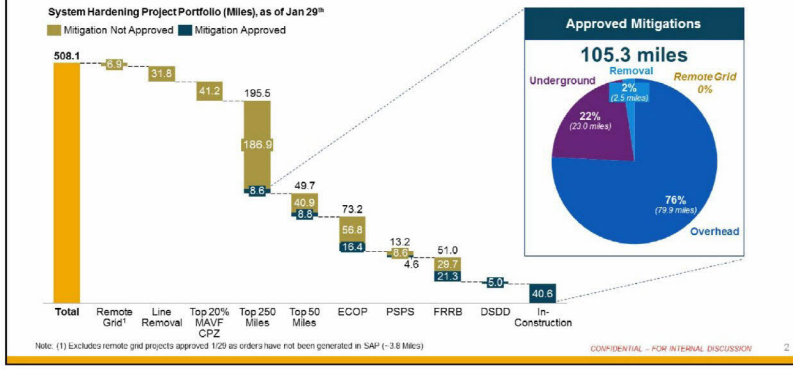


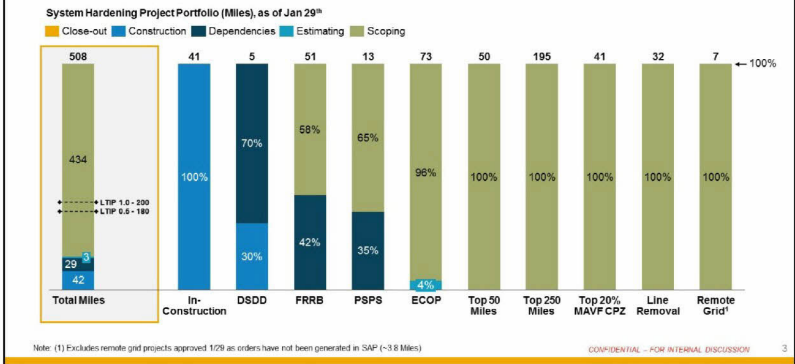
EXECUTION TRACKING

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System Hardening Status – Total Portfolio And Approved Mitigations



System Hardening Status – Work Phase By Project Type



Monthly Board-level System Hardening Status Reporting

Purpose

We will provide a monthly status report to the board, to demonstrate the progress of our System Hardening Program.

This committee will continue to get weekly updates via the summary slides presented earlier this week.

Details

Update will housed in a detailed workbook and consist of:

- Summary Reporting (pictured right)
- Listing of all CPZ's approved for scoping, key risk statistics and existing work within each.
- Detail view of the project / job, associated risk statistics, status and mitigation.

Click on below to view content sample:

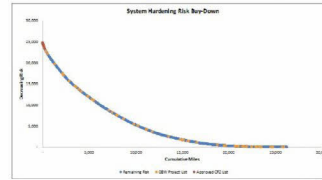


Board_System Hardening Project Tracker_02.02.21_vers.2.ppt

System Hardening Summary Reporting

Information captured as of 2/23 January 2021

Approved CPZs					
CPZ ID	CPZ Approval ID	CPZ Mitig. Approved	CPZs with Action Items (CI)	Action Item Mitig.	
Total	734/7	1,205/3	9/10	98/1	
OSM Opportunities Reported by (Show Mitig.)					
Opportunity Type	Escalated	Eliminating	Discontinuing	Controlling	Controlled
Total	108/1	431/7	2/3	274	42/2
OSM Opportunities Reported (Mitig.)					
Mitigation Approved	Mitigation Not Approved				
Total	108/3	407/2			
OSM Opportunities Reported - Approved Status by Mitigation Type (Mitig.)					
Status	Controlled	Discontinued	Removed	Remedy-Req.	
Total	274/3	2/3	2/2	5/2	



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VEGETATION MANAGEMENT UPDATE

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Distribution Routine VM

Description of Program

- Programs require clearances of 4 feet around power lines in HFTDs with recommended minimum clearances of 12 feet or more at the time of prune to ensure compliance year-round
- Program is funded at ██████████ of expenses

How Program is Targeted

- Full system annual patrol, which includes identification of dead & dying facility protect trees (1st Patrol) and trees that required accelerated mitigation before scheduled trim cycle (Priority Tags)
- The annual tree work funding is informed by forecasts of next year tree work and by Priority Tag rates

Program Targets

- Target Mileage: ~80k total project miles (100% Project Miles completed through the VMBA program patrols)
- Target Tree Units: 1,491,625 units (VMBA program tree work unit count)

Current Timeline

- Pre-inspection work is scheduled for 100% completion by patrols by 11/30/21, with a commitment target of the end of 2021
- Planned Tree work is scheduled for completion by 12/31/2021. A concurrent commitment is to maintain timeliness of accelerated tree work – Priority 1 Tag – next day from inspection and Priority 2 Tag – within 30 days from inspection (excluding external constraints)

Risks & Concerns Related to the Program



Weather, environmental conditions, fire season and PG&E's corresponding response i.e., PSPS Events, Safety Shutdowns



Increased Compliance Burden



Defined Scope Implementation & Potential for Change Order Requests

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CEMA (Drought and Tree Mortality Work VM)

Description of Program

- Program mitigates dead and dying trees that may impact PG&E facilities
- Program is funded at [REDACTED] of incremental expenses

How Program is Targeted

- Patrols: 100% Mid-Cycle of Tier 2/Tier 3 HFTD areas mitigating to identify dead/dying trees, generally six months after Routine patrols
- Tree Work: Planned work volume of dead and dying trees identified on Routine (1st Patrol) and Mid-Cycle to be completed in calendar year based upon annual estimates

Program Targets

- Target Mileage: 43,684 miles through Mid-Cycle patrols
- Target Tree Volume: 65,000 tree units

Current Timeline

- Mid-Cycle Patrols which started 11/15/2020, are scheduled to be complete by 11/15/2021, with a commitment target of the end of 2021
- The 2021 operational focus is shifting to 180/360 day completion timelines for work in Tier 2 and 3 / Tier 1, respectively. Previously, VM targeted completion of all work identified through 9/30 by end of year

Risks & Concerns Related to the Program



Tree inspection volume is subject to external factors— drought, climate change, and path of beetle infestation. No mitigation is available aside from monitoring inspection progress and incidence rate



Maintaining spacing of Mid-Cycle Patrols from Routine Patrols to avoid program overlap / insufficient spacing. Patrols are scheduled generally 6 months apart. This can be mitigated by change control of initial Routine Patrol plan which will review Mid-Cycle timing

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Transmission VM

Description of Program	<ul style="list-style-type: none"> Transmission VM has 4 primary programs: (1) Routine Clearance Maintenance, (2) Existing ROW Management (Integrated Vegetation Management (IVM)), (3) ROW Expansion, including PSPS projects, (4) Orchard Tree Removal Program is funded at a 90/10 ratio between capital and expense. The total funding is ██████████ for the CBP Plan/RES Plan 	Risks & Concerns Related to the Program
How Program is Targeted	<ul style="list-style-type: none"> (1) Routine Clearance Maintenance targets 100% of Transmission system annually (2) IVM is scope-driven from IP annual planning (3) ROW Expansion is scope-driven from IP annual planning (4) Orchard tree removal has remaining scope of 10-year full system abatement program 	
Program Targets	<ul style="list-style-type: none"> Target Routine Clearance Maintenance: ~100k trees Target IVM: ~10k acres Target ROW Expansion (includes PSPS): ~310k trees Target Orchard Removal: ~3k trees 	
Current Timeline	<ul style="list-style-type: none"> Routine Clearance Maintenance is scheduled for completion by 11/15/2021, all other patrols support tree work completion in 2021 All identified tree work on NERC lines, ~20% of annual Routine tree work volume, must be completed in calendar year under NERC requirements. Remaining 80% and other program's planned tree work volume are targeted for completion in 2021 	

External factors, including weather and contractor safety performance, can delay tree work progress

Pending regulatory decision regarding capital funding of ROW expansion activities is a potential risk. If unsuccessful, it may materially increase demand for currently funded expense amounts

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EVM – Utility Defensible Space (UDS)

Description of Program

- UDS is defined as creating an area around PG&E electrical facilities that, in an event of a wire-down scenario, would reduce the likelihood of an ignition and/or spread of a fire
- [REDACTED] will be managed as a part of the program

How Program is Targeted

- The program will leverage the 2021 Wildfire Distribution Risk Model developed by the Asset Strategy team to identify high-risk CPZs to prioritize projects for performing modification of vegetative fuels
- Any projects identified outside the Model will be locations based on a combination of local knowledge and a cohesive strategy to work with Cal Fire, USFS, and Municipalities on wildfire prevention initiatives

Program Targets

- The process of building the framework for UDS is currently ongoing so no targets or metrics have been created for this program at this time. Targets and metrics will most likely be based off funding in 2021

Current Timeline

- Incoming data will be used to determine effectiveness and Risk Spend Efficiency of a UDS program to help determine schedule and cycle time

Risks & Concerns Related to the Program



Environmental planning and permitting to allow for execution of work, since scope can be beyond PG&E's land rights



Obtaining approvals from private property owners to allow for the incremental work outside of PG&E's compliance programs, such as Routine VM and EVM

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EVM – Wood Management

Description of Program

- Program safely disposes of wood from drought-impacted dead trees at no cost to PG&E customers
- Program is available to property owners located within counties where emergencies were declared due to drought and bark beetle infestation
- Funding is [REDACTED] for 2021 for all programs (82% of funding coming from EVM)

How Program is Targeted

- Wood Management is offered in EVM program for trees within 30 ft. of permanent structures. Wood Management refers to wood >6" in diameter. Other woody debris (<6" in diameter) are removed from location as part of tree work
- That's the programmatic WM. The Wildfire piece is a net zero program outside of the administrative

Program Targets

- Target Mileage: 1,876 miles (same as for the overall EVM program in 2021)

Current Timeline

- Timeline of program is the same as for the overall EVM program

Risks & Concerns Related to the Program



Due to the 2020 wildfires, wood and woody debris is being generated by agencies beyond PG&E. Some co-generation facilities with Power Purchase Agreements are currently unable to accept the overwhelming amounts of wood and woody debris generated by all entities in working in HFTDs

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ACTION ITEM REVIEW

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2021 Wildfire Mitigation Plan – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
2021 wildfire mitigation plan	Wildfire mitigation plan review	Review plan to balance wildfire mitigation work with overall EO work		In progress	2/5/2021	2/5/2021
2021 wildfire mitigation plan	Include candid areas where PG&E did not meet expectations in WMP	Include in Executive summary Candid areas where PG&E did not meet expectations in WMP. For example, Veg work not risk-based/prioritized, gaps on systemic inspections, and gaps in quality of veg management		In progress	2/5/2021	2/5/2021
2021 wildfire mitigation plan	HFRA incorporation in inspection plan	Inspections needs to explicitly state HFRA incorporation in inspection plan		In progress	2/5/2021	2/5/2021
2021 wildfire mitigation plan	Volume of inspections to be completed by 9/1	Inspections needs to explicitly state the volume of inspections to be completed by 9/1		In progress	2/5/2021	2/5/2021
2021 wildfire mitigation plan	Comparison of original SH program with current SH program	Inbed comparison of original SH program with current SH program and explicitly explain the reduction in miles to 180 miles		In progress	2/5/2021	2/5/2021

Anticipated closing out these action items today, 2/5/2021

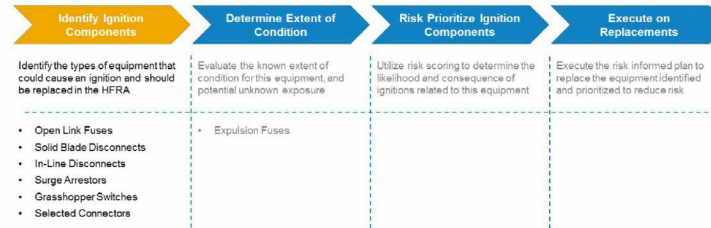
Fire Ignition Component Program – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Fire Ignition Component Program	List of Equipment Considered for replacement	Outline full list of potential ignition equipment to be considered for replacement		In progress	2/5/2021	2/8/2021
Fire Ignition Component Program	Risk Buydown Curve	Create a risk buydown curve for ignition components (Component count X Consequence)		In progress	2/12/2021	
Fire Ignition Component Program	Compliance Concerns Follow Up on Non-Empty Assets	Follow Up on compliance concerns related to failure to clear around non-empty assets (Completed Offline)		In progress	2/12/2021	

Anticipated closing out this action item today, 2/3/2021

Review of Ignition Components

Electrical equipment that could potentially cause an ignition has been identified in the HFTD. A program to locate and replace this equipment is underway, with the initial identification of 7 potential ignition sources



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We have begun the identification process, but we are working through challenges in order to present the most accurate, actionable data for discussion

General Considerations

Palantir Utilization

- Palantir data is not static, so the team is working to aggregate the full datasets despite weekly updates
- Incomplete data needs to be further analyzed and compared between both ED-GIS and Vegetation Management

Data Accuracy

- Verifying the data before presenting the results to the committee is vital
- Working with multiple SME's to sift through results and compare explicit figures between components

Example Results with Detailed Open Items

Ignition Element	Issue Description	Is Count Preserved? (Y/N) and Count?	EDGIS Count	VM Database Count	Negative Clearing	Remarks	Risk Mitigation (Prevention of FTR)
Ignition Element 1 (1A)	Ignition element 1A - Issue description 1A	Yes. As shown in EDGIS, 15,368	15,368	15,368	Yes	High risk due to ignition element 1A - Issue description 1A	High risk due to ignition element 1A - Issue description 1A
Ignition Element 2 (1B)	Ignition element 2B - Issue description 2B	No. As shown in EDGIS, 15,368	15,368	0	No	High risk due to ignition element 2B - Issue description 2B	High risk due to ignition element 2B - Issue description 2B

- No Single Source of Truth** - Both ED-GIS and Veg. Mgmt. databases do not have complete data for all identified ignition components
- Differences Between Data Sets** - Veg. Mgmt. and ED-GIS provide different counts based on fuse types in some instances (i.e., the example above, so the analysis is applied to oranges
- SME Input Vital** - for multiple challenging analysis, SME input is necessary valid data and to understand variances

Next Steps

- Continue to cleanse data
- Provide summary and full details in future committee meeting

Some Ignition components will easier to track due to compliance requirements related to vegetation management

Identify → Determine → Prioritize → Execute					
Ignition Element	Issue Description	Is Count Possible? (Y/N) and how?	Vegetation Clearing	Count Provider	Risk Mitigation Program? (Y/N) and how?
A	Open Link Fuses	Yes: A) fuses w/ Op. # B) fuses w/ Xfmr's - VM survey required	Yes	GIS SME	Yes: active program in place to mitigate all in HFTD
B	Solid Blade Disconnects	Yes: w/ Op. #	Yes	GIS SME	No: working to get SIBs exempted
C	In-Line Disconnects	Yes: associated with LR	Yes	GIS SME	Yes: program to remove as part of 3A & 4C LR replacements
D	Surge Arrestors	Yes: VM survey required	Yes	VM SME	Yes: program to remove S/A's w/ Xfmr shared grounds, but not for standalone S/A's
E	Grasshopper Switches	Yes: w/ Op. #	Yes	GIS SME	Yes: active program in place to mitigate
F	Selected Connectors	Not Likely: maybe possible through GO 165 inspectAp	Maybe	P&I SME	Targeted connector replacement as part of GO 165 incidental work

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Inspections – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Inspections	Structure count	Number of structures in Tier 3, Tier2 and 40-64k and above these structures needs to be completed		In progress	2/5/2021	2/6/2021
Inspections	Structures below 500kV	What is the volume of structures below 500kV that are unique in design to the 500kV structures - are any climbing 500kV structures to inspect guy wire tensioning Find number of structures out and add to the number of structures that needs to be climbed up		In progress	2/5/2021	2/6/2021
Inspections	Flats being done in inspection	Summary plans on all the pilot projects		In progress	2/5/2021	2/6/2021
Inspections	Transmission Probability of Failure Model	Calculate the outputs of Transmission Probability of Failure model and potential impacts to additional structures incorporated into 2021 plan		In progress	2/5/2021	2/6/2021
Inspections	Count of non-500 kV Climbing required	Follow up with volume of non-500kV structures that require climbing for 2021 (and add it to plan)		In progress	2/5/2021	2/6/2021
Inspections	Rate of Degradation Trends WGR - 1/12/2020	Utilize the data-mining platform available at PCEC (Paktor) to understand the rate of degradation of the assets in the different climatic or other appropriate zones. Need location specific degradation Data for this analysis needs to come from the following sources - 2019 and 2020 EC and LO tags - 2019 and 2020 Inspection data records - photos - Asset information available		In progress	2/12/2021	

Anticipated closing out these action items today, 2/3/2021

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Non-500 kV Internally Guyed Steel Structures

- 59 non-500 kV internally guyed towers were identified from review of inspection forms and photos (in HFTD).
 - 52 climbing inspection will be incorporated into 2021 work plan, in addition to planned ground inspection (additional costs approx. [REDACTED])
- Comparison between 500kV and non-500kV structure designs with internal guys:
 - 500kV internal guys have target tension (required specific measurements) / non-angle structures. There is no target tension for non-500kV as they are designed for angle and non-angle application.
 - Both designs rely on internal guys to maintain structure integrity, but 500kV design is less robust.
- Inspection history:
 - All 59 structures inspected through WSIP in 2019 (climbing and aerial).
 - 1 tag for loose guys, 10 other tags on guys (turnbuckle not punched or not enough remaining threads, corroded, poor condition).
 - No nonconformances on out-of-plumb/twisted/leaning structure, 3 structures with loose/missing bolts.
 - 13 structures inspected in 2020 (ground and aerial).
 - No guy tags
 - No nonconformances on out-of-plumb/twisted/leaning structure or loose/missing bolts.
 - 52 structures in 2021 inspection scope (ground, climbing and aerial).
- Inspection Future Consideration:
 - Conditions that are difficult to identify via ground inspection (loose and missing bolts). These conditions can be caused by ineffective guys or vibration issues.
 - Of locations without localized issues or corrective action is implemented (i.e. dampers), then climbing inspections frequency can be reduced.



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PSPS – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
PSPS	Distribution PSPS Ranking	Rank PSPS projects based off of customer types (e.g., customer criticality)		In progress	2/12/2021	
PSPS	PSPS Mitigation Strategy	Need to develop overall PSPS mitigation strategy (e.g. temporary generation, commit to improvement in percentage)		In progress	2/12/2021	
PSPS	Incorporation of open vegetation tags in FGFS strategy	Need to state how open vegetation tags will be incorporated in PSPS strategy. Additionally, need to state how E&F tag repair work will inform any PSPS decisions.		In progress	2/12/2021	
PSPS	PSPS Mitigation Strategy	Need to establish target thresholds for 2021 that account for 2021 weather expectations and determine appropriate communication strategy for these thresholds		In progress	2/12/2021	

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Repairs – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Repairs	Volume of repairs	Establish initial expectations for volume of repairs for HFD and plan to escalate these repairs	[REDACTED]	In progress	2/5/2021	2/5/2021
Repairs	Non-Strike Team B Tag Repair time	What is the repair time for non-strike team B tags	[REDACTED]	In progress	2/5/2021	2/5/2021

Anticipated closing out these action items today, 2/5/2021

System Hardening – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
System Hardening	Open tags	I follow up with open tag issue		In progress - Procedures for ECOPI bundling under review	2/5/2021	2/5/2021
System Hardening	Total Cost of Ownership For Mitigations WCR - 11/20/2020	Do a deep dive into the Total Cost of Ownership Calculations for the SH Mitigations - Hold a separate review with SH team and Operational Observer		In progress	2/5/2021	2/5/2021
System Hardening	Follow up meetings on execution plan for SH	Coordinate follow-up meeting on execution plan for SH		In progress	2/12/2021	
System Hardening	Milestone Based Project Plan	Developing a milestone based 3-year view for all system hardening projects		In Progress	TBD	
System Hardening	Internal Audit Review	Internal audit of reform projects as determined by the decision tree to ensure that they meet the spirit and intent of the project		In Progress	TBD	

Anticipated closing out these action items today, 2/5/2021

Vegetation Management – Open Action Items

Workstream	Action Item	Description	Responsible party	Resolution	Target Resolution Date	Resolution Date
Vegetation Management	Vegetation Programs Presentation	Present all vegetation programs (focus on Brush Clearing and defensive areas)		In progress	2/5/2021	2/5/2021
Vegetation Management	Replace miles from PSS recommendation	Miles that were removed via PSS recommendations need to be replaced with new miles from EVM recommendations		In progress	2/12/2021	
Vegetation Management	Vegetation Management Scorecard	Initial Vegetation management Execution scorecard (EVM, Vegetation, Programs, and Quality Improvement)		In progress	2/12/2021	
Vegetation Management	Contractor Safety Program Follow-Up	Contractor Safety program follow-up		In progress	2/12/2021	

Anticipated closing out this action item today, 2/5/2021