GREATER BAY AREA BLACKSTART TECHNICAL VARIABLES and CRITERIA

Geographic Area of Consideration

- Upon the loss of AC to the Greater Bay Area (GBA), the potential blackstart resource must support the restoration of the backbone 230kV transmission system supporting the Greater Bay Area. The Greater Bay Area (or Bay Area) is at the center of PG&E's service territory. This area includes Alameda, Contra Costa, Santa Clara, San Mateo and San Francisco counties as shown in the adjacent illustration. The area is divided into three sub areas: East Bay, South Bay and San Francisco Peninsula.
    - The East Bay sub area includes cities in Alameda and Contra Costa counties. Some major cities are Concord, Berkeley, Oakland, Hayward, Fremont and Pittsburg.
    - The South Bay sub area covers approximately 1500 square miles and includes San Jose, Mountain View, Morgan Hill and Gilroy. Los Esteros, Metcalf, Monta Vista and Newark are the key substations that deliver power to this sub-area.
    - Last, the San Francisco Peninsula sub area encompasses San Francisco and San Mateo counties, which include the cities of San Francisco, San Bruno, San Mateo, Redwood City and Palo Alto.

- The backbone 230kV transmission system in the Greater Bay Area consists of the substations defined in the ISO's Local Capacity Requirements (LCR) Technical Study. The list of included facilities can be found on page 45 of the report (http://www.caiso.com/Documents/Draft2018LocalCapacityTechnicalReport.pdf)

- Generating resources that are not located within the defined geographic area may submit a proposal provided that they show that they can meet the technical requirements of energizing the Greater Bay Area 230kV system as defined in the ISO LCR report.

Selection Factors and Evaluation Criteria

The ISO encourages applicants to include as much detail and documentation as possible in their black start applications to demonstrate they meet the required technical specification and support their identified costs.

The ISO will not apply specified weights, scoring, and mathematical formulas for selecting black start generating units. The ISO's process will allow all applicants to demonstrate any specific benefits, efficiencies, or advantages their resource provides. Specific proposals may result in additional benefits or costs that the ISO will consider, but the ISO will not know the extent of those until it receives specific proposals. Pre-established weights cannot effectively predict these benefits or costs. The ISO's planned approach will permit a comprehensive, holistic review of all factors and elements of an applicant's proposal.

Factors and Criteria:

- Calculated time to energize backbone 230kV substation loop within the Greater Bay
- Technical ability to meet restoration requirements (Reactive and real power, frequency and voltage regulation, protection coordination, ramping capability, permits, etc.)
- Restoration flexibility (resource flexibility based on location to provide operations multiple options to restore the 230kV system, proximity to other generators.)
- Locational diversity of resource (location with respect to other black start resources in the area)
- Probability of resource completing 5 year term of contract
- Cost of service and capital costs
- Black Start Service commencement date
- Other

Black Start Unit Requirements

- Must satisfy the NERC definition of Blackstart Resource[1]
- Must be able to supply own startup power.

[1] Glossary of Terms Used in NERC Reliability Standards: http://www.nerc.com/files/glossary_of_terms.pdf
Blackstart Resource: A generating unit(s) and its associated set of equipment which has the ability to be started without support from the System or is designed to remain energized without connection to the remainder of the System, with the ability to energize a bus, meeting the Transmission Operator's restoration plan needs for Real and Reactive Power capability, frequency and voltage control, and that has been included in the Transmission Operator's restoration plan.

- Must serve own plant load.
- Must have ability to meet fault impedance requirements of the restoration path. Generator protection relays should be flexible to assume temporary setting changes required to provide adequate protection during anticipated blackstart system configurations. This could be accommodated, but is not limited to, by utilizing microprocessor based protective relays with multiple group setting capability.
- Must follow the CAISO planned outage procedures.

ADDITIONAL OPERATIONAL REQUIREMENTS:

- Must have ability to meet minimum continuous running time for unit - 48 hours
- Must have ability to energize a dead transmission bus within targeted timeframe: 3 hours

Facility Worksheet

Facility/Plant Information

1) Name
2) Owner
3) Location / Address
4) Interconnection point (POI) to the ISO Grid
   a) Terminal Voltage Level
   b) Voltage Level of Interconnecting substation
   c) Interconnecting Substation
5) Age
6) Type (e.g. hydro, combined-cycle, combustion turbine, etc.)
7) Fuel Type
8) Inoperable Regions
   a) Operational Deadbands
   b) Configuration limitations (i.e. unit configurations 1x0, 2x1, etc.)
   c) Other operational limitations
9) What, if any, are the current emission restrictions under emergency conditions?
10) Is this a manned facility (24x7)(Y/N)
    a) If not, what are the facility's remote capabilities?
11) Minimum start-up power
12) Indicate for each unit
    a) Identification
    b) Pmins (stabilizing loads)

c) Pmax
    i) Does Pmax vary on length of time without AC power? If so, what are they?
d) Reactive capabilities (a MVAR capability curve and a table including up to 8 MW points (if possible) with associated minimum and maximum MVAR points. Include the maximum sustained leading and lagging capability and any anticipated operational restrictions to the MVAR capability curve).
e) Start-up time
f) Fuel Type
g) MW/min ramp capability

13) How long can facility operate at full speed/ no load?
14) Please provide a one-line diagram for the facility including all associated auxiliary loads and transmission and distribution level equipment.
15) If known, list the steps that the plant would follow immediately following a full black out to start the Black Start Unit, close to a dead bus, and any anticipated GO/TO coordination for load pickup. The description should reference the submitted one-line diagram.
16) Indicate the anticipated time to close to a dead bus, and the time to ramp to minimum load.

Black Start Unit(s) Information

17) Number of blackstart units at the facility/plant
18) Identification
    a) Of the identified blackstart unit(s), do any parameters for facility/plant information change in blackstart mode?
    b) Droop Capability
        i) Does the unit need to be off-loaded in order to change droop setting (to zero, from zero)?
    c) Droop setting change via SCADA or manual operation?
19) Terminal voltage range (i.e. +/- 5% nominal?)
20) Generator impedance data (pu) (include base quantities)
    a) X''_d
    b) X'_d
    c) X_d
    d) X_2
    e) X_0
21) GSU transformer impedance(pu) (include base quantities):
    a) X_1
    b) X_0
22) GSU tap settings
23) Tie-line impedance
24) Provide steady study models for power flow studies in GE PSLF format
25) Provide dynamic model for stability studies in GE PSLF format

Compliance

26) Demonstrate the ability to comply with all applicable NERC CIP and Reliability Standards as a Blackstart Resource (including but not limited to PRC 19-2, 25-1, EOP 005-2, CIP 008-3, CIP 009-3, COM-001 and CAISO Resource Testing Procedures.)