Definitions of Black Start Resources and Critical Load Requirements

Glen Boyle
## Proposed Black Start Resources

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</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>&lt;= 90 Minutes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Tier 2</td>
<td>90 min - 4 hours</td>
<td>No, proposed option</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (to be developed)</td>
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**Advantages of proposed Tier 2 (90 min – 4 hr) resource:**
- Meets all existing requirements for Black Start generation but allows for up to a 4 hour start time
- Expands pool of potential resources that could provide service
- Increased flexibility for Restoration planning
Existing Critical Load Definition* =

- Cranking Power to Critical Steam
  - Critical steam = steam units with a hot-start time of 8 hours or less

- Off-site Nuclear Station Light and Power
  - Auxiliary load to maintain safe shutdown (not initiate start-up)

- Critical Gas Infrastructure
  - Gas infrastructure load (as defined in TO restoration plans) to ensure adequate natural gas supply (electric pumps, compressors, etc)

*As defined in Attachment A of M-36
Proposed “Critical Cranking Load” (Stage A) Definition =  

Cranking Power to all “8 hour Generators”

8 hour generator is auxiliary power to all units (Steam, CT, Combined Cycle, Hydro) that meet all the following criteria:
- Hot Startup Time < 8 hours
- Cranked unit can not be critical Tier 1 or Tier 2 Black Start unit

Objective of Stage A: Provide cranking path from Tier 1 Black Start unit to supply critical cranking load to allow these “8 hour generators” to begin startup process as soon as possible
Proposed “Nuclear/Gas Critical Load” (Stage B) Definition =

- Off-site Nuclear Station Light and Power
- Critical Gas Infrastructure

Objective Stage B: Restore Nuclear and Gas critical load within 4 hour target utilizing Tier 1 Black Start, Tier 2 Black Start, energized Stage A generator or a combination thereof
Proposed Critical Load Definitions

Critical Cranking Load (Stage A)

- Tier 1 Black Start (90 Min or less Start)

Nuclear/Gas Critical Load (Stage B)

- Tier 1 Black Start (90 Min or less Start)
- Tier 2 Black Start (90 min - 4 hour Start)
- Energized Stage A generator (4 hour or less Start)
System Restoration Process

- **Time 0 – 90 Min**: Tier 1 BS starts and cranking paths established to 8 hour generators.
- **Time 90 Min – 4 hrs**: Tier 2 BS comes on.
- **Time 90 Min – 4 hrs**: Cranking path to Nuclear/Gas established.
- **Time 90 min – 9.5 hrs**: Cranked units with less than 8 hour start come online.
Proposed Black Start Requirements

Tier 1 Black Start Generation Requirement = Critical Cranking Load requirement (Stage 1) (+ margin)**

Tier 2 Black Start Generation Requirement ➔ Requirement varies. Depends on how Stage B load is met.

In Restoration Plans:
- Identify cranking paths from Tier 1 Black Start to supply Critical Cranking Load
- Identify cranking paths to supply Nuclear/Gas Critical Loads, including source to supply this load

** Margin Design component needs to be discussed
Identify "8 hour generators" and their auxiliary load requirements (Stage A Critical Cranking Load). This sets the Tier 1 Black Start (90 min or less) requirement (plus margin).

Select Tier 1 (90 min or less) Black Start units to meet this requirement. (Procurement Options)
Document cranking paths in Restoration Plans.

Identify Nuclear auxiliary load requirements and critical gas infrastructure load (Stage B Critical Load).

Determine source and cranking paths required to restore these loads. (from either Tier 1 Black Start (90 min or less), Tier 2 Black Start (90 min - 4 hr) or energized Stage A generator (4 hr or less start)

Select additional Tier 1 (90 min) or Tier 2 (90 min-4 hr) Black Start if required to meet 4 hour requirements for Stage B Critical Loads (Procurement Options)
Document cranking paths to Nuclear/Gas Critical Loads in Restoration Plans.
Advantages of Redefining Critical Load and Black Start Resources

- Critical Load (defining in 2 stages)
  - Focuses use of fast Black Start on restoring generation
    - Meets existing targets for Nuclear off-site power (4 hours)
    - Provides additional flexibility in Restoration Planning
    - Strikes a balance between providing Black Start generation where and when needed versus over-procurement of Black Start
    - Attempts to optimize and accelerate restoration of generation which would allow for faster load restoration

- Black Start (dividing into 2 categories based on time to start: \( \leq 90 \) min or between 90 min and 4 hours):
  - Provides for larger potential pool of Black Start resources (Tier 2)
  - Provides additional flexibility in Restoration Planning