2012 Grid Assessment Results

CAISO Stakeholder Meeting
September 26-27, 2012
Agenda

• Introduction

• 2012 Grid Assessment Study
  ➢ Study Scope

• Expansion Plan Summary
  ➢ Study Results & Expansion Plan

• Project Summaries
  ➢ Projects requiring CAISO approval

• Questions
San Diego Area - Summary

• The assessment identified:
  – Category B and Category C overloads.
  – Low voltages and voltage deviations on 69kV substations driven by Category B contingencies.

• Comparing to last year results:
  – All Category B overloads until years 2017 and 2022 mitigated by projects and/or SPS.
Objectives

- SDG&E Project Proposals
  - Mitigate overloaded facilities
    - Category B contingencies
  - Operating procedures, SPS
    - Category C contingencies
2012 Study Scope

• Five-Year Studies (2013-2017)

• Ten-Year Study (2022)
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Metro Area 69kV Rebuild

- N-1 Overloads starting in 2017, 2022
  - TL649 OY – SYO – BD
  - TL623 OY – SYO – IB
- Overloads in 2017 are related to the dispatch limitations of Border Gens 1, 2, and 3.
- Overloads beginning in 2022 on 623C and 649D arise from the forecasted load at SYO.
Metro Area 69kV Rebuild

**Preferred Scope:**
- Upgrade TL649A/D to achieve a minimum continuous/emergency rating of 97/136 MVA.
- Instead of two segments make TL649A/D into one continuous line from Otay to San Ysidro.
- Create a new parallel 69kV line from Otay, bypassing Otay Lake Tap, then to be connected with TL649F with a minimum continuous/emergency rating of 97/136 MVA.
- Remove Otay Lake Tap from service.
- Upgrade TL623C to achieve a minimum continuous rating of 105 MVA.
- Cost: $25 - $33 Million (ISD 2017/2022)

**Benefits:**
- Allows for full dispatch of interconnected Border Gens pre- and post-contingency.
- The current SPS designed to prevent the thermal overload of TL649 can be removed.
- TL649 becomes a three terminal line instead of a four terminal line.

**Alternative Scope:**
- Reconductor TL649A/D and TL623C to the previously specified ratings.
- Cost: $17 - $21 Million (ISD 2017/2022)

**Benefits:**
- Allows for full dispatch of interconnected Border Gens pre- and post-contingency.
- The current SPS designed to prevent the thermal overload of TL649 can be removed.

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**Legend:**
- 69 kV
- 230 kV
- Substation/Switchyard
- Generation
Sweetwater Reliability Enhancement

- N-1 overload starting in 2017
  - TL603B Sweetwater – Sweetwater Tap
- Preferred Mitigation:
  - Open Sweetwater Tap and extend the line from Naval Station Metering into Sweetwater. (ISD 2017)
  - Cost: $11 - $14 Million

- Project Diagram

- Alternative Scope:
  - Reconduct TL603B.
  - Cost: $10 - $12 Million

Legend:
- 69 kV
- 230 kV
- Substation/Switchyard
New TL69XX San Luis Rey – Monserate

- N-1 overloads starting in 2014/2016:
  - TL694A Melrose – Morro Hill Tap 69kV in 2016
  - TL6912 Pendleton-San Luis Rey 69kV in 2014

- Mitigation
  
  **Preferred Scope:**
  - Add a new San Luis Rey-Monserate line TL69XX.
  - Cost: $35 - $40 Million.
  - ISD: 2014

  **Alternative Scope:**
  - Reconductor TL694A and TL6912.
  - Cost: $27 – $35 Million.

- Short term mitigation:
  - Dispatch local peakers. Not acceptable for long term.
Loop-In TL674A at Del Mar and RFS TL666D

**Scope:**
- Remove from service TL 666D. (Aging infrastructure, Maintenance access hindered due to location, environmentally sensitive areas)
- Loop in TL674A into Del Mar and terminate at TL666D CB.
- Three terminal TL674 becomes two individual lines: Del Mar – North City West & Encinitas – Rancho Santa Fe
TL600B: Clairemont – Clairemont Tap Reconductor

• N-1 Contingency overload starting in 2022:
  - TL600B: Clairemont – Clairemont Tap

• Mitigation Scope:
  - Reconductor TL600B to a minimum continuous rating of 100 MVA.
  - Cost: $2 - $3 Million. (ISD 2022)
TL662: Penasquitos – Torrey Pines Terminal Equipment Upgrades

- N-1 overload starting in 2020:
  - TL662 Penasquitos – Torrey Pines 69kV
- Mitigation Scope:
  - Terminal Equipment Upgrades.
- Cost: less than $1 Million.
- ISD: 2020
**TL632A: Granite-Granite Tap Loop-In**

- **Driving Factors:**
  - Granite Sub is on Grid Ops substation watch list with 100+ MW of load (26,259 customers) at risk.
  - Weak distribution ties make only ~16% of customer load transferable if Granite experiences an outage.
  - TL632A is loaded to 98% of it’s continuous rating in 2017 for N-0.
  - Removal of an existing tap.

- **Scope:**
  - Open Granite Tap and loop in TL632 into Granite.

- **Cost:** $19 - $24 Million

- **ISD:** 2015
TL6906: Penasquitos – Miramar Loop-In at Mesa Rim

- **Driving Factors:**
  - Mesa Rim is on Grid Ops substation watch list with 100+ MW of load (11,293 customers) at risk.
  - Serving Critical loads including Medical, Commercial, and Industrial customers.
  - Mesa Rim load was interrupted twice in July 2011.
  - Loop-in provides two additional sources.

- **Scope:**
  - Open TL6906 and loop it into Mesa Rim.

- **Cost:** $5 - $7 Million

- **ISD:** 2015
TL13820 Sycamore – Chicarita: Reconductor

- N-1 overload starting in 2021:
  - TL13820 Sycamore Canyon – Chicarita 138kV

- Mitigation Scope:
  - Upgrade Substation Getaways – UG cable.

- Cost: $0.5 – $1 Million.

- ISD: 2014

- Additional benefits:
  - Eliminates the constraint for the Encina Sub-area.
  - Reduces LCR cost.
**TL13821 Temporary Reconfiguration**

- **Driving Factor:**
  - Overloads on TL13821 for the outage of TL50001 until the Fanita Junction/Carlton Hills Tap Loop-In project is completed.

- **Scope:**
  - Temporary reconfiguration of TL13821 to create a Sycamore-Mission-Carlton Hills 3-terminal line.

- **Cost:** <$100k; ISD: ASAP
Reacti ve Support 230kV

• **Scope:**
  Add +/- 240MVAr reactive power sources at Sycamore, Mission, Penasquitos, and Talega Substation’s 230kV Bus.

• **Driving Factors:**
  – Meet NERC/WECC reactive margin criteria.
  – Dynamic reactive capability & inertia:
    • South Bay (Retired in 2010)
    • Encina (Possible 2017 retirement & OTC)
    • SONGS is currently OOS, possible future OTC Retirement
  – Need for improved voltage control pre and post contingency:
    • Maintains voltage stability, particularly with high system imports.
    • Regulates grid voltage for all system loading conditions.
    • Voltage/VAR control independent of unit commitment /dispatch.
    • NUC-001 requires following narrow voltage band at San Onofre bus.
  – Improves San Diego Import Capability.
Reactive Support 230kV (cont’d)

Scope:
- 4 x +60/-30 MVAR Synchronous Condensers operated at 13.8 kV
- 4 x 30 MVAR, 13.8 kV switched shunt reactors
- 2 x 140 MVA 230/13.8/13.8 kV, 3-winding transformers
- 2 x 230 kV breakers, disconnects, & UG cable ties to 230 kV bus sections
- Relaying, controls, RTU points for control/monitoring
- Enclosed 15 kV metalclad switchgear
Additional Benefits:
- Mitigates extreme system voltages.

Cost: $56 - $70 Million.

Alternatives:
- SVCs
- STATCOM
Cost: $58 - $72 Million.

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- SVCs
- STATCOM
Additional Benefits:
- Enhance operators’ ability to maintain the SONGS 230 kV bus voltage within the narrow prescribed limits.

Cost: $58 – $72 Million.

Alternatives:
- SVCs
- STATCOM is not feasible at Talega site
New 230kV Sycamore - Penasquitos Line

Background:
• Originally a part of the Sunrise Power Link project.

Driving Factors:
• “NO-SONGS” study indicates benefits.
• Additional Sycamore 230kV outlet.
• Delivers more power to coastal load center.
• Alleviates multiple Cat. B and C overloads.
• Reinforces SDG&E import capability.
• Renewable integration.

Scope:
• Construct a new 230kV line from Sycamore to Penasquitos 230kV Substations. (ISD 2017)

Cost:
~$111 - $221 Million
Los Coches 230kV Expansion

Driving Factors:
- Congestion at Sycamore.
- Multiple Cat. B and C overloads.

Scope:
- Build 230kV substation at Los Coches.
- Tie Sycamore end of TL23021 to TL23055 to form Los Coches - Suncrest 230 kV line.

Benefits:
- Deliver generation & imports closer to load center.
- Offload Sycamore 230 kV power injection.
- Reduce Sycamore congestion on 69 kV facilities.
- Increase operating flexibility.
- Facilitates 2nd outlet from Sunrise to support the renewable integration.

Cost: $80 - $120 Million. (ISD 2017)

Alternative:
- Continue to upgrade existing 138kV and 69kV lines in Sycamore area.
New Imperial Valley-IID Flow Control Device

Driving Factors:
- High levels of renewable generation planned for interconnection to the CAISO controlled grid in the Imperial Valley area may impact the IID system.

Benefits:
- Allows an increase in the amount of renewable generation that can interconnect to the southwestern 500kV transmission system by controlling SDG&E to IID flow.
- Studies show no major impact to CFE’s system with the addition of the phase shifter.
- Both short and long term studies show that overloads on IID’s system due to renewable integration are mitigated by the addition of the phase shifter.

Scope:
- Install Phase Shifting Transformer
  - 500 MVA +/- 45 deg
- Cost: $20 - $40 Million (ISD 2014)

Alternatives:
- Variable Frequency Transformer
- Back-to-Back HVDC
New Imperial Valley-IID Flow Control Device

Diagram showing the flow control device and connections between different locations such as Suncrest, Miguel, Imperial Valley, and others.
Category C Contingencies

- Construction of the proposed projects, implementing SPS, or operating procedures designed to drop load, would mitigate all identified Category C contingencies.
Questions?

• Send comments to:

Huang Lin
San Diego Gas & Electric
8316 Century Park Court, CP-52A
San Diego, CA  92123
Phone: (858) 654-8687
e-mail: HLin@semprautilities.com