Distribution System Planning
Public Workshop #9
June 24, 2022






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Workshop #9 Information

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  Phone Conference ID: 418 028 485#

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- Please use the chat function in TEAMS to provide any questions or comments during this presentation. We will do our best to address those as they come up, if we are unable to get to them, we will follow-up directly or at an upcoming workshop.

Today's Agenda

1. Introductions and Review Agenda (10 minutes)
2. Review Pacific Power OR Service Territory (10 minutes)
3. Review Distribution Planning Process (60 minutes)
   - Study Cycle (5 Year Cycle)
   - Review Grid Needs Summary from latest cycle of DSP Studies
   - Review DSP Study Process – Highlighting Prioritization Steps
   - Review Current Year Distribution Investments (Results of last year's prioritization)

   Break (10 minutes)

4. Pilot/Transitional Study Areas and Grid Needs (45 minutes)
   - Introduction to Pilot Areas and focus areas
   - Grid Need - Klamath
   - Review potential solutions (Traditional and Non-wires)
   - Outline next steps
5. Update on Community Engagement (20 minutes)
   - CIG Update
   - Local Engagement
6. Review DSP Part 2 Schedule and Upcoming Topics (10 minutes)

2) Pacific Power Service Territory and DSP






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Pacific Power's Oregon Service Territory

Overview of Pacific Power – Oregon

- 502 distribution circuits
- 191 distribution substations

Office	NORTH REGION			CENTRAL REGION			SOUTH REGION	
	Portland	Walla Walla	Yakima	Bend	Albany	Roseburg	Klamath Falls	Medford
Responsible Operating Areas	Clatsop (Astoria) Portland Hood River	Walla Walla Hermiston Pendleton Enterprise	Sunnyside Yakima	Madras Hood River Bend/Redmond Prineville	Albany Corvallis Dallas/Independence Cottage Grove Stayton Lebanon Lincoln City Junction City	Coos Bay Roseburg	Alturas Lakeview Mt Shasta Klamath Falls Yreka	Crescent City Medford Grants Pass
Distribution Profile	95 Circuits 1,200 Line Miles 107,000 Customers	42 Circuits 2,500 Line Miles 54,000 Customers	106 Circuits 3,300 Line Miles 108,000 Customers	65 Circuits 2,800 Line Miles 77,000 customers	86 Circuits 3,700 Line Miles 137,000 Customers	66 Circuits 2,300 Line Miles 70,000 Customers	110 Circuits 5,000 Line Miles 75,000 Customers	138 Circuits 5,700 Line Miles 156,000 Customers
District Specific Attributes	Portland UG Networks DA Pilot Project FHCA		FHCA	High Growth Rate/New Connections FHCA	DA Pilot Project	FHCA	Multiple Code Requirements FHCA & HFTD Footprint Energy Storage Pilot	Large FHCA Footprint DA Pliot Project

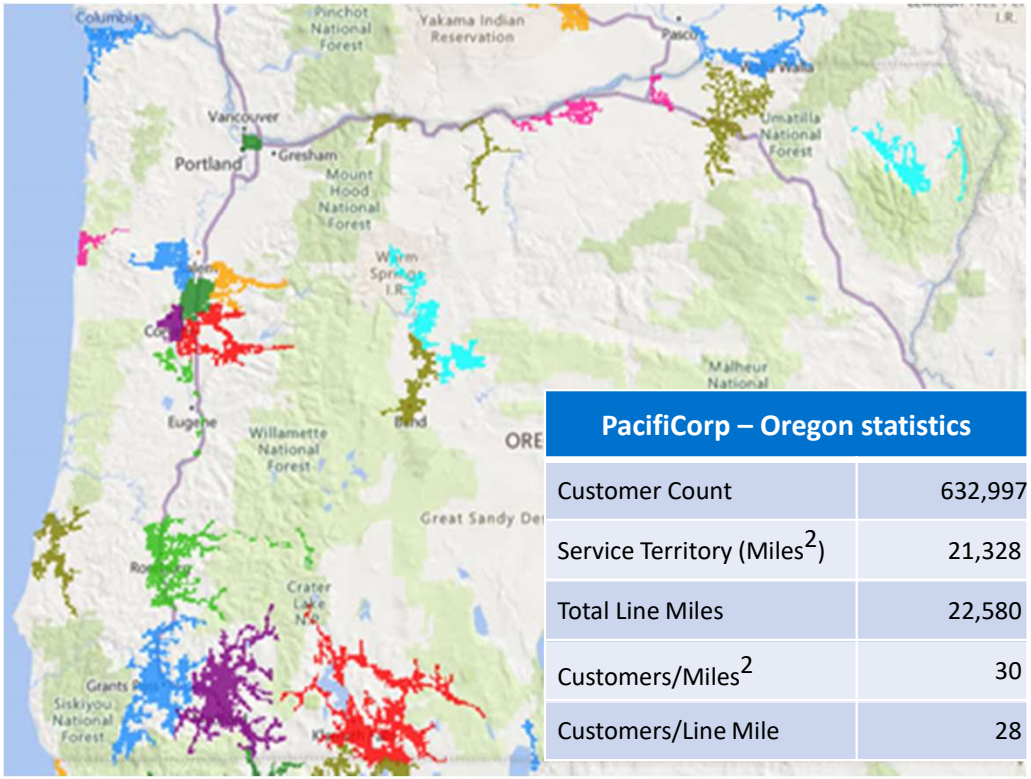
Pacific Power's Oregon Service Territory

- Dispersed and Varied Geography: Territory spans from Washington to California and the coast to Idaho, broken into eight distinct planning districts

- Diverse Circuit Loading/Composition:
  - Densest circuit in Portland with 638 customers per line mile
  - Least dense in Hermiston with one customer per line mile
  - Oregon average is 28 customers per line mile

- Diverse Environmental Conditions: Distribution in eight of nine Oregon climate zones

- Various Touchpoints: Interconnections with 16 other electrical power companies, including CAISO and Bonneville Power



PacifiCorp – Oregon statistics	
Customer Count	632,997
Service Territory (Miles^2)	21,328
Total Line Miles	22,580
Customers/Miles^2	30
Customers/Line Mile	28

3) Distribution System Planning Process (Highlight on Prioritization)



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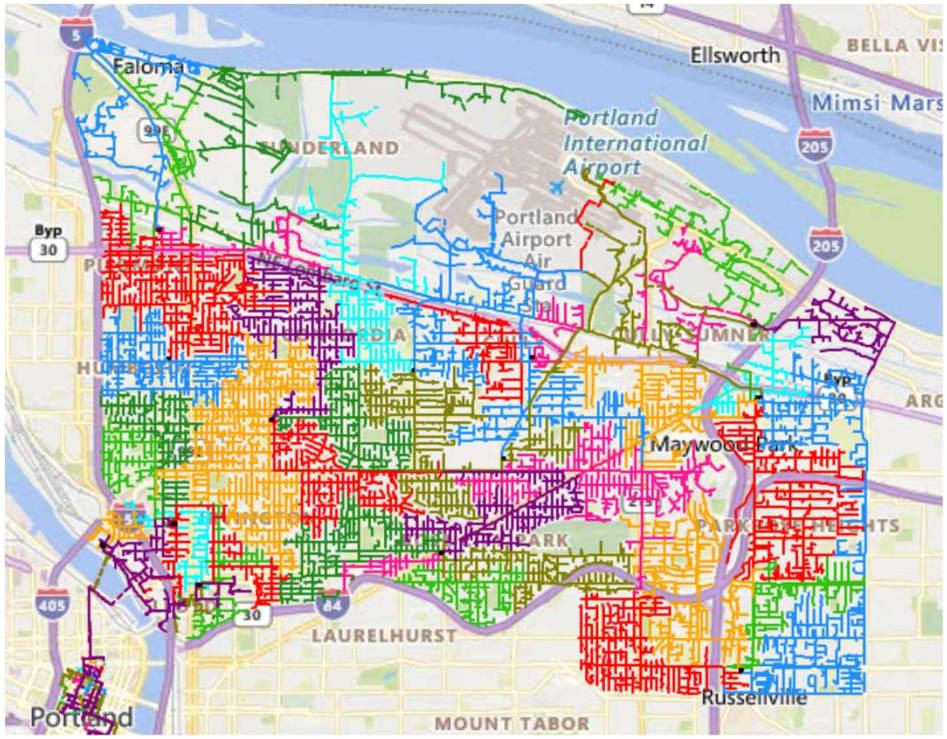
As-is DSP Studies – Cycle vs Ad-Hoc Studies

Distribution Planning Studies

- All distribution system planning studies are scheduled to be completed on a 5-year cycle.
- Study schedules are evaluated each year and studies may be shifted to occur sooner or later depending on a number of factors (high load growth activity, large load additions, etc.).
- Currently 99 planning studies on 5-year cycle in Pacific Power service territory.
- Generally, spend 2-3 months completing study analysis, review and prioritize results with Manager.

Ad-hoc Studies (Generation Interconnect or System Impact Study)

- Typically driven by load, generation interconnection service or transmission service requests
- Study is generally focused on a limited area, and the immediate effects of the request on reliability and load service
- Generally shorter timeframes to meet customer needs (~ 3-4 weeks for initial study).
- Customer shares in solution costs and influences what solutions to implement.



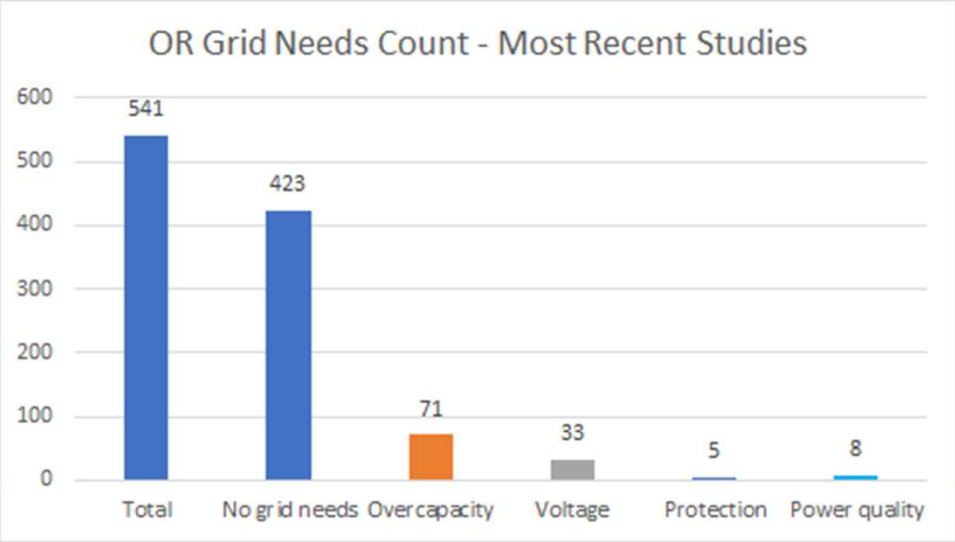
Distribution System Planning Grid Needs Context

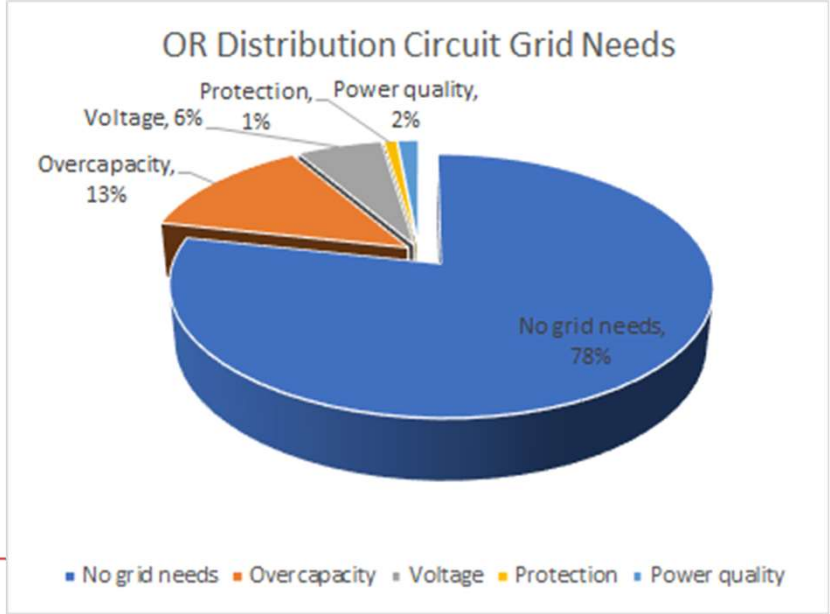
Reviewed the latest Distribution System Planning Studies for all study areas in Oregon (excludes customer-driven or ad-hoc studies):

- Categorized the grid needs that were identified in the studies (see results below)
- Captured rough cost estimates for wires solutions and added that breakdown – 117 total Grid Needs Identified:
  - 32% between $0 and $5K,
  - 54% between $5K and $200K,
  - 14% more than $200K

Findings:

- Grid needs found in 22% of circuits
- Overcapacity is the most common grid need (61% of found needs)
- 86% of found grid needs cost less than $200K
- Of those needs, not all will be suitable for NWS





As-Is Distribution System Planning Process
- Study Initiation Through Approval

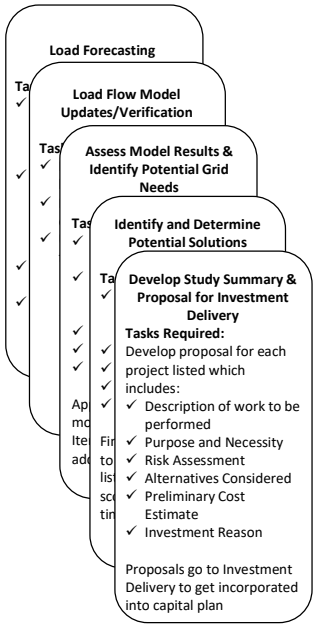
Current process includes **Four** high-level Steps…

1) Start Study
(Scheduled or Ad-hoc)

5 Yr. Study Cycle
(as scheduled)

Ad-Hoc Study
(Different Process)

2) Complete Study



3) Field Engineering Manager Review/Prioritization:

A. Reviews All Scheduled Study Reports (~ 20/year)

B. Ranks each Solution in priority order for each Investment Reason Category

4) Investment Delivery Prioritization and Approval:

A. Each Investment Reason has a budget established for the year based on capital planning.

B. Field Engineering Manager & Inv Delivery Director review prioritized list of solutions & approve in priority order until budgeted funds are exhausted.

As-Is Distribution System Planning Process
- Study Initiation Through Approval

The same **Four** steps with some detail…

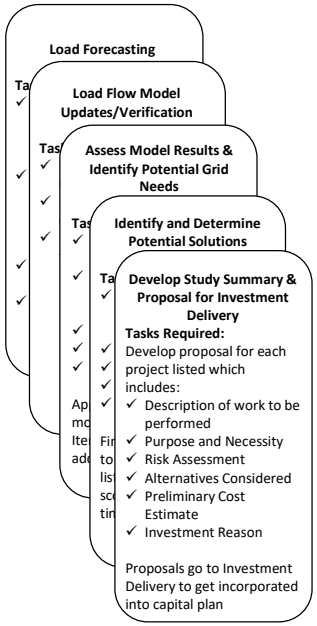
1) Start Study
(Scheduled or Ad-hoc)

5 Yr. Study Cycle
(as scheduled)

Ad-Hoc Study
(as needed)
- New Load/Resource Proposed
- Area Need (e.g., high load growth activity)
- Anticipated large load additions (short and long term)
- Transmission Impact

Ad-Hoc Study Process (ESSA Process)
Ad-Hoc study addresses specific customer need, new block load or resource addition.
Not driven from a grid need found during DSP

2) Complete Study



Study Report

3) Field Engineering Manager Review/Prioritization:

A. Reviews All Scheduled Study Reports (~ 20/year)

B. Ranks each Solution in priority order for each Investment Reason Category

Ranked List Reinforcements

Ranked List Feeder Improvements

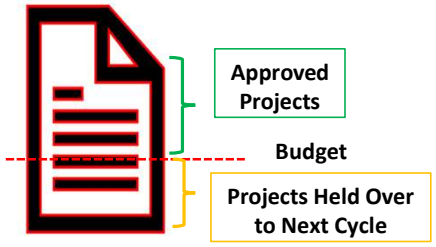
Ranked List Substation Improvements

4) Investment Delivery Prioritization and Approval:

A. Each Investment Reason has a budget established for the year based on capital planning.

B. Field Engineering Manager & Inv Delivery Director review prioritized list of solutions & approve in priority order until budgeted funds are exhausted.

Ranked List Reinforcements ***Example***



As-Is Distribution System Planning Process - Study Initiation Through Approval

The same **Four** steps indicating where Prioritization occurs…

1) Start Study (Scheduled or Ad-hoc)

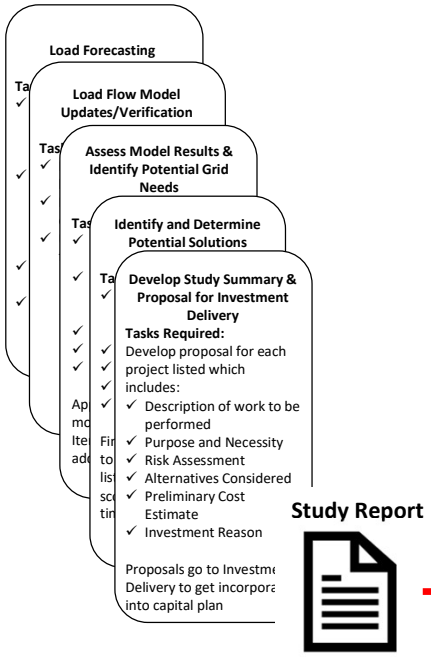
5 Yr. Study Cycle
(as scheduled)

Ad-Hoc Study
(as needed)

- New Load/Resource Proposed
- Area Need (e.g., high load growth activity)
- Anticipated large load additions (short and long term)
- Transmission Impact

Ad-Hoc Study Process (ESSA Process)
Ad-Hoc study addresses specific customer need, new block load or resource addition.
Not driven from a grid need found during DSP

2) Complete Study



Study Report

Prioritization: Grid Needs + Solution
Each identified grid need will have a recommended solution, budget and supporting detail. The solution will go into a specific category for budget prioritization and approval.

3) Field Engineering Manager Review/Prioritization:

A. Reviews All Scheduled Study Reports (~ 20/year)

B. Ranks each Solution in priority order for each Investment Reason Category

Prioritization: Field Engineering Manager (One Person)

- Reviews all Study Reports & recommended solutions during study and prior to prioritization.
- Ranks each proposed solution from all of the studies in rank order (priority) based on:
  - Potential risk and impact
  - Timing (when solution needed/how long will it take to implement)
  - Any relationships to other solutions
  - Consultation with Field Engineer/Ops Managers

Ranked List Reinforcements

Ranked List Feeder Improvements

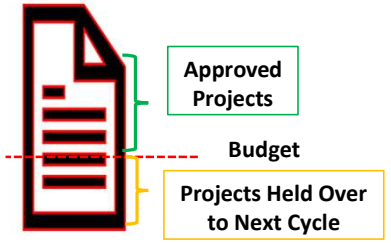
Ranked List Substation Improvements

4) Investment Delivery Prioritization and Approval:

A. Each Investment Reason has a budget established for the year based on capital planning.
B. Field Engineering Manager & Inv Delivery Director review prioritized list of solutions & approve in priority order until budgeted funds are exhausted.

Prioritization: Projects approved in priority order until budget fully allocated.
Projects entered for tracking during design and implementation.

Ranked List Reinforcements *Example*



As-Is Distribution System Planning Study Schedule

1) Start Study
(Scheduled or Ad-hoc)

5 Yr. Study Cycle
(as scheduled)

Study Schedule

CY 2019 – 20 studies		CY 2020 – 20 studies		CY 2021 – 20 studies	
Office	**Study Name**	**Office**	**Study Name**	**Office**	**Study Name**
Albany	Harrisburg	Albany	Lebanon	Albany	Cottage Grove
Albany	Brownsville	Albany	Sweet Home	Albany	Oregon State University
Bend	Deschutes	Bend	Prineville	Albany	Stayton
Bend	Culver	Bend	Powell Butte	Bend	Bend
Klamath Falls	Alturas	Klamath Falls	Sacremento Canyon	Klamath Falls	Butte Valley
Klamath Falls	Agency Lake	Klamath Falls	Sprague River	Klamath Falls	Klamath Urban
Klamath Falls	Lower Klamath River	Klamath Falls	Yreka	Klamath Falls	Tulelake
Medford	Ashland & Talent	Medford	Glendale	Medford	Merlin
Medford	Gasquet-Patricks Creek	Medford	Grants Pass Urban	Medford	Upper Rogue
Medford	Klamath	Medford	Medford Urban North	Medford	Tolo-Gold Hill
Medford	Smith River	Medford	Ruch Area	Portland	Lincoln Network
Portland	Sherman County	Portland	Albina Network	Portland	Warrenton
Roseburg	North Umpqua	Portland	Lincoln Non-network	Portland	Astoria
Roseburg	North Spit	Portland	Hood River	Portland	Seaside
Roseburg	Coquille-Bandon	Roseburg	Myrtle Point	Roseburg	Roseburg Urban
Walla Walla	Touchet	Roseburg	Sutherlin-Oakland	Walla Walla	Pilot Rock
Walla Walla	Umapine	Walla Walla	Athena-Weston	Walla Walla	Pomeroy
Walla Walla	Hermiston-Umatilla	Walla Walla	Dodd Road	Walla Walla	Walla Walla
Yakima	Selah-Wenas	Walla Walla	Dayton-Waitsburg	Walla Walla	Pendleton
Yakima	Wapato-White Swan	Yakima	Yakima Urban	Yakima	Toppenish-Punkin Center

As-Is "Complete Study" Process

2) Complete Study

5 Yr. Study Cycle
(as scheduled)

Load Forecasting

Tasks Required:
- ✓ Review Historical summer/winter peak load SCADA data at circuit breaker level
- ✓ Adjust for large load additions and planned system changes consistent with capital plan
- ✓ Adjust for large DER additions
- ✓ Option: Normalize for weather if base data not representative

Load Flow Model Updates/Verification

Tasks Required:
- ✓ Review equipment and line data in CYME Model
- ✓ Perform field Verification of model data
- ✓ Update CYME Model per field verification

Identify Grid Needs

Tasks Required:
- ✓ Run CYME Model based on load forecast
- ✓ Identify and analyze grid need and timeline due to issue (For Example)
- ✓ Undervoltage
- ✓ Overvoltage
- ✓ Thermal overload

Apply initial solution to model and Re-analyze
Iterate until solutions have addressed issues

Identify and Determine Potential Solutions

Tasks Required:
- ✓ Identify and determine solution to resolve issue
  For example:
- ✓ Load transfer
- ✓ Phase balancing,
- ✓ Capacitor bank
- ✓ Etc.

Finalize proposed solution(s) to develop a project list (includes high-level scope of work, budget, and timeline)

Develop Proposal for Investment Delivery

Tasks Required:
Develop proposal for each project listed which includes:
- ✓ Description of work to be performed
- ✓ Purpose and Necessity
- ✓ Risk Assessment
- ✓ Alternatives Considered
- ✓ Preliminary Cost Estimate
- ✓ Investment Reason

Proposals go to Investment Delivery to get incorporated into capital plan

Distribution System Studies are conducted by Field Engineers who are intimately familiar with the area and equipment.
Field Engineers support all day-to-day operations of the distribution systems and are the subject matter experts for their areas.
They are afforded latitude to utilize professional judgement in the execution of the studies and in the prioritization of grid needs and recommended solutions.

Guidance Provided by:
1E.3.1—Distribution System Planning Study Guide

Excerpt from Section 8.1 – Solution Optimization:
" To operate the distribution system in the most cost-effective manner possible, alternative solutions to problems must be considered and studied. Many problems may be solved by several different solutions or a combination of solutions. The easiest or most direct solution to a problem may not be the best or most economical one or yield the best utilization of the system.
Be creative; sometimes "off the wall" ideas lead to very cost-effective and innovative solutions. The solution chosen for the plan should factor in engineering, operating, and economic aspects."

As-Is Distribution System Planning Process - Field Engineer Study Process

Start Study
(Scheduled or Ad-hoc)

5 Yr. Study Cycle
(as scheduled)

2) Complete Study

Load Forecasting

Tasks Required:
- ✓ Review Historical summer/winter peak load SCADA data at circuit breaker level
- ✓ Adjust for large load additions and planned system changes consistent with capital plan
- ✓ Adjust for large DER additions
- ✓ Option: Normalize for weather if base data not representative

Load Flow Model Updates/Verification

Tasks Required:
- ✓ Review equipment and line data in CYME Model
- ✓ Perform field Verification of model data
- ✓ Update CYME Model per field verification

Assess Model Results & Identify Potential Grid Needs

Tasks Required:
- ✓ Run CYME Model based on load forecast
- ✓ Identify and analyze grid need and timeline due to issue (For Example)
- ✓ Undervoltage
- ✓ Overvoltage
- ✓ Thermal overload

Apply initial solution to model and Re-analyze
Iterate until solutions have addressed issues

Identify and Determine Potential Solutions

Tasks Required:
- ✓ Identify and determine solution to resolve issue For example:
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- ✓ Phase balancing,
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- ✓ Etc.

Finalize proposed solution(s) to develop a project list (includes high-level scope of work, budget, and timeline)

Develop Study Summary & Proposal for Investment Delivery

Tasks Required:
Develop proposal for each project listed which includes:
- ✓ Description of work to be performed
- ✓ Purpose and Necessity
- ✓ Risk Assessment
- ✓ Alternatives Considered
- ✓ Preliminary Cost Estimate
- ✓ Investment Reason

Proposals go to Investment Delivery to get incorporated into capital plan

The Prioritization process for distribution investments for Field Engineers occurs in three stages in the As-Is DSP process.

Prioritization: Grid Needs
Field Engineer identifies and prioritizes grid needs for each circuit .

Prioritization: Solution Identification and Analysis
Field Engineer analyzes potential solutions, in consultation with Mgr/SMEs "DSM Guide"

Prioritization: Study Summary Report
Field Engineer document outlines recommended + alternative solutions – Assigns Investment Reason for Budget Prioritization

Prioritization: Grid Needs

2) Complete Study

Assess Model Results & Identify Potential Grid Needs

Tasks Required:
- ✓ Run CYME Model based on load forecast
- ✓ Identify and analyze grid need and timeline due to issue (For Example)
- ✓ Undervoltage
- ✓ Overvoltage
- ✓ Thermal overload

Apply initial solution to model and Re-analyze
Iterate until solutions have addressed issues

Prioritization: Grid Needs
Field Engineer identifies and prioritizes grid needs for each circuit .

Stage 1

Primary Steps: :

- Field Engineer identifies the grid need and determines the corrective action required to address the issue.

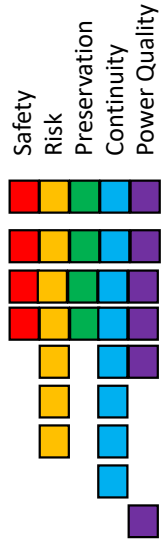
- Since grid needs (and corresponding solutions) can vary widely in scope, severity, and impact the Field Engineer is provided latitude to exercise professional judgement in the identification and prioritization of the grid need.

During assessment of the grid needs and potential solutions, the Field Engineer would consider the risks of not doing the project. Specifically, the Field Engineer would examine the grid need and potential solution(s) in terms of:

- Safety and protection of life and property
- Risk (Customer impact, type of issue, severity of issue)
- Preservation of company facilities
- Continuity of service
- Power Quality

The DSP Guide identifies potential operating issues/Grid Needs in the following rough **priority** order:

1. Overloaded equipment and circuits
2. Voltage problems
3. Protection problems
4. Power factor problems
5. Critical limiting factors
6. Reliability problems
7. Regulatory problems
8. Power quality problems
9. Other



Prioritization: Solution Identification

2) Complete Study

Identify and Determine Potential Solutions

Tasks Required:
- ✓ Identify and determine solution to resolve issue For example:
- ✓ Load transfer
- ✓ Phase balancing,
- ✓ Capacitor bank
- ✓ Etc.

Finalize proposed solution(s) to develop a project list (includes high-level scope of work, budget, and timeline)

Prioritization: Solution Identification and Analysis
Field Engineer analyzes potential solutions, in consultation with Manager/SMEs "DSM Guide"

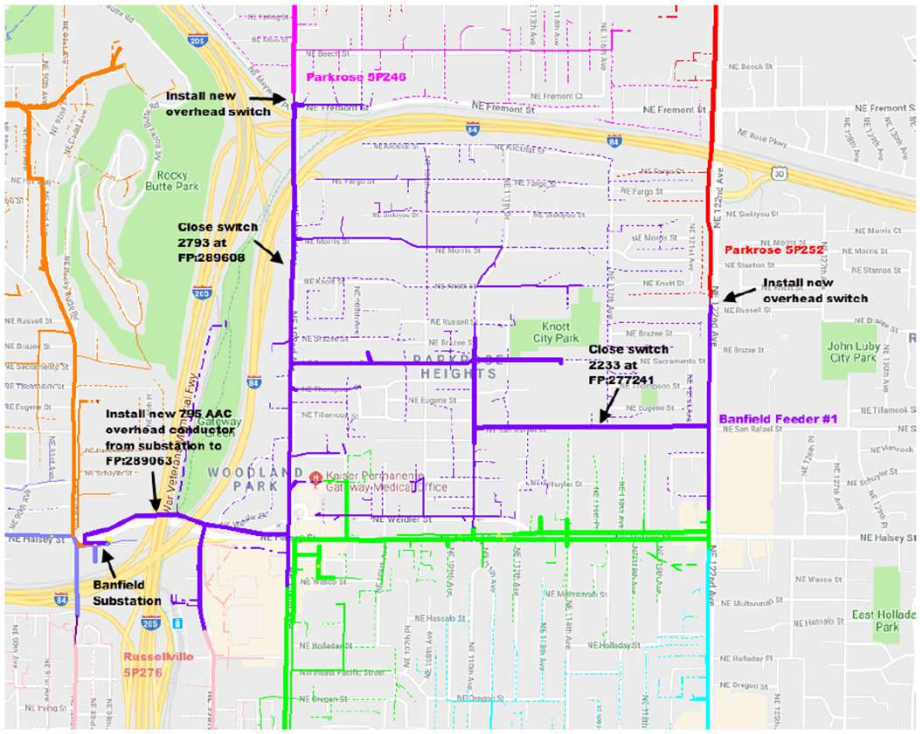
Stage 2

During assessment, the Field Engineer would consider the risks of not doing the project – based on the following factors:

- Safety and protection of life and property
- Risk (Customer impact, type of issue, severity of issue)
- Preservation of company facilities
- Continuity of service
- Power Quality

The DSP Guide suggests that Engineers address the following questions in considering risks associated with the proposed solution:

1. How many hours per year is the risk present?
2. How many customers would be affected?
3. How much load would be affected?
4. How much revenue would be lost?
5. How much would emergency repairs cost?
6. How long would it take to perform emergency repairs, if at all possible?
7. What is the likelihood that a failure or service quality problem would occur?"



2) Complete Study

Identify and Determine Potential Solutions

Tasks Required:
- ✓ Identify and determine solution to resolve issue For example:
- ✓ Load transfer
- ✓ Phase balancing,
- ✓ Capacitor bank
- ✓ Etc.

Finalize proposed solution(s) to develop a project list (includes high-level scope of work, budget, and timeline)

Prioritization: Solution Identification and Analysis
Field Engineer analyzes potential solutions, in consultation with Manager/SMEs "DSM Guide"

Stage 2

Prioritization: Solution Identification (Cont.)

In developing solutions to address the grid need, Field Engineers utilize both experience and collaboration as well as guidance from the DSP Study Guide.

The DSP Guide provides a table that identifies common grid needs and maps them to potential solutions.

Example of using the Guide:
Issue: Substation Transformer is found to be overloaded

Possible Solutions:
1A – Build new substation
2A – Replace or add substation transformer
2B – Add substation cooling equipment
2C – Parallel substation transformers

Table 2—Problem Solution References

Issues \ Solutions	1A Build New Substation	2A Replace or Add Substation Transformer	2B Add Substation Cooling Equipment	2C Parallel Substation Transformers	3A Replace Overloaded Substation Equip.	3B Increase Getaway Capacity	3C Add Parallel Circuit Getaway	4A New Feeder	4B Transfer Load	5A Reconductor	5B Reconfigure System	5C Add Underground Cable	5D Remove an Environmental Hazard	6A Replace Equipment	6B Add Distribution Automation Equipment	7A Replace Regulator	7B Limit Regulator Operating Range	7C Add Secondary Regulators	7D Change Regulator Control Settings	7E Add Line Regulator	7F Relocate Line Regulator	8A Install Line Capacitors	8B Install Capacitor Switches and Controls	9A Replace Step-Up or Step-Down Transformers	9B Change Utilization Transformer Taps	9C Voltage Conversion	10A Add Protective Device	10B Replace Protection Equipment	10C Relocate Protection Equipment	11A Demand Side Management
Substation																														
Transformer	X	X	X	X				X	X					X												X				X
Regulator		X		X				X	X					X		X	X									X				X
Transformer Protection	X		X					X	X					X												X				X
Paralleled Transformers	X	X	X					X	X					X												X				X
Bus Capacity	X	X			X			X	X					X												X				X
Circuit																														
Getaway						X	X	X	X					X												X				X
Circuit Protective Device					X			X	X																	X				X
Switches					X				X																					
Guide Line Loading Limit						X	X	X	X					X												X				
Line and Equipment																														
Overhead Conductor						X	X	X	X	X				X												X				X
Underground Conductor								X	X	X		X		X												X				X
Line Switch									X				X													X				
Switch Cabinet or Device									X				X																	
Regulator									X					X	X	X					X				X	X				
Protective Device																														
Recloser									X					X												X		X	X	
Fuse									X					X														X	X	X	
Series Transformer																														
Step Up or Down	X							X	X					X										X		X				X
Isolation Bank	X																							X		X				X
Grounding Bank Fault Capacity	X							X	X															X		X				
Service Quality Problems																														
Steady State Voltage Levels		X		X				X	X	X				X				X	X	X		X	X	X	X	X				
Regulator Range								X	X	X				X						X	X	X	X	X	X	X				
Regulator Settings														X	X				X											
Capacitor Controls														X	X				X		X		X	X		X				

2) Complete Study

Identify and Determine Potential Solutions

Tasks Required:
- ✓ Identify and determine solution to resolve issue For example:
- ✓ Load transfer
- ✓ Phase balancing,
- ✓ Capacitor bank
- ✓ Etc.

Finalize proposed solution(s) to develop a project list (includes high-level scope of work, budget, and timeline)

Prioritization: Solution Identification and Analysis

Field Engineer analyzes potential solutions, in consultation with Manager/SMEs "DSM Guide"

Stage 2

Prioritization: Solution Identification (Cont.)

Once primary solution is identified to address the grid need, the Field Engineer will:

- Identify and model the solution and any alternative solutions in CYME
- Confirm recommended solution addresses the technical needs for the remainder of the study cycle.

Alternatives are provided along with the recommended solution in the Study Summary Report for consideration.

The common solutions are further explained in text provide further guidance. The common solution titles are listed to the right for ease of reference.

Titles of Common Solutions from DSP Guide Book

- 1A Build New Substation
- 2A Replace or Add Substation Transformer
- 2B Add Substation Cooling Equipment
- 2C Parallel Substation Transformers
- 3A Replace Overhead Substation Equipment
- 3B Increase Getaway Capacity
- 3C Add Parallel Circuit Getaway
- 4A New Feeder
- 4B Transfer Load
- 5A Reconductor
- 5B Reconfigure System
- 5C Add Underground Cable
- 5D Remove an Environmental Hazard
- 6A Replace Equipment
- 6B Add Distribution Automation Equipment
- 7A Replace Regulator
- 7B Limit Regulator Operating Range
- 7C Add Secondary Regulators
- 7D Change Regulator Control Settings
- 7E Add Line Regulator
- 7F Relocate Line Regulator
- 8A Install Line Capacitors
- 8B Install Capacitor Switches and Controls
- 9A Replace Step-up or Step-down Transformers
- 9B Change Utilization Transformers Taps
- 9C Voltage Conversion
- 10A Add Protective Device
- 10B Replace Protective Equipment
- 10C Relocate Protective Equipment
- 11A Demand Side Management

2) Complete Study

Develop Study Summary & Proposal for Investment Delivery

Tasks Required:
Develop proposal for each project listed which includes:

- ✓ Description of work to be performed
- ✓ Purpose and Necessity
- ✓ Risk Assessment
- ✓ Alternatives Considered
- ✓ Preliminary Cost Estimate
- ✓ Investment Reason

Proposals go to Investment Delivery to get incorporated into capital plan

Prioritization: Study Summary Report
Document outlines recommended + alternative solutions – Assigns Investment Reason for Budget Prioritization

Stage 3

Prioritization: Study Summary Report

The Field Engineer creates the DSP Report and Construction Plan for Approval including:

- Report Preface
- Study Summary: grid needs, costs/benefits and risks for recommended and alternative solutions
- Load Forecast for each substation and circuit in the study
- Purpose and Necessity (Investment Reason) for each proposed solution (more on this below)
- Map(s) showing study area and proposed budget items
- Construction Plan and Approval

*The recommended solution includes a level of **prioritization** (that is - the recommended solution is prioritized above the alternative solutions), but there is not further prioritization among a variety of potential solutions until the reports are compiled and prioritized in the next step.*

Each solution assigned to an **"Investment Reason"** - categories that "define the business reasons driving construction of a given capital project… not simply an explanation of the type of work to be performed". The Investment Reason ties directly to budgets that outline work activities.

Prioritization – Field Engineering Manager

3) Field Engineering Manager Review/Prioritization:

A. Reviews All Scheduled Study Reports (~ 20/year)

B. Ranks each Solution in priority order for each Investment Reason Category

Prioritization: Field Engineering Manager (One Person)

- Reviews all Study Reports & recommended solutions during study and prior to prioritization.
- Ranks each proposed solution from all of the studies in rank order (priority) based on:
  - Potential risk and impact
  - Timing (when solution needed/how long will it take to implement)
  - Any relationships to other solutions
  - Consultation with Field Engineer/Ops Managers

Ranked List Reinforcements

Ranked List Feeder Improvements

Ranked List Substation Improvements

Field Engineering Manager Review and Approval: All DSP Reports and Construction Plans are reviewed and approved by the Field Engineering Manager (a single person) and the specific solutions are captured for prioritization.
The solutions' Purpose and Necessity/Investment Reason dictates the type of solution that is needed. The Investment Reasons are themselves a form of prioritization in the process.

Field Engineering Manager prioritization: compiles a list of all identified solutions and prioritizes the list by the Investment Reason. This is the critical prioritization step as the Manager (in consultation with the Field Engineers) force ranks the proposed solutions into priority order based on:

- Type of Issue and Severity
- Risk associated with issue
- Alternatives available
- Customer impact
- Projected Conditions/Benefits
- Timeline
- Cost
- Relationships to other solutions

There is dialog throughout the prioritization process to ensure that risks, potential impacts and other particulars are considered in the ranking of the proposed construction items. Once completed, the force ranked list is provided to Investment Delivery.

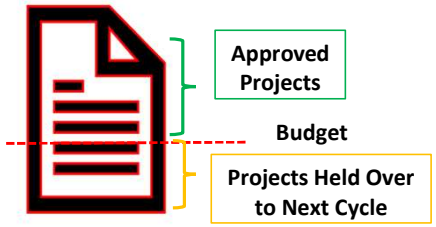
Prioritization – Investment Delivery

4) Investment Delivery Prioritization and Approval:

A. Each Investment Reason has a budget established for the year based on capital planning.
B. Field Engineering Manager & Inv Delivery Director review prioritized list of solutions & approve in priority order until budgeted funds are exhausted.

Prioritization: Projects approved in priority order until budget fully allocated.
Projects entered for tracking during design and implementation.

Ranked List Reinforcements ***Example***



Investment Delivery Prioritization and Approval:

- Each of the Investment Reasons has a set budget for each year
- Budget level reflects investment priorities for PacifiCorp overall. Specific budget levels are allocated to Pacific Power.
- The construction/solution items are force ranked against all other construction items in that category. Projects are approved starting from highest ranked to lower ranked step by step until the annual budget has been exhausted.

"Carryover" projects from the previous year are approved first to ensure they continue toward completion. New projects then are considered for approval with remaining budget for that category.

Examples of the implementation projects currently in flight for calendar year 2022 are provided on the following slides:

- System Reinforcement – Feeder
- System Reinforcement - Substation
- Feeder Improvements
- Substation Improvements
- Functional Upgrade – Reliability (*not through regular DSP Studies)*

Distribution Investment Reasons

Distribution System Reinforcements

Distribution Substation Reinforcements

Feeder Improvements

Substation Improvements

Reliability Improvements

The most common Investment Reasons for DSP Study Solutions are:

System Reinforcement – Feeder: Used for improvements and reinforcements needed to maintain acceptable feeder support for general load growth.

System Reinforcement – Substation: Used for improvements and reinforcements needed to maintain acceptable substation support for general load growth.

Feeder Improvements: Used for *functional* upgrades to a feeder (Addition or enhanced functionality to existing operational function that was not directly related to a customer reliability improvement)

Substation Improvements: *Functional* upgrades to a substation, not directly related to a customer reliability improvement. *Depending on the voltage of the substation equipment, these solutions may be either a Distribution investment or a Transmission investment.*

Functional Upgrade – Reliability (*Not From DSP Studies*): Used for functional upgrades to a feeder, substation or transmission line for the purpose of improving circuit reliability that are directly associated with a customer reliability improvement.
(These items are identified and prioritized through centralized reliability analysis and specific improvement initiatives, not through regular DSP Studies)

Review 2022 Tracking Sheet
Distribution System Reinforcements

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

State	Area	District	Project Type	Project	Planned y/n	Status	Aprvd	Cost Bracket
OR	Central	Albany	eng	STY-4M19-0801/300700-AMSVL-RECLOSER	y	Aprv	12/1/2021	Med 1
OR	Central	Albany	eng	LCS, 4M209 Inst Line Regs & Phase Swap	y	Pend		Med 1
OR	Central	Albany	eng	4M16 Vine St. 795 RVR CRX & 4/0 to 477ACC	y	Pend		Med 2
OR	Central	Albany	eng	CRF 4M206 Recondcutor Mainline	y	Pend		Med 1
OR	Central	Albany	eng	CRF 4M206 Configure Single Phase Loads	y	Pend		Med 1
OR	Central	Albany	eng	Murder Crk 4M243 2,100 reconductor to 4/0 (GoldFish)	y	Pend		Med 1
OR	Central	Albany	pq	IEW/Transformer upgrade:Raleigh Court	n	Aprv	1/25/2022	Small
OR	Central	Albany	pq	ALB:4M243:RECONDUCTOR GOLDFISH FARM RD	n	Aprv	3/2/2022	Med 1
OR	Central	Albany	pq	LYN-4M70-CASCADE VIEW-ML CTY-UPGRADE XFM	n	Aprv	5/21/2022	Small
OR	Central	Bend	eng	OVR5D106:PPL/PURCELL RD RECONDUCTOR	y	Aprv	2/16/2022	Med 1
OR	Central	Bend	eng	PNV 5D167 RECON & FUSING, PRINEVILLE	y	Aprv	12/20/2021	Med 1
OR	Central	Bend	eng	YEW:5D325:DN7:RECONDUCTOR	y	Teco	12/23/2021	Med 2
OR	Central	Bend	eng	CUV 5D5 Highland Ln Reg Bank Haystack FM	y	Aprv	4/5/2022	Med 1
OR	Central	Bend	eng	BND 5D10 Recon to 1,500 u.g.	y	Aprv	3/11/2022	Med 1
OR	Central	Bend	eng	SHP 5D241 Reconductor 4/0 to 1000 UG	y	Pend		Med 2
OR	Central	Bend	eng	OVR 5D120 Recon 4/0	y	Aprv	3/22/2022	Med 1
OR	Central	Bend	eng	CLV 5D94 Xfr load to 5D96	y	Aprv	2/16/2022	Med 1
OR	Central	Bend	eng	BND 5D10 RECONDCTOR TO 477 NW 12TH ST	y	Aprv	6/10/2022	Med 1
OR	Central	Bend	eng	OVR 5D106 Cfg reconductor with 795 AAC	y	Aprv	5/5/2022	Med 1
OR	Central	Bend	eng	BST 5D411 Upgrd to 3 phase	y	Aprv	4/5/2022	Med 1
OR	Central	Bend	eng	5D263 Swap Load to 5D265	y	Aprv	4/7/2022	Small
OR	Central	Bend	eng	CHH 5D142 Cfg Install Reg Bank	y	Pend		Med 1
OR	Central	Bend	eng	PBT.5D263 Recon with 1/0 Al	y	Pend		Med 1
OR	Central	Bend	eng	RDD 5D226 Inst Regs SW 67th St. Winter	y	Pend		Med 1
OR	Central	Bend	eng	PBT.5D263 Recon with 1/0 Al	y	Pend		Med 1
OR	SW	Grants Pass	pq	5R53:DN7:XFMR UPGRADE:228 S. REDWOOD HWY	n	Teco	12/16/2021	Small
OR	SW	Grants Pass	pq	IEW BETTERMENT 207 N FRONTAGE RD WC	n	Teco	3/28/2022	Small

Final List:
Approved
Distribution
System Reinforcements

<u>System Reinforcement – Feeder:</u> Used for improvements and reinforcements needed to maintain acceptable feeder support for general load growth.

Review 2022 Tracking Sheet
Distribution System Reinforcements (Cont.)

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

State	Area	District	Project Type	Project	Planned y/n	Status	Aprvd	Cost Bracket
OR	SW	Klamath Falls	eng	CLA.8G65 Configure Fuse Coordination	y	Pend		Small
OR	SW	Klamath Falls	eng	Nutglade 8G95 Configure Fuse Coordination	y	Pend		Small
OR	SW	Klamath Falls	eng	5L112 Burnt Wire and Fuse Repl Summers Ln	y	Aprv	4/6/2022	Small
OR	NW	Hood River	eng	WASCO:4K1 GORDON HOLLOW VOLTAGE REG	Y	Aprv	6/4/2022	Med 1
OR	SW	Medford	eng	TOL-5R91-DN7-9370 JOHN DAY DR GOLD HILL	y	Teco	12/16/2021	Small
OR	SW	Medford	pq	TAL-5R240-DN7 960 ROSE ST, PHOENIX	n	Teco	4/26/2022	Small
OR	NW	Pendleton	eng	City of Pendleton Voltage Conversion 4KV to 12KV	y	Pend	5/11/2021	Small
OR	NW	Portland	eng	ALB:5P111:216V GRID SRV:1200 SW 12TH	y	Aprv	12/14/2021	Med 1
OR	NW	Portland	pq	HYW:5P205:UPGRADE O/L XFMR:3134 NE 68TH	y	Pend		Small
OR	NW	Portland	eng	ADW:5P604: (2) SWITCHED PAD-MT CAP BANKS	y	Pend		Med 1
OR	NW	Portland	pq	HYW:5P205:UPGRADE O/L XFMR:040 NE SKIDMO	n	Teco	12/22/2021	Small
OR	NW	Portland	pq	VRN:5P391:XFMR OVERLOAD:0101/243807	n	Teco	1/10/2022	Small
OR	NW	Portland	pq	CUL:5P292:UPGRADE O/L XFMR:3630 NE 90TH	n	Teco	2/4/2022	Small
OR	NW	Portland	pq	CUL:5P288:UPGRADE O/L XFMR:0102/203349	n	Teco	2/22/2022	Small
OR	NW	Portland	pq	RVL:5P278:INSL NEW XFMR:8304 NE DAVIS ST	n	Teco	2/23/2022	Small
OR	NW	Portland	pq	CUL:5P292:ROT POLE/OL ON CBL:3633 NE 90T	n	Teco	2/24/2022	Small
OR	NW	Portland	pq	MLY:5P266:XFMR OVERLOAD:01101001.0155701	n	Teco	2/28/2022	Small
OR	NW	Portland	pq	HDY:5P158:XFMR OVERLOAD:01101001.0261600	n	Teco	3/17/2022	Small
OR	NW	Portland	pq	KNO:5P233:XFMR OVERLOAD:01101001.0278409	n	Teco	3/18/2022	Small
OR	NW	Portland	pq	MLY:5P266:XFMR OVERLOAD:01101001.0102206	n	Aprv	3/18/2022	Small
OR	NW	Portland	pq	MLY:5P162:XFMR OVERLOAD:01101001.0143701	n	Aprv	4/25/2022	Small
OR	NW	Portland	pq	CUL:5P290:XFMR OVERLOAD:01101001.0259908	n	Aprv	4/26/2022	Small
OR	NW	Portland	pq	HYW:5P205:UPGRADE O/L XFMR:7114 NE SISKI	n	Aprv	5/18/2022	Small
OR	NW	Portland	pq	KDY:5P12:XFMR OVERLOADE:01101001.0138410	n	Aprv	6/8/2022	Small
OR	NW	Portland	pq	#N/A	n		6/8/2022	Small
OR	NW	Portland	pq	5P89 FP202643 ROTTEN POLE TOP	n	Teco	6/9/2022	Small
OR	Central	Roseburg	eng	4C36 Power Factor Correction	y	Pend		Small
OR	Central	Roseburg	eng	RID 5U2 New 3 Phase Line Regulators	y	Pend		Med 1
OR	Central	Roseburg	eng	LOC 4C49 Recon 1.6 mi of #6 Cu	y	Pend		Med 2
OR	Central	Roseburg	pq	DN7 OAK 5U12 1P XFMR UPGRADE 127 NE 1ST	n	Teco	5/19/2022	Small

Final List:
Approved
Distribution
System Reinforcements

<u>System Reinforcement – Feeder:</u> Used for improvements and reinforcements needed to maintain acceptable feeder support for general load growth.

Review 2022 Tracking Sheet
Distribution Substation Reinforcements

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

State	District	Project	In Servce Date	Status	Cost Bracket
OR	Albany	Prospect Hill-replc leakng roof	07/30/22	Teco	Small
OR	Albany	LYONS-R744-ADD ANML GRDS	07/10/22	Aprv	Small
OR	Albany	STAYTON-4M50IADD ANML GRDS	04/21/22	Teco	Small
OR	Albany	Junction City-4M102-add anml gurds	04/21/22	Aprv	Small
OR	Albany	Queen-4M258-add anml grding	07/30/22	Teco	Small
OR	Albany	Grant St-install fence and gate	04/21/22	Aprv	Small
OR	Albany	Sweet Home-CB4M94-add anml gurds	05/30/22	Aprv	Small
OR	Bend	Cleveland Install Bird Guarding	12/31/2022	Aprv	Med 1
OR	Bend	China Hat Install Bird Guarding	12/31/2022	Aprv	Small
OR	Bend	Prineville Add Bird Guard on 2kV Bus	12/31/2022	Aprv	Med 1
OR	Bend	Madras install bird guarding	12/31/2022	Aprv	Small
OR	Grants Pass	OIL WATER SEPARATOR GP SUB BANK3	10/05/22	Aprv	Small
OR	Grants Pass	OIL WATER SEPARATOR GP SUB BANK4	10/06/22	Aprv	Small
OR	Klamath Falls	Bly-Cantilever Bus Improvements	02/22/22	Teco	Small
OR	Medford	Whetstone-Install TRF & Cable Tray Water	12/31/22	Aprv	Med 1
OR	Medford	STEVENS RD- Bird Guarding	04/30/22	Aprv	Small
OR	Roseburg	Dixonville:Line 39 Rpl SW 2U21,2U23,2U2A	12/30/22	Aprv	Med 1
OR	Roseburg	Roberts Creek-BUS-Add bird guard	12/30/22	Teco	Small
OR	Walla Walla	Herm 5W602 Rpl Bird Guarding	12/30/22	Aprv	Small
OR	Walla Walla	Blalock Install bird guarding 5K40	12/31/22	Aprv	Small
OR	Walla Walla	Joseph Sub 5W21 Deadline Check Install	12/31/22	Aprv	Med 1
OR	Walla Walla	T32222 Rpl BirdG~Cap Arr~Nitro Reg~fan~D	12/31/22	Teco	Med 1
OR	Walla Walla	ProsPec Point T3195 RPL N2 reg, Oil Dryo	12/31/22	Aprv	Med 1

Final List:
Approved
Distribution Substation
Reinforcements

<u>System Reinforcement – Substation:</u>

Used for improvements and reinforcements needed to maintain acceptable substation support for general load growth.

Review 2022 Tracking Sheet - Feeder Improvements

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

State	District	Project Name	Status	In Servce Date	Approved Date	Cost Brack
or	Albany	OSU-7M60-MANHOLE/LADDER REPLACEMENTSX10	Pend	12/31/2022		Small
or	Albany	CircleBlvdSub Discharge Monitorig Sys	Aprv	12/31/2022	6/8/2021	Med 2
or	Albany	DVK:NEL:7A390:SUB RMVL:STEP DOWN XFMRS	Aprv	12/31/2022	3/30/2022	Med 1
or	Albany	STY-4M370-0901/287701-STYTN-RADIAL->LOOP	Aprv	12/31/2022	01/31/22	Med 1
or	Albany	VGN-4M86-2003/284004-4M90,4M28,4M75 SWTC	Aprv	12/31/2022	03/14/22	Med 1
or	Albany	Vine St 4M15 Mainline Sectionalizing Pln	Aprv	12/25/2022		Med 1
or	Bend	Cleveland 5D94 Mainline Sectionalzng Pln	Aprv	12/25/2022	04/21/22	Med 2
or	Lincoln Cit	Devils Lake 4A316 Instl Fiber Optic Cbl	Aprv	12/31/2022	7/26/2021	L
or	Medford	TAL-5R240-3 RECLOSER FLISR & DISTRO WORK	Pend	12/31/2022		Small
or	Medford	Medford Distrib Automation Proj-FLISR	Aprv	6/30/2022	12/16/2021	L
or	Medford	Griffin Crk 12.57KV Circ 5R204-Mainline	Aprv	2/28/2022	4/28/2022	L
or	Portland	Russellville Dist Automation Proj-FLISR	Aprv	3/31/2022	3/30/2021	L
or	Portland	Portland Willamette River Crossing Proj	Aprv	6/30/2025	03/28/19	XL
or	Portland	OR Multi Sub SCADA Installs & Upgrades	Aprv	12/31/2022		Med 1
or	Portland	PPL 500 BUILDING INSTALL HV INTERRUPTERS	Pend	12/31/2021		Small
or	Portland	PPL 700 BUILDING INSTALL HV INTERRUPTERS	Pend	12/31/2021		Small
or	Portland	Hollywood 5P208/5P204 Mainline Sect Plan	Aprv	12/25/2022		Med 2
or	Roseburg	Roseburg-Glide Tap Loop Feeder Improvmnt	Aprv	12/31/2022	08/18/21	Med 2
or	Roseburg	Recon Carnes 5U44 to Winston 5U49-4 Mile	Aprv	12/31/2023		Med 1

Final List
Approved
Feeder Improvements

Feeder Improvements:

Used for *functional* upgrades to a feeder (Addition or enhanced functionality to existing operational function that was not directly related to a customer reliability improvement)

Review 2022 Tracking Sheet: Substation Improvements

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

Project Name	2023 Plan ISD	FERC Code	State	Region	MVA Added	Cost Bucket
Aumsville New Substation and Transmission Loop D	6/15/2031	D	OR	PP	30	XL
Banfield New 115kV to 12.5kV Substation- D	6/15/2025	D	OR	PP	25	XL
Bend Area New Substation	6/15/2030	D	OR	PP		XL
Bend Sub Add Capacity and Transfer Load	6/15/2029	D	OR	PP		XL
Bend Substation 400 A Switches Replacement	5/15/2022	D	OR	PP	1.2	Med 1
Bond Street Add 2nd Transformer	5/15/2025	D	OR	PP	25	XL
China Hat Substation - Increase Capacity (25 MVA)	10/15/2029	D	OR	PP	25	L
Conser Road- Construct New 115kV to 20.8 kV substation D	10/15/2022	D	OR	PP	30	XL
Culver Sub Add Capacity	5/15/2024	D	OR	PP		XL
Dorris Sub- Capacity solution-Transformer (9.4 MVA)	5/15/2024	D	OR	PP	5	L
Empire and State Street Transformer Loading	5/15/2027	D	OR	PP	25	XL
Fraley Capacity Solution	6/15/2022	D	OR	PP	0.5	Med 2
Glendale Sub - Increase Capacity	5/15/2026	D	OR	PP	12.5	L
Henley Sub - Capacity Solution (New Sub - Net 19 MVA)	11/15/2032	D	OR	PP	25	XL
Hunters Circle Add Capacity	6/15/2029	D	OR	PP		XL
Independence Substation Capacity Relief	6/15/2022	D	OR	PP		Med 2
Jefferson Sub - Increase capacity 12.5 MVA	6/15/2022	D	OR	PP	7.5	L
Madras Sub Add Capacity	6/15/2029	D	OR	PP		L
Medford Sub Add Two 12.5kV Feeder Positions	11/15/2023	D	OR	PP		Med 2
Mill City Construct New Substation	11/15/2024	D	OR	PP	25	XL
Ochoco Substation Expansion D	5/15/2031	D	OR	PP		XL
Phoenix Area: New Substation	5/15/2029	D	OR	PP	25	XL
Prineville Sub Construct Three Breaker Ring Bus D	5/15/2031	D	OR	PP	25	XL
Prospect Point Transformer High-Side Fuse Replacement	5/15/2023	D	OR	PP		Med 2
Redmond Area New 115-12.47 kV Substation D	5/15/2026	D	OR	PP	25	XL
Rickreall- Construct New substation D	5/15/2024	D	OR	PP		XL
Rogue River Sub Capacity Relief	5/15/2024	D	OR	PP		Med 2
Shevlin Park Substation Increase Capacity	5/15/2022	D	OR	PP	25	XL
Wake Robin Ave- Construct New Substation D	5/15/2026	D	OR	PP	30	XL

Final List Approved Substation Improvements

Substation Improvements: Functional upgrades to a substation, not directly related to a customer reliability improvement.
Depending on the voltage of the substation equipment, these solutions may be either a Distribution investment or a Transmission investment.

Review 2022 Tracking Sheet: Reliability Improvements

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

Operating Area	Circuit ID	Description	Fund Y/N	Project Type	Cost Bracket
LINCOLN CITY	4A338	Install recloser and coordinate	Y	FIOLI	Med 1
LINCOLN CITY	4A312	Auto splice review, zone 2 FIOLI	Y	FIOLI	Small
LEBANON	4M63	Zone 2/3 FIOLI and install recloser	Y	FIOLI	Med 1
LEBANON	4M204	Install recloser and coordinate	Y	FIOLI	Med 1
STAYTON	4M19	Install recloser and coordinate	Y	FIOLI	Med 1
STAYTON	4M120	Visibility strips and pole protection		Circuit Hardening	
HOOD RIVER	5K44	Install reclosers as switches	Y	Saving SAIDI	Small
PORTLAND	5P274	Visibility strips and pole protection		Circuit Hardening	
PORTLAND	5P393	Zone 1 FIOLI	Y	FIOLI	Med 1
BEND/REDMOND	5D229	Zone 1 FIOLI	Y	FIOLI	Med 1
GRANTS PASS	5R133	Enhanced Fault Indication (EFI)	Y	EFI	Small
GRANTS PASS	5R106	Enhanced Fault Indication (EFI)	Y	EFI	Small
GRANTS PASS	5R52	Enhanced Fault Indication (EFI)	Y	EFI	Small
GRANTS PASS	5R65	Enhanced Fault Indication (EFI)	Y	EFI	Small

Final List:
Approved
Reliability Improvements

<u>Functional Upgrade – Reliability</u>
(*Not From DSP Studies*):
Used for functional upgrades to a feeder, substation or transmission line for the purpose of improving circuit reliability that are directly associated with a customer reliability improvement.
(These items are identified and prioritized through centralized reliability analysis and specific improvement initiatives, not through regular DSP Studies)

Review 2022 Tracking Sheet: Reliability Improvements *(Continued)*

Cost Bracket Legend				
Small	Med 1	Med 2	L	XL
$0 - $50K	$50K - $300K	$300K - $1 M	$1M - $3M	$3M +

Operating Area	Circuit ID	Description	Fund Y/N	Project Type	Cost Bracket
KLAMATH FALLS	5L19	FIOLI and Enhanced Fault Indication (EFI)	Y	FIOLI	Med 1
COOS BAY/COQUILLE	4C41	Recloser Replacement	Y	FIOLI	Med 1
COOS BAY/COQUILLE	4C42	Recloser Replacement	Y	FIOLI	Med 1
MEDFORD	5R55	Full Circuit FIOLI	Y	FIOLI	Small
MEDFORD	5R68	Full Circuit FIOLI	Y	FIOLI	Small
ROSEBURG/MYRTLECREEK	4U5	FIOLI and Enhanced Fault Indication (EFI)	Y	EFI	Small
ROSEBURG/MYRTLECREEK	5U32	Small FIOLI and Reconfigure	Y	FIOLI	Small
PENDLETON	5W202	Full Circuit FIOLI/DSP Transition	Y	FIOLI	Med 1
PENDLETON	5W201	Full Circuit FIOLI/DSP Transition	Y	FIOLI	Med 1
PENDLETON	5W402	Full Circuit FIOLI/DSP Transition	Y	FIOLI	Med 1
PENDLETON	5W406	Pole Fire Mitigation	Y	PFM T1	Small
BEND/REDMOND	5D223	Full Circuit FIOLI	Y	FIOLI	Med 1
BEND/REDMOND	5D22	Full Circuit FIOLI	Y	FIOLI	Med 1
BEND/REDMOND	5D52	Reconductor:Reliability	Y	Circuit Hardening	Med 1
MEDFORD	5R103	Gang Switch	N		Small

Final List:
Approved
Reliability Improvements

Break – 10 Minutes






PACIFIC POWER

POWERING YOUR GREATNESS

4) Pilot/Transitional Study Areas and Grid Needs






PACIFIC POWER

POWERING YOUR GREATNESS

Preliminary Grid Needs – Pilot/Transitional Study Areas

Circuit/Area Characteristics:

- Suburban/rural feeders
  - low load density with high circuit miles
- Small conductor on the mainline, thus less load capacity and higher voltage drop
  - Does not necessarily = less DG readiness
- Historically higher DER adoption rates
  - Among Pacific Power service territory
- Ranked higher in DG capacity and readiness than other areas
  - Including necessary substation equipment

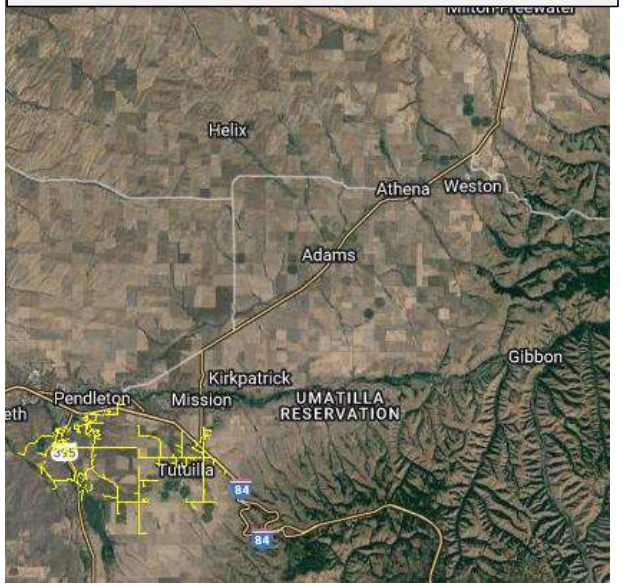
Preliminary findings/Grid Needs

Klamath Falls – Crystal Springs – 5L45

- Projected peak summer load drives overload on conductor
- Phase imbalance
- Low voltages on circuit

Pendleton – McKay – 5W856

- No grid needs due to recent investment upgrades
- Potential low voltages in outlying areas



Grid Needs – Pendleton

Circuit Details:

- Circuit 5W856 served from McKay substation
- Circuit operates at 12.47 kV
- Peak loading occurs during summer
- Daytime minimum loading occurs during the spring
- Overall Customer makeup:
  - 1,802 Total number of customers
    - 1,641 Residential
    - 28 Irrigation
    - 131 Commercial
    - 1 Industrial
    - 1 Hospital

No Grid Needs Found:

- Ad-hoc study performed during planning study cycle resolved any Grid Needs for area.

What Grid Needs could we have found if the Ad-hoc study did not occur?

Would it have been a good candidate for NWS?

Grid Needs – Pendleton

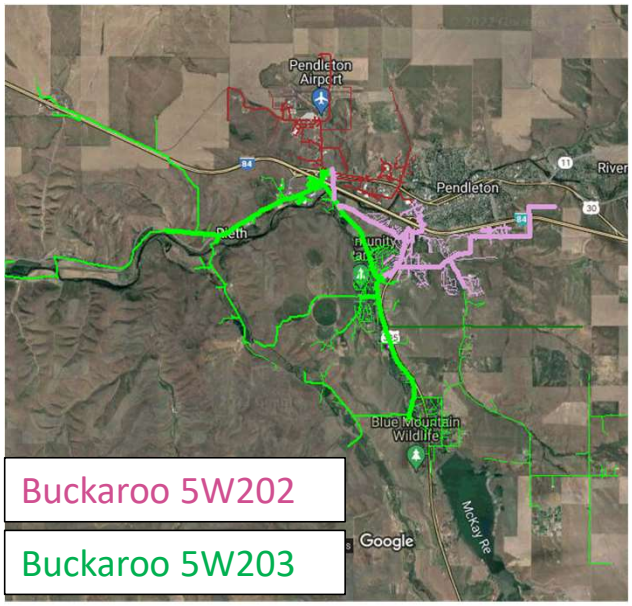
Model Scenario – Analyze the previous circuits as if the new substation and Ad-hoc study did not exist

McKay 5W856 is made up of sections of Buckaroo 5W202 and 5W203 served from Buckaroo Substation.

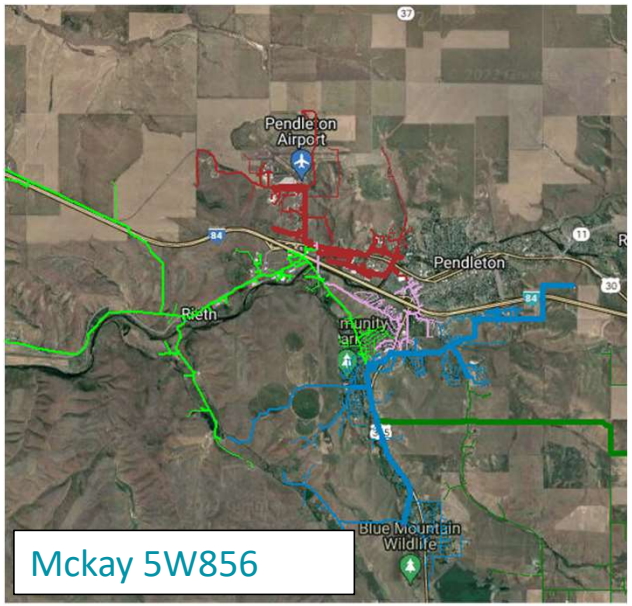
Scenario analyzes the two circuits without the new substation and applies the PV and EV forecast for Buckaroo 5W202 and 5W203

After removing the impact of the Ad-hoc study …
No Grid Needs Found

Before:



After:



Grid Needs – Klamath Falls

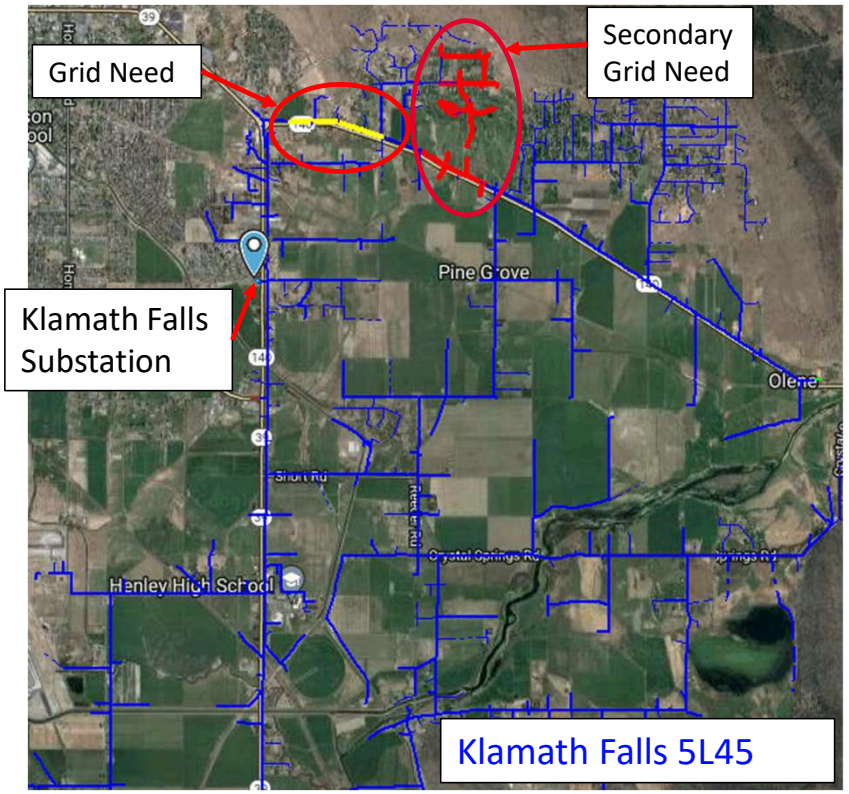
Circuit Details:

- Circuit 5L45 served from Klamath Falls substation
- Circuit operates at 12.47 kV
- Peak loading occurs during summer
- Daytime minimum loading occurs during the spring

- Overall Customer makeup:
  - 1,499 Total number of customers
    - 1,196 Residential
    - 155 Irrigation
    - 145 Commercial
    - 3 Industrial

Grid Needs:

- Study identified an overcapacity issue causing conductor overload
- Also causes low voltage downstream



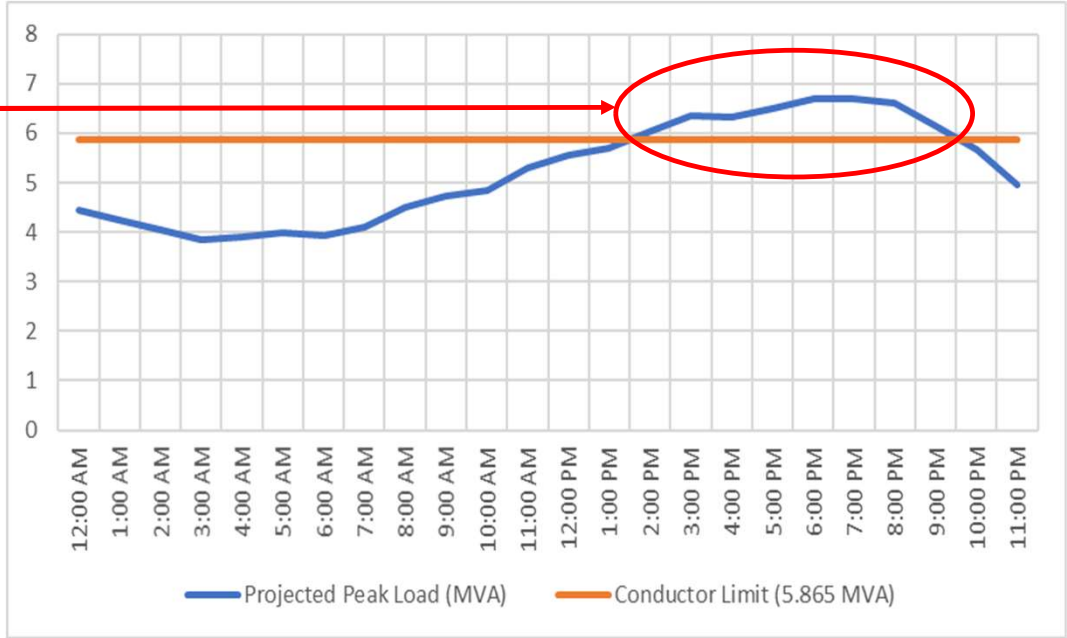
Grid Needs – Klamath Falls

Grid Need:

- Approximately 850 kW over existing conductor limit
- Occurs ~20 – 50 hours total per year in Summer ~ June through August

- Number of customers downstream of issue:
  - 511 Total customers (37% Summer kWh)
    - 461 Residential (24%)
    - 33 Irrigation (13%)
    - 17 Commercial (1%)
    - 0 Industrial (0%)

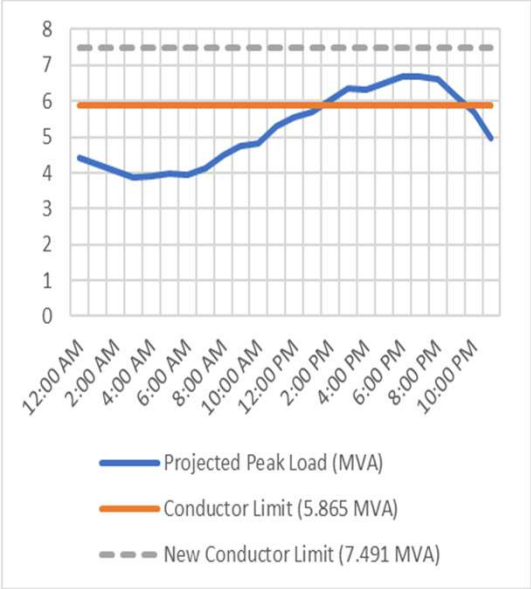
Based on the Grid Need and characteristics of circuit, there are several solutions available. All have different effects in terms of complexity, performance, and reliability.



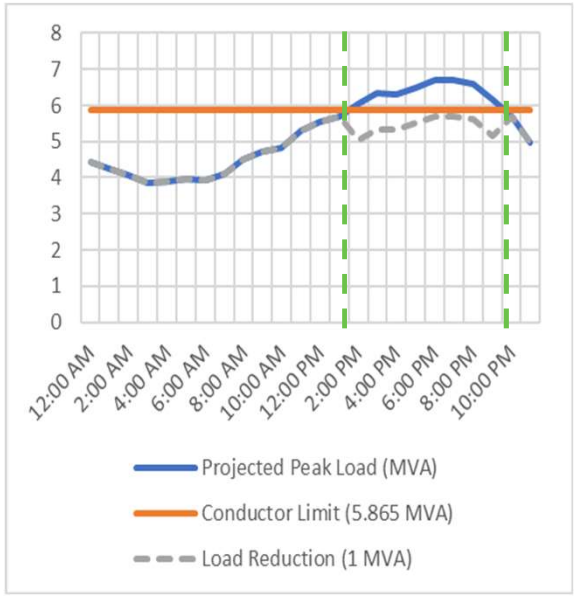
Grid Needs – Klamath Falls

List of hypothetical solutions:

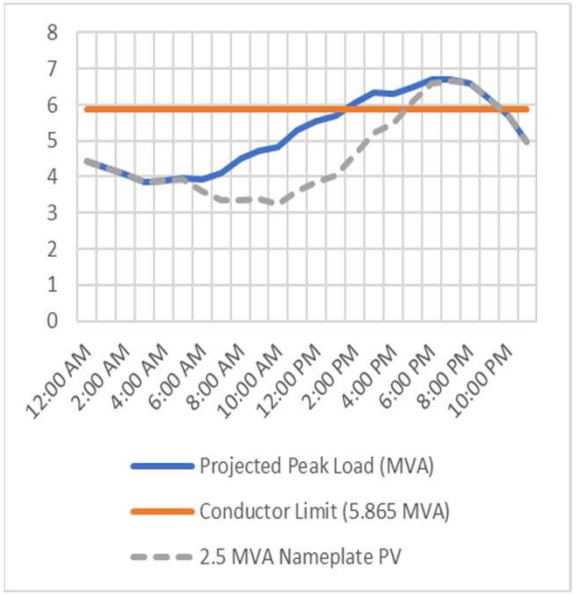
Traditional Wires Solution – Reconductor overloaded conductor



Demand Side Management (DSM) Solution - Load reduction

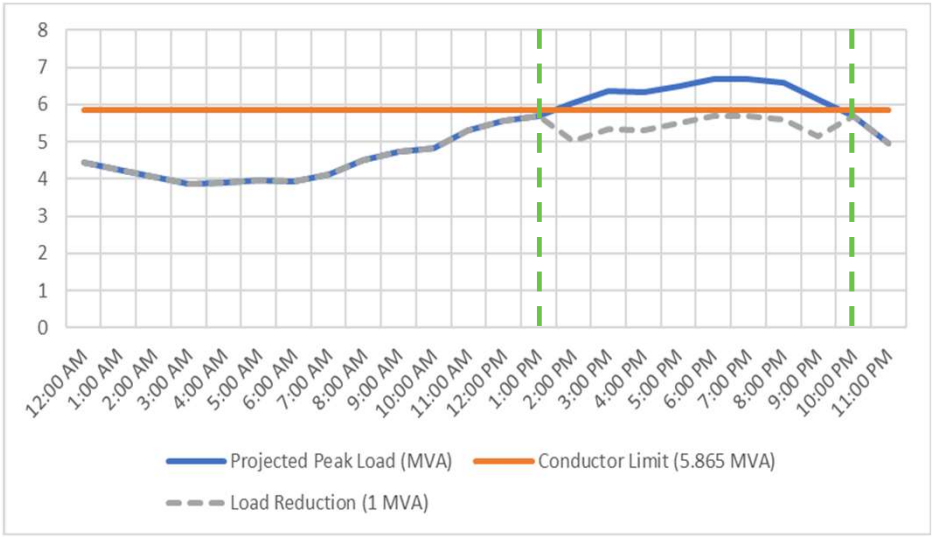


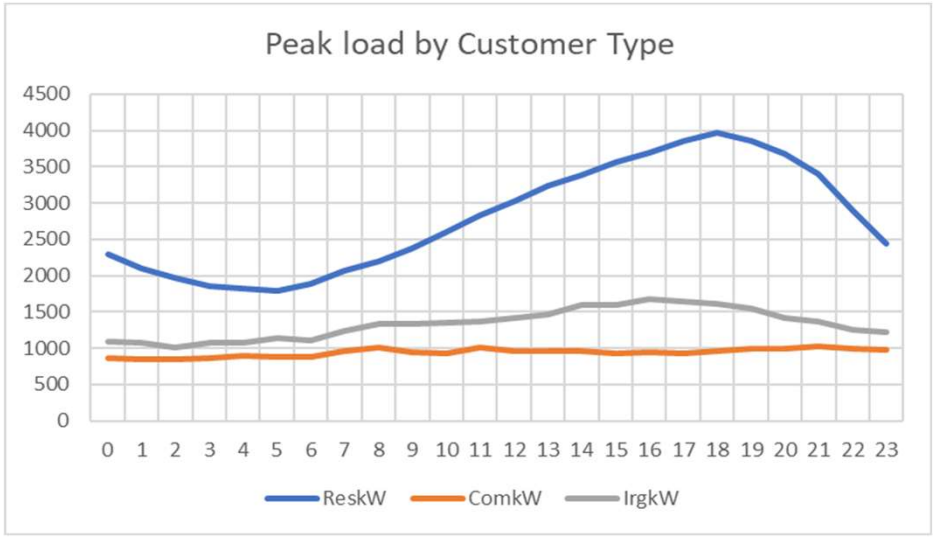
Non-Wires Solution - Solar Only



Hypothetical Load Reduction

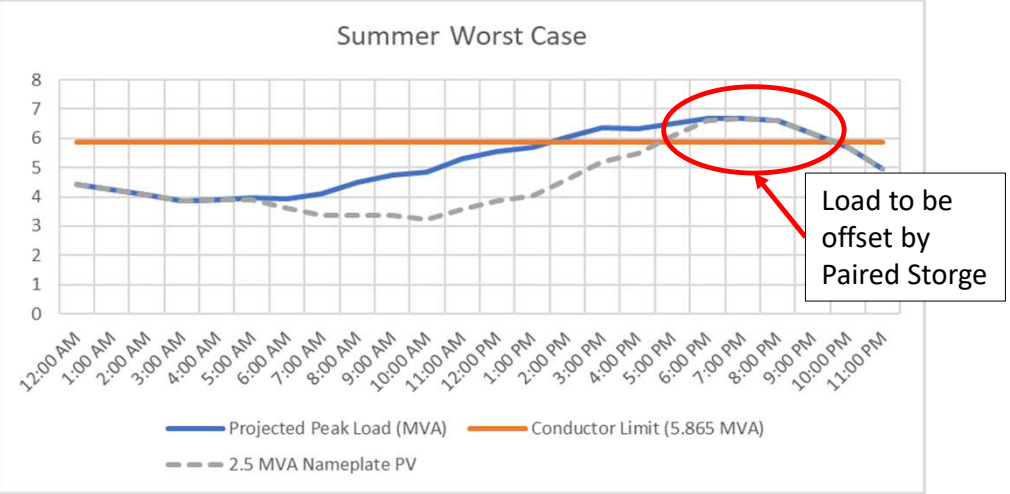
- Need critical mass of customers to participate in order to meet reduction target
- Peak Load day might require 9 or more hours of load reduction
- Needs to be adjusted for growth over time
- Amount & type of customers involved TBD

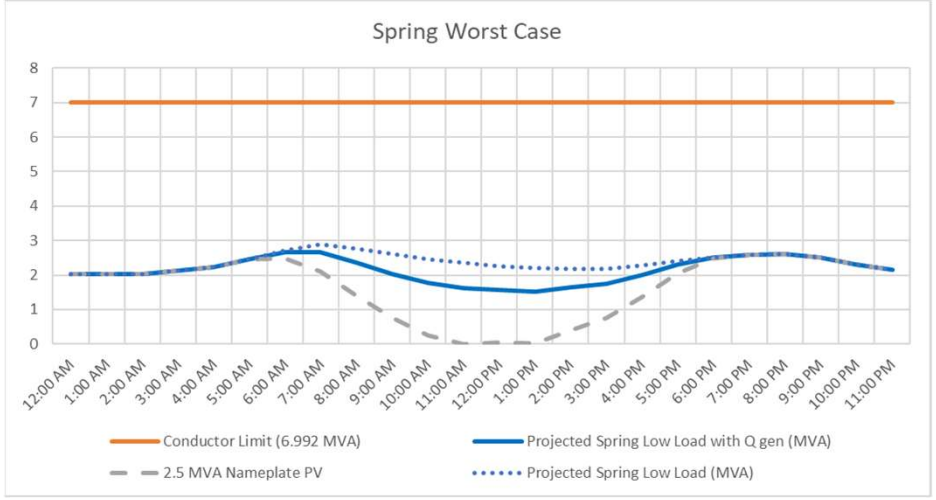




Hypothetical Solar + Storage

- Generation Study required in addition to Load Study
  - Different time of year and study assumptions
- Est 3.5 MWh needed for peak load (excluding buffer capacity), but mix of solar and PV TBD
- Needs to be adjusted for growth over time
- Advanced automated system required to control the smart inverters





Klamath Falls Grid Need and Potential Non-Wires Solutions

Klamath Falls – Crystal Springs – 5L45

- Projected peak summer load drives overload on conductor
- Phase imbalance
- Low voltages on circuit

Non-Wires Solutions PAC is Considering for evaluation

- Solar
- ***Solar + Battery Storage***
- Load Control, Curtailment, Demand Response
- Targeted DSM
- Other DER

Non-Wires Solutions Proposed by Stakeholders:

Farmer's Conservation Alliance:

- ***Solar + Battery Storage***

OSSIA:

- Pilot use of ***Smart Inverters***
- Pilot "Solarize Campaign"

Opportunity to Evaluate *Solar + Battery Storage, w/Smart Inverter*

- Work with local KFalls stakeholders + FCA + OSSIA
- Develop skillset to model and evaluate solar + storage and ID system impacts

2nd NWS – TBD Seek input from KFalls Stakeholders

Next Steps with Pilot Project

- Meeting with stakeholders in Klamath Falls 7/7
- Continue to engage FCA and OSSIA to refine pilot assessment
- Update models with more refined PV/EV adoption rate data from third party contractors
- Produce required equipment amounts and cost estimates

Initial Lessons Learned

DSP requires significantly more than historical approach…

- Much more Data Intensive
  - Requires new data sources and increased granularity for existing data
  - Analysis requires development of 24-hour representative curves instead of single peak point
  - Requires feeder SCADA telemetry instead of manually recorded data
  - Scaling up for DSP requires new toolsets/systems and analytical capabilities

- Broader and More Frequent Outreach
  - Significantly higher degree of community involvement
  - Discussions require deeper education to cover increasingly complex subjects
  - Expanding outreach processes to increase transparency

- Significant Changes to Internal Processes
  - Improve cross-functional/cross-department collaboration
  - Increased reporting requirements (not just DSP)
  - New groups, new responsibilities, and new procedures
  - New regulatory requirements

5) Update on Community Engagement at the State and Local Level



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Overlap of Regulatory Initiatives for Stakeholder Engagement

Several Community Engagement Regulatory Initiatives that Share Similar Goals

- Engaging potentially overlapping stakeholder groups
  - UM 2005 and Order No. 20-485 - Community Engagement Plan to prepare and implement a Distribution System Plan
  - HB 2021 – Community Benefits and Impacts Advisory Group (CBIAG)
  - UM 2225 – Community engagement strategy to support HB 2021

Equity Elements of House Bill 2021

Section 6. Utility Community Benefits and Impacts Advisory Group

(1) An electric company that files a clean energy plan under section 4 of this 2021 Act shall convene a **Community Benefits and Impacts Advisory Group**.

The members of the electric company's Community Benefits and Impacts Advisory Group will be determined by the electric company with input from stakeholders that **represent the interests of customers or affected entities within the electric company's service territory**.

Members must include representatives of environmental justice communities and low-income ratepayers and may include representatives from other affected entities within the electric company's service territory.

Community Input Group Update

PacifiCorp is committed to the formation of the Community Input Group (considering renaming **Oregon Equity Advisory Group)**

- We see great benefit to forming a single equity advisory group in Oregon that focuses on Clean Energy planning including DSP.
- We are working with stakeholders to establish a path forward as we thoughtfully consider requirements of UM 2005 and UM 2225.
- This specific group will not be formed in time to provide input on DSP Part 2 but other engagement opportunities are available to get community and stakeholder feedback prior to filing.
- As we move forward, we plan to use the Oregon Equity Advisory Group as a sounding board for the evolution of PacifiCorp's DSP process.

Statewide Engagement Strategy

- Filed **initial** customer engagement proposal with Commission on April 21, 2022
- Provided mechanisms and processes for meaningful stakeholder engagement on utility initiatives including the Distribution System Plan and the Clean Energy Plan
- Proposed a hybrid stakeholder engagement model
    - Relies upon existing engagement processes within IRP
    - Develops new processes for engagement
- Currently identifying a broad potential participant list to reflect representatives of Environmental Justice communities within our service territory
- PacifiCorp will engage with frontline communities, tribes, equity and environmental justice organizations, community-based organizations and others in Oregon to gauge their interest in membership
- Updated Engagement Strategy to be submitted in July (anticipated after July workshop)
- The engagement strategy will continue to be refined over time

Local Engagement – Klamath Falls

- Received three proposals for Non-wires Pilot evaluation from Farmer's Conservation Alliance and OSSIA (covered previously).
  - Agreed to focus on Solar + Storage (with limited Smart Inverter functionality) as one of the NWS assessments.
  - Working with FCA and OSSIA to confirm assessment framework, assumptions and approach
- Also - engaging local stakeholders in Klamath Falls to participate in review of identified grid need and discuss potential solutions (including NWS)
  - Meeting with stakeholders in Klamath Falls 7/7 for background on DSP, Grid Needs and potential solutions
  - Anticipate second meeting in late July to review preliminary results from assessments and gather further input.

Planning to Attend:	Jeremy Morris – Klamath County Public Works Department – Director Roberto Gutierrez – Klamath Community College – President (Not available, may send delegate) Ellsworth Lang – Tentative (Participating as Pacific Power customer) Paul Simmons – Klamath Water Users Association – Executive Director Heather Harder – Klamath County Chamber of Commerce – Executive Director Randy Cox – Klamath County Economic Development Association – Executive Director Brandon Fouler – Klamath County Emergency Management Department – Director Joe Wall – Klamath Falls City Planner Darin Rutledge – Klamath Falls Downtown Association – Executive Director Christina Zamora – Klamath/Lake Community Action Service (TBD – confirming availability)


Questions?

6) Part 2 Schedule and Topics






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Part 2 - Schedule and Topics

- Schedule
  - OPUC DSP Workgroup Meetings – Expect one more meeting in late July
  - Pacific Power Final DSP Workshop – July 21
  - Distribution System Plan (Part 2) to be filed on August 15, 2022

- Pacific Power July Stakeholder Workshop – Proposed Topics
  - Review refined Load Forecast including adoption for DER and EV
  - Non-wires Solutions (NWS) – Review Initial Assessments
  - Review highlights for Short-Term Plan

Additional Information

- DSP Email / Distribution List Contact Information
  - DSP@pacificorp.com
- DSP Presentations
  - Pacific Power Oregon DSP Website (Now includes Spanish Language version)
- Additional Resources
  - Pacific Power's DSP Part 1 Report
  - DSP Pilot Project Suggestion Form
  - Pacific Power's 2019 Oregon Smart Grid Report
  - Pacific Power's Oregon Transportation Electrification Plan
  - PacifiCorp's Integrated Resource Plan

Thank You!






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