Agenda
Draft 2017-2018 Transmission Plan and transmission project approval recommendations

Kristina Osborne
Senior Stakeholder Engagement and Policy Specialist

2017-2018 Transmission Planning Process Stakeholder Meeting
February 8, 2018
# 2017-2018 Transmission Planning Process Stakeholder Meeting - Agenda

<table>
<thead>
<tr>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Kristina Osborne</td>
</tr>
<tr>
<td>Overview &amp; Key Issues</td>
<td>Neil Millar</td>
</tr>
<tr>
<td>Economic Assessment</td>
<td>Yi Zhang, Robert Sparks and Jeff Billinton</td>
</tr>
<tr>
<td>Southern California Recommended Reliability Projects</td>
<td>Robert Sparks</td>
</tr>
<tr>
<td>Northern California Recommended Reliability Projects</td>
<td>Binaya Shrestha</td>
</tr>
<tr>
<td>Wrap-up &amp; Next Steps</td>
<td>Kristina Osborne</td>
</tr>
</tbody>
</table>
Introduction and Overview
Draft 2017-2018 Transmission Plan and transmission project approval recommendations

Neil Millar
Executive Director, Infrastructure Development

2017-2018 Transmission Planning Process Stakeholder Meeting
February 8, 2018
2017-2018 Transmission Planning Process

Phase 1 – Develop detailed study plan
- State and federal policy
- CEC - Demand forecasts
- CPUC - Resource forecasts and common assumptions with procurement processes
- Other issues or concerns

Phase 2 - Sequential technical studies
- Reliability analysis
- Renewable (policy-driven) analysis
- Economic analysis
- Publish comprehensive transmission plan with recommended projects

February 2017
March 2017
Phase 3 Procurement

ISO Board for approval of transmission plan

Draft transmission plan presented for stakeholder comment.
2017-2018 Ten Year Plan Milestones

- Preliminary reliability study results were posted on August 15
- Stakeholder session September 21st and 22nd
- Comments received October 6
  - (slow response resource special study extended to October 10)
- Request window closed October 15
- Preliminary policy and economic study results and update on other issues November 16
- Comments received November 30
- **Draft** plan posted February 1, 2018
- **Today’s session to review draft plan**
- Comments due February 22
- Revised draft for approval at March Board of Governor meeting
Planning and procurement overview

1. CEC & CPUC
   - Create demand forecast & assess resource needs
     - With input from ISO, IOUs & other stakeholders

2. ISO
   - Creates transmission plan
     - With input from CEC, CPUC, IOUs & other stakeholders

3. CPUC
   - Creates procurement plan
     - With input from CEC, ISO, IOUs & other stakeholders

4. Final plan authorizes procurement

Results of 2-3-4 feed into next biennial cycle
Development of 2017-2018 Annual Transmission Plan

Reliability Analysis (NERC Compliance)

33% RPS Portfolio Analysis
- Incorporate GIP network upgrades
- Identify policy transmission needs

Economic Analysis
- Congestion studies
- Identify economic transmission needs

Other Analysis (LCR, SPS review, etc.)

Results
Emphasis in the transmission planning cycle:

• A modest capital program, as:
  • Reliability issues are largely in hand, especially with load forecasts declining from previous years and behind the meter generation forecasts increasing from previous projections
  • Policy work was largely informational as we await actionable renewable portfolio policy direction regarding moving beyond 33% (for approvals)
  • Modestly-sized economic-driven projects emerging as evolving industry circumstances create some new opportunities
• A major effort in this third and final year of the programmatic review of previously-approved projects
• Preferred resources and transmission upgrades playing a critical role in the integrated solutions in several areas
• Emerging issues continuing to drive re-thinking on how we study and assess transmission system issues
Consideration of the impacts of behind the meter photovoltaic generation on load shapes – and shifting the time of load peaks to later in the day – is evolving:

- In CED 2015 (2016-2026 Forecast), the CEC determined peak loads through downward adjustments to the traditional mid-day peak loads and acknowledged the issue of later-day peaks. In the 2016-2017 planning cycle the ISO conducted its own sensitivities.

- In CEDU 2016 (2017-2027), the CEC provided sensitivities of later day peaks. The ISO used those sensitivities in this 2017-2017 planning cycle to review previously-approved projects, but not as the basis for approving new projects.

- Through CED 2017 (2018-2028) the ISO is anticipating hourly load shapes.
The ISO’s reliability analysis led to the following:

• 12 new reliability projects are recommended – firming up the February 1 posted plan

• In the PG&E service territory, 19 previously-approved projects are recommended to be canceled and 21 have been re-scoped, paring over $2.7 billion from current estimates. 6 have been identified as needing further review

• Two previously-approved projects in the SDG&E service territory are recommended to be canceled
Policy-driven analysis for approval purposes was not needed - no policy-driven approvals are recommended

- Portfolio direction received from the CPUC and CEC on June 13, 2016:

  “Recommend reusing the "33% 2025 Mid AAEE" RPS trajectory portfolio that was used in the 2015-16 TPP studies, as the base case renewable resource portfolio in the 2016-17 TPP studies”

  “Given the range of potential implementation paths for a 50 percent RPS, it is undesirable to use a renewable portfolio in the TPP base case that might trigger new transmission investment, until more information is available.”

- This policy direction remained in place for the 2017-2018 transmission planning cycle.

- Portfolios used in the ISO’s informational 50% RPS special studies and evaluation of interregional projects were provided by CPUC staff.
The ISO is recommending a number of economic-driven projects:

- One – in the VEA service territory – provides production simulation benefits.
- One – in the Imperial Valley area – provides both local capacity requirement reduction benefits and production simulation benefits.
- Two – in the East Bay/Moss Landing Sub-area – focus on reducing local capacity requirements in the area.
Status of proposal to add Phasor Measurement Units (PMUs) to all CAISO Interties:

• In November 2017, the ISO introduced the proposal that PMUs be added to all ISO intertie transmission faculties to other balancing areas

• Phasor measurement units will enhance accuracy of measurements to demonstrate compliance with NERC Reliability Standard BAL-003-1.1

• The ISO must meet frequency response obligation based on net actual interchange measurements
  * The ISO is continuing to refine the scope of the effort and will bring forward a recommendation in the future.
Other considerations:

• No regional (i.e. greater than 200 kV) transmission solutions recommended for approval are eligible for competitive solicitation.

• Transmission Access Charge model to be incorporated into final draft transmission plan – model preparation and data collection in progress.

• The six special studies conducted in 2017 have been summarized in the 2017-2018 Transmission Plan:
  – These were presented previously and are not being revisited today.
  – They will help inform future planning efforts.
  – Three were extensions of 2016-2017 studies and are also documented on the 2016-2017 transmission plan website.
Questions?

Stay connected

@California_ISO

Download ISO Today mobile app

Sign up for the Daily Briefing at www.caiso.com
Economic Assessment
Draft 2017-2018 Transmission Plan and transmission project approval recommendations

Yi Zhang
Regional Transmission Engineer Lead

2017-2018 Transmission Planning Process Stakeholder Meeting
February 08, 2018
Overview of economic planning methodology

• ISO’s economic planning study follows the updated TEAM documentation updated in 2017

• Study approach:

  Power System analyses (production cost simulation, power flow studies, etc.) with and without network upgrade under study

  Production benefits

  Other benefits

  Total benefits

  Total cost (revenue requirement) estimation and calculation

  Benefit to cost ratio (BCR)
Financial analysis in economic planning

• Key parameters as identified in TEAM document and used in 2017~2018 planning cycle
• Use 1.45 cost-to-capital ratio for “total cost” estimation
• For present value calculation
  • 7% discount rate (real)
  • 50 years of economic life for new transmission
  • 40 years of economic life for reconductoring
Production cost simulation in economic planning

• Three steps interacting with each other

  PCM development and validation

  Simulation and congestion analysis

  Detailed congestion investigation and economic assessment

• Production cost simulation software in 2017~2018 planning cycle
  – GridView version 9.7.26.20 (compatible with version 10.1.3)

• ISO’s planning Production cost model (PCM) was developed from WECC common case, and has been modified and enhanced on both modeling and data
Overview of ISO’s planning PCM development and enhancement

• Continued to enhance the production cost simulation tool in collaboration with the software vendor
  – Effectively reflecting market and grid operation (e.g. A/S, Nomograms, RAS, etc.)
  – Efficient data management for system modeling

• Implemented in this planning cycle
  – Multi-tier renewable curtailment prices following the CPUC’s recommendations

<table>
<thead>
<tr>
<th>Tier</th>
<th>Total curtailment (GWh)</th>
<th>Curtailment price ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;200</td>
<td>-$15</td>
</tr>
<tr>
<td>2</td>
<td>Between 200~12400</td>
<td>-$25</td>
</tr>
<tr>
<td>3</td>
<td>&gt;12400</td>
<td>-$300</td>
</tr>
</tbody>
</table>
Overview of ISO’s planning PCM development and enhancement (cont.)

• Database development with more accurate representation of network models
  – Identical network models for the ISO system in PCM and in the reliability power flow cases
    • Transmission topology, generator location, load distribution
  – Load modifiers were modeled as generators at the locations as in power flow cases
  – Coordinated with other regions to update their system models

• Most recently updated operational data and models
  – Updated solar profiles (in collaboration with WPR ADS process) with higher granularity based on NREL measurements
  – Updated thermal unit ramp rates based on industry average
  – IV PFC dispatchable
## Summary of the final congestion results

<table>
<thead>
<tr>
<th>No</th>
<th>Aggregated congestion</th>
<th>2027</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Costs (M$)</td>
<td>Duration (hr)</td>
</tr>
<tr>
<td>1</td>
<td>BOB SS (VEA) - MEAD S 230 kV line</td>
<td>60.11</td>
<td>654</td>
</tr>
<tr>
<td>2</td>
<td>PG&amp;E NCNB</td>
<td>8.24</td>
<td>427</td>
</tr>
<tr>
<td>3</td>
<td>PG&amp;E/TID Exchequer</td>
<td>4.74</td>
<td>2,199</td>
</tr>
<tr>
<td>4</td>
<td>Path 45</td>
<td>3.00</td>
<td>1,062</td>
</tr>
<tr>
<td>5</td>
<td>COI Corridor</td>
<td>2.39</td>
<td>120</td>
</tr>
<tr>
<td>6</td>
<td>PG&amp;E POE-RIO OSO</td>
<td>1.37</td>
<td>106</td>
</tr>
<tr>
<td>7</td>
<td>Moenkopi-Eldorado 500 kV</td>
<td>1.02</td>
<td>49</td>
</tr>
<tr>
<td>8</td>
<td>SDGE IV-SD Import</td>
<td>0.87</td>
<td>172</td>
</tr>
<tr>
<td>9</td>
<td>Path 26</td>
<td>0.63</td>
<td>22</td>
</tr>
<tr>
<td>10</td>
<td>Path 61/Lugo - Victorville</td>
<td>0.39</td>
<td>50</td>
</tr>
<tr>
<td>11</td>
<td>Path 24</td>
<td>0.37</td>
<td>137</td>
</tr>
<tr>
<td>12</td>
<td>SCE Inyo Phase Shifter</td>
<td>0.22</td>
<td>2,364</td>
</tr>
<tr>
<td>13</td>
<td>Path 52 Silver Peak-Control 55 kV</td>
<td>0.20</td>
<td>2,131</td>
</tr>
<tr>
<td>14</td>
<td>SDGE North</td>
<td>0.18</td>
<td>66</td>
</tr>
<tr>
<td>15</td>
<td>PG&amp;E/Sierra MARBLE transformer</td>
<td>0.15</td>
<td>129</td>
</tr>
<tr>
<td>16</td>
<td>IID-SDGE (S line)</td>
<td>0.14</td>
<td>30</td>
</tr>
<tr>
<td>17</td>
<td>Path 15/CC</td>
<td>0.13</td>
<td>8</td>
</tr>
<tr>
<td>18</td>
<td>SCE J.HINDS-MIRAGE 230 kV line</td>
<td>0.13</td>
<td>27</td>
</tr>
<tr>
<td>19</td>
<td>PG&amp;E Fresno</td>
<td>0.11</td>
<td>13</td>
</tr>
<tr>
<td>20</td>
<td>SCE Devers-RedBluff 500 kV line</td>
<td>0.08</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>PG&amp;E GBA</td>
<td>0.03</td>
<td>4,999</td>
</tr>
<tr>
<td>22</td>
<td>PG&amp;E LCR Sierra Gridley-Live Oak 60 kV</td>
<td>0.00</td>
<td>1</td>
</tr>
</tbody>
</table>
## Economic planning study requests

<table>
<thead>
<tr>
<th>#</th>
<th>Study request</th>
<th>Major concerns or comments in request</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bob SS to Mead S upgrade</td>
<td>Benefit of reducing curtailment, participant benefit</td>
</tr>
<tr>
<td>2</td>
<td>COI congestion</td>
<td>COI congestion due to scheduling limit</td>
</tr>
<tr>
<td>3</td>
<td>Mira Loma - Red Bluff 500 kV line</td>
<td>Benefit of reducing LA Basin LCR and LA Basin/SD combined LCR</td>
</tr>
<tr>
<td>4</td>
<td>Devers - Suncrest 500 kV line</td>
<td>Benefit of reducing LA Basin LCR and LA Basin/SD combined LCR</td>
</tr>
<tr>
<td>5</td>
<td>Renewable Energy Express* (AC-DC Conversion of N. Gila-IV-MG)</td>
<td>Benefit of reducing LA Basin LCR and LA Basin/SD combined LCR</td>
</tr>
<tr>
<td>6</td>
<td>Round Mtn. - Cottonwood 230 kV lines flow control devices</td>
<td>COI nomogram with the flow control devices</td>
</tr>
<tr>
<td>7</td>
<td>SunZia and 1500 MW wind in NM*</td>
<td>Renewable integration</td>
</tr>
<tr>
<td>8</td>
<td>LCR benefit evaluation (South Bay-Moss Landing, Vilson, LA Basin, SD/IV)</td>
<td>LCR benefit</td>
</tr>
</tbody>
</table>

* Inter-regional transmission planning (ITP) projects
Summary of evaluating economic planning study requests

- Eight study requests have been accepted and evaluated

- Evaluations followed the ISO Tariff Section 24.3.4.1

- Detail evaluation results can be found in the transmission plan report

- Study request for Bob SS to Mead S congestion was further investigated
Detailed studies were performed for four areas:

- IID S-line (from IID El Centro to SDG&E Imperial Valley)
- Bob SS – Mead S 230 kV line
- San Diego North area
- South Bay/Moss Landing area
The ISO and IID are pursuing upgrades to IID’s existing S-line:

- The S-Line is an 18.1 mile, 230 kV single circuit wood pole construction line from IID’s El Centro substation to SDG&E’s Imperial Valley substation owned by IID.
- The project would consist of the ISO - through a participating transmission owner – funding the upgrade of the existing wood pole line to 230 kV double circuit steel tower construction, and the necessary upgrades to termination equipment, in return for entitlements to the incremental transmission capacity created by the upgrade.
- Cost estimate from IID is $32 million for the line upgrade; $50 million evaluated to allow for IV termination upgrades – “Total cost is approximately $72 million using screening 1.45 ratio...”
S-line congestion mitigation and production benefit assessment

- A double circuit upgrade was studied with each circuit rated at 786 MVA
  - This project design was provided by IID for use in the ISO’s GIP studies in 2014

<table>
<thead>
<tr>
<th></th>
<th>Pre S line upgrade ($M)</th>
<th>Post S line upgrade ($M)</th>
<th>Savings ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO load payment</td>
<td>7,575.95</td>
<td>7,602.79</td>
<td></td>
</tr>
<tr>
<td>ISO owned generation profits</td>
<td>3,909.36</td>
<td>3,935.32</td>
<td></td>
</tr>
<tr>
<td>ISO owned transmission revenue</td>
<td>178.66</td>
<td>182.37</td>
<td></td>
</tr>
<tr>
<td>ISO Net payment</td>
<td>3,487.92</td>
<td>3,485.10</td>
<td>2.82</td>
</tr>
<tr>
<td>WECC Production cost</td>
<td>18,836.17</td>
<td>18,837.07</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

- ISO ratepayer’s benefit was $2.82 million
- Present value is approximately $40 million
  - Assume 50 year life of the project and 7% discount rate
- Renewable curtailment in production cost simulation reduced by about 50 GWh with S line upgrade in place
S-line local capacity benefit assessment

• The primary and most immediate benefit to ISO ratepayers is a reduction in local capacity requirement in the San Diego-Imperial Valley area
  – With the S-Line upgrade project in-service the local capacity requirement can be reduced by approximately 213 MW, potentially up to 500 MW in the future

• LCR benefit with a 213 MW reduction is $111.3 million to $222.6 million based on the following parameters
  – CPM price of $6.31/kw-month or $75,720/MW-year as set out in the ISO tariff
  – Revenue stream over 50 years

• Summing the production benefit and the low end of the capacity benefit yields “total” benefits of $151.3 million
  – BCR is approximately 2.08
Bob SS to Mead S 230 kV line congestion mitigation and production benefit assessment

- Congestion was observed from Bob SS to Mead S since the last planning cycle

- A study request from GridLiance, which owns and operates the VEA 230 kV system, proposed to upgrade the congested line with higher rating
  - Capital cost estimate was about $25M, total revenue requirement was about 1.45x$25M=$37M
Bob SS to Mead S 230 kV line congestion mitigation and production benefit assessment (cont.)

<table>
<thead>
<tr>
<th></th>
<th>Pre Bob SS-Mead S upgrade ($M)</th>
<th>Post Bob SS-Mead S upgrade ($M)</th>
<th>Savings ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO load payment</td>
<td>7,602.79</td>
<td>7,576.60</td>
<td></td>
</tr>
<tr>
<td>ISO owned generation profits</td>
<td>3,935.32</td>
<td>3,985.82</td>
<td></td>
</tr>
<tr>
<td>ISO owned transmission revenue</td>
<td>182.37</td>
<td>118.78</td>
<td></td>
</tr>
<tr>
<td>ISO Net payment</td>
<td>3,485.10</td>
<td>3,472.00</td>
<td>13.10</td>
</tr>
<tr>
<td>WECC Production cost</td>
<td>18,837.07</td>
<td>18,818.19</td>
<td>18.88</td>
</tr>
</tbody>
</table>

- Renewable curtailment in production cost simulation reduced by about 28 GWh with Bob SS to Mead S line upgrade in place
- ISO ratepayer benefit was $13.10 million
- Present value of benefit is approximately $180 million, assuming 40 year life of the project and 7% discount rate
  - Greater than the total cost of $37 million
Bob SS to Mead S 230 kV line congestion mitigation and production benefit assessment (cont.) – Sensitivity without ISO Net Export Limit

<table>
<thead>
<tr>
<th></th>
<th>Pre Bob SS-Mead S upgrade ($M)</th>
<th>Post Bob SS-Mead S upgrade ($M)</th>
<th>Savings ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO load payment</td>
<td>8,010.32</td>
<td>7,993.65</td>
<td></td>
</tr>
<tr>
<td>ISO owned generation profits</td>
<td>4,202.71</td>
<td>4,320.77</td>
<td></td>
</tr>
<tr>
<td>ISO owned transmission revenue</td>
<td>356.07</td>
<td>229.52</td>
<td></td>
</tr>
<tr>
<td>ISO Net payment</td>
<td>3,451.53</td>
<td>3,443.36</td>
<td>8.17</td>
</tr>
<tr>
<td>WECC Production cost</td>
<td>18,691.89</td>
<td>18,659.76</td>
<td>32.13</td>
</tr>
</tbody>
</table>

• ISO ratepayer’s benefit was $8.17 million
• Present value is approximately $112 million
  • Assume 40 year life of the project and 7% discount rate
• Still greater than the total cost of $37 million
San Diego North congestion mitigation and production benefit assessment

- Congestions were observed:
  - From Encina Tap to San Luis Rey 230 kV line under the N-1 of Encina to San Luis Rey
  - From San Marcos to Melrose Tap 69 kV line under the N-2 of Encina and Encina Tap to San Luis Rey
San Diego North congestion mitigation and production benefit assessment (cont.)

• These congestions were observed in correlation with high flows from south to north on the Encina to San Luis Rey corridor

• Two potential mitigations were studied in this planning cycle:
  – To build the second Encina to San Luis Rey 230 kV line and de-loop the Pen to San Luis Rey 230 kV line from the Encina Tap
    • Capital cost approximately $70~$80 million based on per unit cost, total cost is $101 ~ $116 million
  – SPS solution that includes tripping generators at Carlsbad, Palomar, and Otay Mesa under N-1 and N-2 contingencies of the 230 kV lines, and open the 69 kV loop at Melrose to San Marcos under the N-2 contingency of the 230 kV lines
San Diego North congestion mitigation and production benefit assessment (cont.) – New line solution

<table>
<thead>
<tr>
<th></th>
<th>Pre Encina-San Luis Rey new line upgrade ($M)</th>
<th>Post Encina-San Luis Rey new line upgrade ($M)</th>
<th>Savings ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO load payment</td>
<td>7,602.79</td>
<td>7,599.91</td>
<td></td>
</tr>
<tr>
<td>ISO owned generation profits</td>
<td>3,935.32</td>
<td>3,936.56</td>
<td></td>
</tr>
<tr>
<td>ISO owned transmission revenue</td>
<td>182.37</td>
<td>180.18</td>
<td></td>
</tr>
<tr>
<td>ISO Net payment</td>
<td>3,485.10</td>
<td>3,483.17</td>
<td>1.93</td>
</tr>
<tr>
<td>WECC Production cost</td>
<td>18,837.07</td>
<td>18,839.01</td>
<td>-1.94</td>
</tr>
</tbody>
</table>

- ISO ratepayer’s benefit was $1.93 million
- NPV is approximately $27 million
  - Assume 50 year life of the project and 7% discount rate
- Is less than the total cost of $101~ $116 million
San Diego North congestion mitigation and production benefit assessment (cont.) – SPS solution

<table>
<thead>
<tr>
<th></th>
<th>Pre SPS solution ($M)</th>
<th>Post SPS solution ($M)</th>
<th>Savings ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO load payment</td>
<td>7,602.79</td>
<td>7,595.01</td>
<td></td>
</tr>
<tr>
<td>ISO owned generation profits</td>
<td>3,935.32</td>
<td>3,927.15</td>
<td></td>
</tr>
<tr>
<td>ISO owned transmission revenue</td>
<td>182.37</td>
<td>180.59</td>
<td></td>
</tr>
<tr>
<td>ISO Net payment</td>
<td>3,485.10</td>
<td>3,487.28</td>
<td>-2.18</td>
</tr>
<tr>
<td>WECC Production cost</td>
<td>18,837.07</td>
<td>18,839.01</td>
<td>-1.94</td>
</tr>
</tbody>
</table>

- The SPS solution can completely mitigate the congestions in this area and did not cause any unserved load in simulation
- However, the SPS solution did not provide production benefit to ISO ratepayers
- The SPS solution may be a valid option to consider in future planning cycles if it can eliminate potential reliability violations that may evolve in the future in this local area
Mitigation Plan to Reduce the LCR Need in South Bay - Moss Landing Sub-area
Established Need – Primary Limitation

2018 Local Capacity Requirement:
• Outage of the Tesla-Metcalf 500 kV and Moss Landing-Los Banos 500 kV
• Limitation is thermal overloading of the Las Aguilas-Moss Landing 230 kV

The sub-area local capacity requirement was determined to be 2,221 MW in the 2018 LCR technical study and 2,346 MW in the 2022 LCR technical study. At the time the LCR studies were conducted by the ISO there was 2,408 MW of generation located within the LCR area.
Established Need – Secondary Limitation

2018 Local Capacity Requirement

- Outage of the Tesla-Metcalf 500 kV and Moss Landing-Los Banos 500 kV
- Limitation is thermal overloading of the Trimble-San Jose ‘B’ 115 kV
**Moss Landing–Panoche 230 kV Path Upgrade**

South Bay-Moss Landing sub-area is connected to the Fresno area through a double circuit 230 kV line between the Moss Landing and Panoche substations with interconnections to the Los Aguilas and Coburn substations.

- Existing emergency rating of the Moss Landing-Las Aguilas 230 kV line and the Las Aguilas-Panoche #1 230 kV line is 339 MVA.
- The Moss Landing-Coburn 230 kV line and the Coburn-Las Aguilas 230 kV lines are rated at 318 MVA due to terminal equipment limitations associated with the current transformers (CT) at Coburn substation.
- The Las Aguilas-Panoche #2 230 kV line is rated at 318 MVA due to terminal equipment limitations associated with the wavetraps at Panoche substation.
- To achieve the rerate of the lines to 400 MVA for the Moss Landing-Panoche 230 kV Path, terminal equipment upgrades at Coburn and Panoche are required.
- The cost estimate to rerate the 230 kV lines and upgrade the terminal equipment is $5 million dollars with an expected in-service date of December 2018.
San Jose-Trimble 115 kV line limitation and consideration of series reactors

The San Jose-Trimble 115 kV line is also identified as a limiting facility for establishing local capacity requirements for the South Bay-Moss Landing sub-area. The ISO assessed the size of series reactor necessary to alleviate the potential thermal overloading of this circuit, and found that under the most limiting P6 contingency, a 4 ohm series reactor would be sufficient.

• Based on the per unit cost calculated from Request Window submissions for similar projects, the estimated cost for the addition of this series reactor is expected to be between $6M to $9M and the expected in-service date is May, 2019.
• In the event that the project is not in-service by the expected in-service date, operational action plans during abnormal operating conditions can be implemented as a temporary mitigation plan to mitigate the overloads in the interim until the series reactor is in-service.
Summary of results:

The combination of the modeling changes, proposed line re-rating, recommended reliability-driven projects, and the two economic-driven projects collectively reduce the local capacity requirements for the South Bay-Moss Landing sub-area by approximately 400 to 600 MW beginning in 2019:

- Re-rate the Moss Landing-Los Aguilas 230 kV lines to 400 MVA. (PG&E action)
- Re-scoping of the South of San Mateo Capacity Increase (reliability-driven project found to be needed in this 2017-2018 transmission plan)
- San Jose-Trimble 115 kV Line Limiting Facility Upgrade (reliability-driven project found to be needed in this 2017-2018 transmission plan)
- Moss Landing–Panoche 230 kV Path Upgrade (economic-driven project found to be needed in 2017-2018 transmission plan)
- San Jose-Trimble 115 kV Series Reactor (economic-driven project found to be needed in this 2017-2018 transmission plan)
- Interim operating procedures to mitigate delay of San Jose-Trimble 115 kV Series Reactor if delays occur (PG&E action)
- Since several of the identified upgrades will not be in effect until the end of 2018 or early 2019, the identified RMR need for the Metcalf Energy Center in 2018 as well as the need for the CPM designation for Moss Landing 2 remain valid.
Summary and recommendations

Four upgrades were found to be needed as economic-driven projects in the 2017-2018 planning cycle:

- S-Line Upgrade
- Bob SS to Mead S 230 kV Line Upgrade,
- South Bay-Moss Landing enhancements comprising of the San Jose-Trimble 115 kV series reactor and the Moss Landing–Panoche 230 kV Path Upgrade

<table>
<thead>
<tr>
<th>Congestion or study area</th>
<th>Production benefit ($M)</th>
<th>Capacity benefit ($M)</th>
<th>Estimated total cost ($M)</th>
<th>Economic justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-Line</td>
<td>40</td>
<td>85~110</td>
<td>46~72</td>
<td>Yes</td>
</tr>
<tr>
<td>Bob SS-Mead S</td>
<td>180</td>
<td>Not applicable</td>
<td>37</td>
<td>Yes</td>
</tr>
<tr>
<td>San Diego North</td>
<td>27</td>
<td>Not applicable</td>
<td>101~116</td>
<td>No</td>
</tr>
<tr>
<td>South Bay-Moss Landing area</td>
<td>Not applicable</td>
<td>400-600 MW LCR benefit</td>
<td>$14</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Questions?

Stay connected

@California_ISO
Download ISO Today mobile app
Sign up for the Daily Briefing at www.caiso.com
Southern Area - Reliability Assessment
Draft 2017-2018 Transmission Plan and the transmission project approval recommendations

Robert Sparks
Manager, Regional Transmission - South

2017-2018 Transmission Planning Process Stakeholder Meeting
February 8, 2018
Overview of Southern Area Project Recommendations

• The Moorpark-Pardee #4 230 kV transmission circuit is recommended to be approved

• Two reliability projects less than $50 million that were already presented for management approval in November 2017:
  – San Ysidro 69 kV Reconductoring Project
  – Suncrest 500/230 kV Transformers Rating Increase

• Two reliability projects recommended to be canceled:
  – Mission Penasquitos 230 kV line (presented in November 2017)
  – Sycamore-Chicarita Reconductector Project
Moorpark-Pardee #4 230 kV transmission circuit

- The project is proposed by SCE to address the local capacity deficiency in the Moorpark subarea and involves:
  - stringing a fourth Moorpark-Pardee 230 kV circuit approximately 26 miles on existing structures
  - installing terminal equipment at Moorpark and Pardee Substations and
  - relocating existing circuit terminations in the 230 kV switchrack at Moorpark Substation.
Project overview – cont’d

• The project has an estimated cost of $45 million.

• The required in service date is 12/31/2020 to coincide with the retirement of OTC generation in the area.

• SCE has requested ISO approval by March 2018 in order to meet the required in service date.
Alternatives considered

• **Alternative 1** – Moorpark-Pardee project to address Moorpark LCR need coupled with 86 MW to 105 MW (NQC) of local capacity located downstream of Goleta to address Santa Clara LCR and SCE’s Goleta resiliency objectives

• **Alternative 2** – Approximately 318 MW (NQC) of local capacity to address Moorpark LCR need of which 105 MW is located downstream of Goleta to address Santa Clara LCR and SCE’s Goleta resiliency objectives

• **Alternative 3** – 240 Mvar dynamic reactive power support coupled with 135 MW (NQC) of local capacity to address Moorpark LCR need of which 105 MW is located downstream of Goleta to address Santa Clara LCR and SCE’s Goleta resiliency objectives
## Comparison of alternatives

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Alternative 1 (Tx + 86 MW to 105 MW LC)</th>
<th>Alternative 2 (318 MW LC)</th>
<th>Alternative 3 (240 Mvar + 135 MW LC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase in post contingency voltage stability area load limit</td>
<td>916-928 MW</td>
<td>300 MW</td>
<td>294 MW</td>
</tr>
<tr>
<td>Maximum thermal loading under critical contingency</td>
<td>&lt;100%</td>
<td>159% (Pardee-Santa Clara 230 kV)</td>
<td>189% (Pardee-Santa Clara 230 kV)</td>
</tr>
<tr>
<td>Grid resiliency</td>
<td>Neutral</td>
<td>Better</td>
<td>Neutral</td>
</tr>
<tr>
<td>Operational complexity due to variability, run-time limitation and charging needs of local capacity resources</td>
<td>Lower</td>
<td>Higher</td>
<td>Lower</td>
</tr>
<tr>
<td>Capital cost</td>
<td>Lower</td>
<td>Much higher</td>
<td>Higher</td>
</tr>
<tr>
<td>Required 12/31/2020 in-service date</td>
<td>Achievable</td>
<td>Most aggressive</td>
<td>More aggressive</td>
</tr>
</tbody>
</table>
Conclusion

• Alternative 1 was identified as the recommended alternative
Questions?
Northern Area - Reliability Assessment
Draft 2017-2018 Transmission Plan and the transmission project approval recommendations

Binaya Shrestha
Regional Transmission - North

2017-2018 Transmission Planning Process Stakeholder Meeting
February 8, 2018
Overview

• High level summary of results of previously-approved projects review.
  – Discussion of projects with revised scopes that were not discussed in November stakeholder meeting #3.

• Review of new projects.

• Review of request Window submissions.
High level summary of results of previously approved projects review.

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
<th>Current PG&amp;E Project Estimate ($M)</th>
<th>Revised 2017-2018 Estimate ($M)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects Modeled in 2017-2018 TPP Base Cases (Based on Phase-1 assessment recommendations)</td>
<td>33</td>
<td>1,137</td>
<td>1,137</td>
<td>Please refer to slide 4 for detailed list of projects</td>
</tr>
<tr>
<td>Projects Not Modelled in 2017-2018 TPP Base Cases - Found to be needed with original approved scope based on Phase-2 assessment</td>
<td>16</td>
<td>569</td>
<td>572</td>
<td>Please refer to slide 5 for detailed list of projects</td>
</tr>
<tr>
<td>Projects found to be not needed - Recommended to be cancelled</td>
<td>19</td>
<td>1,066</td>
<td>6</td>
<td>Please refer to slide 6 for detailed list of projects</td>
</tr>
<tr>
<td>Projects to Put on Hold for One More Year</td>
<td>6</td>
<td>638</td>
<td>548</td>
<td>Please refer to slide 7 for detailed list of projects</td>
</tr>
<tr>
<td>Projects Not Modelled in 2017-2018 TPP Base Cases - Found to be needed with revised scope based on Phase-2 assessment</td>
<td>21</td>
<td>2299</td>
<td>705</td>
<td>Please refer to slides 8 for detailed list of projects</td>
</tr>
</tbody>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>5,709</td>
<td>2,968</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Projects Modeled in 2017-2018 TPP Base Cases

<table>
<thead>
<tr>
<th>Projects</th>
<th>Planning Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maple Creek Reactive Support (Install 10 Mvar SVC at Maple Creek Sub)</td>
<td>Humboldt</td>
</tr>
<tr>
<td>Cortina No. 3 60 kV Line Reconductoring Project</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Lodi-Eight Mile 230 kV Line</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Missouri Flat-Gold Hill 115 kV Line</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Rio Oso 230/115 kV Transformer Upgrades</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Ripon 115 kV Line</td>
<td>Central Valley</td>
</tr>
<tr>
<td>South of Palermo 115 kV Reinforcement Project</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Stockton A-Weber 60 kV Line Nos. 1 and 2 Re conductor</td>
<td>Central Valley</td>
</tr>
<tr>
<td>West Point-Valley Springs 60 kV Line</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Christie 115/60 kV Transformer No. 2</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Contra Costa Sub 230 kV Switch Replacement</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Cooley Landing 115/60 kV Transformer Capacity Upgrade</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>East Shore-Oakland J 115 kV Reconductoring Project</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Martin 230 kV Bus Extension</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Metcalf-Piercy &amp; Swift and Newark-Dixon Landing 115 kV Upgrade</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Monta Vista 230 kV Bus Upgrade</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>North Tower 115 kV Looping Project</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>NRS-Scott No. 1 115 kV Line Reconstructor</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Pittsburg 230/115 kV Transformer Capacity Increase</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Estrella Substation Project</td>
<td>Central Coast and Los Padres</td>
</tr>
<tr>
<td>Gregg-Herndon #2 230 kV Line Circuit Breaker Upgrade</td>
<td>Fresno</td>
</tr>
<tr>
<td>Helm-Kerman 70 kV Line Reconstructor</td>
<td>Fresno</td>
</tr>
<tr>
<td>Lemoore 70 kV Disconnect Switches</td>
<td>Fresno</td>
</tr>
<tr>
<td>Los Banos-Livingston Jct-Canal 70 kV Switch Replacement</td>
<td>Fresno</td>
</tr>
<tr>
<td>Panoche-Ora Loma 115 kV Line Reconductoring</td>
<td>Fresno</td>
</tr>
<tr>
<td>Series Reactor on Warnerville-Wilson 230 kV Line</td>
<td>Fresno</td>
</tr>
<tr>
<td>Warnerville-Bellota 230 kV Line Reconductoring</td>
<td>Fresno</td>
</tr>
<tr>
<td>Wilson-Le Grand 115 kV Line Reconductoring</td>
<td>Fresno</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Projects</th>
<th>Planning Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kern PP 230 kV Area Reinforcement</td>
<td>Kern</td>
</tr>
<tr>
<td>Midway-Kern PP Nos. 1,3 and 4 230 kV Lines Capacity Increase</td>
<td>Kern</td>
</tr>
<tr>
<td>Midway-Kern PP#2 230 kV Line</td>
<td>Kern</td>
</tr>
<tr>
<td>San Bernard-Tejon 70 kV Line Reconstructor</td>
<td>Kern</td>
</tr>
<tr>
<td>Semitropic-Midway 115 kV Line Reconstructor</td>
<td>Kern</td>
</tr>
</tbody>
</table>
## Projects Not Modeled in 2017-2018 TPP Base Cases –
Found to be needed with original approved scope

<table>
<thead>
<tr>
<th>Projects</th>
<th>Planning Area</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delevan 230 kV Substation Shunt Reactor</td>
<td>North Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Glenn 230/60 kV Transformer No 1 Replacement</td>
<td>North Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Bellota 230 kV Substation Shunt Reactor</td>
<td>Central Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Vierra 115 kV Looping Project</td>
<td>Central Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Ignacio 230 kV Substation Shunt Reactor</td>
<td>North Coast and North Bay</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Metcalf-Evergreen 115 kV Line Reconductoring</td>
<td>Greater Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Moraga-Castro Valley 230 kV Line Capacity Increase Project</td>
<td>Greater Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Ravenswood – Cooley Landing 115 kV Line Reconductator</td>
<td>Greater Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Los Esteros 230 kV Substation Shunt Reactor</td>
<td>Greater Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Gates No. 2 500/230 kV Transformer</td>
<td>Fresno</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Wilson Voltage Support</td>
<td>Fresno</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Kearney - Herndon 230 kV Line Reconductator</td>
<td>Fresno</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Wheeler Ridge Junction Substation</td>
<td>Kern</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Midway-Temblor 115 kV Line Reconductator and Voltage Support</td>
<td>Kern</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Wheeler Ridge-Weedpatch 70 kV Line Reconductor</td>
<td>Kern</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Wheeler Ridge Voltage Support</td>
<td>Kern</td>
<td>Presented in Nov meeting</td>
</tr>
</tbody>
</table>
## Projects found to be not needed - Recommended to be canceled

<table>
<thead>
<tr>
<th>Projects</th>
<th>Planning Area</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenn #1 60 kV Reconductoring</td>
<td>North Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Table Mountain – Sycamore 115 kV Line</td>
<td>North Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Rio Oso–Atlantic 230 kV Line Project</td>
<td>Central Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Stagg – Hammer 60 kV Line</td>
<td>Central Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Napa – Tuluca No. 1 60 kV Line Upgrades</td>
<td>North Coast and North Bay</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Fulton 230/115 kV Transformer</td>
<td>North Coast and North Bay</td>
<td></td>
</tr>
<tr>
<td>Evergreen-Mabury Conversion to 115 kV</td>
<td>Greater Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Los Esteros-Montague 115 kV Substation</td>
<td>Greater Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>San Mateo – Bair 60 kV Line Reconstructor</td>
<td>Greater Bay Area</td>
<td></td>
</tr>
<tr>
<td>Cayucos 70 kV Shunt Capacitor</td>
<td>Central Coast and Los Padres</td>
<td></td>
</tr>
<tr>
<td>Watsonville Voltage Conversion Project</td>
<td>Central Coast and Los Padres</td>
<td></td>
</tr>
<tr>
<td>Ashlan - Gregg and Ashlan - Herndon 230 kV Line Reconstructor</td>
<td>Fresno</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Caruthers - Kingsburg 70 kV Line Reconstructor</td>
<td>Fresno</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Kearney - Caruthers 70 kV Line Reconstructor</td>
<td>Fresno</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Reedley-Dinuba 70 kV Line Reconstructor</td>
<td>Fresno</td>
<td></td>
</tr>
<tr>
<td>Reedley-Orosi 70 kV Line Reconstructor</td>
<td>Fresno</td>
<td></td>
</tr>
<tr>
<td>McCall - Reedley #2 115 kV Line</td>
<td>Fresno</td>
<td></td>
</tr>
<tr>
<td>Oro Loma-Mendota 115 kV Conversion Project</td>
<td>Fresno</td>
<td></td>
</tr>
<tr>
<td>North East Kern Voltage Conversion Project</td>
<td>Kern</td>
<td></td>
</tr>
</tbody>
</table>
## Projects to Put on Hold for One More Year

<table>
<thead>
<tr>
<th>Projects</th>
<th>Planning Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic-Placer 115 kV Line</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Jefferson - Stanford #2 60 kV Line</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Midway-Andrew Project</td>
<td>Central Coast and Los Padres</td>
</tr>
<tr>
<td>Morrow Bay 230/115 kV Transformer Project</td>
<td>Central Coast and Los Padres</td>
</tr>
<tr>
<td>Diablo Canyon Voltage Support Project</td>
<td>Central Coast and Los Padres</td>
</tr>
<tr>
<td>Gates-Gregg 230 kV Line</td>
<td>Fresno</td>
</tr>
<tr>
<td>Projects</td>
<td>Planning Area</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>New Bridgeville – Garberville No. 2 115 kV Line</td>
<td>Humboldt</td>
</tr>
<tr>
<td>Cottonwood 115 kV Substation Shunt Reactor</td>
<td>North Valley</td>
</tr>
<tr>
<td>Cascade 115/60 kV No2 Transformer Project and Cascade – Benton 60 kV Line Project</td>
<td>North Valley</td>
</tr>
<tr>
<td>Cottonwood-Red Bluff No2 60 kV Line Project and Red Bluff Area 230/60 kV Substation Project</td>
<td>North Valley</td>
</tr>
<tr>
<td>Pease 115/60 kV Transformer Addition and Bus Upgrade</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Rio Oso Area 230 kV Voltage Support</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Lockeford-Lodi Area 230 kV Development</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Vaca – Davis Voltage Conversion Project</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Mosher Transmission Project</td>
<td>Central Valley</td>
</tr>
<tr>
<td>Fulton-Fitch Mountain 60 kV Line Reconductor (Fulton-Hopland 60 kV Line)</td>
<td>North Coast and North Bay</td>
</tr>
<tr>
<td>Clear Lake 60 kV System Reinforcement</td>
<td>North Coast and North Bay</td>
</tr>
<tr>
<td>Ignacio–Alto 60 kV Line Voltage Conversion</td>
<td>North Coast and North Bay</td>
</tr>
<tr>
<td>South of San Mateo Capacity Increase</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Spring 230/115 kV substation near Morgan Hill (Morgan Hill Area Reinforcement)</td>
<td>Greater Bay Area</td>
</tr>
<tr>
<td>Northern Fresno 115 kV Area Reinforcement</td>
<td>Fresno</td>
</tr>
<tr>
<td>Borden 230 kV Voltage Support</td>
<td>Fresno</td>
</tr>
<tr>
<td>Wilson 115 kV Area Reinforcement</td>
<td>Fresno</td>
</tr>
<tr>
<td>Oro Loma 70 kV Area Reinforcement</td>
<td>Fresno</td>
</tr>
<tr>
<td>Reedley 115/70 kV Transformer No. 2 Replacement Project</td>
<td>Fresno</td>
</tr>
<tr>
<td>Reedley 70 kV Reinforcement</td>
<td>Fresno</td>
</tr>
<tr>
<td>Kern PP 115 kV Area Reinforcement</td>
<td>Kern</td>
</tr>
</tbody>
</table>
Previously-Approved Projects with Revised Scope
Not Presented in November Meeting
Original Project Scope:

- Build a new 36 mile Bridgeville – Garberville No.2 115 kV line as a DCTL (built to 115 kV specs) with the existing Bridgeville – Garberville No.1 60 kV Line.
- Build new 115 kV bus and install a 115/60 kV transformer at Garberville substation
- 2011-2012 TPP estimated cost: $55-65 million
- Current estimated cost: $80-90 million
- Current In-Service Date: Jan-2024

Revised Project Scope:

- Generation dispatch at Humboldt Bay Power Plant to address P-1 contingencies
- Reconductor the Humboldt – Rio Dell Jct line from tower 1/2 to tower 3/7, tower 3/12 to tower 6/1, tower 6/6 to 11/4, tower 15/4 to 19/6 (i.e. the 336.4-19 AAC and 4/0-7 AAC sections), which is approximately 13 miles with a WE rating of at least 600 amps.
- Reconductor the Humboldt – Rio Dell Jct Line from Tower 11/4 to 15/5 with a WE rating of at least 600 amps (same conductor as the second item of this project scope).
- Rerate sections of the Rio Dell – Bridgeville line to 4 feet per second from Rio Dell Junction (tower 19/6) to Carlotta Substation and Swains Flat substation to Bridgeville Substation.
- Rerate the Bridgeville – Garberville 60 kV Line to 4 feet per second.
- 2017-2018 TPP estimated cost: $60 million
- In-service date: 2023
Original scope:
- Cottonwood-Red Bluff No2 60 kV Line and Red Bluff Area 230/60 kV Substation
- Original estimated cost: $43-57 million
- Current estimated cost: $200-300 million

Revised scope:
- Current need: P1, P2 and P6
- Reconductor Coleman to Red Bluff 60 kV line. PG&E is reconductoring Cottonwood – Red Bluff line as part of their maintenance due to asset condition.
- Install sectionalizing breaker at Cottonwood 60 kV substation
- 2017-2018 TPP estimated cost: $40 million
- In-service Date: 2021
Lockeford-Lodi Area 230 kV Development Project (1/2)

**Original Scope:**
- A double circuit 230 kV line from Lockeford to Eight Mile
- Loop in one of the lines at a new Lodi 230 kV substation.
- 2012-2013 TPP estimated cost: $80 to 105 million
- Current estimated cost: $166 million
Lockeford-Lodi Area 230 kV Development Project (2/2)

**Revised Scope:**

- Current need: P1 voltage and P6 thermal
- Loop-in the Brighton – Bellota 230 kV line into Lockeford substation.
- Approximately 6 miles of double-circuit 230 kV line from Lockeford to a new Industrial 230 kV substation.
- 2017-2018 TPP estimated cost: $95 million
- In-service Date: 2023
**Original Scope:**

- Convert the 60 kV network between Vaca Dixon to Davis to 115 kV.
- Reconductor and convert the two 60 kV lines to 115 kV operation.
- Reconductor/re-rate four other 115 kV.
- Construct/convert four 115 kV switching station.
- Replace Vaca Dixon 230/115 kV transformer
- 2010-2011 TPP estimated cost: $70 to $107 million
- Current estimated cost: $192 million
Revised Scope:

- Current need: P0 voltage, P1, P2, P6 & P7 thermal
- Add 10 Mvar capacitor at Plainfield 60 kV substation
- Upgrade Vaca Dixon 115/60 kV Transformer bank #5
- Address terminal equipment at Dixon 60 kV substation
- Recommend PG&E to re-rate the 115 kV lines in Davis and West Sacramento areas and address remaining issues by modifying existing SPS or add new SPS.
- 2017-2018 TPP estimated cost: $15 million
- In-service Date: 2021
South of San Mateo Capacity Increase Project

**Original Scope:**
- Reconductor the Newark-Ames and San Mateo-Ravenswood 115 kV Lines with higher capacity conductors and substation equipment, as needed.
- 2007 TPP estimated cost: $10 to 20 million
- Current estimated cost: $80 to 200 million

**Revised Scope:**
- Current need: P6 thermal
- Normally close Monta Vista-AMES 115 kV Path.
- Reconductor San Mateo-Ravenswood 115 kV line
- 2017-2018 TPP estimated cost: $15 million
- In-service Date:
  - Monta Vista-AMES 115 kV path closing – January 2019
  - San Mateo-Ravenswood Reconductoring – Mar 2026
Morgan Hill Area Reinforcement (Spring) Project

Original scope:
- Construct new 230/115 kV Spring Substation in Morgan Hill, with connections into the Metcalf-Moss Landing No. 2 230 kV Line and the Morgan Hill-Llagas 115 kV Line.
- Original cost: $35M-$45M
- Current estimated cost: $250M-$350M
- Current estimated cost of Watsonville project: $40M-$70M

Revised scope:
- Current need: P6 thermal
- Rebuild Metcalf - Green Valley 115kV into the Green Valley - Morgan Hill 115kV (all new structures; 15 miles) and rebuild Morgan Hill 115kV into a BAAH
- Current estimated cost: $72-104 million
- In-service Date: May 2021
Original scope:
- Build new 230/115kV substation northeast of Fresno.
- Reconductor multiple 115kV facilities using existing right of ways (ROWs). Sectionalize Herndon 230 kV and McCall 230 kV buses.
- 2012-2013 TPP estimated cost: $110 to 190 Million
- Install one +/- 200 MVAR SVC at the new substation
- Current estimated cost: $300 to 381 million

Revised scope:
- Sectionalize Herndon 230 kV and McCall 230 kV buses and develop an operating solution for any incremental P6 overloads.
- 2017-2018 TPP estimated cost: $26 million
- In-service Date: March 2020
**Original scope:**
- Loop the Wilson-Gregg 230 kV line into Borden substation.
- Install approximately 200 MVAR of reactive support on the 230 kV bus at Borden substation.
- 2011-2012 TPP estimated cost: $15 to 20 million
- Current estimated cost: $40 million

**Revised scope:**
- Loop the Wilson-Gregg 230 kV line into Borden substation.
- 2017-2018 TPP estimated cost: $23 million
- In-service Date: February 2019
Wilson 115 kV Area Reinforcement

**Original scope:**
- Build a new 230/115 kV substation.
- Build a 4 mile 115 kV line to El Capitan.
- Reconfigure El Capitan Substation.
- 2010-2011 TPP estimated cost: $35 to 45 million
- Current estimated cost: $91 million
- Current In-service date: 2026

**Revised scope:**
- Line relocation by 2020 to make room for approved Wilson 115 kV SVC project
- Convert existing Wilson 115 kV bus to breaker and a half configuration.
- Replace limiting equipment on Wilson 230/115 kV Bank #1 to obtain full bank capacity (269 MVA SN, 322.9 MVA SE)
- Install third 230/115 kV transformer at Wilson
- Replace limiting components and rerate the Atwater-Atwater Junction 115 kV Line section
- 2017-2018 TPP estimated cost: $71 million
- In-service Date: 2023
Oro Loma 70 kV Area Reinforcement

Original scope:
- Build a new 230/70 kV Mercy Springs Substation looped into the Los Banos – Panoche #2 230 kV Line.
- Install one 200 MVA 230/70 kV transformer
- Install a 70 kV ring bus sectionalizing the Los Banos-Canal-Oro Loma 70 kV Line.
- Rebuild the line from Mercy Springs Junction to Canal as a double circuit tower line.
- 2012-2013 TPP estimated cost: $110 to 190 million
- Current estimated cost: $300 to 381 million

Revised scope:
- Cancel the Oroloma-Mendota 115 kV conversion project
- Maintain seasonal setup on Oro Loma CB 32, and Canal CB 32
- Re-conductor 2.4 miles of the Los Banos-Livingston Jct-Canal 70 kV Line, from Los Banos to Santa Nella
- Re-conductor 10.8 miles of the Mercy Springs SW STA-Canal-Oro Loma 70 kV Line, from Mercy Springs SW STA to Canal
- 2017-2018 TPP estimated cost: $31 million
- In-service Date: May 2020
Reedley 115/70 kV Transformer No. 2 Replacement Project

**Original scope:**
- Phase 1: Replace the limiting substation equipment to obtain the full bank rating of existing bank (90 MVA summer normal, and 108 MVA summer emergency).
- Phase 2: Replace the four single-phase transformers comprising the Reedley 115/70 kV Transformer No. 2 with four single phase 60 MVA transformers to obtain a 180 MVA summer normal and 198 MVA summer emergency capacity.
- 2012-2013 TPP estimated cost: $12 to $18 million
- Current estimated cost: $10 to $15 million

**Revised scope:**
- Cancel the replacement of Bank # 2
- Other terminal equipment work to utilize the full rating of the transformer is already completed.
- Project already completed based on the revised scope of work
**Reedley 70 kV Reinforcement**

**Original scope:**

**Reedley 70 kV Reinforcement**
- Replace limiting equipment on the Reedley-Orosi 70 kV Line #1
- Reconduct 9 miles of the Dinuba-Orosi 70 kV Line #1 from Dinuba to Stone Corral Junction.
- 2010 TPP estimated cost: $7-10 million
- Current estimated cost: $5 - 15 million
- Current In-service date: February 2020

**Reedley-Orosi 70 kV Line Reconductor**
- Reconductor 2 miles of the Reedley-Orosi 70 kV line from Orosi Jct to Orosi Substation.
  - In addition, 20 MVARs of shunt capacitors will be installed at Dinuba Substation.
- 2010 TPP estimated cost: $4 million
- Current estimated cost: $6 million
- Current In-service date: December 2018

**Reedley-Dinuba 70 kV Line Reconductor**
- Reconductor approximately 8 miles of the Reedley Dinuba 70 kV Line
- 2010 TPP estimated cost: $8 million
- Current estimated cost: $10 million
- Current In-service date: March 2019
Revised scope:

- Install 10 MW 51 MWh Energy Storage device at Dinuba 70 kV substation
  - Energy storage to be a transmission asset.
- Upgrade Dinuba 70 kV substation to accommodate new Energy Storage
- 2017-2018 TPP estimated cost: $14 million
- In-service Date: 2021
Kern PP 115 kV Area Reinforcement

Original Scope

- Reconductor 3.8 miles of the Kern PP-West park #1 115 kV line with 795 ACSS.
- Reconductor 3.8 miles of the Kern PP-Westpark #2 115 kV line with 795 ACSS.
- Reconductor 16.5 miles of the Kern-Magunden-Witco 115 kV line with 795 ACSS.
- Reconductor 3.5 miles of the Westpark-Magunden 115 kV line from Columbus to Magunden with 795 ACSS.
- Reconductor 5.0 miles of the Kern-Lamont 115 kV line from Kern PP to Tevis Jct. with 795 ACSS.
- Reconductor 5.0 miles of the Kern-Stockdale 115 kV line from Kern PP to Tevis Jct. with 795 ACSS.
- 2011-2012 TPP estimated cost: $40 to 65 million
- Current estimated cost: $50 to 64 million
Revised scope:

- Rerate 9 miles of the Kern-Magunden-Witco 115 kV line (Kern Oil Junction to Magunden) with at least 805 Amp & upgrade Magunden CB122.
- Rerate Kern-Magunden-Witco 115 kV line (Kern Oil Junction to Kern Water & Kern Power to Kern Water) with at least 780 Amp.
- Reconductor 3.5 miles of the West park-Magunden 115 kV line from Columbus to Magunden with 560 Amp.
- Reconductor 6.63 miles of the Kern – Live Oak 115 kV Line with a conductor capable of at least 595 amps during summer emergency conditions. This was originally part of North East conversion project.
- Reconductor 4.6 miles of the Live Oak – Kern Oil 115 kV Line with a conductor capable of at least 822 amps during summer emergency conditions. This was originally part of North East conversion project.
- 2017-2018 TPP estimated cost: $24 million
- In-service Date: December 2023

Note: Revised scope has been updated from the 2017-2018 Draft Transmission Plan
New Projects Recommended for Approval in 2017-2018 TPP
## New Projects Recommended for Approval in 2017-2018 TPP

<table>
<thead>
<tr>
<th>Projects</th>
<th>Planning Area</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shingle Springs Reconfiguration</td>
<td>Central Valley</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Lakeville 60 kV Area Reinforcement</td>
<td>North Coast and North Bay</td>
<td></td>
</tr>
<tr>
<td>Vaca Dixon-Lakeville 230 kV Corridor Series Compensation</td>
<td>North Coast and North Bay</td>
<td></td>
</tr>
<tr>
<td>Newark-Lawrence 115 kV Line Upgrade</td>
<td>Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Newark-Milipitas #1 115 kV Line Upgrade</td>
<td>Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Trimble-San Jose B 115 kV Line Upgrade</td>
<td>Bay Area</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Cooley Landing-Palo Alto and Ravenswood-Cooley Landing 115 kV Rerate</td>
<td>Bay Area</td>
<td></td>
</tr>
<tr>
<td>Oakland Clean Energy Initiative Project</td>
<td>Bay Area</td>
<td></td>
</tr>
<tr>
<td>Oil Fields 60 kV Capacitor Bank</td>
<td>Central Coast and Los Padres</td>
<td>Presented in Nov meeting</td>
</tr>
<tr>
<td>Herndon-Bullard 115 kV Reconductoring Project</td>
<td>Fresno</td>
<td></td>
</tr>
</tbody>
</table>
Lakeville 60 kV Area Reinforcement

- **Reliability Assessment Need**
  - NERC Category P6 thermal overloads in 2019, 2022 and 2027 summer peak and winter peak scenarios without local generation

- **Project Submitter**
  - CAISO

- **Project Scope**
  - Reconductor the line sections on the Lakeville #2 60 kV Line between Petaluma A to Lakeville Junction (tower 4/100) and Cotati to tower 11/236 (approx. 3.39 miles) with 397.5 AAC
  - Upgrade the capacity of the Petaluma A bus conductor with at least a summer emergency (SE) rating of 490 amps (currently, the bus consists of 250 Cu)
  - Upgrade limiting equipment, including terminal equipment and disconnect switches, on the line and buses so that the full capacity of the line can be used.
  - Open 60kV line between Cotati and Petaluma

- **Project Cost**
  - Current estimated cost: $7 million

- **In-service Date**
  - 2021

- **Alternatives Considered**
  - SPS to drop load

- **Recommendation**
  - Approval
Vacca Dixon-Lakeville 230 kV Corridor Series Compensation project

- Reliability Assessment Need
  - NERC Category P2 and P6 thermal overloads in 2019, 2022 and 2027 winter peak and Peak Shift study scenarios without local generation
- Project Submitter
  - CAISO
- Project Scope
  - Install series compensation device on these 230 kV lines.
- Project Cost
  - Current estimated cost: $11 million
- In-service Date
  - October 2019
- Alternatives Considered
  - Smart Wires in 2017 Request Window
  - SPS to drop load
- Recommendation
  - Approval
Cooley Landing-Palo Alto and Ravenswood-Cooley Landing 115 kV Rerate

- Reliability Assessment Need
  - NERC Category P2, P6 and P7 thermal overloads
- Project Submitter
  - CAISO
- Project Scope
  - Rerate Cooley Landing-Palo Alto and Ravenswood-Cooley Landing 115 kV lines to 4 fps wind speed ratings.
- Project Cost
  - Current estimated cost: $1 million
- In-service Date
  - February 2019
- Alternatives Considered
  - None
- Recommendation
  - Approval
Herndon-Bullard 115 kV Reconductoring Project

- Reliability Assessment Need
  - NERC Categories P2 &2-1 thermal overload in baseline and sensitivity scenarios.
  - Overloads worsen in 2027 peak-shift and high CEC forecast sensitivities.

- Project Submitter
  - PG&E

- Project Scope
  - Reconductor ~6 circuit miles (3 miles of double circuit transmission lines) between Pinedale Junction and Bullard Substation on the Herndon-Bullard #1 and #2115kV Lines.

- Project Cost
  - Current estimated cost: $6 - $8 million

- Alternatives Considered
  - Energy Storage was not considered due to expected high costs as compared to reconductoring

- Recommendation
  - Approval
Oakland Clean Energy Initiative

- Reliability Assessment Need
  - NERC Category P2 and P6 thermal overloads in baseline and sensitivity scenarios without local generation
- Project Submitter
  - PG&E
- Project Scope
  - Rerate
  - Substation upgrade
  - Front-of-the-meter energy storage
  - Preferred resources
- Project Cost
  - Estimated Capital Cost: $56-731 (2022 $M)
  - Expected PVRR: $102^2 (2022 $M)
- Alternatives Considered
  - Generation: $232 (2022 $M)
  - New 115 kV Transmission: $193-217 (2022 $M)
  - New 230 kV Transmission: $280-300 (2017 $M)
  - 40MW BESS: $60 (2022 $M)
- Recommendation
  - Approval
  - Requires ISO Board approval (>50M)

Notes:
1. Proportion of capital to contract spend will be determined by the most cost effective portfolio determined through the RFO
2. Calculated using unit costs of the expected portfolio, including land and O&M as appropriate
### Alternative Comparison

<table>
<thead>
<tr>
<th>Projects Comparison</th>
<th>Submitter</th>
<th>Scope</th>
<th>In-Service Date</th>
<th>Mitigates Reliability Concerns?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PG&amp;E</td>
<td>Rerate Substation upgrades 10MW / 4 hour Energy Storage Portfolio of DERs (DG, EE, DR)</td>
<td>Aug-22</td>
<td>Yes</td>
<td>Mitigates all reliability issues identified. Continued reliance on existing load switching capabilities following the first N-1 contingency for N-1-1 contingency condition.</td>
</tr>
<tr>
<td></td>
<td>NEER</td>
<td>40MW / 4 hour Battery Energy Storage</td>
<td>Dec-22</td>
<td>No</td>
<td>Doesn’t mitigate all reliability issues identified. Submitted as part of a wider solution to all the reliability issues identified in the Oakland area.</td>
</tr>
<tr>
<td></td>
<td>NEET</td>
<td>230 kV overhead line from Moraga close to Claremont (~4 miles) 230 kV underground line from close to Claremont to new Oakland C 230 kV substation (~5.4 miles) Oakland C 230/115 kV autotransformer connecting to the existing PG&amp;E’s Oakland C 115 kV substation 230 kV overhead line from Sobrante close to Claremont (~5 miles) 230 kV underground line from close to Claremont to new Oakland C 230 kV substation (~5.4 miles) Oakland C 230/115 kV autotransformer connecting to the existing PG&amp;E’s Oakland C 115 kV substation</td>
<td>Dec-23</td>
<td>No</td>
<td>C-X 2 and D-L overloads unresolved.</td>
</tr>
</tbody>
</table>
## Alternative Cost Comparison

<table>
<thead>
<tr>
<th></th>
<th>Estimated Cost (2022 $M)</th>
<th>Expected PVRR (2022 $M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCEI</td>
<td>$56-$73&lt;sup&gt;1&lt;/sup&gt;</td>
<td>$102&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>115 kV</td>
<td>$193-$217</td>
<td>$367&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>230 kV</td>
<td>$316</td>
<td>$574&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Generation</td>
<td>$232</td>
<td>$368&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### Notes:

1. Proportion of capital to contract spend will be determined by the most cost effective portfolio determined through the RFO.
2. Calculated using unit costs of the expected portfolio, including land and O&M as appropriate.
3. Based on the $193 capital estimate assuming 2022 installation date.
4. Based on the capital estimate assuming 2022 installation date.
5. Based on the capital estimate assuming 2022 installation date.
## 2017 Request Window Submissions

<table>
<thead>
<tr>
<th>Ref. #</th>
<th>Project Name</th>
<th>Submitted by</th>
<th>In-Service Date</th>
<th>Cost ($M)</th>
<th>ISO Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>California High-Speed Rail Project Load Interconnection</td>
<td>PG&amp;E</td>
<td>2020</td>
<td>737</td>
<td>Concur (Load interconnection)</td>
</tr>
<tr>
<td>2</td>
<td>Oakland Clean Energy Initiative</td>
<td>PG&amp;E</td>
<td>2022</td>
<td>56</td>
<td>Approve</td>
</tr>
<tr>
<td>3</td>
<td>Oil Fields 60 kV Voltage Support</td>
<td>PG&amp;E</td>
<td>2022</td>
<td>7</td>
<td>Approve</td>
</tr>
<tr>
<td>4</td>
<td>Herndon-Bullard 1 and 2 115 kV Reconductoring</td>
<td>PG&amp;E</td>
<td>2021</td>
<td>6-8</td>
<td>Approve</td>
</tr>
<tr>
<td>5</td>
<td>Wellhead Merchant Transmission Line</td>
<td>WellHead</td>
<td>2018</td>
<td>NA</td>
<td>No reliability concerns identified with this merchant transmission facility.</td>
</tr>
<tr>
<td>6</td>
<td>Alto 45 MW &amp; Las Gallinas 22 MW Battery Energy Storage Systems (BESS)</td>
<td>NEER</td>
<td>2022</td>
<td>100</td>
<td>Lower cost alternative of transmission upgrade recommended.</td>
</tr>
<tr>
<td>7</td>
<td>Oakland 40 MW Battery Energy Storage System (BESS)</td>
<td>NEER</td>
<td>2022</td>
<td>60</td>
<td>Doesn't address all reliability issues identified. Project that mitigates all reliability issues recommended.</td>
</tr>
<tr>
<td>8</td>
<td>Lodi 40MW Battery Energy Storage System (BESS)</td>
<td>NEER</td>
<td>2022</td>
<td>60</td>
<td>Doesn't address all reliability issues identified. Project that mitigates all reliability issues recommended.</td>
</tr>
<tr>
<td>9</td>
<td>Lockeford - Industrial Transmission Reliability Project</td>
<td>NEET West</td>
<td>2022</td>
<td>30</td>
<td>Doesn't address all reliability issues identified. Project that mitigates all reliability issues recommended.</td>
</tr>
<tr>
<td>10</td>
<td>Lopez to Divide 500/230 kV Transmission System</td>
<td>NEET West</td>
<td>2023</td>
<td>100</td>
<td>Doesn't address all reliability issues identified. Project that mitigates all reliability issues currently on hold.</td>
</tr>
<tr>
<td>11</td>
<td>Oakland 230 kV Transmission System (Moraga-Oakland C)</td>
<td>NEET West</td>
<td>2023</td>
<td>280</td>
<td>Doesn't address all reliability issues identified and also higher cost. Project that mitigates all reliability issues and is lower cost is recommended.</td>
</tr>
<tr>
<td>12</td>
<td>Oakland 230 kV Transmission System (Sobrante-Oakland C)</td>
<td>NEET West</td>
<td>2023</td>
<td>300</td>
<td>Doesn't address all reliability issues identified and also higher cost. Project that mitigates all reliability issues and is lower cost is recommended.</td>
</tr>
<tr>
<td>13</td>
<td>Round Mountain Dynamic Reactive 500 kV Transmission System</td>
<td>NEET West</td>
<td>2023</td>
<td>80</td>
<td>Continuing to assess the bulk system reactive needs after the retirement of the Diablo generation in the 2018-2019 transmission planning process.</td>
</tr>
<tr>
<td>14</td>
<td>Vaca Dixon – Lakeville Corridor Smart Wires Project</td>
<td>Smart Wires</td>
<td>2018-2027</td>
<td>8.5 - 11</td>
<td>Feasible alternative for the Vaca-Lakeville 230 kV Corridor Series Compensation project.</td>
</tr>
<tr>
<td>15</td>
<td>Metcalf - Evergreen No. 1 115 kV Smart Wires Project</td>
<td>Smart Wires</td>
<td>2021</td>
<td>1.0 – 1.5</td>
<td>Doesn't address all reliability issues identified. Project that mitigates all reliability issues recommended.</td>
</tr>
<tr>
<td>16</td>
<td>Feather River Energy Center Clutch</td>
<td>Calpine</td>
<td>2019</td>
<td>6-7</td>
<td>Need addressed by other previously approved project. This project does not eliminate the need or reduce the scope of the previously approved project.</td>
</tr>
<tr>
<td>17</td>
<td>TBC Bi-Directional flow control Upgrade</td>
<td>TBC</td>
<td>2020</td>
<td>15</td>
<td>Need addressed by other previously approved project.</td>
</tr>
<tr>
<td>18</td>
<td>NRS-Scott No. 2 115 kV Line Reconstructor</td>
<td>SVP</td>
<td>2018</td>
<td>2-4</td>
<td>Previously approved project rescoped to include reconductoring of the NRS-Scott #2 line.</td>
</tr>
</tbody>
</table>
Questions?

Stay connected

@California_ISO

Download ISO Today mobile app

Sign up for the Daily Briefing at www.caiso.com
Next Steps
Draft 2017-2018 Transmission Plan and transmission project approval recommendations

Kristina Osborne
Senior Stakeholder Engagement and Policy Specialist

2017-2018 Transmission Planning Process Stakeholder Meeting
February 8, 2018
2017-2018 Transmission Planning Process

Next Steps

- Comments due February 22, 2018
  - regionaltransmission@caiso.com

- ISO Board Meeting on March 21-22, 2018
THANK YOU

Stay connected

@California_ISO

Download ISO Today mobile app

Sign up for the Daily Briefing at www.caiso.com