Decision 25-06-005 June 12, 2025

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

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| Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes. | Rulemaking 20-05-003 |

# DECISION GRANTING, WITH MODIFICATIONS, LONG DURATION ENERGY STORAGE COUNCIL'S PETITION FOR MODIFICATION OF DECISION 21-06-035

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# DECISION GRANTING, WITH MODIFICATIONS, LONG DURATION ENERGY STORAGE COUNCIL'S PETITION FOR MODIFICATION OF DECISION 21-06-035

## Summary

This decision grants, with some modifications, the petition for modification (PFM) of the Long Duration Energy Storage Council (LDES Council) of Decision (D.) 21-06-035, with respect to the requirements of load-serving entities (LSEs) for procurement of long-duration energy storage resources. The LDES Council PFM sought clarification to ensure that shorter-duration energy storage resources could not be derated to a lower capacity and discharged over the minimum eight-hour period in order to meet the requirements, because those types of resources are easier to procure and would create inequities between LSEs that are procuring true eight-hour storage resources and those that are not.

This decision finds that the intent of D.21-06-035 was sufficiently clear from its plain language to reject grandfathering of resources that are derated to a lower capacity to discharge over a longer period, from qualifying to meet D.21-06-035 requirements, even if the contracts were approved for rate recovery by Commission resolution. D.21-06-035 used the term "maximum capacity" to signal that resources discharging at less than that maximum capacity over an eight-hour period would not qualify. D.21-06-035 also emphasized the importance of resource diversity and grid reliability benefits of longer-duration storage resources.

Finally, this decision offers some clarification of the LDES requirements upon a finding that these requirements have been interpreted differently by some LSEs, in keeping with the requests in the LDES Council PFM, for the benefit and equity of all LSEs, and to make clear what is necessary for their future compliance showings.

This proceeding remains open.

## 1. Background

### 1.1. Factual Background

Decision (D.) 21-06-035 was adopted by the Commission to require load serving entities (LSEs) to meet mid-term reliability (MTR) needs for procurement of new electricity resources. D.21-06-035 originally covered procurement in the years 2023-2026, but was subsequently amended by D.23-02-040 to require procurement through 2028, and to allow for certain potential extensions to compliance deadlines for long lead-time (LLT) resources to come online no later than 2031.

Ordering Paragraph 2 of D.21-06-035 states that long-duration energy storage (LDES) resources must be "able to deliver at maximum capacity for at least eight hours from a single resource."

On January 10, 2025, Long Duration Energy Storage Council (LDES Council) filed a petition for modification (PFM) of D.21-06-035. The LDES Council's PFM requests additional clarity on the eligibility of LDES resources to meet the MTR procurement requirements in D.21-06-035, after noticing that different LSEs were interpreting the requirement differently in their requests for offers (RFOs).

LDES Council's PFM suggests specific language to be added to the requirements in D.21-06-035 to make clear what types of storage resources qualify for the LDES category, and which resources would not. LDES Council is concerned that without any clarification, lithium-ion batteries may be favored by many LSEs for procurement over more diverse LDES technologies such as pumped storage hydro (PSH) facilities, flow batteries, and compressed air energy storage (CAES). LDES seeks clarification that an LDES resource, to be eligible to be used for compliance purposes, must be capable of discharging at full capacity for at least eight hours, without deration.

### 1.2. Procedural Background

On February 10, 2025, fourteen parties filed comments in response to the LDES Council PFM. Those parties are as follows: Alliance for Retail Energy Markets (AReM); American Clean Power – California (ACP-CA); California Community Choice Association (CalCCA); Environmental Defense Fund (EDF); GreenGen Storage, Inc. (GreenGen); Green Power Institute (GPI); Hydrostor, Inc. (Hydrostor); Mussey Grade Road Alliance (MGRA); Pacific Gas and Electric Company (PG&E); Public Advocates Office at the Commission (Cal Advocates); San Diego Gas & Electric Company (SDG&E); Shell Energy North America, US (Shell); Solar Energy Industries Association (SEIA); and Southern California Edison Company (SCE).

On February 20, 2025, LDES Council filed a reply to the responses.

### 1.3. Submission Date

This portion of the proceeding was submitted on February 20, 2025 with the filing of the reply of LDES Council to the responses to its PFM.

## 2. Timing of PFM

Rule 16.4 of the Commission's Rules of Practice and Procedure (Rules) governs the filing of PFMs. Rule 16.4(d) requires that a PFM be filed within one year of the effective date of the decision, or if the PFM is filed after that date, it must state why the PFM could not have been filed within one year. If the Commission determines that the late submission has not been justified, it may on that ground issue a summary denial of the petition.

LDES Council states that the PFM could not have been presented within one year of the effective date of D.21-06-035 because LSEs were not required to disclose the relevant compliance information during the year following the decision and significant efforts to procure the MTR LDES mandate had not yet occurred within that timeframe. Further, LDES Council argues that the decision did not require LSEs to submit evidence of a "good faith effort" to procure LDES resources until February 2023, which was a year and a half after the effective date of the decision. In addition, LDES Council points out that D.23-02-040 further pushed back the required online dates for the LDES resources to June 1, 2028, with a potential for extension to June 1, 2031. Thus, LDES Council argues that the Commission and other parties were unaware of the manner in which the LSEs were soliciting LDES projects within a year of D.21-06-035. Finally, LDES Council notes that its members have been experiencing LSE behavior through actual solicitations now taking place, and they have only recently discovered inconsistent interpretations of the decision language.

### 2.1. Comments of Parties

Parties' opinions were split on whether the LDES Council's justification for submitting the PFM more than one year after the effective date of D.21-06-035 was reasonable. SDG&E, CalCCA, MGRA, Cal Advocates, and ACP-CA all argue that the PFM was submitted too late and that similar issues were raised and dismissed during previous rounds of comments leading up to the decision.

EDF, Hydrostor, GreenGen, AReM, PG&E, SCE, and SEIA, on the other hand, generally argue that D.21-06-035 lacks clarity and should be modified so LSEs have certainty with respect to how to interpret the requirements, though these parties themselves disagree somewhat on how the decision should be clarified.

### 2.2. Discussion

The PFM was not filed within one year of the effective date of the decision. However, we agree with the LDES Council's arguments that the PFM could not have been presented within a year of the effective date of D.21-06-035, because the decision did not require the LSEs to begin submitting evidence of their good-faith efforts to procure the LDES resources until February 1, 2023, which is more than one year after the effective date of D.21-06-035. This was the first chance to observe LSEs' progress in procuring the LDES category of resources required by D.21-06-035. In addition, it was only in late 2024 that some LSE solicitations began including guidance about eligible resources that was contrary to LDES Council's expectation based on language in D.21-06-035. Thus, LDES Council could not have known that LSEs were acting on differing interpretations of the D.21-06-035 requirements within one year of the decision.

Though issues with the definition of LDES resources were raised in the development of D.21-06-035, in comments to the proposed decision, D.21-06-035 failed to address the specific issues raised by the PFM, such as an expanded definition of the term "maximum capacity."

Thus, we find the PFM could not have been filed within one year of D.21-06-035 within the meaning of Rul 16.4 and we will move on to discussing the particulars of the PFM and the parties' responses to it.

## 3. LDES Council's Proposal

The LDES Council's proposal seeks the following specific changes to the language in D.21-06-035.

First, LDES Council suggests revising the discussion in Section 5.2 of D.21-06-035 as follows (additions are underlined):

> We have specified that long-duration storage must be able to discharge at maximum capacity over at least an eight-hour period from a single resource, though we also note that 12 hours or even multi-day storage options may be even more favorable, given grid needs. Maximum capacity for a long-duration storage resource means the full capacity capability of a resource's installed storage component. LSEs should bear these considerations in mind when evaluating proposals to deliver long-duration storage, and strive to increase the diversity of resources on the grid with this category, if possible. In addition, long-duration storage is a resource category of long lead-time resources that is distinct from short-duration storage, and the maximum capacity of a storage resource may not be reduced in order to extend the discharge period to meet the minimum eight-hour period. This standard also applies to the storage component of a hybrid or co-located resource.

Second, LDES Council would revise Ordering Paragraph 2 as follows:

> Long lead-time resources required by this order by June 1, 2026 shall be defined as: (a) at least 1,000 megawatts (MW) of long-duration storage (able to deliver at maximum capacity, *i.e.*, the full capacity capability of the installed storage technology, for at least eight hours from a single resource);

Third, LDES Council would add an Ordering Paragraph 18 that reads as follows:

> Load-serving entities may not meet the long-duration storage requirement by reducing the full potential maximum capacity of a storage resource and extending the delivery period of that resource over an eight-hour or more period at the reduced capacity output. This standard also applies to the storage component of a hybrid or co-located resource.

### 3.1. Responses of Parties

Several parties generally support the LDES Council PFM, including EDF, GreenGen, and Hydrostor.

EDF fully supports the PFM, arguing that true eight-hour storage resources are essential for California's decarbonization goals. EDF argues that allowing LSEs to comply by using short-duration resources contradicts D.21-06-035, in that it was originally intended to stimulate the development of new technologies. EDF also states that LSEs have already received flexibility with the deadline extension in D.23-02-040 and EDF would prefer not to further delay California's clean energy transition.

GreenGen supports the PFM and agrees that the Commission should clarify procurement guidance for the LDES category in a way that aligns with the plain reading of D.21-06-035. GreenGen argues that ensuring that only true eight-hour discharge resources are included in the LDES category will better meet system needs and ultimately benefit LSEs, developers, and ratepayers. GreenGen warns that relying on derated four-hour batteries will undermine resource diversification, which is critical given the market constraints. GreenGen also points out that short-duration battery storage lacks the capability to provide essential grid services, such as spinning reserves, non-spinning reserves, and inertia, which pumped storage hydro (PSH) and other true long-duration storage resources can provide.

Hydrostor supports the PFM and requests that the Commission clarify the following: a resource may only have one maximum capacity across all discharge periods, its maximum capacity must align with its nameplate capacity (Pmax), and that it must be capable of sustaining that output for at least eight hours. Hydrostor argues that allowing derated four-hour batteries to qualify under the LDES category violates the intent of the decision because these resources operate at less than their full capability and should not be considered long-duration storage. Hydrostor warns that permitting derated battery storage resources reduces the incentives for resource diversity, particularly for technologies like advanced compressed air energy storage, which provide unique reliability and grid benefits that cannot be provided by lithium-ion batteries.

Hydrostor also emphasizes that true eight-hour resources were granted procurement extensions due to their longer development timelines and higher costs; allowing derated batteries to qualify undermines the reasoning behind the extensions. In order to maintain a technology-neutral approach, Hydrostor argues the Commission should not allow resources to bid into multiple MTR categories based on how a resource chooses to bid and contract. Instead, Hydrostor urges that we require an energy storage project to be designed, constructed, and interconnected as either a short-duration or a long-duration resource. Finally, Hydrostor warns that failing to enforce this distinction will weaken the effectiveness of D.21-06-035 and undermine the state's clean energy goals by delaying investment in true long-duration solutions.

PG&E supports the PFM, but with some modifications to the proposed language. Specifically, PG&E recommends modifying the definition of "maximum capacity" to include operational and contractual characteristics. PG&E argues that without these additional clarifications, LSEs could be forced to contract a resource's full nameplate value, leading to over-procurement and higher costs. As drafted, PG&E warns that the LDES Council definition of maximum capacity could reduce the number of eligible resources, slowing procurement efforts and limiting LSEs' ability to meet MTR requirements efficiently. PG&E urges the Commission to adopt a more flexible approach that maximizes the pool of eligible resources, to ensure market fairness for both LSEs and developers.

Several parties generally oppose the PFM, but recommend changes to the LDES Council's proposed language if the Commission decides to grant the PFM. Those parties include AReM, SCE, SEIA, CalCCA, MGRA, and SDG&E.

AReM is concerned with the proposed language in the PFM as well as the longer-term market effects of the PFM and urges that the Commission reject the PFM altogether. AReM argues that the proposed Ordering Paragraph language is flawed because it lacks a reference point for the phrase "reduced capacity output." AReM also states that the PFM improperly assumes that LSEs are the entities controlling a resource's maximum capacity, rather than the developers. AReM also argues that the proposed language defining maximum capacity is redundant, because it should already be read as being equal to Pmax. AReM claims that a resource that can truly deliver eight hours at Pmax costs more to build, and therefore if four-hour resources were to compete in the same LDES category, the eight-hour resources would have less market opportunities as they would charge higher rates in order to recoup their larger costs. AReM also takes issue with the timing of the PFM, arguing that changing the procurement order requirements now could further delay plans in progress and increase costs even more. If the Commission decides to modify the decision, AReM requests an extension out through June 1, 2031 and requests more specific language that ties LDES eligibility to the Pmax stated in the California Independent System Operator (CAISO) Master File.

SCE does not support the proposed modification to the decision language. SCE acknowledges that its comments previously argued for more flexibility in

LDES requirements, but SCE claims the Commission already decided against this flexibility with the final adopted language in D.21-06-035. Thus, SCE states that it has already procured true eight-hour resources, so changing the definition now would create an unfair advantage for LSEs that delayed procurement. While SCE supports the LDES Council's request for clarification, SCE opposes modifying the existing decision language, arguing that doing so years into the procurement efforts could create confusion and disrupt progress. SCE does not see additional reliability or cost benefits from stricter compliance, but asserts that changing the language now would be more disruptive than beneficial. SCE also points out that modifying the language for reliability needs would be redundant with the new resource adequacy slice-of-day framework. Ultimately, SCE argues for greater flexibility in general, but not in MTR procurement at this stage.

SEIA acknowledges the LDES Council's concerns, but asserts that there is no need to modify the decision. SEIA agrees with the LDES Council's perspective that only resources that can sustain an eight-hour duration at maximum discharge should qualify for LDES compliance. However, they argue the existing language is clear enough. SEIA also encourages the Commission to consider reducing market disruptions by accounting for contracts already signed and bids already in place. SEIA cautions that the PFM adds unnecessary ambiguity by trying to differentiate short-duration and long-duration storage categories. If the Commission decides to grant the PFM, SEIA proposes language that ties the definition of "maximum capacity" to the Pmax value found in the CAISO Master File.

CalCCA opposes the PFM, arguing that D.21-06-035 already clearly states that derated batteries do not qualify for LDES compliance, which makes language modifications unnecessary. While CalCCA acknowledges that additional clarity may assist with enforcement, they warn that modifying the decision could disrupt ongoing procurement and set a bad precedent for future Commission rulings. CalCCA urges the Commission to enforce the existing language rather than revise it. However, if the PFM is granted, CalCCA requests that enforcement is applied forward-looking rather than retroactively.

MGRA fully opposes the PFM, stating that the proposed modifications violate Commission rules and fail to provide clean energy, reliability, and ratepayer benefits. First, MGRA argues that the PFM was filed too late and raises concerns that were already addressed prior to the issuance of the decision. Second, MGRA argues restricting LDES compliance to true eight-hour resources would increase ratepayer costs. Third, MGRA argues that a flexible interpretation of the language would allow for greater grid reliability, because dispatch can be based on actual system needs, which are dynamic in nature. Finally, MGRA recommends that if the PFM is granted, it should be applied only to technologies with less than 1 gigawatt (GW) of installed capacity and that a grandfathering process should be put in place for existing/legacy signed contracts. MGRA also generally recommends further incorporation of even-longer-duration storage resources in RESOLVE modeling to analyze the impact on grid reliability.

SDG&E opposes the PFM, citing a lack of new facts to support the PFM. SDG&E argues that the LDES Council could have submitted the PFM within one year of D.21-06-035, and that the Commission had already considered similar arguments prior to the decision's adoption. SDG&E argues that the D.21-06-035 language was intentionally broad to allow multiple pathways for complying without restricting technology choices. SDG&E opposes the PFM's attempt to restrict eligibility to physical requirements, arguing that contractual and operational characteristics should be considered in determining compliance. If the Commission determines that further clarification is necessary, SDG&E suggests that contracts be required to specify duration and compliance eligibility, rather than modifying the decision to limit resource configurations. SDG&E also states that a smaller pool of eligible resources will drive up costs.

In addition, SDG&E highlights that the implementation of the Reliable and Clean Power Procurement Program (RCPPP) may shift the relevance of MTR eligibility criteria altogether, making the PFM unnecessary. Finally, SDG&E points out that resource adequacy rules allow for derated four-hour batteries to count towards eight-hour resource obligations and would argue that this proceeding follow the same approach. SDG&E requests the Commission depend on future modeling and holistic compliance methods rather than granting the PFM.

Several parties also completely oppose the PFM, including Cal Advocates, ACP-CA, GPI, and Shell.

Cal Advocates requests that the Commission deny the PFM due to untimely submission, potential legal conflicts, disruption to procurement progress, and the risk of continued ambiguity. Cal Advocates argues that the LDES Council had enough information to have raised these issues within the one-year timeframe after issuance of D.21-06-035. Cal Advocates claims that PG&E had already issued a solicitation within one year of D.21-06-035 allowing derated batteries for LDES bids, and contracts were already being executed. Cal Advocates also references D.24-02-047, which states that the Commission's intent was to encourage LLT development, but not to require its procurement at all costs. Cal Advocates warns that modifying the decision now could force LSEs to issue additional solicitations, further delaying procurement. Another major concern of Cal Advocates is that some LSEs have already submitted advice letters that have been approved or are in the process of being approved. Cal Advocates argues that if contracts suddenly become ineligible for compliance with D.21-06-035, it could lead to legal disputes.

Cal Advocates also takes issue with the PFM's proposed definition of "maximum capacity," arguing that it needs more specificity to differentiate between power capacity (inverter size, software, and hardware configuration) and energy capacity (total battery cell storage). Without this clarification, Cal Advocates argues that eligibility should align with resource adequacy valuation. Ultimately, Cal Advocates is in favor of the original D.21-06-035 language that is flexible and allows for an affordable pathway to meet LDES requirements.

ACP-CA opposes the PFM both on procedural grounds and for the potential to cause market disruptions. ACP-CA argues that all stakeholders within the LDES Council were already parties to the proceeding prior to D.21-06-035 and should not be granted a PFM simply because a new legal entity was formed four years after the fact. ACP-CA notes that the PFM would unfairly impact LSEs that already executed or solicited contracts, and could force renegotiations of existing contracts, ultimately increasing costs.

ACP-CA also raises concerns that the PFM could redefine "maximum capacity" as nameplate capacity rather than contracted capacity, by incorporating "installed capacity" into the definition. ACP-CA argues this approach conflicts with industry norms and the Resource Data Template (RDT) process, which allows LSEs to contract for a portion of a resource's capacity, rather than its full nameplate capacity. In addition, ACP-CA highlights that the PFM's definition of "maximum capacity" fails to account for round-trip efficiency losses, inverter limits, and software controls that can restrict a resource's actual deliverable capacity. Given that some LSEs have solicitations and contracts underway, ultimately ACP-CA argues that granting the PFM will disrupt ongoing procurement efforts and introduce unnecessary uncertainty into the market.

GPI requests that the Commission reject the PFM, arguing that LDES procurement should remain technology-neutral and that modifications to D.21-06-035 should be based on newer system modeling and updated procurement needs. GPI warns that granting the PFM would conflict with

D.24-08-064, which designates the Department of Water Resources (DWR) as the Central Procurement Entity (CPE) to procure LDES resources. GPI argues that the Commission should rely on the CPE to ensure resource diversity (which excludes lithium-ion batteries) rather than modifying D.21-06-035. Changing the decision now, according to GPI, could disrupt procurement already in progress and create unnecessary competition between the CPE and LSEs.

GPI further argues that the modeling used to support D.21-06-035 requirements is outdated, because it relied on 2019-2020 data that did not explicitly define storage duration requirements or specify whether derated four-hour batteries could qualify. GPI emphasizes that 2025-2026 Transmission Planning Process (TPP) base case demonstrates significantly greater need for LDES capacity, proving that even if the 1 GW LDES target in D.21-06-035 is met with derated batteries, it still would not be enough to support system needs.

Given market constraints, GPI warns against further restriction on eligible procurement to maintain reliability for the grid. GPI also argues that modifying the D.21-06-035 language now could discourage LSEs from following through on existing procurement plans, leading to delays and additional costs. GPI recommends that before any changes are made, the Commission should conduct a system reliability needs assessment to determine whether the priority should be placed on procurement timeliness, cost impacts, or resource diversity. GPI urges the Commission to prioritize reliability and costs over resource diversity and instead of modifying D.21-06-035, use the RCPPP, future procurement orders, and updated modeling to assess system needs.

Shell opposes the PFM, arguing that it raises costs without improving reliability and contradicts the Commission's technology-neutral approach. Shell emphasizes that LSEs should have the flexibility to procure the least-cost, best-fit resources rather than being forced to procure more expensive LDES technologies. Shell also warns that restricting eligibility would increase procurement costs unnecessarily and contradict prior discussions within the proceeding. With affordability as a primary concern, Shell urges the Commission to reject the PFM.

### 3.2. LDES Council Reply

In its reply to the comments of parties, LDES Council reaffirms that its PFM is justified. LDES Council acknowledges that earlier comments were made by LSEs about derated batteries during the comment period for D.21-06-035, but argues that a lack of response from the Commission does not imply agreement. Regardless of parties' prior comments, LSEs must follow the Findings of Fact, Conclusions of Law, and Ordering Paragraphs outlined in D.21-06-035.

LDES Council's reply further highlights the varying interpretations of maximum capacity, including Pmax, nameplate percentage, and energy delivery standards, all of which LDES Council argues demonstrate the need for further clarification and modification of the decision.

LDES Council continues to argue that the D.21-06-035 LDES category was designed to support distinct, longer-duration resources, rather than further support an abundance of short-duration resources. To uphold resource diversity, reliability, and emissions reduction goals, LDES Council urges the Commission

to modify the decision with technology-specific attributes and explicitly exclude paper-based extensions of battery duration.

Further, LDES Council states that it supports the inclusion of battery storage in LDES procurement if batteries can provide eight hours of sustained discharge. LDES Council also clarifies that, in its view, the PFM does not propose language excluding multiple off-takers from a single resource.

In addition, LDES Council argues that LSEs that plan to use derated batteries for LDES compliance are doing so for an economic advantage. LDES Council argues that if the Commission allows for this, then LSEs that did procure distinct long-duration resources will be at a disadvantage. LDES Council also states that higher costs of true eight-hour storage resources are to be expected and reasonable.

Ultimately, LDES Council urges the Commission to grant the PFM to ensure clarity and uphold the intended objectives of the MTR LDES procurement requirements.

## 4. Discussion

As a preliminary matter, we believe the intent of the LDES requirement in D.21-06-035 was clear, based on the plain language of the decision. At a minimum, the phrase in Ordering Paragraph 2 of D.21-06-035 that states "long-duration storage (able to deliver at maximum capacity for at least eight hours from a single resource)" unambiguously signals an intent not to allow derated four-hour lithium-ion batteries to count toward this category of resources. Other discussion in the decision emphasizes the importance of

resource diversity, renewable integration, and system reliability.[1] A common-sense reading of the plain language of D.21-06-035 by an industry-knowledgeable reader would suggest that adding more four-hour lithium-ion batteries to the system is not what the Commission intended by the LDES requirement in D.21-06-035. The fact that D.23-02-040 extended the deadline for compliance with the LDES requirements only serves to underscore the Commission's original intent. It would seem obvious that LSEs procuring four-hour lithium-ion batteries would not have required an extension, particularly one that could allow online dates as late as 2031.

Nonetheless, we acknowledge that some further clarification of the D.21-06-035 LDES language and, in particular, the definition of "maximum capacity," will help make compliance determinations unambiguous. Thus, we will grant the PFM of the LDES Council, with some modifications, as discussed further below.

First, we discuss the definition of the term "maximum capacity." We agree with parties, including PG&E, that point out that the definition needs to take into consideration not only the physical aspects of the facility, but also the contractual configurations, including where there may be multiple off-takers from a single resource.

Second, we clarify, as proposed by the LDES Council PFM, that the requirements should be applied to standalone storage facilities, as well as any

[1] *See*, for example, Finding of Fact 13 of D.21-06-035.

qualifying storage portions of hybrid generation and storage or co-located storage resources used for compliance.

Thus, in section 5.2.1 on pages 35-36 of D.21-06-035, we will make the following modifications (additions are underlined):

> We have specified that long-duration storage must be able to discharge at maximum capacity over at least an eight-hour period from a single resource, though we also note that 12 hours or even multi-day storage options may be even more favorable, given the grid needs. Maximum capacity for a long-duration storage resource for this procurement requirement means the highest power output at full continuous dispatch capability for the contracted or guaranteed capacity in the contract submitted for compliance with this obligation. The resource must be able to deliver continuously for eight hours at that full capacity. This allows multiple LSEs to contract for output from a single storage resource, as not every LSE will have a contract for the full Pmax of any given facility. LSEs should bear these considerations in mind when evaluating proposals to deliver long-duration storage, and strive to increase the diversity of resources on the grid with this category, if possible. In addition, long-duration energy storage, for Mid-Term Reliability procurement, is a resource category of long lead-time resources that is distinct from short-duration storage, in which the length of duration matters, rather than the technology type. The maximum capacity, as defined above, may not be reduced in order to extend the discharge period to meet the minimum eight-hour period. This standard also applies to the qualifying storage component of a hybrid generation and storage or co-located storage resource.

Also included in our clarifications above is the concept that not every LSE will contract for a resource's full Pmax. The above language is intended to

address that concern. Given multiple methods exist to manipulate a battery's duration (*e.g.*, inverter size, firmware limits, etc.) it is important to specify the eight-hour duration without favoring any particular long-duration technology. Rather, our intent here, as with D.21-06-035, is to maximize the amount of dispatch capability to the grid for reliability and grid stability.

In order to make this clear throughout D.21-06-035, commensurate revisions are necessary to Ordering Paragraph 2 of the decision, as follows (additions are underlined):

> Long lead-time resources required by this order by June 1, 2026 shall be defined as: (a) at least 1,000 megawatts (MW) of long-duration storage (able to deliver at maximum capacity (*i.e.*, the highest power output that can be dispatched continuously at the full installed or guaranteed capacity in the contract), for a least eight hours from a single storage resource, or qualifying hybrid generation and storage or co-located storage resource);

The LDES Council also proposed adding a new Ordering Paragraph 18 in D.21-06-035 to make the compliance requirements crystal clear to LSEs and ensure that derated four-hour batteries cannot be used to show compliance with the long-duration storage resource category. We agree that it is necessary to further clarify that derated four-hour batteries are not an eligible resource for compliance with the requirements of D.21-06-035 Ordering Paragraph 2, because that compliance path is contrary to the intent and plain language of D.21-06-035. Therefore, we will add the following Ordering Paragraph 18 to modify D.21-06-035:

> Load-serving entities may not meet the long-duration storage requirement in Ordering Paragraphs 2 and 3 by reducing the full installed or guaranteed capacity in the contract of a storage resource and extending the delivery period of that resource over an eight-hour or more period at a reduced capacity output. This prohibition also applies to the qualifying storage component of a hybrid generation and storage or co-located storage resource used for compliance with Ordering Paragraphs 2 and 3.

To ensure additional clarity, we consider three example configurations to meet a 50 MW compliance requirement. In the first example, a four-hour battery, with an installed or guaranteed capacity of 100 MW (i.e., able to store 400 MWh), cannot be discharged at half its maximum discharge rate, in order to meet the eight-hour minimum requirement. This configuration would not be compliant with the requirement.

In the second example, two batteries with 25 MW of installed or guaranteed capacity, that are both dispatchable for eight-hours (*i.e.,* in total able to store 400 MWh), may be used to count towards a 50 MW requirement, if the resources are combined, operated, and contracted as a single product. This second example would be compliant with the requirement.

In the third example, the long-duration storage part of a co-located or hybrid resource can comply with LDES requirements. If the storage part of the resource can operate as a single product, with 50 MW of installed or guaranteed capacity in the contract, an interconnection limit of 50 MW, and dispatchability at 50 MW for eight continuous hours (i.e., in total being able to store 400 MWh), the storage resource may be submitted towards a 50 MW requirement. This

long-duration storage component could be co-located with another shorter-duration storage resource or a generation resource, but only the long-duration storage component would count toward the requirement. This third example would be compliant with the requirement.

We are concerned about creating market disruption with the addition of the above language. Therefore, Commission staff reviewed the contracts represented in the semi-annual compliance filings of the LSEs thus far and only found a few instances of derated shorter-duration lithium-ion battery configurations. Therefore, we find that our decision regarding grandfathering derated shorter-duration lithium-ion battery configurations, as discussed below, will not create market disruption. It is also the case that any storage resources that do not qualify under the D.21-06-035 LDES requirements may still qualify for the general capacity procurement requirements under the same decision.

Because the intent of D.21-06-035 regarding LDES resources was sufficiently clear from its plain language, we will not grandfather or give legacy status to any existing contracts that involve derated four-hour batteries for the purpose of counting these resources to meet LSEs' LDES requirements in D.21-06-035 or this decision, even if the Commission approved the reasonableness of an LDES resource contract in a resolution. In general, a Commission resolution that approves cost reasonableness is never a guarantee that the contract is in compliance with any specific requirements.

There is no question that derated four-hour lithium-ion batteries would, in all likelihood, be less expensive than true eight-hour duration resources, but

given that most LSEs are complying with the LDES requirements in the manner that was originally intended, it would be unfair (from a process perspective) and inequitable (from a cost perspective) to broaden the standard and allow different cost impacts to customers, depending on the timing and level of compliance of their LSEs with the intent of D.21-06-035.

We do clarify, however, that there is no prohibition on lithium-ion batteries meeting the requirements for the LDES category of resources in D.21-06-035. Configurations where a lithium-ion battery can deliver at maximum discharge capability or guaranteed capacity in the contract for eight hours, or where multiple battery modules of eight-hour duration are added together and operating and contracted as a single product, are eligible to meet the requirements of the long-duration storage category in D.21-06-035.

We also note that compliance verification of the various potential LDES configurations can be complex to analyze. In particular, ensuring that LDES resources provide eight hours of maximum delivery without deration requires LSEs to provide clear operational information to the Commission. Therefore, we make clear that each LSE is solely responsible for providing the operational characteristics to the Commission to show that their LDES resources qualify under the standards of D.21-06-035 and this decision. To implement this requirement, we will add an Ordering Paragraph 19 to D.21-06-035 that states the following:

> Load-serving entities, when submitting information about contracts to show compliance with Ordering Paragraphs 2 and 3, shall provide the operational characteristics that include the

following, but are not necessarily limited to: facility description, maximum throughput, total unit dispatchable range, inverter size (if applicable), interconnection capacity, and discharge and charge rates.

We also note that the Commission will use the CAISO's Pmax testing and Net Dependable Capacity definitions as guidance for compliance verification.

## 5. Summary of Public Comment

Rule 1.18 allows any member of the public to submit written comment in any Commission proceeding using the "Public Comment" tab of the online Docket Card for that proceeding on the Commission's website. Rule 1.18(b) requires that relevant written comment submitted in a proceeding be summarized in the final decision issued in that proceeding.

One public comment was received that relates to the topic of this decision. Energy Dome, an LDES technology and development company, urges the Commission to grant the PFM. Energy Dome comments that clarification is needed to signal the need for LDES systems in California with a rated capacity of more than eight hours. Energy Dome argues that if there is no clarification of the requirements for longer-duration storage resources, market adoption will be further delayed.

## 6. Comments on Proposed Decision

The proposed decision of Administrative Law Judge (ALJ) Julie A. Fitch in this matter was mailed to the parties in accordance with Section 311 of the Public Utilities Code and comments were allowed under Rule 14.3 of the Commission's Rules of Practice and Procedure. Comments were filed by May 19, 2025 by the

following parties: AReM; EDF; GPI; Hydrostor; LDES Council; MGRA; Cal Advocates; SEIA; Vistra.

Reply comments were filed on May 27, 2025 by Hydrostor and MGRA.

This section summarizes the comments from parties thematically. Where relevant, changes have been made in the text of the decision in response to the comments summarized below.

LDES Council and EDF, in their comments, generally support adoption of the proposed decision as written.

GPI points out that Finding of Fact 13 is missing the word "not," resulting in a reversal of the meaning of the sentence. GPI is correct and we have fixed this inadvertent omission. GPI also suggests modifying D.21-06-035 further by including the language from Conclusion of Law 8 below in an ordering paragraph, to ensure clarity. We have made this addition to the ordering paragraphs. GPI also urges more focus on future procurement program design and implementation and closing out the administration of past procurement orders. We generally agree, though do not find that this warrants any additional changes to this decision.

Cal Advocates suggests that the proposed decision be revised to remove some language that could be interpreted in an ambiguous manner, potentially leading to differing interpretations of LDES eligibility. In particular, Cal Advocates objects to references to "full potential installed capacity" and suggests a uniform manner to refer to maximum discharge capability throughout

the decision. We have made changes consistent with this recommendation from Cal Advocates.

Cal Advocates also suggests modifications to the language in the proposed decision referencing the engineering design of a battery system's duration. On this issue, we prefer not to add specifics related to a battery system design, in order to maintain a technology-neutral approach. Thus, we have not made the second set of changes recommended by Cal Advocates.

SEIA generally supports the proposed decision, but offers changes related to how a resource qualification can be demonstrated, particularly for battery systems, using the system manufacturer's label that details the system's specifications. While we agree that this is one piece of information that may be useful for us to use in verifying system eligibility, we prefer not to prescribe or limit the type of evidence that can be provided for verification. We stress that it is the responsibility of the LSE to provide enough information to verify compliance of an LDES system with the terms of this decision.

AReM recommends that the decision include a reference to a facility's Pmax in the definition of maximum capacity in the decision, to avoid the potential for further confusion and differing interpretations about what it means to "deliver continuously for eight hours at full capacity." However, we prefer not to add the language AReM recommends because we are concerned that it would limit LSEs to contracting for a full facility, rather than allowing multiple offtakers as we prefer and as discussed in the proposed decision. Thus, we have not added AReM's recommended language on this point.

AReM also recommends clarifying that a cancelled contract would still qualify as a "signed contract" and adding more relaxation of options for deadline extensions due to tariff and supply chain issues. Because compliance issues such as what types of contracts qualify as "good faith efforts" and issues related to extensions are covered in D.24-02-047 and not the subject of the LDES Council PFM addressed in this decision, we decline to make AReM's requested changes herein.

Hydrostor strongly supports the proposed decision and encourages prompt adoption. Hydrostor offers several error corrections in the Findings of Fact and Conclusions of Law, which we have made, including a clarification that an eligible LDES resource may be able to discharge for eight hours *or more*. Hydrostor is correct that our intention is for eight hours to be the minimum capability, not a limit. In addition, Hydrostor recommends the addition of a reference to a facility's Pmax, where we have clarified that multiple off-takers may contract for output from a single facility. We have added slightly different language than Hydrostor recommends, but which is still intended to further clarify that a single facility may contract with multiple LSEs.

MGRA generally supports clarifying definitions and maintaining technology neutrality in the LDES category, but requests that the proposed decision be modified to grandfather or grant legacy status to any procurement that has already been approved by the Commission, to avoid damaging existing contractual relationships between LSEs and developers and to avoid the likelihood that developers may apply an additional risk premium to contracts

executed in response to the Commission's orders. MGRA specifically requests that we grandfather contracts that have already been approved for cost recovery by the Commission. We decline to make this change for the reasons already stated herein; mainly, that D.21-06-035 was sufficiently clear as to the Commission's overall intent. In addition, a Commission resolution approving cost recovery never states or implies anything about a compliance determination for a contract.

MGRA also suggests including a reference to the possibility of extensions to the 2028 deadline for LDES procurement out to 2031, where such extensions could enable non-lithium-ion technologies to continue research and development to potentially reduce their costs and allow them to compete better with lithium-ion batteries. While this may be true, we prefer to maintain technology neutrality, with a general focus on reliability and least-cost procurement overall. MGRA also suggests some of the same typographical error corrections as other parties, which we have addressed.

Vistra's comments provide some detailed examples of storage resources where multiple individual resources may be added together to operate as a system, delivering the full duration requirements by operating multiple resources sequentially. Vistra would like the decision to allow LSEs to procure projects that can achieve commercial operations with flexibility to choose whether the contracted project can better be managed as a single resource or multiple resources with various maximum capacity levels that add up to the contracted capacity and output (duration). In reply comments, Hydrostor

opposes these recommendations from Vistra, arguing that it is important that the "single resource" requirement be maintained to avoid short-duration resources being able to qualify. Hydrostor therefore argues that the proposed decision does not require modification to eliminate the concept of a "single resource" or "full installed capacity" in order to accommodate the scenarios presented by Vistra.

We agree with Hydrostor and decline to make the changes requested by Vistra, because it will be difficult for us to verify whether individual resources are being dispatched sequentially or simultaneously, unless the interconnection capacity is limited to the size of one of the storage resources. We have added an example in the text explaining circumstances in which the long-duration portion of a co-located storage or hybrid generation and storage resource could qualify. However, the burden of proof ultimately falls on the LSE to provide the necessary evidence to show compliance.

Vistra also includes in its comments concerns about the different rules in the IRP procurement context relative to how storage resources are counted in the resource adequacy program and in its slice-of-day paradigm. In reply comments, MGRA agrees. In reply comments, Hydrostor disagrees, and argues that alignment of LDES resource operational characteristics in the IRP program for procurement obligations, and the valuation of the same LDES resources in resource adequacy, is properly under debate in the resource adequacy rulemaking and should be handled there. We agree with Hydrostor. It is beyond the scope of this decision for us to address any resource-adequacy-related issues here; those must be addressed in the resource adequacy rulemaking (R.23-10-011

or its successor). Therefore, we have not included any of these changes related to alignment between resource adequacy and IRP requested by Vistra and supported by MGRA.

## 7. Assignment of Proceeding

Alice Reynolds is the assigned Commissioner and Julie A. Fitch is the assigned ALJ in this proceeding.

## Findings of Fact

1. The LDES Council PFM was not filed within one year of the effective date of D.21-06-035.

2. The PFM could not have been filed within one year of the effective date of D.21-06-035.

3. Compliance filings for the LDES portion of D.21-06-035 procurement requirements were due on February 1, 2023, which was the first opportunity to review progress and was not within one year of the adoption of D.21-06-035.

4. LSE solicitations in 2024 revealed differing interpretations of the LDES requirements in D.21-06-035 which the decision had not accounted for, and which was more than one year after the adoption of D.21-06-035.

5. Some LSEs interpreted the LDES requirements of D.21-06-035 differently, which could thereby create inequity among ratepayers of different LSEs.

6. D.21-06-035 used the term "maximum capacity" required to deliver over a minimum eight-hour period to signal that shorter-duration storage resources derated to deliver over a longer period would not qualify for the D.21-06-035 LDES requirements.

7. D.21-06-035, Finding of Fact 13, discusses the importance of resource diversity, renewable integration, and system reliability.

8. Four-hour lithium-ion batteries would not provide LDES the resource diversity or improved reliability sought by the D.21-06-035 LDES requirements.

9. D.23-02-040 included an extension of time for compliance with the D.21-06-035 LDES requirements, which would not have been necessary if derated four-hour lithium-ion batteries were considered options for compliance, because these resources are readily available in the market for LSEs to procure in much shorter timeframes.

10. The term "maximum capacity" was not defined in D.21-06-035; defining it could offer clarification for what resources comply with the LDES requirements.

11. The LDES category is a distinct type of resource compared to short-duration storage, where LDES is defined by its duration and not its technology type.

12. For purposes of D.21-06-035 compliance, long-duration requires a discharge period of eight hours or more.

13. Derating a short-duration storage resource by discharging it at lower capacity for a longer period of time does not meet the definition of a long-duration storage resource for purposes of D.21-06-035 compliance.

14. Multiple LSEs may contract for output from a single storage resource; not every LSE will have a contract for the full Pmax of any given facility.

15. The plain language of D.21-06-035 is sufficiently clear that prior Commission approval of a derated four-hour lithium-ion LDES contract for

purposes of cost recovery does not guarantee that the contract can be used for compliance with D.21-06-035 requirements.

16. LDES configurations can be complex and difficult to analyze for compliance with duration requirements without clear operational information.

## Conclusions of Law

1. The LDES Council PFM meets the requirements of Rule 16.4(d) of the Commission's Rules of Practice and Procedure.

2. Because some LSEs interpreted the LDES requirements of D.21-06-035 differently, the Commission should clarify additional aspects of the compliance requirements.

3. The plain language of D.21-06-035 with respect to the LDES requirements conveys the need to procure storage resources with a minimum of eight-hour discharge capability, not shorter-duration resources that can be derated and discharged over a longer period of time.

4. The term "maximum capacity" as used in Ordering Paragraph 2 of D.21-06-035, should be defined as "the highest power output at full continuous dispatch capability for the contracted or guaranteed capacity in the contract submitted for compliance with this obligation. The resource must be able to deliver continuously for eight hours at that full capacity."

5. The definition of "maximum capacity" should allow for multiple LSEs to contract for output from a single storage resource.

6. The definition of "maximum capacity" should be applied to standalone storage, as well as hybrid generation and storage or co-located storage, used to comply with D.21-06-035 Ordering Paragraph 2 requirements.

7. Rules for compliance with the D.21-06-035 LDES requirements should account for the fact that one facility may contract with more than one LSE or off-taker.

8. Derated shorter-duration (less than eight hours) lithium-ion batteries should not be allowed to count for D.21-06-035 LDES requirements.

9. Lithium-ion batteries that have discharge capabilities at maximum capacity (as defined in Ordering Paragraph 2 of D.21-06-035) for eight hours or more are eligible to be used for D.21-06-035 LDES compliance.

10. Grandfathering, extending legacy status to, or otherwise allowing contracts entered into prior to the date of this decision to count towards D.21-06-035 LDES requirements without meeting the clarified requirements in this decision could be inequitable to some LSE customers.

11. It should be the sole responsibility of the LSE providing an LDES resource to the Commission to show compliance with D.21-06-035 LDES requirements to provide the appropriate operational information to show its configuration.

12. LSEs should be required to provide operational characteristics of facilities used to meet LDES requirements in D.21-06-035, including, but not necessarily limited to: facility description, maximum throughput, total unit dispatchable range, inverter size (if applicable), interconnection capacity, and discharge and charge rates.

## O R D E R

**IT IS ORDERED** that:

1. The Long Duration Energy Storage Council Petition for Modification of Decision 21-06-035 filed on January 10, 2025 is granted, as modified in this decision.

2. The text in Section 5.2.1 on pages 35-36 of Decision 21-06-035 shall be modified as follows (with additions underlined):

> We have specified that long-duration storage must be able to discharge at maximum capacity over at least an eight-hour period from a single resource, though we also note that 12 hours or even multi-day storage options may be even more favorable, given the grid needs. Maximum capacity for a long-duration storage resource for this procurement requirement means the highest power output at full continuous dispatch capability for the contracted or guaranteed capacity in the contract submitted for compliance with this obligation. The resource must be able to deliver continuously for eight hours at that full capacity. This allows multiple LSEs to contract for output from a single storage resource, as not every LSE will have a contract for the full Pmax of any given facility. LSEs should bear these considerations in mind when evaluating proposals to deliver long-duration storage, and strive to increase the diversity of resources on the grid with this category, if possible. In addition, long-duration energy storage, for Mid-Term Reliability procurement, is a resource category of long lead-time resources that is distinct from short-duration storage, in which the length of duration matters, rather than the technology type. The maximum capacity, as defined above, may not be reduced in order to extend the discharge period to meet the minimum eight-hour period. This standard

also applies to the qualifying storage component of a hybrid generation and storage or co-located storage resource.

3. Ordering Paragraph 2 of Decision 21-06-035 shall be modified as follows (with additions underlined):

> Long lead-time resources required by this order by June 1, 2026 shall be defined as: (a) at least 1,000 megawatts (MW) of long-duration storage (able to deliver at maximum capacity (*i.e.*, the highest power output that can be dispatched continuously at the full installed or guaranteed capacity in the contract), for a least eight hours from a single resource, or qualifying hybrid generation and storage or co-located storage resource);

4. A new Ordering Paragraph 18 shall be added to Decision 21-06-035 that states as follows:

> Load-serving entities may not meet the long-duration storage requirements in Ordering Paragraphs 2 and 3 by reducing the full installed or guaranteed capacity in the contract of a storage resource and extending the delivery period of that resource over an eight-hour or more period at a reduced capacity output. This prohibition also applies to the qualifying storage component of a hybrid generation and storage or co-located storage resource used for compliance with Ordering Paragraphs 2 and 3.

5. A new Ordering Paragraph 19 shall be added to Decision 21-06-035 that states as follows:

> Load-serving entities, when submitting information about contracts to show compliance with Ordering Paragraphs 2 and 3, shall provide the operational characteristics that include the following, but are not necessarily limited to: facility description, maximum throughput, total unit dispatchable

range, inverter size (if applicable), interconnection capacity, and discharge and charge rates.

6. A new Ordering Paragraph 20 shall be added to Decision 21-06-035 that states as follows:

   Lithium-ion batteries that have discharge capabilities at maximum capacity (as defined in Ordering Paragraph 2) for eight hours or more are eligible to be used for compliance with this decision.

7. This proceeding shall remain open.

This order is effective today.

Dated June 12, 2025, at Sacramento, California.

ALICE REYNOLDS
President
DARCIE L. HOUCK
JOHN REYNOLDS
KAREN DOUGLAS
Commissioners

Commissioner Matthew Baker recused himself from this agenda item and was not part of the quorum in its consideration.