PDR-LSR	Proxy Demand Resource-Load Shift Resource
RDRR	Reliability Demand Response Resource
RDT	Resource Design Template

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Acronym	Definition
SIBR	Scheduling Interface and Business Rules System


4 Details of Business Need/Problem

The focus of the California Independent System Operator’s (CAISO) energy storage and distributed energy resources (ESDER) initiative is to lower barriers and enhance the abilities for energy storage and distribution-connected resources to participate in the CAISO markets. The growing number and diversity of these resources are beginning to represent an increasingly important part of the future grid.

The ESDER initiative is an omnibus initiative with annual phases covering several related but distinct topics. This is the third phase of the overall initiative.

This ESDER 3 project involves the following key changes:

- **Demand Response Bidding Options:**
 - Currently, Demand Response (DR) resources are limited to a 5-minute bid option
 - This project will introduce new bid options of hourly and 15-minutes
- **Removal of Single LSE requirement for DR registrations and default load adjustment (DLA):**
 - Currently, a DR registration requires that all service accounts/locations be with the same LSE
 - This project will remove the requirement for a single LSE
 - Removal of the single LSE requirement combined with new bid criteria will eliminate the need for the DLA
- **Load Shift Product:**
 - A load shift product for behind the meter (BTM) storage devices is being introduced
 - This product will follow the PDR participation model and operate under existing PDR policy provisions
 - These resources can bid and be dispatched for both load consumption or load curtailment
 - Each registered resource will be assigned two (2) unique Resource IDs
 - Specific performance methodologies will be assigned to these resource types
- **Behind-the-meter (BTM) Electric Vehicle Supply Equipment (EVSE):**
 - This project will enable EVSEs sub-metering and MGO-like performance method for EVSE market participation independent of, or in combination with, its host customer
 - Specific performance methodologies will be assigned to these resource types to address residential versus non-residential installations


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5 Business Process Impacts

5.1 Business Practice Manual (BPM)

BPMs denoted in red represent an impacted BPM

BPM	Description of Impact(s)
Managing Full Network Model	N/A
Congestion Revenue Rights	N/A
Market Instruments	Yes - Update PDR bid requirements – new SIBR rule, load consumption and new bidding options
Outage Management	Yes - Update to incorporate the PDR-LSR outage management protocols
Reliability Requirement	Yes - Address RA and bidding requirements for PDR-LSR
Market Operations	Yes - Update market functionality to include PDR-LSR, EVSE
Compliance Monitoring	N/A
Metering	Yes - Updates to Performance Methodologies and PDR Registrations
Scheduling Coordinator Certification & Termination	N/A
Rules of Conduct Administration	N/A
BPM Change Management	N/A
Definitions & Acronyms	Yes - Add PDR-LSR, EVSE
Settlements & Billing	Yes - Updates to Charge Code(s)
Credit Management	N/A
Candidate CRR Holder	N/A
Transmission Planning Process	N/A
Direct Telemetry	N/A
Distributed Generation for Deliverability	N/A
Energy Imbalance Market (EIM)	N/A

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BPM	Description of Impact(s)
Generator Interconnection Procedure (GIP)	N/A
Generator Interconnection and Deliverability Allocation Procedures	N/A
Generator Management	N/A

5.2 Other

Impact:	Description: (optional)
Market Simulation	Yes
Market Participant Impact	Yes
External Training	Yes - Update Demand Response User Guide to reflect changes
Policy Initiative	Yes

6 Business Requirements

The sections below describe the Business Processes and the associated Business Requirements involved in the project. These may represent high level functional, non-functional, reporting, and/or infrastructure requirements. These business requirements directly relate to the high level scope items determined for the project.

6.1 Business Process: Manage Demand Response Bidding


Proxy Demand Resources (PDRs) currently participate in CAISO markets. However, some PDRs are constrained from participating in market optimization due to their individual operating characteristics.

New bidding options enabling PDRs to be dispatched for time periods that are supported by their individual operating characteristics will be available to provide opportunities to participate in the CAISO markets.


PDRs will need to identify their specific Bid Option selection when the resources are registered in the Master File. Bid Options can be changed for a given PDR per existing change processes associated with Master File registrations.

Bids will be optimized for dispatch in the market per the current effective Bid Option selected in the Master File.

6.1.1 Business Requirements

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ001	Bid Option Type System to have ability to allow a Proxy Demand Resource (PDR) to register a Bid Option Type. Bid Options to include: <ul style="list-style-type: none"> • Hourly • 15-Minute • 5-Minute 	Core	Master File
ESDER3-BRQ002	Bid Option Type – RDT RDT to be updated to include requirement to identify Bid Option Type for PDRs	Core	Master File
ESDER3-BRQ005	Bid Option Type Effective Period System to require Proxy Demand Resource ID to have a single effective Bid Option Type registered with a Start Date and End Date	Core	Master File
ESDER3-BRQ006	Bid Option Type - Startup <u>Hourly</u> - For PDR resources selecting the hourly bid option, RTM shall assume a value of 52.5 minutes (similar to hourly ties), for purposes of making commitment decisions <u>15-Minute</u> –For PDR resources selecting the 15-minute bid option, RTM shall assume a value of 22.5 minutes (similar to 15-minute ties), for purposes of making commitment decisions.	Core	Market Systems
ESDER3-BRQ010	Bid Option Type - Market Use For PDR Bids submitted in the Real-Time Market, system to use the effective Bid Type Option from the Master File for market optimization runs	Core	Market Systems

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ011	Hourly Bid Constraint For resources selecting the hourly bid option, during the HASP run, system shall enforce a constraint that the resource's schedule for each of the advisory 15-minute interval of the HASP hour (i.e., interval 4-7) is equal but otherwise optimal.	Core	Market Systems
ESDER3-BRQ011C	Ramping for Hourly Dispatches PDR Resources dispatched based on an hourly bid option to be treated like hourly intertie resources with a 20-minute ramp across hours	Core	Market Systems
ESDER3-BRQ011D	Ramping for 15-Minute Dispatches PDR Resources dispatched based on a 15-minute bid option to be treated like a 15-min intertie resources with a 20-minute ramp across hours and a 10-minute ramp across 15-minute intervals	Core	Market Systems
ESDER3-BRQ012	Hourly Schedule Broadcasts System will make available to the downstream applications binding PDR Hourly schedule 52.5 minutes before scheduled flow of energy Refer to BRQ040 for access to these dispatches	Existing	Market Systems
ESDER3-BRQ014	Expected Energy 15-Minute and Hourly Dispatch System shall calculate total expected energy using block energy accounting for PDRs selecting the hourly or 15-minute dispatch options, similar to static intertie resources and make it available to Settlements	Core	Market Systems
ESDER3-BRQ020	PDR 15-Minute Dispatch System will make available to the downstream applications binding 15-minute dispatches for PDRs Refer to BRQ041 for access to these dispatches	Existing	Market Systems



ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ040	<p>RTUC Hourly Advisory Report</p> <p>System to have the capability to receive and report on Hourly, Energy Schedules and A/S awards (MW & price) for PDRs</p> <p>Data to be available for seven (7) days</p>	Existing	CMRI
ESDER3-BRQ041	<p>FMM Energy Schedules/Awards - RTPD Report</p> <p>System to have the capability to receive and report on 15-minute Energy Schedules and A/S awards (MW & price) for PDRs</p>	Existing	CMRI
ESDER3-BRQ043	<p>Expected Energy Report</p> <p>System to have the capability to receive and report Expected Energy for PDRs having 5-minute, 15-minute and hourly dispatches</p>	Existing	CMRI
ESDER3-BRQ065	<p>Bid Cost Recovery – Hourly Bids</p> <p>Settlements to <u>exclude</u> Bid Cost Recovery (BCR) for PDR Bids having an effective Bid Option of Hourly</p>	Existing	Settlements
ESDER3-BRQ070	<p>Bid Cost Recovery – 15-Minute Bids</p> <p>Settlements to include Bid Cost Recovery (BCR) for PDR Bids having an effective Bid Option of 15-minutes</p>	Existing	Settlements
ESDER3-BRQ071	<p>Hourly Settlements</p> <p>The hourly PDRs will be treated like hourly intertie resources with a block 15-minute energy settlement with four equal 15-minute schedules at the corresponding FMM LMP</p>	Existing	Settlements
ESDER3-BRQ072	<p>15-Minute Settlements</p> <p>The 15-minute PDRs will be treated like 15-minute intertie resources with a block 15-minute energy settlement at the corresponding FMM LMP</p>	Existing	Settlements

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ075	Bid Verification - SIBR System to not allow PDR Bid Option to be changed in SIBR.	Core	SIBR

6.2 Business Process: Manage Load Shift Product (PDR-LSR)

The CAISO is adding a load shift product for behind the meter (BTM) storage devices under the PDR participation model. The load shift product will fall under existing PDR policy provisions, but will develop certain functionalities allowing the resource to bid and be dispatched for both load consumption (charging, negative generation) and load curtailment (discharging, generation) from a BTM storage resource.


The initial product will allow a PDR to access day-ahead and real-time energy markets for both load curtailment and load consumption capabilities through the use of two separate resource IDs.

These products will be represented as PDR-LSRs. PDR-LSRs can provide both load curtailment and load consumption through use of two (2) discrete resource IDs registered in the Master File. In addition, discrete Registration IDs in DRRS will be required and certain criteria will apply for each type, i.e., PDR-LSR-Curtailment and PDR-LSR-Consumption.


Current mapping of unique PDR Resource IDs in Master File to associated Registration IDs in DRRS will persist.

6.2.1 Business Requirements


ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ100	PDR-LSR Registration - DRRS System to have capability to enable a Registration ID for PDR-LSR resource by selecting Performance Methodologies for LSRs as identified in BRQ140	Core	DRRS

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ101	<p>PDR-LSR Pmin & Pmax Models</p> <p>System to enforce business rules for PDR-LSR Resources per the following limits:</p> <ul style="list-style-type: none"> • PDR-LSR Curtailment Model <ul style="list-style-type: none"> ○ Pmin = zero (0) ○ Pmax > zero (0) • PDR-LSR Consumption Model <ul style="list-style-type: none"> ○ Pmin < zero (0) ○ Pmax of zero (0) 	Core	Master File
ESDER3-BRQ110	<p>PDR-LSR Registration</p> <p>System to have capability to validate a Registration ID for PDR-LSR resource based on the following:</p> <ul style="list-style-type: none"> • Registration must include at least 1 Service Account with a behind-the-meter (BTM) storage device 	Core	DRRS

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ112	<p>PDR-LSR Registration and Resource IDs</p> <p>System to have capability to assign two (2) Resource IDs to the same Registration ID for PDR-LSR.</p> <p>Individual Resource IDs to represent:</p> <ul style="list-style-type: none"> • LSR-Curtailment • LSR-Consumption <p>Implementation Notes:</p> <ul style="list-style-type: none"> • System should display an additional data field for 2nd PDR-LSR Resource ID • When 1st PDR-LSR Resource ID is entered, 2nd Resource ID with complimentary function (i.e., Curtailment or Consumption) should be auto populated 	Core	DRRS
ESDER3-BRQ130	<p>PDR-LSR Registration- MF</p> <p>System to add capability to create Registrations for two (2) new PDR types:</p> <ul style="list-style-type: none"> • PDR-LSR Curtailment • PDR-LSR Consumption 	Core	Master File
ESDER3-BRQ131	<p>PDR-LSR Initial Registration- SCID</p> <p>Initial registration for related PDR-LSR Resource IDs, i.e., PDR-LSR Curtailment and PDR-LSR Consumption for the same physical entity, to confirm both Resource IDs have the same SC.</p>	Business Process	Master File

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ132	PDR-LSR Resource ID Updates - SCID System to require that registration updates for related PDR-LSR Resource IDs, i.e., PDR-LSR Curtailment and PDR-LSR Consumption for the same physical entity, be made by the same SC.	Core	Master File
ESDER3-BRQ135	Bid Option & Period Consistent For PDR-LSR Curtailment and PDR-LSR-Consumption Resource, system to require: <ul style="list-style-type: none"> • Bid Option Type to be the same • Start Date and End Date to be the same 	Core	Master File
ESDER3-BRQ140	PDR-LSR Performance Methodologies System to add six (6) new performance methodologies for PDR-LSR registrations: <ul style="list-style-type: none"> • LSR-10/10 • LSR-Day Matching 5/10 • LSR-Day Matching 10/10 • LSR-Weather matching • LSR-Day Matching Combined • LSR-Control Group 	Core	DRRS

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ150	<p>BTM Storage Device in Service Account</p> <p>System to add capability to indicate if a Service Account has a BTM storage device</p> <p>Implementation Notes:</p> <ul style="list-style-type: none"> • Indication of a BTM storage device should be “Y” • Service Accounts for which a BTM storage device exists must be terminated and reregistered to identify BTM storage device 	Core	DRRS
ESDER3-BRQ154	<p>PDR-LSR Naming Convention</p> <p>New naming convention for PDR-LSR resource types to be developed</p>	Business Process	N/A

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SDER3- BRQ160	PDR-LSR RDT Process The following business rules to be enforced for the new resource types noted in BRQ 130: <ul style="list-style-type: none"> • PDR-LSR-Consumption <ul style="list-style-type: none"> ○ <i>Bid Options must be either:</i> <ul style="list-style-type: none"> ▪ 5 min ▪ 15 min ○ <i>Worst Operational Ramp rate must meet or exceed the following :</i> <ul style="list-style-type: none"> ▪ 5 min bid option: ramp rate $\geq (P_{max} - P_{min})/5$ ▪ 15 min bid option: ramp rate $\geq (P_{max} - P_{min})/15$ ○ <i>No Ancillary Services are permitted</i> • PDR-LSR-Curtailment <ul style="list-style-type: none"> ○ <i>Bid Options can be one of the following:</i> <ul style="list-style-type: none"> ▪ 5 min ▪ 15 min ○ <i>Worst Operational Ramp rate must meet or exceed the following:</i> <ul style="list-style-type: none"> ▪ 5 min bid option: ramp rate $\geq (P_{max} - P_{min})/5$ ▪ 15 min bid option: ramp rate $\geq (P_{max} - P_{min})/15$ ○ <i>Ancillary Services are permitted:</i> <ul style="list-style-type: none"> ▪ Spin ▪ Non-Spin • Pmin to Pmax ramp rates (5-min or 15-min) to be: <ul style="list-style-type: none"> ○ <i>verified as being achievable</i> ○ <i>validated during RDT process</i> 	Business Process	Master File
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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ175	Exceptional Dispatch (ED) of PDR-LSR If an Exceptional Dispatch (ED) is issued for a PDR-LSR Resource ID (1 st), system to: <ul style="list-style-type: none"> • Enter a companion ED for the 2nd PDR-LSR resource ID. • Companion ED shall have the same start and end time and reason, but with a fixed “goto” of zero MW. 	Core	Market System
ESDER3-BRQ180	End of ED of PDR-LSR Upon termination of an ED for a PDR-LSR (1 st), system shall terminate the companion ED for the 2 nd PDR-LSR Resource ID noted in BRQ175.	Core	Market System
ESDER3-BRQ197	NQC Rejection for PDR-LSR Consumption System shall not allow a PDR-LSR Consumption Resource ID to be submitted for request of NQC.	Core	CIRA


6.3 Business Process: Manage Demand Resource Aggregations

The CAISO currently requires DR resource aggregations consist of locations under a single LSE, represented by one demand response provider (DRP), and within a single sub-LAP.

This requirement for a DR resource aggregation consist of locations under a single LSE will be removed. DR resource registrations will be allowed to include locations (service accounts) from multiple LSEs. However, these accounts will still need to be within the same sub-Lap.


In addition, PDR bids will be required to be at or above the current net benefits test NBT price. Bids not meeting this criteria will be rejected. There will be the opportunity to resubmit the bids.

Given that all accepted PDR bids will be at or above the NBT price, there will not be a need for the CAISO to make default load adjustment (DLAs). Thus, the DLA function will be removed and LSEs' metered load will not be subject to adjustments due to the NBT criteria.


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6.3.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ200	<p>Service Accounts - LSEs</p> <p>System to allow registrations of PDRs and RDRRs to include Service Accounts from multiple LSEs</p> <p>Implementation Note:</p> <ul style="list-style-type: none"> Implementation Plan to manage existing PDR and RDRR registrations should be considered 	Core	DRRS
ESDER3-BRQ210	<p>Service Accounts – Sub-laps</p> <p>System to require Service Accounts used in a PDR or RDDR registration to be in the same sub-lap</p>	Existing	DRRS
ESDER3-BRQ220	<p>Service Accounts - DLAP</p> <p>For PDR registrations, DLAP data will not be required:</p> <p>Implementation Note:</p> <ul style="list-style-type: none"> Implementation Plan to manage existing PDR and RDRR registrations should be considered 	Core	DRRS
ESDER3-BRQ230	<p>Eliminate DLAP Mapping</p> <p>DLAP mapping for PDRs and RDRRs is not required in the Master File</p> <p>Implementation Note:</p> <p>A transition plan for DLAP mapping truncation must be developed. Items to include:</p> <ul style="list-style-type: none"> Existing DLAP mapping to be retained for historical data purposes New resource IDs will not need any DLAP mapping 	Core	Master File

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ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ240	NBT Price Threshold – DA Market System to verify all RDRR, PDR and PDR-LSR-Curtailment bids submitted in DA Market are at or above monthly NBT price thresholds	Core	SIBR
ESDER3-BRQ245	NBT Price Threshold – RT Market System to verify all PDR and PDR-LSR-Curtailment bids submitted in RT Market are at or above monthly NBT price thresholds	Core	SIBR
ESDER3-BRQ250	PDR-LSR-Consumption Price Criteria System to verify all PDR-LSR-Consumption bids submitted in DA and RT Market meet the following criteria: <ul style="list-style-type: none"> • Equal to or greater than current Bid Floor price and • Less than \$0.00 	Core	SIBR
ESDER3-BRQ255	Bid Rejections If Bids identified in BRQ240, BRQ245 and BRQ250 do not meet the applicable bid criteria noted in the respective BRQ, system shall: <ul style="list-style-type: none"> • Reject the bid and provide indication of rejection on system's User Interface • Provide an Error Message appropriate for the rejection • Allow rejected bids to be corrected and resubmitted 	Core	SIBR
ESDER3-BRQ270	Remove DLA System to deactivate current capability that triggers default load adjustment (DLA) function when a PDR delivers energy and the RT LMP is less than the NBT price threshold	Core	DReAMS Settlement

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6.4 Business Process: Manage Electric Vehicle Supply Equipment (EVSE)

EVSEs with sub-metering will be able to participate independent of, or in combination with, its host customer load. New performance methodologies for residential and non-residential installations have been added.

6.4.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ESDER3-BRQ300	EVSE Registration - DRRS System to have capability to enable a Registration ID for EVSE resource by selecting Performance Methodologies for EVSEs as identified in BRQ301	Core	DRRS
ESDER3-BRQ301	EVSE Performance Methodologies System to add eleven (11) new performance methodologies for EVSE registrations: <ul style="list-style-type: none"> • EVSE-Res • EVSE-Res + Day Matching 5/10 • EVSE-Res + Day Matching 10/10 • EVSE-Res + Day Matching Combined • EVSE-Res + Weather Matching • EVSE-Res + Control Group • EVSE-Non-Res • EVSE-Non-Res + Day Matching 10/10 • EVSE-Non-Res + Day Matching Combined • EVSE-Non-Res + Weather Matching • EVSE-Non-Res + Control Group 	Core	DRRS