

Upper Rogue Distribution System Planning

Community Workshop #1

April 19, 2023

Presenters:

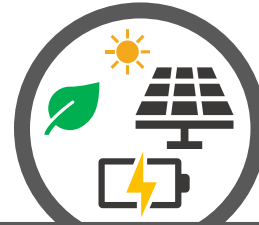
Ian Hoogendam – DSP Manager, Shauna Thomas – T&D Program Specialist, Daniel Talbot – Sr. Engineer



Process
modernization



Outreach and
engagement



Non-traditional
solutions



Collaboration

DISTRIBUTION SYSTEM PLANNING

Workshop #1 Information

Microsoft Teams meeting info:

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 227 334 821 74

Passcode: Sg6F9e

Or call in (audio only)

[+1 563-275-5003,,939105480#](#) United States, Davenport

Phone Conference ID: 939 105 480#

- Please **place your phone on “Mute”** when not speaking
- If you call in using your phone in addition to joining via the online link, please make sure to **mute your computer audio**
- Please **do not use the “Hold”** function on your phone

Participation:

This workshop is available to the public, and there is a Questions/Comment section at the end of the workshop for online participants.

Please input your name and organization into the chat when you enter and please “raise your hand” during the Open Discussion section to ask questions or provide input.

This meeting will be recorded and published to the PacifiCorp DSP website.

Land Acknowledgement

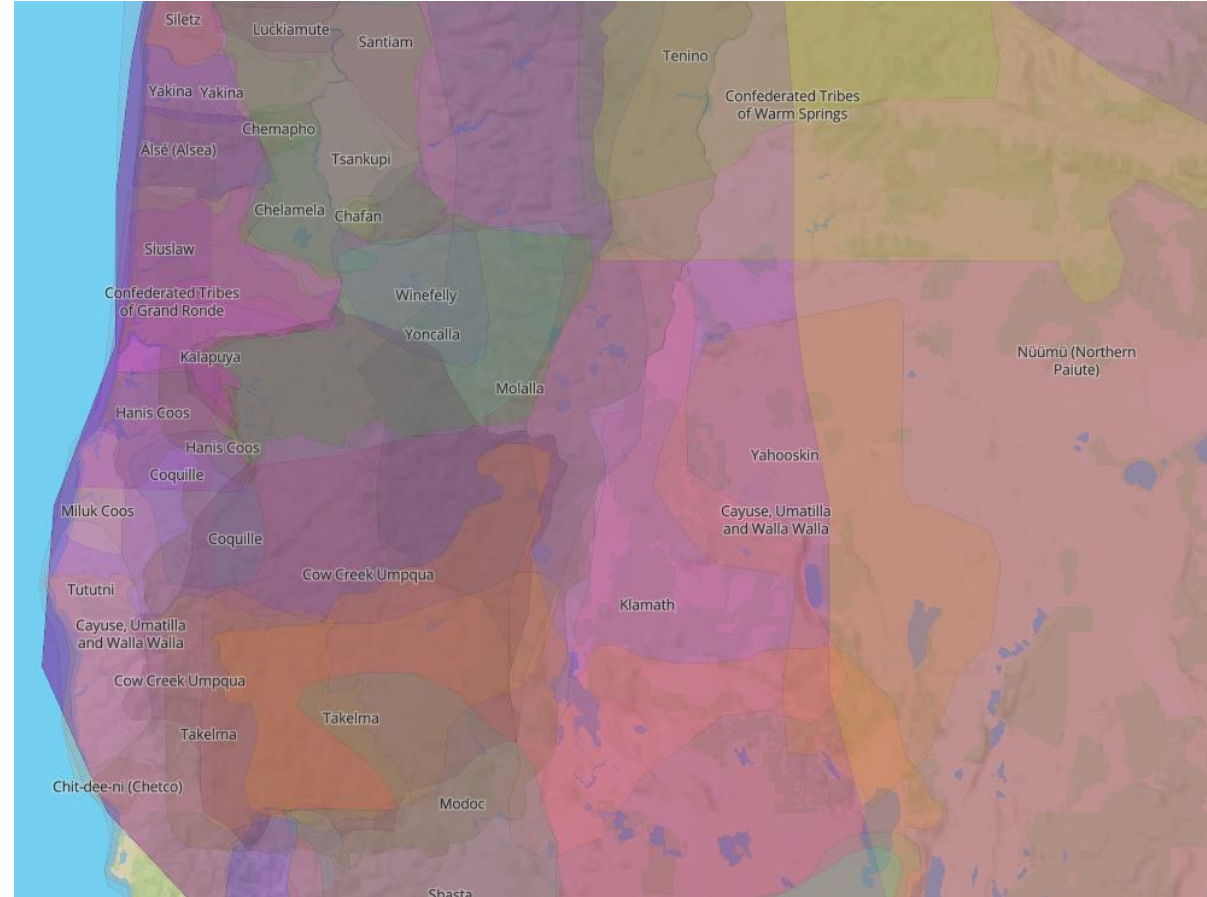
We are meeting online from various locations within the United States.

To learn about the original stewards of the land where you are now, this is a wonderful resource:



Native Land Digital

<https://native-land.ca>



By acknowledging Indigenous peoples and tribes, their traditional homeland ties are renewed and reaffirmed.

Today's Agenda

10 Mins Introductions

10 Mins Power Utility Overview

15 Mins Distribution System Planning Overview

15 Mins Study Area Overview

BREAK(10 mins)

30 Mins Load Forecasting and Next Steps

10 Mins Community Engagement

20 Mins Conclusions and Open Discussion



Distribution System Planning

- Jon Connelly – Director T&D Asset Management
- Ian Hoogendam* – Manager
- Shauna Thomas* – Program Specialist
- Daniel Talbot* – Engineer
- Daniel Morgan – Engineer
- John Rush* – Project Manager

Local Medford/Upper Rogue

- Tom Dunlap* – Field Engineer
- Cooper Whiteman* – Regional Business Manager
- Ed DeVries – Area Operations Manager

*Planned to be in attendance

Please share with us:

- Name
- Organization and role
- What you hope to get out of today's discussion

- Aaron Prunty, Eagle Point City Manager
- Tom Corrigan, Shady Cove City Manager
- Jon Ball, Shady Cove Mayor
- Edem Gomez, Rogue Valley Transportation District Associate Planner
- Access
- Medford Water Commission
- RHT Energy
- Rogue Climate

Interactive Live Poll:

What do you love about the communities in the Upper Rogue area
(Eagle Point, Shady Cove, and Prospect)?

Workshop Objectives

Success is a transparent, robust, and holistic distribution system planning framework.

Education

- Explaining distribution planning, and how it is changing
- Forecasting:
 - Process evolution
 - Drivers of load growth
 - Preliminary forecast results

Engagement

- Gathering input from participants
- Understanding the demographics, needs, values, and awareness of the community

Transparency

- Involving the community throughout the process
- Sharing of processes, analysis results, decisions, and learnings

Power Utility Overview

Electric Grid Overview

Generation

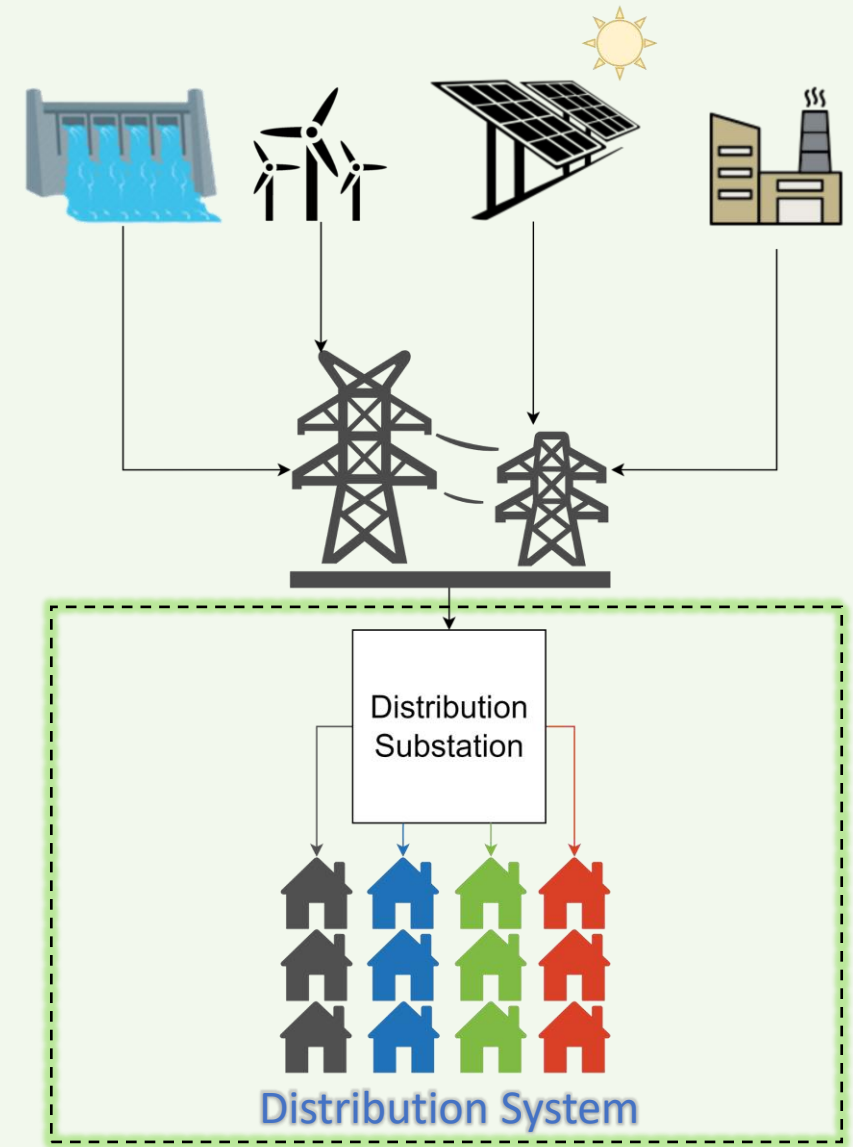
- Produces Power

Transmission System

- Transmits power from generation plants to distribution substations
- Interstate highway of the electric grid
- High voltage
- High redundancy

Distribution System

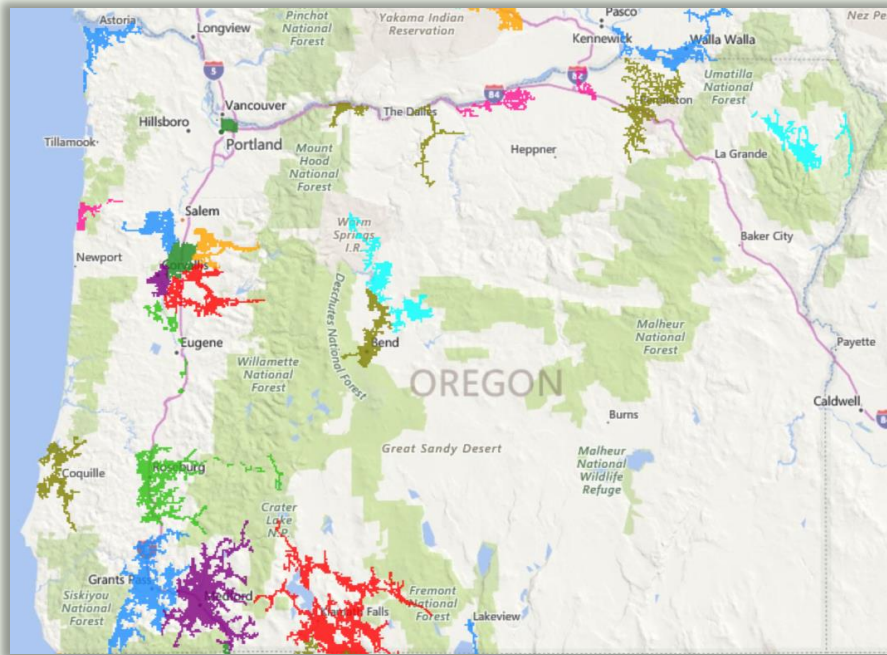
- Starts at the distribution substation and ends at the customer meter
- Distribution **substations** are the interstate exits of the electric grid
- Distribution **circuits** are like the roads that connect the exit to the homes and businesses of the community
- Delivers power to consumers via poles and wires (overhead and underground)
- Medium voltage



Overview of Pacific Power - Oregon

Oregon Service Area

Distribution Circuits: 535
 Distribution Substations: 197
 Distribution Line Miles: 19,000
 Customers: 629,000



North Region		Central Region			South Region	
Portland	Walla Walla	Bend	Albany	Roseburg	Klamath Falls	Medford

Operating Areas / Districts

Astoria Portland	Hermiston Pendleton Enterprise	Prineville Madras Hood River Bend Redmond	Albany Corvallis Dallas Independence Cottage Grove Stayton Lebanon Lincoln City	Coos Bay Roseburg	Lakeview Klamath Falls	Grants Pass Medford
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Distribution System Stats

Circuits: 102	Circuits: 40	Circuits: 67	Circuits: 89	Circuits: 69	Circuits: 47	Circuits: 122
Line Miles: 1,200	Line Miles: 1,700	Line Miles: 2,800	Line Miles: 3,700	Line Miles: 2,300	Line Miles: 2,300	Line Miles: 5,200
Customers: 112,000	Customers: 26,000	Customers: 99,000	Customers: 139,000	Customers: 69,000	Customers: 40,000	Customers: 144,000

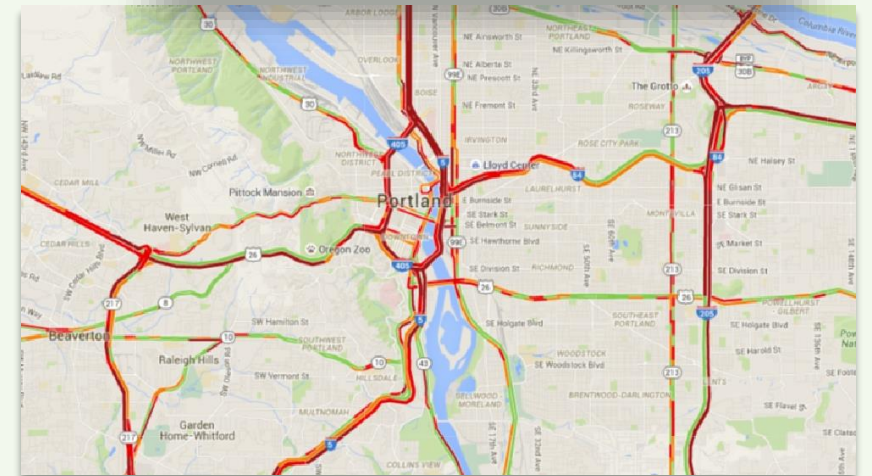
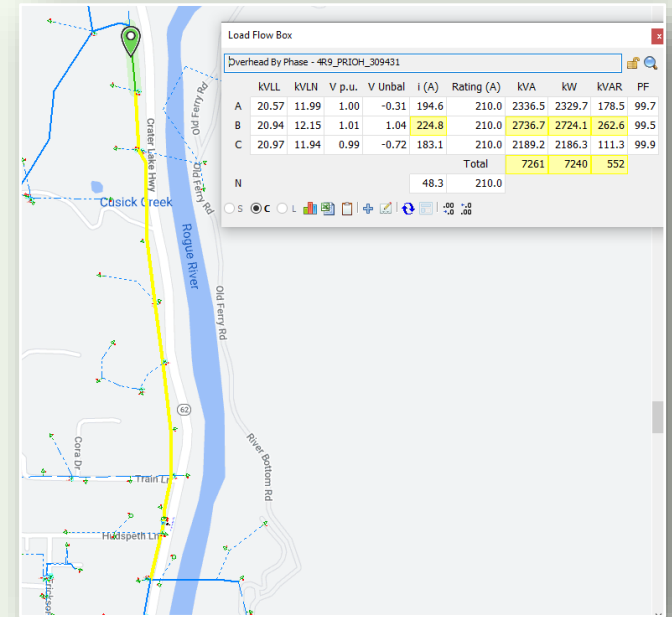
Unique Attributes

*Distribution Automation Pilot *Portland Underground Mesh Network	*Fire High Consequence Area	*High Growth Rate	*Distribution Automation Pilot	*Fire High Consequence Area	*Fire High Consequence Area *Energy Storage Pilot	*Distribution Automation Pilot *Fire High Consequence Area
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Distribution System Planning Overview

What is Distribution System Planning?

- Like roads, wires have limited capacity and can become congested.
- The distribution system is designed to accommodate the power demand (load) of a community for the foreseeable future.
- If equipment loading guidelines are exceeded, solutions are required to accommodate the anticipated load.
- Distribution system planning assesses future needs by forecasting load on distribution circuits and running simulations on models.
- Traditionally, distribution system planning studies have been conducted by a local field engineer on a 5-year cycle.



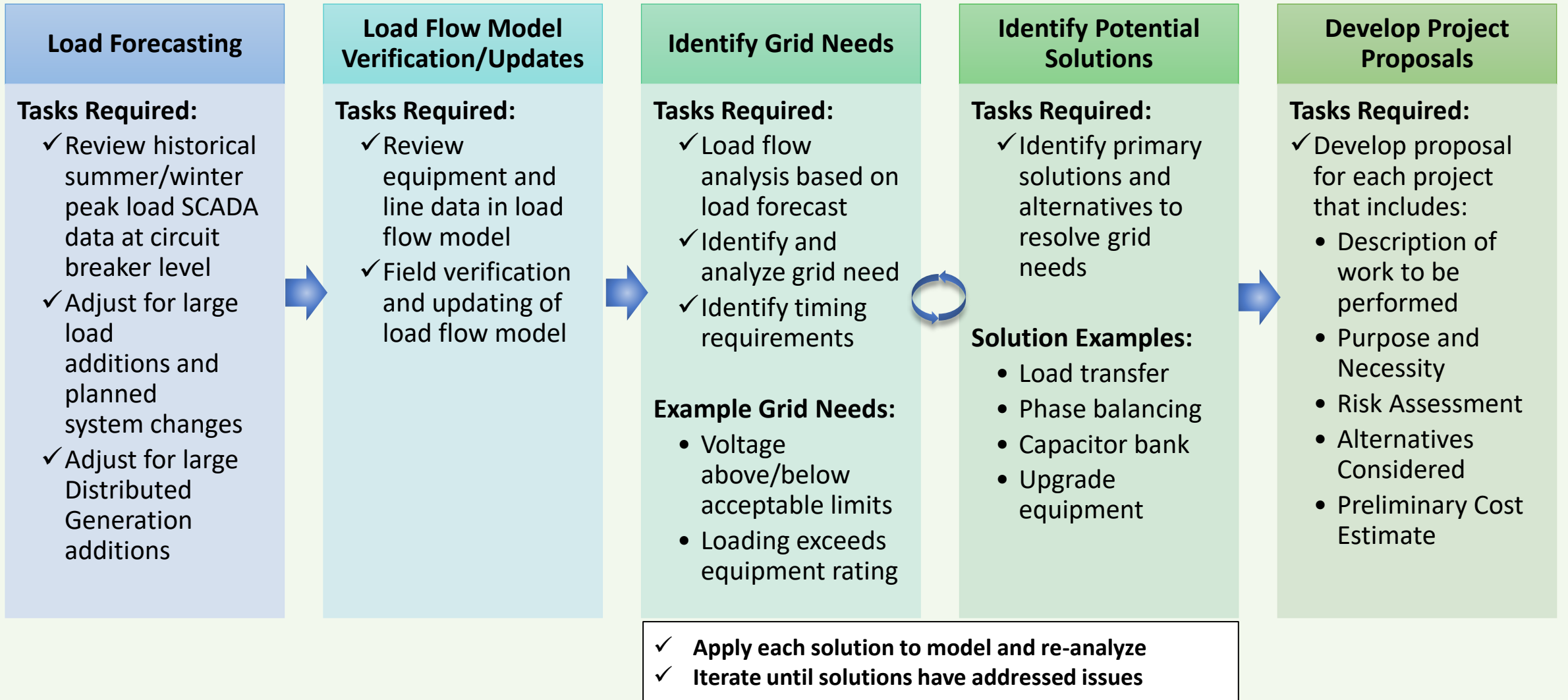
5-Year Cycle Distribution Planning Studies

- Scheduled to be completed on a 5-year cycle
- 5-year planning horizon
- Schedule may shift depending on several factors (high load growth activity, large load additions, etc.)
- 99 planning studies are on 5-year cycle in Pacific Power service area
- Study process takes 2-3 months

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

- Initiated by load, generation interconnection, or transmission service requests
- Focused on a limited area, and the immediate effects of the request on reliability and load service
- Shorter timeframes to meet customer needs (~ 3-4 weeks for initial study)
- Customer shares in solution costs and influences what solutions are implemented

Traditional Distribution System Planning Study Process (5-Year Cycle)



Advancements in Distribution System Planning (DSP)

What is Oregon DSP?

- Based on guidelines proposed by Oregon PUC staff
- Increased transparency and modernization of traditional DSP to meet the needs and leverage the capabilities of the modern grid

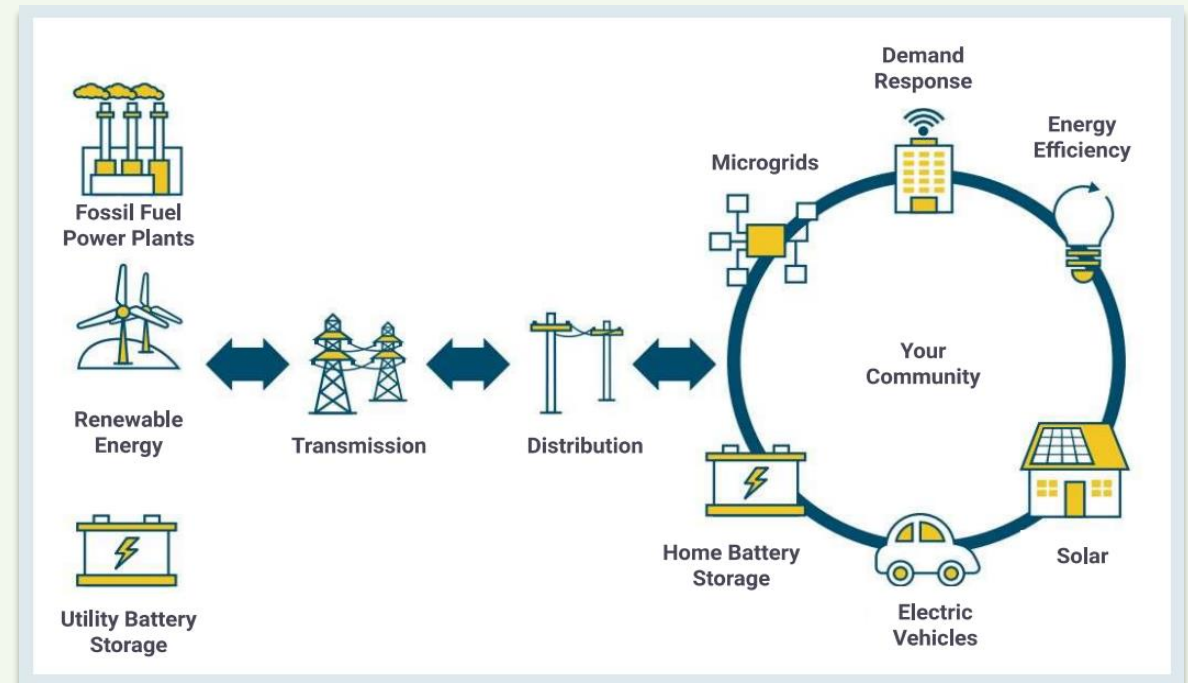
Key changes to traditional DSP:

- Consideration of non-traditional solutions to meet grid needs
- Increased community engagement
- Enhanced forecasting
 - 24-hour load profiles
 - Inclusion of incremental electric vehicle (EV) and solar adoption rates

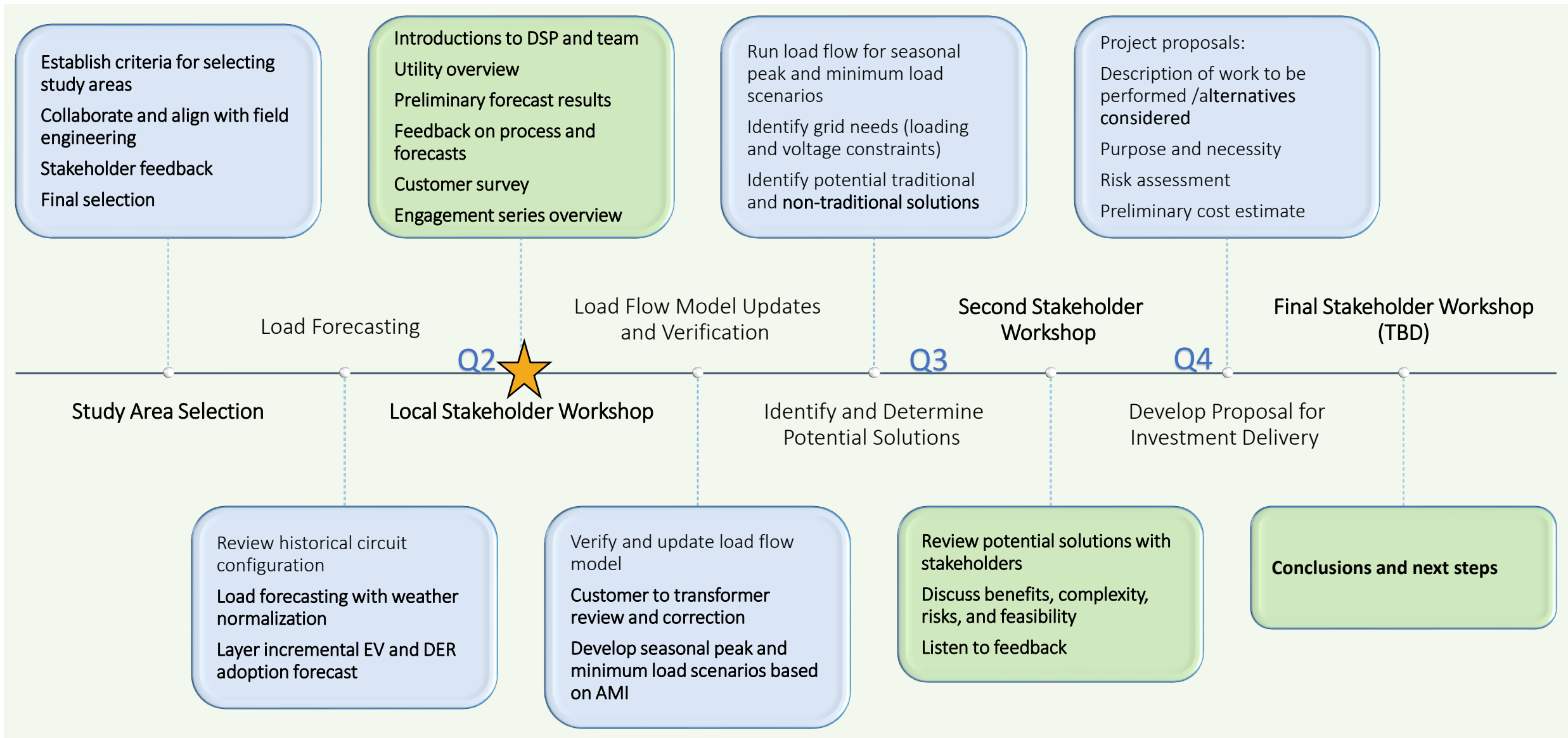
Past Grid



Modern Grid



2023 DSP Study Process and Local Engagement Plan



Study Area Overview

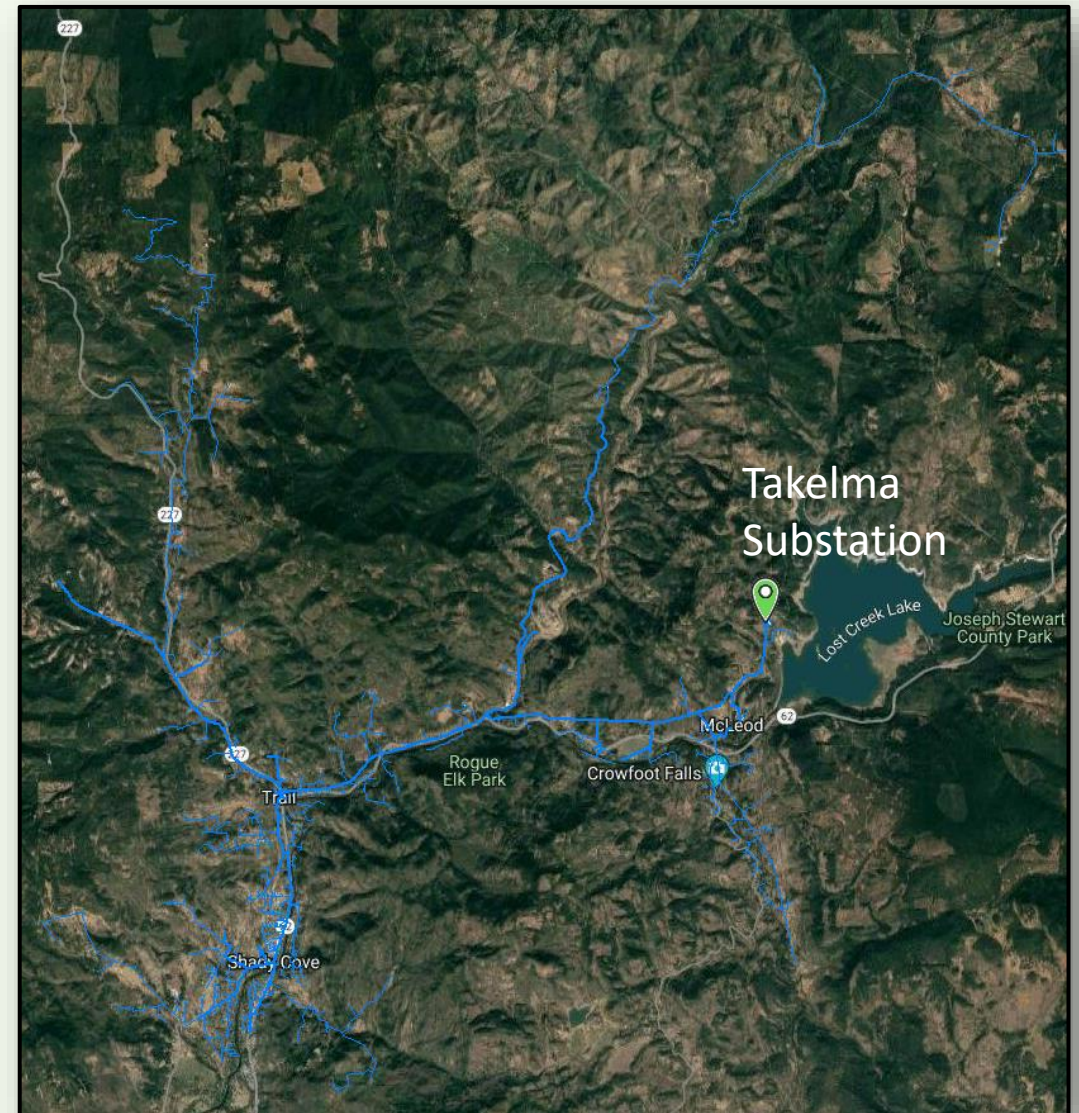
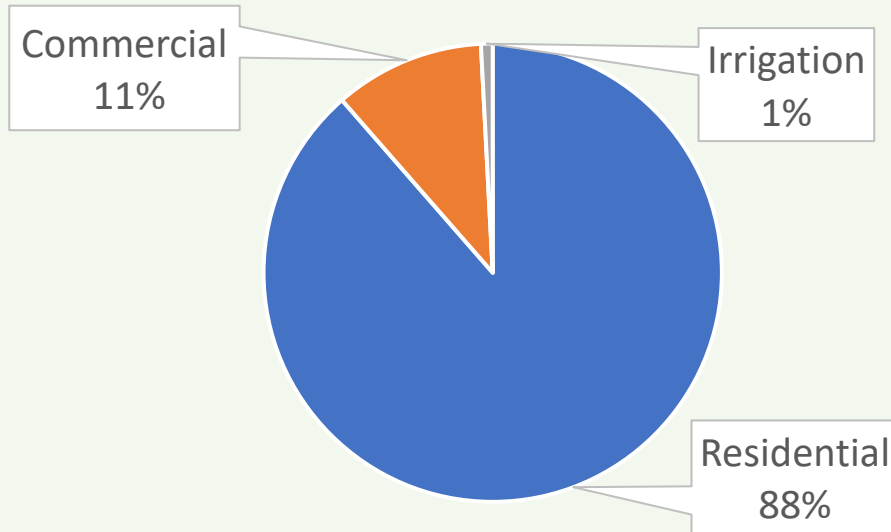
4R9 (Lost Creek) Summary

Selection Criteria:

- High forecasted DG growth
- High forecasted EV growth
- Median income below \$50k (equity)
- Low reliability score

Other Considerations:

- One of the longest PAC circuits in Oregon
- High customer count



Study Area Overview

Substations

- 6 substations

Circuits

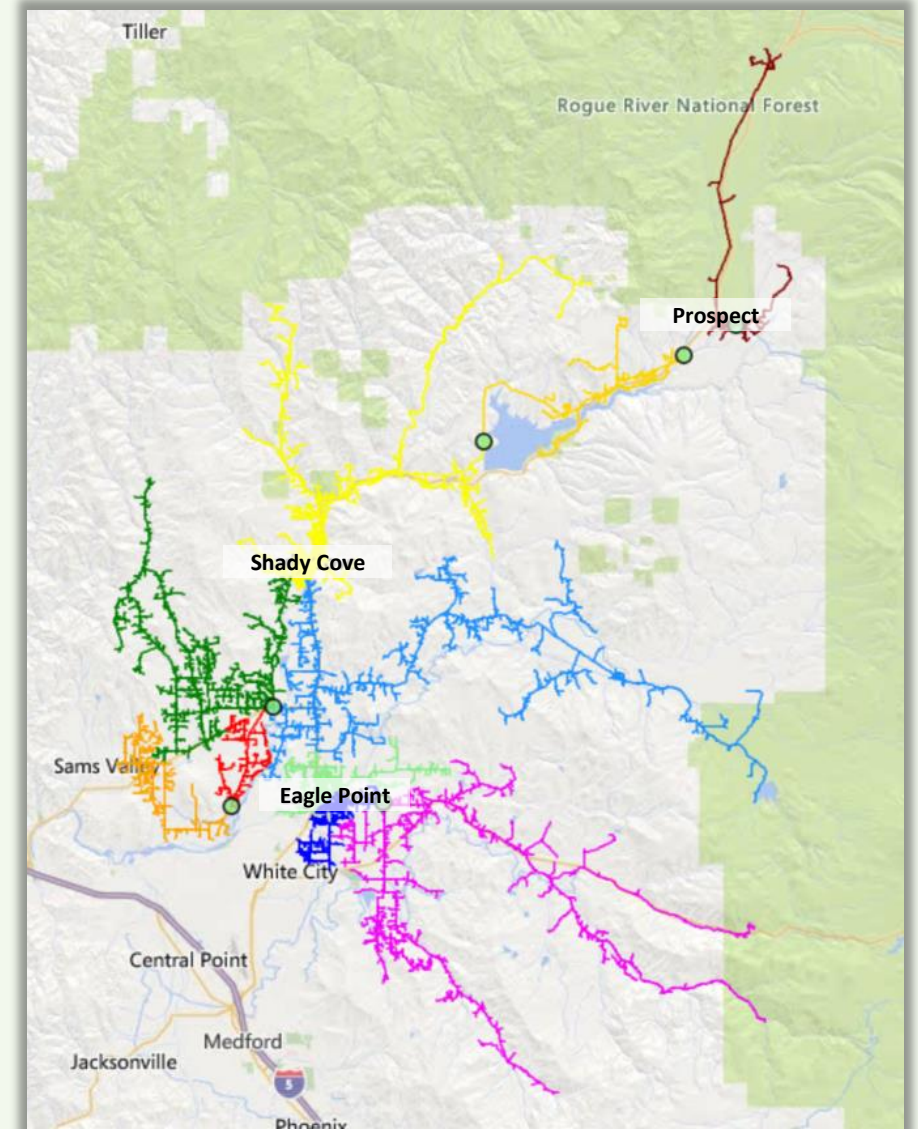
- 10 circuits
- Line miles: 868 (sum of pole-to-pole distance)

Customers Served

- Total: 13285
- Residential: 11856 (89%)
- Commercial: 1235 (9%)
- Industrial: 11 (<1%)
- Irrigation: 171 (1%)
- Misc.: 11 (<1%)

Other Characteristics

- 3 of the longest PAC circuits in Oregon



Some things that stand out

- Eagle point (10K population)
- Shady Cove (3K population)
- 10 MW Agate Bay Solar farm
- Butte Creek Mill
- 3 MW Biogas plant
- 3 of the longest circuits in PAC Oregon service area



What else should we understand/consider about the communities in the Upper Rogue area?

What are your concerns about energy?



Break (10ish Mins)

Time Start Timer g

TIME TO RESUME

Load Forecasting and Next Steps

Traditional

Inputs

- Manual Reads
- SCADA where available
- Load Loggers
- Planned Spot Loads

Analysis

- Linear Regression of Seasonal Peaks

Outputs

- 5-year Planning Horizon
- Seasonal Scenarios

Enhanced

Inputs

- Automatic SCADA
- Advanced Metering Infrastructure
- Planned Spot Loads
- Daily Weather Logs
- Local Stakeholder Engagement
- EV and Distributed Generation Forecasts

Analysis

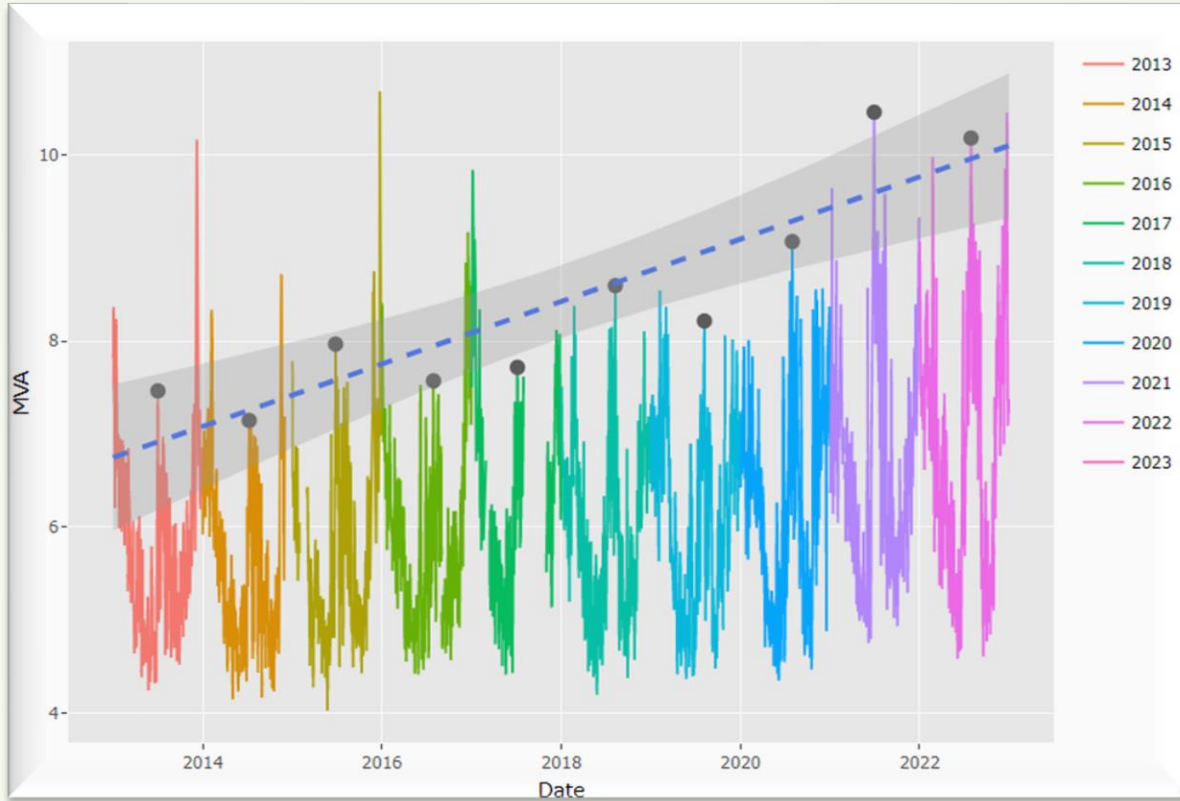
- Weather-Normalized Datasets
- Exponential Regression of Seasonal Peaks
- Multiple Scenario Analysis

Outputs

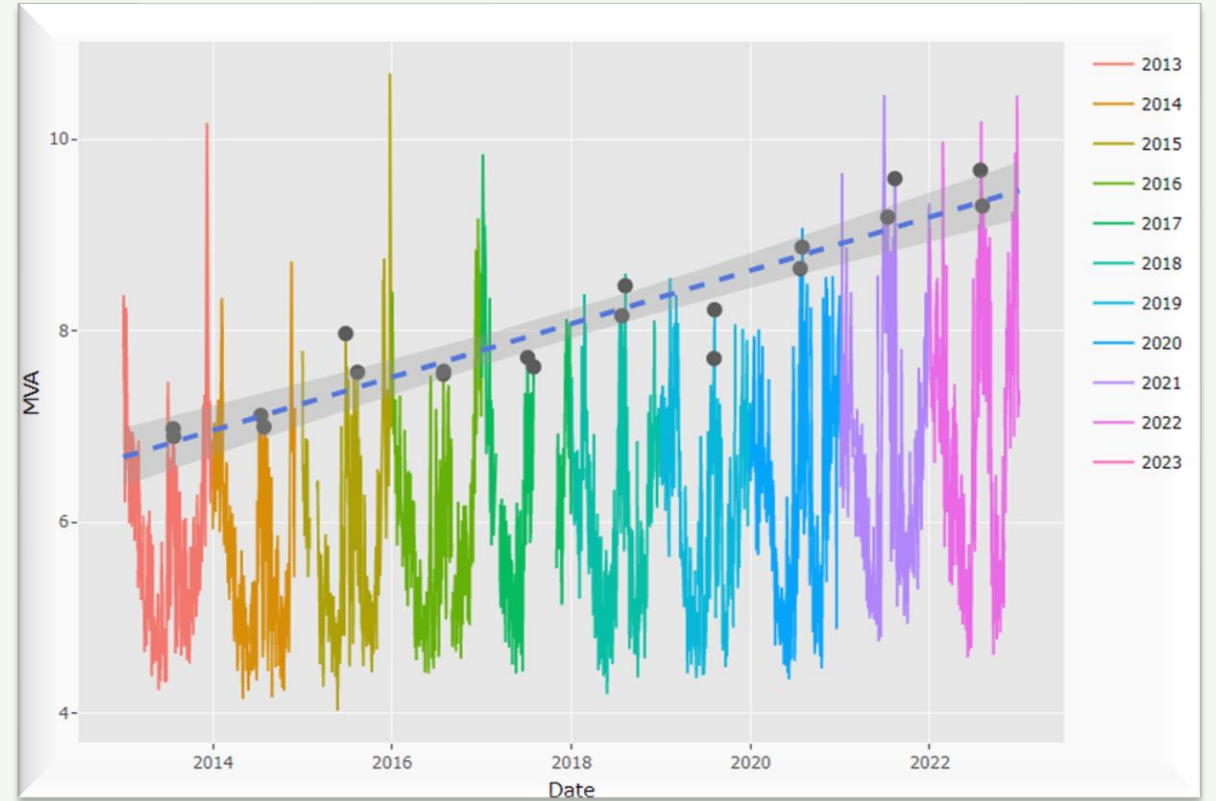
- 10-year Planning Horizon
- Multiple Seasonal and Load Growth Scenarios

Forecasting Example

Traditional



Enhanced



*Temperature outlier days filtered out

Drivers for Load Growth

What drivers of load growth have you seen in your community and where are they occurring?



Commercial/Industrial Development



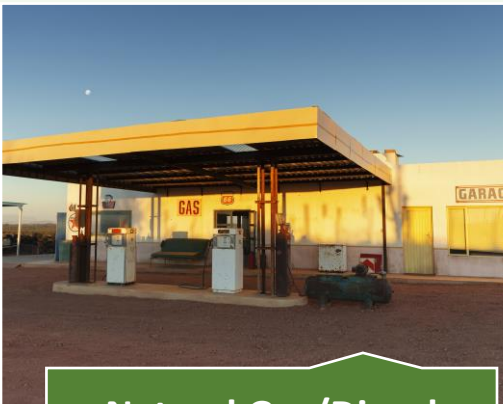
Population Growth



Heat Electrification



A/C Adoption



Natural Gas/Diesel Prices



Policy



Economic Output (Gross County Product)



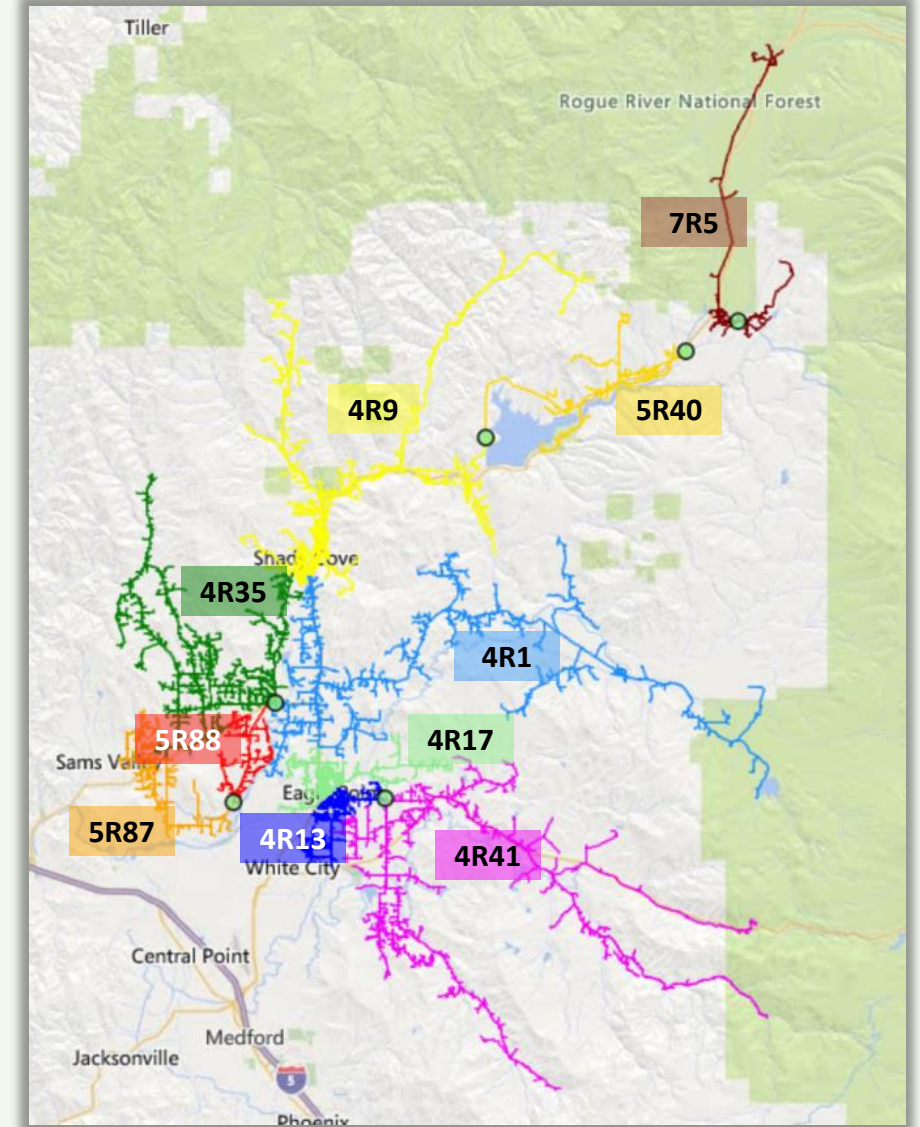
Technology

Area Load 10 Year Forecast Summary (Summer)

Summer is typically the time of year when equipment is closest to capacity

Temperatures have seen significantly higher peaks in the past two years, stressing some equipment more than anticipated.

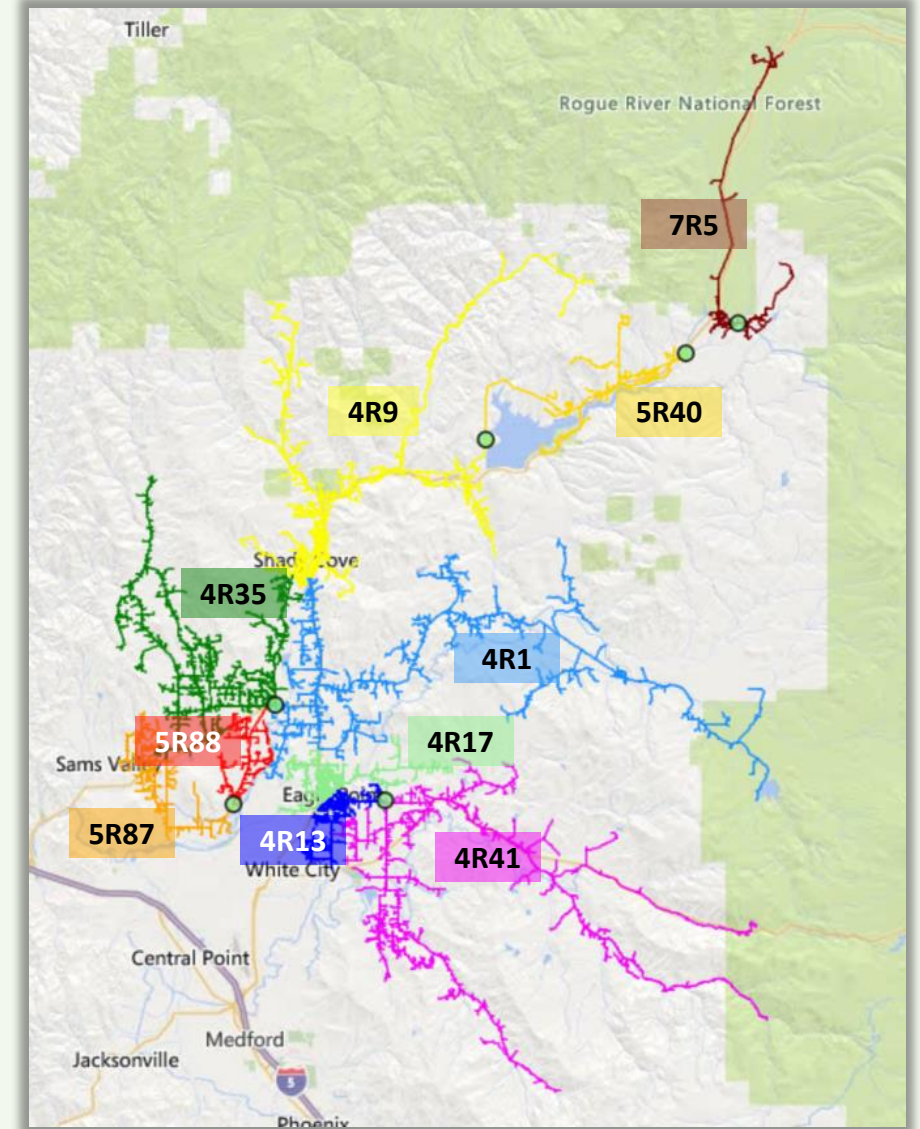
Circuit Name	Base Peak Load (MVA)	% Projected Growth Rate	Projected 2032 Peak Load (MVA)	% Capacity Utilized (2032)
4R1 (Salmon)	6.4	3.0%	7.0	56%
4R13 (Henry Miller)	11.1	3.2%	14.9	92%
4R17 (Stingray)	12.1	1.8%	13.5	84%
4R35 (Meadows)	6.0	2.0%	6.8	54%
4R41 (Antelope)	5.1	2.0%	2.9	18%
4R9 (Lost Creek)	10.1	2.3%	12.8	103%
5R40 (Cascade Gorge)	1.1	1.0%	1.1	76%
5R87 (Table Rock)	2.6	2.0%	3.1	78%
5R88 (Eagle Point)	1.5	2.0%	1.8	45%
7R5 (Prospect)	1.2	0.0%	1.1	71%



Area Load 10 Year Forecast Summary (Winter)

Cooler temperatures allow higher capacity on most equipment

Circuit Name	Base Peak Load (MVA)	% Projected Growth Rate	Projected 2032 Peak Load (MVA)	% Capacity Utilized (2032)
4R1 (Salmon)	6.8	3.0%	8.9	57%
4R13 (Henry Miller)	7.4	1.4%	8.8	54%
4R17 (Stingray)	11.1	0.8%	12.0	74%
4R35 (Meadows)	7.2	2.0%	8.7	56%
4R41 (Antelope)	5.8	2.0%	3.7	23%
4R9 (Lost Creek)	15.2	0.9%	16.7	107%
5R40 (Cascade Gorge)	1.1	1.0%	1.2	61%
5R87 (Table Rock)	2.6	1.0%	2.9	56%
5R88 (Eagle Point)	1.6	2.0%	1.9	38%
7R5 (Prospect)	1.7	0.0%	1.6	81%



Load Flow Model Updates and Verification

- Verify an update load flow model
- Customer to transformer mapping review and correction
- Develop seasonal peak and minimum load scenarios based on AMI

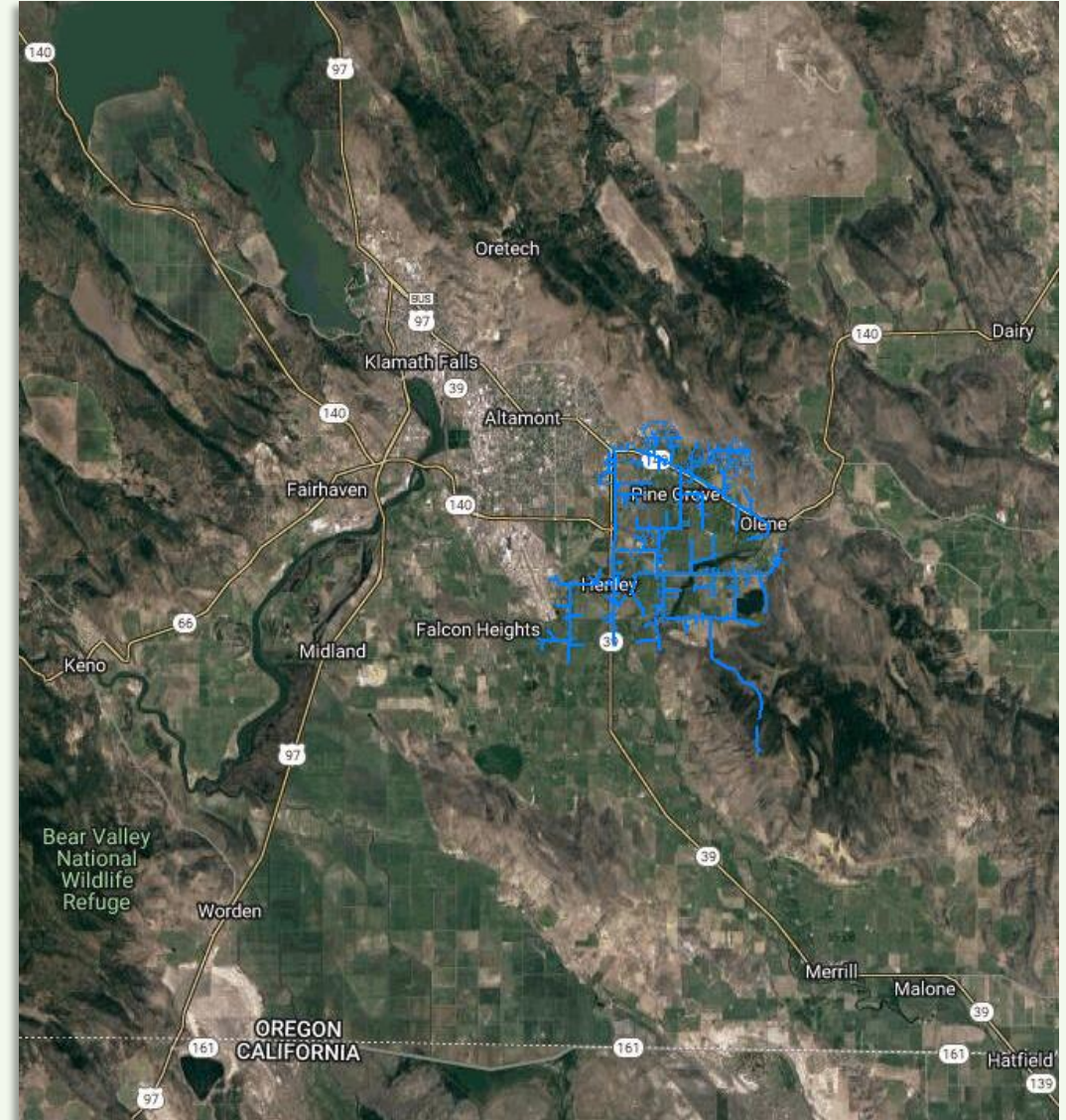
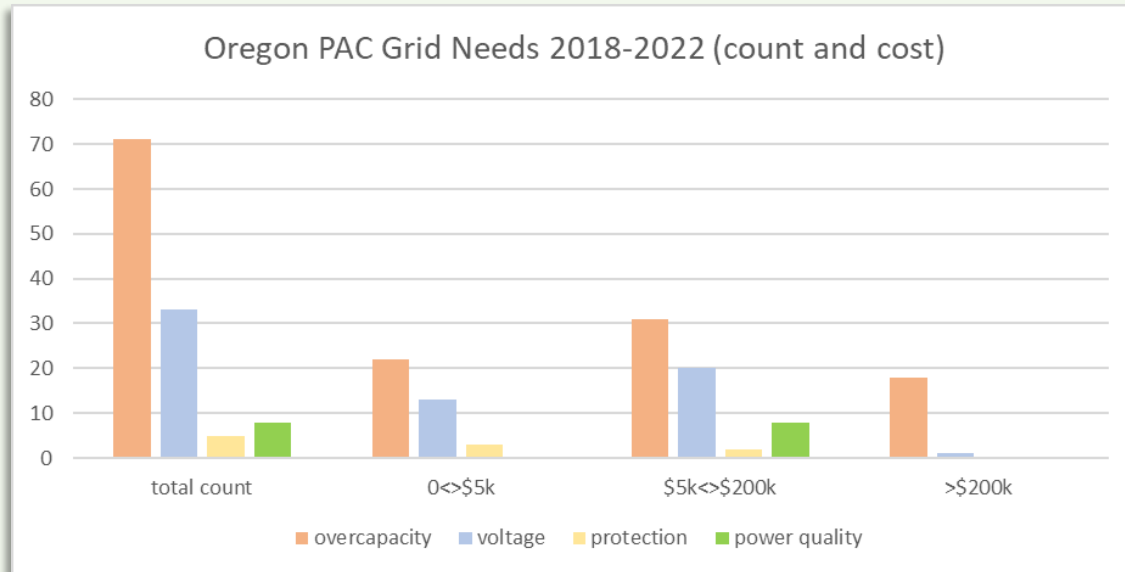
Identify and Determine Potential Solutions

- Run load flow for seasonal peak and minimum load scenarios
- Identify grid needs (loading and voltage constraints)
- Identify potential traditional and non-traditional solutions

Take input from this meeting and develop follow up actions/ ideas about benefits to community

Klamath Falls Study Overview

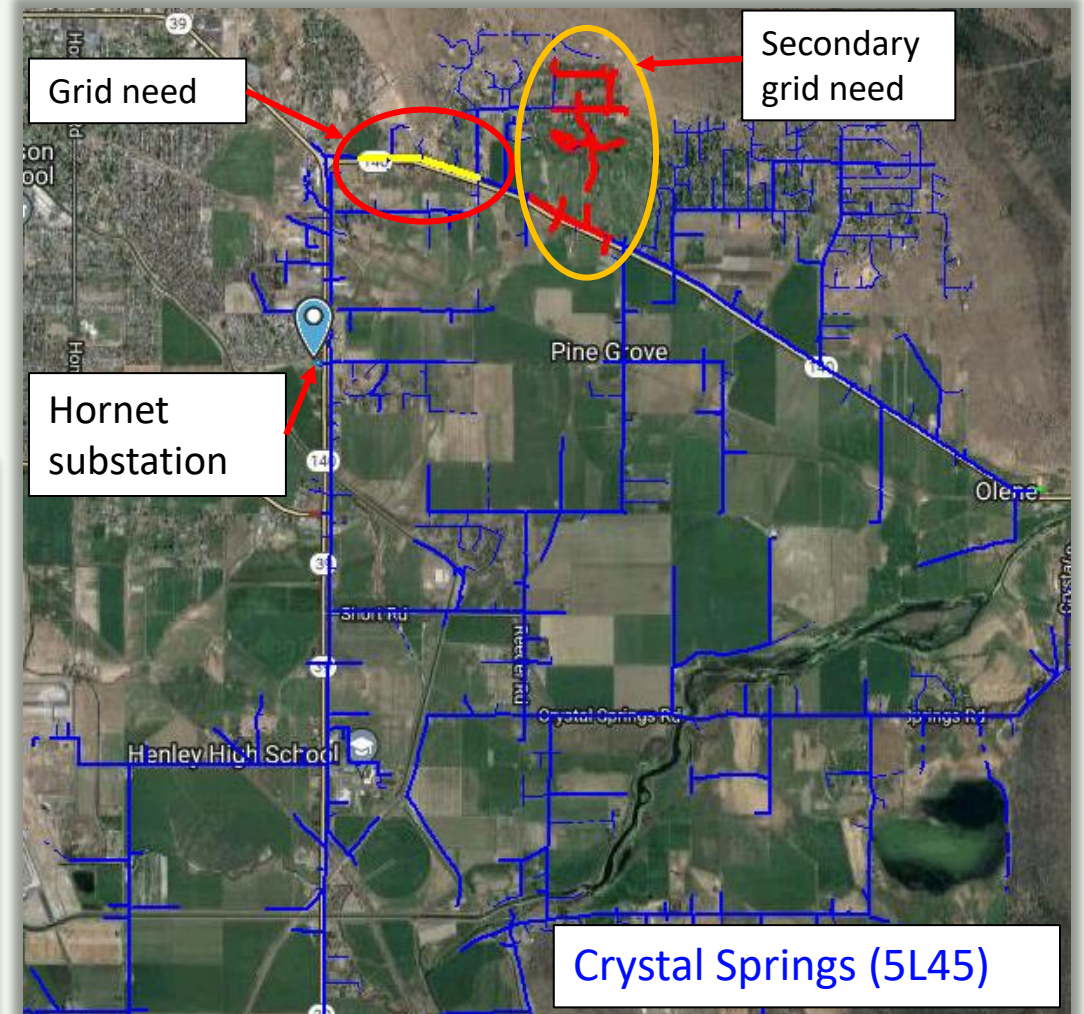
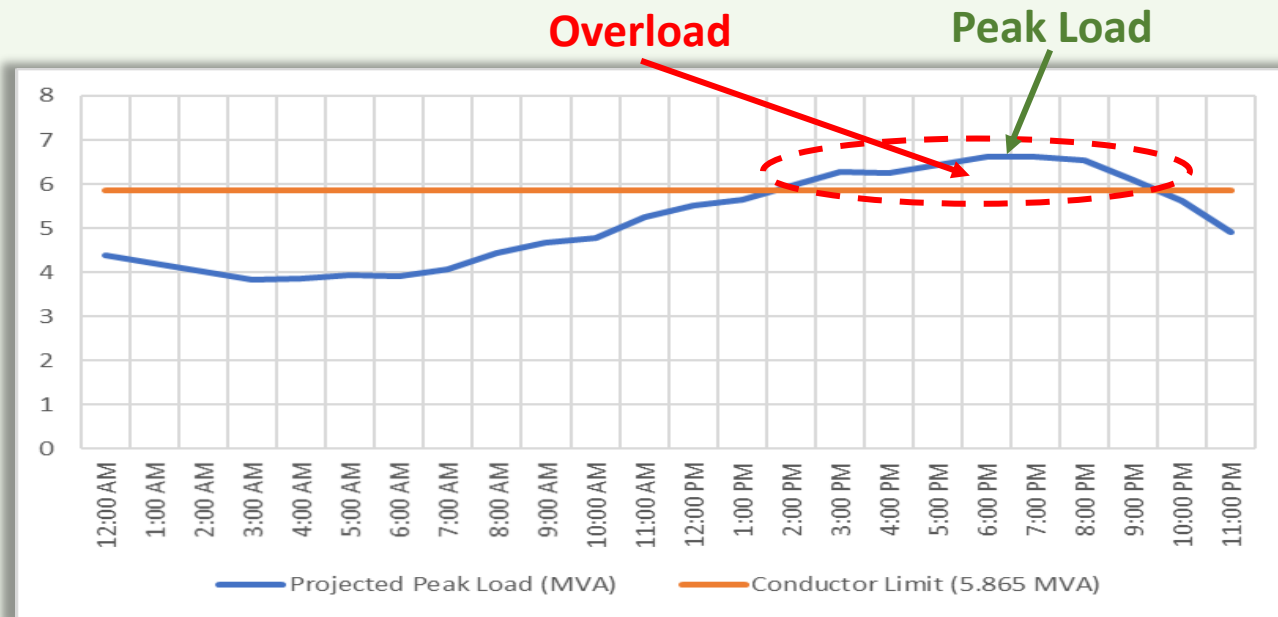
- Klamath Falls was selected for a DSP study
- The area was examined thoroughly for an appropriate grid need
- Local feedback was incorporated into potential non-traditional solutions
- Model results were translated into estimated costs and compared for the most optimal and feasible outcome



Klamath Falls Grid Need Analysis

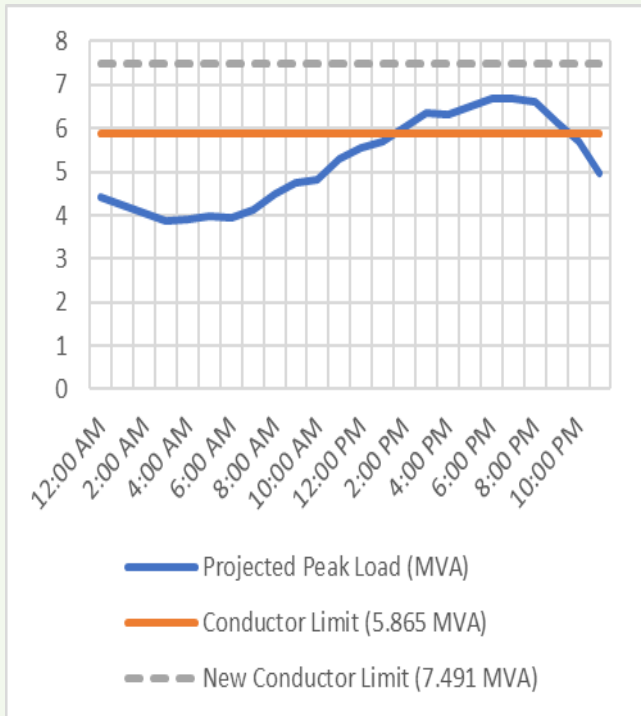
Grid Needs:

- Study identified an overcapacity at peak load, causing conductor overload
- Also causes low voltage downstream
- Needed to be addressed in 2-3 years
- Peak load occurs during the summer in the evening



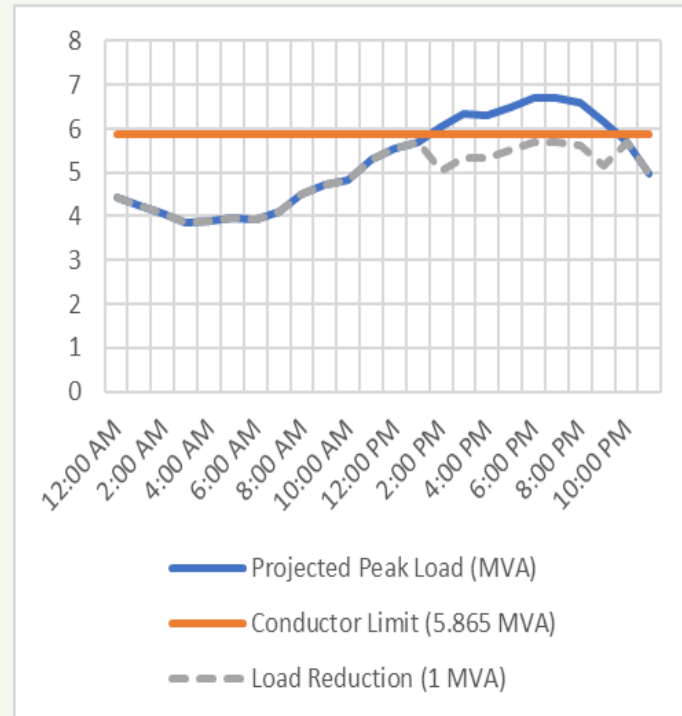
Klamath Falls Traditional and Non-Traditional Solutions

Traditional Solution – Reconductor overloaded conductor

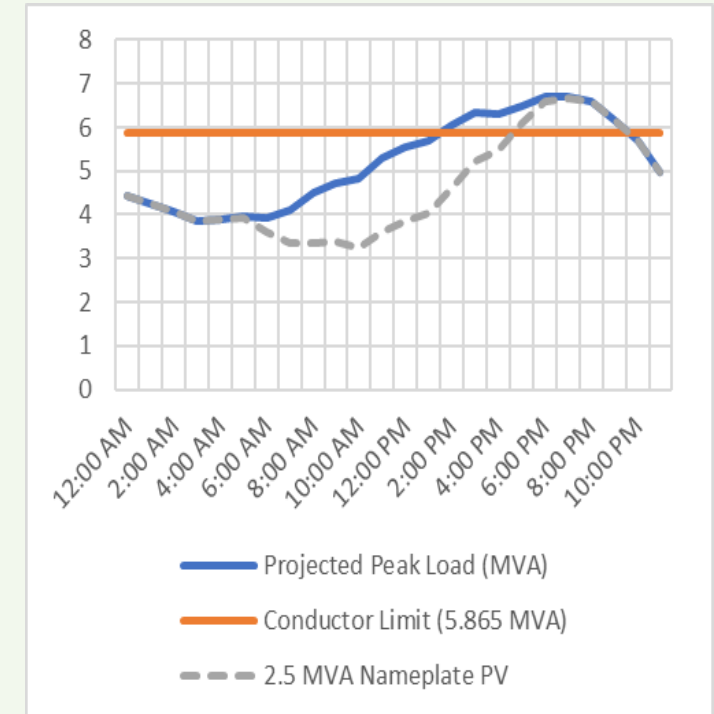


Non-traditional solution examples

Demand Side Management (DSM) Solution - Load reduction



Distributed Generation (DG) Solution - Solar Only



Klamath Falls – Solution Evaluations and Final Conclusions

Traditional Solution:

- Reconductor overloaded wire

Non-traditional solution concepts considered:

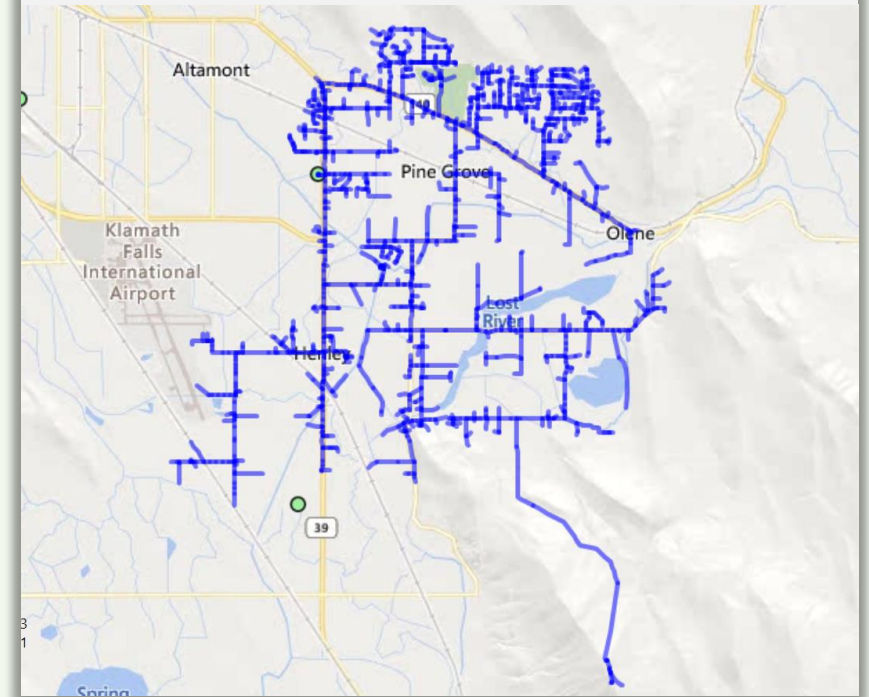
- *Solar + Battery Storage (Evaluation #1)*
- *Targeted Energy Efficiency (Evaluation #2)*
- Demand Response, Curtailment, other Renewables

Conclusions:

- **Reconductoring was chosen due to several constraints**
 - Amount of Solar + Battery Storage was too costly
 - Energy Efficiency would have taken too long
- **Future studies need to evaluate a longer study horizon**
- **Futures studies will consider a hybrid approach of methods**
(ex: solar + storage and energy efficiency)

Klamath Falls – Crystal Springs – 5L45

- Overloaded conductor during peak summer load
- Low voltages downstream of overload
- Needed to be addressed in 2-3 years



What kind of benefits could non-traditional solutions offer?

Benefits to Customers



- **Reduce energy bills** (for customer resources, e.g., rooftop solar)
- **Greater Reliability/Resilience**- expect lower likelihood of outages
- **Tax incentives** – programs to help with energy efficiency or other programs
- **Greater energy independence** (with certain solutions)
- **Improved Comfort** – especially with energy efficiency solutions

Society Benefits



- **Reduce Green House Gas (GHG) and Particulate Emissions**- cleaner air
- **Potential for greater community resilience**
- **Potential for greater energy independence**

Benefits to Utility



- **Fuel savings**
- **Reduce volatility / increased flexibility**
- **Deferral of infrastructure investments**

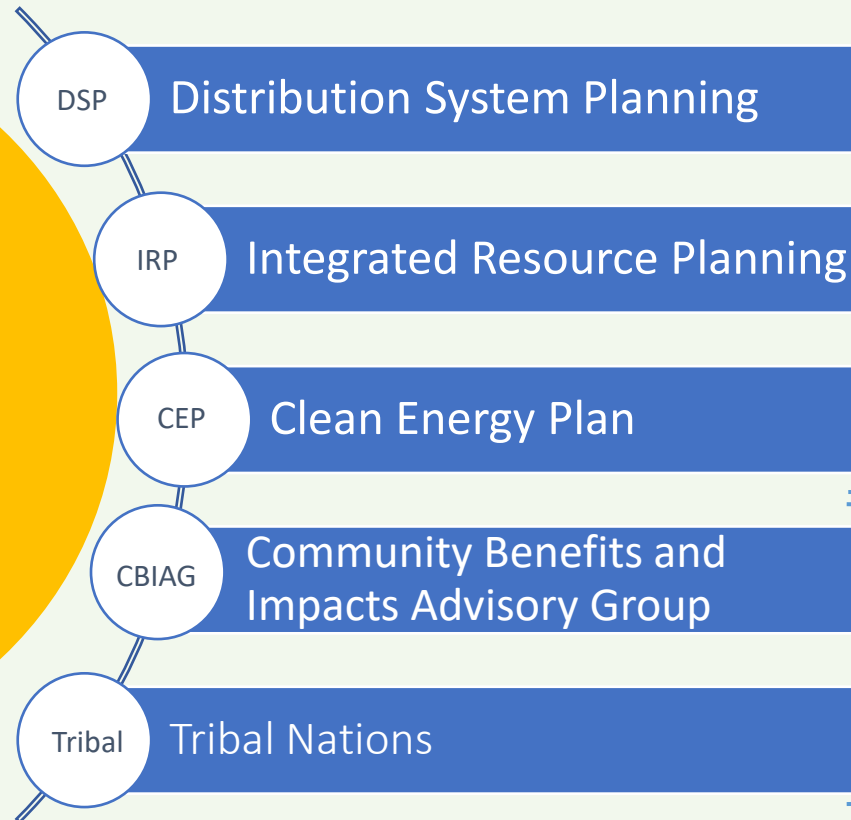
Stakeholder Engagement

Where does DSP Fit in with Other Engagement Initiatives?

Transitioning to a clean energy future benefits from diverse stakeholder input

Clean Energy Plan (CEP) Engagement Series

- Meetings on various topics/groups receiving Stakeholder input.
- Public is welcome to attend meetings



Utility Planning

- Investments in generation, transmission, distribution (substations and circuits)
- Includes renewable energy, storage, demand response, community based renewable energy projects.

Community Specific

- Community input, surveys, outreach
- Customer support programs
- Community Benefits Indicators

Continued Engagement - Utility Planning

Integrated Resource Plan (IRP)

To file twenty-year strategic plan that focuses on ten-year planning and two-to-four-year actionable plans with utility commission.

Intensive data forecasting, modeling, and portfolio analysis, to ensure PacifiCorp balances system needs, regulatory requirements and stakeholder input

Next meeting TBD- Online form [Integrated Resource Plan](#)

Oregon Clean Energy Plan (CEP) Stakeholder Group

CEP goal is to develop an actionable strategy to provide emission free electricity for Oregon customers by 2040.

CEP includes requirements for small-scale and Community Based Renewable Energy.

Works closely with IRP group to plan system needs, regulatory requirements, and stakeholder input.

Next meeting April 28th [Oregon Clean Energy Plan](#)

The screenshot shows the PacifiCorp website with a navigation menu (ENERGY, TRANSMISSION, ENVIRONMENT, COMMUNITY) and a search icon. A sidebar on the left lists various energy topics, with 'Oregon Clean Energy Plan' highlighted. The main content area features a news item for a 'Clean Energy Plan Engagement Series - April 2023 Meeting' on April 28, 2023, from 1 p.m. to 4 p.m. Pacific Time, with live translations available. Below this is a section titled 'Oregon Clean Energy Plan' with a sub-header 'We have a vision for a clean energy future...' and a list of goals: 80% below baseline emissions by 2030, 90% below by 2035, and 100% below by 2040. A photo of wind turbines is visible on the right.

The screenshot shows the PacifiCorp website with a navigation menu (ENERGY, TRANSMISSION, ENVIRONMENT, COMMUNITY) and a search icon. A sidebar on the left lists various energy topics, with 'Integrated Resource Plan' highlighted. The main content area features a section titled 'Integrated Resource Plan' with a sub-header 'PacifiCorp's 2021 Integrated Resource Plan (IRP) builds upon our significant progress...' and a photo of a power transmission tower. Below this is a sub-header 'Clean, reliable, resilient: The power and promise of a connected West' and a paragraph about the plan's goals, including a 69% reduction in greenhouse gas emissions from 2005 levels by 2030. A video link 'WATCH THE VIDEO: CONNECTING THE WEST' is also present.

Continued Engagement - Group Specific

Engagement for Oregon Tribal Nations

Increase feedback from communities that have not traditionally participated in utility planning process.

Provide us with better understanding of community needs, perspectives, barriers to participations, assisting with community outreach.

Next meeting April 28th

[Tribal Nations](#)

Oregon Community Benefits and Impacts Advisory Group (CBIAG)

CBIAG composed of stakeholders that do not usually participate in utility planning processes to ensure community voices are heard. Primary topics: community benefits, concerns, guidance to utility on approach & engagement.

CBI indicators- using feedback/indicators from community to drive utility planning and actions

Next meeting April 20th

[Oregon Community Benefits and Impacts Advisory Group](#)

The screenshot shows the PacifiCorp website with a navigation bar (ENERGY, TRANSMISSION, ENVIRONMENT, COMMUNITY) and a search icon. On the left is a 'Energy' sidebar menu with items: Integrated Resource Plan, Wind & solar, Hydro, Thermal, Storage, Grid modernization, Private generation, Oregon Clean Energy Plan, and Washington CEIP. The main content area features the article 'Clean Energy Plan Engagement Series for Oregon Tribal Nations'. The article text states: 'We seek expanded engagement with Oregon tribes for a clean energy future that focuses on equity to build an inclusive and accessible process for consultation and collaboration.' It continues: 'Throughout the development of the 2023 CEP, we will continue to seek and incorporate feedback, which will help develop our specific actions, interim and particular targets, and other aspects of our clean energy plan.' Below this, it says: 'PacifiCorp Clean Energy Plan Virtual Engagement Series for Oregon Tribal Nations will focus on equity and a clean energy future in Oregon per Oregon House Bill 2021. Through external engagement, we plan to continue seeking direct stakeholder feedback to build an inclusive and accessible process for consultation and collaboration. This includes:'. A bulleted list follows:

- Increasing participation from communities that have not traditionally participated in utility planning processes;
- Providing us with a better understanding of community needs and perspectives;
- Identifying barriers to participation and input on

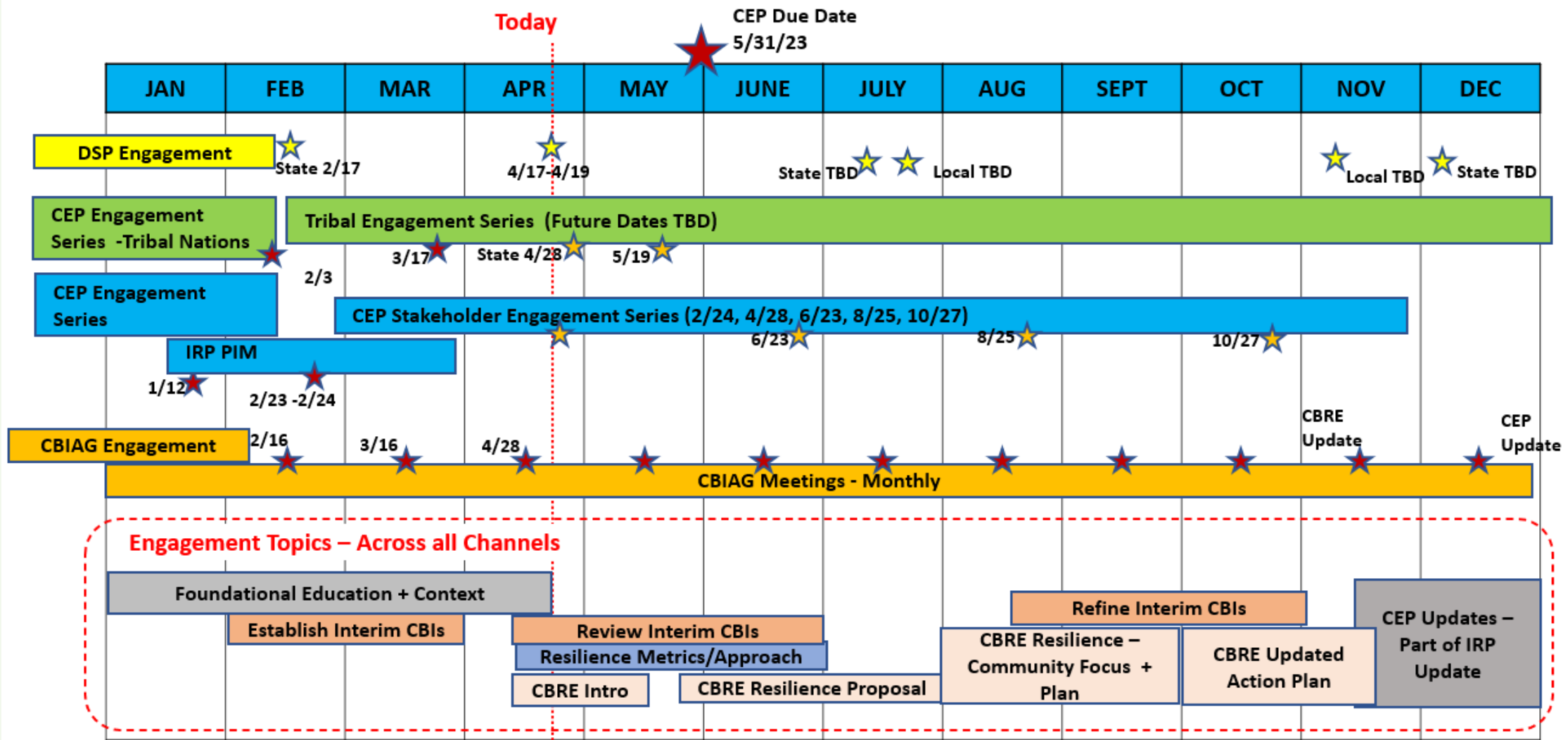
 An image of a fish is visible on the right side of the article.

The screenshot shows the PacifiCorp website with the same navigation bar. The 'Energy' sidebar menu is also present. The main content area features a meeting announcement: 'CBIAG April 2023 Meeting' on 'April 20, 2023, 1 p.m. - 4 p.m. Pacific Time'. It notes 'American Sign Language and Spanish live translations available' and includes a 'Join Zoom Meeting' link. Below the announcement is the article 'Oregon Community Benefits and Impacts Advisory Group'. The article text states: 'We have convened the Community Benefits and Impacts Advisory Group (CBIAG) to focus on equity and a clean energy future in the state of Oregon in accordance with Oregon House Bill 2021. Through the CBIAG, we plan to continue seeking direct stakeholder feedback to build an inclusive and accessible process for consultation and collaboration. This includes:'. A bulleted list follows:

- Increasing participation from communities that have not traditionally participated in utility planning processes;
- Providing us with a better understanding of community needs and perspectives;
- Identifying barriers to participation and input on how to address these barriers;

 An image of a wind turbine is visible on the right side of the article.

Stakeholder Engagement Timeline



Final Survey/Discussion

What did you learn today?

What resonated with you today?

What are the benefits of moving to a clean energy future?

What comes to mind when you think of community resilience?

What special topics would you like to hear about at the next workshop?

Next workshop format: in-person or online only?



Conclusion:

After forecasting the load for circuits in the Upper Rogue area with enhanced forecasting methods, we have higher confidence of growth rates for summer and winter peaks. We hope you have gained a better understanding of our Distribution System Planning and want to continue to engage with us throughout this process. Thank you for attending and improving our understanding of the needs and values of the Upper Rogue communities.

Going Forward:

Now, we are ready to start Load Flow Analysis to determine grid needs and benefits and costs to traditional and non-traditional solutions.

Questions/Comments?

Online Participants Questions/Comments?

DSP Email / Distribution List Contact Information

- DSP@pacificorp.com

DSP Webpages

- [Pacific Power Oregon DSP Website](#)
- [Planificación del Sistema de Distribución de Oregón \(pacificorp.com\)](#)

Additional Resources

- [PacifiCorp's DSP Part 1 Report](#)
- [PacifiCorp's DSP Part 2 Report](#)
- [DSP Pilot Project Suggestion Form](#)

Thank you!

Back up Slides

Initial Community Benefits Indicators (CBIs)

Customer Benefit Indicator Category	Interim Customer Benefit Indicators	Interim Customer Benefit Indicator Metrics	Purpose
Rulemaking Language	Outcomes	How we Measure Outcomes	Why
Resiliency (System and Community)	<p>Reduce frequency and duration of energy outages</p> <p>Improve resiliency of vulnerable communities during electricity outages</p>	<p>Metric of Energy Not Served (ENS) from IRP portfolios</p> <p>SAIDI, SAIFI, and CAIDI at area level including major events</p>	SAIDI, SAIFI and CAIDI scores show how reliable and resilient areas of PacifiCorp's system are. Producing these metrics for Census Tracts will demonstrate how reliable and resilient our system at the community level.
Health and Community Well-being	Decrease number of residential disconnections	Number of residential customer disconnections	Access to energy affects the provision and sustainability of basic human needs. Disconnections could be the result of a customer's decision whether to pay utility bills or pay for other basic needs like paying rent, buying food, or purchasing prescription drugs. Tracking disconnections by Census Tract provides an indicator of how communities may be struggling with their basic needs.
Environmental Impacts	Increase energy from non-emitting resources and reduce CO2 emissions to meet HB 2021 targets	<p>Amount of renewable and non-emitting resources serving Oregon retail customers</p> <p>Amount of emissions associated with Oregon retail sales</p>	Reduce fossil fuel resources and increase renewable and non-emitting resources that currently power Oregon's grid, thereby leading to increased environmental benefits, while maintaining system reliability and on-demand service to customers.
Energy Equity (Distributional and Intergenerational Equity)	Decrease number of households experiencing high energy burden	<p>Energy burden by census tract</p> <p>Energy burden for low-income customers, bill assistance participants and Tribal members</p>	Energy equity is concept that all member of society should be able to afford and have access to a necessary and basic amount of energy. Energy burdened households spend a disproportionate amount of their income on home energy costs. Tracking energy burden by Census Tract provides an indicator of energy equity for communities in PacifiCorp's Oregon service territory.
Economic Impacts	Increase community-focused efforts and investments	TBD	The purpose of this CBI is to focus investments so that communities more equitably receive benefits. Impacts from these investments will have positive implications on communities.

2023 DSP Study Area Selection Process

Establish New
Selection
Criteria for
Initial
Evaluation

Calculate
Selection
Metrics for all
Oregon
Circuits

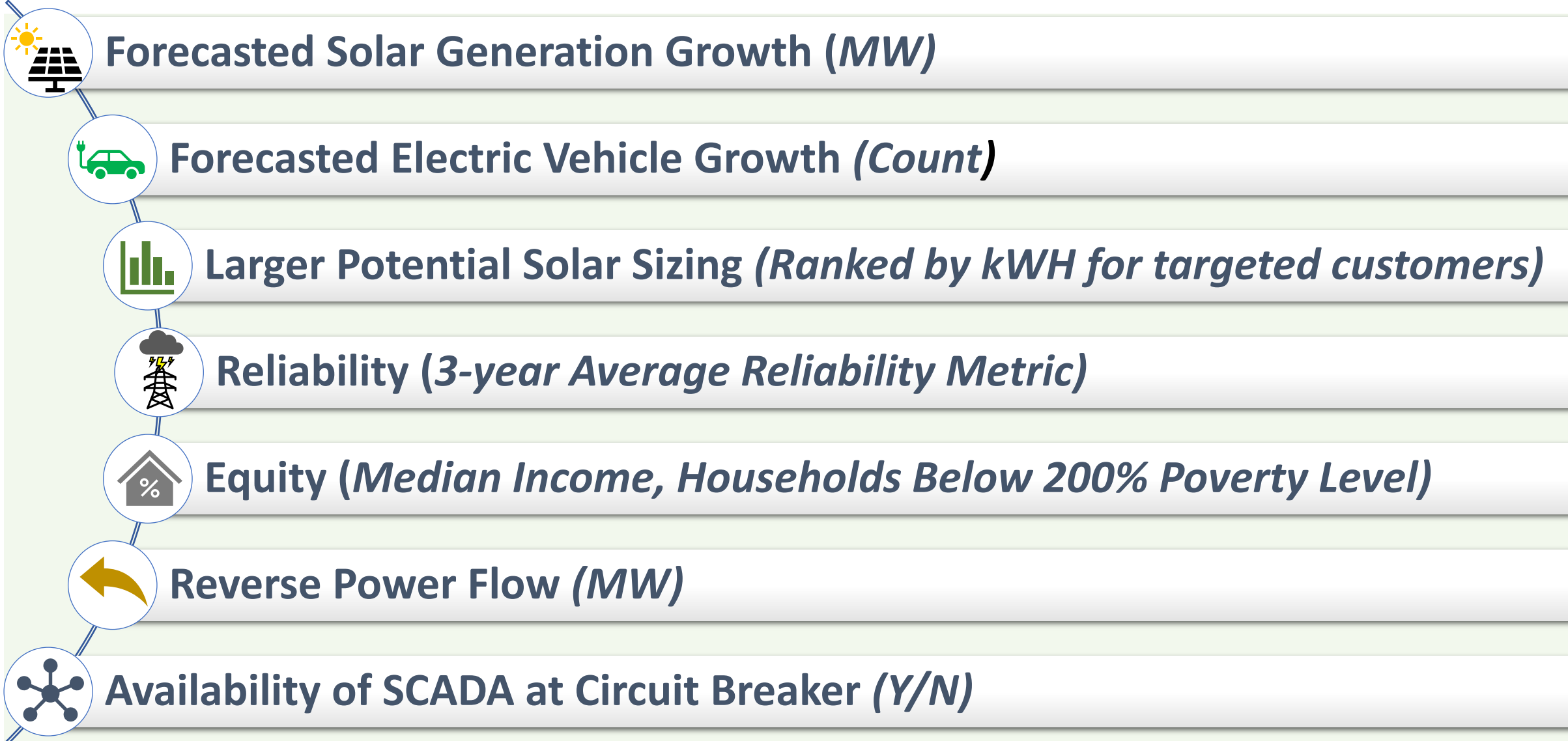
Select 12
Circuits Based
on Criteria

Preliminary
Grid Needs
Analysis on
Selected
Circuits

Share with
Stakeholders
and Get
Feedback

Final DSP
Study Area
Selection

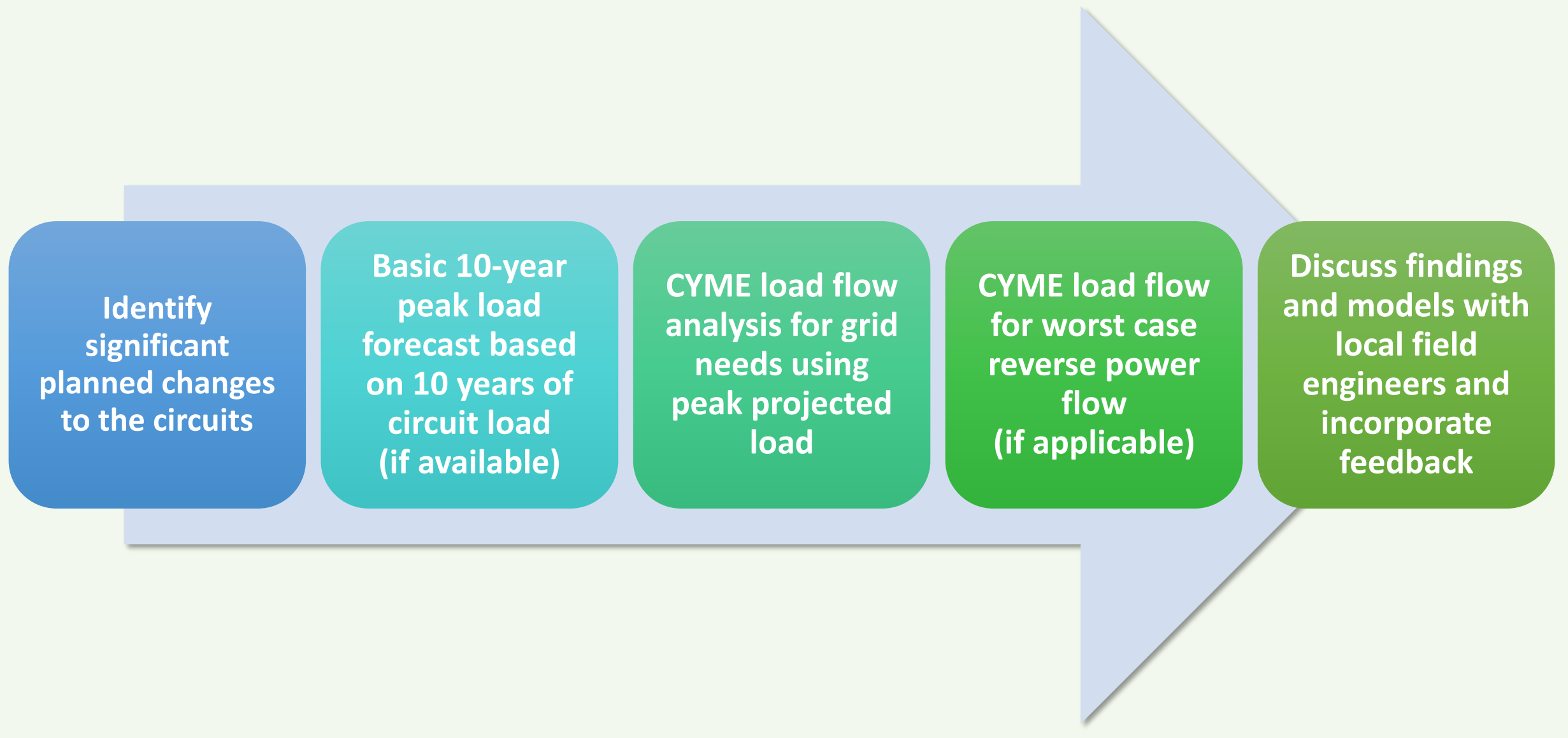
Selection methodology: Criteria and Metrics



Selection Methodology: Results

Circuit	High Solar Generation Growth	High Electric Vehicle Growth	Low Reliability Score	Larger Potential Solar Sizing	High Potential for Reverse Power Flow	SCADA Available	Median Income ≤ \$50k	High Amount of Households Below 200% Poverty Level
4R9	✓	✓	✓			✓	✓	✓
5D22	✓	✓		✓		✓		
5D167	✓	✓				✓		✓
5P395	✓	✓				✓		
5L45	✓	✓	✓	✓		✓		
5D261		✓			✓	✓		
5D227		✓			✓	✓		
5L27				✓		✓	✓	
5D50			✓	✓		✓		✓
4M182		✓				✓		✓
4M16	✓	✓						
4M15	✓	✓					✓	✓

Selection Methodology: Preliminary Grid Needs Analysis



Identify significant planned changes to the circuits

Basic 10-year peak load forecast based on 10 years of circuit load (if available)

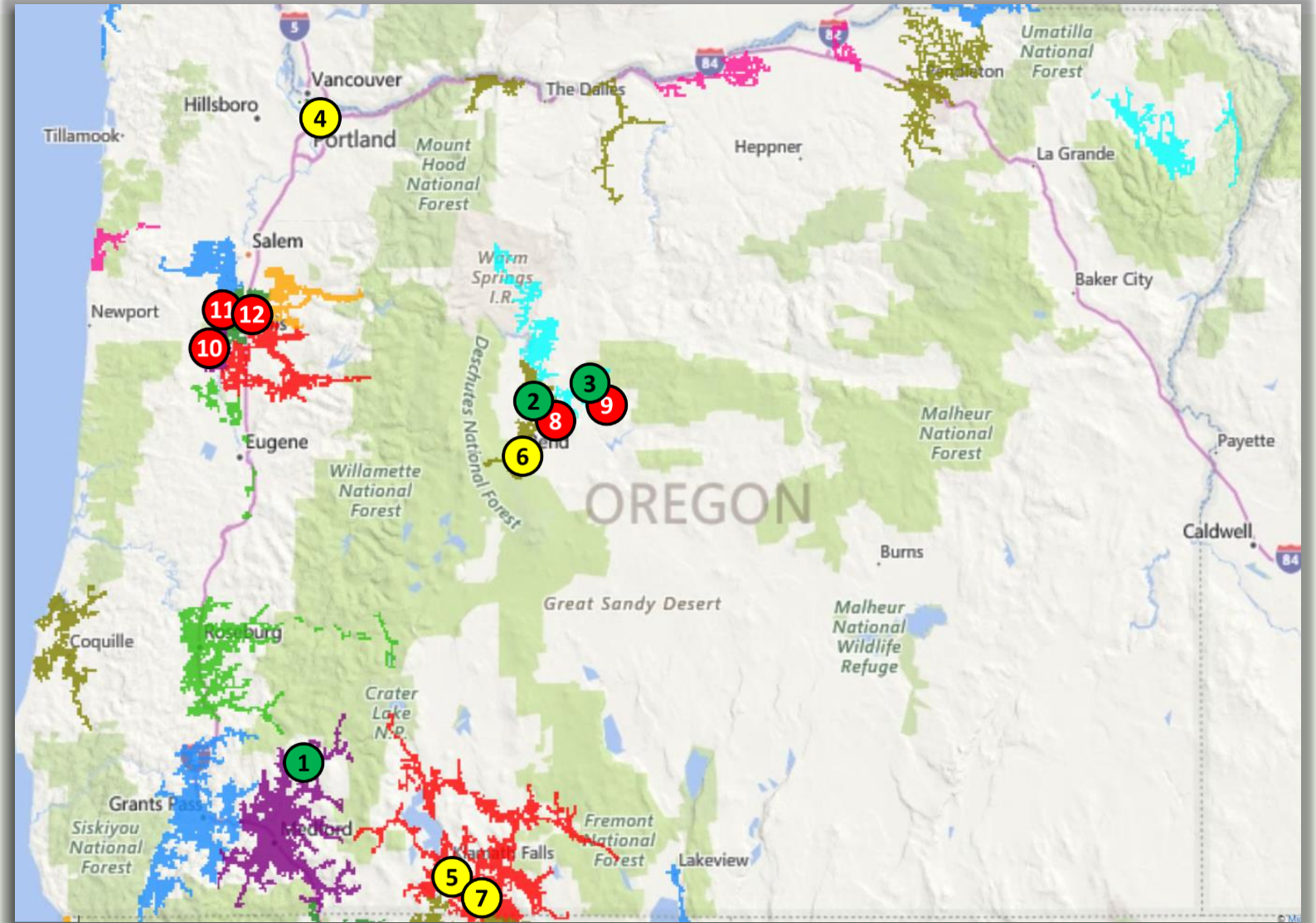
CYME load flow analysis for grid needs using peak projected load

CYME load flow for worst case reverse power flow (if applicable)

Discuss findings and models with local field engineers and incorporate feedback

Preliminary Selection for Full Area DSP Study

#	Circuit	Evaluation Likelihood:		
		High	Low	Disqualified
1	4R9	Grid needs identified		
2	5D22	Grid needs identified		
3	5D167	Grid needs identified		
4	5P395	No grid needs identified		
5	5L45	No grid needs identified		
6	5D261	No grid needs identified		
7	5L27	No grid needs identified		
8	5D227	New substation		
9	5D50	Large planned load transfer		
10	4M182	New substation		
11	4M16	New substation		
12	4M15	New substation		

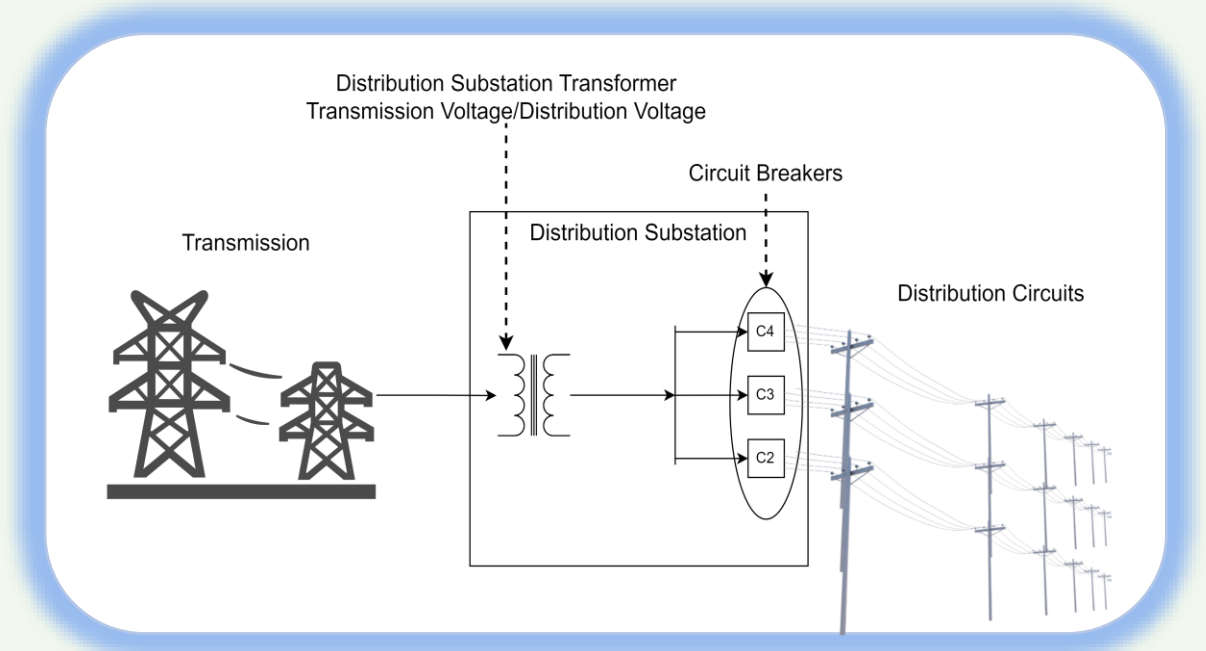


Distribution substation transformer

- Lowers voltage from transmission levels to distribution levels
- Manages distribution voltage levels
- Load measurements
- Sized to accommodate loading levels for the foreseeable future

Distribution circuit breakers

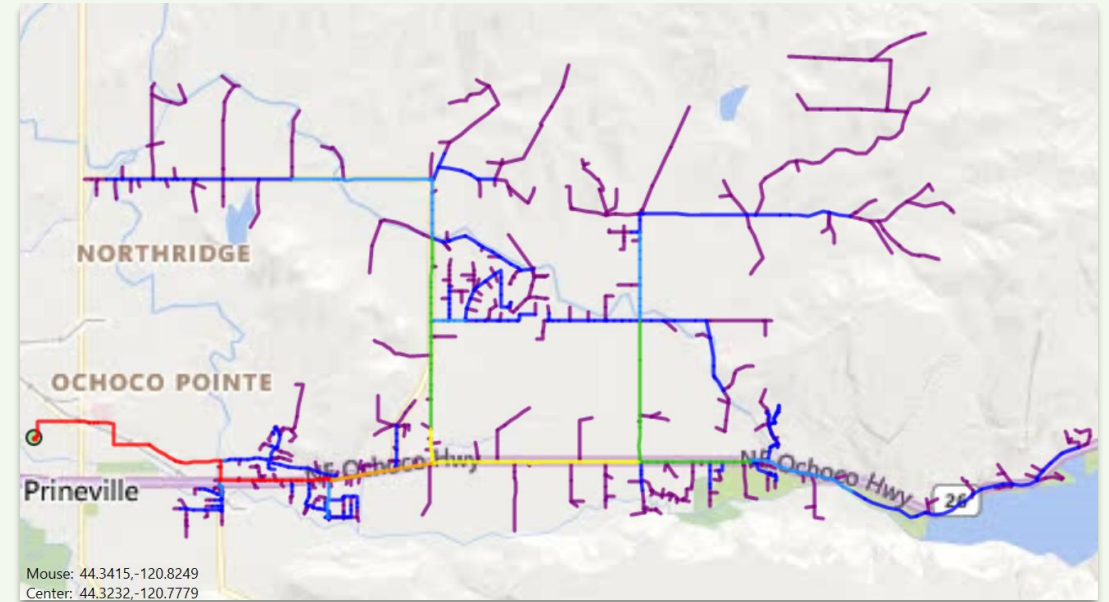
- Starting point for distribution circuits
- System protection
- Load measurements



Distribution Circuit Overview

What is a distribution circuit?

- Starts at the distribution circuit breaker, ends at the customer meter
- Distribution circuit components:
 - Poles
 - Wires (overhead and underground): load capacity starts out large from the substation and decreases as the amount of load downstream decreases
 - System protection: public safety, protects system, minimizes customer outages
 - Switches: maintenance, circuit reconfiguration, outage restoration
 - Voltage management devices: maintain acceptable voltage levels along the circuit
 - Service transformers (pole mounted and pad mounted): lowers primary distribution voltage to service levels
 - Customer meters: Advanced Metering Infrastructure (AMI) captures power usage at hourly intervals. Used for billing and load research.
- Circuit designed to accommodate anticipated load for the foreseeable future



Why Is Weather Normalization Important?

What we have observed:

- Load in summer has a strong correlation with max temperature and an even stronger correlation with Cooling Degree Days (CDD)
- Load in winter has a strong correlation with min temperature. Heating Degree Days (HDD) can have a strong correlation as well.
- Large yearly variations of extreme heat and cold
- 2021 and 2022 had exceptional heat waves

Why does this matter?

- Peak load has strong correlation to yearly weather extremes. Load growth is masked by yearly variations in temperature extremes.
- Purpose of weather normalization is to remove this yearly variation.

