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

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<th>Topic</th>
<th>Presenter</th>
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<tr>
<td>Opening</td>
<td>Tom Cuccia</td>
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<tr>
<td>Introduction &amp; Overview</td>
<td>Neil Millar</td>
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<td>RPS Portfolio Assessment</td>
<td>ISO Regional Transmission Engineers</td>
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<tr>
<td>Economic Planning Assessment</td>
<td>Xiaobo Wang</td>
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<tr>
<td>Delaney-Colorado River Incremental Capacity Assessment</td>
<td>Yi Zhang</td>
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### Today’s Agenda – November 21st

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<th>Topic</th>
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<tr>
<td>Opening</td>
<td>Tom Cuccia</td>
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<tr>
<td>Recommendations for Management Approval of Reliability Projects less than $50 Million</td>
<td>ISO Regional Transmission Engineers</td>
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<tr>
<td>Long-Term CRR Simultaneous Feasibility Test</td>
<td>Chris Mensah-Bonsu</td>
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</table>
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

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Type of Project</th>
<th>Submitted By</th>
<th>Is Project Found Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>RoseCanyon 69 kV Tap Elimination</td>
<td>Reliability</td>
<td>SDG&amp;E</td>
<td>Yes</td>
</tr>
<tr>
<td>TL690A/E San Luis Rey-OceansideTap &amp; StuartTap-Las Pulgas 69 kV Lines Recondor</td>
<td>Reliability</td>
<td>SDG&amp;E</td>
<td>Yes</td>
</tr>
<tr>
<td>TL13834 Trabuco-Capistrano 138 kV Line Upgrade</td>
<td>Reliability</td>
<td>SDG&amp;E</td>
<td>Yes</td>
</tr>
<tr>
<td>Mission Bank #51 replacement</td>
<td>Reliability</td>
<td>SDG&amp;E</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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 Reconstructor

**Need:** NERC Category B and C overloads (2015)

**Project Scope:** Reconstructor 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

Legend
- 500 kV line & bus
- 230 kV line & bus
- transformer
- line tap
- outage element
- overload
- bus voltage concern

Before Mission Bank #51&#52 Replacement

After Mission Bank #51&#52 Replacement

California ISO
Shaping a Renewed Future
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
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Type of Project</th>
<th>Cost of Project</th>
<th>Is Project Found Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Upgrade at Mead-Pahrump 230 kV Terminal</td>
<td>Reliability</td>
<td>$100 k</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Project Name</th>
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<th>Is Project Found Needed</th>
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</thead>
<tbody>
<tr>
<td>Victor Loop-in</td>
<td>Reliability</td>
<td>$12 M</td>
<td>Yes</td>
</tr>
</tbody>
</table>
1 Project Recommended for Management Approval (under $50 Million)
Victor Loop-In

**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

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Type of Project</th>
<th>Cost of Project</th>
<th>Is Project Found Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estrella Substation Project</td>
<td>Reliability</td>
<td>$35-45 M</td>
<td>Yes</td>
</tr>
</tbody>
</table>
1 Project Recommended for Management Approval (under $50 Million)
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

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Type of Project</th>
<th>Cost of Project</th>
<th>Is Project Found Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kearney-Kerman 70kV Line Reconductor</td>
<td>Reliability</td>
<td>$12M-$18M</td>
<td>Yes</td>
</tr>
<tr>
<td>McCall-Reedley #2 115kV Line</td>
<td>Reliability</td>
<td>$25M-$40M</td>
<td>Yes</td>
</tr>
<tr>
<td>Reedley 115/70kV Transformer Capacity Increase</td>
<td>Reliability</td>
<td>$12M-$18M</td>
<td>Yes</td>
</tr>
<tr>
<td>Load Interconnection (Sanger-Reedley 115kV Tap)</td>
<td>Load Interconnection</td>
<td>$2M-$3M</td>
<td>Concur</td>
</tr>
<tr>
<td>Load Interconnection (Gill Ranch 115kV Tap)</td>
<td>Load Interconnection</td>
<td>$1M-$2M &amp; $5M-$10M</td>
<td>Concur</td>
</tr>
</tbody>
</table>
Three (3) Projects Recommended for Management Approval (under $50 Million)
Kearney-Kerman 70kV Line Reconductot

**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

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Type of Project</th>
<th>Cost of Project</th>
<th>Is Project Found Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Bernard-Tejon 70kV Line Reconductor</td>
<td>Reliability</td>
<td>$8M-$12M</td>
<td>Yes</td>
</tr>
<tr>
<td>Taft-Maricopa 70kV Line Reconductor</td>
<td>Reliability</td>
<td>$6M-$10M</td>
<td>Yes</td>
</tr>
<tr>
<td>Wheeler Ridge-Weedpatch 70kV Line Reconductor</td>
<td>Reliability</td>
<td>$15M-$25M</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Three Projects Recommended for Management Approval (under $50 Million)
San Bernard-Tejon 70kV Line Reconductort

**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 Reconductort

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

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

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

Cost: $15M-$25M

Other Considered Alternatives:
- Status Quo
- SPS (~15 MW )
- Recondor Kern Cyn-Magunden-Weedpatch 70 kV Line

Expected In-Service: May 2018

Interim Plan: (if applicable) N/A
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

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<tr>
<th>Project Name</th>
<th>Type of Project</th>
<th>Cost of Project</th>
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<tbody>
<tr>
<td>Mosher Transmission Project</td>
<td>Reliability</td>
<td>$10M - $15M</td>
</tr>
<tr>
<td>Glenn 230/60 kV Transformer No. 1 Replacement</td>
<td>Reliability</td>
<td>$5M - $10M</td>
</tr>
<tr>
<td>Weber-French Camp 60 kV Line Reconfiguration Project</td>
<td>Reliability</td>
<td>$7M - $8.4M</td>
</tr>
<tr>
<td>Stockton A-Lockeford-Bellota Load Interconnection</td>
<td>Reliability (Load Interconnection)</td>
<td>Interconnection Facility: $7M Network Upgrades: $1M - $2M</td>
</tr>
<tr>
<td>Stagg No. 1 Load Interconnection</td>
<td>Reliability (Load Interconnection)</td>
<td>Interconnection Facility: $1M - $2M Network Upgrades: None</td>
</tr>
</tbody>
</table>
3 Projects Recommended for Management Approval (under $50 Million)
Mosher Transmission Project


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
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**

**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

Proposed Project

Diagram showing the proposed reconfiguration of the Weber-French Camp 60 kV line.
Two (2) Projects Recommended for Concurrence (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
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

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<th>Project Name</th>
<th>Type of Project</th>
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<tbody>
<tr>
<td>BART Berryessa Extension Project</td>
<td>Reliability (Load Interconnection)</td>
<td>$9M</td>
<td>Concur</td>
</tr>
</tbody>
</table>
One (1) Project Recommended for Concurrence (Load Interconnection)
BART Berryessa Extension Project

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
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<tbody>
<tr>
<td>Laytonville 60kV Breaker</td>
<td>Reliability</td>
<td>$ 5M - $10M</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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
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

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<th>Date</th>
<th>Milestone</th>
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<tr>
<td>November 21 – December 5</td>
<td>Stakeholder comments to be submitted to <a href="mailto:regionaltransmission@caiso.com">regionaltransmission@caiso.com</a></td>
</tr>
<tr>
<td>January 31, 2013</td>
<td>2013/2014 Draft Transmission Plan posted</td>
</tr>
<tr>
<td>February 2013</td>
<td>Stakeholder Meeting on contents of draft Transmission Plan</td>
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