

2020 Transmission Maintenance and Compliance Review Stakeholder Meeting

Re: 2020 Transmission Maintenance and Compliance Review Report

Date: June 26, 2020



Roll Call

Roundtable: Before we begin, please state your name and identify the organization you represent.

Introduction and Overview

Fernando E. Cornejo
Senior Advisor, Regulatory Affairs



Stakeholder Meeting Comment Process

- After each project sponsor completes their presentation(s), there will be a “Question and Answer” segment to allow time for stakeholders to ask questions.
- If you have a question, then please type your (i) Name and (ii) Affiliated Organization in the comment window of the Skype Meeting.
- SCE will keep track of each stakeholder in the order of appearance in the comment window. This will inform the order of questions.
- Once the “Question and Answer” segment begins, you will be called on by the moderator to verbally ask your question directly to the project sponsor.
- Please refrain from speaking until your name is called so that SCE can ensure everyone has a chance to speak and no one is talking over another person.

2020 TMCR Stakeholder Meeting Agenda

Topic	Presenter	Time
Introduction/Overview	Fernando Cornejo & Jeff Nelson	10:00 - 10:30
Compliance – Transmission Line Rating & Remediation (TLRR)	Corey Semrow	10:30 - 10:55
Substation Infrastructure Replacement & Compliance – Disturbance Monitoring	Jeff Shiles	10:55 – 11:20
Transmission Capital Maintenance & Wildfire Management	Randall Daffern	11:20 - 11:45
LUNCH		11:45 – 12:30
Work Performed by Operating Agent	Tracee Reeves	12:30 – 12:40
Operations Support – Substation Capital Maintenance (ISO Facilities)	Don Neal	12:40 – 1:00
Operations Support – Seismic Activity	Jenny Pearce	1:00 – 1:20
Physical/Cyber Security	Alex Benoliel	1:20 – 1:35
Next Steps/Wrap-up	Fernando Cornejo	1:35 – 1:50

Safety Moment

Meeting Disclaimer

SCE has made a good faith effort to identify the appropriate subject matter experts to speak on each topic and to provide accurate information throughout this presentation, but reserves the right to correct or supplement the information provided if it becomes aware of needed modifications or additions.

TMCR Background

- August 31, 2018, FERC accepted SCE's proposal for a new process (i.e. TMCR) which, subject to certain exceptions, will cover proposed SCE facilities and projects that will have their costs recovered through transmission rates (FERC Docket: ER18-370-00)
 - September 28, 2018, SCE submitted its compliance filing with FERC
- Tariff requires SCE to post draft TMCR Report by no later than May 15 and to subsequently host a stakeholder meeting
- Stakeholders will have an opportunity to provide comments on the draft TMCR Report
- SCE will consider stakeholders' comments in the development of the final TMCR Report
- After posting of the final TMCR Report, stakeholders may submit comments on considerations for the following year's TMCR

Stakeholder Process Timeline

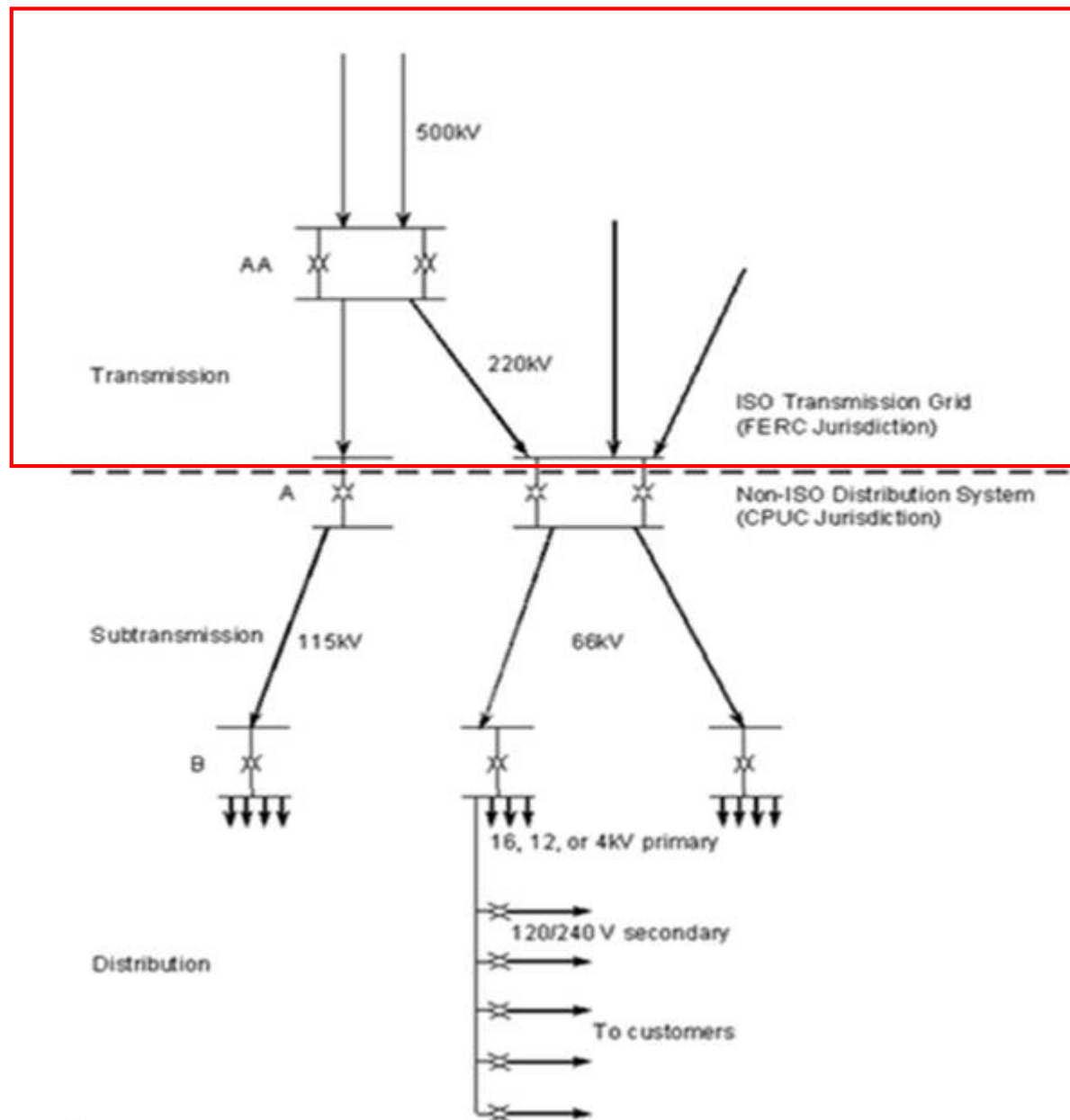


<u>DUE DATE</u>	<u>ACTIVITY</u>
May 15, 2020	SCE circulated TMCR stakeholder meeting notice
May 15, 2020	SCE posted 2020 draft TMCR report
Today: June 26, 2020	SCE conducts stakeholder meeting and posts comments template
July 27, 2020	Stakeholders comments due on draft TMCR report
August 10, 2020	SCE posts stakeholder comments on draft TMCR report
September 29, 2020	SCE posts final TMCR report
October 13, 2020	Stakeholders comments due on final TMCR report
October 27, 2020	SCE posts stakeholder comments on final TMCR report

Overview of TMCR Process

- Annual process open to all stakeholders
- Reviews SCE transmission projects not assessed in CAISO's TPP, and other exemptions, whose costs are recovered in CAISO's TAC
- In-Scope: Compliance (NERC, WECC, and CPUC driven); Infrastructure Replacement; Operational Support, and Work Performed by Operating Agent
- Out-of-Scope: CAISO TPP or generator interconnection projects; projects initiated and online within 2 years; projects related to security; and primarily distribution projects with ancillary transmission elements
- Covers years "3-5" of a five year window (2022 – 2024 for this 2020 TMCR process); Years "1-2" (2020-2021) covered by FERC formula rate case process

Overview of SCE's Transmission and Distribution System



2022- 2024 TMCR Forecast

<i>AS OF 05/2020</i>	2022 FORECAST	2023 FORECAST	2024 FORECAST	TOTAL
TOTAL TMCR REPORT FORECAST	\$250,970	\$351,117	\$386,618	\$1,065,271
COMPLIANCE	\$115,343	\$216,831	\$269,885	\$602,060
INFRASTRUCTURE REPLACEMENT AND CAPITAL MAINTENANCE	\$90,624	\$86,808	\$70,398	\$247,831
WILDFIRE MANAGEMENT	\$1,961	\$2,255	\$1,889	\$6,104
WORK PERF. BY OP. AGENT	\$2,321	\$1,232	\$1,267	\$4,820
OPERATIONS SUPPORT	\$14,322	\$14,440	\$22,561	\$51,324
PHYSICAL SECURITY	\$26,400	\$29,550	\$20,617	\$76,566

Compliance: Transmission Line Rating Remediation (TLRR)

*Corey Semrow
Senior Project Manager, Transmission & Distribution*

*2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
June 26, 2020*

TLRR

Description:

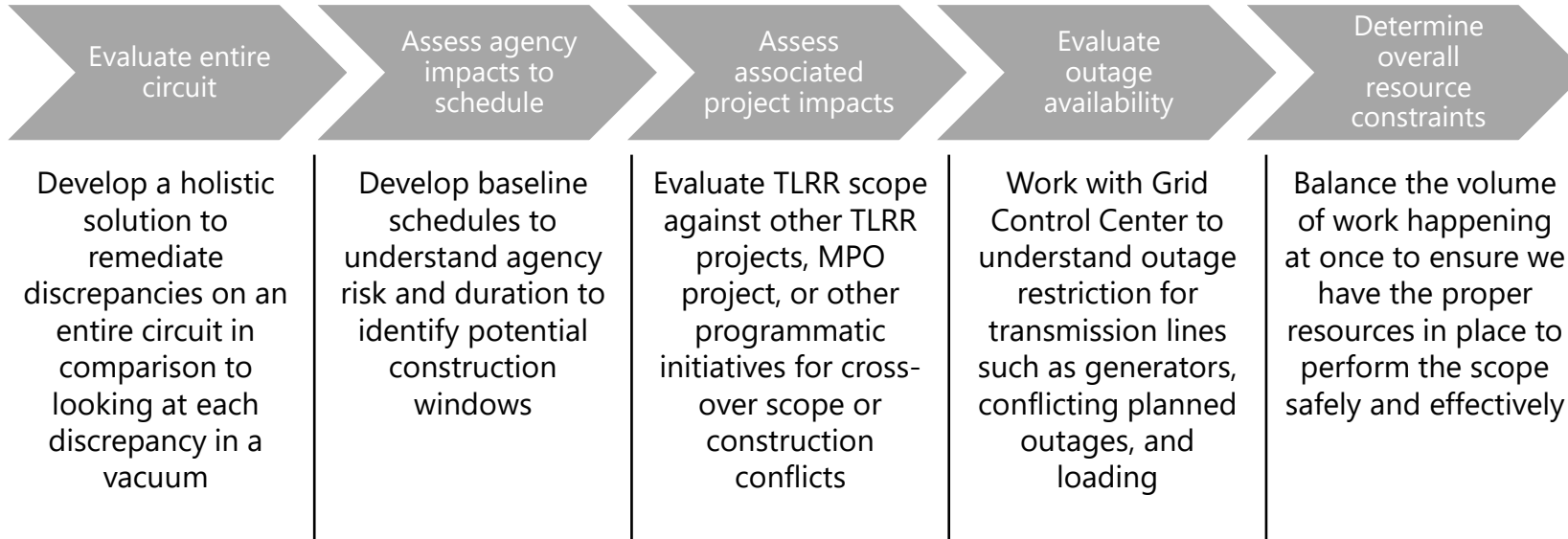
- The purpose of the TLRR Program is to mitigate potential electrical clearance issues on the SCE system in support of NERC reliability, as set up in its standards, and in compliance with CPUC's General Order 95.

Criteria:

- SCE conducted a Light Detection and Ranging (LiDAR) study of all ISO-controlled lines and radial 115kV lines to identify lines potentially in violation of GO 95.
- Over 11,000 discrepancies were found that require remediation.

TLRR

Methodology:



TLRR – Forecast

PIN	Project Title	OD	WBS	2022 Forecast	2023 Forecast	2024 Forecast	Total
	Eagle Mountain-Blythe	2023	CET-PD-OT-PJ-792801	\$8,661	\$2,512	\$0	\$11,172
	Big Creek No.1-Rector	2022	CET-PD-OT-PJ-792801	\$1,725	\$0	\$0	\$1,725
	Pardee-Pastoria (North Coast)	2022	CET-PD-OT-PJ-792801	\$167	\$0	\$0	\$167
	Big Creek 3-Rector No.2	2022	CET-PD-OT-PJ-792801	\$5,887	\$12	\$0	\$5,898
	Big Creek 2-Big Creek 3	2025	CET-PD-OT-PJ-792801	\$12	\$12	\$218	\$241
	Big Creek 3-Big Creek 8	2024	CET-PD-OT-PJ-792801	\$12	\$172	\$9,695	\$9,878
	Big Creek 2-Big Creek 8	2025	CET-PD-OT-PJ-792801	\$12	\$12	\$799	\$822
	Bailey-Pardee	2024	CET-PD-OT-PJ-792801	\$17,561	\$9,900	\$3,300	\$30,761
	Pardee-Pastoria-Warne (North Coast)	2022	CET-PD-OT-PJ-792801	\$1,233	\$0	\$0	\$1,233
	Serrano-Valley (San Jacinto)	2023	CET-PD-OT-PJ-792801	\$200	\$3,456	\$0	\$3,656
	Big Creek 3-Rector No.1	2024	CET-PD-OT-PJ-792801	\$29,746	\$22,713	\$7,327	\$59,785
	La Fresa-Laguna Bell	2022	CET-PD-OT-PJ-792801	\$200	\$0	\$0	\$200
	Lugo-Victor No.1	2023	CET-PD-OT-PJ-792801	\$0	\$274	\$0	\$274
	Padua-Rancho Vista No.1	2022	CET-PD-OT-PJ-792801	\$207	\$0	\$0	\$207
7298	Transmission Line Rating Remediation (Exempt from Licensing)			\$65,620	\$39,061	\$21,338	\$126,019
7867	TLRR Eldorado-Lugo-Pisgah 220kV Transmission Project	2026	CET-PD-OT-PJ-7867*	\$10,754	\$25,017	\$86,668	\$122,439
7904	TLRR Inyokern-Ivanpah (Ivanpah-Coolwater-Kramer-Inyokern 115kV)	2026	CET-PD-OT-PJ-7904*	\$25,100	\$118,470	\$118,590	\$262,160
7906	TLRR Control-Silver Peak	2026	CET-PD-OT-PJ-7906*	\$11,853	\$33,833	\$43,074	\$88,760
	Transmission Line Rating Remediation (Licensing)			\$47,707	\$177,320	\$248,333	\$473,359
	Total Transmission Line Rating Remediation (TLRR)			\$113,327	\$216,381	\$269,671	\$599,378

(Forecast in thousands)

Question & Answer

*2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Substation Infrastructure Replacement

Jeff Shiles
Principal Manager, Transmission & Distribution

2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Substation Infrastructure Replacement (Sub IR)

Description:

- Sub IR program reduces the impact of aging infrastructure on the reliability and safety of SCE's grid by proactively replacing substation equipment and structures before they cause an unplanned outage
 - Proactive replacements (rather than running to failure) decrease the likelihood and impact of extended outages due to in-service failures
- Seven Sub IR programs in scope for TMCR
 - Bulk Power Circuit Breaker Replacement; Substation Transformer Bank Replacement; Critical Spare Transformer Equipment Program (STEP); Bulk Power Relay Replacement; Non-Bulk Relay Replacement; Substation Miscellaneous Equipment Replacement; Substation Switchrack Rebuild

Criteria:

- Aged assets that are nearing end of life
- Assets that have become obsolete in the industry
- System criticality
- Assets with poor maintenance history / excessive maintenance costs

Substation Infrastructure Replacement (Sub IR)

Methodology:

Applicable to
circuit breakers
& transformers
only

1. Combining **analysis of historical failure rates** (Weibull curves) with current age of SCE fleet assets yields forecast annual replacement volume
2. Additional **asset-specific data** further refines selection of specific units to replace
 - **Health Indexing** – a score as a function of age, loading, fault history, maintenance history, mechanisms, oil quality, severity of in-service failure consequences
 - **Maintenance Decision Tool (MDT)** - an algorithm-derived prioritization which yields a five-year replacement plan
 - **Technical expert review** and **construction-schedule optimization** includes evaluation of factors difficult to quantify, and optimization of construction schedule
3. **Scoping Job Walks** on each project confirm full scope in advance of engineering design; evaluate bundling opportunities
4. **Annual Integrated Work Planning meetings** ensure coordination with other T&D programs and initiatives to avoid unnecessary work
5. **Bottom-Up Operational Planning** is based on project-specific scope, using historical unit costs and/or preliminary engineering design information where available

Substation Infrastructure Replacement (Sub IR) - Forecast

2022 FORECAST	2023 FORECAST	2024 FORECAST	TOTAL
\$49,122	\$52,491	\$36,081	\$137,694

	Replace Bulk Power Circuit Breakers -Vincent	4,168,115	3,279,435	-	7,447,550
	Replace Bulk Power Circuit Breakers - Devers	809,569	-	-	809,569
	Replace Bulk Power Circuit Breakers - Mira Loma	1,912,327	819,569	-	2,731,896
4211	Bulk Power Circuit Breakers/Switches Replacement Program	6,890,011	4,099,004	-	10,989,015
	Substation Transformer Bank Replacement (AA-Bank & A-Bank) - Vincent	4,674,577	5,410,201	-	10,084,778
5210	Substation Transformer Bank Replacement Program (AA-Bank & A-Bank)	4,674,577	5,410,201	-	10,084,778
3362	Critical Spare Equipment Program	8,869,003	16,417,624	9,343,855	34,630,481
5089	Bulk Power 500kV & 220kV Line Relay Replacement	8,319,042	8,000,000	8,000,000	24,319,042
4343	Non-Bulk Relay Replacement Program ("SRRP")	1,158,168	1,192,262	1,000,000	3,350,430
4756	Substation Miscellaneous Equipment Additions & Betterment	13,361,618	11,886,864	12,500,000	37,748,482
7716	Substation Batteries and Chargers	349,408	974,916	-	1,324,324
	Substation Miscellaneous Equipment Replacement	13,711,026	12,861,780	12,500,000	39,072,806
7713	Substation Switchrack Rebuild	5,500,000	4,510,000	5,237,343	15,247,343

Compliance: Disturbance Monitoring

Jeff Shiles
Principal Manager, Transmission & Distribution

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Compliance: Disturbance Monitoring

Description:

- NERC requires each Transmission Owner to install Disturbance Monitoring Equipment (DME) and report on disturbance data to facilitate analysis of events and verify system models.
- SCE installs Digital Fault Recorders (DFR) and Phasor Measurement Unit (PMU) devices for post event analysis, situational awareness, and for use with mis-operation investigations.

Criteria:

- Obsolescence of hardware
- SCE's PRC-002-2 sites are upgraded in time to meet the NERC compliance deadline.
- Requests from SCE's Grid Control Center (GCC) for upgrades to ensure GCC personnel have the necessary situational awareness

Methodology:

- Replacement of an obsolete PMU is accomplished through a combination of infrastructure replacement work and bundled capital projects.
- SCE takes advantage of substation construction projects to upgrade PMUs when possible, as efficiencies can be realized by coupling the PMU installation with other capital work.

Compliance: Disturbance Monitoring - Forecast

2022 FORECAST	2023 FORECAST	2024 FORECAST	TOTAL
\$2,017	\$451	\$214	\$2,682

	Control 115/55 kV Substation	2024	CET-ET-GA-EM-644600	0	451	214	665
	Johanna 220/66 kV Substation	2022	CET-ET-GA-EM-644600	389	0	0	389
	Walnut 220/66 kV Substation	2022	CET-ET-GA-EM-644600	396	0	0	396
	Hinson 220/66 kV Substation	2022	CET-ET-GA-EM-644600	396	0	0	396
	Chevmain 220/66 kV Substation	2021	CET-ET-GA-EM-644600	389	0	0	389
	Pastoria 220/66 kV Substation	2022	CET-ET-GA-EM-644610	445	0	0	445
6446	Phasor Measurement System Installations			2,017	451	214	2,682

Question & Answer

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Transmission Capital Maintenance

*Randall Daffern
Principal Manager, Transmission*

*2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Transmission Capital Maintenance

Description: Transmission Capital Maintenance includes the costs to remove, replace, and retire assets on a planned or reactive basis in three main areas (1) Tower Corrosion, (2) Transmission Grid-Based Capital Maintenance and (3) IR Overhead Conductor.

(1) Tower Corrosion:

Criteria & Methodology

- 30 years is the average age at which the first signs of tower corrosion, from minor to severe, generally are revealed.
- Sample Assessment and testing will take place on 2235 SCE towers to identify further remediation needs and prioritization of work.

(2) Transmission Grid-Based Capital Maintenance:

Criteria & Methodology

- Per CPUC requirements for inspection and maintenance programs, SCE inspects right of ways, conductors, encroachment, structures and hardware components for “break/fix” items.
- In 2021, SCE is starting aerial inspections, which will also result in capital replacements based on notifications.
- Based on these inspections, capital replacements are identified.

Forecast

(3) IR Overhead Conductor

Criteria & Methodology

- Overhead conductor review and poor performing circuits are used to identify interruptions and prioritize overhead conductors to be replaced.
- In order to determine prioritization of replacement, SCE completes overhead conductor assessments of the wire and related components, analyzes performance data, and completes a risk analysis on the structures and location where there is a risk of ignition. An additional visual inspection of the condition of the conductor is also performed through infrared and corona scans.

3364	Transmission Grid-Based Maintenance	13,011,561	13,309,593	13,309,593	39,630,747
	Chevmain-El Nido 220 kV lines Reconductoring	2,500,000	-	-	2,500,000
	Chevmain-El Segundo 220 kV lines Reconductoring	2,500,000	-	-	2,500,000
	El Nido-El Segundo 220 kV lines Reconductoring	2,500,000	-	-	2,500,000
3364	Transmission IR Overhead Conductor	7,500,000	-	-	7,500,000
3364	Transmission Tower Corrosion Program	20,990,509	21,007,700	21,007,700	63,005,909

Wildfire Management

*Randall Daffern
Principal Manager, Transmission*

*2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Wildfire Management: High Fire Risk Informed Inspection

Description:

- CPUC GO 95 Rule 18 has designated adjusted compliance timeframes for issues identified in HFRA.
- In 2020, SCE is incorporating lessons learned and best practices from Enhanced Overhead Inspection into a broader redesign of our inspection practices, which will be performed as part of the emergent High Fire Risk Informed Inspection Program (HFRI).

Criteria:

- All overhead transmission structures and equipment in HFRA with a focus on potential ignition risk conditions.

Methodology:

- The HFRI program uses advanced wildfire risk modeling to estimate the amount of risk expected at particular locations that require remediation.
- This risk modeling evaluates the probability of failure and likelihood of ignition, fire propagation potential, and the associated impacts.

2022 FORECAST	2023 FORECAST	2024 FORECAST	TOTAL
\$1,961	\$2,255	\$1,889	\$6,104

Question & Answer

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Work Performed by Operating Agent

*Tracee Reeves
Principal Manager, Transmission & Distribution*

*2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Work Performed by Operating Agent

Description:

- Work activities are coordinated by Los Angeles Department of Water and Power (LADWP) (Operator of the Pacific Direct Current Intertie (PDCI)).

Criteria:

- Replacement of approximately 80,000 old porcelain insulators, which are not compliant with current industry standards, with new glass insulators

Methodology: Prioritization and planning of work belongs to LADWP.

2022 FORECAST	2023 FORECAST	2024 FORECAST	TOTAL
\$2,321	\$1,232	\$1,267	\$4,820

Question & Answer

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Operation Support: Substation Capital Maintenance of ISO Facilities

Don Neal
Director, Corporate Real Estate

2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Operation Support: Substation Capital Maintenance of ISO Facilities

Description:

- Preserve the value of SCE's buildings, equipment, and grounds, by making them as safe, reliable, and productive as reasonably possible.
- Corrective facility work orders are entered to respond to emergent issues.

Criteria

- Repair or replace building systems and components that are damaged, degraded, non-operational, non-compliant, or have reached their end of useful life
- This program addresses issues related to:
 1. Electrical/Fire systems
 2. Fencing and Walls,
 3. Flooring
 4. HVAC
 5. Paving
 6. Roof Repairs
 7. Lighting
 8. Restroom Remodels
 9. Specialty Equipment
 10. Other Repairs

Operation Support: Substation Capital Maintenance of ISO Facilities

Methodology:

SCE evaluates four factors:

- 1. the condition of a facility (Facility Condition Index);
- 2. the need for a facility to deliver utility services to SCE customers (Asset Priority Index);
- 3. the functionality and utility of a facility for business use(s) (Fitness for Purpose); and
- 4. the requirement to account for federal and state laws, regulations impacting facility use, maintenance, design, construction practices, and building codes (Compliance).

2022 FORECAST	2023 FORECAST	2024 FORECAST	TOTAL
\$5,902	\$6,020	\$6,161	\$18,084

Question & Answer

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Operation Support: Seismic Activity

*Jennifer Pearce
Principal Manager, Business Resiliency*

*2020 Transmission Maintenance and Compliance Review Stakeholder Meeting
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Operation Support – Seismic Activity

Background and Scope:

The Seismic Program, consolidated under Business Resiliency, is part of a larger, mostly CPUC funded effort beyond just the FERC dollar request. The broader seismic program centralizes and coordinates across organization units to assess and perform mitigations as identified to increase safety, infrastructure reliability and maintain regulatory requirements. Program scope includes electric infrastructure (transmission lines and substations), non-electric facilities, generation facilities, and telecom infrastructure.

Methodology:

- SCE conducts hazard and vulnerability assessments on its infrastructure in order to:
 1. Understand the seismic exposure and impacts of seismic events
 2. Assess the functionality and stability of the infrastructure if a seismic event occurred
 3. Identify applicable design standards and codes.
- Assessments utilize a combination of site surveys, seismic modeling, and geographic information systems
- Prioritization
 - Projects with the highest safety, reliability, and compliance impact will be executed first. This includes populated buildings and transmission, distribution, generation, and telecom infrastructure critical to maintaining business continuity and operational reliability.
 - Projects may be escalated in order to bundle work for efficiency purposes and to minimize outages.
 - Projects related to high-hazards dams with pending FERC reviews will be prioritized accordingly.

Operation Support: Seismic Activity

Description:

The primary objectives of the Seismic Assessment and Mitigation Program are to:

1. Assess SCE’s electric infrastructure (transmission lines and substations), non-electric facilities, generation, and telecom infrastructure and identify what seismic mitigations are needed
2. Mitigate risks by making the necessary retrofits and improvements in order to increase reliability and reduce the risk of harm to workers, customers and communities due to a moderate or major earthquake.

Criteria:

- SCE addresses the seismic mitigation activities pertaining to SCE’s transmission system assets, which include both transmission line infrastructure and substation assets.
- Examples of mitigations for these assets include bracing and anchoring electrical equipment in substations, improving conductor slack, structural work to reinforce building wall to roof connections, and replacing aged equipment with modern equipment designed to withstand greater levels of seismic activity.

Description							
	2022	# of Units	2023	# of Units	2024	# of Units	Total Units
Transmission Line Assets (Towers)	\$ 3,300,000.00	4	\$ 3,300,000.00	4	\$ 10,000,000.00	10	18
Trans Subs (MEERS)	\$ 5,120,000.00	5	\$ 5,120,000.00	5	\$ 6,400,000.00	6	16
	\$ 8,420,000.00	9	\$ 8,420,000.00	9	\$ 16,400,000.00	16	34

Question & Answer

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Physical/Cyber Security

Alex Benoliel

Director, Corporate Security

2020 Transmission Maintenance and Compliance Review Stakeholder Meeting

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Physical/Cyber Security

Description:

- SCE's Grid Infrastructure Protection Tier Program is dedicated to the physical protection of SCE employees, the general public, and SCE assets at electric facilities.
- This program protects SCE's grid infrastructure assets against physical attacks, theft, vandalism, security breaches, and more.

Criteria:

- For compliance projects, such as NERC CIP 014, SCE adheres to the applicable regulations and laws.
- For non-compliance security programs and projects, apply risk-based security mitigations to protect facilities based on criticality that have inadequate or beyond-service life security controls, or where new security controls are required to mitigate emerging risks
- Examples of security controls include cameras, walls, access control systems, gates, smart keys, lighting, and alarms

Physical/Cyber Security

Methodology:

- For all critical infrastructure projects, SCE conducts security assessments in order to:
 - Assess threats and vulnerabilities
 - Evaluate the impacts of a security risk
 - Identify security control risk mitigations
- Prioritization
 - Projects with the highest safety, reliability, and compliance impact will be executed first. This includes grid infrastructure critical to maintaining reliability and customer service
 - Compliance-related projects are prioritized based on the compliance dates of the requirements.
 - Projects may be escalated based on changes in the security environment, and to synchronize with other T&D work for efficiency and cost-reduction purposes

Forecast

The expected cost is approximately \$76.566 million for 2022-2024.

Question & Answer

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Next Steps

July 27

Stakeholder comments are due on draft TMCR Report

August 10

SCE posts stakeholder comments*

September 29

SCE posts final TMCR Report

October 13

Stakeholder comments are due on Final TMCR Report

*Submit comments to FERCCaseadmin@sce.com