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Memorandum

To: Chair David Hochschild
Vice Chair Siva Gunda
Commissioner Karen Douglas
Commissioner J. Andrew McAllister, Ph.D.
Commissioner Patty Monahan

Date: February 23, 2022

From: Drew Bohan, Executive Director
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**Subject: CEC STAFF'S RESPONSE TO APPLICANT'S FILING
REQUESTING EXEMPTION FROM THE NOI PROCESS FOR THE
GEM ENERGY STORAGE CENTER (21-AFC-02)**

In its "Order Finding the Application for Certification Incomplete and Directing Applicant and Staff to File Information Regarding Exemption From the NOI Process and Appointing a Committee" the Commission directed the applicant to file evidence supporting the project's qualification for an exemption from the notice of intention (NOI) process by February 9, 2022, and the Executive Director to file a response to the applicant's filing by February 23, 2022. CEC staff has reviewed the applicant's February 9, 2022, filing titled "Joint Response of the Pecho Energy Storage Center and the Gem Energy Storage Center Supporting Exemption from the NOI Process and Request for Commission Order at March 9, 2022 Business Meeting" and provides the following response for the Gem project.

As staff explains in more detail below, the applicant has not provided sufficient information to substantiate the use of the exemption.

The Notice of Intention and Application for Certification Processes

The Warren-Alquist State Energy Resources Conservation and Development Act (WAA) (Public Resources Code sec. 25000 et. seq) established a two-step process for the certification of thermal power plants 50 megawatts (MW) or larger: the notice of intention to file an application for certification of the site and related facilities (notice of intent or NOI),¹ to be followed by an application for certification (AFC).² The NOI

1 Pub. Resources Code §25502.

2 Pub. Resources Code §25519.

process requires an applicant to propose three alternative sites and related facility proposals.³ An AFC could not be filed until the NOI was approved, and the CEC had found at least two alternative site and related facility proposals acceptable.⁴ The combined process could take a minimum of three years to complete. This two-step approach did not exist for long before the Legislature started exempting certain types of power plants from having to do the first step, the notice of intent.

Exemption from the NOI Process

In 1978, four years after the WAA was first adopted, Senate Bill (SB) 1805 (Chapter 1010, Statutes 1978) was enacted establishing Public Resources Code section 25540.6, which created five distinct exemptions from the NOI process. As it stands today, Public Resources Code section 25540.6 exempts from the required NOI process (and establishes an expedited 12-month AFC review for) the following types of facilities:

“(1) A thermal powerplant which will employ cogeneration technology, a thermal powerplant that will employ natural gas-fired technology, or a solar thermal powerplant.

(2) A modification of an existing facility.

(3) A thermal powerplant which it is only technologically or economically feasible to site at or near the energy source.

(4) A thermal powerplant with a generating capacity of up to 100 megawatts.

(5) A thermal powerplant designed to develop or demonstrate technologies which have not previously been built or operated on a commercial scale. Such a research, development, or commercial demonstration project may include, but is not limited to, the use of renewable or alternative fuels, improvements in energy conversion efficiency, or the use of advanced pollution control systems. Such a facility may not exceed 300 megawatts unless the commission, by regulation, authorizes a greater capacity. Section 25524 does not apply to such a powerplant and related facility or facilities.”

Once Public Resources Code section 25540.6 was adopted, and as the exemptions were further expanded, more and more projects were exempted from the NOI process, with the large majority of jurisdictional power plants being exempted from the NOI process

³ Pub. Resources Code §25502. The NOI process appeared to have two purposes: to provide several alternative locations for the CEC to consider for large, potentially undesirable power plants and to create an inventory of prescreened sites that would be acceptable for powerplant development. Any alternative site and related facility once found to be acceptable would be eligible for consideration in an AFC without further proceedings required for an NOI.

⁴ Pub. Resources Code §25516 and §25519. Pursuant to Public Resources Code, section 25503, at least one site shall not be located in whole or in part in the coastal zone.

under paragraph (1), which was expanded in 1993 to include natural gas thermal facilities selected through a competitive solicitation or negotiation. The exemption was expanded to include any natural gas fired facility in 1999 (coinciding with deregulation of the energy market), the last time section 25540.6 has been modified.⁵ Because the use of that particular provision is straightforward (it is usually clear from the outset whether a proposed facility qualifies as cogeneration technology, natural gas-fired, or solar thermal) the CEC does not generally conduct a detailed analysis of the applicability of an exemption from the NOI process.

Here, however, the proposed project, an advanced compressed air energy storage (A-CAES) facility, is of a type the CEC has not licensed before, and more effort needs to be made to confirm that it can properly be exempted from the NOI process.⁶ The technology would use off-peak electricity from the grid to inject compressed air into a cavern, displacing water from the cavern up a shaft to the surface. When power is needed, the compressed air is expanded through a turbine generator to generate electricity and the previously displaced water travels back down the shaft from the reservoir at the surface, maintaining constant pressure in the cavern. Heat is generated from the compression process and captured and stored in a proprietary thermal storage system. When the compressed air is released to generate electricity, it is reheated using the stored heat, which expands the air through a turbine. If the expanding air was not heated by stored energy or some thermal process, the air would become super cooled during expansion, potentially forming ice that could damage the turbine generator; therefore, adding heat is a necessary thermal component in the generation process.

The project is not one of the technologies listed in paragraph (1), is not a modification of an existing facility under paragraph (2), is larger than the 100 MW allowed under

⁵ The last NOI the CEC approved was in 1985. The last NOI to be filed with the CEC was withdrawn in 1991. According to existing records, the bulk of the NOIs approved by the CEC occurred in the 1970s and involved coal, coal gasification, oil-fired combined cycle, gas-fired combined cycle, geothermal, and nuclear facilities. In short, as the energy industry has shifted away from monopolies and towards a more competitive marketplace, the Legislature has expanded the availability of exemptions from the NOI process. *See, e.g.* Assem. Com. Utilities and Commerce, Analysis of Sen. Bill No. 110 (1999-2000 Reg. Sess.), dated August 23, 1999 [“ In 1996, the California Legislature restructured the electricity generation market AB 1890 (Brulte), [Statutes of 1996]. AB 1890 provided incentives for the state's three investor-owned utilities (IOUs), Pacific Gas and Electric, Southern California Edison, and San Diego Gas and Electric to divest their electric generating plants, paving the way for a competitive electricity generation market. This bill streamlines CEC's siting and licensing process to conform with a competitive generation market, where ratepayers are no longer on the hook for the cost of building and maintaining power plants. In a competitive generation market, the owners of these new 'merchant' generating facilities, and not ratepayers, bear the risks.”]

⁶ Staff is also concerned about the reliability of the technology at the proposed scale given that it is orders of magnitude larger than what has been tested in practice, but that concern can be explored further during substantive review of the application, whichever type of application is ultimately determined to be necessary.

paragraph (4), and is larger than the 300 MW allowed under paragraph (5). Therefore, to be exempted from the NOI process, the project must show that it qualifies for an exemption under paragraph (3): that it is a power plant that is only technologically or economically feasible to site at or near the energy source.

Interpretation of Public Resources Code Section 25540.6(a)(3)

To staff's knowledge the CEC has never interpreted this exemption, there is no statutory language elsewhere in the WAA that would help interpret this exemption, the CEC has not promulgated regulations interpreting this exemption, and a court has not opined as to how the CEC is to apply the exemption. Without other guidance, the rules of statutory construction are applied to the language to determine ambiguity. (Day v. City of Fontana (2001) 25 Cal.4th 268, 272.) If there is no ambiguity, the plain language of the exemption controls. Therefore, staff turns to the plain language of the statute to help guide the application of the statute to this situation.

The Plain Language of the Statute is Unambiguous

The exemption does not contain unique, undefined terms. *Thermal powerplant* is defined in Public Resources Code section 25120, and, as discussed above, the project meets that definition. Likewise technological and economic feasibility are commonplace terms and readily and consistently defined in dictionaries. These terms can be found throughout the CEC's regulations⁷ and *feasible* itself is defined in California Code of Regulations, title 20, section 1201 of the CEC's regulations as meaning "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

Site is defined in Public Resources Code section 25119 as "any location on which a facility is constructed or is proposed to be constructed" and is used over 250 times in the WAA. For the term *at or near the energy source*, "energy source" is likewise found elsewhere in the WAA and the CEC's regulations, both as it relates to energy efficiency matters⁸ and electricity generation facilities.⁹ Thus, the use of the term "energy source"

7 See, e.g. Cal. Code Regs., tit. 20, §1745.5(b)(1)(C) requiring a presiding member's proposed decision to be based on consideration of any significant effects remaining after application of "all feasible mitigation measures and alternatives, whether economic, legal, social, technological or other environmental benefits of the project outweigh the unavoidable adverse effects." See also, Cal. Code Regs., tit. 20, §2904 establishing a methodology for concluding that carbon sequestration projects meet the emission performance standard if, among other things, they have "an economically and technically feasible plan that will result in the permanent sequestration of CO₂..."

8 See, e.g. Pub. Resources Code §25470(g) [Energy conservation measure means an installation or modification of an installation in a building that is primarily intended to reduce energy consumption or allow the use of a more cost-effective energy source."]

9 See, e.g. Pub. Resources Code §25300(c) ["The Legislature further finds and declares that the state government requires at all times a complete and thorough understanding of the operation of energy markets, including electricity, natural gas, petroleum, and alternative energy sources..."]

in paragraph (3) does not create an ambiguity because the concept is consistent with the dictionary definitions of those words as well as other references in the WAA and CEC's regulations.

Taken all together, paragraph (3) sets out clear, unambiguous criteria for concluding whether a project qualifies for an exemption from the NOI process: It must (1) be a thermal power plant; (2) which it is only technologically or economically feasible; (3) to site; (4) at or near the energy source.

If the project meets all these elements, then it can proceed past the NOI process and file an AFC directly.

As an initial matter, it is possible that the proposed technology could meet all four elements required for this exemption. As discussed above, heat is integral to the process, with the reheated compressed air being the source of the thermal energy. Therefore, the project can be said to be a thermal power plant, which is statutorily defined as any stationary or floating electrical generating facility using any source of thermal energy.¹⁰ For element two, the CEC has ample experience evaluating technological and economic feasibility in many contexts, and there is no question that it is capable of doing so in this context if provided sufficient facts. Element three should be the easiest term to interpret, with a definition readily provided in statute and it being a reasonably simple concept. The final element is that the power plant be "at or near the energy source."

When speaking of traditional power plants, the energy source is straightforward – whether it be natural gas, coal, nuclear fuel, biomass, or geothermal, among others. The proposed project, however, is a facility that first stores energy created by another facility and then feeds that energy back to the grid. In this context, the energy source referenced in paragraph (3) could be either the energy taken from the grid to initially power the storage process, or the compressed air released from the cavern and reheated, driving the production of electricity that is ultimately delivered to the grid. In staff's view the applicant must show that there are only a limited number of sites in California where these types of facilities could be located either from a technological or economic basis. At this point the record does not contain evidence that links the economic or technological feasibility of Gem to one or more of the energy sources at the Gem site, suggesting that the project has not met the criteria to qualify for the exemption. Therefore, it is up to the applicant to provide the information that demonstrates that the NOI exemption is triggered.

¹⁰ It goes without saying that if the project fails to meet this initial element, the CEC does not have jurisdiction to consider the project in the first place.

Staff Recommends the CEC Require the Applicant to Provide Additional Information to Support a Conclusion that the Plain Language of Public Resources Code Section 25540.6(a)(3) Exempts the Proposed Project from the NOI Process

The NOI process was created to ensure the state had a role to play in determining where, among several options, large, mainly fossil-fuel burning power plants that ratepayers would be paying for would be built. When it became clear that this process impaired the ability of less polluting or more efficient facilities that were more restricted in where they could be sited from receiving permits, or receiving them in a timely manner, the Legislature carved out exemptions.

The key questions the CEC must answer in applying Public Resources Code section 25540.6(a)(3) to the proposed project are (1) Whether the grid connection the project proposes (from which the projects would draw electricity supplied by renewable energy projects) or the cavern it will build to contain the compressed air, or both, constitute an energy source for purposes of the exemption; and (2) If one or both of the above constitute an energy source pursuant to the exemption, whether the applicant has made a sufficient showing that it would be technologically or economically infeasible to locate the project farther away from the identified energy sources. Based on a plain reading of the statute, staff proposes that the answer to the first question is no for the grid connection but yes for the cavern. For the second question, staff discusses whether the applicant has so far provided sufficient information to make this determination below. Without the information, staff cannot provide a recommendation whether the projects qualify for the exemption.

Site Proximity to Optimal Geology

In its request the applicant stated, "The subsurface storage caverns, which can only be technically and economically constructed in the proper geological setting, are the principal energy storage mechanism for the facilities." Staff agrees with the technical principles that form the foundation of this statement. However, the applicant did not provide sufficient evidence that the technology requires a particularly specific site, or that siting it farther away from the identified energy source would be technologically or economically infeasible. From a purely geological perspective, the proposed facility could be sited anywhere suitable subsurface bedrock conditions exist.

To aid staff in making a recommendation on this NOI exemption request, the applicant should be ordered to provide a discussion of the specific geological requirements for this technology, including any additional physical or other characteristics a site must have in order to support this technology and an estimate of the number of such sites in California and their general availability for this use. This discussion should contain information on key geological characteristics such as bedrock formation targeted for the storage caverns. The applicant needs to show that there are real constraints that limit

the placement of these facilities and adequately describe those constraints and preferably provide an estimate of how many suitable sites might possibly be available.

Site Proximity to Optimal Renewable Resources

The transmission interconnectivity of the Western Electricity Coordinating Council (WECC) grid has allowed California to take advantage of coal by wire, run of the river energy from the Pacific Northwest, and the burgeoning renewables throughout the WECC. However, the applicant has stated that the economic benefits from co-locating the storage projects next to in-state renewables dictates the economic feasibility of the projects. This is not demonstrated in the filings and ignores the robust existing interconnected energy infrastructure. Staff recommends that the applicant be ordered to provide the analyses that show the temporal and spatial relationships between the renewable resources identified by the applicant and the charging and discharging times of the storage projects, and ultimately, the economic feasibility of the Gem project.

Site Proximity to Optimal Interconnection

The California Independent System Operator's (California ISO) Phase I Interconnection Study provides an analysis of the transmission facilities required to reliably interconnect generating (or storage) projects to the transmission grid. The studies are a forecast that include not only all the projects that applied to the California ISO for interconnection in the last year but all the generation projects that remain in the interconnection queue from previous years. The interconnection studies identify the direct and downstream transmission facilities that are required for the California ISO transmission system to comply with reliability standards after the interconnection of the generators. The interconnection study does not identify which locations or points of interconnection are better or best.

Based on the Phase I Interconnection Connection study, the large number of generators wanting to interconnect in the same general area as the Gem project (and the Pecho project in San Luis Obispo County which would use the same technology) results in the identification of a significant number of major transmission upgrades required to deliver power from this group of projects. This does not mean that all these facilities will be required or that this level of transmission upgrades is not the best for California, but it is not possible to make this judgment based on the Phase I study. Staff recommends that the applicant be ordered to submit the analyses of the proposed A-CAES technology that show either the economic feasibility at the proposed locations, or the infeasibility at other sites that then limit or steer the siting to the proposed locations.

Technological Feasibility and Scale-up

The Gem project (and the Pecho project in San Luis Obispo County which would use the same technology) would, for the first time, deploy Hydrostor's A-CAES technology in California. The largest project worldwide currently in operation using this technology has a maximum generating capacity of only several MWs. The Gem and Pecho projects, at 500 and 400MW respectively, would be a massive scale-up of this technology. Geological and economic requirements to accommodate successful scale-up may limit the number of appropriate sites. To determine the technological, and ultimately economic feasibility, or the reliability of these projects, staff recommends that the applicant be ordered to submit scale up analyses for the A-CAES technology that show the factors considered in deciding the MW capacity of the projects, and the expected reliability of the proposed operating plants that is supported by the analyses.

Economic Feasibility

The applicant has stated that the economic feasibility of the projects hinges on the locations, and one assumes, the technology. Staff recommends that the applicant be ordered to submit the economic analyses of the proposed A-CAES technology that show either the economic feasibility at the proposed locations, or the infeasibility at other sites that then limit or steer the siting to the proposed locations.