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| NPRR Number | [1182](https://www.ercot.com/mktrules/issues/NPRR1182) | NPRR Title | Inclusion of Controllable Load Resources and Energy Storage Resources in the Constraint Competitiveness Test Process |
| Date Posted | May 22, 2023 |
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| Requested Resolution  | Normal  |
| Nodal Protocol Sections Requiring Revision  | 3.19.1, Constraint Competitiveness Test Definitions3.19.2, Element Competitiveness Index Calculation3.19.3, Long-Term Constraint Competitiveness Test3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test |
| Related Documents Requiring Revision/Related Revision Requests | None |
| Revision Description | This Nodal Protocol Revision Request (NPRR) incorporates Controllable Load Resources and Energy Storage Resources (ESRs) into both the Long-Term and Security-Constrained Economic Dispatch (SCED) versions of the Constraint Competitiveness Test (CCT). In the case of Controllable Load Resources, the Resources will not themselves be mitigated but will be used to identify if a Market Participant has market power in resolving a constraint on the transmission system. As is the case for other Resources, registration data will be used for these Resources in the Long-Term CCT process and Real-Time telemetry will be used in the SCED CCT process. It should be noted that the language specific to ESRs (paragraph (3)(e) of Section 3.19.1) is only intended to become effective with the implementation of Nodal Protocol Revision Request (NPRR) 1014, BESTF-4 Energy Storage Resource Single Model. |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](https://www.ercot.com/files/docs/2018/12/13/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| Business Case | The CCT process is designed to detect the existence of local market power in resolving transmission congestion. In the cases that such market power is detected, the CCT process is used to label constraints as being non-competitive and, for SCED, to apply mitigation to Resources that meet defined criteria. Current CCT Protocol language does not address Controllable Load Resources nor how ESRs will be treated after the implementation of NPRR1014. These Resource types directly participate in SCED and are part of a Market Participant’s overall portfolio. As such, the availability of these Resources and how they are offered or bid into the market can have an impact on congestion management and associated pricing outcomes. The below revisions are necessary to incorporate ESRs and Controllable Load Resources into CCT processes to better identify Market Participants’ market power and the implementation of these changes will improve the ability of the CCT process to evaluate competitiveness of the market in solving transmission congestion. Implementation of this NPRR will subject ESRs to mitigation, however Controllable Load Resources will continue not to be subject to mitigation and are solely considered for market power identification purposes. |

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| Proposed Protocol Language Revision |

3.19.1 Constraint Competitiveness Test Definitions

(1) The Constraint Competitiveness Test (CCT) checks the competitiveness of a constraint by evaluating each Market Participant’s ability to exercise market power by physical or economic withholding. The CCT for a constrained Transmission Element evaluates whether there is sufficient competition to resolve the constraint on the import side by calculating the Element Competitiveness Index (ECI) on the import side of the constraint and by determining whether a single Entity is needed to resolve the constraint.

(2) The competitiveness of a constraint is tested both on a long-term basis and before each Security-Constrained Economic Dispatch (SCED) execution.

(3) The “Available Capacity for a Resource” is defined as follows:

(a) For Generation Resources, including Switchable Generation Resources (SWGRs), but excluding Intermittent Renewable Resources (IRRs):

(i) Long-Term CCT - the Seasonal net max sustainable rating, as registered with ERCOT.

(ii) SCED CCT - the telemetered High Sustained Limit (HSL) for Resources with telemetered Resource Status as specified in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria, and zero for all other Resources.

(b) For IRRs:

(i) Long-Term CCT - the Seasonal net max sustainable rating, as registered with ERCOT, on the export side and zero MW on the import side.

(ii) SCED CCT - the telemetered HSL for Resources with telemetered Resource Status as specified in paragraph (5)(b)(i) of Section 3.9.1 and zero for all other Resources.

(c) For the Direct Current Tie (DC Tie) lines, the full import capability on the export side and zero MW on the import side for all CCTs.

(d) For Controllable Load Resources:

(i) Long-Term CCT – the maximum interruptible Load MW, as registered with ERCOT.

(ii) SCED CCT - the telemetered Maximum Power Consumption (MPC) minus the telemetered Low Power Consumption (LPC) for Resources with a telemetered Resource Status as specified in paragraph (5)(b)(iii) of Section 3.9.1, excluding Resources with a Resource Status of OUTL.

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| ***[NPRR1182: Insert paragraph (e) below upon system implementation of NPRR1014:]***(e) For Energy Storage Resources (ESRs):(i) Long-Term CCT – the Seasonal net max sustainable rating minus the Seasonal net min sustainable rating, as registered with ERCOT.(ii) SCED CCT – for Resources with a telemetered Resource Status as specified in paragraph (5)(b)(iv) of Section 3.9.1, excluding Resources with a Resource Status of OUT, the minimum of:(A) The telemetered HSL minus the telemetered Low Sustained Limit (LSL) for the Resource; and(B) The telemetered max State of Charge minus the min State of Charge for the Resource divided by 15 minutes. |

(4) “Managed Capacity for an Entity” is a Resource for which a Decision Making Entity (DME) has control over how the Resource is offered or scheduled (e.g., Output Schedules), in accordance with subsection (d) of P.U.C. Subst. R. 25.502, Pricing Safeguards in Markets Operated by the Electric Reliability Council of Texas.

(5) Shift Factors of all Electrical Buses are computed relative to the distributed load reference Bus.

(a) For voltage, stability, and thermal-limited constraints, as well as interfaces represented by thermal limits, the Shift Factors should be computed with no other contingencies removed from the electrical network.

(b) For contingency-limited constraints, the Shift Factors used should be computed with the contingencies removed from the electrical network.

(6) As part of the Long-Term and SCED CCT processes described below, there are several thresholds used in determining the competitive designation of a constraint and the Resources, excluding Controllable Load Resources, for which mitigation will be applied in SCED Step 2, as described in Section 6.5.7.3, Security Constrained Economic Dispatch. These thresholds are defined as follows:

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| **Threshold** | **Definition** | **Value** |
| SFP1 | Minimum Shift Factor threshold for determining which Managed Capacity for an Entity to include in the ECI calculation |  2% |
| ECIT1 | Maximum competitive threshold for ECI on the import side of a constraint for the Long-Term CCT process | 2000 |
| SFP2 | Minimum Shift Factor threshold for a constraint to be eligible to be a Competitive Constraint as part of the Long-Term CCT process | 2% |
| ECIT2 | Maximum competitive threshold for ECI on the import side of a constraint for the SCED CCT process | 2300 |
| SFP3 | Minimum Shift Factor threshold for a constraint to be eligible to be a Competitive Constraint as part of the SCED CCT process | 2% |
| DMEECP | Threshold for the ECI Effective Capacity for a DME to determine if their Managed Capacity for an Entity is eligible to be mitigated as part of SCED Step 2 | 10% |
| SFP4 | Minimum Shift Factor threshold below which a Resource will not have mitigation applied in SCED Step 2 | 2% |

3.19.2 Element Competitiveness Index Calculation

(1) To compute the ECI on the import side, first determine the “ECI Effective Capacity” available to resolve the constraint. The ECI Effective Capacity that each Entity contributes to resolve the constraint on the import side is determined by taking, for each Managed Capacity for an Entity having Shift Factors that can help resolve the constraint by increasing power injection or reducing power withdrawal with absolute values greater than the minimum of one-third of the highest absolute value of any Resource Shift Factor meeting this criterion and SFP1, the sum of the products of (a) the Available Capacity for a Resource and (b) the square of the Shift Factor of that Resource to the constraint.

(2) ERCOT will determine the ECI on the import of the constraint, as follows:

(a) Determine the total ECI Effective Capacity by each DME on the import side.

(b) Determine the percentage of ECI Effective Capacity by each DME on the import side by taking each DME’s ECI Effective Capacity and dividing by the total ECI Effective Capacity on the import side.

(c) The ECI on the import side is equal to the sum of the squares of the percentages of ECI Effective Capacity for each DME on the import side.

3.19.3 Long-Term Constraint Competitiveness Test

(1) The Long-Term CCT process is executed once a year and provides a projection of Competitive Constraints for the month with the highest forecasted Demand in the following year.

(2) The Long-Term CCT performs analysis on a selected set of constraints.

(3) A constraint is classified as a Competitive Constraint for the monthly case if it meets all of the following conditions:

(a) The ECI is less than ECIT1 on the import side of the constraint;

(b) The constraint can be resolved by eliminating all Available Capacity for a Resource on the import side, except nuclear capacity and minimum-energy amounts of coal and lignite capacity, that is Managed Capacity for a DME during peak Load conditions; and

(c) There are Shift Factors corresponding to Electrical Buses with Available Capacity for a Resource that can help resolve the constraint by increasing power injection or reducing power withdrawal that have an absolute value greater than or equal to SFP2.

(4) Any constraint that is analyzed and does not meet the conditions in paragraph (3) above will be designated as a Non-Competitive Constraint for the monthly case.

(5) ERCOT shall update and post the list of Competitive Constraints identified by the Long-Term CCT on the MIS Secure Area. The list of Competitive Constraints shall be posted at least 30 days prior to the first of the year.

3.19.4 Security-Constrained Economic Dispatch Constraint Competitiveness Test

(1) The SCED CCT uses current system conditions to evaluate the competitiveness of a constraint.

(2) Before each SCED execution, CCT is performed for all active constraints in SCED. The SCED CCT shall classify a constraint as competitive for the current SCED execution if the constraint meets all of the following conditions:

(a) The ECI is less than ECIT2 on the import side;

(b) The constraint can be resolved by eliminating all Available Capacity for a Resource on the import side, except nuclear capacity and minimum-energy amounts of coal and lignite capacity, that is Managed Capacity for a DME. If the constraint cannot be resolved, then the DME will be marked as the pivotal player for resolving the constraint;

(c) There are Shift Factors corresponding to Electrical Buses with Available Capacity for a Resource that can help resolve the constraint by increasing power injection or reducing power withdrawal that have an absolute value greater than or equal to SFP3; and

(d) The constraint was not designated as non-competitive by a previous SCED CCT execution within the current Operating Hour.

(3) Any constraint that is analyzed and is not designated as a Competitive Constraint under the conditions outlined in paragraph (2) above shall be designated as a Non-Competitive Constraint by the SCED CCT.

(4) A constraint that is determined to be a Non-Competitive Constraint by the SCED CCT within an Operating Hour will not be re-evaluated for its competitiveness status for the remainder of that Operating Hour. However, the SCED CCT will reevaluate the percentage of the ECI Effective Capacity on the import side for each DME and whether the DME is a pivotal player for the constraint. SCED will re-evaluate the competitiveness of the Non-Competitive Constraint starting with the first SCED interval of the next Operating Hour if the constraint remains active in SCED.

(5) The Independent Market Monitor (IMM) may designate any constraint as a Competitive Constraint or a Non-Competitive Constraint.  ERCOT shall provide notice describing any such designation by the IMM.  The notice shall include an effective date, justification for the constraint designation by the IMM and the duration for which the IMM designation will be applied. Any such designation from the IMM shall override the competitiveness status determined by the SCED CCT for the dates for which the IMM override is effective.

(6) Each hour, ERCOT shall post on the ERCOT website whether each binding constraint was designated as a Competitive Constraint or as a Non-Competitive Constraint for each of the SCED executions during the previous Operating Hour.

(7) Mitigation will be applied to a Resource, excluding Controllable Load Resources, in the SCED Step 2, as described in Section 6.5.7.3, Security Constrained Economic Dispatch, when all of the following conditions are met:

(a) A constraint has been determined to be a Non-Competitive Constraint by either the SCED CCT or the IMM;

(b) The DME for the Resource is either identified as a pivotal player for the constraint as described in paragraph (4) above or has a percentage of ECI Effective Capacity on the import side for the constraint greater than DMEECP; and

(c) The Resource has a Shift Factor on the import side of the constraint with an absolute value greater than SFP4;

(8) Once mitigation has been applied to a Resource for a SCED interval, it shall remain applied for the remainder of the Operating Hour regardless of the conditions listed in paragraph (7) above.