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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 RESPONSE TO COMMITTEE QUESTIONS

On August 28, 2018, the McLaren Backup Generating Facility Committee issued a memorandum to the parties requesting additional testimony in response to three questions. The following testimony provides a response and background information to the questions:

Testimony of Shahab Khoshmashrab, Matthew Layton and Edward Brady

1. *Is the CAT 3526E diesel-fired generator set a turbine generator?*

The proposed generator set for McLaren Backup Generating Facility (MBGF) is a Caterpillar 3516E, not 3526E –neither model contains a turbine generator. Caterpillar Model 3516E uses a diesel-fired reciprocating internal combustion engine to drive a 2.75 MW generator, all of which are skid mounted with included double walled fuel tanks, control, cooling, and lubrications systems, air intake filters, sound attenuation panels, and exhaust piping and filters.

The following additional explanation regarding the assessment of generation capacity may be useful in helping the Committee and public understand the process for making these assessments regardless of type of equipment.

First it is important to note that a generator's name plate capacity is a manufacturer's nominal, or in name only, value – a capacity that a generator could achieve considering, but not limited to:

- Age, or relative newness of the equipment;
- Maintenance status;
- Fuel characteristics;
- Parasitic loads;

- Regulatory de-rates;
- Emission control de-rates:
- Standard ambient conditions; and
- Installation and use per vendor instructions, without modification to meet particular needs of an owner.

Staff uses nominal to describe an approximate generation value since achievable generation changes hourly, daily and seasonally (e.g., with variations in fuel energy content, intake air temperature and density, or ambient air temperatures to the cooling towers). Since each generator installation has some site-specific characteristic, staff does not use the nameplate value in determining net generating capacity of a project. Staff uses the gross, or maximum generating capacity of the generator for average conditions at the site. Staff then subtracts ancillary or parasitic loads, calculated for average site conditions that occur in conjunction with, or to enable, the operation of the generator and its prime mover (i.e., the generator engine, such as a combustion turbine, reciprocating engine, or steam turbine). Therefore, using just name plate capacity and nothing more is misleading and not an accurate way to assess the net generating capacity of a facility.

The Commission's statute defines a thermal power plant as an electrical generating facility using any source of thermal energy, with a generating capacity of 50 MW or more. This statute does not define “generating capacity”. Section 2003 of Title 20 provides a framework to more accurately determine the generating capacity of a facility for jurisdictional purposes by providing certain definitions and conditions that apply to the determination. For example:

> Section 2003 defines Generating Capacity as:
>
> > (a) The "generating capacity" of an electric generating facility means the maximum gross rating of the plant's turbine generator(s), in megawatts ("MW"), minus the minimum auxiliary load.

The section goes on to define parasitic loads, generating capacity and maximum gross rating, and specify average atmospheric conditions under which the generating capacity and parasitic loads must be calculated. What type of prime mover, or mechanical source of power (engine or turbine) that drives the electricity generator, or where the electricity is delivered to, do not render the regulations methodology or framework inapplicable.

A generating capacity determination for a traditional thermal power plant would have obvious parasitic loads (fans, pumps, heaters) siphoning off electricity from the gross amount generated before the electricity would be delivered to the bus in the switchyard. The electricity at the

switchyard bus would be considered net generation, deliverable to users, or useable. If the grid "demanded" more, the power plant could not deliver more electricity unless it burned fuel at a higher rate or reduced internal loads – even then, equipment would have to have the physical capacity to burn more fuel and convert thermal energy into rotational energy, and then operate the generator at a higher output.

The term "maximum generating capacity" is not the same as "nameplate capacity". For the purpose of jurisdictional determination, "maximum generating capacity" means: the maximum generating capacity of a generator, or the entire thermal power facility, generated under site ambient conditions and with other factors considered that are listed above (i.e., the age of the engines and generating equipment). This is important for projects with generating capacities that are close to the 50-100 MW jurisdictional range. However, for a power facility that is clearly jurisdictional based on its huge MW output (i.e., Alamitos at 1,040 MW), where the generating capacity is well above the 50 or 100-MW thresholds, staff does not need to calculate the facility's generating capacity and to determine whether or not it is jurisdictional.

Staff uses its Engineering Questionnaire for generating capacity determinations, as a tool to calculate the maximum net generating capacity of power projects for the purpose of determining whether a proposed thermal power project falls within the Energy Commission's jurisdiction. The calculation method in this questionnaire has been developed based on, and consistent with, the definitions and conditions in Section 2003. This questionnaire includes projects employing prime movers that utilize several different fuels and thermodynamic cycle categories such as gas turbine powered generators; condensing steam turbine powered generators; and compression-ignition reciprocating internal combustion engine generators such as the ones selected for the MBGF.

Whether the prime mover is an engine or turbine, or the project is a data center or a typical power plant, the methodology is consistent; that is, to calculate, in detail, the maximum net generating capacity by subtracting the facility's parasitic loads from its maximum gross generating capacity, based on the particular conditions of that facility (those listed above). The types of power generating facilities that staff has evaluated over the years using this methodology vary. Examples include Vantage Santa Clara Campus I data center and the proposed McLaren project (Santa Clara Campus II data center) using diesel engines, Heber 1 Geothermal Project and Ormat M-1 and CD-4 Geothermal Plant, both using steam turbines, and Pasadena Glenarm Repowering Project, employing a combustion turbine generator and steam turbine. Regardless of what prime mover(s) these projects use, staff performs detailed calculations of parasitic loads (i.e., fans, pumps, heaters, cooling) specific to each project and its equipment, fuel types, and average site ambient conditions.

There are several projects that employ or are proposed to use non-turbine generators, but have fallen under the Commission's permitting jurisdiction. Examples of such projects include Humboldt Bay Generating Station, employing Wartsila reciprocating natural gas with diesel pilot engines, and Calico Solar Project and Imperial Valley Solar, both of which proposed to use solar-powered Stirling piston engines. This demonstrates that the Commission's jurisdiction is not limited to projects using turbines, but to all projects employing thermal prime movers, or thermal engines, attached to electrical generators.

For data centers like MDC using self-contained diesel engine generator sets (gensets), the obvious parasitic loads (fans, pumps, heaters) are internal to the self-contained genset – thus the gross output is the net output. We want to be clear that we are not saying that the gross output is nameplate or theoretical capacity, but we are referring to the actual operating output of the generator as it matches up with actual demand.

If the server bay load required only 4 or 6 MW – the genset(s) supplying that load would only generate a combined 4 or 6 MW. If the gensets were to generate in excess of demand (e.g., 9 MW), breakers would trip in an effort to protect servers, motors, relays and lighting from significant damage. Note that if the breakers were to trip, isolating the data center from the backup generators, the servers and building cooling would be forced to shut down. This subverts the intent of the backup generators – to maintain reliable and high quality electricity supply to the server bays. Supply always must match demand - excess electricity cannot be stored in wires or at the generator. Excess electricity will damage components or at a minimum, isolate the load from the backup generators. If a building and cooling load were to increase (e.g., the day gets warmer), the genset(s) would open the engine fuel throttle to increase generation output to match demand but would still not exceed building demand.

In the case of a data center, the load served acts as a limit to the generation levels from the genset(s) in the backup generating facility. This additional factor is not present in a capacity generation determination for a typical power plant feeding to the grid because the grid does not act in the same way a building does in the context of how much energy can be fed into it (almost unlimited).

In the case of the Santa Clara data center, there was no scenario in which generating capacity would be anywhere near 100 MW, so it was not necessary for staff to prepare a detailed analysis. Similarly, no such analysis is needed on a 1,000 MW facility which clearly exceeds the 50 MW or 100 MW thresholds.

Under the Commission's statute the commission may exempt thermal power plants with a generating capacity of up to 100 megawatts. The proposed project can only generate up to 94.41 MW as currently configured, and therefore would not exceed the 100 MW threshold.

2. *Is there a warranty or other specific limitation that should be used to calculate generating capacity for the proposed facility?*

The proposed generator sets have a warranty operational output level. But the answer to the Committee's question is No. For the reasons set forth above, neither the generator nameplate nor the warranty output levels should be used to calculate generating capacity of a single genset, nor the entirety of the proposed facility.

3. *In the Initial Study and Proposed Mitigated Negative Declaration (IS/MND)[2] published by the Energy Commission staff (Staff) and in Staff's responses to comments on the IS/MND, Staff indicates that determining a number of hours for operation (as opposed to hours for testing the equipment) is too speculative. Why is this determination speculative in light of data from Silicon Valley Power, the local power provider, showing historic outage data?[3] Are there other factors, including, but not limited to, the characteristics of the transmission system, that render analyzing emissions from the operations of the backup generators speculative?*

Staff has arranged for representatives from Silicon Valley Power (SVP) to call in at 1:00 PM Thursday, August 30, 2018. We hope their comments can clarify how McLaren Data Center (MDC) specifically, and data centers in general are connected to, and supported by, their electricity utility. Additionally, SVP representatives can clarify the lack of applicability of the outage data referenced above to data centers and MDC located in SVP service territory. Staff will discuss at the hearings how SVP's comments support staff's concerns about the speculative nature of MDC's response to a potential SVP service outage.