**SCE BLACKSTART TECHNICAL VARIABLES and CRITERIA**

## Geographic Area of Consideration

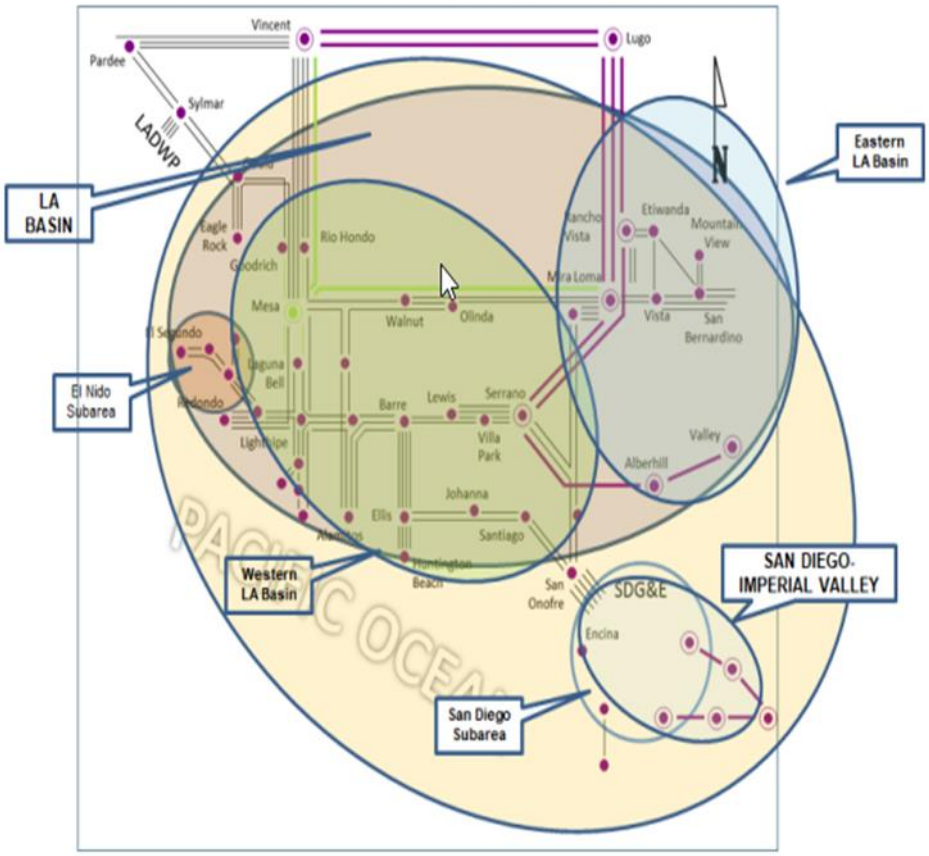
Upon the loss of AC power to the Los Angeles Basin or LA Basin, the potential black start resource must support the restoration of the 220kV transmission system supporting the LA Basin. The LA Basin includes a significant footprint of SCE's service territory. This area includes Los Angeles, Orange County, and portion of San Bernardino and Riverside counties. Overall the LA Basin consists approximately 80 percent of SCE's total loads. The area is divided into major two sub areas: Western and Eastern LA Basin. The El Nido sub area is a smaller sub area partially in the Western LA Basin sub area.

- The Western LA Basin sub area includes cities in Los Angeles and Orange counties. Some of the major cities are Pasadena, Monterey Park, San Gabriel, Walnut, Long Beach, Huntington Beach, Anaheim, Santa Ana, Garden Grove, and Irvine. It is noted that that City of Los Angeles is included in the Los Angeles Department of Water & Power's service territory and is not part of the CAISO-Balancing Authority footprint. The El Nido sub area is a smaller sub area partially in the Western LA Basin sub area. This sub area includes the cities of Redondo Beach, Commerce, El Segundo and Culver City.

- The Eastern LA Basin sub area includes cities in the very eastern side of Los Angeles county and in the San Bernardino and Riverside counties. Some of the major cities are Pomona, Riverside, Ontario, Chino, Fontana, Redlands, Rancho Cucamonga, Redlands, Montclair, San Bernardino, Palm Springs, and Temecula.

**LA Basin LCR Area Diagram**

Figure 3.3-87 LA Basin LCR Area




The 220kV transmission system in the LA Basin Area consists of the substations defined in the CAISO's Local Capacity Requirements (LCR) Technical Study. The list of included facilities can be found on page 123 of the report (http://www.caiso.com/Documents/Final2021LocalCapacityTechnicalReport.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 a bus and establishing an island in the LA Basin 220kV system as defined in the CAISO LCR report.

## Selection Factors and Evaluation Criteria

- Calculated time to energize 220kV substation loop and reach a potential target unit within the LA Basin
- Technical ability to meet restoration requirements (start-up time, MVARs, MW, ramps, permits, etc)
- Restoration flexibility (resource location that provides CAISO or SCE operations multiple options to restore the 220kV system, proximity to other generators.)
- Locational diversity of resource (location with respect to other black start resources in the area)

- Resource viability over 5 to 10 year horizon
- Cost of Service financials
- Other

## Blackstart Unit Requirements

- Must satisfy the NERC definition of Blackstart Resource[1]
- Must be able to supply own startup power.
- Must serve own plant load.
- 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.
- Follows the CAISO planned outage procedure

ADDITIONAL OPERATIONAL REQUIREMENTS:

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

## Facility/Plant Information

- Name
- Owner
- Location / Address
- Interconnection point
    - Terminal Voltage Level
    - Voltage Level of Interconnecting substation
    - Interconnecting Substation
- Age
- Type (e.g. hydro, combined-cycle, combustion turbine, etc.)
- Inoperable Regions

[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.

    - Operational Deadbands
    - Configuration limitations (i.e. unit configurations 1x0, 2x1, etc.)
    - Other operational limitations
- What, if any, are the current emission restrictions under system emergency conditions?
- Is this a manned facility (24x7)(Y/N)? If not, what are remote capabilities?
- Minimum start-up power
- Indicate for each unit
    - Identification
    - Pmins (stabilizing loads)
    - Pmax
        - Do Pmaxs vary on length of time without AC power? If so, what are they?
    - 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 (MOD-025 compliance report or equal)).
    - Start-up time (hot and cold trip)
    - Fuel Type and supply source
    - MW/min ramp capability
- How long can facility operate at full speed no load?
- How will the generator transition from isochronous control to speed droop control at the end of the black start event?
- Please provide a one-line diagram for the facility including all associated auxiliary loads, and transmission and distribution level equipment.
- 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.
- Indicate the anticipated time to close to a dead bus, and the time to ramp to minimum load.
- Provide a detailed load list, startup sequence of operations, running load calculations and detailed resource requirements used to determine the proposed sizing of the black start resource energy source (diesel or gas reciprocating engine, BESS, etc.). Load data should be based on actual verified load information available facility data (OSI Pi, etc.). Provide calculations based on a worst case scenario following a facility hot trip, considering a minimum of 3 start attempts. All sizing calculations shall include the assumptions and basis for any oversizing of the identified black start resource energy source.
- Provide facility and individual specific generator reliability and availability information (GADS or equal)

**Blackstart Unit(s) Information**

- Number of black start units in the Facility/Plant

- Identification
    - Of the identified black start unit(s), do any parameters for facility/plant information change in black start mode?
    - Droop Capability
        - Does the unit need to be off-loaded in order to change droop setting (to zero, from zero)?
    - Droop setting change via SCADA or manual operation?
- Terminal voltage range (i.e. +/- 5% nominal?)
- Generator impedance data (pu) (include base quantities) (Later must supply Test Report)(Protection Studies)
    - $X''_d$
    - $X'_d$
    - $X_d$
    - $X_2$
    - $X_0$
- GSU transformer impedance(pu) (include base quantities):
    - $X_1$
    - $X_0$
- GSU tap settings
- Tie-line impedance
- Must provide steady study models for power flow studies in PSLF format
- Must provide dynamic model for stability studies in PSLF format

**Compliance**

- 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, CIP008-2, 3, COM-001 and CAISO Resource Testing Guidelines.)