

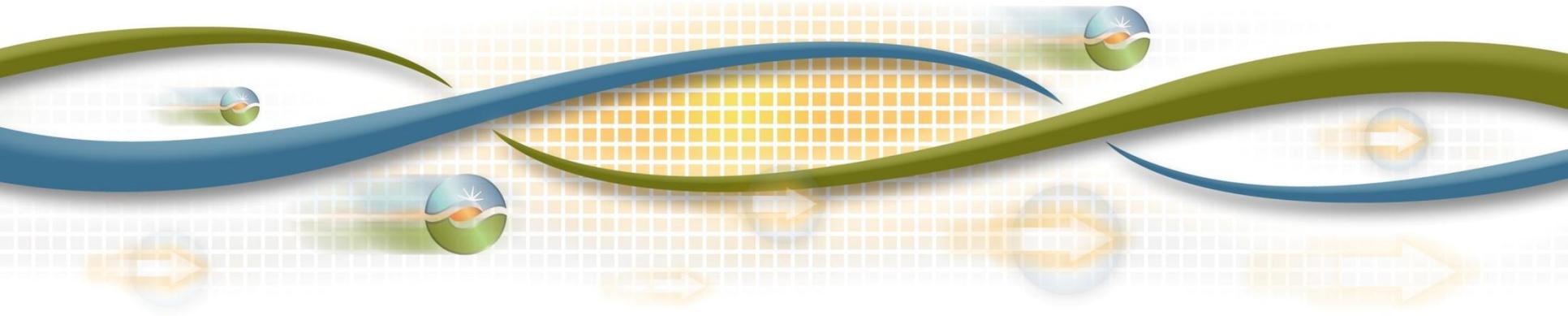
Opening

2013/2014 Transmission Planning Process Stakeholder Meeting

Tom Cuccia

Sr. Stakeholder Engagement and Policy Specialist

November 20-21, 2013



Yesterday's Agenda – November 20th

Topic	Presenter
Opening	Tom Cuccia
Introduction & Overview	Neil Millar
RPS Portfolio Assessment	ISO Regional Transmission Engineers
Economic Planning Assessment	Xiaobo Wang
Delaney-Colorado River Incremental Capacity Assessment	Yi Zhang

Today's Agenda – November 21st

Topic	Presenter
Opening	Tom Cuccia
Recommendations for Management Approval of Reliability Projects less than \$50 Million	ISO Regional Transmission Engineers
Long-Term CRR Simultaneous Feasibility Test	Chris Mensah-Bonsu



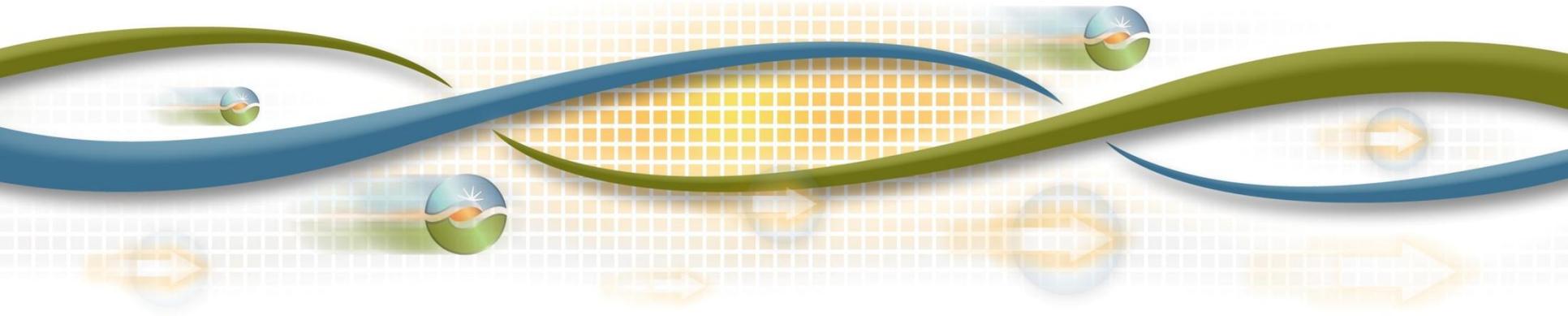
California ISO
Shaping a Renewed Future

Recommendations for Management Approval of Reliability Projects less than \$50 Million

San Diego Gas & Electric Sub-Transmission Area

2013/2014 ISO Transmission Planning Process

Frank Chen
Sr. Regional Transmission Engineer
November 20-21, 2013

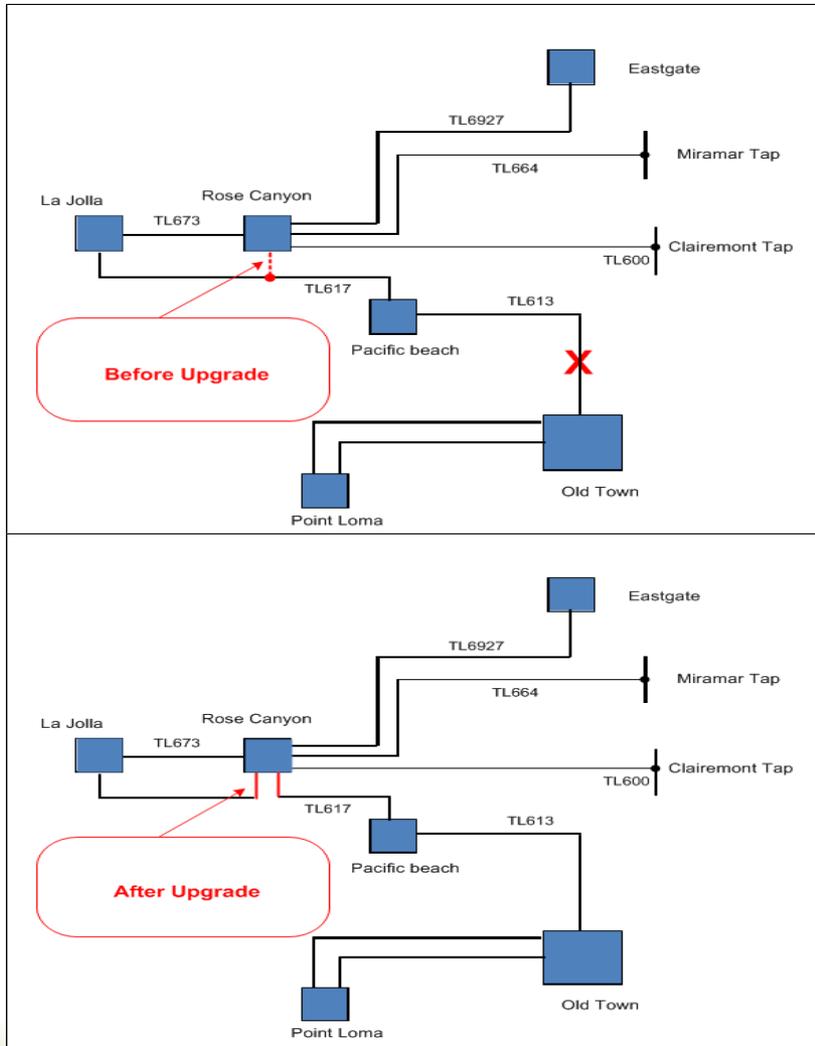


San Diego Gas & Electric Sub-Transmission Area

Project Name	Type of Project	Submitted By	Is Project Found Needed
RoseCanyon 69 kV Tap Elimination	Reliability	SDG&E	Yes
TL690A/E San Luis Rey-OceansideTap & StuartTap-Las Pulgas 69 kV Lines Reconductor	Reliability	SDG&E	Yes
TL13834 Trabuco-Capistrano 138 kV Line Upgrade	Reliability	SDG&E	Yes
Mission Bank #51 replacement	Reliability	SDG&E	Yes

4 Projects Recommended for Management Approval (under \$50 Million)

1. RoseCanyon 69 kV Tap Elimination



Need: NERC Category B overloads (2018)

Project Scope: Eliminate Rose Canyon Tap and create new Rose Canyon-La Jolla and Pacific Beach-Rose Canyon 69 kV lines

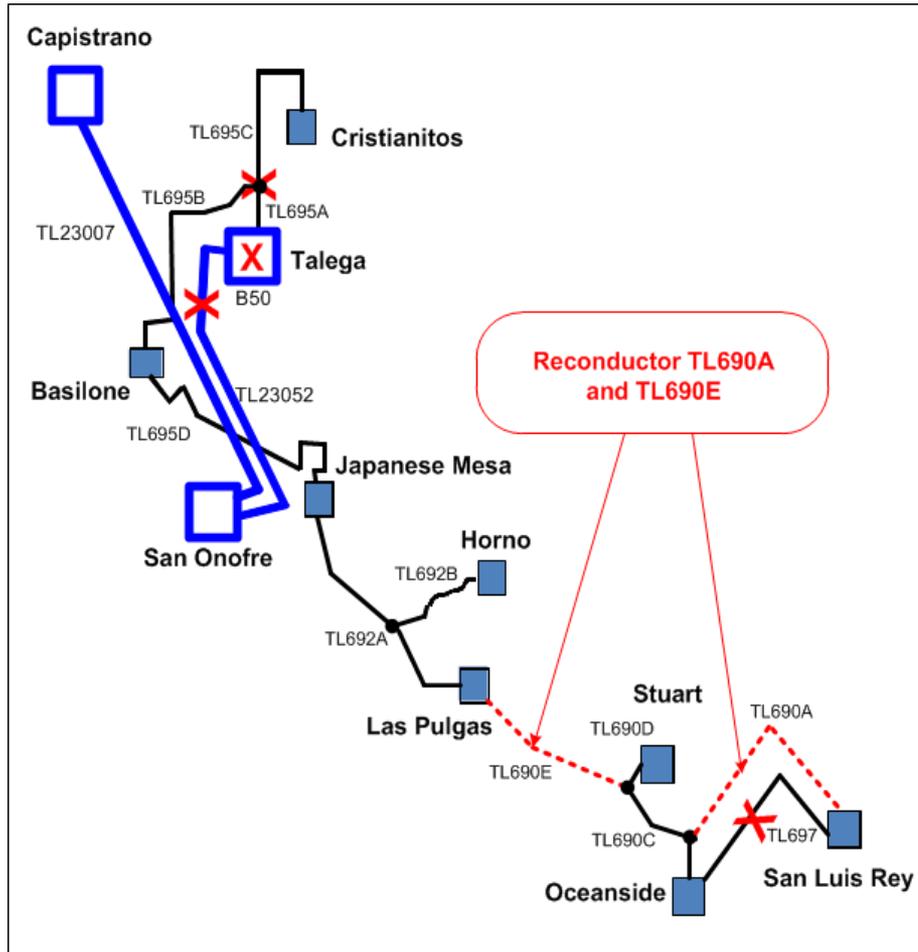
Cost: \$3.2~4 millions

Other Considered Alternatives:
No alternative

Expected In-Service: June 2018

Interim Plan: NA

2. TL690A and TL690E 69 kV Lines Reconductor



Need: NERC Category B and C overloads (2015)

Project Scope: Reconductor 5.2 miles of TL690A and 5 miles of TL690E by replacing aged wood structures to steel structures

Cost: \$24~28 millions

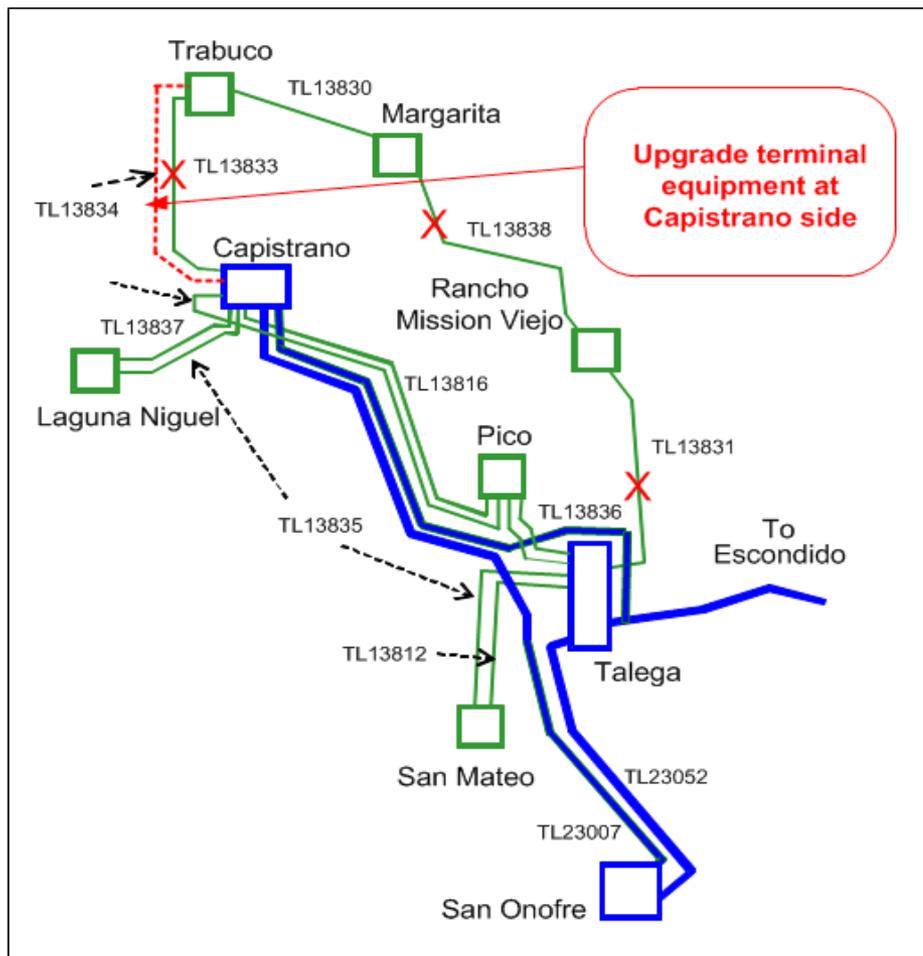
Other Considered Alternatives:

Upgrade TL690 as maintenance project, or Jan Mesa 230/69 kV along with TL692A upgrade (\$54~76 millions)

Expected In-Service: June 2015

Interim Plan: NA

3. TL13834 Trabuco-Capistrano 138 kV Line Upgrade



Need: NERC Category C overloads (2018)

Project Scope: Upgrade terminal equipment (jumpers and CT) in Capistrano Sub to boost the line from 157 to 274 MVA

Cost: <\$1 million

Other Considered Alternatives:
Design a SPS to shed at least 105 MW loads in the Trabuco area

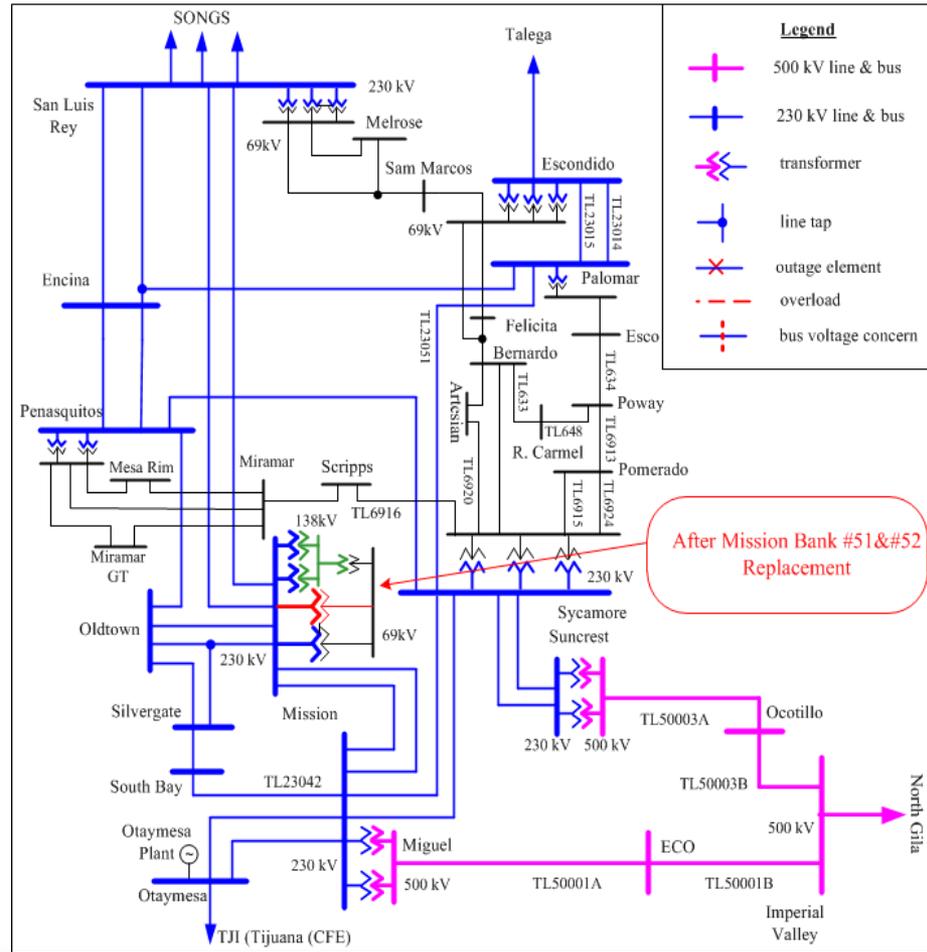
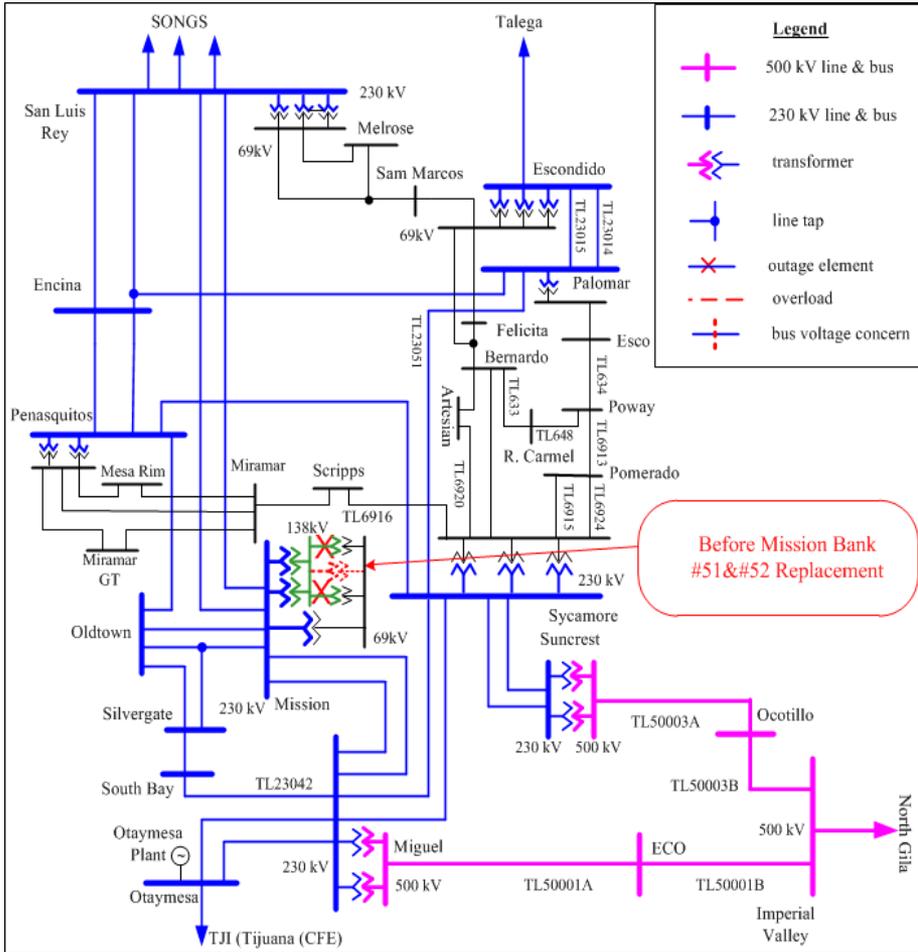
Expected In-Service: June 2018

Interim Plan: NA

4. Mission Bank #51 replacement

Before

After



4. Mission Bank #51 replacement (cont'd)

Need: NERC Category C overloads on Mission Bank #51 (2018)

Project Scope: Install a new 230/69 kV transformer to replace Banks #51 in Mission 230/139/69 kV substation

Cost: \$10 millions

Other Considered Alternatives:

Replace Banks #51 and #52 (\$19 million), or design a SPS to shed at least 85 MW loads in the Mission area, but it may take up to weeks to resume the service, and Bank #52 is aging infrastructure.

Expected In-Service: June 2018

Interim Plan: NA

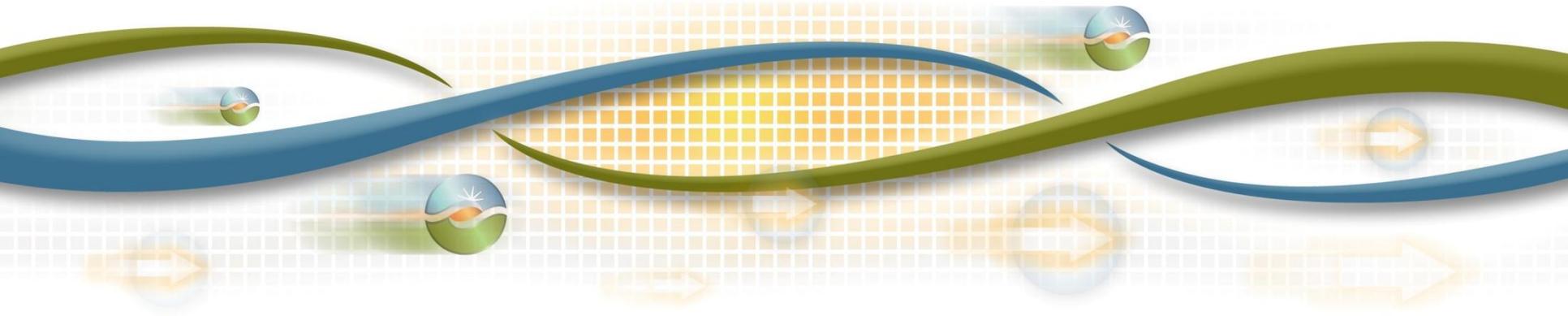


Recommendations for Management Approval of Reliability Projects less than \$50 Million

Valley Electric Association Area

2013/2014 ISO Transmission Planning Process

Sushant Barave
Senior Regional Transmission Engineer
November 20-21, 2013

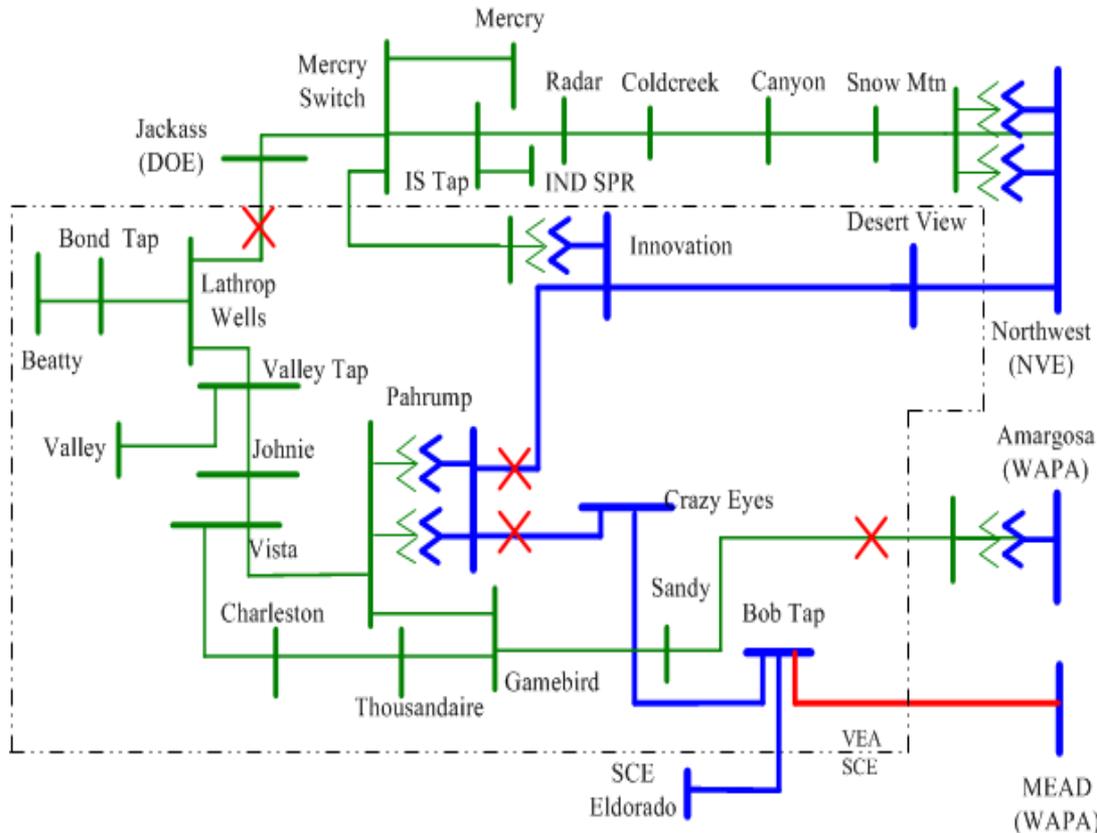


Valley Electric Association Area

Project Name	Type of Project	Cost of Project	Is Project Found Needed
CT Upgrade at Mead-Pahrump 230 kV Terminal	Reliability	\$100 k	Yes

1 Project Recommended for Management Approval (under \$50 Million)

CT Upgrade at Mead-Pahrump 230 kV Terminal



Need: NERC Category D overloads. Loss of load in VEA if 3 sources into VEA are lost (2018 to 2023)

Project Scope: Replace existing CTs at Mead on the Mead-Pahrump 230 kV line.

Cost: \$100k

Other Considered Alternatives: Status quo.

Expected In-Service: 2014

Interim Plan: N/A

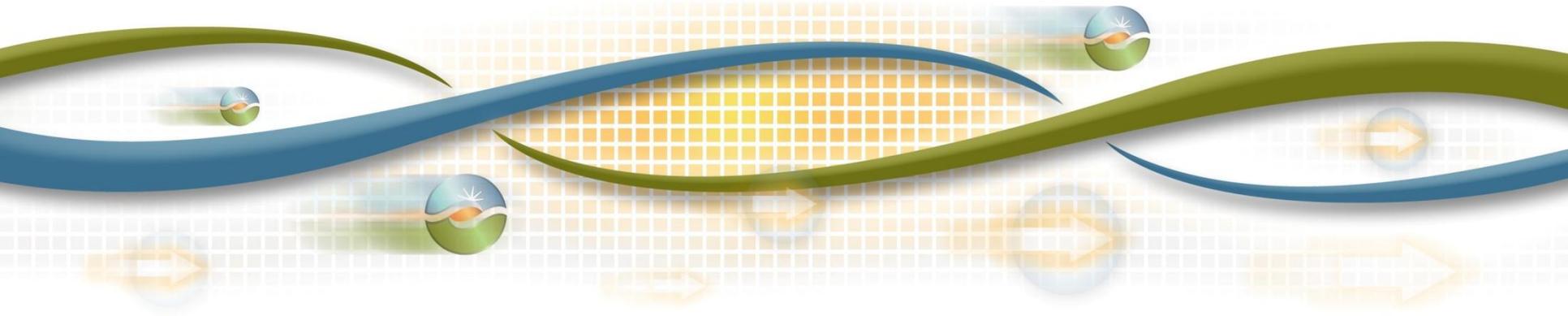


Recommendations for Management Approval of Reliability Projects less than \$50 Million

North of Lugo Area

2013/2014 ISO Transmission Planning Process

Sushant Barave
Senior Regional Transmission Engineer
November 20-21, 2013

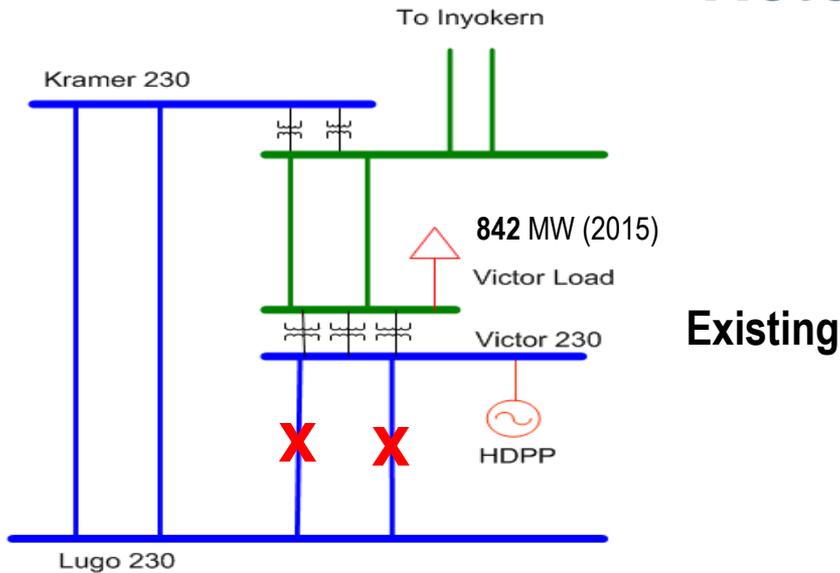


North of Lugo Area

Project Name	Type of Project	Cost of Project	Is Project Found Needed
Victor Loop-in	Reliability	\$12 M	Yes

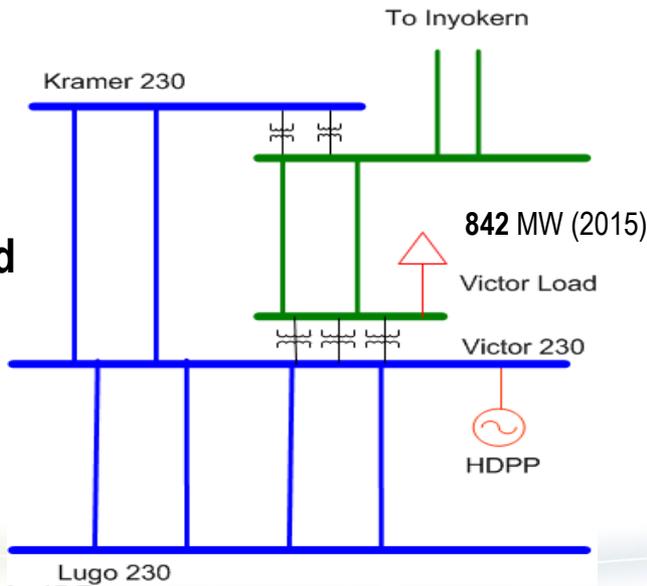
1 Project Recommended for Management Approval (under \$50 Million)

Victor Loop-In



Existing

Proposed



Need: NERC Category C Transient Voltage Dip (2014)

Project Scope: The project will loop in the existing Kramer-Lugo No. 1 & 2 230 kV lines into Victor 230 kV Substation.

Cost: \$12 million

Other Considered Alternatives:

An SPS to open Victor-Roadway and Victor-Kramer 115kV lines (Load at risk: upwards of 800 MW under 2015 peak conditions)

Expected In-Service: 2015

Interim Plan: An SPS to open Victor-Roadway and Victor-Kramer 115kV lines—resulting in upwards of 800 MW of load dropping

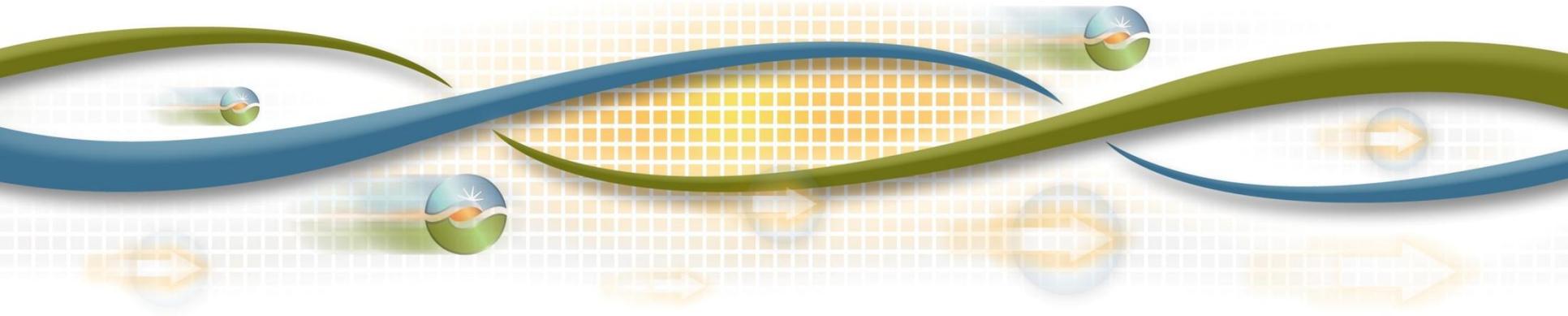


Recommendations for Management Approval of Reliability Projects less than \$50 Million

Central Coast & Los Padres Areas

2013/2014 ISO Transmission Planning Process

Chris Mensah-Bonsu, Ph.D.
Senior Regional Transmission Engineer
November 20-21, 2013

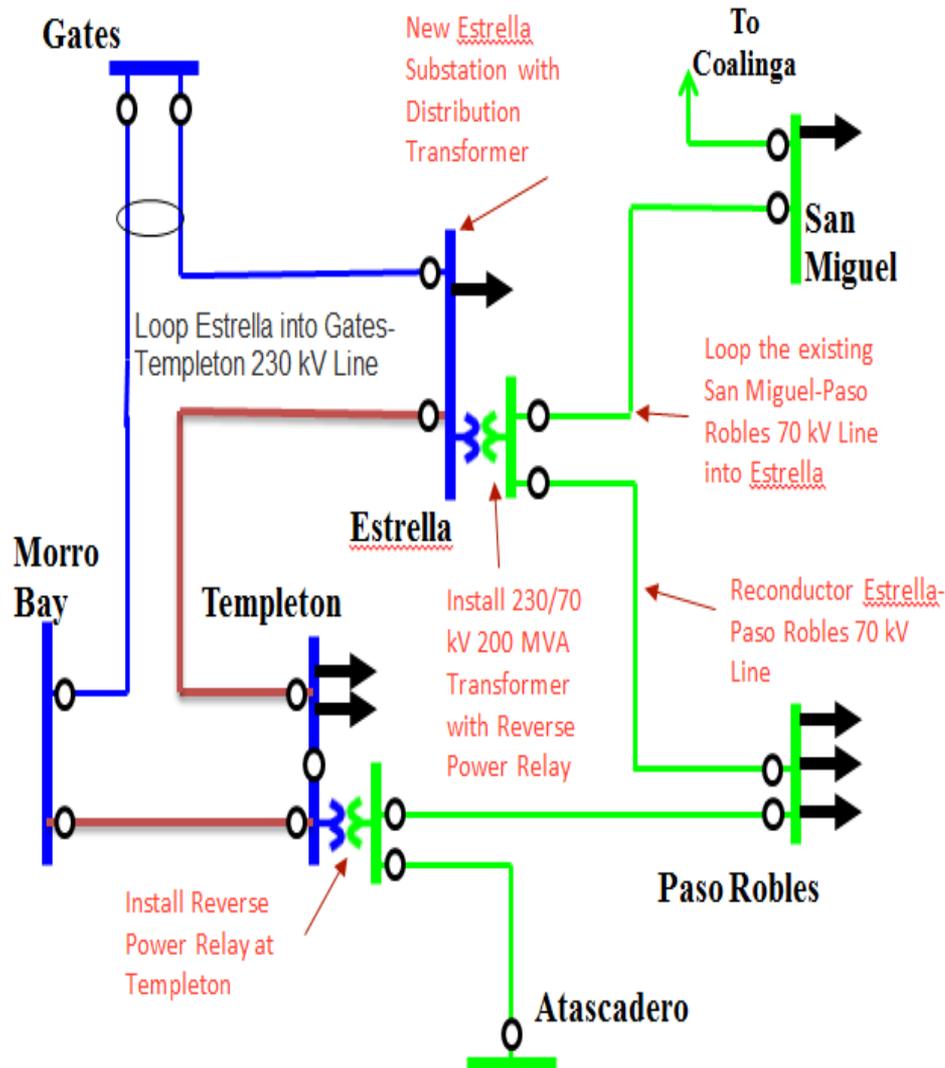


Central Coast & Los Padres Areas

Project Name	Type of Project	Cost of Project	Is Project Found Needed
Estrella Substation Project	Reliability	\$35-45 M	Yes

1 Project Recommended for Management Approval (under \$50 Million)

Estrella Substation Project



Need: NERC Category B (currently has UVLS which drops Paso Robles 60-70 MW) and C3 thermal overloads & low voltages in 70 kV system (2015 and after)

Project Scope: Constructs a new Estrella 230/70 kV Substation approximately 5 miles east of the existing Paso Robles Substation to be looped into the Gates-Templeton 230 kV Line and San Miguel-Paso Robles 70 kV Line

- Installs new 230/70 kV transformer at Estrella substation
- Installs new 45 MVA distribution transformer at the Estrella 230 kV bus
- Installs reverse power relay on Estrella 230/70 kV and the existing Templeton 230/70 kV #1 transformer banks to prevent the 70 kV system from feeding the 230 kV system

Cost: \$35 - 45 million

Other Considered Alternatives:

- Loop Estrella Substation to two 230 kV Lines (\$40-50 M)
- Status Quo

Expected In-Service: May 2019

Interim Plan: Activate Paso Robles UVLS

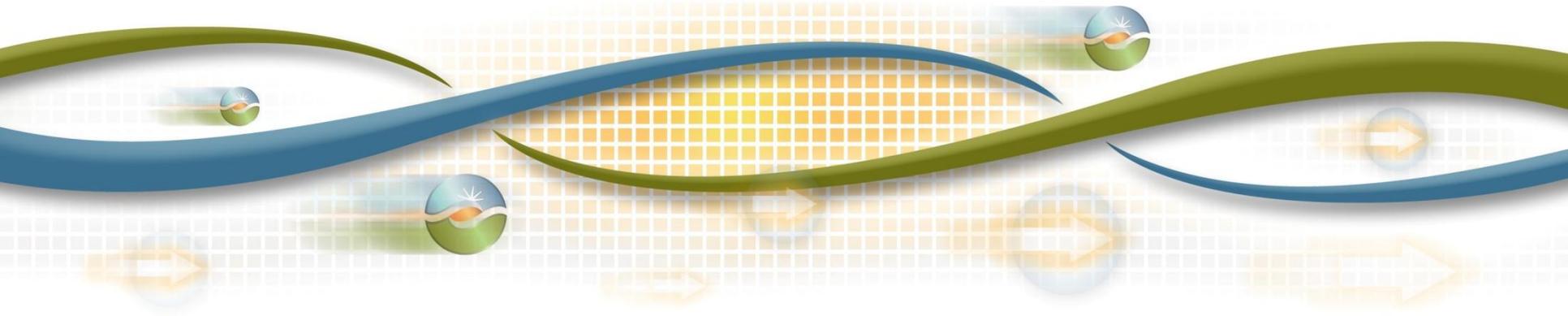


Recommendations for Management Approval of Reliability Projects less than \$50 Million

Fresno Area

2013/2014 ISO Transmission Planning Process

Joseph E Meier, P.E.
Sr. Regional Transmission Engineer
November 20-21, 2013

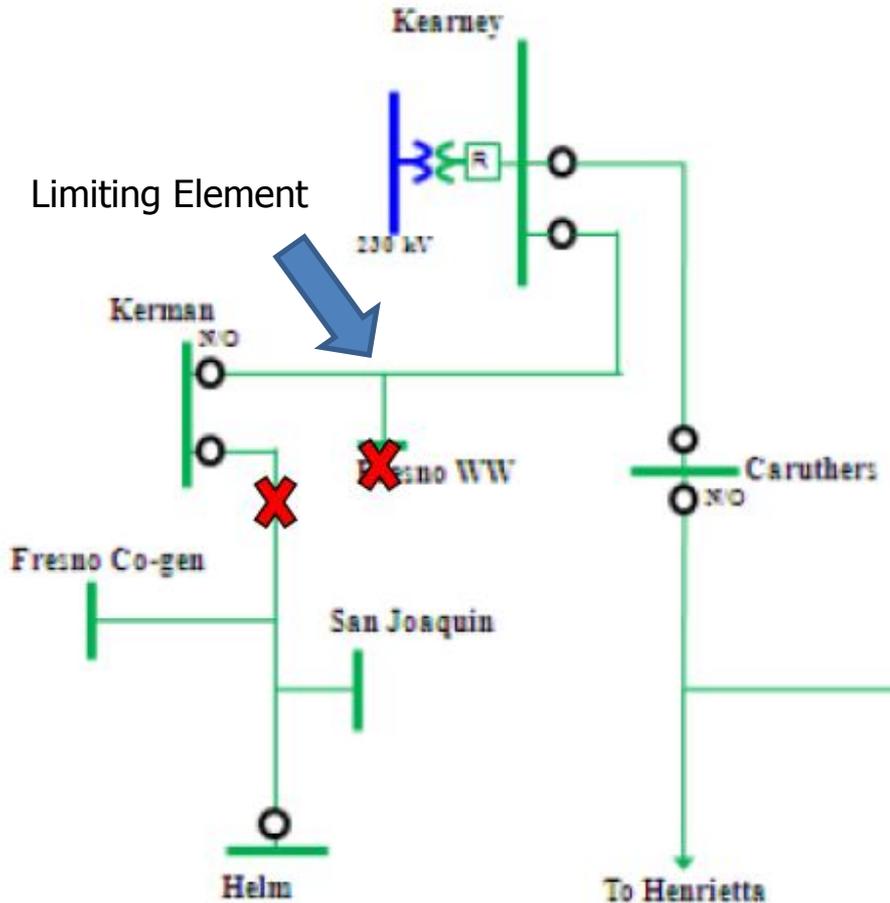


Fresno Area

Project Name	Type of Project	Cost of Project	Is Project Found Needed
Kearney-Kerman 70kV Line Reconductor	Reliability	\$12M-\$18M	Yes
McCall-Reedley #2 115kV Line	Reliability	\$25M-\$40M	Yes
Reedley 115/70kV Transformer Capacity Increase	Reliability	\$12M-\$18M	Yes
Load Interconnection (Sanger-Reedley 115kV Tap)	Load Interconnection	\$2M-\$3M	Concur
Load Interconnection (Gill Ranch 115kV Tap)	Load Interconnection	\$1M-\$2M & \$5M-\$10M	Concur

Three (3) Projects Recommended for Management Approval (under \$50 Million)

Kearney-Kerman 70kV Line Reconductor



Need: CAISO Planning Standard, Planning for New Transmission vs. Involuntary Interruption Standard (Section VI-4)

Project Scope: Reconductor Kearney-Kerman 70kV with conductor with capability of at least 600A Summer Normal and 700A Summer Emergency. (1.41 BCR)

Cost: \$12M-\$18M

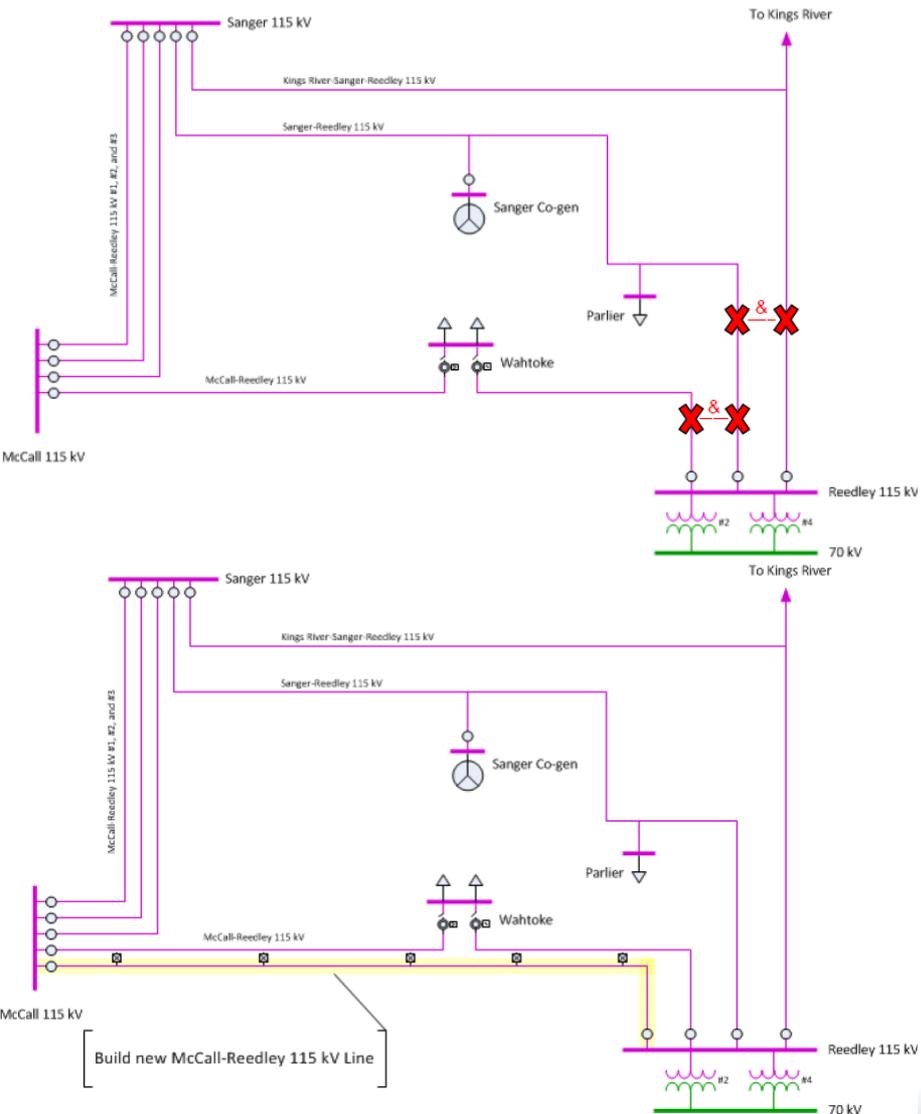
Other Considered Alternatives:

- Status Quo
- New Kearney-Kerman-Biola 70kV Line

Expected In-Service: May 2018

Interim Plan: Summer set-up to split Kerman 70kV load

McCall-Reedley #2 115kV Line



Need: NERC Category C overloads (2015)

Project Scope: Build new McCall-Reedley #2 115kV line. Add one bay position at both McCall & Reedley substations for new line terminations

Cost: \$25M-\$40M

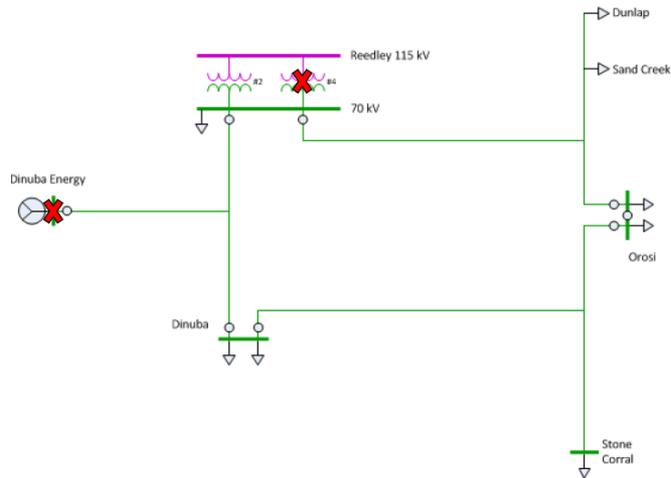
Other Considered Alternatives:

- Status Quo
- SPS (~70 MW)
- Disable automatics at Wahtoke and reconductor Wahtoke-Reedley section of McCall-Reedley #1 115kV.

Expected In-Service: May 2019

Interim Plan: Action Plan

Reedley 115/70kV Transformer Capacity Increase



Need: CAISO Category B overloads (2018)

Project Scope:

- Phase 1: Replace limiting terminal on #2 bank.
- Phase 2: Re-rate #4 bank 4-hour rating, replace #2 bank.

Cost: \$12M-\$18M

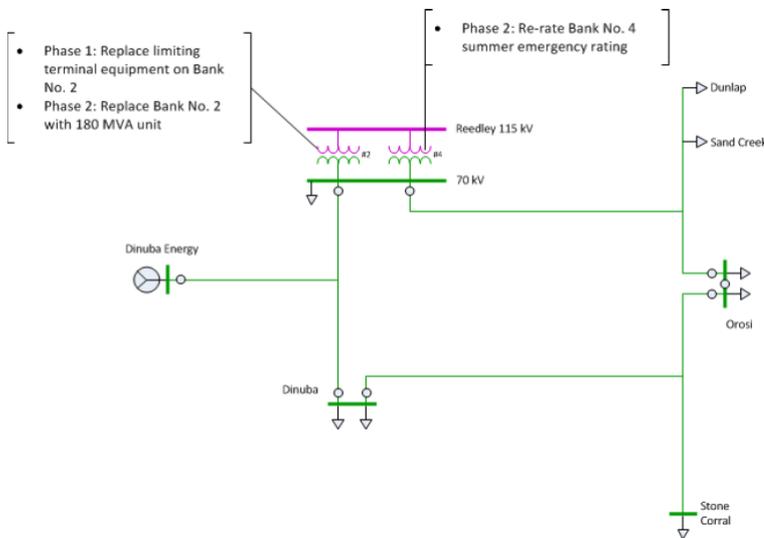
Other Considered Alternatives:

- Status Quo
- Install third 115/70kV at Reedley.

Expected In-Service:

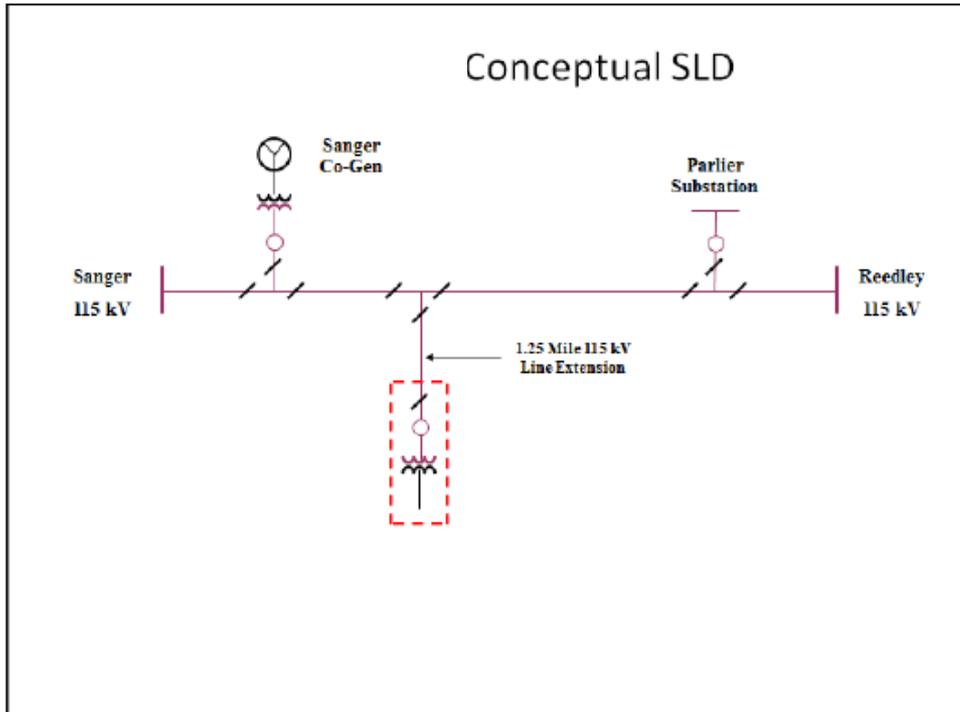
- Phase 1 - May 2015
- Phase 2 - May 2018

Interim Plan: Action Plan



Two (2) Projects Recommended for Concurrence (Load Interconnection)

Load Interconnection (Sanger-Reedley 115kV Tap)



Need: Load interconnection

Project Scope: Interconnect a new 16.7 MW load to PG&E's Sanger – Reedley 115 kV Line, via a new 1.25 mile transmission line extension to the Project substation. Existing 5.8 MW load on distribution. Max load 22.5 MW

Cost: \$2M-\$3M Interconnection cost. No network upgrades.

Other Considered Alternatives:

- Status Quo
- Tap PG&E's McCall – Sanger #2 or #3 115 kV Lines

Expected In-Service: June 2015

Interim Plan: None

Load Interconnection (Gill Ranch 115kV Tap)

Need: Load interconnection

Project Scope: This project proposes to connect a new customer owned substation to PG&E's Gill Ranch 115 kV Line via a new 115 kV tap. This project interconnection is expected to cost PG&E approximately \$1 to 2 million. The cost estimate for the mitigation plans to reliably serve the maximum proposed 17 MW load is approximately \$5 to 10 million.

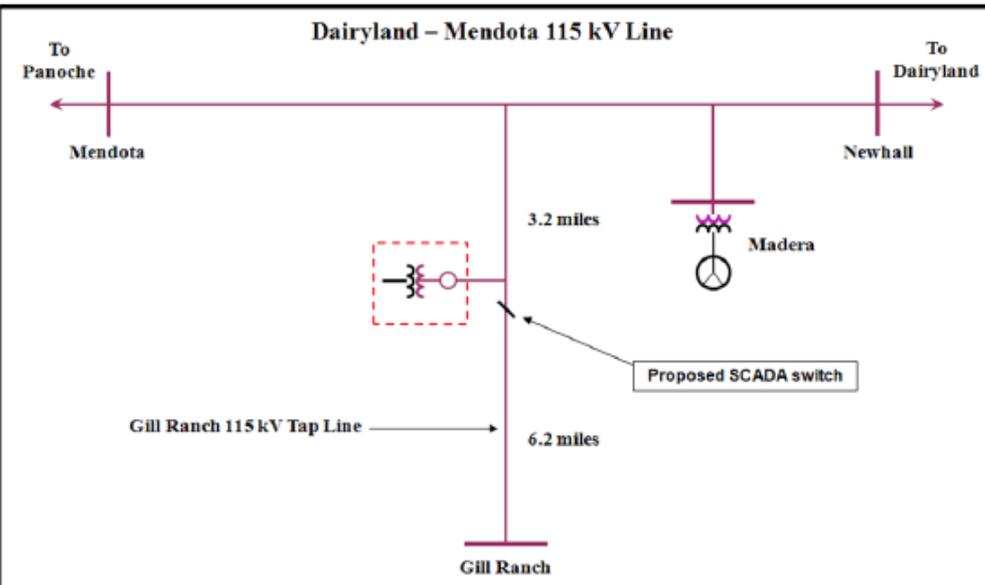
Cost: \$1M-\$2M for interconnection and \$5M-\$10M for voltage support

Other Considered Alternatives:

- Status Quo
- Newhall 115 kV Substation

Expected In-Service: June 2014

Interim Plan: Customer will be installing an undervoltage relay at their substation to drop load that potentially will cause low voltages at their bus until installation of capacitor banks at Mendota.



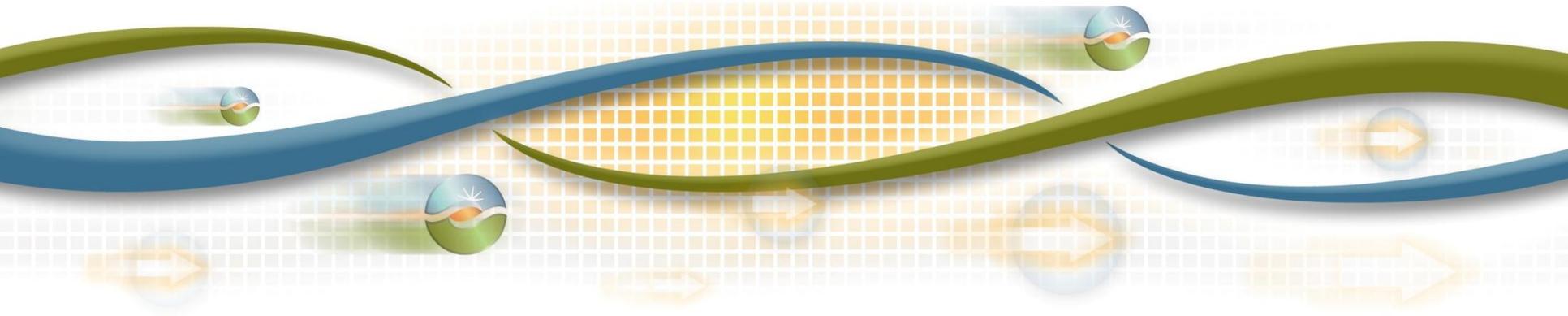


Recommendations for Management Approval of Reliability Projects less than \$50 Million

Kern Area

2013/2014 ISO Transmission Planning Process

Joseph E Meier, P.E.
Sr. Regional Transmission Engineer
November 20-21, 2013

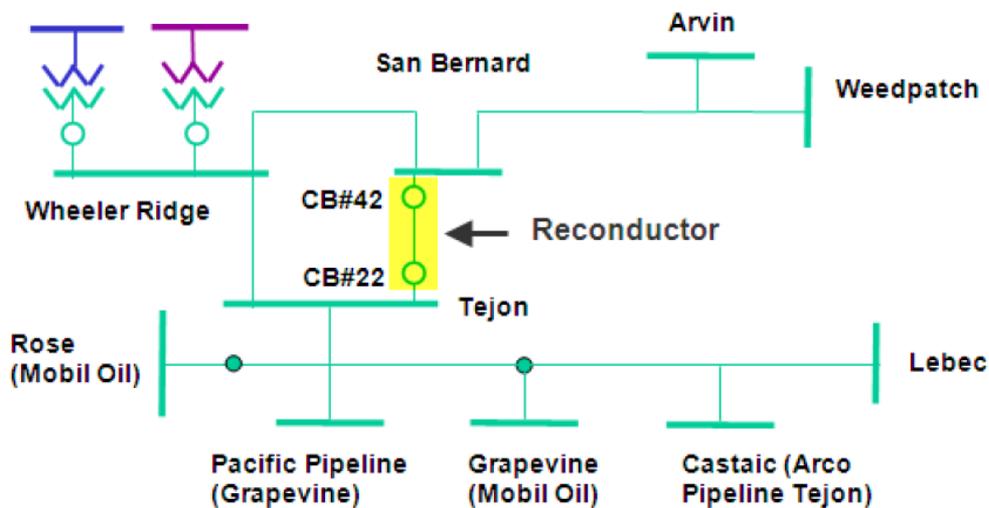


Kern Area

Project Name	Type of Project	Cost of Project	Is Project Found Needed
San Bernard-Tejon 70kV Line Reconductor	Reliability	\$8M-\$12M	Yes
Taft-Maricopa 70kV Line Reconductor	Reliability	\$6M-\$10M	Yes
Wheeler Ridge-Weedpatch 70kV Line Reconductor	Reliability	\$15M-\$25M	Yes

Three Projects Recommended for Management Approval (under \$50 Million)

San Bernard-Tejon 70kV Line Reconductor



Need: CAISO Planning Standard for New Transmission vs. Involuntary Load Interruption (BCR 1.06)

Project Scope: Reconductor 7 miles with 631A Summer Normal and 742A Summer Emergency rated conductor

Cost: \$8M-\$12M

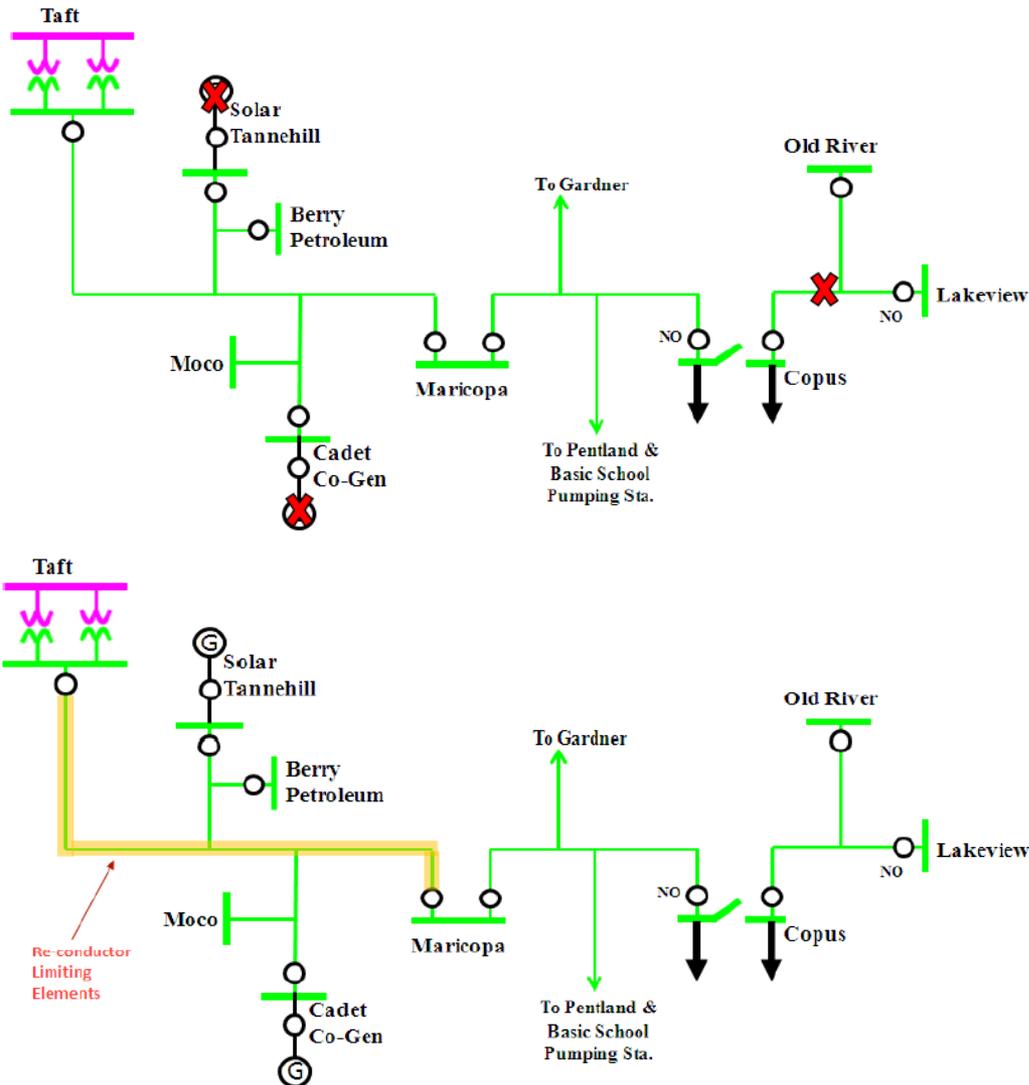
Other Considered Alternatives:

- Status Quo
- New Wheeler Ridge-Tejon 70 kV Line

Expected In-Service: May 2018

Interim Plan: (if applicable) N/A

Taft-Maricopa 70kV Line Reconductor



Need: CAISO Planning Standard for New Transmission vs. Involuntary Load Interruption (BCR 1.05)

Project Scope: Reconductor 6 miles with 631A Summer Normal and 742A Summer Emergency rated conductor

Cost: \$6M-\$10M

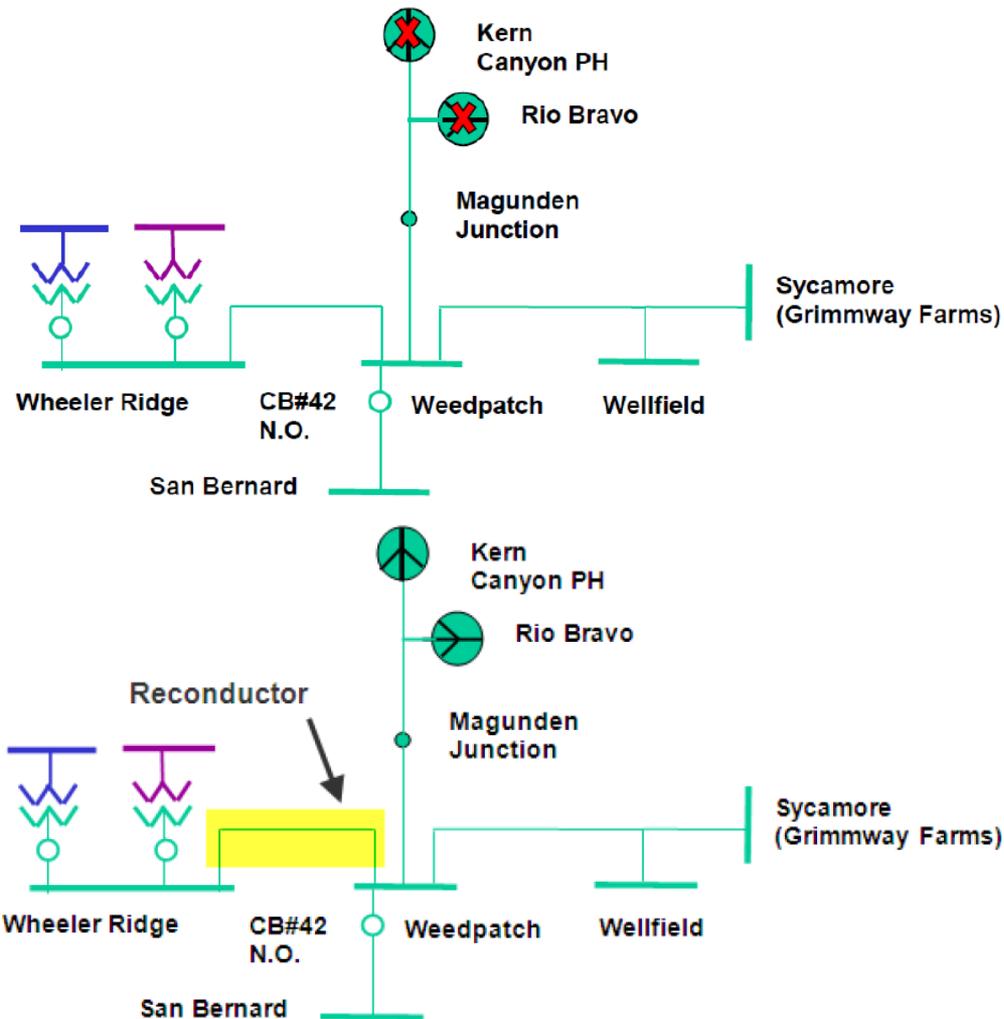
Other Considered Alternatives:

- Status Quo
- Disable automatics at Copus

Expected In-Service: May 2018

Interim Plan: (if applicable) N/A

Wheeler Ridge-Weedpatch 70kV Line Reconductor



Need: NERC Category C (G-2 for two run-of-river hydro units)

Project Scope: Reconductor 15 miles with 631A Summer Normal and 742A Summer Emergency rated conductor

Cost: \$15M-\$25M

Other Considered Alternatives:

- Status Quo
- SPS (~15 MW)
- Reconductor Kern Cyn-Magunden-Weedpatch 70 kV Line

Expected In-Service: May 2018

Interim Plan: (if applicable) N/A



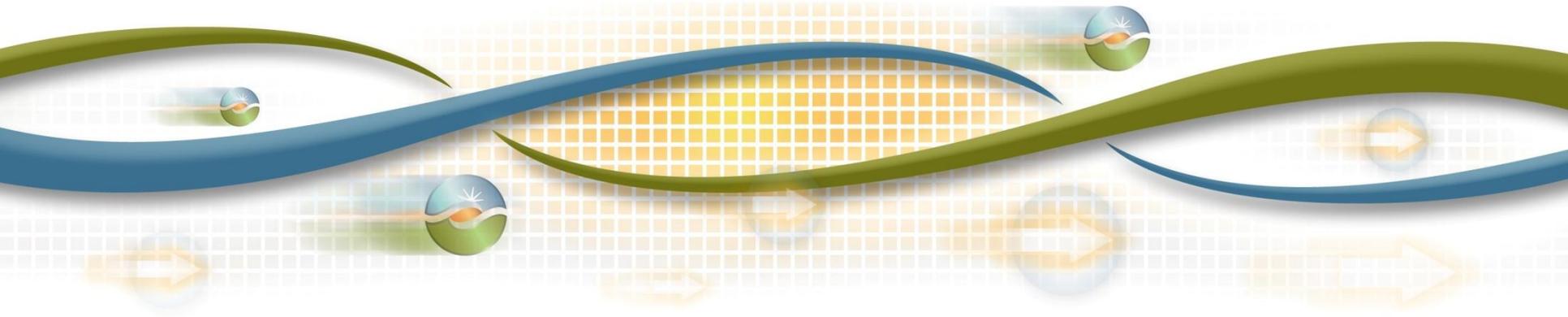
California ISO
Shaping a Renewed Future

Recommendations for Management Approval of Reliability Projects less than \$50 Million

PG&E North Valley and Central Valley Areas

2013/2014 ISO Transmission Planning Process

Binaya Shrestha
Sr. Regional Transmission Engineer
November 20-21, 2013

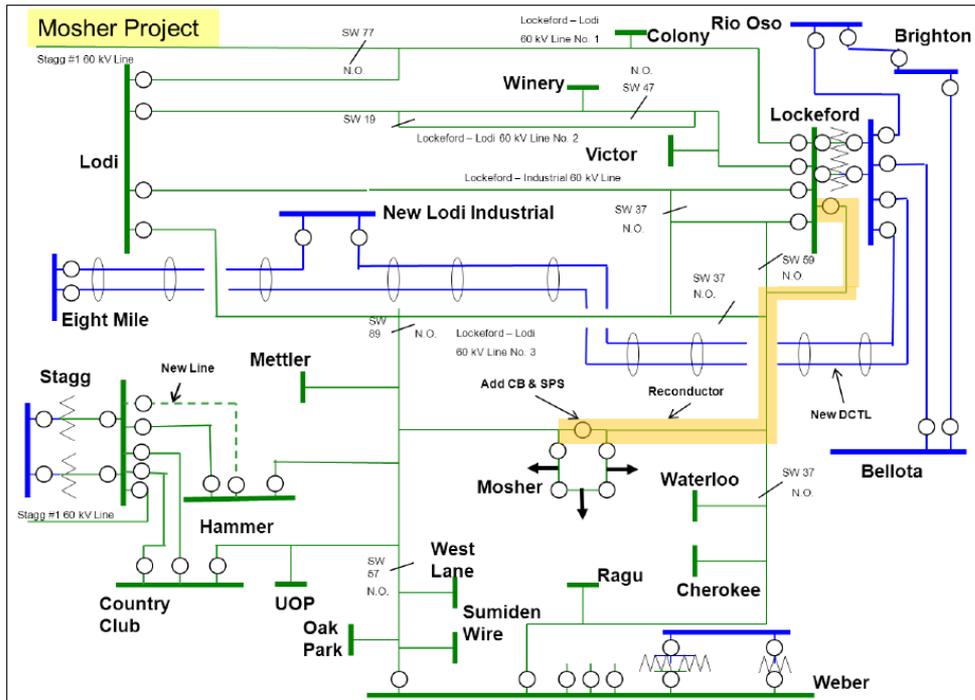


North Valley and Central Valley Areas

Project Name	Type of Project	Cost of Project
Mosher Transmission Project	Reliability	\$10M - \$15M
Glenn 230/60 kV Transformer No. 1 Replacement	Reliability	\$5M - \$10M
Weber-French Camp 60 kV Line Reconfiguration Project	Reliability	\$7M - \$8.4M
Stockton A-Lockeford-Bellota Load Interconnection	Reliability (Load Interconnection)	Interconnection Facility: \$7M Network Upgrades: \$1M - \$2M
Stagg No. 1 Load Interconnection	Reliability (Load Interconnection)	Interconnection Facility: \$1M - \$2M Network Upgrades: None

3 Projects Recommended for Management Approval (under \$50 Million)

Mosher Transmission Project



Need: ISO Planning Standards - Planning for New Transmission vs. Involuntary Load Interruption Standard (Section VI - 4 reducing load outage exposure through a BCR above 1.0). BCR 1.55. Also mitigates NERC Category C overload (2015).

Project Scope: Reconductor the Lockeford No. 1 60 kV line, install one circuit breaker at Mosher and SPS for loss of 230 kV source at Stagg or Lockeford substations. No load or generation drop associated with the SPS.

Cost: \$10M - \$15M

Other Considered Alternatives:

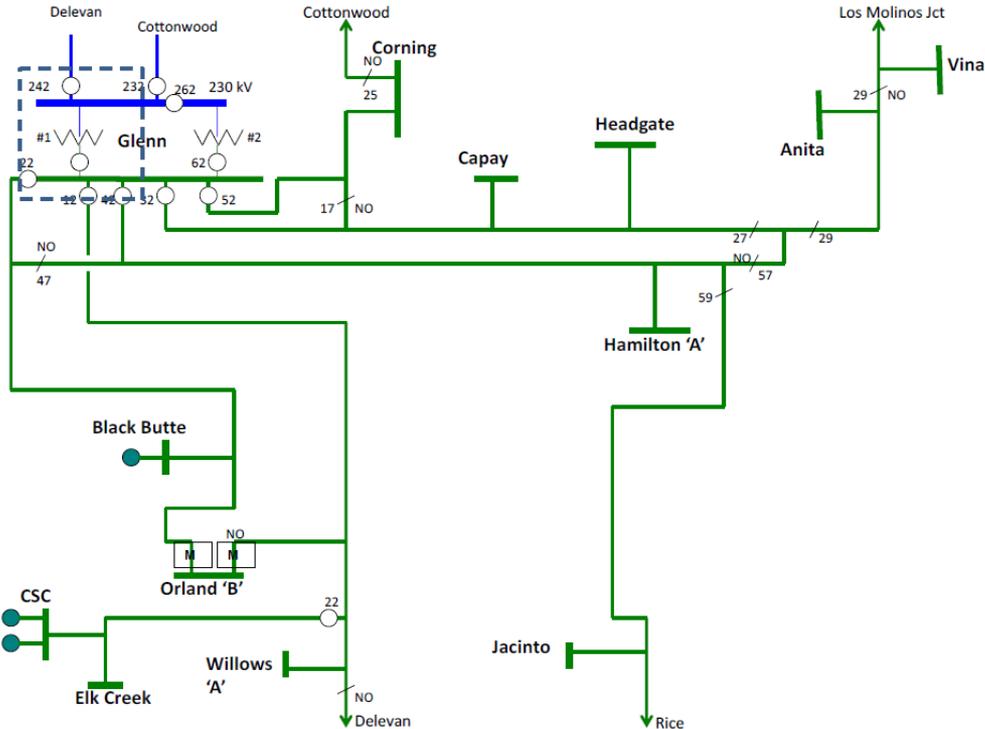
A new line, Stagg-Mosher 60kV (~\$20M)

- Single source (Stagg)

Expected In-Service: 2017

Interim Plan: Disable automatics

Glenn 230/60 kV Transformer No. 1 Replacement



Need: ISO Planning Standards - Planning for New Transmission vs. Involuntary Load Interruption Standard (Section VI - 4 reducing load outage exposure through a BCR above 1.0). BCR 1.54.

Project Scope: Replace Glenn 230/60 kV transformer No. 1 and install high side circuit breaker.

Cost: \$5M - \$10M

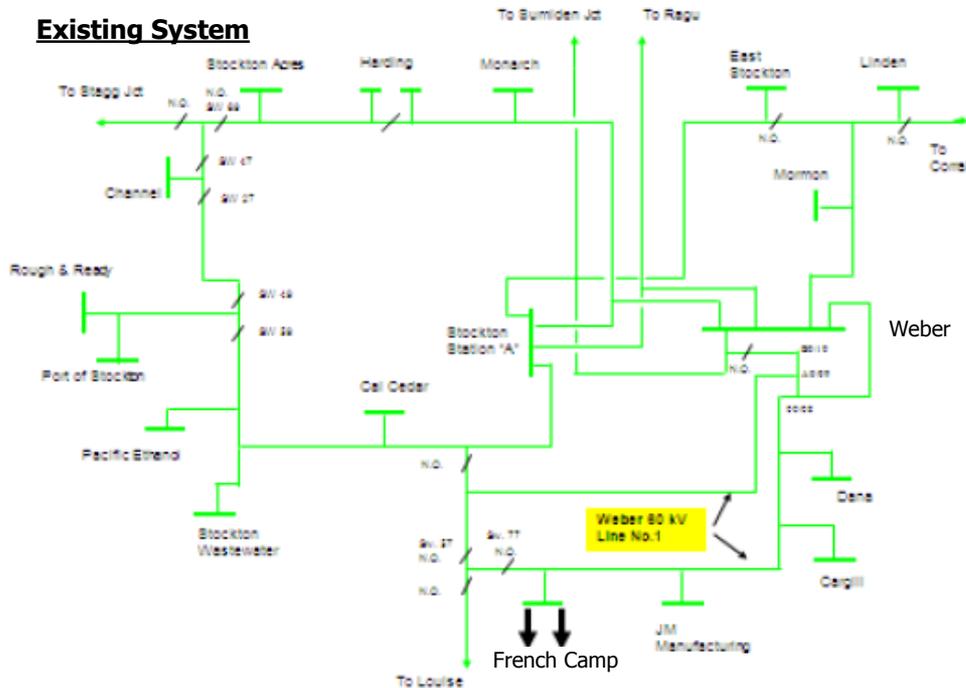
Other Considered Alternatives:
None

Expected In-Service: 2018

Interim Plan: None

Weber-French Camp 60 kV Line Reconfiguration Project

Existing System



Need: ISO Planning Standards - Planning for New Transmission vs. Involuntary Load Interruption Standard (Section VI - 4 reducing load outage exposure through a BCR above 1.0). BCR 1.04.

Project Scope: Weber 60 kV line No. 1 by 0.2 mile to create two Weber-French Camp 60 kV lines, install 60 kV circuit breaker at Weber and extend bus for a new bay and install three circuit breakers at French Camp substation.

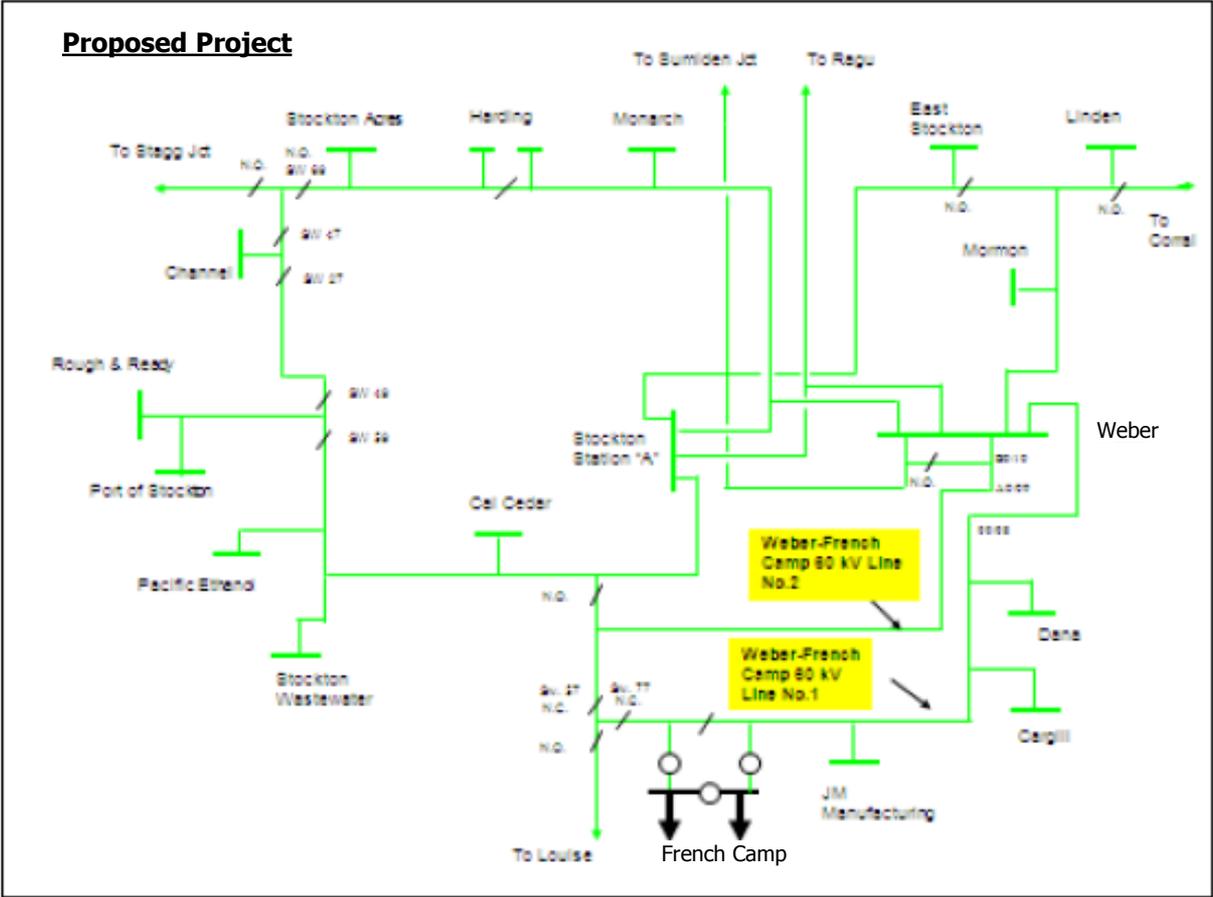
Cost: \$7M - \$8.4M

Other Considered Alternatives: None

Expected In-Service: 2016

Interim Plan: None

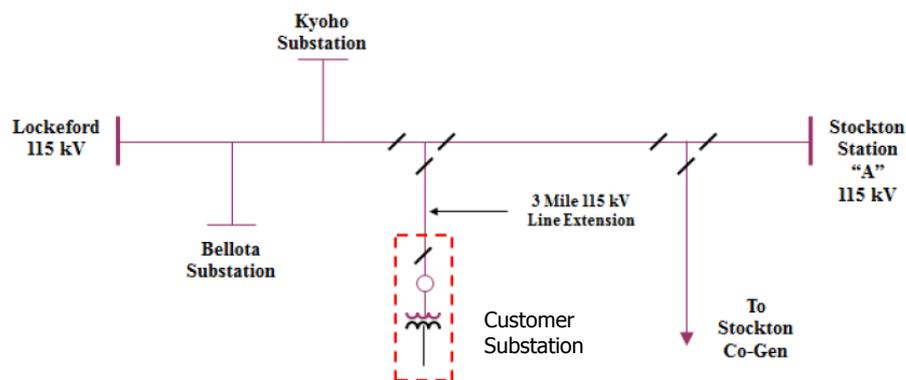
Weber-French Camp 60 kV Line Reconfiguration Project



Two (2) Projects Recommended for Concurrence (Load Interconnection)

Stockton A-Lockeford-Bellota Load Interconnection

Stockton A-Lockeford-Bellota Load Interconnection



Need: Load interconnection.

Project Scope:

Interconnection Facility: 115 kV tap line and interconnection.

Network Upgrade: SPS to drop load for loss of 230 kV source at Bellota (~55 MW of load drop).

Cost: Interconnection Facility: \$7M
Network Upgrade: \$1M - \$3M

Other Considered Alternatives:

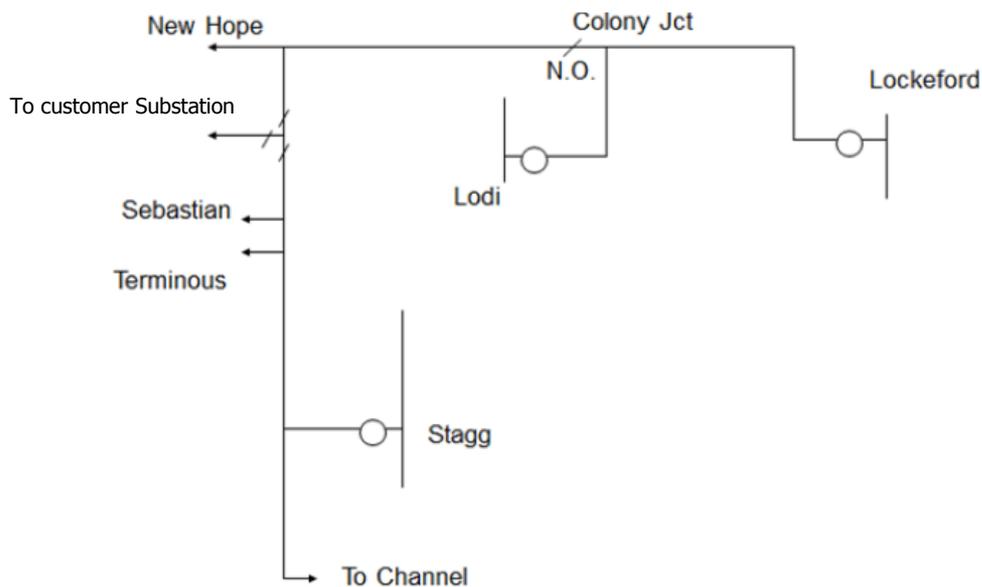
Voltage support and line re-rate/reconductor— \$3M-\$5M (Voltage support).
60 kV option – Requires line reconductoring

Expected In-Service: 2014

Interim Plan: None

Stagg No. 1 Load Interconnection

Stagg No. 1 Load Interconnection



Need: Load interconnection.

Project Scope:

Interconnection Facility: 60 kV tap line and interconnection.

Network Upgrade: None

Cost: Interconnection Facility: \$1M - \$2M
Network Upgrade: None

Other Considered Alternatives:

Distribution Service (\$6M-\$10M)

Expected In-Service: 2014

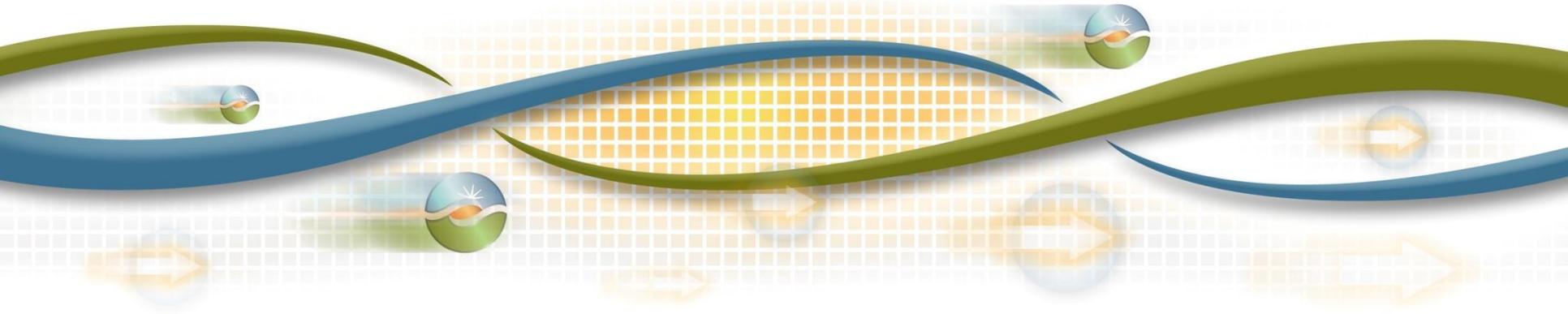
Interim Plan: None

Recommendations for Management Approval of Reliability Projects less than \$50 Million

Greater Bay Area

2013/2014 ISO Transmission Planning Process

Bryan Fong
Sr. Regional Transmission Engineer
November 20-21, 2013



Greater Bay Area

Project Name	Type of Project	Cost of Project	Is Project Found Needed
BART Berryessa Extension Project	Reliability (Load Interconnection)	\$9M	Concur

One (1) Project Recommended for Concurrence (Load Interconnection)

BART Berryessa Extension Project

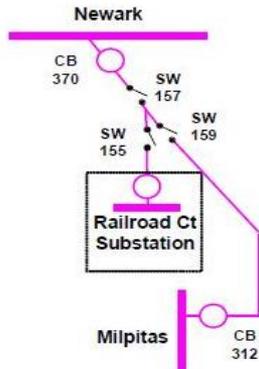


Figure 3: Proposed Single Line Diagram for the Railroad Court Substation Interconnection

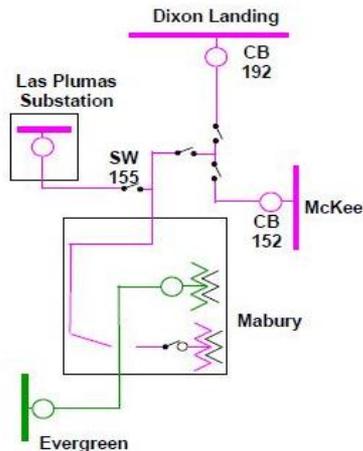


Figure 4: Proposed Single Line Diagram for the Las Plumas Substation Interconnection

Need: Load Interconnection

Project Scope: To connect the two new customer owned substations to PG&E's 115 kV system in east San Jose. The Railroad Court substation will be served via a tap connection into the Newark – Milpitas No. 1 115 kV Line, and the Las Plumas substation will initially be served via a tap connection into the Mabury 115 kV Tap Line. (When PG&E's Evergreen – Mabury 60 kV to 115 kV Conversion Project begins the bus upgrades at Mabury Substation, the tap connection for the Las Plumas substation will be connected directly into Mabury Substation.)

Cost: \$9M Interconnection cost

Other Considered Alternatives:
Status Quo

Expected In-Service: 2014

Interim Plan: N/A

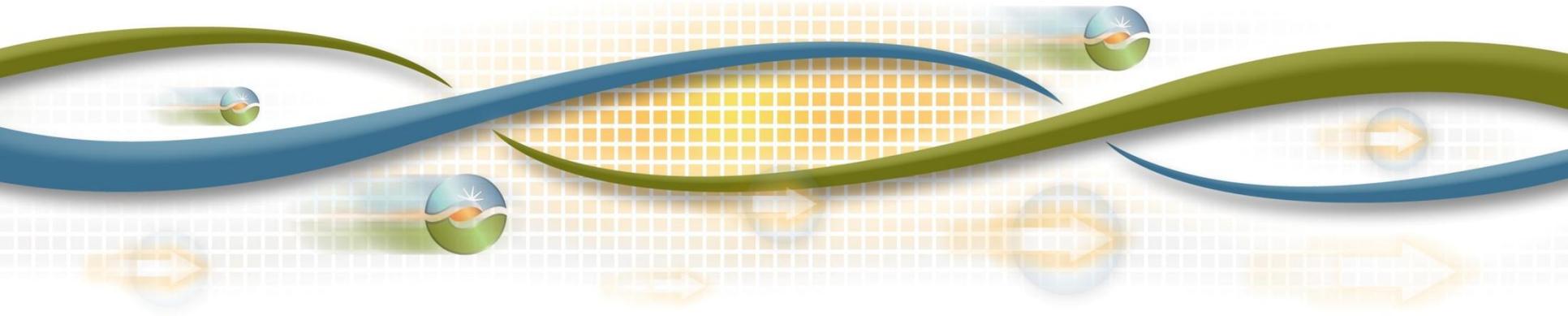


Recommendations for Management Approval of Reliability Projects less than \$50 Million

Humboldt, North Coast & North Bay Areas

2013/2014 ISO Transmission Planning Process

Rajeev Annaluru
Sr. Regional Transmission Engineer
November 20-21, 2013

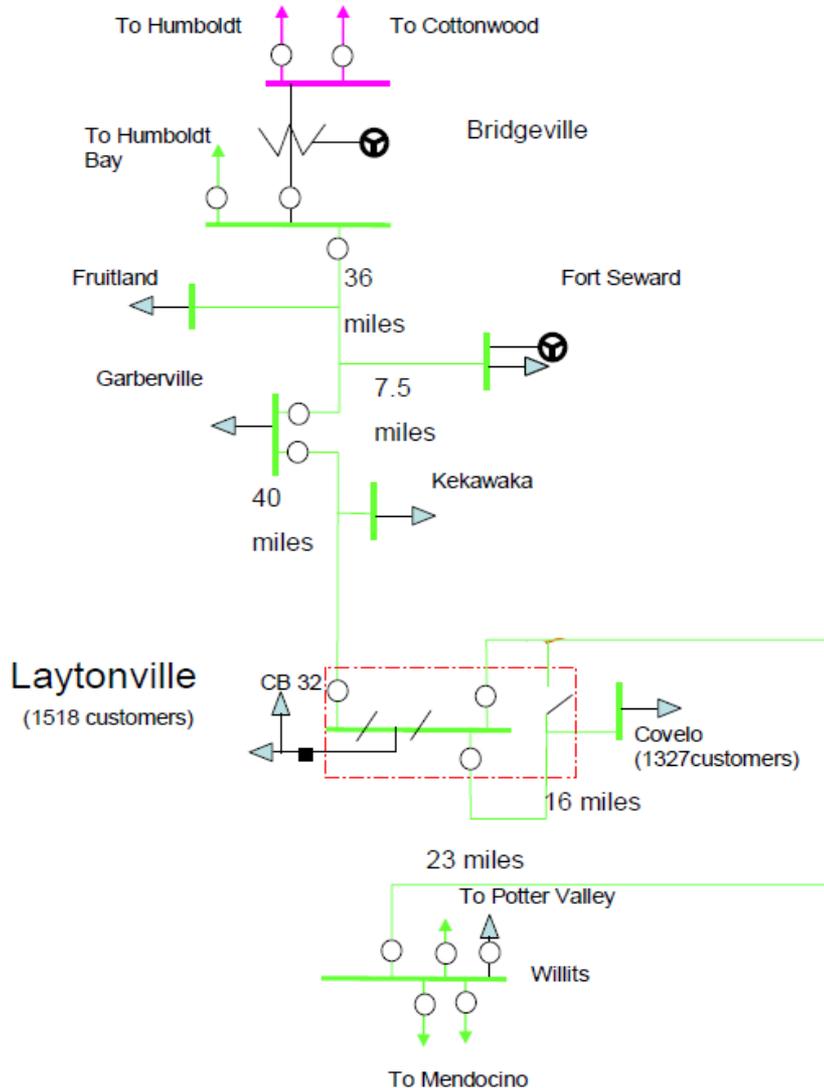


Humboldt, North Coast & North Bay Area

Project Name	Type of Project	Cost of Project	Is Project Found Needed
Laytonville 60kV Breaker Installation	Reliability	\$ 5M - \$10M	Yes

1 Project Recommended for Management Approval (under \$50 Million)

Laytonville 60kV CB Installation



Need: Reliability, Involuntary Load Interruption standard with a BCR of 1.19

Project Scope: 1) Construct a loop bus at Laytonville Substation
2) install 3 SCADA operable circuit breakers
3) connect the Laytonville-Covelo 60 kV Line into Laytonville Substation.

Cost: \$5 million - 10 million (Detailed Engineering estimate is around \$7.5 Million)

Other Considered Alternatives:

- 1) Status Quo
- 2) Install a ring bus (rejected due to Space constraint)

Expected In-Service: Dec 2015

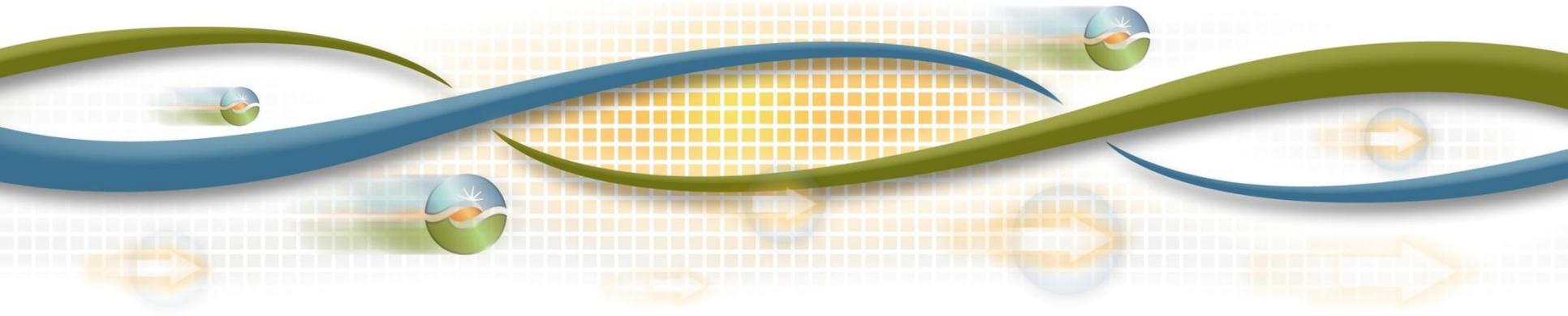
Interim Plan: N/A



CAISO Long Term Congestion Revenue Rights Simultaneous Feasibility Test

2013/2014 Transmission Planning Process Stakeholder Meeting

*Chris Mensah-Bonsu, Ph.D.
Senior Regional Transmission Engineer
November 20-21, 2013*



Objectives

- CAISO is required by tariff to perform the Congestion Revenue Rights (CRR) Simultaneous Feasibility Test (SFT) as part of its annual Transmission Planning Process (TPP)
- CRR SFT study has the goal to ensure that existing LT CRRs remain feasible over their full term
 - ✓ Long-Term CRR (LTCRR) has a 10-year term

Study Assumptions

- Based on the CAISO Tariff and BPM for Transmission Planning Process (TPP)
 - ✓ Existing Long-Term CRRs must be feasible

- Transmission Assumptions
 - ✓ Transmission projects and element are considered
 - ✓ Projects must not adversely impact the LTCRRs

- Market Data and Systems
 - ✓ Scheduling locations and price nodes
 - ✓ Full Network Model
 - ✓ CRR suite of applications

Study Scenario

- Six market scenarios reflecting seasonal and time-of-use conditions are considered
 - ✓ Four (4) seasons
 - ✓ On-peak and off-peak conditions

Conclusions

- In compliance with Section 24.4.6.4 of the ISO tariff, ISO followed the LTCRR SFT study steps outlined in Section 4.2.2 of the BPM for TPP in order to determine whether, there are any existing released LTCRRs that could be “at risk” and for which appropriate mitigation measures should be developed
- Based on the results of this analysis, the ISO has determined that there are:
 - ✓ No existing released LT CRRs “at-risk”

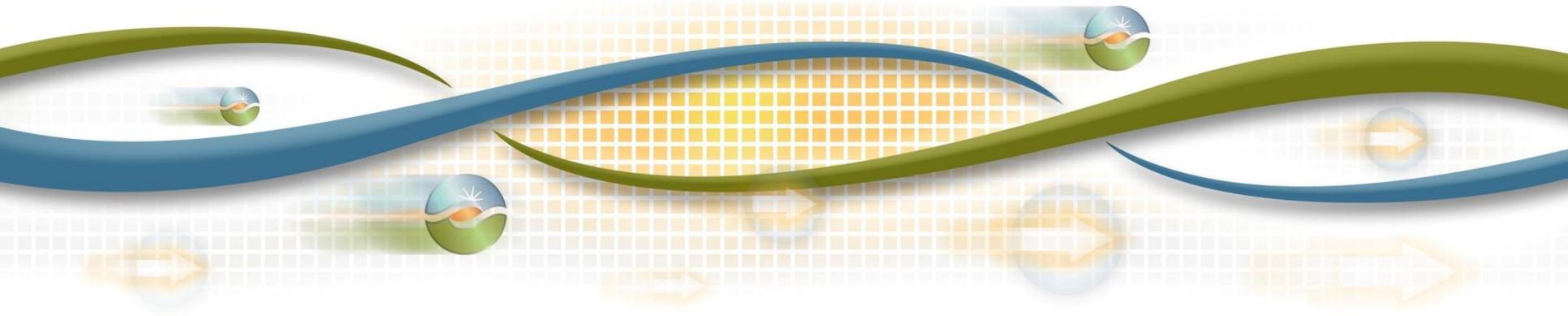
Wrap-Up

2013/2014 Transmission Planning Process Stakeholder Meeting

Tom Cuccia

Sr. Stakeholder Engagement and Policy Specialist

November 20-21, 2013



Next Steps

Date	Milestone
November 21 – December 5	Stakeholder comments to be submitted to regionaltransmission@caiso.com
January 31, 2013	2013/2014 Draft Transmission Plan posted
February 2013	Stakeholder Meeting on contents of draft Transmission Plan