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Before the Energy Resources Conservation and Development Commission of the State of California
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APPLICATION FOR A SMALL POWER PLANT EXEMPTION FOR THE:

MCLAREN BACKUP GENERATING FACILITY PROJECT

Docket No. 17-SPPE-01

ENERGY COMMISSION STAFF'S ISSUES STATEMENT

On September 28, 2018, the McLaren Backup Generating Facility Committee (Committee) issued a Notice of Status Conference and Further Orders (Order) which ordered staff and applicant to file an Issues Statement no later than Friday, October 5, 2018, to address a series of questions regarding Generating Capacity and Air Quality. The following is staff's response.

INTRODUCTION

The McLaren Backup Generating Facility (MBGF) is correctly calculated as having a generating capacity of less than 100 megawatts (MW). As described below, the methodology used by staff to calculate generating capacity is based on Title 20, section 2003[1] but is not limited by this section, which does not fully address facilities such as data centers. Based on prudent engineering principles and prior practice, staff has included the McLaren Data Center building demand as a factor in determining generating capacity. Utilizing building demand is not inconsistent with section 2003, which is silent on the consideration of building load. More importantly, as described in response to the Committee's first question, the Committee is authorized under Public Resources Code sections 25218 and 25218.5 to adopt staff's calculation methodology, and results, that the generating capacity of the MBGF is under 100 MW and therefore subject to a Small Power Plant Exemption.

STAFF'S RESPONSES TO THE COMMITTEE'S QUESTIONS

Staff has responded to the Committee's questions below. However, there were several statements made by the Committee in the Order that prompted staff to provide further clarification.

[1] All section references are to Title 20, California Code of Regulations unless otherwise indicated.

The Committee's Order includes the following statement at Page 4:

> *"However, the basic notion in Section 2003 that "generating capacity" is how much electricity a thermal power plant has the potential to generate, without regard to how much load it may serve, is simply a statement of the generally understood meaning of "generating capacity." (Order, p. 4.)*

Staff is unaware of any stakeholders in the power or data center industries that would agree that generating capacity is the potential to generate without regard to load. The gross MW output at the generator terminals provides no guidance to a reviewer of a project concerning the size of the engine driving the generator and the amount of fuel that engine would use to produce those MW. The gross MWs at the generator terminals would not define the environmental footprint of the project. Without knowing the fuel and engine type, the engine fuel conversion efficiencies, operational constraints, auxiliary loads, and ambient physical limitations on the engine, a reviewer could not identify the range of potential impacts and required mitigation for the generation facility.

The environmental footprint of the engine and fuel type is important, but so is the effect of the project on the electricity grid. The Committee's statement above implies that electricity planners would assume that a new addition to the grid would deliver the gross nameplate MWs when called upon in various grid operating scenarios. In practice, this is just not true. **Generating capacity is "generally understood" to be a calculated net MW delivered to the grid or end users.** The gross MWs at the generator terminals would not quantify the actual effect of the project's operation on the grid, whereas net MW delivered would be the primary generation characteristic of interest to a utility or system operator.

> *"The Committee is also aware from Staff's testimony that the Energy Commission has calculated generating capacity for purposes of determining jurisdictional questions by multiplying the nameplate capacity by the number of proposed generators and subtracting the auxiliary load." (Order, p. 4.)*

As staff has noted, and as section 2003 highlights, a generator engine's performance can be affected by ambient conditions, so it is important to use the engine performance and generation output values that are actually produced by the genset at the location it is installed. Reciprocating engines like those proposed to be used at the MBGF are less affected by ambient air temperatures and elevation (air density) than combustion turbines. And since the genset parasitic loads are internal, and often mechanical, the genset electrical nameplate value has

already netted out generation parasitic load and nearly reflect actual engine performance and generator output - in this case staff could use the genset nameplate value in the jurisdictional calculations. However, actual generator output would still be limited by actual building demand.

> *"While both Staff and Applicant support using the maximum demand of the Data Center as the generating capacity, rather than the gross generating capacity of the diesel and lifesaving generators, such an approach may conflict with the intent of Section 2003." (Order, p. 4.)*

Staff does not agree that a standard industry methodology laid out in section 2003 for calculating net generating capacity would conflict with the intent of section 2003, or that this methodology would not apply to calculating the net generating capacity of the MBGF. The Energy Commission's licensing process always looks at the equipment and processes inside the fence line and linears, and includes related activities such as offsite carbon sequestration, to calculate net generating capacity.

> *"In addition, the demand of the Data Center could be altered at the discretion of the Applicant--by reconfiguring the interior spaces of the Data Center building to allow additional servers, adding additional buildings and so on." (Order, p. 4.)*

This is implausible. Such changes are not trivial and would result in a cascade of design and physical changes to the McLaren Data Center and MBGF, which would likely obliterate the applicant's ability to meet their contractual obligations to their data customers. Furthermore, such changes would require filing an application with the local jurisdiction, or to the Energy Commission. It is important to remember the calculated demand of the building already included an assumption of 100 percent of the critical IT load operating during the hottest day of the year. In actuality, the critical IT load and related cooling load would be less. (Exhibit 20, pp. 2-3; Exhibit 202, p. 4.)

Generating Capacity-1. *Are there any regulations, statutes, or guidance documents, other than Section 2003, that can apply to the calculation of generating capacity for determining SPPE jurisdiction?*

In its Order the Committee states:

> *"Section 2003 does not explicitly state that it is to be used for calculating power plant generating capacity for purposes of determining Energy Commission*

jurisdiction under either [Public Resources Code] section 25120 or 25541, nor does it specifically address how to calculate generating capacity for diesel generators, such as those proposed for this Project." (Order, p. 4.)

Article 6, Title 20, California Code of Regulations, contains only two sections—section 2001 and section 2003. Section 2001 directs the use of section 2003 as the methodology to determine generating capacity as follows:

> *"In addition to the definitions found in Chapter 2 (beginning with Section 25100), Division 15, Public Resources Code and the definitions found in Section 1201 of chapter 2,* ***the definitions contained in this article shall apply to all commission determinations of megawatt capacity thresholds, including the 50 megawatt jurisdictional threshold, the 100 megawatt threshold for a small powerplant exemption****, and the 300 megawatt threshold for a small powerplant exemption, and the 300 megawatt threshold for a cogeneration or solar thermal powerplant exemption from the notice of intention requirement."* (Cal. Code Regs., tit. 20, §2001; emphasis added.)

Section 2003 immediately follows section 2001 and thus would be the operative language for determining the generation capacity for a thermal power plant with turbine generators. Section 2003 was added to title 20 in 1993 and centered on the standard grid-tied power plants with turbine generators. As staff noted in its testimony, section 2003 can provide a framework for determining the generating output of other types of equipment in other use situations, but it does not specifically cover data centers and issues unique to these facilities.

Two salient sections of the Public Resources Code, sections 25218 and 25218.5, set forth powers of the Commission to "adopt any rule or regulation, or take any action, it deems reasonable and necessary to carry out this division" (Pub. Resources Code, § 25218), and that "the provisions specifying any power or duty of the commission shall be liberally construed, in order to carry out the objectives of this division" (Pub. Resources Code, § 25218.5).

Because Title 20 is silent on a methodology to be used to determine generating capacity for a non-turbine generator, and section 2003 neither accounts for the unique features of a data center, nor does it prohibit the methodology selected by staff and the applicant, the Committee must turn to the Commission powers set forth under the Warren-Alquist Act. Therefore, staff contends that under Public Resources Code, sections 25218 and 25218.5, the Committee is

empowered to approve staff and applicant's methodology for generating capacity, especially given the robust basis for the methodology in the record and the lack of any counter evidence.[2]

In addition, other technical standards are consistent with staff's approach. For example, AHRAE's (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Energy Standards for Data Centers do not use the nameplate or gross capacity, but the net generating capacity of data centers.[3]

Staff's approach to calculating generating capacity has been devised based on the International Organization for Standardization (ISO), which sets standards for different industries including the energy industry. Its approach is widely accepted by, and used throughout, the energy industry. Consistent with staff's method, the ISO specifies that generating capacity should be the net capacity at average annual ambient conditions.[4] Staff's method in calculating the generating capacity of MBGF and all other generating facilities it has evaluated for at least the past 20 years is consistent with both the ISO and ASHRAE standards.

Generating Capacity-2. *Is there any regulation, statute, or other guidance document that supports the argument that the generation capacity in this proceeding can or should be based upon the data center's demand?*

The attached jurisdictional determination letter from Executive Director Robert Oglesby to Matt Silvers of Vantage Data Centers demonstrates staff's previous method in determining the generating capacity of data centers. It shows the consistent practice of using the actual on-site generating capacity, and more importantly the critical IT and building loads for determining jurisdiction and not the nameplate rating. The determination is based on what is reasonable and what is actual, not on what is purely theoretical (nameplate rating). This methodology was applied to the MBGF as well.

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[2] Intervenor Helping Hand Tools objected to staff's conclusion of the generating capacity being under 100 MW but did not provide any counter evidence to staff's methodology or legal authority for excluding the building load in the calculation.
MR. LAYTON: This is Matt Layton again. We see no evidence that the Data Center can draw more than 100 megawatts, I'm confused by that. I guess I do not see the evidence in there and I don't know if Mr. Sarvey has pointed us to it.
MR. SARVEY: Would you like me to?
MR. LAYTON: Sure. (TN 224793)
Helping Hand Tools did not elaborate during the hearing or in subsequent filings where in the record evidence supported their contention.

[3] American National Standards Institute(ANSI)/ASHRAE Standard 90.4-2016, www.shrae.org.

[4] ISO 3046-1 Reciprocating Internal Combustion Engines – Performance, www.iso.org/standards.

The letter also points out the following key factors in our determination of whether or not power generating facilities are jurisdictional or above 100 MW:

- *Project being a part of a foreseeable plan of development.* MBGF has not been designed or proposed as part of a planned future expansion of a greater facility that would cause them to be considered one single generating facility of above 100 MW net in the foreseeable future. Therefore, it is not reasonable to assume that its IT and building loads would increase to above 100 MW in the foreseeable future.
- *Units having shared facilities (shared parcel, balance of plant, linear facilities, etc.), which could be viewed as one larger facility of above 100 MW net.* MBGF does not currently include, and does not plan to include, any such commonalities with another power generating project. If MBGF, as proposed, is exempted by the Energy Commission, any changes to the project would mean the facility would no longer be the one exempted by the Energy Commission, and the project owner would be required to amend the project.

The letter also emphasizes that the jurisdictional determination is subject to change if the generating capacity of the project is increased, the data centers are expanded, or new information arises that contradicts the details leading the jurisdictional determination made in the letter. In other words, in any such case the developer will be required to either amend the project or apply for a new permit under the Application for Certification (AFC) process. This also applies to an SPPE and thus to McLaren.

Generating Capacity-3. *Is there a technology or device that would allow the electricity demand of the Data Center to be met and still permanently limit the generating capacity to less than 100 MW?*

The design of the McLaren Data Center and the associated MBGF in providing data services to customers is relevant to defining and fixing maximum demand of the data center. The maximum demand would be fixed by the specification and installation of electrical buses and panels, a switchyard, and breakers that would have an upper electrical capacity limit. Some functions would have built-in redundancy to improve reliability (e.g., an extra 50 percent capacity transformer in the switchyard). The cooling equipment's maximum demand would be fixed by the specification and installation of equipment that has an upper physical limit of cooling capacity, and would include some redundant cooling equipment. Redundant equipment could only be operated if a primary component fails, and could not be operated in addition to the primary components, which would damage the data center.

The data center would be served from the grid with electricity that matched demand for normal operations of the data server bays and building. In addition, the backup equipment

would match that same demand, and would include redundant equipment to improve backup reliability. Like redundant equipment usage during normal operations, redundant backup equipment or capacity could only be operated if a primary component fails, and could not be operated in addition to the primary components, which would damage the data center. The equipment sizing fixes permanently, not temporarily, how the data center can be used and up to what levels of electrical demand. To suggest that the data center is easier to modify, or more likely to be modified, than any other facility the Energy Commission licenses is not correct.

The project would have to be redesigned to physically fit more servers in a server bay. The project owner would have to address the unplanned increase in electricity demand during normal operations, because the existing electrical equipment was not sized for the higher electricity throughput. Additionally, the project owner would have to install additional cooling equipment units to address the increased heat rejected into the server bays and building, and install additional redundant cooling equipment, additional UPS batteries units, and additional gensets to units to maintain the level of backup and reliability to match the new higher levels of load.

If the project owner installed additional buildings/server bays post-certification or exemption, the Committee appears to assume that existing gensets would operate at a higher output, or more gensets would operate, to handle an increase in critical IT and building facility loads. However, this would expose the data center owner to enormous risk with the loss of contractually promised reliability and redundancy levels. The project owner would have to modify the MBGF by adding more gensets to continue to deliver the required level of reliability – in that case, the applicant would have to amend the design of the facility potentially triggering review by the Commission.

Critical IT load (the servers in each bay) is like an incandescent light bulb. Whenever the 69 MW of critical IT load would be served by the grid (or the MBGF during an emergency) to spin hard disks to move and store data, it would result in about 69 MW of heat rejected to the surrounding space inside the building, just like a light bulb. That heat has to be removed from the bay or else the server equipment and data would be damaged. Any attempt to add more critical load (servers) to a bay would result in direct, immediate and dire consequences because the building and equipment would have been designed for up to 69 MW of critical IT load. It is important to remember that the maximum building load of 94.41 is based on 100 percent critical IT load with maximum cooling on the hottest day. Even at maximum load there is still over 5 MW of cushion which could absorb minor operational changes. (Exhibit 202, p. 4.)

Generating Capacity-4. *Instead of only using diesel generators, are there other devices or technology, such as battery storage, that could meet some of the backup electricity needs of the Data Center?*

In earthquake zones like Santa Clara and the Bay Area, data centers choose diesel over natural gas to fuel backup generators. Pipelines are vulnerable to damage and shutdown during an earthquake and natural gas cannot easily be stored on site in liquid or compressed forms in adequate quantities for longer term events. Accordingly, the location of the project precludes the use of natural gas-fired reciprocating engine gensets.

There are data centers being built out of state with natural gas-fired fuel cell units as the backup electricity generators. However, current commercial fuel cells are generally limited to lower energy density gaseous fuels such as natural gas or hydrogen, with their inherent storage problems. Further, current commercial fuel cells have low power densities, requiring more space than compression ignition or spark ignition engines, potentially requiring vertical stacking of the fuel cells 3 or 4 units high. In earthquake zones, this type of construction can be expensive and would increase project maintenance costs.

Staff is not aware of 100 percent battery backup generation units being used in data centers. The size and cost appear to be prohibitive factors.

Generating Capacity-5. *Is the Applicant willing to amend its project and SPPE application to a facility whose generators have a capacity of less than 100 MW as calculated using just a generator's nameplate capacity?*

Staff defers to the applicant on how they might modify their project description to meet this limit. For example, the applicant has a contract with their electricity service provider that limits the capacity of the proposed dedicated switch yard to no more than 100 MW, which could be incorporated into the project description.

Generating Capacity-6. *What additional information would be necessary for an Application for Certification (AFC) if no changes to the Project were available or made? How long would the process take, given the existing environmental review already conducted?*

Title 20, California Code of Regulations, section 1745.5 sets forth the required information in the presiding members proposed decision and eventually the Commission decision. In an AFC process, staff would have to ensure that all relevant information is in the staff assessment to

support the relevant findings identified in section 1745.5. Additional information would include the following:

1) Identification of all relevant laws, ordinances, regulations and standards and how the project complied with them;
2) Since no impacts were found, only minimal additional discussion on alternatives would be necessary;
3) A statement regarding minimum standards of efficiency under Public Resources Code section 25402(d);
4) A discussion of the public benefits of the project;
5) Preliminary and Final Determinations of Compliance from the Bay Area Air Quality Management District (BAAQMD) and related time for BAAQMD to go through its process; and
6) An engineering assessment related to the facility's efficiency, health and safety.

In addition to this information, all the identified mitigation would have to be converted into conditions of certification and verifications developed, as the Commission would now be the agency issuing the license and approving the mitigation. Finally, the standard compliance conditions of certification, which cover construction and operations and decommissioning, most likely would have to be modified for a data center and then added into the staff assessment. The Commission would also now have enforcement authority for the life of the facility, which includes the data center buildings and all associated generators. Even with the environmental review activities already conducted, there are many factors outside of staff's control that could impact an AFC process schedule.

Air Quality-1. *What measures, if any, are available to mitigate the Project's potential to exceed the threshold of significance for daily and annual NOx emissions to a less than significant level?*

The Order states on page 5 that "... the potential impacts of the generators based on 50 hours per year per generator have been modeled." While the statement is true, this modeling was done for carbon monoxide (CO) and toxic air contaminants. Short-term CO and acute Health Risk Assessments were based on all the engines operating at the same time for every hour of the 5 modeling years in the analysis. Chronic hazard index and cancer risk were based on all engines operating at the same time for 50 hours/year. For 1-hour NO_2 (nitrogen dioxide) impacts, staff analyzed testing of each engine one at a time.

Also on page 5, the Order indicated that "... the modeling discloses that, when operated for 50 hours per year per generator, the Project would exceed the air district's threshold of significance for nitrous oxide (sic) (NOx)." However, Table 5.3-6 (daily) and Table 5.3-7 (annual)

in the IS/MND (TN 223911) indicate that only the MBGF gensets nitrogen oxides (NOx) emissions' in pounds per day and tons per year would exceed BAAQMD's corresponding CEQA thresholds, meaning that further analysis is warranted to determine whether or not these emissions rates would lead to significant air quality impacts. These CEQA thresholds listed do not imply a significant impact if emissions exceed the thresholds. The applicant and staff (TN 223911, pp. 5.3-9 and 5.3-10) conducted further analysis in the form of air quality modeling of readiness testing and found that these emissions would not lead to significant air quality impacts. Staff also concluded that emergency operation was not a reasonable operating scenario. Further, the number of assumptions needed to even begin modeling emergency operations rendered the modeling outputs inconsistent and speculative. (TN224479, p. 9).

Staff has not found that emissions from the MBGF would cause a significant direct air quality impact at 50 hours of reliability and load testing and maintenance activities, which also envelopes emissions and impacts when hours are limited by a 35 tons per year of NOx emission limit. And with the provision of the NOx offsets under District Rule 2-2-302.1, the facility's contribution to regional pollutants such as ozone and secondary particulate matter (PM) would be mitigated. The applicant proposes to accept a NOx emission limit for reliability and load testing and maintenance activities of 35 tons per year.[5] This equates to about 42 hours, at full load, of reliability and load testing and maintenance per year per unit, testing one unit at time. NOx emissions from emergency operation (and source testing) are exempt from permitting per Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines.

The Evidentiary Record does not identify a need for further mitigation to reduce NOx emissions and impacts to a less than a significant level. However, diesel-fueled Tier 4[6] engines rated at approximately 2.75 MW are available commercially. These would have lower NOx and PM emission rates. For an engine this size, diesel-fueled Tier 4 engines would likely include selective catalytic reduction using an ammonia-containing consumable. Staff estimates the incremental cost of a Tier 4 engine, compared to the applicant-proposed Tier 2 engine, is approximately $800,000 to one million dollars more than a Tier 2 engine costing approximately $1.5 million.

CONCLUSION

For the reasons stated above, the use of building demand to determine the generating capacity of the MBGF is not inconsistent with section 2003, and the Committee is authorized to accept

[5] California Energy Commission 2018b—Compilation of Data Clarification Questions and Responses for the McLaren Backup Generation Facility SPPE application review. June 2018. (TN223744, p. 4).

[6] The Tier standards apply to on road and off road reciprocating engines, of varying sizes. Tier 1 engines have the least stringent requirements. The standards are becoming more stringent as the requirements have moved from Tier 1 to Tier 2, Tier 4, and so on.

staff's calculation. As set forth in the Initial Study and supplemental staff testimony, the project meets the requirements for an exemption under Public Resources Code section 25541 and staff recommends the Committee issue a proposed decision adopting the Mitigated Negative Declaration consistent with Title 20 section 1945.

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY

EDMUND G. BROWN JR., *Governor*

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August 25, 2017

Mr. Matt Silvers, Director of Operations
Vantage Data Centers
2820 Northwestern Parkway
Santa Clara, CA 95051

JURISDICTIONAL DETERMINATION FOR VANTAGE DATA CENTERS V4 AND V5

Dear Mr. Silvers:

The California Energy Commission has been asked to analyze whether Vantage Data Centers' (Vantage) expansion on its Santa Clara campus, would possibly bring the facility under Energy Commission jurisdiction as a thermal power plant of 50 megawatts (MW) or more.

As a general matter, the Energy Commission has permitting jurisdiction over any thermal power plant with a generating capacity of 50 megawatts (MW) or more. (Pub. Resources Code, §§ 25110, 25120, 25500) Vantage Data Centers operates data centers in California and Washington, several of which (V1-V4) are currently located on two adjacent parcels in Santa Clara, California. The company is also in the process of constructing another data center (V5) at this location.[1] For reliability purposes, these data centers use diesel-fired back-up generators to maintain operation in case of interruption of electrical service from the grid. If these generators were considered together to constitute a project of 50 MW or more, the Energy Commission would have jurisdiction. Staff has concluded that V1-V3 should not be considered as part of the same project as V4 and V5 as it does not appear that they were part of a foreseeable plan of development and, therefore, do not together constitute the same project. Units V1-V3 were expanded or constructed at various times in 2011 and there is no information or evidence that units V4 and V5 were contemplated or planned at that time.

With regard to data centers V4 and V5, it is unnecessary to determine whether they should be considered the same or separate projects because even if combined their generation is insufficient to trigger Energy Commission jurisdiction pursuant to section 2003 of title 20 of the California Code of Regulations.

[1] Staff had previously concluded that another data center (V6) should be considered separately for several reasons, including that it is on a parcel non-contiguous with the other units and it is connected to the grid through a different substation, and, therefore, its back-up generators would be triggered by a different event than those of V1-5.

Based on the product "cut sheets" Vantage provided to the Energy Commission, from Caterpillar and Cummins power generating suppliers, the steady state continuous output is 70 percent of the nameplate rating for the Caterpillar and the Cummins backup generators. Vantage also included a revised table from its initial submittal updating the outputs, which demonstrates that if the generating output for V4 and V5 were added together, the combined output would be 40.43 MW when accounting for the steady state continuous ratings.

Staff normally determines jurisdiction of a power generating facility based on its maximum generating capacity. However, in determining a facility's maximum generating capacity, we consider both internal loads to deliver the electricity, and any restrictions on the amount of electricity the end user can actually receive. In the case of Vantage, the sole end user of electricity from the diesel generators dedicated to V4 and V5 are two computer buildings with a combined maximum building capacity of 31.5 MW. In other words, under actual operational modes, V4 and V5 together will not generate more than 31.5 MW due to the upper limiting computer building loads, which are well below 50 MW.

In summary, the Energy Commission staff concludes that the construction of V5 at the Vantage Data Centers' Santa Clara campus is not within the Energy Commission's permitting jurisdiction. Staff makes this conclusion based upon the information provided in the May 30, 2017, June 8, 2017, and June 28, 2017 data submitted by Vantage and DayZen, LLC.

If the generating capacity of this project is increased, the existing data centers are expanded, or new information arises that contradicts the details above, staff reserves the right to reexamine or change its conclusion regarding jurisdiction. Please contact Mr. Shahab Khoshmashrab at (916) 654-3913 or Shahab.Khoshmashrab@energy.ca.gov should you have any questions.

Sincerely,

Robert P. Oglesby
Executive Director

cc: Spencer Myers, Director of Construction, Vantage Data Centers
Scott Galati – DayZen, LLC
Brenda Cabral, Supervising Engineer, Bay Area Air Quality Management District
Sanjeev Kamboj, Director, Bay Area Air Quality Management District
Flora Chan, Bay Area Air Quality Management District
Sharl Libicki, Ph.D., Global Air Quality Service Line Leader
Shawn Pittard, CA Energy Commission
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