California ISO

Business Requirements Specification

Aliso Canyon Phase 5

Document Version: 1

Current Version Date: 5/5/2020

Owner: Owens, Andrew

Program Office

Disclaimer

All information contained in this draft Business Requirements Specification (BRS) as provided by the California Independent System Operator Corporation (ISO) is prepared for discussion and information purposes only. The draft BRS is provided “as is” without representation or warranty of any kind, including, without limitation, a representation or warranty as to accuracy, completeness, or appropriateness for any particular purpose. The draft BRS shall be revised as the development and review of the business requirements progresses. The ISO assumes no responsibility for the consequences of any errors or omissions. The ISO may revise or withdraw all or part of this information at any time at its discretion without notice.

Table of Contents

1 Introduction

1.1 Purpose

Currently, the DCPA methodology is in the Locational Market Power Mitigation (LMPM) mechanism in the Day-Ahead Market (DAM) and the Real-Time Market (RTM). The DCPA determines whether a binding transmission constraint is competitive or not. Supply resources that provide counter flow to uncompetitive binding transmission constraints may be subject to market power mitigation. The enhancement includes the effects of gas-burn nomogram that limit the supply counter flow in the calculation of the RSI within the DCPA methodology.

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 the rights of the California ISO (CAISO), 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.

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 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), the California ISO can undertake the next step.
- 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 protect its Intellectual Property. Contact the Legal Department if you have any questions regarding Intellectual Property.

3 Details of Business Need/Problem

3.1 Description – Dynamic Competitive Path Assessment (Scope 1)

Business Opportunity/Problem Statement:	
What:	Enhance the existing Dynamic Competitive Path Assessment (DCPA) methodology employed currently in the Locational Market Power Mitigation (LMPM) mechanism in the Day-Ahead Market (DAM) and the Real-Time Market (RTM).
When:	Fall 2020
Why do we have this opportunity/problem:	Currently DMM performs the DCPA competitive constraint calculation manually. This calculation is normally run after the applicable market (both Day-ahead and Real-time) and therefore does not effectively mitigate the resources.

4 Business Impacts

4.1 Business Practice Manual (BPM)

BPM	Description of Impact(s)
Managing Full Network Model	**Yes** Add new formulas related to the DCPA for gas nomograms within section 4.2.7.
Congestion Revenue Rights	No
Market Instruments	No
Outage Management	No
Reliability Requirement	No
Market Operations	**Yes** Update DCPA formulas to include the gas nomograms.
Compliance Monitoring	No
Metering	No
Scheduling Coordinator Certification & Termination	No
Rules of Conduct Administration	No
BPM Change Management	No
Definitions & Acronyms	No
Settlements & Billing	No
Credit Management	No
Candidate CRR Holder	No
Transmission Planning Process	No
Direct Telemetry	No
Distributed Generation for Deliverability	No
Energy Imbalance Market (EIM)	No
Generator Interconnection Procedure (GIP)	No
Generator Interconnection and Deliverability Allocation Procedures	No

BPM	Description of Impact(s)
Generator Management	No
Managing Full Network Model	No

4.2 Other

Impact:	Description: (optional)
Market Simulation	**Yes** – see section 5.5 for detailed Market/Business Scenarios
Market Participant Impact	**Yes**
User Acceptance Testing (UAT)	No
Internal Training	No
External Training	No
Policy Initiative	**Yes**
Vendor	**Yes** - Siemens

5 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.

5.1 Business Process: Manage Day Ahead Market (MMR LII) – Dynamic Competitive Path Assessment

5.1.1 Business Requirements

ID#	Business Feature	Requirement Type	Potential Application(s) Impacted
ALCAN5-BRQ001	If the supply counter flow from fringe competitive suppliers on a binding transmission constraint violates any gas-burn nomogram, the maximum RSI where the gas-burn nomograms are not violated can be calculated as the solution to the following Linear Programming problem (see Appendix A – figure 1). Implementation Note: 1. The solution shall calculate the highest possible supply counter flow from fringe competitive suppliers without violating the gas-burn nomograms. 2. This is the expected optimal scheduling solution (if the binding transmission constraints are considered one at a time) because the cost of violating a transmission constraint or a gas-burn constraint is much higher than the highest possible energy bid from a potentially pivotal supplier. 3. The calculation must account for multiple gas-burn nomograms, which may overlap.	Core	IFM/FMM/RTD (MPM Pass)

5.2 Business Process: Market/Business Simulation

This section shall provide a basis for the development of the Market/Business Simulation Scenarios. These requirements will provide guidance on the market participant impacts, inputs into the Scenarios, endpoints to the Scenarios and reasons for potential Scenarios. The guidance on market participant impacts shall be gathered from the requirements that impact rules, interfaces, applications/reports, new system processes, new/modified data models and new user roles. The source and sink systems shall be determined through the development of the system context diagram and the web service requirements. The Reason for the Potential Scenario column will be to offer guidance regarding what potential Scenarios, and their context, may be needed for this project. This section applies to all policy development projects, market enhancements, technology enhancements, operation enhancements, Energy Imbalance Market (EIM) implementations and Reliability Coordination (RC) service implementations.

In the Reason for Potential Scenario column, the Business Analyst must select one or more of the following reasons:

1. **Rule Impacts**: Generalized changes in market rules, bidding rules, settlements rules, market design changes, or other business rules.
2. **Interface changes**: Changes that impact templates (e.g. the Resource Adequacy {RA} supply plan), user interface (UI), and application programming interface (API) (e.g. retrievals of new shadow settlement data).
3. **New application/report**: Changes that cause addition/modification of market software or reports, especially when market data input is required by the market participant.
4. **New system process**: Modification of data flow in systems, especially if the new process requires the market participant to demonstrate proficiency prior to production.
5. **New/Modified model data**: Addition or substantial modification of model data as a market solution provided by the CAISO.
6. **New user role**: The addition or modification of access permissions for a user role applied to specific business units within an EIM entity or market participant organization (e.g. Load Serving Entity (LSE) as a Local Regulatory Authority (LRA) role). Scenarios are beneficial for market participants taking on a new function or process within their organization.

5.2.1 Business Requirements

ID#	Guidance on Market Participant Impacts	Source System	Sink System	Reason for Potential Scenario
ALCAN5-MKT001	Set up a scenario where there is a binding transmission constraint in MPM where several resources provide counter flow while some of them are bound by at least one gas nomogram. Set up the scenario so that when the nomogram is not enforced the constraint is competitive and there is no mitigation, but when the nomogram is enforced, the constraint is uncompetitive and there is mitigation. Mitigation results can be seen in CMRI.	MPM	CMRI (no impacts to existing reports)	4. Enhanced System Process

6 Appendix A - Notation

The following notation is used in the business requirement formulas:

i	Resource index
k	Binding transmission constraint index
m	Gas-burn nomogram index
t	Time interval index (zero for initial condition)
n	Supplier index
PS	Potentially pivotal supplier index
$\forall$	For all…
$\wedge$	Logical and…
$\in$	Member of…
$\notin$	Not member of…
$\cup$	Union…
$\cap$	Intersection…
$\rightarrow$	Leads to…
N	The total number of suppliers
T	Time interval duration
a	Energy-to-gas conversion factor ($a \geq 0$)
G	Set of resources bound by a gas nomogram
S	Set of resources of a supplier
PPS	Set of resources of potential pivotal suppliers
FCS	Set of resources of fringe competitive suppliers
δ	Global binary option (1/0) to adjust ED/MD for ancillary services self-provision in RTM
η	Binary variable (1/0) that is set if the resource is must-run because of energy self-schedule, or regulation, spin, or online non-spin self-provision, or inter-temporal constraints
UOL	Upper Operating Limit reflecting derates
LOL	Lower Operating Limit reflecting rerates
URL	Upper Regulating Limit
LRL	Lower Regulating Limit
UEL	Upper Economic Limit (top of energy bid)
ESS	Energy Self-Schedule for Generating Resource (GR) (bottom of energy bid or LOL)
GSS	Generating Self-Schedule for Non-Generator Resource (NGR) (bottom of energy bid or zero)
UCL	Upper Capacity Limit

LCL	Lower Capacity Limit
EN	Energy Schedule
RU	Regulation Up self-schedule
RD	Regulation Down self-schedule
SR	Spinning Reserve self-schedule
NR	Non-Spinning Reserve self-schedule
$RRU(p,\tau)$	Piecewise linear upward ramp capability function from output p for a ramping period τ, reflecting derates
$RRD(p,\tau)$	Piecewise linear downward ramp capability function from output p for a ramping period τ, reflecting derates
$\overline{ED}$	Maximum effective (MAXGOTO) ED/MD
$\underline{ED}$	Minimum effective (MINGOTO) ED/MD
SF	Shift Factor of a resource to a binding transmission constraint
$\beta_{i,k,t}$	"Counter flow" Shift Factor of a resource to a binding transmission constraint
WC	Withheld counter flow capacity from a resource on a binding transmission constraint
$\overline{SCF}$	Maximum supply counter flow from a resource on a binding transmission constraint
SCF	Supply counter flow from a resource to a binding transmission constraint
$\underline{SCF}$	Minimum supply counter flow from a resource on a binding transmission constraint
DCF	Demand for counter flow from a resource on a binding transmission constraint
RSI	Residual supply index for a binding transmission constraint
GL	Gas nomogram limit

Note: downward quantities (RD and RRD) are non-negative.

Figure 1:

$$\max RSI_{k,t} \equiv \frac{\sum_{i\in FCS_{k,t}} SCF_{i,k,t} + \sum_{i\in PPS_{k,t}} \underline{SCF}_{i,k,t}}{\sum_i DCF_{i,k,t}}$$

$$\text{s.t.} \quad \left.\begin{array}{l} \sum_{i\in G_m\cap FCS_{k,t}} a_i \frac{SCF_{i,k,t}}{\beta_{i,k,t}} \le GL_{m,t} - \sum_{i\in G_m - FCS_{k,t} - PPS_{k,t}} a_i\, EN_{i,t} - \sum_{i\in G_m\cap PPS_{k,t}} a_i \frac{\underline{SCF}_{i,k,t}}{\beta_{i,k,t}}, \forall m \\ \underline{SCF}_{i,k,t} \le SCF_{i,k,t} \le \overline{SCF}_{i,k,t}, \forall i \notin PPS_{k,t} \end{array}\right\}, \forall k,t$$