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| OBDRR Number | [046](https://www.ercot.com/mktrules/issues/OBDRR046) | OBDRR Title | Related to NPRR1188, Implement Nodal Dispatch and Energy Settlement for Controllable Load Resources |
| Date Posted | June 27, 2023 |
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| Other Binding Document Requiring Revision  | Procedure for Identifying Resource Nodes |
| Supporting Protocol or Guide Section(s) / Related Documents | Nodal Protocol Revision Request (NPRR) 1188, Nodal Dispatch and Energy Settlement for Controllable Load Resources |
| Revision Description | This Other Binding Document Revision Request (OBDRR) aligns the Procedure for Identifying Resource Nodes with the revisions from NPRR1188 to accommodate nodal Dispatch and Settlement of Controllable Load Resources (CLRs) that are not Aggregate Load Resources (ALRs). |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/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 | Alignment between the Protocols and Other Binding Documents is necessary and proper. |

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| Market Segment | Not applicable |

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| Proposed Other Binding Document Language Revision |

**Introduction:**

This procedure is the guiding document for ERCOT and Market Participants with Generation Resources or Controllable Load Resources (CLRs) that are not Aggregate Load Resources (ALRs), to identify Resource Nodes and manage the lifecycle of the Resource Node.

Revisions to this document must be approved by the Technical Advisory Committee (TAC). In the following cases, after review and recommendation by TAC, revisions to this document must be approved by the ERCOT Board:

a. The revisions require an ERCOT project for implementation; and

b. The revisions are related to a Nodal Protocol Revision Request (NPRR), a Planning Guide Revision Request (PGRR), or a revision request requiring an ERCOT project for implementation.

Upon approval of revisions, ERCOT shall post the revised procedure to the ERCOT website within three Business Days.

**Procedure to Incorporate a Resource Node into the Network Operations Model:**

1. At the designated time period as determined by Protocol Section 3.10, Network Operations Modeling and Telemetry, and associated ERCOT business processes, a Resource Entity must submit Resource Registration information that includes a detailed electrical one-line drawing of the generation facility. The ERCOT business process indicates that the Resource Registration information will be presented to the Network Modeling Group within ERCOT.

2. The Network Modeling Group will utilize the “Principles for Resource Node Definition” located in Appendix A to determine the Resource Node parameters.

3. The Network Modeling Group will provide documentation back to the Resource Entity clearly indicating the Resource Node parameters.

4. The Resource Entity will have five Business Days to accept or reject the suggested Resource Node parameters.

5. If there are any disagreements with the Resource Node parameters, ERCOT and the Resource Entity shall work together to reach agreement.

6. If agreement cannot be reached by ERCOT and the Resource Entity, the Wholesale Market Subcommittee (WMS) or appropriate WMS working group shall help guide the decision.

7. Upon an agreement between ERCOT and the Resource Entity, the Resource Node parameters will be implemented in the Network Operations Model.

8. The normal timeline for this procedure shall not exceed 20 Business Days after the submission date of validated Resource Registration information that includes a detailed electrical one-line drawing.

9. In the event that agreement between ERCOT and the Resource Entity cannot be reached within 20 Business Days, no Resource Node parameters will be entered into the Network Operations Model. This may have an effect on Congestion Revenue Right (CRR) Network Models and associated CRR activities regarding the Generation Resource or CLR in question. There must be an agreement between ERCOT and the Resource Entity before Resource Node parameters will be implemented into the Network Operations Model.

10. Once effective in the Network Operations Model, the Resource Node name cannot be changed.

11. Once incorporated into the Network Operations Model, the Resource Node will be used in all associated ERCOT models, applications, and processes.

12. The Resource Node parameters, associated electrical one-line drawings, and other relevant data shall be posted on the Market Information System (MIS) Secure Area and will be available to Market Participants with Digital Certificates.

**Procedure to Retire a Resource Node in the Network Operations Model:**

1. Resource Nodes cannot be retired until all outstanding CRRs on that Resource Node have been settled. Transmission Service Providers (TSPs) cannot submit Network Operations Model Change Requests (NOMCRs) to delete a Resource Node.

2. ERCOT’s Forward Markets team will identify a nearby energized bus to move the location of the retiring Resource Node to until such time as all the outstanding CRRs are settled once it has been notified that equipment tied to a Resource Node is requested to be removed from the Network Operations Model. In this specific case, the Resource Node location will not follow the rules in this document, and it may not be located near a Generation Resource or CLR.

3. ERCOT’s CRR team will submit a NOMCR with the appropriate effective date to remove the retiring Resource Node in the future. The effective date is determined based on the last active CRR date.

4. ERCOT’s Day-Ahead Market (DAM) team will update the Resource Node expiration date in the Market Management System (MMS) based on the retirement of the Resource Node.

**Appendix A**

**PRINCIPLES FOR RESOURCE NODE DEFINITION**

**1. Network Operations Model**

a. Annual/Monthly CRR Auctions use a network model as close as possible to the Network Operations Model.

b. MMS and Energy Management System (EMS) use the same Network Operations Model for both commercial and operational purposes.

c. Breakers between the Resource Connectivity Nodes and the Resource Node are assumed closed by default so that Resource Nodes and associated Resource Connectivity Nodes appear energized.

d. Transmission Element Outages, as defined in the Protocols, are submitted into the Outage Scheduler and posted before DAM submission, i.e. de-energized Resource Nodes (Settlement Points) are known in advance of DAM submission.

**2. Resource Connectivity Nodes**

a. Resource Connectivity Node represents the Electrical Bus where the physical generator is connected or the Electrical Bus of a Common Information Model (CIM) Load that a CLR is mapped to.

b. Generator output is injected at the Resource Connectivity Node and CLR consumption is withdrawn at the Resource Connectivity Node.

c. More than one Resource can be connected to the same Resource Connectivity Node.

**3. Resource Nodes**

3.1 Resource Node Definition

a. Resource Node represents the Electrical Bus or the logical construct that defines the location of a Settlement Point.

b. Resource Nodes include Generation/CLR Resource Nodes, Combined Cycle Plant (CCP) Logical Resource Nodes, Combined Cycle Unit (CCU) Resource Nodes and Private Use Network (PUN) Resource Nodes. Note that for an ESR, the Resource Node for both the Generation Resource component as well as the CLR component is the same and the location of this single Resource Node for both components of the ESR is based on the guidelines described in this document for the placement of Resource Nodes for a Generation Resource.

c. Generation/CLR Resource Nodes represent the Settlement Points for ERCOT and PUN Generation Resources and CLRs. The Three-Part Supply Offers, Energy Bid Curves, DAM Energy-Only Offers, Ancillary Service Offers and DAM Energy Bids as well as Point-to-Point (PTP) bids can be submitted and settled at a Generation/CLR Resource Node, unless that Generation/CLR Resource Node is within a PUN site where constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and ERCOT-Polled Settlement (EPS) Meter, in which case only Three-Part Supply Offers, Energy Bid Curves, and Ancillary Service Offers can be submitted and settled.

i. Generation/CLR Resource Nodes within a PUN site refer to those Resource Nodes defined for Generation Resources and/or CLRs within a PUN site that cannot be placed at the PUN Point of Interconnection (POI) due to the rules for placement of Resource Nodes described in Section 3.2, Resource Node Location.

d. CCP Logical Resource Nodes represent the Settlement Points for Three-Part Supply Offers for CCP configurations. Only Three-Part Supply Offers and Ancillary Service Offers for CCP configurations can be submitted to be settled at a CCP Logical Resource Node.

e. CCU Resource Nodes represent the Settlement Points for the CCU. Only DAM Energy-Only Offers, DAM Energy Bids and PTP bids can be submitted and settled at a CCU Resource Node.

f. PUN Resource Nodes represent the Settlement Points at the PUN interconnection to ERCOT. Only DAM Energy-Only Offers, DAM Energy Bids and PTP bids can be submitted and settled at a PUN Resource Node.

g. Multiple Generation Resources and CLRs can be mapped to the same Resource Node, i.e. offers from different Generation Resources and/or bids from CLRs can be settled at the same Settlement Point.

h. A Generation Resource can only be mapped to one Resource Node, i.e. DAM offers from a Generation Resource can only be settled using one Settlement Point Price (SPP). A CLR can only be mapped to one Resource Node, i.e. DAM bids from a CLR can only be settled using one SPP.

i. The Resource Nodes for “single” Resources and for Resources that are a component of a CCP shall be identified prior to the identification of the PUN Resource Nodes. Once those Resource Nodes have been located, the PUN Resource Nodes shall be located for PUN Resources that are not co-located with an existing Resource Node.

j. Resource Nodes shall not be located at the Direct Current Ties (DC Ties). (The DC Ties are Load Zones.)

k. Resource Nodes shall not be located at the Block Load Transfer (BLT) buses.

l. Do not identify or locate Resource Nodes for Settlement Only Resources.

3.2 Resource Node Location

a. First Fork Rule: Locate Resource Node at the first Electrical Bus with alternate paths starting from the Generation Resource Connectivity Node for Generation Resources and the Connectivity Node of the CIM Load that a CLR is mapped to for CLRs. Parallel network paths do not count as alternate paths.

i. Exception: There is an exception to this rule for placing Generation/CLR Resource Nodes and CCU Resource Nodes that are mapped to Generation Resources/CLRs within a PUN. If the Generation Resource(s)/CLR(s) is within a PUN that has only one interconnection to the ERCOT Transmission Grid, locate the Resource Node at the Electrical Bus that is the interconnection point of the PUN to the ERCOT Transmission Grid.

ii. ERCOT-Polled Settlement (EPS) Meter Location Check: As the network connectivity path is traversed in searching for the first Electrical Bus with alternate paths (First Fork Rule), if an Electrical Bus is encountered with a mapped EPS Meter first, then place the Resource Node at this Electrical Bus. The Resource Node for an ESR is the same for both the Generation Resource and CLR components of the ESR. The placement of the Resource Node for the components of an ESR is governed by the guidelines in this document for a Generation Resource.

b. EPS Meter Rule: Locate Resource Node, subject to First Fork Rule, electrically as close as possible to EPS Meter location, i.e. where energy is effectively metered. If the EPS Meter location changes, then a new Resource Node must be established and the old Resource Node retired in accordance with the procedure in this document. Please refer to paragraph (h)(ii) below for a list of exceptions under which ERCOT can relocate a Resource Node.

c. Ownership Rule: Locate Resource Node at the Electrical Bus that is the ERCOT POI (if practical). Subsequent ownership changes shall not change the Resource Node location.

d. De-Energization Rule: Locate Resource Node at Electrical Bus that is less often de-energized, if alternate choices exist. SPPs for de-energized Resource Nodes are calculated using heuristic rules.

e. Generic Transmission Constraint (GTC) Rule: A GTC cannot include Transmission Elements between a Resource Node and any Generation Resources or CLRs mapped to it.

f. Transmission Constraint Rule: Initial placement of the Resource Node should not be such that Transmission Elements between Resource Node and associated Resource Connectivity Nodes could be constrained. The parameters of the Network Operations Model are evaluated at that point in time when the determination of the Resource Node placement is being made such that there is no congestion between the location of the Resource Node and the Resource Connectivity Node that the Generation Resource is physically connected to, or the Connectivity Node of the CIM Load that the CLR is mapped to, in the Network Operations Model. Ongoing monitoring to ensure that there is no congestion between the Resource Node and the Resource Connectivity Node of the Generation Resource, or the Connectivity Node of the CIM Load that the CLR is mapped to, requires the Resource Entity and Transmission and/or Distribution Service Provider (TDSP) to monitor and coordinate changes that may impact this. See Articles 5, 6 and 7 of the Standard Generation Interconnection Agreement (SGIA).

g. Publicity Rule: Market Participants need to know where the Resource Nodes are located.

h. In the event of a subsequent NOMCR that changes the topology, ERCOT shall review the impact to the Resource Node location.

i. In cases where a NOMCR, that is to be effective in the future, requires the placement of a new Resource Node, there may be instances where the Common Information Model (CIM) may show both the current and the future topology with the new Resource Node. This is done to handle situations where the energization date/time of the future network changes are different than the date/time of the migration of the changes in the network model into the ERCOT production systems. In such cases:

A. The location of the new Resource Node will be based on the future topology only.

B. The transition of the mapping between the Generation Resource or CLR and the new Resource Node (if applicable) will be performed by ERCOT support staff.

ii. ERCOT may relocate the existing Resource Node to an appropriate location to:

A. Align with the implementation of NPRR1016, Clarify Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs), in the Network Operations Model;

B. Account for a series compensator(s); or

C. Implement station renames.

i. If all rules cannot be simultaneously satisfied, then the rules are listed in order of priority. ERCOT will use discretion in choosing the appropriate Resource Node location, assuming such a location does not allow the Resource Entity to control its Resource Node price.

**4. Combined Cycle Plant (CCP) Modeling**

4.1 CCP Logical Resource Node

a. Each CCP configuration for a train represents a CCP Logical Generation Resource.

b. Each CCP Logical Generation Resource is mapped to a CCP Logical Resource Node. All CCP Logical Generation Resources, i.e. all CCP configurations for a train are mapped to the same CCP Logical Resource Node.

c. Each CCP train has its own CCP Logical Resource Node, i.e. CCP Logical Generation Resources for different CCP trains are mapped to different CCP Logical Resource Nodes.

d. Each CCP Logical Resource Node is a Settlement Point.

e. CCP Logical Resource Nodes are used only for Resource-specific Three-Part Supply Offers and Ancillary Service Offers for CCP configurations.

4.2 CCU Resource Node

a. CCU Resource Nodes are mapped to a CCP Logical Resource Node.

b. A CCU Resource Node is the Electrical Bus determined by above rules (First Fork and others as described in Section 3.2, Resource Node Location, above) starting from the Resource Connectivity Node of the physical CCP train Resources.

c. A CCU Resource Node is a Settlement Point.

d. Only DAM Energy-Only Offers, DAM Energy Bids and PTP bids can be submitted at CCU Resource Nodes.

4.3 CCP/CCU Resource Node Processing

a. PTP cleared quantities are injected at Electrical Buses of CCU Resource Nodes.

b. DAM SPP for CCU Resource Node is used as Settlement Price for PTP bids that sink or source at CCU Resource Node.

c. In DAM, energy for CCP Logical Resource is distributed to Connectivity Nodes of physical CCP Resources proportionally to the Resource capacities that are On-Line in the selected CCP configuration.

d. In DAM, Shift Factor for CCP Logical Resource Node Dispatch is calculated as the High Reasonability Limit (HRL) weighted average of Shift Factors for CCU Resource Connectivity Nodes using the Resource HRLs that are On-Line in the selected CCP configuration as weights. Note that the assumption here is that there is no congestion between the connectivity node of the CCU and the Resource Node.

e. DAM SPP for CCP Logical Resource Node is equal to weighted average of DAM SPPs at CCU Resource Nodes using the Resource HRLs that are On-Line in selected CCP configuration as weights. For an Off-Line CCP, the Locational Marginal Price (LMP) for the CCP Logical Resource Node is calculated as weighted average of LMPs at CCU Resource Nodes using the HRLs of the CCU Resources. Note that the assumption here is that there is no congestion between the Resource Connectivity Node of the CCU and the Resource Node.

f. DAM SPP for CCP Logical Resource Node is used as the Settlement Price for CCP Three-Part Supply Offers.

g. In Real-Time Market (RTM), Shift Factor for CCP Logical Resource Node is calculated as weighted average of Shift Factors for CCU Resource Connectivity Nodes using the telemetered outputs of CCU Resources that are online in current CCP configuration as weights. Note that the assumption here is that there is no congestion between the Resource Connectivity Node of the CCU and the Resource Node.

h. RTM LMP for CCP Logical Resource Node when the CCP is On-Line is calculated based on the weighted average of Shift Factors at CCU Resource Connectivity Nodes using telemetered outputs of CCU Resources that are online in current CCP configuration as weights. For an Off-Line CCP, the LMP for the CCP Logical Resource Node is calculated as weighted average of LMPs at CCU Resource Nodes using the HRLs of the CCU Resources. Note that the assumption here is that there is no congestion between the Resource Connectivity Node of the CCU and the Resource Node.

i. RTM SPP for the CCP Logical Resource Node is the Base Point or time weighted average of RTM LMPs at Logical Resource Node.

**5. Private Use Network (PUN) Modeling**

5.1 PUN Resource Node

a. The placement of a PUN Resource Node is optional. At a PUN, after all the Generation/CLR Resource Nodes, CCP Logical Resource Nodes and CCU Resource Nodes are placed (if applicable), if none of the Generation/CLR Resource Nodes or CCU Resource Nodes are placed where the EPS Meter is effectively located, then this is the location of the PUN Resource Node.

b. PUN Resource Node represents the Electrical Bus where an EPS Meter is effectively located that is measuring the flow at a POI with ERCOT.

c. PUN Resource Node is a Settlement Point.

d. PUN Resource Node cannot have mapped PUN Generation/CLR Resources.

e. There can be several PUN Resource Nodes for one PUN.

f. Only PTP and DAM Energy Bids and Energy-Only Offers can be submitted at a PUN Resource Node.

g. For DAM Energy-Only Offers, power is injected at the Electrical Bus of the PUN Resource Node.

h. DAM Cleared quantities are settled at PUN Resource Node SPP.

5.2 Resource Nodes for PUN Generation Resource/CLR

a. Resource Connectivity Node for PUN Generation Resource/CLR represents the Electrical Bus where physical Resource is connected or the Connectivity Node of the CIM Load that the CLR is mapped to.

b. Generator outputs are injected at Resource Connectivity Nodes and CLR consumption is withdrawn at the Resource Connectivity Nodes.

c. Resource Node for PUN Generation Resource/CLR represents the Electrical Bus where Settlement Point for PUN Generation Resource/CLR is located.

d. Resource Node for PUN Generation Resource/CLR is defined using First Fork Rule and others as described in Section 3.2, Resource Node Location, above.

e. A Resource Node for a PUN Generation Resource/CLR is a Settlement Point.

f. PUN energy offers represent net to grid in respect to PUN self-served load excluding CLR energy consumption. PUN CLR Energy Bid Curves represent the bid to buy of the CLR total energy consumption

g. Three-Part Supply Offer and Ancillary Service Offers can be submitted for PUN Generation Resource for the excess capacity and energy not used to serve the PUN self-serve Load. CLR Energy Bid Curves and Ancillary Service Offers can be submitted for PUN CLR for its total capacity.

h. DAM Resource-specific Energy Offer Curves and Energy Bid Curves for PUN Generation Resources/CLRs are settled using SPPs at Resource Nodes for PUN Generation Resources/CLRs.

i. Constraints within a PUN can be monitored but will not be enforced by DAM, Reliability Unit Commitment (RUC) and Security-Constrained Economic Dispatch (SCED).

j. Only PTP and DAM Energy Bids and DAM Energy-Only Offers can be submitted at PUN Resource Nodes.

5.3 CCP Modeling within a PUN

a. CCP trains within a PUN are treated in the same way as any CCP within ERCOT.

**6. Settlement Points**

a. Settlement Point is a Resource Node, Load Zone, or Hub.

b. Resource Nodes include Generation/CLR Resource Nodes, CCP Logical Resource Nodes, CCU Resource Nodes, and PUN Resource Nodes.

c. Generation/CLR Resource Nodes within ERCOT as well as within PUN are Settlement Points.

**7. DAM Clearing and Settlements**

a. PTP bids can be submitted using any Settlement Point (except Generation/CLR Resource Nodes within a PUN site where constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and EPS Meter; and CCP Logical Resource Nodes) as a source and sink.

b. CRRs acquired at de-energized Settlement Points will not be considered by Simultaneous Feasibility Test (SFT) function.

c. DAM Energy-Only Offers can be submitted at any Settlement Point (except Generation/CLR Resource Nodes within a PUN site where constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and EPS Meter; and CCP Logical Resource Nodes).

d. DAM Resource-specific energy offers that are submitted are mapped to a Generation Resource/CLR Node or a CCP Logical Resource Node only.

e. DAM Energy Bids can be submitted at Load Zones, Hubs, Generation/CLR Resource Nodes, CCU Resource Nodes and PUN Resource Nodes, i.e., at any Settlement Point except Generation/CLR Resource Nodes within a PUN site where constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and EPS Meter; and CCP Logical Resource Nodes.

f. DAM/Supplemental Ancillary Services Market (SASM) Ancillary Service Offers are Generation/Load Resource-specific, not Settlement Point-specific.

g. DAM scheduling determines hourly quantities for PTP, energy and Ancillary Service Offers and bids.

h. DAM pricing determines hourly LMPs for all Settlement Points.

i. DAM Settlements is based on DAM quantities and DAM SPPs.

**8. RTM Clearing and Settlements**

a. SCED dispatch determines Base Points for Generation Resources/CLRs.

b. SCED pricing determines LMPs for all Generation/CLR Resource Nodes, CCP Logical Resource Nodes, CCU Resource Nodes, PUN Resource Nodes and all EPS Meter locations.

c. RTM determines 15-minute SPPs for each Settlement Point and each EPS Meter location. These prices are the Base Point weighted and time weighted average of the Real-Time LMPs.

d. RTM Settlement uses 15-minute RTM SPPs (prices at Settlement Points) and Settlement prices (prices at EPS Meter locations).

e. RTM Energy Settlement for the measured output from the Generation Resources uses the prices at the EPS Meter locations as specified in Protocol Section 6.6.3, Real-Time Energy Charges and Payments.

f. RTM Energy Settlement for the measured consumption from the CLRs uses the prices at the EPS Meter locations as specified in Protocol Section 6.6.3, Real-Time Energy Charges and Payments.

**9. Summary of Allowed Activities**

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|  | **ACTIVITIES** |
| **Settlement Points** | **Three-Part Supply Offer** | **Ancillary Service Offer** | **DAM Energy-Only Offers** | **DAM Energy Bid** | **PTP bids (both in DAM & CRR\*\*)** | **QSE to QSE Transaction** | **Energy Bid Curve** |
| Generation/CLR Resource Node not in a PUN site, or Generation/CLR Resource Node at a PUN where no constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and EPS Meter | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Generation/CLR Resource Node within a PUN site\* where constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and EPS Meter  | Yes | Yes | **No** | **No** | **No** | Yes | Yes |
| CCU Resource Node | **No** | **No** | Yes | Yes | Yes | Yes | No |
| PUN Resource Node | **No** | **No** | Yes | Yes | Yes | Yes | No |
| CCP Logical Resource Node | Yes | Yes | **No** | **No** | **No** | **No** | No |

Note that Resource-specific offers (Three-Part Supply Offer, Energy Bid Curve, and Ancillary Service Offers) are made for the Resource and the submittal does NOT specify a Resource Node.

\*These Generation/CLR Resource Nodes will be identified as such in the report NP4-500-SG, Day-Ahead Power System Simulator for Engineering (PSS/E) Network Operations Model and Supporting Files. CRR Auctions will use the most recent report available at the time the CRR Auction model is created.

\*\*Generation/CLR Resource Nodes within a PUN site where constrainable Transmission Element(s) exist between the Generation/CLR Resource Node and EPS Meter will become non-biddable in CRR Auctions for CRR effective dates after December 31, 2020.