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| **TN #:** | 226354 |
| **Document Title:** | Staff Analysis of Petition to Amend to Add Black Start Capability |
| **Description:** | N/A |
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CALIFORNIA ENERGY COMMISSION
1516 NINTH STREET
SACRAMENTO, CA 95814-5512
www.energy.ca.gov

**DATE:** January 22, 2019

**TO:** Interested Parties

**FROM:** John Heiser, Project Manager

**SUBJECT:** **Russell City Energy Center (01-AFC-07C)**
**Staff Analysis of Petition to Amend to Add Black Start Capability**

On March 2, 2018, Russell City Energy Company, LLC, filed a Petition to Amend (PTA) with the California Energy Commission requesting to modify the Russell City Energy Center (RCEC) by installing a battery energy storage system (BESS) and associated equipment. The batteries would be used to start the gas turbines to restart the power plant in the event of a blackout to support the California Independent System Operator's (California ISO) directed restoration of the electrical grid in response to an emergency condition (also known as "black start" capability). RCEC is a combined-cycle, natural gas-fired, 600-megawatt (MW) facility, located at the intersection of Enterprise and Whitesell streets in the industrial corridor of the city of Hayward in Alameda County, California. The project was certified by the Energy Commission on October 3, 2007 and began commercial operation on August 8, 2013.

## DESCRIPTION OF PROPOSED MODIFICATION

The PTA (TN 222836) is seeking approval to install and operate a BESS to provide black start capability to RCEC. The proposed project consists of installing 6 to 10 MW of lithium-ion batteries to start either RCEC gas turbine to be able to respond to a grid-wide blackout. The project would include interconnecting the BESS to the existing power plant's motor control center and the existing 4160-volt auxiliary bus. The BESS would be contained in three metal enclosures.

## ENERGY COMMISSION AMENDMENT REVIEW PROCESS

Energy Commission technical staff reviewed the petition for potential environmental effects and consistency with applicable laws, ordinances, regulations, and standards (LORS). Staff recommends approval of the PTA with changes and additions to the air quality conditions of certification – five new conditions and four modified conditions – and one new worker safety and fire protection condition.

Staff concluded that all potential impacts associated with the installation of black start capability, as well as the operating and testing scenarios associated with black start capability, would be less than significant, and with new and revised air quality and worker safety and fire protection conditions of certification the project would remain in compliance with applicable LORS.

For additional information, the Energy Commission's webpage for this facility, http://www.energy.ca.gov/sitingcases/russellcity/index.html, has a link to the PTA (TN 222836) accessible through the webpage in the box labeled "Compliance Proceeding." Click on the "Documents for this Proceeding (Docket Log)" option.

This notice is being mailed to the Energy Commission's list of interested parties and property owners adjacent to the site of the facility. It is also available through the RCEC listserv. The listserv is an automated system by which information about the facility is emailed to parties who have subscribed. To subscribe, go to the Energy Commission's webpage for the RCEC, cited above, scroll down the right side of the project webpage to the box labeled "Subscribe," and provide the requested contact information.

Any person may comment on the staff analysis. Those who wish to comment are asked to submit their comments by 5:00 p.m. on Monday, February 18, 2018. This amendment is scheduled for a decision at the February 20, 2018 Energy Commission Business Meeting.

To use the Energy Commission's electronic commenting feature, go to the Energy Commission's webpage for this facility, cited above, click on the "Comment on this Proceeding" or "Submit e-Comment" link, and follow the instructions in the on-line form. Be sure to include the facility name in your comments. Once the Energy Commission Dockets Unit dockets your comments, you will receive an email with a link to them. Written comments may also be mailed or hand-delivered to:

California Energy Commission
Dockets Unit, MS-4
Russell City (01-AFC-07C)
1516 Ninth Street
Sacramento, CA 95814-5512

All comments and materials filed with the Dockets Unit will be added to the facility Docket Log and become publicly accessible on the Energy Commission's webpage for the facility.

For information on participating in the Energy Commission's review of the petition, call the Public Adviser at (800) 822-6228 (toll-free in California) or send an email to publicadviser@energy.ca.gov.

News media inquiries should be directed to the Energy Commission Media Office at (916) 654-4989, or by email to mediaoffice@energy.ca.gov.

If you have questions about this notice, please contact John Heiser, Project Manager, at (916) 653-8236 or via email at John.Heiser@energy.ca.gov.

Date: 1.22.19

**CHRIS DAVIS**, Office Manager
Siting, Transmission, & Environmental Protection Division

Mail List # 7078
Russell City Energy Center listserv

# STAFF ANALYSIS

## RUSSELL CITY ENERGY CENTER
## BLACK START CAPABILITY
## (01-AFC-07C)

## PETITION TO AMEND

# RUSSELL CITY ENERGY CENTER
# (01-AFC-07C)
## PETITION TO AMEND THE COMMISSION DECISION
## STAFF ANALYSIS

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# RUSSELL CITY ENERGY CENTER (01-AFC-07C)
## Petition to Amend to Add Black Start Capability
## EXECUTIVE SUMMARY

John Heiser, AICP

## INTRODUCTION

On March 2, 2018, Russell City Energy Company, LLC (petitioner), filed a Petition to Amend (PTA) with the California Energy Commission requesting to modify the Russell City Energy Center (RCEC) by installing a battery energy storage system (BESS) and associated equipment. The batteries would start the gas turbines to restart the power plant in the event of a blackout to support the California Independent System Operator's (California ISO) directed restoration of the electrical grid in response to an emergency condition (also known as "black start" capability). RCEC is a combined-cycle, natural gas-fired, 600-megawatt (MW) facility, located at the intersection of Enterprise and Whitesell streets in the industrial corridor of the city of Hayward in Alameda County, California. The project was certified by the Energy Commission on October 3, 2007 and began commercial operation on August 8, 2013.

The purpose of the Energy Commission's review process is to analyze whether the proposed changes to the project may have a significant effect on the environment or cause the project to not comply with applicable laws, ordinances, regulations, and standards (LORS) (Cal. Code Regs., tit. 20, § 1769).

Energy Commission staff has completed its review of all materials received. The staff analysis below includes staff's independent assessment of the petitioner's proposal to modify the Air Quality conditions of certification for the BESS installation, and to conform with the Bay Area Air Quality Management District (BAAQMD or District) air quality permit conditions.

Staff concluded that all potential impacts associated with the installation of black start capability, as well as the operating and testing scenarios associated with black start capability, would be less than significant, and with new and revised air quality and worker safety and fire protection conditions of certification the project would remain in compliance with applicable LORS.

## DESCRIPTION OF PROPOSED MODIFICATIONS

The PTA (TN 222836) is seeking approval to install and operate a BESS to provide black start capability to RCEC. The proposal consists of installing 6 to 10 MW of lithium-ion batteries to start either RCEC gas turbine in order to respond to a grid-wide blackout. The project would include interconnecting the BESS to the existing power plant's motor control center and to the existing 4160-volt auxiliary bus. The BESS would be contained in three metal enclosures. The BESS black start service would start either gas turbine in a 1x0 mode to then be able to re-energize a 230 kilovolt (kV) bus within three hours of a grid-wide blackout.

## NECESSITY FOR THE PROPOSED MODIFICATIONS

RCEC was selected by the California ISO to provide black start service. To provide this service, the petitioner is proposing modification of the power plant to install a BESS. The batteries would start one of the gas turbines to restart the power plant in the event of a blackout, to support the California ISO's directed restoration of the electrical grid in response to an emergency condition also known as "black start" capability.

## STAFF'S ASSESSMENT OF THE PROPOSED PROJECT CHANGES

Energy Commission technical staff reviewed the petition for potential environmental effects and consistency with applicable LORS. Staff has determined that all potential impacts associated with the project changes would be less than significant, and with new and revised air quality and worker safety and fire protection conditions of certification the project would remain in compliance with applicable LORS. The resulting project modification would not affect any population, including the environmental justice population, as shown in the **Environmental Justice Population Figure 1**, **Figure 2**, and **Table 1** below.

Staff's conclusions in each technical area are summarized in **Executive Summary Table 1** and discussed in more detail, below.

**Executive Summary Table 1**
**Summary of Impacts for Each Technical Area**

| Technical Areas Reviewed | Technical Area Not Affected | CEQA | | | Conforms with applicable LORS | Revised or New Conditions of Certification requested or recommended |
|---|---|---|---|---|---|---|
| | | Potentially significant impact | Less than significant impact with mitigation | Less than significant impact | | |
| Air Quality | | | | X | X | X |
| Biological Resources | | | | X | X | |
| Cultural Resources | | | | X | X | |
| Efficiency and Reliability | | | | X | N/A | |
| Facility Design | | | | N/A | X | |
| Geological and Paleontological Resources | | | | X | X | |
| Hazardous Materials Management | | | | X | X | |
| Land Use | | | | X | X | |
| Noise and Vibration | | | | X | X | |
| Public Health | | | | X | X | |
| Socioeconomics | | | | X | X | |
| Soil and Water Resources | | | | X | X | |
| Traffic and Transportation | | | | X | X | |
| Transmission Line Safety and Nuisance | | | | X | X | |
| Transmission System Engineering | X | | | | | |
| Visual Resources | | | | X | X | |
| Waste Management | | | | X | X | |
| Worker Safety and Fire Protection | | | | X | X | X |

**Air Quality**. The petitioner proposes to modify four air quality conditions of certification in the Final Commission Decision (Decision) and add five new conditions (RCEC 2018a) to install a battery system to enable black start capabilities. Staff concludes that with the adoption of the new and revised conditions of certification, the modified RCEC would continue to comply with all applicable federal, state, and District air quality LORS.

The amendment adds five new conditions (**AQ-50** to **54**) related to the emission limits and operational limits for the gas turbines during the black start related operations. The amendment also modifies four conditions (**AQ-19**, **AQ-22**, **AQ-23** and **AQ-26**) to exempt the black start-related operations from the normal operation emission limits.

Several conditions of certification are modified to include PM2.5 in addition to PM10. PM2.5 is considered a subset of PM10. Staff conservatively assumes PM2.5 emissions are equivalent to PM10 emissions from natural gas combustion. This is supported by studies evaluating in-stack testing results. Staff assumes as part of this analysis that all PM10 equals PM2.5. This change does not affect PM10 or PM2.5 emissions. However, the Title V permit conditions from the District now include PM2.5 in addition to PM10 so this analysis incorporates PM2.5 into applicable conditions of certification so that Energy Commission conditions would be consistent with corresponding district permit conditions. In addition, several other conditions include minor modification for consistency with Title V permit changes.

**Biological Resources**. The new BESS equipment, along with construction material staging and worker parking, would be located on land that is fully developed within the RCEC. Therefore, the proposed modification would have no significant impacts on biological resources and would not result in changes to any biological resources conditions of certification. **BIO-1** (Designated Biologist Selection), **BIO-2** (Designated Biologist Duties), **BIO-3** (Designated Biologist Authority), **BIO-4** (Biological Resources Mitigation Implementation and Monitoring Plan), **BIO-5** (Worker Environmental Awareness Program), **BIO-11** (Facility Closure), **BIO-12** (Construction Noise Levels), and **BIO-13** (Bird Flight Diverters) in the Decision would all remain applicable. The RCEC with the proposed modification would be in compliance with all applicable LORS related to biological resources.

**Cultural Resources**. There are no known cultural resources on the project site or in the project vicinity that could be impacted by the proposed modifications. In the event that cultural resources are encountered during the construction of the BESS and related facilities, implementation of existing Conditions of Certification **CUL-1** through **CUL-6** would mitigate any potentially significant impacts and would ensure the project remains in conformance with Hayward Municipal Code, Chapter 10, Article 11.150 regarding treatment of archaeological resources.

**Efficiency and Reliability.** The BESS itself would not consume natural gas. Although gas consumption at low loads during black start operations would be less efficient than when the turbines are operating at or near full-load, black start operations would occur infrequently, for a short duration, in an emergency situation or periodic testing. Therefore, the proposed modification would have no significant adverse impacts on natural gas consumption or the project's overall thermal efficiency. The proposed black start capability would provide operating flexibility, particularly during a system emergency that would result in a sudden and widespread loss of grid power, and thus, would improve the project's operational reliability.

**Facility Design**. Installation of the battery system and its related components must comply with the 2016 California Building Code. Implementation of the existing facility design conditions of certification adopted in the Decision would ensure this.

**Geological Hazards and Resources.** Staff concludes the proposed modifications would not result in additional significant environmental impacts in terms of geologic resources, paleontologic resources, or geologic hazards in comparison with the original analysis for the approved project, provided the owner complies with Conditions of Certification **GEO-1, GEO-2** and **PAL-1** through **PAL-7**. The proposed construction would not require any change to the conditions of certification related to geology or geologic hazards adopted in the Decision.

**Hazardous Materials Management**. The proposed battery system would use lithium-ion batteries. The batteries would be delivered to the RCEC site in U.S. Department of Transportation-certified vehicles via a route approved by the compliance project manager in accordance with existing Condition of Certification **HAZ-7**. The Hazardous Materials Business Plan would be updated to include the new BESS in accordance with existing Condition of Certification **HAZ-2**. Also, the batteries would be included on the list of hazardous materials contained at the site and reported in the Annual Compliance Report per existing Condition of Certification **HAZ-1**.

There would be no other changes to the hazardous materials used during operation of the RCEC. The use, handling, storage, and transportation of the lithium-ion batteries would be in compliance with all current LORS. Therefore, the potential hazardous materials management impacts are expected to be less than significant with the continued implementation of the existing Conditions of Certification **HAZ-1, HAZ-2** and **HAZ-7** adopted in the Decision.

**Land Use**. The proposed modification to include black start capabilities through installation of a battery energy storage system would have a less than significant land use impact. The proposed modification would be consistent with the city of Hayward's land use and zoning designation for the project site.

**Noise**. Construction work associated with this petition would be temporary and would occur during the daytime hours. Any noise generated during these activities would result in a less-than-significant impact with implementation of the existing noise conditions of certification in the Decision.

Battery systems do not generate high levels of noise when operating, and thus, no noticeable increase in operational noise would result from this petition. Because the project would continue to meet operational noise requirements established in the Decision, the project would not cause a significant adverse noise impact as the result of this modification.

**Socioeconomics**. The proposed modification to include black start capabilities through installation of a BESS would take approximately 3 to 6 months to complete and require approximately 25 workers at peak construction. From a socioeconomics standpoint, the proposed modification would have insignificant workforce-related impacts on housing and community services. It would not affect existing Conditions of Certification **SOCIO-1** (recruit employees and procure materials and supplies within Alameda County) and **SOCIO-2** (school impact fees).

**Traffic and Transportation**. Impacts to the traffic and transportation system from installation of a BESS would be less than significant. Construction traffic would be minimal, and there would be no added traffic from operation. All construction would occur on-site and would not obstruct any part of the transportation network.

**Visual Resources**. Impacts to visual resources from installation of a BESS would be less than significant. Structures would be located in a heavily industrial area and would not impact visual character or quality of the site or its surroundings. Structures would not exceed 11 feet in height, and no new source of substantial light or glare would be created.

**Worker Safety and Fire Protection**. Based on the information provided by the petitioner, staff proposes new Condition of Certification **WORKER SAFETY-3**, which would ensure compliance with LORS to provide adequate protection for on-site workers and first responders.

With the adoption of **WORKER SAFETY-3**, staff concludes that the proposed modifications would be in compliance with applicable worker safety and fire protection LORS and conditions of certification adopted by the Energy Commission in its Final Decision. The approved conditions of certification in the Decision would include compliance with current worker safety and fire protection LORS.

## ENVIRONMENTAL JUSTICE

**Environmental Justice - Figure 1** shows 2010 census blocks in the six-mile radius of Russell City Energy Center with a minority population greater than or equal to 50 percent. The population in these census blocks represents an environmental justice (EJ) population based on race and ethnicity as defined in the US Environmental Protection Agency's (EPA) Guidance on Considering Environmental Justice During the Development of Regulatory Actions.

Based on California Department of Education data in **Environmental Justice - Table 1** and presented in **Environmental Justice - Figure 2**, staff concluded that the percentage of those living in the school districts of Hayward Unified, San Leandro Unified, San Lorenzo Unified, and New Haven Unified (in a six mile radius of the project site) and receiving free or reduced-price meals is larger than those in the reference geography, and thus are considered an EJ population based on low income as defined in EPA's *Guidance on Considering Environmental Justice During the Development of Regulatory Actions.*

**Environmental Justice - Table 1**
**Low Income Data within the Project Area**

| SCHOOL DISTRICTS IN SIX-MILE RADIUS | Enrollment Used for Meals | Free or Reduced Price Meals | |
|---|---|---|---|
| | | | |
| Hayward Unified School District | 22,922 | 15,671 | 68.4% |
| San Leandro Unified School District | 8,638 | 5,234 | 60.6% |
| San Lorenzo Unified School District | 11,739 | 7,807 | 66.5% |
| New Haven Unified School District | 11,893 | 5,732 | 48.2% |
| | | | |
| **REFERENCE GEOGRAPHY** | | | |
| Alameda County | 226,916 | 96,769 | 44.6% |

**Source:** CDE 2017. California Department of Education, DataQuest, Free or Reduced Price Meals, District level data for the year 2016-2017, <http://dq.cde.ca.gov/dataquest/>.

The following technical areas (if affected) consider impacts to EJ populations: **Air Quality**, **Cultural Resources (Indigenous People)**, **Hazardous Materials Management**, **Land Use**, **Noise and Vibration**, **Public Health**, **Socioeconomics**, **Soil and Water Resources**, **Traffic and Transportation**, **Transmission Line Safety and Nuisance**, **Visual Resources**, and **Waste Management**.

## ENVIRONMENTAL JUSTICE CONCLUSIONS

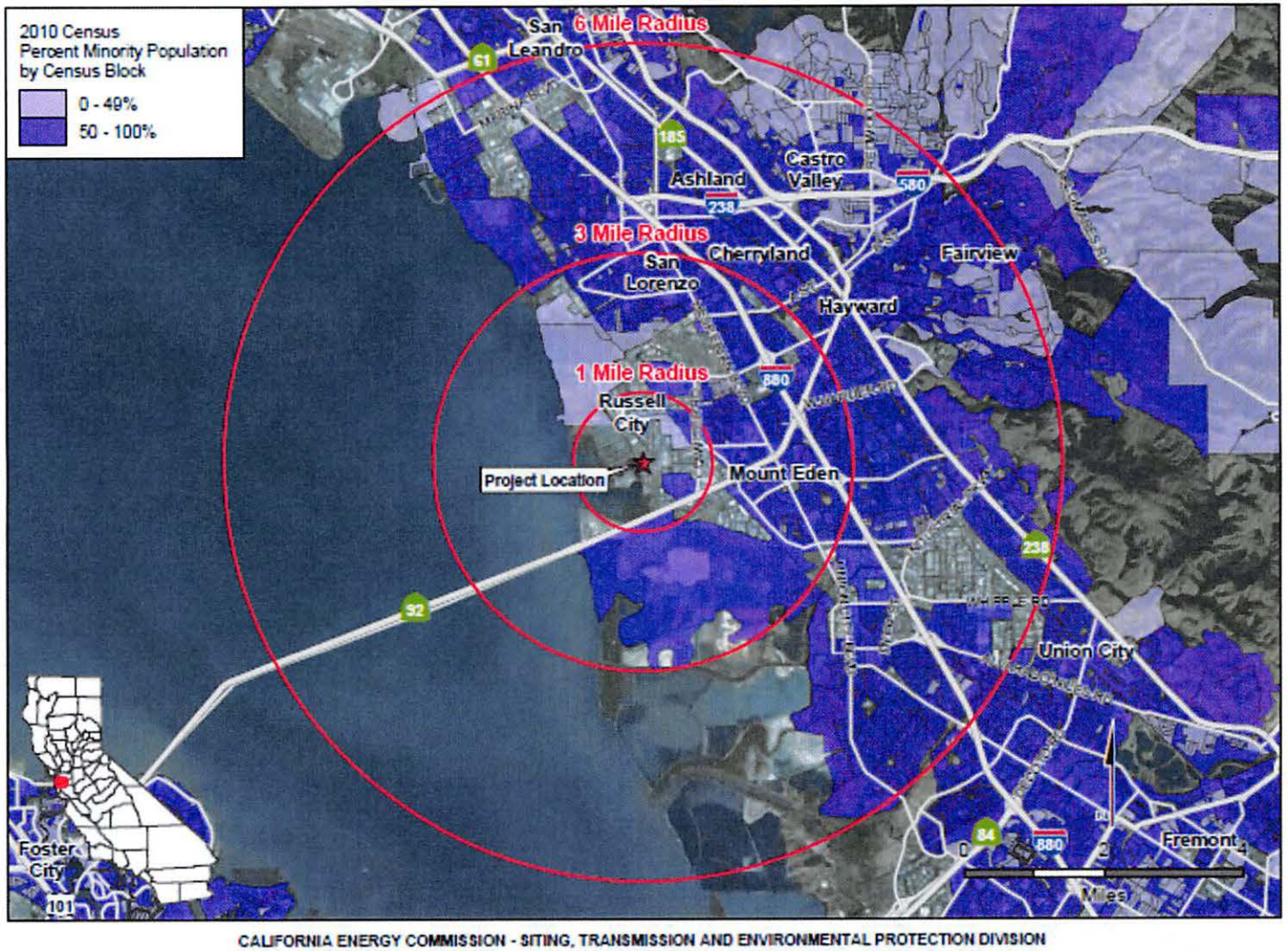
Staff has determined that with the existing conditions of certification, the modified project would not cause significant impacts for any population in the project's six-mile radius, including the EJ population represented in **Environmental Justice – Figure 1**, **Figure 2**, and **Table 1**.

## STAFF RECOMMENDATIONS AND CONCLUSIONS

Staff concludes that the project modification would not result in significant adverse environmental impacts, and with new and revised air quality and worker safety and fire protection conditions of certification the project would remain in compliance with all applicable laws, ordinances, regulations, and standards. Staff also concludes that none of the required findings in Title 20, California Code of Regulations, section 1748(b) are applicable to this amendment.

**ENVIRONMENTAL JUSTICE - FIGURE 1**

Russell City Energy Center - Census 2010 Minority Population by Census Block

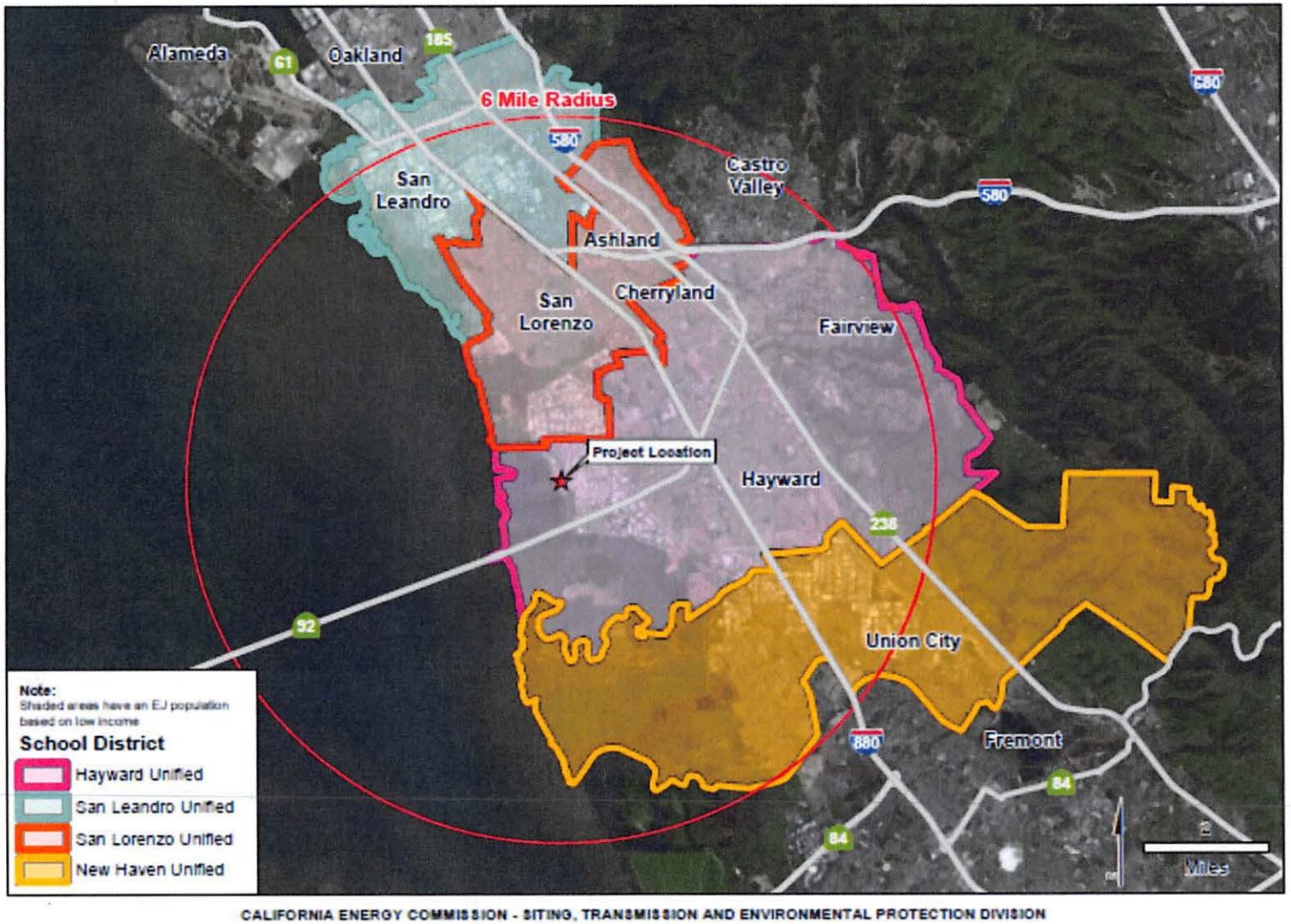



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Census 2010 PL 94-171 Data

**ENVIRONMENTAL JUSTICE - FIGURE 2**

Russell City Energy Center - Environmental Justice Population Based on Low Income

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SOURCES: TIGER Data, CA Dept. of Education Data Quest

# RUSSELL CITY ENERGY CENTER (01-AFC-07C)
**Petition to Amend to Add Black Start Capability**
## AIR QUALITY
Tao Jiang, Ph.D., P.E.

## SUMMARY OF CONCLUSIONS

In this petition for modification of the Russell City Energy Center (RCEC), the petitioner proposes to modify the existing air quality conditions of certification (RCEC 2018a) to install a battery system to enable black start capabilities. Staff concludes, the amended RCEC would not result in significant adverse air quality related impacts, and with the adoption of the attached conditions of certification that the RCEC would continue to comply with all applicable federal, state, and Bay Area Air Quality Management District (BAAQMD or District) air quality laws, ordinances, regulations, and standards (LORS).

## INTRODUCTION

The RCEC was originally certified by the California Energy Commission (Energy Commission) in September 2002 and received an amended approval by the Energy Commission in October 2007. The facility is a nominal 600-megawatt, natural gas-fired, combined-cycle power plant located in the city of Hayward in Alameda County. The Energy Commission approved two petitions to extend commencement of the construction deadline on August 29, 2007 and on July 30, 2008, respectively. On August 11, 2010, the Energy Commission approved an amendment to make modifications to the Air Quality conditions of certification to be consistent with the project's federal Prevention of Significant Deterioration (PSD) permit and enable the renewal of the Authority to Construct (ATC) issued by the District.

Construction of RCEC began in September 2010. On July 1, 2013, the Energy Commission approved an amendment to extend the timing for conducting initial source testing and to make certain non-substantive clarifications and administrative amendments to provisions governing monitoring and initial source testing and to conform with the ATC issued by District. The project commenced operation on August 8, 2013. On August 10, 2016, the Energy Commission approved an amendment to install a new demineralization system designed to produce demineralized water from the recycled water supply which would be used for steam cycle makeup water and combustion turbine inlet air cooling. On November 7, 2017, the Energy Commission approved an amendment to install a 6,667-gallon tank for storage of sodium hydroxide to use in the zero liquid discharge system and for cooling tower acidity (PH) control.

On March 2, 2018, Russell City Energy Company, LLC filed a petition for modification with the Energy Commission requesting to change certain air quality conditions of certification for the RCEC (RCEC 2018a). RCEC had been selected by the California Independent System Operator (California ISO) to provide black start services in the Bay Area. To provide this service, the petitioner requested to include black start capabilities through installation of a battery energy storage system (BESS). The BESS is designed

to be large enough to start either of the two combustion turbines in a 1x0 (no heat recovery) mode to energize a 230kV bus within three hours of a grid-wide blackout (black start event occurrence) and play a vital role in restoring the power grid. The amendment modifies four air quality conditions of certification and adds five new conditions. In addition, several other conditions include minor modification for consistency with Title V permit changes. The District has also reviewed the proposed project changes and issued the "Draft Engineering Evaluation – Russel City 'Black Start' Capacity Project" on December 7, 2018 (BAAQMD 2018) for a 30-day comment period.

## LAWS, ORDINANCES, REGULATIONS, AND STANDARDS COMPLIANCE

RCEC is subject to all the LORS described in the original Decision for RCEC (CEC 2002) and previous amendments (CEC 2007, CEC 2010 and CEC 2013). The applicable LORS remain the same as previous analyses; the requested changes would enable the facility to continue to comply with all applicable LORS.

## ANALYSIS OF REQUESTED CHANGES

The BESS includes an installation of a 6-10 MW lithium-ion (Li-ion) Battery. The final capacity and energy dimensions are still being determined. This energy storage system comprises the storage device, the interconnection and the communication system. There are no new emissions sources associated with the BESS.

In order to respond to the grid-wide blackout as determined by the California ISO, the turbine in a 1x0 configuration could operate up to 48 hours at full speed no load (FSNL) while grid stability is restored. During this time, the turbine emissions may not be compliant with the existing permitted emission limits for oxides of nitrogen (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs), which are also called Precursor Organic Compounds (POCs).

## CONSTRUCTION PHASE IMPACTS

Construction of the BESS is expected to last approximately 5 months. The construction includes site preparation, foundation work, construction/installation of structures, and installation of equipment, paving, and painting. The actual disturbance area is approximately 0.34 acres in size and essentially flat, which would require only minimum grading and leveling. **Air Quality Table 1** shows the maximum monthly and annual emissions during the construction period. The maximum daily emissions of NOx, CO, sulfur dioxide ($SO_2$) and VOC are expected to occur during the middle of the construction schedule during building construction and the installation of the mechanical equipment. The maximum daily emissions of particulate matter less than or equal to 10 micrometers (PM10) and particulate matter less than or equal to 2.5 micrometers (PM2.5) are estimated by adding the maximum fugitive dust emissions and exhaust emissions, which are expected to occur during different months. Therefore, this estimation is very conservative. Annual emissions are based on the average equipment mix during the 5-month construction period. The estimated emissions for the original

facility construction are also included for comparison. As shown in **Air Quality Table 1**, BESS construction is a very small percentage of original facility construction.

**Air Quality Table 1**
**RCEC, Maximum Emissions Rates during BESS Construction**

| | NOx | VOC | PM10 | PM2.5 | CO | $SO_2$ |
|---|---|---|---|---|---|---|
| **Daily Construction Emissions (lbs/day)** | | | | | | |
| **Original Facility Construction** | 382.7 | 82.1 | 44.7 | 44.7 | 813.5 | 11.5 |
| **BESS Construction** | 14.05 | 2.2 | 1.03 | 0.88 | 18.14 | 0.031 |
| **Total Construction Emissions (tons/period)** | | | | | | |
| **Original Facility Construction** | 22.95 | 6.09 | 3.10 | 3.10 | 63.82 | 0.58 |
| **BESS Construction** | 0.752 | 0.118 | 0.055 | 0.047 | 0.97 | 0.0017 |

Source: RCEC 2018b.

All Staff Conditions of Certification (COCs) for construction in the Commission Decision remain valid and must be implemented during BESS construction. As shown in **Air Quality Table 1**, the emissions during black start system construction would be significantly less than those during the original facility construction. Due to the short duration of construction and the limited area of disturbance, the air quality impacts associated with emissions for BESS construction activities are expected to be less than significant. Staff recommends continued implementation of the conditions of certification adopted in the original Commission Decision for consistency with previous construction activities.

**Black Start Commissioning, Readiness Testing and Emergency Operation Impacts**

Commissioning of BESS would be conducted in two phases: 1) testing of the BESS itself, and 2) plant performance test of the BESS's ability to initiate a system start. The sequence would need to be performed on both turbines. The commissioning of BESS will not exceed 20 hours in total for both turbines and would be conducted up to 5 hours per day. The emissions during the commissioning activities are based on FSNL operation.

**Air Quality Table 2** presents the petitioner's anticipated maximum commissioning emissions. The current permitted project annual emissions are also included for comparison.

**Air Quality Table 2**
**RCEC, Maximum Emissions Rates during Black Start Commissioning**

| | NOx | CO | VOC | $SO_2$ | PM10/2.5 |
|---|---|---|---|---|---|
| **Maximum Hourly Emission (lbs/hr)** | 240 | 5,700 | 304.2 | 6.21 | 7.5 |
| **Maximum Daily Emission (lbs/day)** | 1,200 | 28,500 | 1521 | 31.05 | 37.5 |
| **Maximum Annual Emission (tons/year)** | 2.4 | 57.0 | 3.04 | 0.06 | 0.08 |
| **Current Permitted Annual Emission (tons/year)** | **127** | **330** | **28.5** | **12.2** | **71.8** |

Source: RCEC 2018b, BAAQMD 2018.

In addition to commissioning, RCEC would also perform annual readiness testing to ensure availability for black start emergency operations. The readiness testing would be similar to the commissioning but only with very short duration of operation at FSNL. **Air Quality Table 3** presents estimated maximum emissions during readiness testing. Since the readiness testing is expected to be no more than one hour, maximum hourly emissions are presented in the table. However, the petitioner proposes to comply with the existing normal operation emission limits during the readiness testing. At this time staff does not propose new conditions of certification for readiness testing.

**Air Quality Table 3**
**RCEC, Maximum Emissions Rates during Black Start Readiness Testing (Assumes One Hour of Readiness Testing)**

| | NOx | CO | VOC | $SO_2$ | PM10/2.5 |
|---|---|---|---|---|---|
| **Maximum Hourly Emission (lbs/hr)** | 130 [a] | 2237.5 [a] | 304.2 [b] | 6.21 [b] | 7.5 [b] |

Source:
a. RCEC 2018b.
b. Data from staff analysis. emissions are below daily emissions limits for normal operations except that for VOC, which is 298 lbs/day. Data in the table are very conservative and represent an upper bound on emissions. Petitioner indicates they will be able to comply with currently-applicable emissions limits for normal operations.

The proposed operation during a black start event is based on 48 hours of FSNL operation, 18 hours of cold starts and 1.5 hours of shutdowns for a total black start operation of 67.5 hours (Table 1 of Responses to Staff's Data Requests, Set 1, A1 through A15, attachment DR-A3 of RCEC 2018b). The estimated maximum emissions during the black start events are presented in **Air Quality Table 4** below. The maximum hourly emissions are also based on FSNL operation. As shown in **Air Quality Table 4**, the estimated total emissions during the black start operation are considerably less than those permitted during normal project operation.

**Air Quality Table 4**
**RCEC, Maximum Emissions Rates during Black Start Emergency Operation**

| | NOx | CO | VOC | $SO_2$ | PM10/2.5 |
|---|---|---|---|---|---|
| **Maximum Hourly Emission (lbs/hr)** | 240 | 5,700 | 304.2 | 6.21 | 7.5 |
| **Maximum Daily Emission (lbs/day)** | 5,760 | 131,100 | 7,300 | 149 | 180 |
| **Maximum Annual Emission (tons/year)** | 5.8 | 68.6 | 7.3 | 0.15 | 0.18 |
| **Current Permitted Annual Emission (tons/year)** | **127** | **330** | **28.5** | **12.2** | **71.8** |

Source: RCEC 2018b, BAAQMD 2018.

The petitioner provided a modeling analysis for black start emergency operation to determine the worst case air quality impacts The petitioner evaluated RCEC's expected black start operation impacts for state and federal 1-hour and 8-hour CO and state 1-hour $NO_2$ ambient air quality standards. The federal 1-hour $NO_2$ ambient air quality standard is expressed as a 3-year average of the 98th percentile of the daily maximum 1-hour concentration. Since this is a statistically based standard averaged over three years, it is not applicable to the short duration of emergency black start operations. RCEC would not have a significant impact on the federal 1-hour $NO_2$ standard due to the very limited duration of black start operations compared to the 3-year averaging time used for the federal standard. Annual $NO_2$ impacts were also not evaluated further for the same reason.

Impacts due to PM10, PM2.5, and $SO_2$ are directly proportional to the fuel use and therefore are always highest at full load, normal operation. Therefore, short-term $SO_2$ and PM10/2.5 impacts during black start operations would be less than normal operations and are not evaluated further here.

During commissioning and readiness testing, maximum emissions occur when the black start unit operates at FSNL condition. Therefore, the short term impacts of $NO_2$ and CO for both periods can also be conservatively estimated by those emissions during the black start operations.

**Air Quality Table 5** presents the maximum CO and $NO_2$ impacts during black start operations, commissioning and readiness testing. The background $NO_2$ and CO concentrations are the highest values during the last three years (2015-2017) from BAAQMD Oakland East monitoring station. As shown in **Air Quality Table 5**, the emissions of the black start unit would not cause new exceedances of any state or federal CO or $NO_2$ ambient air quality standard.

**Air Quality Table 5**
**RCEC, Black Start Emergency Operation, Commissioning and Readiness Testing Maximum Impacts (µg/m³)**

| Pollutant | Averaging Time | Modeled Impact | Background | Total | Limiting[a] Standard | Percent of Standard |
|---|---|---|---|---|---|---|
| CO | 1 hour | 3,983 | 3,665 | 7,648 | 23,000 | 33 |
| | 8 hour | 968 | 2,519 | 3,487 | 10,000 | 35 |
| $NO_2$ | 1 hour (state) | 84 | 122 | 206 | 339 | 61 |

Source: RCEC 2018b and independent staff analysis.
Note: a. The limiting standards are the most stringent federal or state standards. The 1-hour CO standard represents California state standard. The 8-hour CO standard represents both federal and state standards.

The amendment adds five new conditions of certification (**AQ-50** to **54**) related to the emission limits and operational limits for the gas turbines during the black start related operations. The amendment also modifies four conditions (**AQ-19, AQ-22, AQ-23** and **AQ-26**) to exempt the black start-related operations from the normal operation emission limits.

Several conditions are modified to include PM2.5 in addition to PM10. PM2.5 is considered a subset of PM10. Staff conservatively assumes PM2.5 emissions are equivalent to PM10 emissions from natural gas combustion. This is supported by studies evaluating in-stack testing results. Staff assumes as part of this analysis that all PM10 equals PM2.5. This change does not affect PM10 or PM2.5 emissions. However, the Title V permit conditions from district now include PM2.5 in addition to PM10 so this analysis incorporates PM2.5 into applicable conditions so that Energy Commission conditions of certification would be consistent with corresponding district permit conditions. In addition, several other conditions include minor modification for consistency with Title V permit changes.

## CONCLUSIONS AND RECOMMENDATIONS

Staff recommends that the revised conditions of certification be approved as shown below. With the recommended changes, RCEC would continue to conform to all applicable federal, state, and District LORS. Staff concludes the amended facility would not cause any significant adverse air quality impacts.

## AMENDED CONDITIONS OF CERTIFICATION

Below is a list of conditions of certification that staff recommends to be revised from those approved in the 2002 Energy Commission Final Decision (CEC 2002) and the 2007 (CEC 2007), 2010 (CEC 2010) and 2013 (CEC 2013) Orders Approving Petitions to Amend. Staff proposes to modify four COCs and adds five new COCs. In addition, staff proposes minor modification to several other conditions for consistency with Title V permit change. ~~Strikethrough~~ is used to indicate deleted language and **underline and bold** is used for new language.

## BAAQMD CONDITIONS OF CERTIFICATION

**Definitions:**

| | |
|---|---|
| Commissioning Activities: | All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the RCEC construction contractor to insure safe and reliable steady state operation of the gas turbines, heat recovery steam generators, steam turbine, and associated electrical delivery systems during the commissioning period **(Separated from Commissioning Activities for black start Capability)**. |
| **$CO_2E$:** | **Combined emissions of $CO_2$, $CH_4$, and $N_2O$, expressed in terms of the amount of $CO_2$ emissions that would have the equivalent impact on global climate change.** |
| **Black Start Emergency Operation:** | **Operation of a gas turbine and associated equipment as directed by the California Independent System Operator (CAISO) and/or Pacific Gas and Electric Company (PG&E) to restore power to the grid in the event of a system outage in accordance with the CAISO's or PG&E's system restoration plan.** |
| **Black Start Emergency Event:** | **The duration of black start emergency operation from initial ignition of a gas turbine after declaration of a black start emergency by the CAISO or PG&E until conclusion of the emergency as determined by the CAISO or PG&E.** |
| **Commissioning Activities For Black Start Capability:** | **All performance testing and adjustment activities associated with the initial installation of the battery energy storage system specifically designed for black start capability at RCEC.** |

## CONDITIONS FOR COMMISSIONING PERIOD

**AQ-11** No less than ~~120~~**90** days after startup, the owner/operator shall conduct District and Energy Commission approved source tests to determine compliance with the emission limitations specified in **AQ-19**. The source tests shall determine $NO_x$, CO, and **precursor organic compound (**POC**)** emissions during start-up and shutdown of the gas turbines. The POC emissions shall be analyzed for methane and ethane to account for the presence of unburned natural gas. The source test shall include a minimum of three start-up and three shutdown periods and shall include at least one cold start, one warm start, and one hot start. ~~Twenty (20)~~**Thirty (30)** working days before the execution of the source tests, the owner/operator shall submit to the District and the CPM a detailed source test plan designed to satisfy the requirements of this condition. The District and the CPM will notify the owner/operator of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The owner/operator shall incorporate the District and CPM comments into the test plan. The owner/operator shall notify the District and the CPM within seven (7) working days prior to the planned source testing date. The owner/operator shall submit the source test results to the District and the CPM within ~~150~~**60** days of the source testing date.

**Verification:** No later than 30 working days before the commencement of the source tests, the project owner shall submit to the District and the CPM a detailed source test plan designed to satisfy the requirements of this condition. The District and the CPM will notify the project owner of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The project owner shall incorporate the District and CPM comments into the test plan. The project owner shall notify the District and the CPM within seven (7) working days prior to the planned source testing date. Source test results shall be submitted to the District and the CPM within ~~150~~**60** days of the initial startup.

## CONDITIONS FOR THE GAS TURBINES (S-1 & S-3) AND THE HRSGS (S-2 & S-4)

**AQ-12** The owner/operator shall fire the gas turbines (S-1 & S-3) and HRSG Duct Burners (S-2 & S-4) exclusively on PUC-regulated natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. To demonstrate compliance with this limit, the operator of S-1 through S-4 shall sample and analyze the gas from each supply source at least monthly to determine the sulfur content of the gas. PG&E monthly sulfur data may be used provided that such data can be demonstrated to be representative of the gas delivered to the RCEC. In the event that the rolling 12-month annual average sulfur content exceeds 0.25 grain per 100 standard cubic feet, a reduced annual heat input rate may be utilized to calculate the maximum projected annual emissions. The reduced annual heat input rate shall be subject to District review and approval. (BACT for SO2 and PM10**/PM2.5**)

**Verification:** The project owner shall complete, on a monthly basis, a laboratory analysis showing the sulfur content of natural gas being burned at the facility. The sulfur analysis reports shall be incorporated into the quarterly compliance reports.

**AQ-14** The owner/operator shall not operate the units such that the combined heat input rate to each power train consisting of a gas turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) exceeds 53,726 MM BTU (HHV) per day. (PSD for PM10/**PM2.5**)

**Verification:** As part of the quarterly and annual compliance reports, the project owner shall include information on the date, time, and duration of any violation of this permit condition.

**AQ-19** The owner/operator shall ensure that the gas turbines (S-1 & S-3) and HRSGs (S-2 & S-4) comply with requirements (a) through (h) under all operating scenarios, including duct burner firing mode. Requirements (a) through (h) do not apply during ~~a~~ gas turbine start-up**s**, combustor tuning operation**s** ~~or~~ shutdown**s, commissioning activities for black start capability, or black start emergency operations**. (BACT, PSD, and Regulation 2, Rule 5)

(a) Nitrogen oxide mass emissions (calculated as $NO_2$) at P-1 (the combined exhaust point for S-1 gas turbine and S-2 HRSG after abatement by A-1 SCR System) shall not exceed 16.5 pounds per hour or 0.00735 lb/MM BTU (HHV) of natural gas fired, averaged over any 1-hour period. Nitrogen oxide mass emissions (calculated as $NO_2$) at P-2 (the combined exhaust point for S-3 gas turbine and S-4 HRSG after abatement by A-3 SCR System) shall not exceed 16.5 pounds per hour or 0.00735 lb/MM BTU (HHV) of natural gas fired, averaged over any 1-hour period.

(b) The nitrogen oxide emission concentration at emission points P-1 and P-2 each shall not exceed 2.0 ppmv, on a dry basis, corrected to 15 percent $O_2$, averaged over any 1-hour period. (BACT for $NO_x$)

(c) Carbon monoxide mass emissions at P-1 and P-2 each shall not exceed 10 pounds per hour or 0.0045 lb/MM BTU of natural gas fired, averaged over any 1-hour period. (PSD for CO)

(d) The carbon monoxide emission concentration at P-1 and P-2 each shall not exceed 2.0 ppmv, on a dry basis, corrected to 15 percent $O_2$, averaged over any 1-hour period. (BACT for CO)

(e) Ammonia ($NH_3$) emission concentrations at P-1 and P-2 each shall not exceed 5 ppmv, on a dry basis, corrected to 15 percent $O_2$, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to A-2 and A-4 SCR Systems. The correlation between the gas turbine and HRSG heat input rates, A-2 and A-4 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1 and

P-2 shall be determined in accordance with permit condition **AQ-29** or District approved alternative method. (Regulation 2-5)

(f) Precursor organic compound (POC) mass emissions (as $CH_4$) at P-1 and P-2 each shall not exceed 2.86 pounds per hour or 0.00128 lb/MM BTU of natural gas fired. (BACT)

(g) Sulfur dioxide ($SO_2$) mass emissions at P-1 & P-2 each shall not exceed 6.21 pounds per hour or 0.0028 lb/MM BTU of natural gas fired. (BACT)

(h) Particulate matter (PM10 **and PM2.5**) mass emissions at P-1 & P-2 each shall not exceed 7.5 pounds per hour or 0.0036 lb PM10**/PM2.5** per MM BTU of natural gas fired. (BACT)

**Verification:** The project owner shall submit to the District and CPM, quarterly reports for the proceeding calendar quarter within 30 days from the end of the quarter. The report for the fourth quarter can be an annual compliance summary for the preceding year. The quarterly and annual compliance summary reports shall contain the following information:

(a) Operating parameters of emission control equipment, including but not limited to ammonia injection rate, $NO_x$ emission rate and ammonia slip.

(b) Total plant operation time (hours), number of startups, hours in cold startup, hours in warm startup, hours in hot startup, and hours in shutdown.

(c) Date and time of the beginning and end of each startup and shutdown period.

(d) Average plant operation schedule (hours per day, days per week, weeks per year).

(e) All continuous emissions data reduced and reported in accordance with the District approved CEMS protocol.

(f) Maximum hourly, maximum daily, total quarterly, and total calendar year emissions of $NO_x$, CO, PM10, **PM2.5,** POC and SOx (including calculation protocol).

(g) Fuel sulfur content (monthly laboratory analyses, monthly natural gas sulfur content reports from the natural gas supplier(s), or the results of a custom fuel monitoring schedule approved by the District.

(h) A log of all excess emissions, including the information regarding malfunctions/breakdowns.

(i) Any permanent changes made in the plant process or production, which would affect air pollutant emissions, and indicate when changes were made.

(j) Any maintenance to any air pollutant control system (recorded on an as performed basis).

In addition, this information shall be maintained on site for a minimum of five (5) years and shall be provided to District personnel on request.

**AQ-22** The owner/operator shall not allow total combined emissions from the gas turbines and HRSGs (S-1, S-2, S-3 & S-4), S-5 Cooling Tower, and S-6 Fire Pump Diesel Engine, including emissions generated during gas turbine start-ups, combustor tuning, and shutdowns to exceed the following limits during any calendar day**, except on days when commissioning activities for black start capability or black start emergency operations occur**:

(a) 1,453 pounds of $NO_x$ (as $NO_2$) per day (Cumulative Emissions)

(b) 1,225 pounds of $NO_x$ per day during ozone season from June 1 to September 30. (CEC Condition of Certification)

(c) 7,360 pounds of CO per day (PSD)

(d) 295 pounds of POC (as $CH_4$) per day (Cumulative Emissions)

(e) 413 pounds of PM10 per day (PSD)

(f) 292 pounds of $SO_2$ per day (BACT)

**Verification:** The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-19**.

**AQ-23** The owner/operator shall not allow cumulative combined emissions from the gas turbines and HRSGs (S-1, S-2, S-3 & S-4), S-5 Cooling Tower, and S-6 Fire Pump Diesel Engine, including emissions generated during gas turbine start-ups, combustor tuning **operations**, ~~and~~ shutdowns**, commissioning activities for black start activities, and black start emergency operations,** to exceed the following limits during any consecutive twelve-month period:

(a) 127 tons of $NO_x$ (as $NO_2$) per year (Offsets, PSD)

(b) 330 tons of CO per year (Cumulative Increase, PSD)

(c) 28.5 tons of POC (as $CH_4$) per year (Offsets)

(d) 71.8 tons of PM10 per year (Cumulative Increase, PSD)

(e) 12.2 tons of $SO_2$ per year (Cumulative Increase, PSD)

**Verification:** The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-19**.

**AQ-26** The owner/operator shall demonstrate compliance with **AQ-13** through **AQ-16**, **AQ-19(a)** through **(d)**, **AQ-20**, **AQ-22(a)** and **(b)**, **AQ-23(a)** and **(b)**, **AQ-53** by using properly operated and maintained continuous monitors (during all hours of operation including gas turbine start-up, combustor tuning, ~~and~~ shutdown ~~periods~~, **and black start emergency operations**) for all of the following parameters:

(a) Firing Hours and Fuel Flow Rates for each of the following sources: S-1 & S-3 combined, S-2 & S-4 combined.

(b) Oxygen ($O_2$) concentration, Nitrogen Oxides ($NO_x$) concentration, and Carbon Monoxide (CO) concentration at exhaust points P-1 and P-2.

(c) Ammonia injection rate at A-1 and A-3 SCR Systems

The owner/operator shall record all of the above parameters every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total firing hours, the average hourly fuel flow rates, and pollutant emission concentrations.

The owner/operator shall use the parameters measured above and District-approved calculation methods to calculate the following parameters:

(d) Heat Input Rate for each of the following sources: S-1 & S-3 combined, S-2 & S-4 combined.

(e) Corrected $NO_x$ concentration, $NO_x$ mass emission rate (as $NO_2$), corrected CO concentration, and CO mass emission rate at each of the following exhaust points: P-1 and P-2.

For each source, source grouping, or exhaust point, the owner/operator shall record the parameters specified in **AQ-26(d) and (e)** at least once every 15 minutes (excluding normal calibration periods). As specified below, the owner/operator shall calculate and record the following data:

(f) total heat input rate for every clock hour.

(g) on an hourly basis, the cumulative total heat input rate for each calendar day for the following: each gas turbine and associated HRSG combined and all four sources (S-1, S-2, S-3 and S-4) combined.

(h) the average $NO_x$ mass emission rate (as $NO_2$), CO mass emission rate, and corrected $NO_x$ and CO emission concentrations for every clock hour.

(i) on an hourly basis, the cumulative total $NO_x$ mass emissions (as $NO_2$) and the cumulative total CO mass emissions, for each calendar day for the following: each gas turbine and associated HRSG combined and all four sources (S-1, S-2, S-3 and S-4) combined.

(j) For each calendar day, the average hourly heat input rates, corrected $NO_x$ emission concentration, $NO_x$ mass emission rate (as $NO_2$), corrected CO emission concentration, and CO mass emission rate for each gas turbine and associated HRSG combined.

(k) on a daily basis, the cumulative total $NO_x$ mass emissions (as $NO_2$) and cumulative total CO mass emissions, for the previous consecutive twelve month period for all four sources (S-1, S-2, S-3 and S-4) combined.

(1-520.1, 9-9-501, BACT, Offsets, NSPS, Cumulative Increase)

**Verification:** At least 30 days before first fire, the project owner shall submit to the CPM a plan on how the measurements and recordings required by this condition will be performed.

**AQ-27** To demonstrate compliance with conditions **AQ-19(f)**, **AQ-19(g)**, **AQ-19(h)**, **AQ-22(c)**, **AQ-22(d)**, **AQ-22(e)**, **AQ-22(f)**, and **AQ-23(c)**, **AQ-23(d)**, **AQ-23(e)**, the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter (PM10 **and PM2.5**) mass emissions (including condensable particulate matter), and Sulfur Dioxide ($SO_2$) mass emissions from each power train. The owner/operator shall use the actual heat input rates measured pursuant to **AQ-26**, actual gas turbine start-up times, actual gas turbine shutdown times, and CEC and District-approved emission factors developed pursuant to source testing under **AQ-30** to calculate these emissions. The owner/operator shall present the calculated emissions in the following format:

(a) For each calendar day, POC, PM10 **and PM2.5**, and $SO_2$ emissions, summarized for each power train (gas turbine and its respective HRSG combined) and all four sources (S-1, S-2, S-3 & S-4) combined

(b) on a ~~daily~~**monthly** basis, the cumulative total POC, PM10, and $SO_2$ mass emissions, for each year for all four sources (S-1, S-2, S-3 & S-4) combined

(Offsets, PSD, Cumulative Increase)

**Verification:** The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-19**.

**AQ-29** Within ~~120~~**90** days of start-up of the RCEC, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 to determine the corrected ammonia ($NH_3$) emission concentration to determine compliance with **AQ-19(e)**. The source test shall determine the correlation between the heat input rates of the gas turbine and associated HRSG, A-2 or A-4 SCR System

ammonia injection rate, and the corresponding $NH_3$ emission concentration at emission point P-1 or P-2. The source test shall be conducted over the expected operating range of the turbine and HRSG (including, but not limited to, minimum and full load modes) to establish the range of ammonia injection rates necessary to achieve $NO_x$ emission reductions while maintaining ammonia slip levels. The owner/operator shall repeat the source testing on an annual basis thereafter. Ongoing compliance with **AQ-19(e)** shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlation and continuous records of ammonia injection rate. The owner/operator shall submit the source test results to the District and the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of conducting the tests. (Regulation 2, Rule 5)

**Verification:** The project owner shall notify the District and the CPM within seven (7) working days before the execution of the source tests required in this condition. Source test results shall be submitted to the District and to the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of the date of the tests.

**AQ-30** Within ~~120~~**90** days of start-up of the RCEC and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on exhaust points P-1 and P-2 while each gas turbine and associated Heat Recovery Steam Generator are operating at maximum load to determine compliance with **AQ-19(a)**, **(b)**, **(c)**, **(d)**, **(f)**, **(g)**, and **(h)** and while each gas turbine and associated Heat Recovery Steam Generator are operating at minimum load to determine compliance with **AQ-19(c)** and **(d)**, and to verify the accuracy of the continuous emission monitors required in **AQ-26**. For the purposes of the testing at maximum load only, the owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and mass emissions, nitrogen oxide concentration and mass emissions (as $NO_2$), carbon monoxide concentration and mass emissions, sulfur dioxide concentration and mass emissions, methane, ethane, and particulate matter (PM10 **and PM2.5**) emissions including condensable particulate matter. The owner/operator shall submit the source test results to the District and the CEC CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of conducting the tests. (BACT, offsets)

**Verification:** The project owner shall notify the District and the CPM within seven (7) working days before the execution of the source tests required in this condition. Source test results shall be submitted to the District and to the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of the date of the tests.

**AQ-31** The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section and the CPM prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements for continuous emission monitors as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section and the CPM in writing of the source test protocols and projected test dates at least 7 days prior to the testing date(s). As indicated above, the owner/operator shall measure the contribution of condensable PM (back half) to the total PM10 **and PM2.5** emissions. However, the owner/operator may propose alternative measuring techniques to measure condensable PM such as the use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds. The owner/operator shall submit the source test results to the District and the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of conducting the tests. (BACT)

**Verification:** Approval of the source test procedures, as required in **AQ-31**, and the source test reports shall be deemed as verification for this condition. The project owner shall notify the District and the CPM within seven (7) working days before the execution of the source tests required in this condition. Source test results shall be submitted to the District and to the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of the date of the tests.

**AQ-32** Within ~~120~~**90** days of start-up of the RCEC and on a biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 while the gas turbine and associated Heat Recovery Steam Generator are operating at maximum allowable operating rates to demonstrate compliance with **AQ-25**. The owner/operator shall also test the gas turbine while it is operating at minimum load. If three consecutive biennial source tests demonstrate that the annual emission rates calculated pursuant to **AQ-25** for any of the compounds listed below are less than the BAAQMD trigger levels, pursuant to Regulation 2, Rule 5, shown, then the owner/operator may discontinue future testing for that pollutant:

| | | |
|---|---|---|
| Benzene | ≤ | 6.4 pounds/year and 2.9 pounds/hour |
| Formaldehyde | ≤ | 30 pounds/year and 0.21 pounds/hour |
| Specified PAHs | ≤ | 0.011 pounds/year |

(Regulation 2, Rule 5)

**Verification:** The project owner shall notify the District and the CPM within seven (7) working days before the execution of the source tests required in this condition. Source test results shall be submitted to the District and to the CPM, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter, within 60 days of the date of the tests.

**AQ-34** Within ~~120~~**90** days of start-up of the RCEC and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on exhaust points P-1 and P-2 while each gas turbine and HRSG duct burner is operating at maximum heat input rates to demonstrate compliance with the SAM emission rates specified in **AQ-24**. The owner/operator shall test for (as a minimum) $SO_2$, $SO_3$, and $H_2SO_4$. The owner/operator shall submit the source test results to the District and the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of conducting the tests. (PSD)

**Verification:** The project owner shall notify the District and the CPM within seven (7) working days before the execution of the source tests required in this condition. Source test results shall be submitted to the District and to the CPM~~, in the case of initial source testing, within 150 days of startup, and for all source testing conducted thereafter,~~ within 60 days of the date of the tests.

**CONDITIONS FOR COOLING TOWERS**

**AQ-45** The owner/operator shall perform a visual inspection of the cooling tower drift eliminators at least once per calendar year, and repair or replace any drift eliminator components which are broken or missing. Prior to the initial operation of the Russell City Energy Center, the owner/operator shall have the cooling tower vendor's field representative inspect the cooling tower drift eliminators and certify that the installation was performed in a satisfactory manner. Within ~~120~~**60** days of the initial operation of the cooling tower, the owner/operator shall perform an initial performance source test to determine the PM10 **and PM2.5** emission rate from the cooling tower to verify compliance with the vendor-guaranteed drift rate specified in **AQ-44**. The CPM may require the owner/operator to perform source tests to verify continued compliance with the vendor-guaranteed drift rate specified in **AQ-44**. (PSD)

**Verification:** The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by **AQ-19**.

**CONDITIONS FOR THE GAS TURBINES (S-1 & S-3) DURING BLACK-START-RELATED OPERATIONS**

**AQ-50 Commissioning Activities for Black Start Capability: The owner/operator shall perform commissioning activities for black start capability at S-1 and S-3 for no more than 20 hours combined. The owner/operator shall not perform these activities at S-1 and S-3 simultaneously. Upon completion of these activities, the owner/operator shall provide written notice to the District Engineering and Enforcement Divisions. (Basis: BACT)**

**Verification: The project owner shall submit to the CPM the commissioning report to demonstrate the compliance of this condition within 30 days from the completion of black start capability commissioning.**

**AQ-51 Emission Limits for Commissioning Activities for Black Start Capability: The owner/ operator shall not operate the Gas Turbines (S-1 & S-3) in a manner such that the combined pollutant emissions from these sources will exceed the following limits when performing commissioning activities for black start capability.**

**(a) $NO_X$ (as $NO_2$): 4,800 pounds**

**(b) CO: 114,000 pounds**

**(c) POC (as $CH_4$): 6,080 pounds**

**(d) PM10/PM2.5: 150 pounds**

**(e) $SO_2$: 124 pounds**

**(f) GHG: 3,298,700 pounds $CO_2E$**

**(Basis: BACT)**

**Verification: The project owner shall submit to the District and CPM the commissioning report to demonstrate the compliance of this condition within 30 days from the completion of black start capability commissioning.**

**AQ-52 Monitoring and Recordkeeping for Commissioning Activities for Black Start Capability: The owner/operator of the RCEC shall demonstrate compliance with AQ-50 and 51 through the use of properly operated and maintained continuous emission monitors and data recorders for the following parameters:**

- **firing hours**
- **fuel flow rates**
- **stack gas nitrogen oxide emission concentrations,**
- **stack gas carbon monoxide emission concentrations**
- **stack gas oxygen concentrations.**

**The owner/operator shall use District-approved methods to calculate heat input rates, nitrogen dioxide mass emission rates, carbon monoxide mass emission rates, and NOx and CO emission concentrations, summarized for each clock hour. The owner/operator shall retain records on site for at least 5 years from the date of entry and make such records available to District personnel upon request. (Basis: BACT).**

**Verification: During site inspection, the project owner shall make all records and reports available to the District, ARB, EPA or Energy Commission staff.**

**AQ-53** Daily Emission Limits: The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1 & S-3) to exceed the following limits during any calendar day when commissioning activities for black start capability or black start emergency operations occur:

(a) $NO_X$ (as $NO_2$): 5,760 pounds

(b) CO: 131,100 pounds

(c) POC (as $CH_4$): 7,300 pounds

(d) PM10/PM2.5: 360 pounds

(e) $SO_2$: 292 pounds

(f) GHG: 12,786,900 pounds $CO_2E$ per day

(Basis: BACT).

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by AQ-19.

**AQ-54** Emission Limits for Black Start Emergency Events: The owner/operator shall not allow total combined emissions from the Gas Turbines (S-1 & S-3) to exceed the following limits during a black start emergency event:

(a) $NO_X$ (as $NO_2$): 11,520 pounds

(b) CO: 137,100 pounds

(c) POC (as $CH_4$): 14,600 pounds

(d) PM10/PM2.5: 360 pounds

(e) $SO_2$: 298 pounds

(f) GHG: 11,644,500 pounds $CO_2E$

(Basis: BACT).

Verification: The project owner shall submit to the District and CPM the quarterly and annual compliance reports as required by AQ-19.

## REFERENCES

BAAQMD 2018 - Bay Area Air Quality Management District. Draft Engineering Evaluation - Russel City "Black Start" Capacity Project. December 7, 2018.

CEC 2002 - California Energy Commission. Commission Decision of Russel City Energy Center (01-AFC-07C). September 12, 2002.

CEC 2007 - California Energy Commission, Final Commission Decision Including Adoption Order. October 2, 2007.

CEC 2010 - California Energy Commission. Order Amending the Energy Commission Decision. August 11, 2010.

CEC 2013 - California Energy Commission. Order Approving a Petition to Amend Air Quality, Hazardous Materials Management, and Visual Resources Conditions of Certification. July 1, 2013.

RCEC 2018a - Russell City Energy Company, LLC. Russell City Energy Center Petition for Modification Black Start Capabilities. March 2, 2018.

RCEC 2018b - Russell City Energy Company, LLC. Application for Confidential Designation. October 18, 2018.

# RUSSELL CITY ENERGY CENTER, 01-AFC-07C
## Petition to Amend to Add Black Start Capability
## WORKER SAFETY AND FIRE PROTECTION

Brett Fooks

## INTRODUCTION

Russell City Energy Company, LLC filed a Petition to Amend (PTA) on March 2, 2018 requesting approval to install a battery energy storage system (BESS) to provide black start capability to the Russell City Energy Center (RCEC) (RCEC 2018).

## SCOPE OF ANALYSIS

The scope of this analysis is to determine whether construction and operation of the BESS would:

- Comply with worker safety and fire protection laws, ordinances, regulations, and statutes (LORS);
- Protect the workers during construction and operation of the facility;
- Protect against fire;
- Provide adequate emergency response procedures; or
- Require the change, deletion, or addition of any new condition(s) of certification in order to ensure compliance with LORS.

## BACKGROUND

The project was certified operational by the Energy Commission in August 2013, as a 600-megawatt (MW) natural gas-fired, wet cooled, combined cycle electric generating facility. RCEC is located at 3862 Depot Road, Hayward California.

On December 1, 2017, the CAISO selected RCEC for "black start" capabilities based on a competitive solicitation (CAISO 2017). Black start capability refers to the ability of a generating unit or facility to begin operating and delivering electric power without external assistance from the electric system. Black start resources are essential to restart other generation and to restore power to the grid in the event of a widespread system outage (CAISO 2017).

The proposed RCEC black start project consists of installing a lithium-ion BESS having anywhere from 6 to 10-MW. The BESS would provide black start capability to the gas turbine (RCEC 2018). The BESS consists of lithium-ion battery banks installed in three metal enclosures. The batteries would be configured as modules of multiple packages, with each package containing many individual lithium-ion battery cells plus battery protection circuits in a sealed container. The battery enclosures would be kept away from any heat sources.

## ANALYSIS

Worker safety and fire protection are regulated through LORS, at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials and may face hazards that can result in accidents and serious injury. Protective measures are employed to eliminate or reduce these hazards through special training, protective equipment, and procedural controls.

The short duration of construction for the installation of the BESS would comply with worker safety and fire safety measures contained in health and safety plans prepared in accordance with existing Condition of Certification **WORKER SAFETY-1**. During plant operation, the BESS would be operated in compliance with the health and safety plans as required by existing Condition of Certification **WORKER SAFETY-2**. The Operations Fire Prevention Plan, Emergency Action Plan, and Hazardous Materials Management Plan would be updated to include the BESS in accordance with existing Condition of Certification **WORKER SAFETY-2.** The project would also comply with the project Operations and Maintenance Safety and Health Program.

RCEC relies on local fire protection services provided by the Hayward City Fire Department. Energy storage systems like the one that would be installed at RCEC may still be a relatively new technology for local fire fighters. Therefore, staff proposes Condition of Certification **WORKER SAFETY-3**, under which the project owner would be required to provide necessary system information and opportunities for on-site fire protection training to the Hayward City Fire Department to assist them in updating, if needed, their standard operating procedures for dealing with a potential lithium ion battery fire at the RCEC facility. The project owner would also be required to collaborate with the Hayward City Fire Department in its review and comment on the fire safety provisions to be provided for the BESS.

If adopted, staff's proposed Condition of Certification **WORKER SAFETY-3** would ensure adequate protection to on-site workers and first responders through compliance with existing LORS applicable to the proposed BESS.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided by the petitioner, staff proposes new Condition of Certification **WORKER SAFETY-3**, which would ensure compliance with LORS to provide adequate protection for on-site workers and first responders.

With the adoption of **WORKER SAFETY-3**, staff concludes that the proposed modifications would be in compliance with applicable worker safety and fire protection LORS and conditions of certification adopted by the Energy Commission in its Final Decision. The approved conditions of certification in the Final Decision would include compliance with current worker safety and fire protection LORS.

## PROPOSED CHANGES OR MODIFICATION TO CONDITIONS OF CERTIFICATION

Staff recommends adoption of the following new condition of certification in **underline and bold.**

**WORKER SAFETY-3. The project owner shall submit the fire protection drawings and specifications for the Battery Energy Storage System (BESS) to the Hayward City Fire Department for review and comment, to the Delegate Chief Building Official (DCBO) for plan check and inspection, and to the CPM for review and approval. The project owner shall also collaborate with the Hayward City Fire Department to assist in any needed modifications of their standard operating procedures for first responders to implement when confronting a fire occurring within the BESS located on site.**

**Verification:**

**(1) At least sixty (60) days prior to the start of construction of the BESS project, the project owner shall:**

**(a) Provide the complete set of BESS fire protection drawings and specifications to the Hayward City Fire Department for review and comment, and to the DCBO for plan check approval and construction inspection, and to the CPM for review and approval, and;**

**(b) Provide a copy of a letter from the project owner to the Hayward City Fire Department offering collaboration and assistance with standard operating procedures for first responders to any fires that might occur within the BESS.**

## REFERENCES

RCEC 2002a, California Energy Commission final decision on the application for certification for the Russell City Energy Center, September 12, 2002, Docket No. 01-AFC-7 (TN#:26635).

CAISO 2017, California Independent System Operator, Greater San Francisco Bay Area Black Start Resources Selection Report. December 1, 2017.

RCEC 2018, Petition to amend – black start capability enhancement. 2 March 2018, Docket No. 01-AFC-7C (TN#:222836).

UL 2016. Underwriters Labs, *UL 9540 Standard for energy Storage Systems and Equipment*, November 2, 2016.