PJM Manual 21a:
Determination of Accredited UCAP Using Effective Load Carrying Capability Analysis
First draft

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Section 1: Overview, Applicability, Function of ELCC and Accredited UCAP, Definitions, and Classes

1.1 Function and Applicability of ELCC and Accredited UCAP

Effective load carrying capability (ELCC) analysis provides ELCC Class Ratings for each class (e.g., onshore wind, tracking solar, 4-hour energy storage resource, etc.) that in part determine the Accredited UCAP of ELCC Resources (a broad category that includes most renewable resources and storage resources). The Accredited UCAP in turn sets a cap on the amount of UCAP that such resources can offer or otherwise provide in the Capacity Market.

The effective load carrying capability analysis identifies a scenario in which the aggregate installed capacity "X" of a group of Unlimited Resources with no outages yields the same annual loss of load expectation as the one produced by the scenario with all ELCC Resources that are expected to offer in a given RPM Auction, or otherwise provide capacity, in the Delivery Year being analyzed. The ELCC Portfolio UCAP is the value "X". The ELCC Portfolio UCAP is allocated to each class to yield the ELCC Class UCAP, from which the ELCC Rating is in turn derived, as described in <**pending reference**>.

RAA Schedule 9.1 provides the following definitions which establish the applicability of ELCC and define broad types of resources that are treated differently in the calculation of Accredited UCAP:

*"**Accredited UCAP**" shall mean the quantity of Unforced Capacity, as denominated in Effective UCAP, that an ELCC Resource is capable of providing in a given Delivery Year.*

***"ELCC Resource"** shall mean a Generation Capacity Resource that is a Variable Resource, a Limited Duration Resource, or a Combination Resource.*

***"Variable Resource"** shall mean a Generation Capacity Resource with output that can vary as a function of its energy source, such as wind, solar, run of river hydroelectric power without storage, and landfill gas units without an alternate fuel source. All Intermittent Resources are Variable Resources, with the exception of Hydropower with Non-Pumped Storage.*

***"Limited Duration Resource"** shall mean a Generation Capacity Resource that is not a Variable Resource, that is not a Combination Resource, and that is not capable of running continuously at Maximum Facility Output for 24 hours or longer. A Capacity Storage Resource is a Limited Duration Resource.*

***"Combination Resource"** shall mean a Generation Capacity Resource that has a component that has the characteristics of a Limited Duration Resource combined with (i) a component that has the characteristics of an Unlimited Resource or (ii) a component that has the characteristics of a Variable Resource.*

Examples of combination resources include solar+battery hybrids and Hydropower with Non-Pumped Storage.

1.2 General Approach to Calculation of Accredited UCAP

As further described in Section 3 below, the calculation of the Accredited UCAP of an ELCC Resource is generally derived from the product of:

1. The Effective Nameplate Capacity of the resource X
2. The ELCC Class Rating of the applicable class X
3. The ELCC Resource Performance Adjustment

The Performance Adjustment (described in detail in Section 3.2) is derived from actual output for Variable Resources, and is derived from (1-EFORd) for other ELCC Resources.

RAA Schedule 9.1 provides the following definitions for these terms:

*"**Effective Nameplate Capacity**" shall mean (i) for each Variable Resource and Combination Resource, the resource's Maximum Facility Output; (ii) for each Limited Duration Resource, the sustained level of output that the unit can provide and maintain over a continuous period, whereby the duration of that continuous period matches the characteristic duration of the corresponding ELCC Class, with consideration given to ambient conditions expected to exist at the time of PJM system peak load, to the extent that such conditions impact such resource's capability.*

*"**ELCC Class Rating**" shall mean the rating factor, based on effective load carrying capability analysis, that applies to ELCC Resources that are members of an ELCC Class as part of the calculation of their Accredited UCAP.*

*"**ELCC Resource Performance Adjustment**" shall mean the performance of a specific ELCC Resource relative to the aggregate performance of the ELCC Class to which it belongs as further described in RAA, Schedule 9.1, section E.*

1.3 ELCC Classes

The ELCC Classes are as listed below. ELCC Class Ratings will not be calculated for classes listed below if no units of the class are expected to participate in the Capacity Market in the applicable year.

1. Tracking solar
2. Fixed-tilt solar
3. Onshore wind
4. Offshore wind
5. Landfill gas units that cannot run consistently at ICAP levels for 24 or more hours
6. Intermittent run-of-river hydropower
7. Hydropower With Non-Pumped Storage
8. Energy Storage Resources of 4-hour, 6-hour, 8-hour, and 10-hour duration, or longer duration as required to secure a 100% ELCC Rating. Such classes include pumped storage hydropower.
9. Generic limited duration resources of 4-hour, 6-hour, 8-hour, and 10-hour duration, or longer duration as required to secure a 100% ELCC Rating
10. Hybrids that are combinations of one of the above generation types plus an Energy Storage Resource of 4-hour, 6-hour, 8-hour, or 10-hour duration
11. Hybrids that are combinations of one of the above generation types plus generic limited duration resource of 4-hour, 6-hour, 8-hour, or 10-hour duration

An Energy Storage Resource of "X" hours duration is capable of running continuously at its Effective Nameplate Capacity power level for X hours starting with a full state of charge under conditions of highest risk of shortage on the PJM system, provided that such calculation excludes any MWh that must be reserved for Black Start service or for other firm commitments, and that such resource is capable of fully recharging in a similar amount of time. For example, a

100 MW, 300 MWh Energy Storage Resource can run at 75 MW for 4 hours, and therefore has an Effective Nameplate Capacity value of 75 MW.

A generic limited duration resource of “X” hours duration is capable of running at its Effective Nameplate Capacity power level for X hours under conditions of highest risk of shortage on the PJM system.

A Limited Duration Resource (which includes any Energy Storage Resource) or Combination Resource must be in a given duration class for at least five delivery years.

The RAA provides that the term “Hydropower With Non-Pumped Storage” shall mean “a hydropower facility that can capture and store incoming stream flow, without use of pumps, in pondage or a reservoir, and the Generation Owner has the ability, within the constraints available in the applicable operating license, to exert material control over the quantity of stored water and output of the facility”. A hydropower resource can exert material control over the quantity of stored water and over the output of the facility when it can consistently store at least than 10% of its ICAP for at least 4 hours. This criterion is demonstrated by evaluating the difference of the actual output during the 4 highest load hours of all summer afternoons of a year against the average actual output of all other hours on the same days, and comparing with the ICAP value. Such assessment and determination is once per five years.

Section 2: Overall Timeline for the ELCC Accreditation Process

2.1 Schedule for ELCC Results and Applicability

ELCC Round	Applicable to Auctions	Posting Date	Note
Round 1	2023/24 BRA	June, 2021	Includes floors for 2021 cohort
Round 2	2024/25 BRA	December, 2021	Includes floors for 2022 cohort
Round 3	2025/26 BRA	July, 2022	Updated results, but no floors and no report
Round 4	2026/27 BRA Any IA's run in calendar year 2023	No later than December 31, 2022	Includes floors for 2023 cohort
2023 and Subsequent Years	Results and report generally posted in November, include floors during the transition period, and apply to all activities and auctions in the following calendar year, including the Delivery Year that starts the following calendar year.		

PJM will post final ELCC Class UCAP and ELCC Class Rating values for use in the upcoming Delivery Year in an annual report that also includes appropriate details regarding methodology and inputs. PJM will post this report and communicate ELCC Resource Performance Adjustment values to applicable Generation Capacity Resource Providers no later than five months prior to the start of the upcoming Delivery Year, as further described in the table above. The report will also include ELCC Class Rating values for nine subsequent Delivery Years. ELCC Ratings and ELCC Resource Performance Adjustment values from the report will apply to Capacity provided in the upcoming Delivery Year, as well as to all auctions and activities executed in the following calendar year, using the applicable ELCC Ratings for the corresponding Delivery Year. PJM may post supplemental reports more often than annually.

Starting with the 2023/2024 Delivery Year, Accredited UCAP values for the applicable Delivery Year shall establish the maximum Unforced Capacity that an ELCC Resource can physically provide or offer to provide in the applicable Delivery Year.

For any Delivery Year, the Accredited UCAP of an ELCC Resource shall be based on the most recent ELCC Class Rating value for that Delivery Year (considering also the applicable floor rating, as discussed in Section 7 below), together with the most recently calculated ELCC Resource Performance Adjustment value for that ELCC Resource. Except to the extent specified above or otherwise specified, the ELCC Class Rating values for future years are non-binding and are only for indicative purposes.

A Generation Capacity Resource Provider can offer or provide capacity from an ELCC Resource that is not subject to a capacity market must offer obligation (as specified in Tariff, Attachment DD, Section 6.6) at a level less than the Accredited UCAP for such resource.

Section 3: Calculation of Accredited UCAP

3.1 Calculation of Accredited UCAP

(a) For Variable Resources and Limited Duration Resources (which includes Energy Storage Resources), Accredited UCAP values shall be equal to the product of:

(i) the Effective Nameplate Capacity;
(ii) the applicable ELCC Class Rating; and
(iii) the ELCC Resource Performance Adjustment.

(b) For Combination Resources, Accredited UCAP values shall be equal to the sum of the Accredited UCAP of each component, but not to exceed the Maximum Facility Output of the resource, where:

(i) The value for a Variable Resource component shall be determined in accordance with subsection (a) above.

(ii) The value for a Limited Duration Resource component shall be equal to the product of:

(A) the Effective Nameplate Capacity determined for the Limited Duration Resource component;

(B) [one minus the EFORd for the Limited Duration Resource component]; and

(C) the applicable Limited Duration Resource component ELCC Class Rating

(iii) The value for an Unlimited Resource component shall be equal to the product of the installed capacity of the Unlimited Resource component and [one minus the EFORd for the Unlimited Resource component].

(iv) The Accredited UCAP for Hydropower With Non-Pumped Storage, and for each member of an ELCC Class whose members are so distinct from one another that a single ELCC Class Rating fails to capture their physical characteristics, shall be based on a resource-specific effective load carrying capability analysis based on the resource's unique parameters. The Accredited UCAP value shall be equal to the product of: (i) the resource-specific ELCC rating; (ii) the Effective Nameplate Capacity; and (iii) one minus the EFORd of the aggregate plant.

The applicable class rating of a resource or component is the greater of a) the ELCC Class Rating for the applicable Delivery Year and b) the applicable guaranteed minimum floor rating for the resource, as described in Section 7 below.

3.2 Calculation of ELCC Resource Performance Adjustment

(a) For a Variable Resource, the ELCC Resource Performance Adjustment is based on a metric consisting of the average of (1) actual output during the 200 highest coincident peak load hours over the preceding ten years, regardless of the years in which they occur, and (2) actual output during the 200 highest coincident peak putative net load hours over the preceding ten years, regardless of the years in which they occur, where putative net load is actual load minus the

putative hourly output of Variable Resources based on the resource mix of the target year. For Planned Resources or resources less than 10 years old, estimated hypothetical historical output will be used to develop this metric. For a given resource or component, the Performance Adjustment shall equal the ratio of such metric to the average (weighted by the Effective Nameplate Capacity) of such metrics for all units in the applicable Variable Resource ELCC Class.

(b) For Limited Duration Resources (which includes Energy Storage Resources), the ELCC Resource Performance Adjustment is equal to 1 minus EFORd.

(c) For Combination Resources with only an Unlimited Resource component and a Limited Duration Resource component, the ELCC Resource Performance Adjustment is equal to 1 minus EFORd.

(d) For Combination Resources with a Variable Resource component (except for Hydropower With Non-Pumped Storage): (1) based on the direct metered or estimated output of the Variable Resource component, which is then assessed according to the methodology described in subsection (a) above for Variable Resources and in accordance with the PJM Manuals; and (2) based on the EFORd that is applicable to the Limited Duration Resource component.

(e) For Hydropower With Non-Pumped Storage and other Combination Resources that do not fall into the above categories: equal to 1 minus EFORd.

For all of the foregoing resource categories that use EFORd:

- The applicable class average EFORd value is used for Planned Resources.
- For Existing Resources with less than 12 months of GADS data at the time that EFORd values are evaluated, the class average EFORd value is used to represent any months without data.

Section 4: Determination of Effective Nameplate Capacity, Installed Capacity, and Other Parameters

The RAA provides that ""**Effective Nameplate Capacity**" shall mean (i) for each Variable Resource and Combination Resource, the resource's Maximum Facility Output; (ii) for each Limited Duration Resource, the sustained level of output that the unit can provide and maintain over a continuous period, whereby the duration of that continuous period matches the characteristic duration of the corresponding ELCC Class, with consideration given to ambient conditions expected to exist at the time of PJM system peak load, to the extent that such conditions impact such resource's capability.

The installed capacity of a resource is defined in Manual 21, Section 1.2, as further described here in the context of ELCC Resources. Manual 21 specifies that the "Installed Capacity (ICAP) of a generation resource is defined as the summer net capability of a generating unit…" and further that "The CIR level of a generating unit is reflective of the net capability of the generating unit at the time of the expected summer peak".

Accredited UCAP values are calculated on a plant-wide basis; ELCC Resources comprising multiple units are assessed under ELCC as a single facility, with the various units aggregated up to the plant level. Therefore, the parameters for such resources reflect the aggregate plant parameters, with all units at the plant running simultaneously; the parameters for such resources do not the parameters of any one unit at the plant.

A derate of a Variable Resource is recognized by a decrease in the Effective Nameplate Capacity, or by a deteriorated Performance Adjustment, or both, as applicable.

4.1 Parameters for Limited Duration Resources (which Includes Energy Storage Resources)

In order for a Limited Duration Resource to retain its Effective Nameplate Capacity and Installed Capacity levels, it must demonstrate the level of output the resource can reach under the conditions expected to exist at the time of highest risk of shortage on the PJM system, to the extent that such conditions impact such resource's capability.

The Installed Capacity value and the Effective Nameplate Capacity value of a Limited Duration Resource cannot exceed any of:

1) The sustained level of output that the resource can provide and maintain over a continuous period, whereby the duration of that period matches the characteristic duration of the corresponding ELCC Class (e.g., 4 hours, 8 hours, etc), with consideration given to ambient conditions expected to exist at the time of PJM system peak load.
2) The highest of the most recent three consecutive years' Summer Net Corrected Test Capability values, as specified in Manual 21 Section 2.
3) The Maximum Facility Output.

To increase an Effective Nameplate Capacity level and Installed Capacity level that has been lost due to failed tests, the resource must achieve a higher value in a new test during the next summer period. A derate of the MW power capability or a reduction in the MWh storage capability of an Energy Storage Resource is recognized with a decrease in Effective Nameplate Capacity, as applicable.

4.2 Parameters for Combination Resources Other than Hydropower with Non-Pumped Storage

In order for a Combination Resource (other than Hydropower with Non-Pumped Storage) to retain its Installed Capacity level and the equivalent Effective Nameplate Capacity level of its components, it must demonstrate the level of output each component can reach under the conditions expected to exist at the time of highest risk of shortage on the PJM system, to the extent that such conditions impact such resource's capability.

The installed capacity of a Combination Resource (other than Hydropower With Non-Pumped Storage) is based on the lesser of the Maximum Facility Output or the sum of the equivalent Effective Nameplate Capacity values of the resource's constituent components considered on a stand-alone basis, with consideration given to ambient conditions expected to exist at the time of PJM system peak load.

The contribution to the Installed Capacity of a Combination Resource from a Limited Duration Resource component cannot exceed any of:

1) The sustained level of output that the component can provide and maintain over a continuous period, whereby the duration of that period matches the characteristic duration of the corresponding ELCC Class (e.g., 4 hours, 8 hours, etc), with consideration given to ambient conditions expected to exist at the time of PJM system peak load.
2) The highest of the most recent three consecutive years' Summer Net Corrected Test Capability values for the component, as specified in Manual 21 Section 2.

The contribution to the Installed Capacity of a Combination Resource from a Variable Resource component cannot exceed:

- The highest single-year Capacity Value of the most recent three summer periods, as specified in Manual 21, Appendix B.

The contribution to the Installed Capacity of a Combination Resource from an Unlimited Resource component cannot exceed:

- The highest of the most recent three consecutive years' Summer Net Corrected Test Capability values for the component, as specified in Manual 21 Section 2.

To increase an Effective Nameplate Capacity level of a Combination Resource component and/or an Installed Capacity level that has been lost due to failed tests, the resource must achieve a higher value in a new test during the next summer period. A derate of a component of a Combination Resource is handled in the same way as an equivalent standalone resource.

4.3 Parameters for Hydropower with Non-Pumped Storage

In order for a Hydropower with Non-Pumped Storage resource to retain its Maximum Power, Effective Nameplate Capacity, and Installed Capacity levels, it must demonstrate the level of output the resource can reach under the conditions expected to exist at the time of highest risk of shortage on the PJM system, to the extent that such conditions impact such resource's capability.

The "Minimum Allowable Water Flow" parameter for Hydropower with Non-Pumped Storage resources is the minimum sustained water flow allowable under applicable licenses, contracts, and/or other agreements. This parameter represents incoming streamflow that cannot be

retained in storage during off-peak hours due to contractual or other legal obligations to maintain minimum water flows downstream of the facility. For any given day, the minimum sustained water flow is the average of the lowest contractually-allowable water flow levels in CFS that may be derived for a) 14 consecutive off-peak hours in the summer (i.e., June 21 through September 21, inclusive); or b) 6 consecutive off-peak hours in the rest of the year. Different values of this parameter may be submitted for different modeled days. Submitted values must cover each modeled day from June 2012 through the most recent May 31. These values are not historical actual water flow values, but instead based on the contracts that will be in place in the target Delivery Year. These values reflect governing agreements (such as FERC licenses), river sharing agreements, and any other governing contracts that will be in place in the target Delivery Year. If such contract levels are dependent on water flow levels or other conditions, these values should reflect the impact of those historical conditions.

The “Maximum Power” parameter for a Hydropower with Non-Pumped Storage resource is the maximum net power the resource can maintain in a given month over the hours of highest risk of shortage on the PJM system in that month. For summer months, the Maximum Power parameter cannot exceed the sum of the Installed Capacity values of all units that comprise the resource when running simultaneously.

The Effective Nameplate Capacity value of a Hydropower with Non-Pumped Storage resource cannot exceed any of:

1) The highest of the most recent three consecutive years’ Summer Net Corrected Test Capability values summed across all units of the plant, with all units at the plant tested simultaneously, as specified in Manual 21 Section 2.
2) The Maximum Facility Output.
3) The summer Maximum Power value

To increase an Effective Nameplate Capacity level and Installed Capacity level that has been lost due to failed tests, the resource must achieve a higher value in a new test during the next summer period.

Section 5: Data Submission and Validation

5.1 Introduction

The ELCC methodology developed by PJM requires modeling hourly output from ELCC Resources (i.e., Generation Capacity Resources that are not capable of running continuously at their summer rated power level for 24 or more hours). To perform the hourly modeling, PJM needs specific information about such resources (such information may go beyond the information the resources supplied during the interconnection process).

Those Variable Resources (e.g., wind, solar, hydro without storage or pondage, landfill gas without alternate fuel), Limited Duration Resources (e.g., Energy Storage Resources including pumped hydro), and Combination Resources (e.g., hybrids of generation plus energy storage, hydro with non-pumped storage) that wish to offer in any auctions, or otherwise provide Capacity, for Delivery Year 2023/24 or subsequent Delivery Years shall provide the required information and supporting documentation as detailed below by the deadlines also outlined below in order to ensure that PJM can perform the necessary ELCC analysis.

Data Submission Deadlines

Delivery Year	Deadline
2023/24 BRA	Feb. 15, 2021 For Hydropower with Non-Pumped Storage and pumped storage hydropower resources, this deadline is March 1, 2021.
2024/25 BRA	Aug. 15, 2021
2025/26 BRA	Feb. 15, 2022

For subsequent delivery years, the data submission deadline is August 1 of each calendar year prior to the calendar year in which the applicable RPM auction is held, or in which the applicable Delivery Year begins, or in which the applicable FRR plan is submitted.

A Planned Resource that does not submit any valid data may be issued an Accredited UCAP value calculated on the basis of its apparent class and physical characteristics, provided that such class has a rating included in the most recent ELCC report.

The required information may include relevant physical parameters, relevant historical data such as weather data and actual or estimated historical energy output, and documentation supporting such parameters and historical data. The relevant physical parameters are those that are incorporated into the effective load carrying capability analysis. The parameters required for Hydropower With Non-Pumped Storage shall include Ordinary Water Storage and any applicable Exigent Water Storage. Submitted parameters must indicate the expected duration for which any submitted physical parameters are valid.

PJM will evaluate, validate, and approve the foregoing information. In evaluating the validity of submitted information, PJM may assess the consistency of such information with observed conditions. If PJM observes that the information provided by the Generation Capacity Resource Provider of the ELCC Resource is inconsistent with observed conditions, PJM will coordinate with the Generation Capacity Resource Provider of the ELCC Resource to understand the information and observed conditions before making a determination regarding the validity of the

applicable parameters. PJM may engage the services of a consultant with technical expertise to evaluate the foregoing information.

After PJM has completed its evaluation of the foregoing information, PJM will notify the Generation Capacity Resource Provider in writing whether the submitted information is considered invalid by no later than September 1 following the submission of the information. PJM's determination on the validity of the foregoing information will continue for the applicable Delivery Year and, if requested, for such longer period as PJM may determine is supported by the data.

In the event that PJM is unable to validate any of the required information, physical parameters, supporting documentation, or other related information submitted by the Generation Capacity Resource Provider of an ELCC Resource, then PJM will calculate Accredited UCAP values for that ELCC Resource based only on the validated information. Such ELCC Resource shall not be permitted to offer or otherwise provide capacity above such Accredited UCAP values until PJM determines new Accredited UCAP values for such resource.

Generation Capacity Resource Providers of Hydropower with Non-Pumped Storage resources must provide documentation to support the physical parameters provided for expected load carrying capability analysis modeling, as specified in Section 5.2.5 below. This documentation must: (a) support the plant's physical capabilities; (b) demonstrate that the parameters do not violate any federal, state, river basin, or other applicable authority operating limitations of the plant; and (c) demonstrate full authorization from FERC, any river basin commissions, and any other applicable authorities to meet those capabilities.

5.2 Required Information

Note: Generation Capacity Resource Providers of solar, onshore wind, and landfill gas resources do not have any ELCC data submission requirement.

For members planning to offer or otherwise include certain hydro, storage, hybrids, offshore wind, landfill gas, and certain other resources in the Capacity Market for the 2023/24 Delivery Year and after, certain data (as described in detail in the subsections below) must be submitted by the deadlines outlined in section 5.1 above. This submission facilitates calculation of Accredited UCAP values for such resources using PJM's effective load carrying capability ("ELCC") method.

ELCC Data Submission Process:

1. Visit the ELCC web page: https://www.pjm.com/planning/resource-adequacy-planning/effective-load-carrying-capability
2. From the ELCC web page, download the data submission template corresponding to the applicable ELCC Class. For all ELCC Classes except Hydro With Non-Pumped Storage, a separate template for each RPM Resource ID must be submitted.
3. Review all the sheets in the data submission template. Input all the required data following the data submission standards provided in the template.
4. Access the ELCC portal linked on the ELCC web page. If access has not already been granted, access will need to be requested following the instructions available on the ELCC web page.
5. Use the ELCC portal to submit the filled in data submission template together with the accompany form.

Resubmission of Data:

Generation Capacity Resource Providers who must resubmit data should do so in a complete new data submission template including the full time series and complete set of parameters, as applicable. Supporting documentation does not need to be resubmitted unless it has changed. Members who already submitted ELCC-related data through the above process do not need to submit new data except in the following circumstances:

1. If the previously submitted data did not include the complete time series from June 1, 2012 through the most recent May 31, or was not valid;
2. If the data has changed since the prior submission;
3. If the PJM data template for the applicable class has been updated since the most recent submission.

In general, providers of all resources other than onshore wind and solar must provide basic physical details of the resource, including geographic coordinates, Effective Nameplate Capacity, technology type, generator make and model, and other relevant physical characteristic of the plant. Providers of Variable Resources other than onshore wind and solar that have not been in service since June 1, 2012 must provide an hourly backcast of estimated hypothetical output of the resource from June 1, 2012 through the most recent May 31. In addition, they must provide the underlying data and method used to develop such backcast (for example, hourly streamflow data from the USGS in the case of hydropower, together with the method to convert streamflow to MWh using the generator characteristics).

The information and data required for specific technology types is as follows:

5.2.1 Onshore Wind and Solar

Starting March 1, 2022, providers of onshore wind and solar resources must provide the following data. Prior to March 1, 2022, providers of onshore wind and solar resources must provide the following data only if requesting a unit-specific backcast, otherwise they may provide it if desired.

For onshore wind plants (optional prior to March 1, 2022):

- Latitude and longitude in decimal degrees
- Turbine make, model, rating, and number of such turbines
- Turbine power curves
- Hub height

For solar plants (optional prior to March 1, 2022):

- Latitude and longitude in decimal degrees
- Inverter and panel make, model, DC and AC power ratings, and other specifications
- Number of inverters and total AC power rating of inverters
- Number of panels and total DC power rating panels
- Physical configuration of the panels: fixed tilt, single axis tracking, or dual axis tracking
- For tracking: brand of tracker
- For fixed-tilt: azimuth angle and tilt angle

For onshore wind and solar resource providers that wish to provide their own hourly backcast instead of a PJM-provided backcast, such backcasts must meet the following requirements and are subject to PJM validation:

- Planned Resources and Existing Resources that entered service after June 1, 2012: hourly backcast going back to June 1, 2012, together with the underlying data and method used to develop such backcast.
- Existing resources that entered service on or before June 1, 2012: data submission is only required if there was a change in physical plant configuration as specified in Section YYYYYY below.

After an onshore wind or solar resource enters service, PJM may update its backcast annually by using new production data to calibrate previously developed backcasts.

5.2.2 Variable Resources Other Than Onshore Wind and Solar

Providers of offshore wind must provide the data specified below. In order to derive the most accurate ELCC analysis, providers of landfill gas units and intermittent hydro units should, if possible, provide the data specified below. In the case of landfill gas and intermittent hydro, PJM may utilize existing data and publicly available data to perform ELCC analysis and calculate Accredited UCAP values when no valid data or incomplete valid data has been submitted.

- Latitude and longitude in decimal degrees.
- Planned Resources and Existing Resources that entered service after June 1, 2012: hourly backcast for all years from June 1, 2012 through the most recent May 31, together with the underlying data and method used to develop such backcast.
- Existing resources that entered service on or before June 1, 2012: data submission is only required if there was a change in physical plant configuration as specified in Section YYYYYY below.

For offshore wind plants:

- Turbine make, model, rating, and number of such turbines
- Turbine power curves
- Hub height
- Rotor diameter

Supporting Documentation for Run-of-river Hydropower without Storage and Landfill Gas Resources that are Planned Resources or that Entered Service after June 1, 2012

Run-of-River Hydro without Storage:

- FERC license and any other agreements by which they are required to operate

Landfill gas:

- Expected landfill life
- Size (acreage)

5.2.3 Energy Storage Resources Including Pumped Storage Hydropower

Examples of Energy Storage Resources include standalone batteries and pumped storage hydropower. Providers of Energy Storage Resources must provide the following data and information:

A. Maximum combined power output capability of the plant while running all generators simultaneously under conditions corresponding to PJM peak loads (MW)

B. Maximum number of hours plant can run at maximum output. This metric accounts for the water storage capability of upper and lower ponds, assumes conditions corresponding to PJM peak loads, and assumes the plant starts with an upper pond at its maximum elevation. (Hours)
C. Storage inventory capacity in MWh (A times B)
D. Black Start commitments in MW
E. Any other firm commitments in MW and either MWh or duration (hours)
F. Charging/discharging roundtrip efficiency

In addition, Pumped Storage Hydropower plants must submit monthly average values for the ratio of the number of cubic feet of water required to pump a single MWh, as well as for the ratio of the number of cubic feet of water required to produce a single MWh.

Supporting Documentation for Pumped Storage Hydropower

This documentation is intended to support the information requested for pumped storage hydropower plants a detailed above.

- FERC-related documents
- Documents from river basin authorities
- Any relevant river-sharing agreements
- Prime mover ratings, power curve and elevation
- Upper and lower ponds volumes (minimum and maximum)
- Pond elevations (minimum and maximum)
- Daily average hourly inflows and outflows (if any) of upper and lower ponds
- Requirements related to elevation changes or discharge rates

Supporting Documentation for Batteries

- Battery specifications
- Inverter specifications

5.2.4 Combination Resources (Other than Hydropower with Non-Pumped Storage)

Combination Resources (other than Hydropower with Non-Pumped Storage) include hybrids of generation plus storage located at the same site with a single shared Point of Interconnection. Such resources must provide the following data and information:

- Maximum Output Facility (MFO) in MW
- Power rating capability associated with each component (in MW)
- Black Start commitments in MW
- Any other firm commitments in MW and MWh
- Storage inventory capacity for energy storage resource component in MWh
- Charging/discharging roundtrip efficiency

Providers of a Combination Resource that includes a component that is itself a type of ELCC Resource must additionally meet the requirements of the applicable section above for standalone equivalents of such resource. For example, providers of Combination Resources with a wind or solar component must meet the requirements in Section 5.2.1. Providers of Combination Resources with a component that is another types of variable resource must meet the requirements in Section 5.2.2.

5.2.5 Hydropower with Non-pumped Storage

A Hydropower with Non-pumped Storage plant is one that has water pondage, a water reservoir, or other water storage that is passively filled from incoming streamflow, and which can actively control the hour-by-hour output of the plant. Providers of such resources must submit the following data and information:

- Hourly Maximum Power capability, as specified in Section 4.3 above, for each month since June 2012 through the most recent May 31 (in MW).
- Minimum Allowable Water Flow. As specified in Section 4.3 above, this parameter represents the minimum sustained water flow allowable under applicable licenses, contracts, and/or other agreements. The ELCC model uses this parameter to indicate incoming streamflow that cannot be retained in storage during off-peak hours due to contractual or other legal obligations to maintain minimum water flows downstream of the facility.
- Monthly average values for the ratio of the number of cubic feet of water required to produce a single MWh for each month from June 2012 through the most recent May.
- 24-hour rolling average streamflow data in cubic-feet per hour, for each hour from June 1, 2012, through the most recent May 31, and 24-hour rolling average data on incoming available water energy in MWh per hour, for each hour from June 1, 2012 through the most recent May 31, together with a description and justification for the method for converting streamflow to available MWh. If a valid source of such data is not available, PJM will work with the corresponding owner/operator to identify an alternate data source
- Ordinary daily water storage capability, which can vary monthly, in various forms: cubic feet, converted to MWh, and in terms of daily minimum and maximum forebay elevations, together with a description and justification for the method for converting water storage in cubic feet or forebay elevation to MWh.
- Exigent water storage capability—water storage that is only available on exceptionally high load days or on a PJM-declared emergency, which can vary monthly, in various forms: cubic feet, converted to MWh, and in terms of daily minimum and maximum forebay elevations, together with a description and justification for the method for converting water storage in cubic feet or forebay elevation to MWh.
- Any cascading relationships to ordinary or exigent storage in plants on the same river system in MW. In the ELCC model, water discharges from upstream hydro plants with cascading relationships will be available to downstream hydro plants for generation or storage.
- Any Black Start commitments, in MW.
- Any other firm commitments, in MW and MWh, together with a description of the nature of such firm commitments.

Supporting Documentation for Hydropower with Non-pumped Storage

Owners of Hydropower with Non-pumped Storage plants must provide documentation to support the parameters provided for dispatch modeling. This documentation must support a) their plants' physical capabilities; b) show that the parameters do not violate any operational limits of the plant; and c) show full authorization from FERC, river basin commissions, and any other applicable authorities to meet those capabilities.

- FERC license
- Documents from river basin authorities
- Any relevant river-sharing agreements
- Geographical information

- Storage information to support storage MWh values (ordinary and exigent)

Section 6: Backcasts

For resources that entered service after June 1, 2012, a backcast is required so that a complete time series of estimated output stretching from June 1, 2012 until the most recent May 31 can be identified. This time series is used in developing the ELCC Resource hourly output shapes and in calculating the ELCC Resource Performance Adjustments.

For onshore wind and solar resources, PJM will develop the backcasts, unless a Generation Capacity Resource Provider requests to use their own PJM-validated backcast. Where data is available prior to development of a given backcast, PJM will use the actual plant characteristics to develop a unit-specific backcast; otherwise, PJM will use a generic backcast that corresponds to the overall technology type and location of the resource. PJM may update onshore wind and solar backcasts on a regular basis, including using additional available data to enhance backcasts developed in prior years.

Where possible, backcasts should reflect changes in plant characteristics, including deterioration, enhancements to control systems, derates, uprates, and other physical changes.

Section 7: ELCC Transition Mechanism

7.1 Introduction

The purpose of the transition mechanism is to provide a lower bound on the variability of the Class Rating values that are used to calculate Accredited UCAP values, without producing direct financial impacts to load or to Unlimited Resources. While the transition mechanism does not have an established sunset date, it is intended to be a temporary mechanism to mitigate the downside risk of variable ELCC Class Ratings while resource providers develop the capability to anticipate how ELCC Class Ratings might change in the future. The transition mechanism shall be evaluated in conjunction with a quadrennial periodic review of the shape of the Variable Resource Requirement Curve, as described in Tariff, Attachment DD, section 5.10, no later than the end of 2026. Such evaluation shall include an assessment of the efficacy and appropriateness of the transition mechanism and shall make recommendations as to whether some or all aspects of the transition mechanism should be reconsidered through a stakeholder process. The already-established floor values and associated term duration for each cohort should apply for their entire term, as described below, regardless of the outcome of such evaluation, except as described below.

Planned ELCC Resources of each ELCC Class are organized into annual cohorts according to when they are ready to first offer to provide Capacity. Each cohort has a set of 13 annual floor rating values that place a lower bound on the ELCC rating that is used to calculate their Accredited UCAP—one annual floor rating value is applicable to each of the next 13 consecutive Delivery Years. All resources of the same class and cohort share the same floor rating value for any target Delivery Year. By contrast, resources of the same class but different cohorts will have different floor ratings for the same target Delivery Year. For example, all hypothetical onshore wind resources that sign an ISA in 2022 and otherwise meet the requirements to join the 2022 onshore wind cohort would get a table of floor values like this:

Example Table of Hypothetical Floor Rating Values for Onshore Wind 2022 Cohort

	Target Delivery Year	Floor value	Year calculated
1	2022/23	13%	2021
2	2023/24	12%	2021
3	2024/25	11%	2021
4	2025/26	11%	2021
5	2026/27	11%	2021
6	2027/28	10%	2021
7	2028/29	10%	2021
8	2029/30	10%	2021
9	2030/31	9%	2021
10	2031/32	9%	2021
11	2032/33	9%	**2022**
12	2033/34	8%	**2023**
13	2034/35	8%	**2024**

Note that values 11, 12, and 13 are calculated in later years, such that resources in the 2022 cohort may only know the first 10 values when they join the cohort.

The 2023 onshore wind cohort would get a different table with different floor values.

The ELCC Class Rating used to calculate the Accredited UCAP of a resource is the greater of the applicable floor rating and the overall class rating from the most recently published ELCC report (the "report rating").

As described in Section 7.XXXXX below, the method to calculate floor ratings for a given class cohort yields a value that is lower than the expected report rating value for the same year. For the unexpected scenario in which applicable floor ratings previously calculated for a class cohort are higher than more recent report ratings for a given Delivery Year for that class (in which case the floors "bind"), resources in the cohort will get a higher Accredited UCAP than similarly situated resource of the same class but in a different cohort that has a lower applicable floor rating. In such a case, the higher Accredited UCAP value of the cohort with the higher floors is identified and offset with a lower report rating value for that class, such that the total anticipated Accredited UCAP values of all ELCC Resources of a given grouping does not exceed the same total value determined through the ELCC model. The grouping is defined in Section 7.3 below. In this way the "cost" of floors binding is shared among all resources of the group, and does not extend outside the group.

7.2 General Provisions of the ELCC Transition Mechanism

Floor values for a given class and cohort are published on pjm.com on the ELCC page: https://www.pjm.com/planning/resource-adequacy-planning/effective-load-carrying-capability

7.2.1 Cohort Milestones

The criteria for joining an ELCC cohort of a given year are:

a) completion of one of the following milestones in the New Services Queue:
   i) execution of an Interconnection Service Agreement by the Interconnection Customer, or equivalent, for the ELCC Resource; *or*
   ii) execution of a Wholesale Market Participation Agreement by the wholesale market participant, or equivalent, for the ELCC Resource; *or*
   iii) posting credit to submit a Sell Offer into the next Base Residual Auction, pursuant to the applicable RPM Auction Credit Rate;

   -- and --

b) receipt by the Office of the Interconnection of a written attestation by the Generation Capacity Resource Provider of the ELCC Resource affirming the Generation Capacity Resource Provider's intent to proceed to provide capacity in the PJM Region. Such attestation shall be provided to the Office of the Interconnection after reaching one of the milestones identified in subsection (a) above.

The written attestation above is provided by filling out and signing the form in Attachment A and sending it in PDF format via email to rpm_hotline@pjm.com with the subject line "ELCC Resource Notice of Intent to Provide Capacity". Include in the body of the email the resource name, Queue ID, appropriate ELCC Class, county, and Maximum Facility Output.

7.2.2 Cohort Definitions

The 2021 Cohort consists of ELCC Resources that on or before December 31, 2021 either: (i) are Existing Generation Capacity Resources that are in-service, or: (ii) satisfy the cohort milestones in Section 7.2.1 above. For the purposes of this provision, "in-service" means interconnection service has ever commenced (for resources located in the PJM Region), or it is physically and electrically interconnected to an external Control Area and is in full commercial operation (for resources not located in the PJM Region).

The cohort for a given calendar year after 2021 consists of the ELCC Resources that satisfy the cohort milestones in Section 7.2.1 in that calendar year.

7.2.3 Timing of Preliminary Floor Rating Postings

Floor values are first posted in preliminary form and later finalized in order to provide an opportunity for stakeholders and PJM to identify and correct any errors.

For the 2021 Cohort: a table of preliminary floor values for Delivery Years 2021/2022 through 2030/2031 shall be posted no later than December 31, 2021; preliminary floor values for Delivery Years 2031/2032, 2032/2033, and 2033/2034 shall be posted on or before December 31 of 2022, 2023, and 2024, respectively.

For subsequent cohorts: a table of preliminary floor rating values for ten consecutive Delivery Years shall be posted on or before December 31 prior to the nominal year of the cohort. For example, for the 2022 Cohort, the first ten years of floor ratings shall be published no later than December 31, 2021. The first floor rating in the list is for the Delivery Year that starts in the nominal year of the cohort. For example, for the 2022 Cohort, the first floor rating is for the 2022/23 Delivery Year. Preliminary floor values for Delivery Years eleven, twelve, and thirteen shall be posted on or before December 31 of each of the immediately following three calendar years, respectively. For example, for the 2022 Cohort, the eleventh floor rating will be posted no later than December 31, 2022, and will apply to Delivery Year 2032/33.

This timing is reflected in the below table, where "X" is the nominal year of the cohort.

Target Delivery Year	**Floor Rating Value for Cohort X**	**Calendar Year In which Floor Values Are Posted for Cohort "X"**
X/X+1	Value I	X-1
X+1/X+2	Value II	X-1
X+2/X+3	Value III	X-1
X+3/X+4	Value IV	X-1
X+4/X+5	Value V	X-1
X+5/X+6	Value VI	X-1
X+6/X+7	Value VII	X-1
X+7/X+8	Value VIII	X-1
X+8/X+9	Value IX	X-1
X+9/X+10	Value X	X-1
X+10/X+11	Value XI	**X**
X+11/X+12	Value XII	**X+1**
X+12/X+13	Value XIII	**X+2**

The following table provides an example of the above timing applied to the 2022 Cohort:

Target Delivery Year	Floor Rating Value for the 2022 Cohort	Calendar Year In which Floor Values Are Posted for Cohort "X"
2022/23	Value I	Dec. 31, 2021
2023/24	Value II	Dec. 31, 2021
2024/25	Value III	Dec. 31, 2021
2025/26	Value IV	Dec. 31, 2021
2026/27	Value V	Dec. 31, 2021
2027/28	Value VI	Dec. 31, 2021
2028/29	Value VII	Dec. 31, 2021
2029/30	Value VIII	Dec. 31, 2021
2030/31	Value IX	Dec. 31, 2021
2031/32	Value X	Dec. 31, 2021
2032/33	Value XI	**Dec. 31, 2022**
2033/34	Value XII	**Dec. 31, 2023**
2034/35	Value XIII	**Dec. 31, 2024**

7.2.4 Finalizing Preliminary Floor Rating Values

Preliminary floor values shall be finalized within 120 days of posting. Upon posting the preliminary floor values, the Office of the Interconnection shall conduct a retrospective review to determine if any potential errors occurred in its implementation, whereby the potential error, if verified, could have a material impact on the posted preliminary floor values. In the event the Office of the Interconnection discovers such a potential error within 60 days of posting such preliminary floor value, the Office of the Interconnection will notify Market Participants of the existence of the potential error as soon as possible, but in no event later than 60 days after posting the applicable preliminary floor value. Within 45 days of identifying a potential error in a preliminary floor value, the Office of the Interconnection shall consult with Market Participants, and provide all available supporting documentation (such documentation shall not contain market sensitive or confidential information), prior to determining whether to modify an initially posted preliminary floor value. If the Office of the Interconnection determines it is necessary to modify an initially posted preliminary floor value, it shall notify Market Participants of its intent to do so and post such notification on its website by no later than 45 days following the notification of a discovery of a potential error in the preliminary floor value. The Office of the Interconnection shall post on its website the corrected floor value by no later than 120 days following the initial posting of the preliminary floor value. Should any of the above deadlines pass without the associated action on the part of the Office of the Interconnection, the originally posted floor values will be considered final.

To the extent an ELCC Resource satisfies the requirements of RAA, Schedule 9.1, section J(1)(a) and (b) (i.e., the Cohort Milestones described in Section 7.2.1) on or after the January 1 following the posting of the preliminary floor value applicable to that ELCC Resource, and within 60 days of such posting, and the Office of the Interconnection identifies a potential error with respect to that floor value, the Generation Capacity Resource Provider may elect for the ELCC Resource to be included in the cohort for the prior calendar year. Any election to be included in the cohort for the prior calendar year must be provided in writing to the Office of the

Interconnection within 10 days after the Office of the Interconnection consults with Market Participants regarding the potential error.

7.2.4 Other Provisions

A resource that chooses to offer or provide less capacity than its Accredited UCAP will nonetheless maintain its applicable table of minimum values ("floors ratings").

For the purposes of calculating the Accredited UCAP under the transition mechanism, an uprate for a resource is treated as a separate resource, in a separate cohort, with separate floor values.

The floor value applicable to an ELCC Resource is not transferable to a different ELCC Resource.

Some resources have the option to be in different classes. For example, a 5-hour storage resource can choose to be in the 4-hour storage class or in the 6-hour storage class. Or, a mixed-technology resource without significant interaction between the components could choose to be two separate resources in separate classes, or could be one hybrid resource in the corresponding Combination Resource class. In case such a resource chooses to change to a class that is different from the class of its cohort, the floor ratings of its cohort no longer apply.

In general, resource derates are handled as described in Section 4 above. A derate of a Variable Resource, Limited Duration Resource, or a Combination Resource other than Hydropower with Non-Pumped Storage does not impact the applicability of floors to the derated resource. Dereates of the Maximum Power, Installed Capacity, and/or Effective Nameplate Capacity parameter of Hydropower with Non-Pumped Storage does not impact the applicability of floors to the derated resource. However, previously issued floor ratings that are calculated on a resource-specific basis (for example, Hydropower with Non-Pumped Storage) are no longer applicable in the event that such resource suffers a degradation in any parameter other than ICAP or Maximum Power.

While floor values issued for a specific resource generally would not be changed, such change is required under these circumstances:

A. The resource provider has inaccurately represented the resource's physical capabilities for the purposes of calculating floors.
B. The physical characteristics of the resource have diminished, or the other firm commitments have increased, relative to the time when floors were initially calculated, such that the capabilities assumed when the floors were initially calculated no longer accurately reflect the resource's current or expected capabilities.
C. The resource changes its parameters such that it falls into a different resource class.
D. The ELCC Class for a resource has been merged with another ELCC Class, or split, or otherwise materially redefined such that the aggregate performance of the new ELCC Class is materially distinct from that of the old ELCC Class. In this case, floors will be recalculated as described in Section 7.6.1 below.
E. The sum of the Accredited UCAP values of the resources in the ELCC model calculated on the basis of the previously issued floors exceeds the Portfolio UCAP. In this case, floors will be recalculated as described in Section 7.6.2 below.

7.3 ELCC Floor Grouping

All ELCC Resources benefit from the risk mitigation of the transmission mechanism. The transition mechanism also has the potential cost of supporting floors that bind. This cost is

allocated only among a certain group of ELCC Classes. The purpose of this grouping is to share the risk that guaranteed minimum Class Rating floors of applicable class cohorts need to be supported. That is, in the event that the floor rating of a given cohort and class is higher than the otherwise-applicable ELCC Class Rating, such cohort will enjoy a higher Accredited UCAP value than the overall class. These higher Accredited UCAP values are in turn offset with lower Accredited UCAP values assigned to other members of the group. The purpose of such offsets is solely to isolate the financial impact of bound floors within a group of ELCC Resources; it is not to provide a price signal or incentive to resources in the applicable group.

PJM stakeholders may from time to time wish to revisit the group definitions; however, in the event that any floor ratings are above the applicable ELCC Class Rating (i.e., the floors "bind"), such revisit should not be initiated solely or mainly to shield a certain class or classes of resource from the impact of supporting any such bound floors. Further, it must be recognized in any such revisit that all ELCC Resources benefit from the transition mechanism, and it is appropriate that all such resources be subject to the potential cost of that mechanism.

The RAA specifies: "The groups shall be defined in accordance with the following principles: (1) each group shall be composed of ELCC Classes that shall share relevant physical characteristics; and (2) each group is broad enough to include a significant fraction of the ELCC Portfolio UCAP, with consideration given to ELCC Classes that are expected to increase in deployment over the ten-year term of the effective load carrying capability analysis."

The floor grouping is defined as follows:

- All ELCC Resources

7.4 Method to Calculate Floor Ratings

The ELCC Class Rating floor values for each ELCC Class shall be calculated using the same form of effective load carrying capability analysis used for calculating ELCC Class Ratings for future years, except that the forecasted resource mix used for calculating the ELCC Class Ratings (the "expected forecast") shall be adjusted for the calculation of the floor value for each ELCC Class (the "floor forecast") in order to reflect a more conservative ELCC Class Rating value. Each ELCC Class shall have a unique floor forecast that accounts for the interaction among ELCC Classes, both the given subject ELCC Class and the other ELCC Classes, through adjusting (up or down) the rate of deployment expected for each ELCC Class. The floor forecast for a given ELCC Class of Variable Resources or Limited Duration Resources shall be developed according to the following method:

(i) Any expected increase in deployment of ELCC Resources in the given subject class in each year shall be accelerated in an exponential fashion such that the increase in deployment after 10 years shall be twice the value in the expected forecast.

(ii) For ELCC Resources in ELCC Classes other than the given subject ELCC Class that show a complementary interaction with the given subject class in the effective load carrying capability analysis, where a complementary interaction occurs in the case that the increase in deployment of the complementary class tends to increase the ELCC Class Rating of the subject class, any expected increase in deployment in a complementary ELCC Class shall be decelerated in an exponential fashion such that the increase in deployment after ten years shall be half the value in the expected forecast; any expected decrease in deployment in a complementary ELCC Class shall be accelerated in an exponential fashion such that the decrease in deployment after ten years shall be twice the value in the expected forecast.

Resources that are not consistently complementary across the 10-year horizon of the floor analysis are not considered complementary.

(iii) For ELCC Resources in ELCC Classes showing an antagonistic interaction with the given subject class in the effective load carrying capability analysis, where an antagonistic interaction occurs in the case that the increase in deployment of the antagonistic class tends to decrease the ELCC Class Rating of the subject class, any expected increase in deployment in an antagonistic class shall be accelerated in an exponential fashion such that the increase in deployment after ten years shall be twice the value in the expected forecast; any expected decrease in deployment in an antagonistic class shall be decelerated in an exponential fashion such that the decrease in deployment after ten years shall be half the value in the expected forecast. Resources that are not consistently antagonistic across the 10-year horizon of the floor analysis are not considered complementary.

For Combination Resources other than Hydropower with Non-Pumped Storage: the applicable floor ratings for a Variable Resource component are the same as the standalone equivalent. The applicable floor ratings for the Limited Duration Resource component of a Combination Resource class will be as posted for that specific component category. For example, for a tracking solar+4hr storage resource, the storage component would take ratings from the category “Storage Component of Tracking Solar+4-hour Storage Hybrid”.

For Hydropower With Non-Pumped Storage, the applicable floor values will be determined, using the foregoing method, on a resource-specific basis and not on an ELCC Class basis.

7.5 Method to Adjust Report Ratings to Account For Bound Floors

When the floor rating of any cohort exceeds the applicable ELCC Class Rating for a given Delivery Year, the ELCC Class Rating is reduced in order to maintain the aggregate ELCC Class UCAP of all classes of the group at the level indicated in the ELCC model, as described in Manual 20. The group is as defined in Section 7.3 above. The arithmetical method for making this adjustment is as follows:

1) Calculate the ratio of the available “room” for “unfloored resources” to the total “pre-floor UCAP” of unfloored units. This is the "Reduction Fraction".
    - “Room” is the aggregate ELCC Class UCAP of the classes of the group minus the Accredited UCAP value of all modeled “floored resources”.
    - “Floored resources” are those in a cohort whose floor rating will exceed the report rating.
    - “Unfloored resources” are those in a cohort whose floor rating is less than the report rating.
    - “Pre-floor Class Rating” means the ELCC Class UCAP divided by the aggregate Effective Nameplate Capacity of the modeled resources in the class, without regard for floor ratings.
    - “Pre-floor UCAP” of a unit means the product of the Effective Nameplate Capacity * ELCC Resource Performance Adjustment * Pre-Floor Class Rating
2) Multiply the Pre-floor Class Ratings by the Reduction Fraction to arrive at the Post-floor ELCC Ratings. These are the final ELCC ratings that will be used for all unfloored resources (i.e., the “report ratings”).

If the sum of the Accredited UCAP of the floored resources exceeds the aggregate ELCC Class UCAP of the group as calculated using the ELCC model, then the report rating of that group is adjusted to zero, and additional adjustments need to be made outside the group in order to

ensure that the aggregate of all Accredited UCAP values of resources in the model does not exceed the ELCC Portfolio UCAP. This method is achieved using a comparable approach to that described immediately above, and consistent with RAA Schedule 9.1 Section (J)(3)(e).

If the sum of the Accredited UCAP of the floored resources exceeds the ELCC Portfolio UCAP, then the floor ratings are adjusted as described in Section 7.6.2 below.

7.6 Method to Adjust Certain Floor Ratings

7.6.1 Floor Adjustment in Case of Class Redefinition

If the ELCC Class for a resource has been merged with another ELCC Class, or split, or otherwise materially redefined such that the aggregate performance of the new ELCC Class is materially distinct from that of the old ELCC Class, then the ELCC Class Rating and the Performance Adjustment for the old class could be significantly different from the ELCC Class Rating for the new class, which would render the old floor values inappropriate in the new performance context. For example, a significantly lower-than average performer in a high-value class would have a very low ELCC Resource Performance Adjustment but belong to a cohort with high floor values; if its class were split to include just the similarly low-performing resources, the ELCC Resource Performance Adjustment would rise to close to 100%, but the new ELCC Class Rating would then be much lower than the floor ratings of the class as previously-defined class. It would not be appropriate to calculate the resource's Accredited UCAP based on the newly-increased performance adjustment but the obsolete and too-high floor rating.

Therefore, if an ELCC Class has been merged with another ELCC Class, or split, or otherwise materially redefined such that the aggregate performance of the new ELCC Class is materially distinct from that of the old ELCC Class, the previously posted floor ratings for the subject cohorts will be adjusted based on a ratio of the aggregate performance of the newly defined class relative to the aggregate performance of the previously-defined class. The performance is established based on the hourly output profile of the new and old class during the 200 coincident peak ("CP") gross load hours and putative net load hours over 10 years (the same hours used to calculate the Variable Resource performance adjustment as described in Section 3.2 above.

7.6.2 Floor Adjustment in Case of Insufficient ELCC Portfolio UCAP

If the aggregate of the Accredited UCAP values of all modeled ELCC Resources calculated using the applicable floor values is higher than the ELCC Portfolio UCAP, the applicable floor values will be reduced by the same proportion such that the aggregate Accredited UCAP values equal the ELCC Portfolio UCAP.

Attachment A: Form of ELCC Resource Attestation of Intent to Provide Capacity

This is to attest that the Planned Resource specified below has met the milestones specified in RAA Schedule 9.1 Section J(1)(a), and that _____ [name of Generation Capacity Resource Provider] intends to proceed to provide capacity from such resource to the PJM Capacity Market by offering the resource into an auction, or including the resource in an FRR plan, by no later than December 31 of the upcoming calendar year. This attestation is not a substitute for any notice of intent to participate in a particular Capacity Market auction.

Queue ID: _____ Resource name:_____

State: ____ County:_____ Capacity Interconnection Rights (in MW): _____

ELCC Resource Class (only check more than 1 if multiple technologies are included in the same Queue position):

- ☐ Tracking solar
- ☐ Fixed-tilt solar
- ☐ Onshore wind
- ☐ Offshore wind
- ☐ Landfill gas units that cannot run consistently at ICAP levels for 24 or more hours
- ☐ Intermittent run-of-river hydropower
- ☐ Hydropower With Non-Pumped Storage
- ☐ 4-hour Energy Storage Resource
- ☐ 6-hour Energy Storage Resource
- ☐ 8-hour Energy Storage Resource
- ☐ 10-hour Energy Storage Resource
- ☐ Hybrid: tracking solar+4-hour storage (can charge from grid)
- ☐ Hybrid: tracking solar+4-hour storage (cannot charge from grid)

For an Energy Storage Resource:

A. Maximum AC power capability of storage (in MW): _____

B. MWh storage capability (in MWh): _____

C. Duration of storage (A/B, in hours): _____

For a Queue position with solar and 4-hour storage:

Maximum AC power capability of solar (in MW) _____

☐ DC-coupled ---or--- ☐ AC-coupled

A. Maximum AC power capability of storage (in MW) _____

B. MWh storage capability (in MWh) _____

C. Duration of storage (A/B, in hours): _____

Will the resource be able to charge from the grid? (yes/no) _____

☐ Check this box if the components of the mixed-technology Queue position do not interact and you wish to offer the components as two separate “co-located” resources.

For Queue positions with multiple technologies:

Class 1: _____ Maximum AC power capability of Class 1 (in MW): _____

Class 2: _____ Maximum AC power capability of Class 2 (in MW) _____

If storage is included: Maximum AC power capability of storage (MW): _____

If storage is included: MWh storage capability (in MWh) _____

Will the storage be able to charge from the grid? (yes/no) _____

☐ Check this box if the components of the mixed-technology Queue position do not interact and you wish to offer the components as two separate “co-located” resources.

Generation Capacity Resource Provider: [Name of party]

By: _____ _____
Signature Date

_____
Printed Name

_____
Title