Exhibit to Agenda Item #4

Provide an overview of the Cosumnes Power Plant (CPP) steam turbine generator stator ground fault failure and approve the proposed amendment to the 2022 SFA Budget Resolution to augment the Capital Expenditures line item by $18.61 million for Sacramento Municipal Utility District Financing Authority (SFA).

Board Finance & Audit Committee and Special SMUD Board of Directors Meeting Tuesday, October 18, 2022, scheduled to begin at 5:30 p.m.
Virtual Meeting (online)
Background

- Cosumnes Power Plant (CPP) had an extensive Cold Iron Outage to complete several Capital improvements including CT3 Major and Steam Turbine (STG1) Overhaul in Spring of 2022.

- The STG tripped while performing “return to service” testing on June 5, 2022. The plant was forced out of service and immediately began investigation believing to have experienced a Stator ground fault based on the relay activation data following the trip.

- Extensive damage was subsequently identified resulting in a complete generator and core restack with the field still being evaluated with the high probability of requiring a rewind as well. STG1 is expected to remain out of service until approximately January-February 2023, as repairs are made.

- The plant was able to place the Combustion Turbines into a 1x0 & 2x0 availability state June 17, 2022, by running the plant by bypassing to the condenser.
What caused the Ground Fault Failure

- Through-bolt came into contact with the core which caused the stator ground fault.

- The Root Cause Analysis (RCA) indicates insulation surrounding the through-bolt had failed which resulted in contact with stator core.

- The most plausible cause for the failure of the through-bolt insulation is abrasion or wear of the insulation caused by relative motion between the through bolts and core iron laminations while they were in contact.
Through Bolt following removal

Through bolt through lamination

Deterioration of Insulation
Why Air-Cooled Generators Fail

Thermal – heat generated by the working generator (thermal cycling)

Mechanical – cause by machine vibration

Electrical – caused by voltage stress

Chemical stresses – caused by the breakdown of materials, insulation (epoxy resin) and other components over time

Environmental factors

Rarely does one factor work alone to cause a problem
Repair Scope

- **100% Stator Core Lamination Replacement & Restack**
  - Ethos and TG Advisors (3rd party consultants) recommend 100% core restack

- **Replace all through bolts**
  - Ethos and TG Advisors recommend replacing all through bolts
  - Bolts purchased from Mitsubishi

- **Replace core vents**
  - Full replacement due to extent of damage

- **Generator rotor inspection and rewind**
  - Currently in St. Louis with Mechanical Dynamics and Analysis (MDA) for inspection
  - Incoming inspection has identified metal deposits within coil slots & will require full rewind
Schedule

Timeline Overview

- Preliminary Electrical Testing & Winding removal to include 50% lamination removal (June-July) ~ 60 Days
- Lamination Design & Fabrication* (July-November) ~ 100 Days
- 50% Core Vent Design & Fabrication* (July-November) ~ 80 Days
- Procuring/Manufacturing – Through Bolts* (Sept-December) ~ 120 Days
- Perform Core Lamination Restack and Stator Rewind (Sept-January) ~ 165 Days
- Field Rewind (will be completed in parallel with Core restack & rewind) (Aug-October) ~ 96 Days
- Post Repair Electrical & Performance Testing (January/February) ~ 5 Days

*Material fabrication & design are scheduled to be completed in parallel within the detailed schedule
Temporary CPP Operations

1X0 & 2X0 Operations

- Confirmed safety and plant capability from 3rd party (IEC) and Ethos Engineering.
- Obtained Sacramento Metropolitan Air Quality Management District (SMAQMD) Regular Variance to operate in this configuration for up to a year on 08/17/22.
- Received Staff Approval of Petition to Amend from the California Energy Commission (CEC) to operate in this configuration on 08/03/22.
1X0 & 2X0 Operations

- Bypass Steam Turbine
  - 1X0 83 MW – 200 MW (Gross)
  - 2X0 83 MW – 280 MW (Gross)
- Run in manual control with no Automatic Generation Control (AGC) for unit stability
# SFA Steam Turbine Generator Repair Supplementary Budget

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td><strong>Total repair costs:</strong></td>
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<tr>
<td><strong>2022 O&amp;M costs to be covered by existing budget:</strong></td>
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<tr>
<td><strong>2022 Capital costs:</strong></td>
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<td><em>(current augmentation request)</em></td>
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<tr>
<td><strong>2023 Capital costs:</strong></td>
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<td><em>(included in 2023 Budget to be approved in December)</em></td>
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