Distribution System Planning Workshop
Public Workshop #1
May 24, 2021






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Workshop #1 Information

Teams Meeting Information

- Microsoft Teams Meeting
- +1 (563) 275-5003
- +1 (385) 301-2977 [Salt Lake City, Utah]
- **CONF CALL ID: 972 027 605#**
- **Please place your phone on “Mute” when not speaking**
- **Please do not use the “Hold” function on your phone**

- Meeting attendance and public chat will be available at the website.
- 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 Goals

- Introductions
- Describe existing planning processes
  - *Preview certain baseline information currently under development*
- Begin the planning dialogue
  - *Website, feedback and other methods*
  - *Review upcoming workshop topics*

Tell us about yourself...

- In the chat, please send us:
  - Name
  - Organization
  - What are you most interested in learning about in this proceeding?
- Feel free to send us an email to tell us more about you at DSP@pacificorp.com

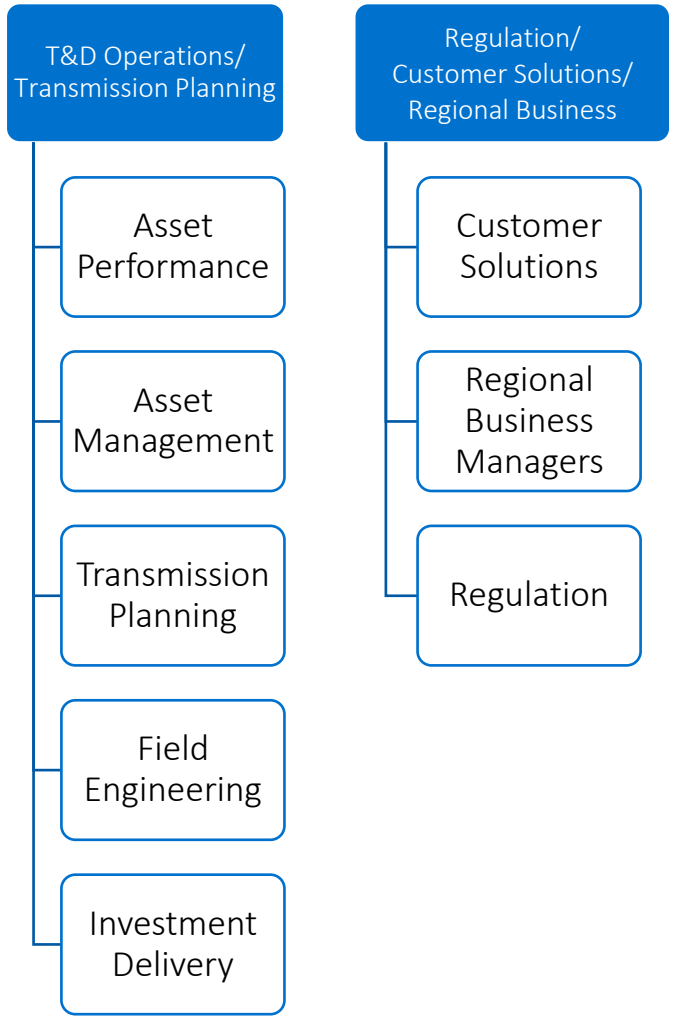
Introducing the PacifiCorp Team

Lead

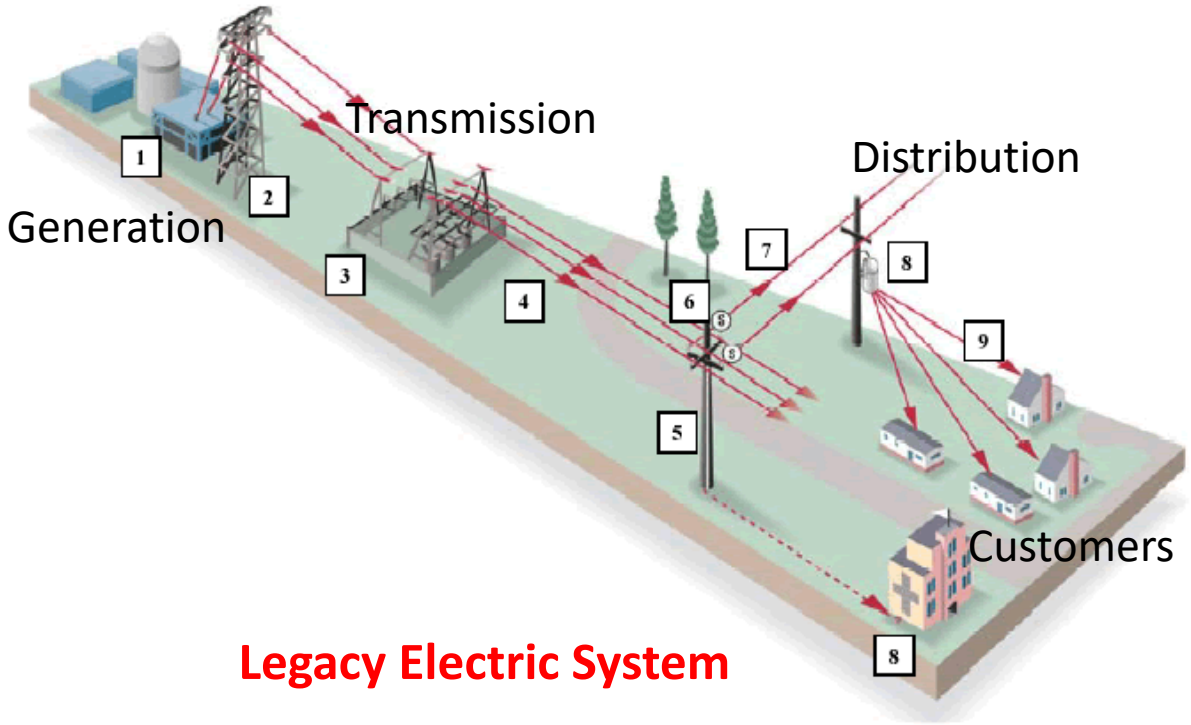
- Heide Caswell – T &D Asset Performance

Contributors (today's content)

- Alan Meyer & Regional Business Managers (more later)
- Erik Anderson – Customer Solutions
- Jon Connelly – Engineering Manager
- Wyatt Pierce - Engineer
- Adam Lint – Engineer
- Adam Rosenstein – Engineer

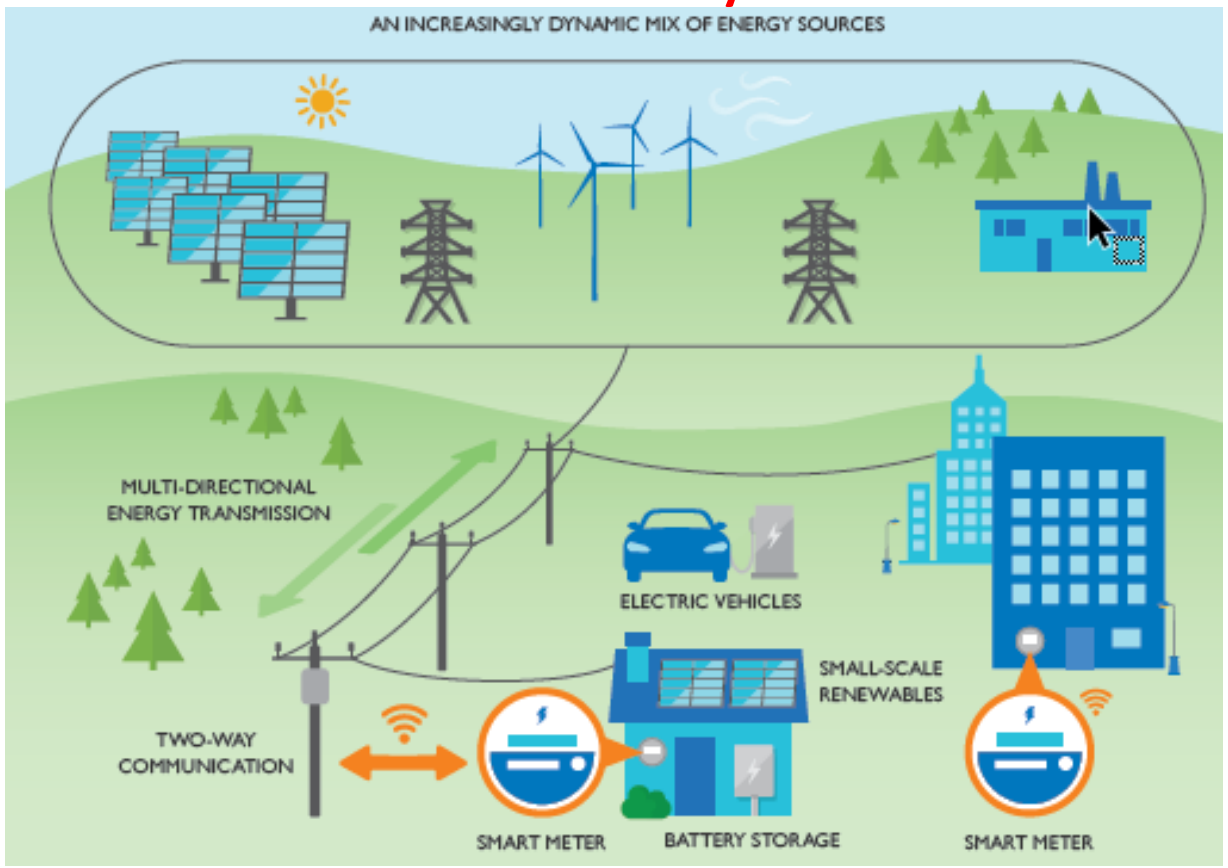


Electric Utility...current & future



Legacy Electric System

Future Electric System



Existing Planning Process



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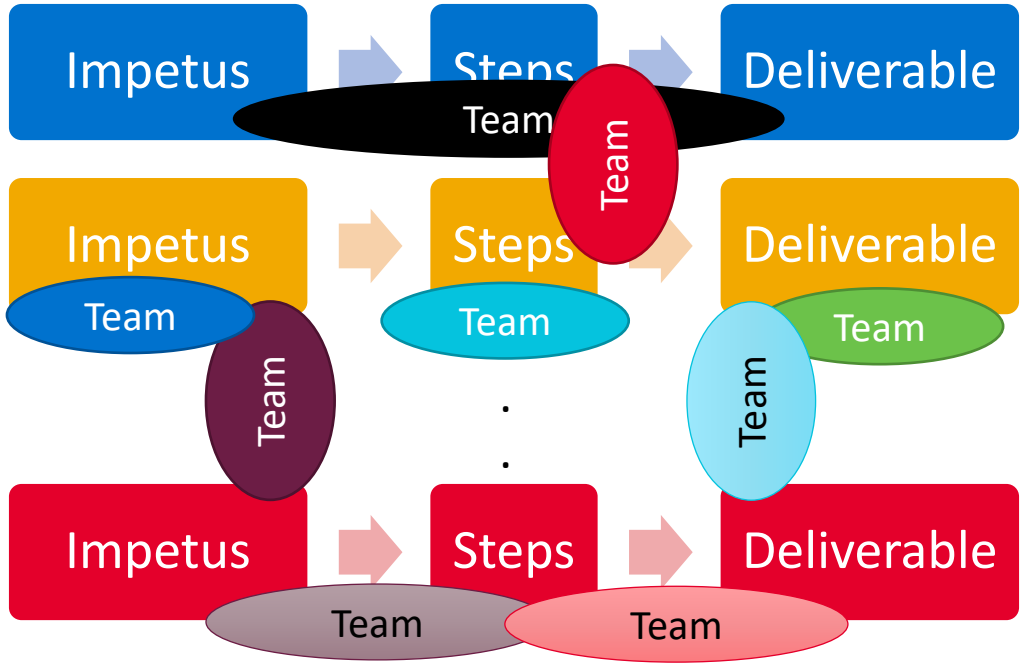
Existing 2021 Processes



Semi-independent but related processes for

- *Capital improvements*
- *Demand side management programs*
- *Reliability improvements*
- *Risk-driven and mandated projects*
- *Integrated resource plans*

Impetus Examples

- Specific load or generation additions
- Periodic/cyclical review of growth
- Periodic/cyclical review of reliability
- Pilot projects
- Customer complaints

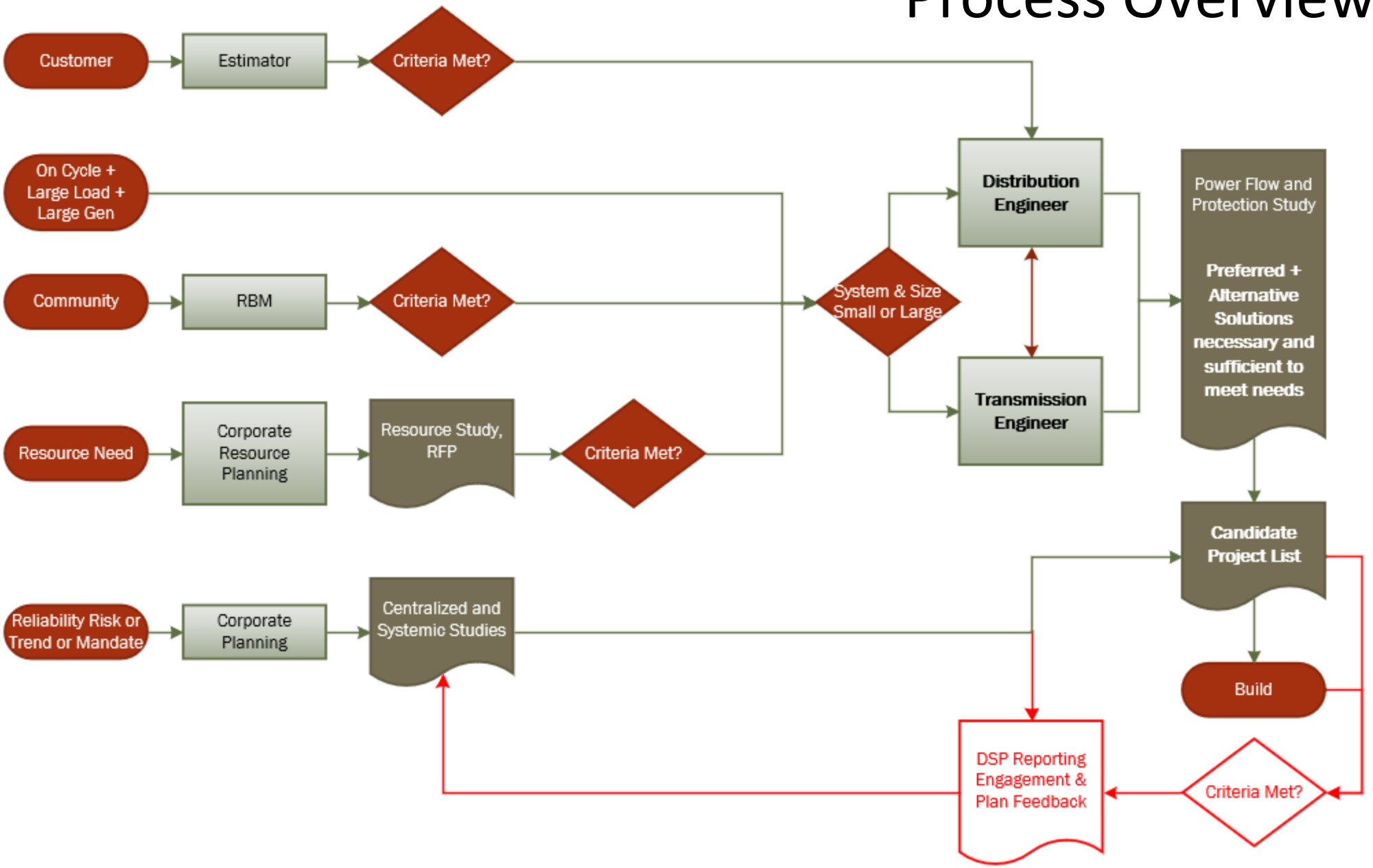
Steps Examples

- Reviewing historical data
- Forecasting
- Scenario building/evaluation
- Inter-department coordination

Deliverable Examples

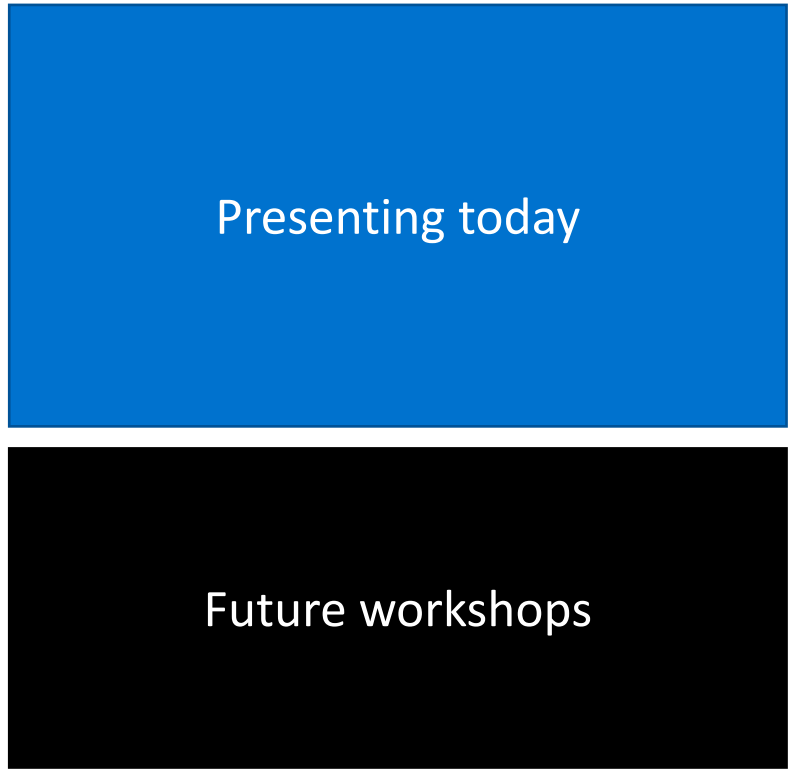
- Approved study
- Prioritized project list
  - Justification/necessity
  - High level scope

Process Overview



Teams Involved in Planning

- Regional Business Managers
- Distribution Engineers
- Transmission Engineers
- Customer Solutions
- T&D Asset Performance
- Wildfire Safety & Asset Management
- Investment Delivery
- Resource Planning



Regional Business Managers



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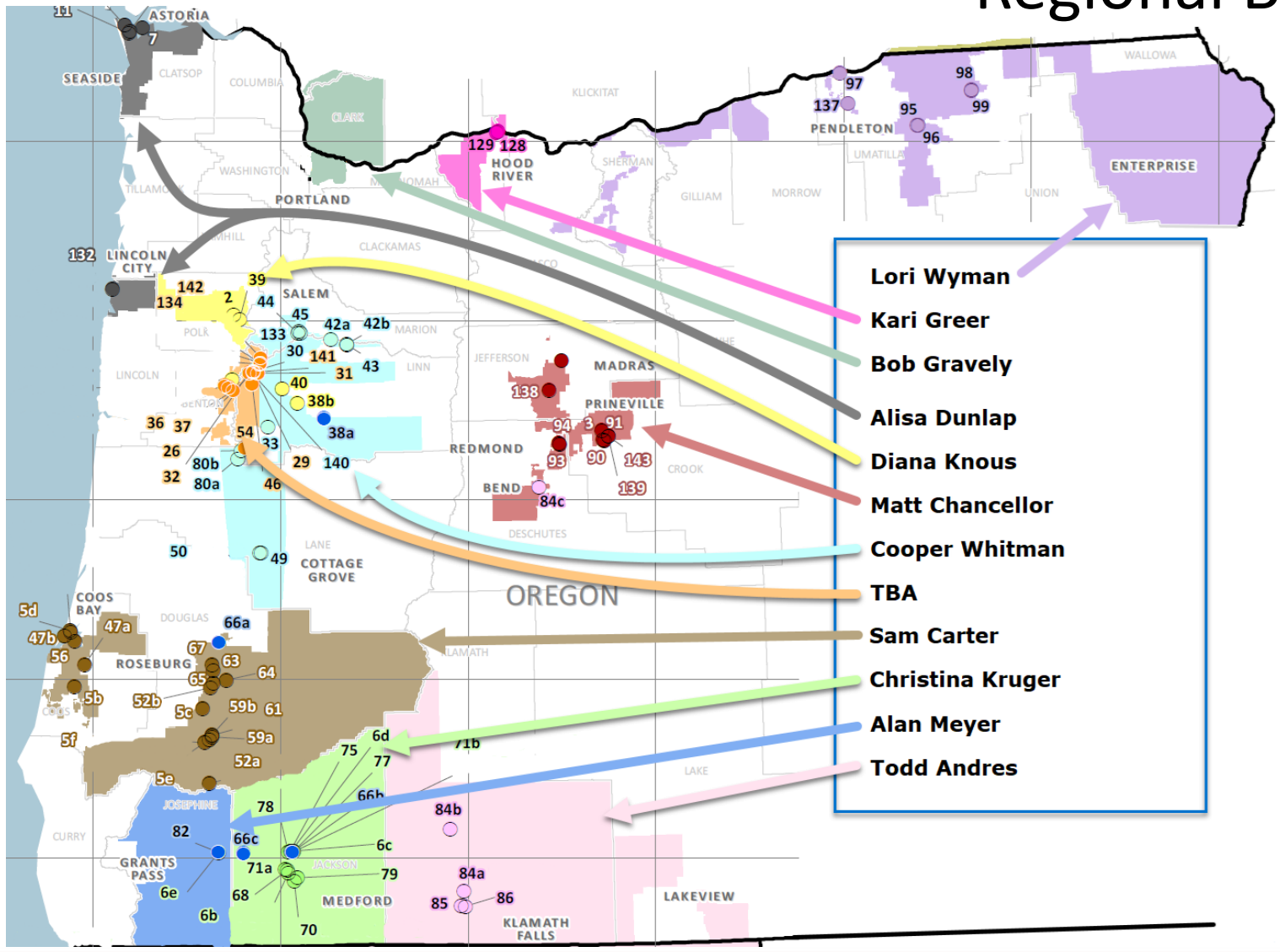
Regional Business Managers (RBMs)



- Primary contact for local leadership and critical accounts (like public safety partners) as well as key commercial and industrial customers in their area
- Share customer plans and needs with engineering teams
- Collaborate with engineering to inform customers and communities
- Act as a voice on behalf of customers and communities into the planning pipeline

Distribution Planning



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Distribution Engineering (0-34.5 kV)

- Distribution engineering provides support to transmission, substation, and distribution operations in three specific areas which include (1) Emergency Support, (2) As-Needed Support, and (3) Routine Evaluations (planning studies).

- Staff are qualified electrical professionals that have background in multiple areas including distribution planning, protection and control, power quality, and operations.

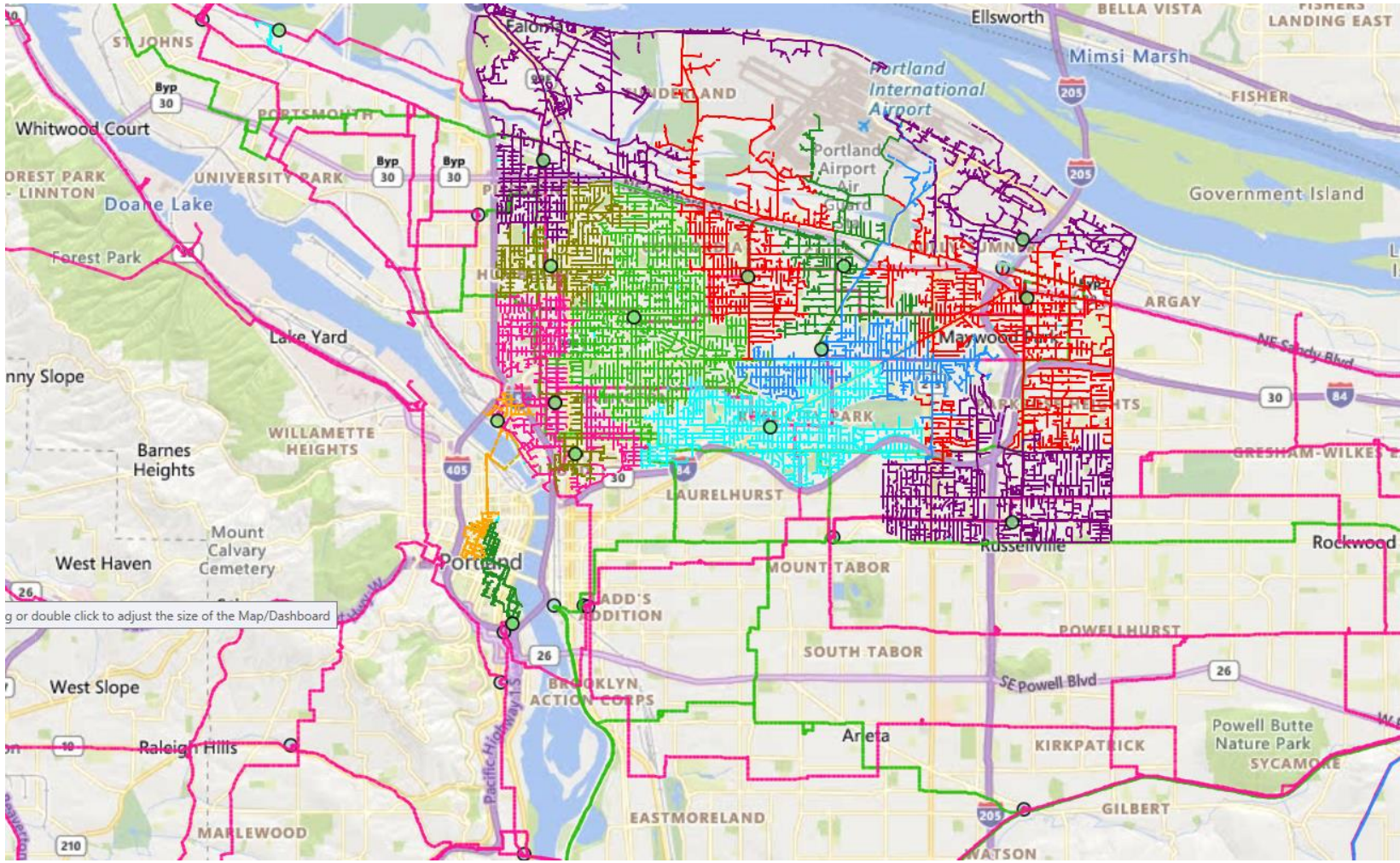
- Distribution planning studies are part of the Routine Evaluations that are performed on a cycle, which has been up to 5 years between study periods. The main underlying drivers for our current planning study process are:
  - accommodating net load changes,
  - reliability, distributed resources,
  - preparing the grid for the future, and
  - developing greater resilience and risk mitigation.

Distribution Planning Processes and Study Horizons

- Distribution planning studies (Local distribution up to 34.5 kV)
  - Evaluate limiting conditions on equipment (e.g., transformers, regulators, reclosers, wires)
  - Seasonal peak and minimum load conditions, 20% exceedance
  - All distribution system planning studies are completed on a 5 year cycle. Studies can vary in frequency class from one to five.
    - Class 1 studies are scheduled to be updated each year. Class 5 studies are scheduled to be updated every five years.
  - Study schedules are evaluated each year and studies may be shifted to occur sooner or later depending on a number of factors
- Ad-hoc Studies
  - Typically driven by load, generation interconnection service or large block load
  - Study is generally focused on a limited area, and the immediate effects of the request on reliability and load service

Distribution Planning Tools

- Power flow model (CYME)
- CYME Gateway (Data)
- Fastmap
- Reliability model (GREATER, FIRE)
- Load and (some) gen data
  - PI Historian
  - SCADA-based tools
- DER Screening tool
- Load forecasting tool



Distribution Planning Evolution

- More dynamic and holistic view to inputs and outputs
  - DER
  - EV
  - Customer preferences
  - Policy and opportunity driven trends
  - Integration with neighborhood/community/city plans and goals
- Improve planning models, information and assumptions
  - DER Screening Tool → DER Impact Tool (Locational Planning)
- Improve system operation and flexibility
- Modernize the energy grid / increased deployment of advanced technologies
- Customer side solutions
- More efficient utilization of existing system capacity

Transmission Planning



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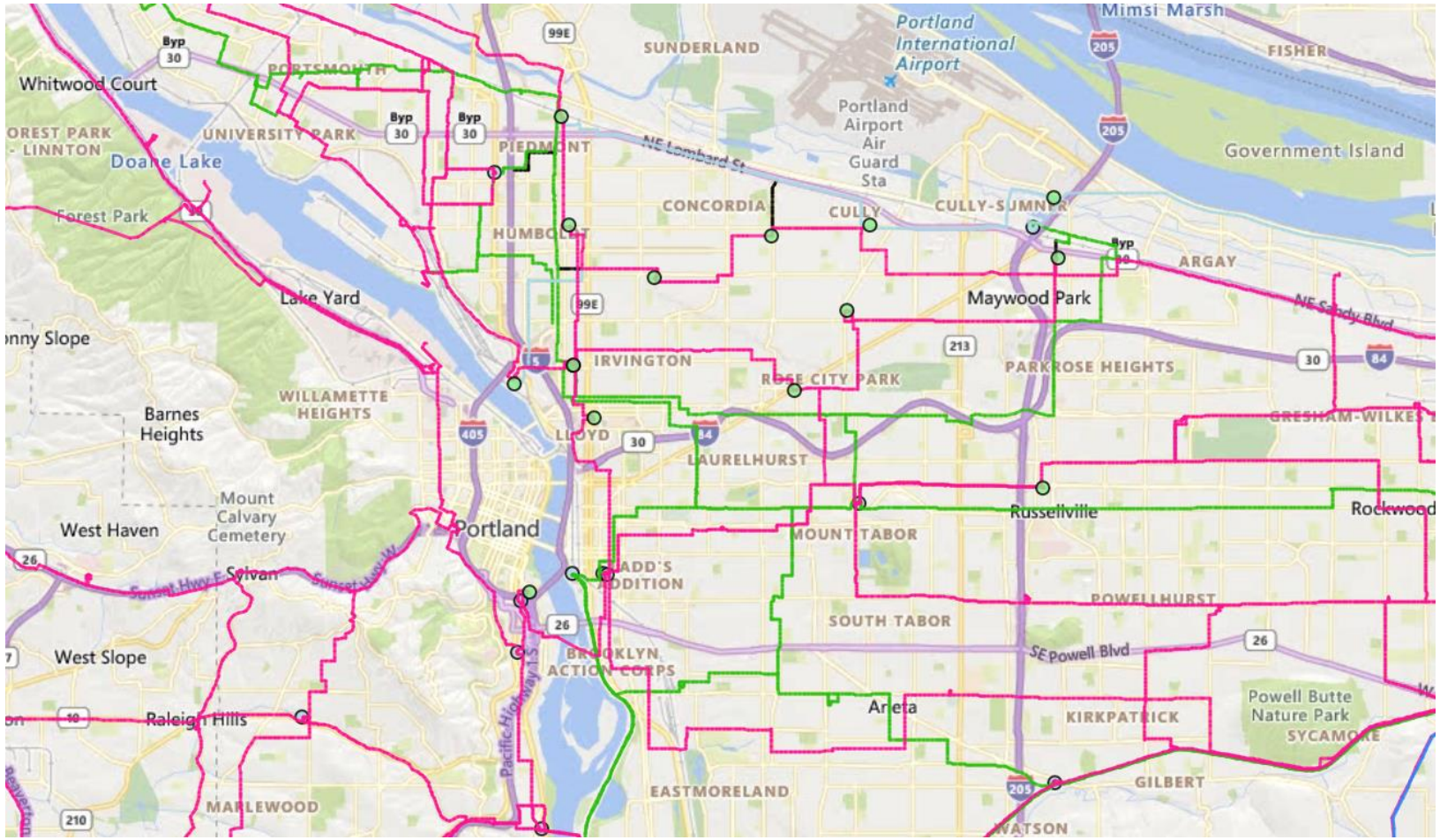
Transmission Planning

Definition:

- "Zoom out" one level from the distribution system
- Higher voltage:
  - 115 kV
  - 69 kV
  - 57 kV (phased out)
  - 34.5 kV
- Ties to other utilities such as BPA and PGE

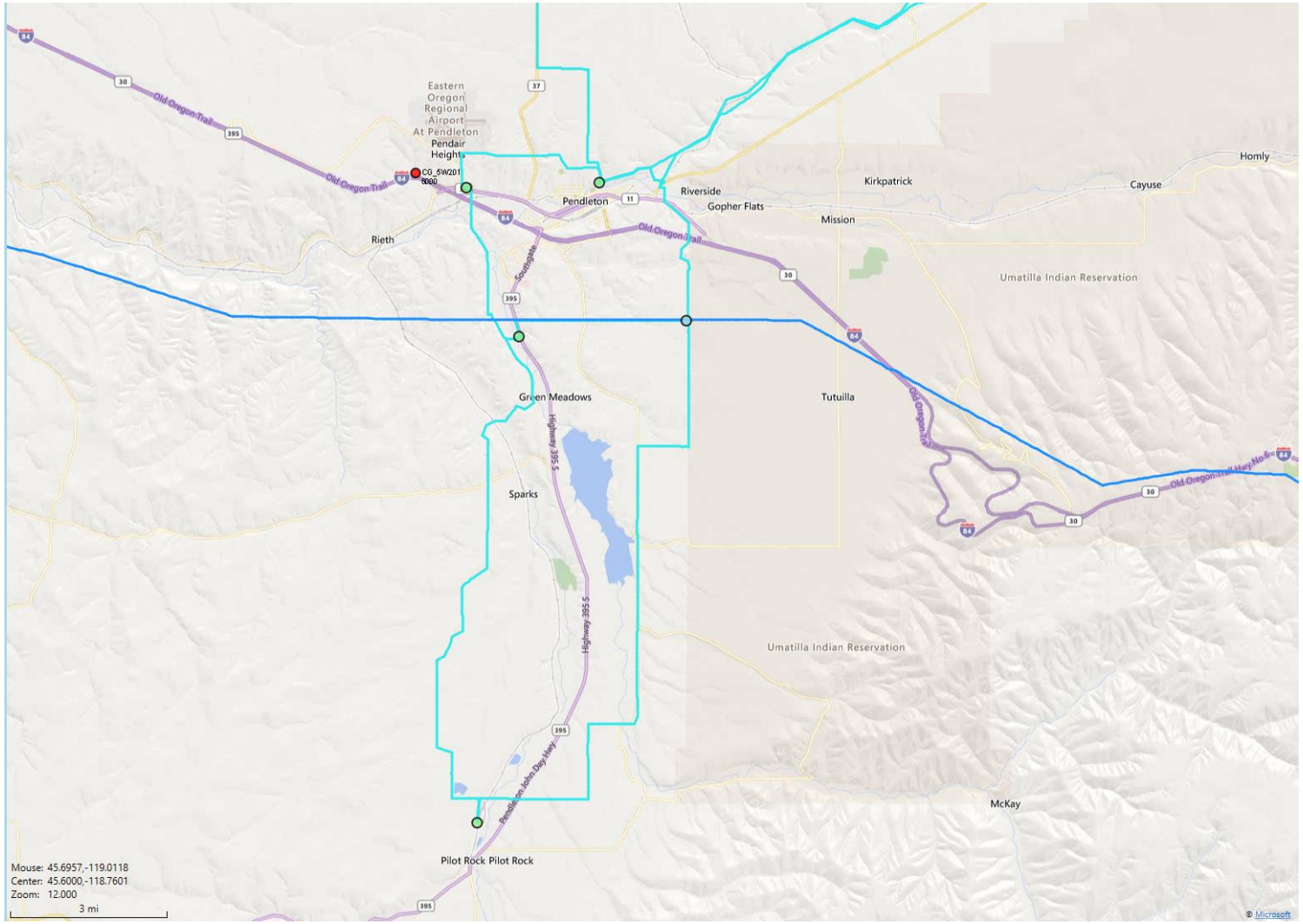


Transmission Planning

Tools:

- Power flow model (Siemens PSS/E)
- Reliability model* (GREATER, FIRE)
- SCADA*
- PI Historian (Load data)*
- DER Screening tool*
- Load forecasting tool*

*shared tool with distribution planning



Transmission Planning Processes and Study Horizons

- Area planning studies (Local Transmission 34.5 kV to 115 kV)
  - Evaluate limiting conditions on equipment (e.g., substation transformers, wires)
  - Seasonal peak and minimum load conditions
  - Limiting credible generation dispatch cases
  - 5 / 10 year horizon
- Transmission level studies (NERC TPL, FERC Order 1000 ,115 kV to 500 kV)
  - Meet specific system performance criteria for peak and credible stressed conditions
  - Bulk power transmission across larger areas
  - 1, 5 and 10 year horizon
- Ad-hoc Studies
  - Typically driven by load, generation interconnection service or large block load
  - Study is generally focused on a limited area, and the immediate effects of the request on reliability and load service

Transmission Planning Areas (Oregon)

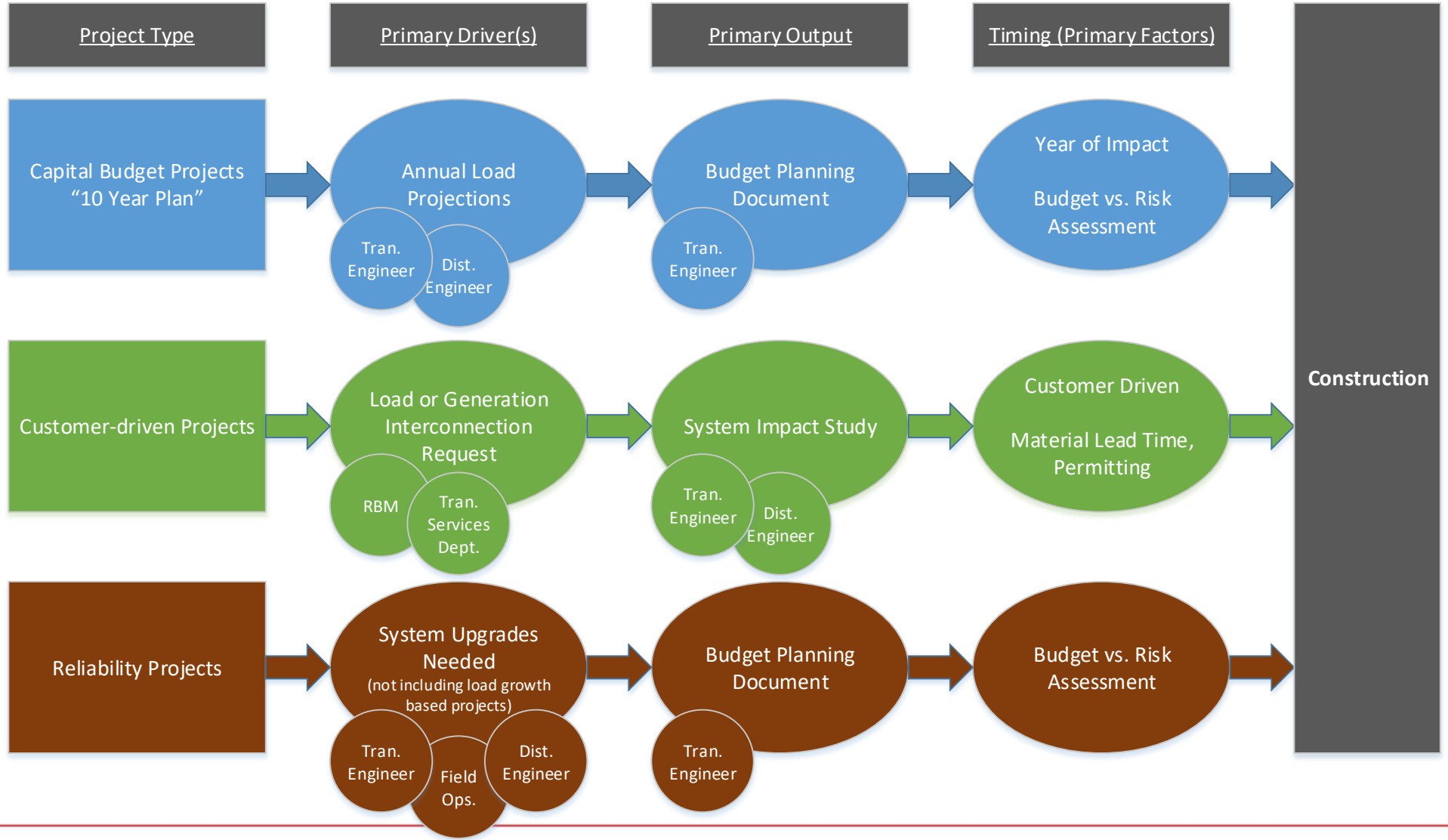
Local Transmission 34.5 kV to 115 kV

1. Central Oregon
2. Coos Bay
3. Dalreed/Arlington/Sherman County
4. Grants Pass
5. Hood River
6. Klamath Falls/Lakeview/Alturas
7. Medford
8. North Oregon Coast
9. Hermiston/Pendleton/Enterprise
10. Portland
11. Roseburg
12. Willamette Valley/Junction City/Cottage Grove

Transmission Planning: Ties to DSP

- Visibility
  - Transmission projects are prominently seen and heard about in and around the communities they serve, even though, generally, the upgrades are due to growth “downstream” on the distribution system.
- Backbone (reliability, capacity, future growth needs)
  - Without a reliable transmission system, you do not have a reliable distribution system
  - Without capacity on the transmission system, you do not have capacity on the distribution system
  - It’s important to track growth trends and “hotspots” so that transmission upgrades or line extensions can be planned for areas in need (no surprises).
- Inter-utility coordination
  - Distribution systems are single-utility entities. Upgrades can generally happen without affecting other utilities…until the transmission system becomes involved.

Transmission Planning: Project Life Cycle



Transmission Planning: Future

- Capacity Optimization Opportunities ("new technology")
  - Dynamic Line Ratings
  - Smart Wires/Smart Valves for Flow Control
  - Advanced Fault Indicators
  - Other Non-Wires Solutions
- Big Challenges:
  - How to Integrate Battery Storage
  - Large Scale EV Charging
  - Addressing Inequities

Distributed Resources



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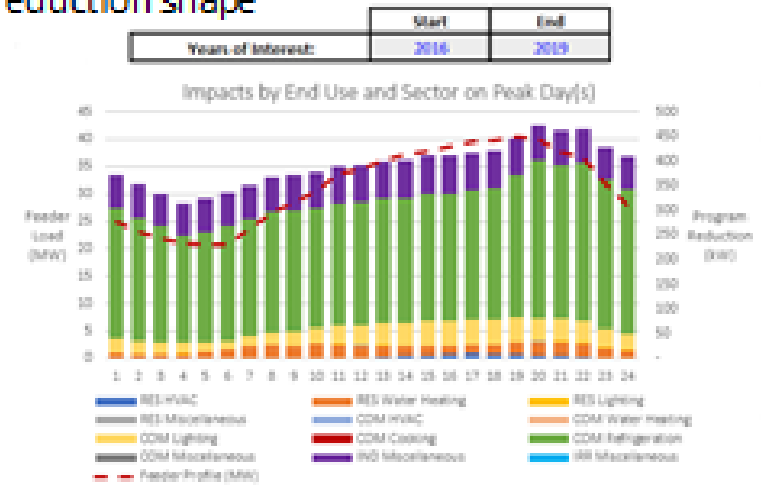
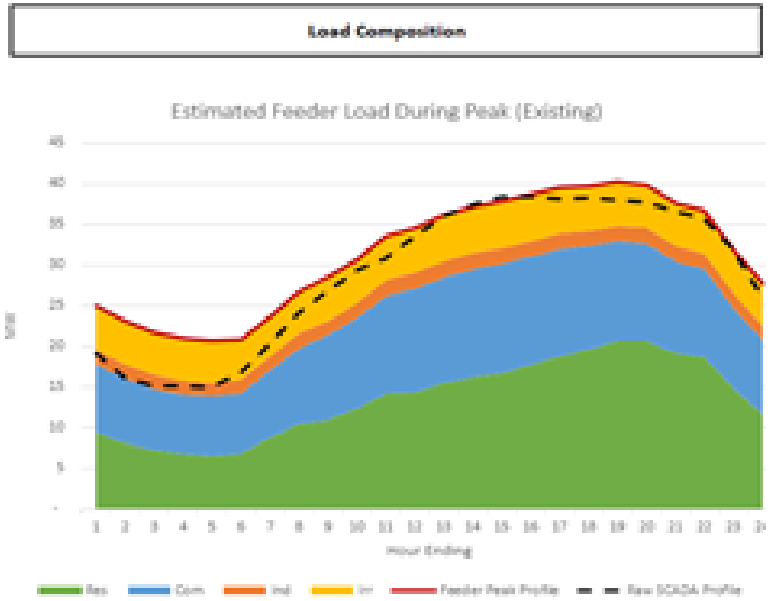
Distributed Energy Resource Forecasting

Technology	Existing Forecast	Primary Use	Published	Granularity	Challenges to use in DSP	Refresh Schedule	DSP Due Date
Electric Vehicles	Yes	Load Forecast/ IRP	Transportation Electrification Plan	State	Public Data bases, mapping to customer sites and evaluation of distribution impacts unrefined	Fall 2021	Oct 2021
EV Charging Stations	No	NA	NA	State	Incentivized chargers have been assigned to customer sites where possible, otherwise mapping to customer sites and evaluation of distribution impacts unrefined	Fall 2021	Oct 2021
Private Generation	Yes	Load Forecast/ IRP	Private Generation Study	State	Interconnection process ensures visibility to facilities; but forecast aren't at circuit level evaluation of distribution impacts unrefined	Winter 2022	Aug 2022
BTM Storage	Starting in 2021 IRP	NA	Conservation Potential Assessment provides technical potential	State	Interconnection process ensures visibility to facilities, evaluation of distribution impacts unrefined	Winter 2022	Aug 2022
Demand Response	Yes	Supply side resource, IRP drives acquisition	Conservation Potential Assessment	State	Participating customer locations are known, but forecasts aren't at circuit level and evaluation of distribution impacts unrefined	Winter 2022	Aug 2022
Energy Efficiency	Yes	IRP drives acquisition targets for all cost- effective resources	Energy Trust of Oregon	State	Energy Trust compiles data on completed energy efficiency work, mapping to customer sites and evaluation of distribution impacts unrefined	Winter 2022	Aug 2022

DER Impact Tool

- Revised DER Impact Tool
  - Review all capitals projects for DER: demand response, solar, and storage alternatives.
  - Step 1: Screening criteria
    - Estimated capital cost ≥ $1 M
    - 3 – 5 years out
    - Within 25% of traditional project costs
    - Must meet capacity reductions at time of need
  - Step 2: Conduct further review of sites that meet above screening criteria
    - Determine feasibility of location and customer mix
    - Determine appropriateness of reduction shape
- Integration of Data
  - GREATER
  - Customer Billing Data
  - Load Forecast
  - Load Research
  - EE End-use Loadshapes
  - Feeder Loadshapes
  - Energy efficiency





	Feeder/Substation/System Load		
Sector	Usage (MWh)	Feeder Peak (MW)	Customers
Residential	95,586	18.2	6,301
Commercial	78,610	13.1	461
Industrial	16,233	1.9	438
Irrigation	20,113	5.7	428
Total	210,542	38.9	7,628

Electric Vehicle Forecast Updates

1. Compile current public data and update load impact assumptions

- For example: Oregon Electric Vehicle Dashboard, DOE Alternative Fueling Station Locater, any other public source, Information from existing Pacific Power Programs
- Evaluate available data to develop informed assumptions of the impacts of EVs and associated infrastructure on feeder performance

2. Map existing electric vehicles and charging stations to specific circuits

- Use addresses and GPS data to assign known EV ownership and charging infrastructure to specific circuits

3. Forecast Circuit-Level Adoption and impacts of Electric Vehicles

- Initially apply growth rates consistently across circuits

4. Begin to incorporate other information of interest

- Examples may include: How does EV adoption vary by income? Race or ethnicity? Local air quality? Population density? Customers receiving support for energy payments? Other?

5. Overtime, refine forecast to reflect different data sets.

Reliability & Risk



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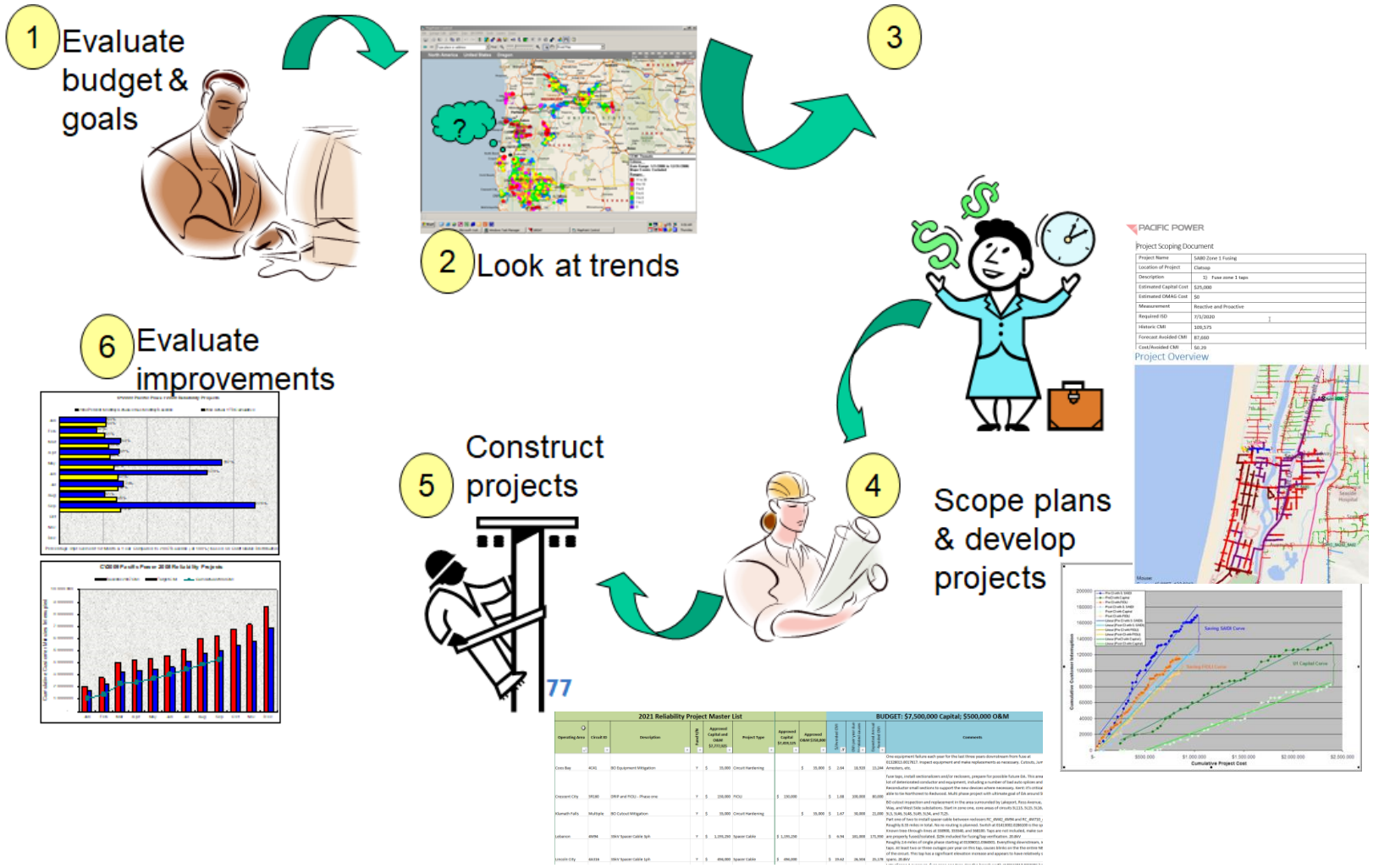
Reliability & Risk Planning

- Reliability Planning
  - Driven by outage analysis
  - Past performance, considered input to future expectations
  - Models/plans built based upon credible cases
  - Expectations largely established from historic record
- Resilience & Risk Planning
  - Driven by wide range of situations not necessarily previously experienced within system
  - Probabilistic modeling
  - In formative stages at PacifiCorp

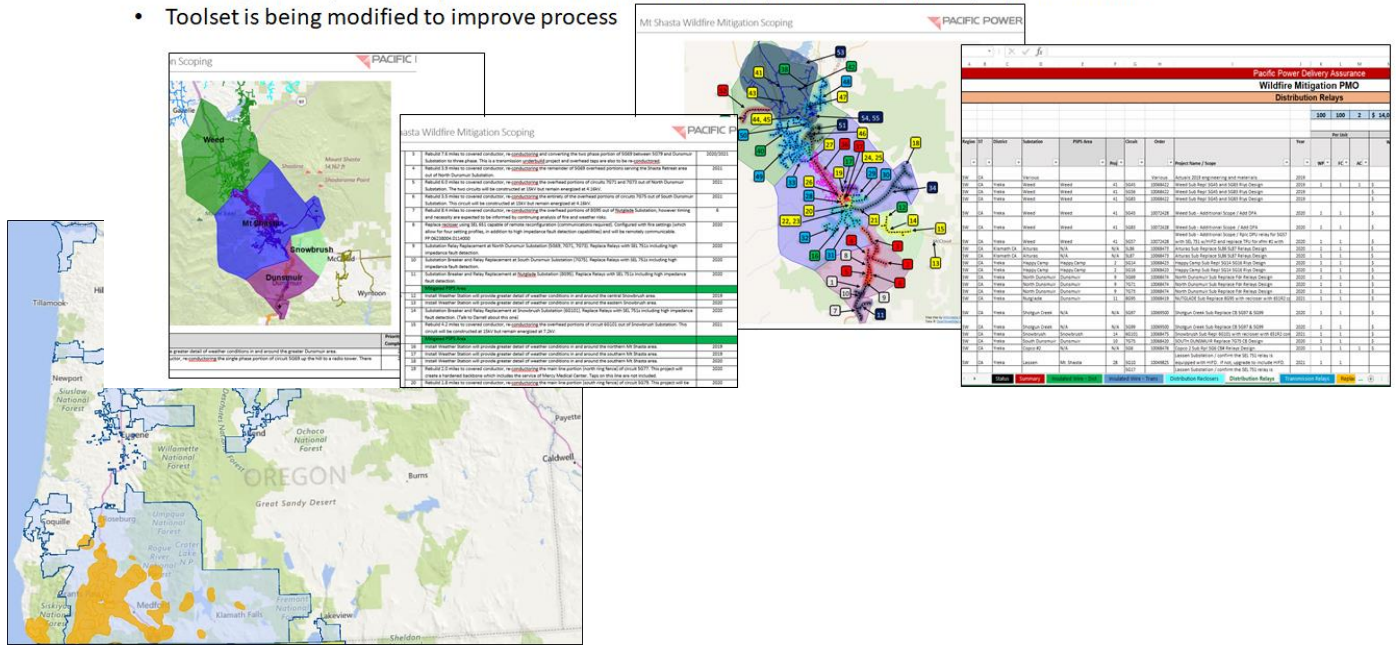


Reliability & Risk Planning

- Improved Resiliency
- Recent systemic/advanced planning examples
  - Distribution automation
  - Fire risk modeling
  - Fire threat device settings
  - Hardening technologies
- Near term additions
  - Centralized support for studies performed using advanced tools

Grid Hardening Project Data

- Mitigation Plans have been developed for all areas identified to be at risk for PSPS
- Priorities were established based upon historic PSPS risk duration, combined with impacts to customers and communities, with special consideration to priority (or critical) customers
- Efforts are underway and the data management process is being developed to align with reporting requirements (while recognizing the impacts of reporting cycles on long-term projects)
- Utilizing centrally-housed spreadsheet correlated to geographically-displayable project references
- Toolset is being modified to improve process



Baseline Data



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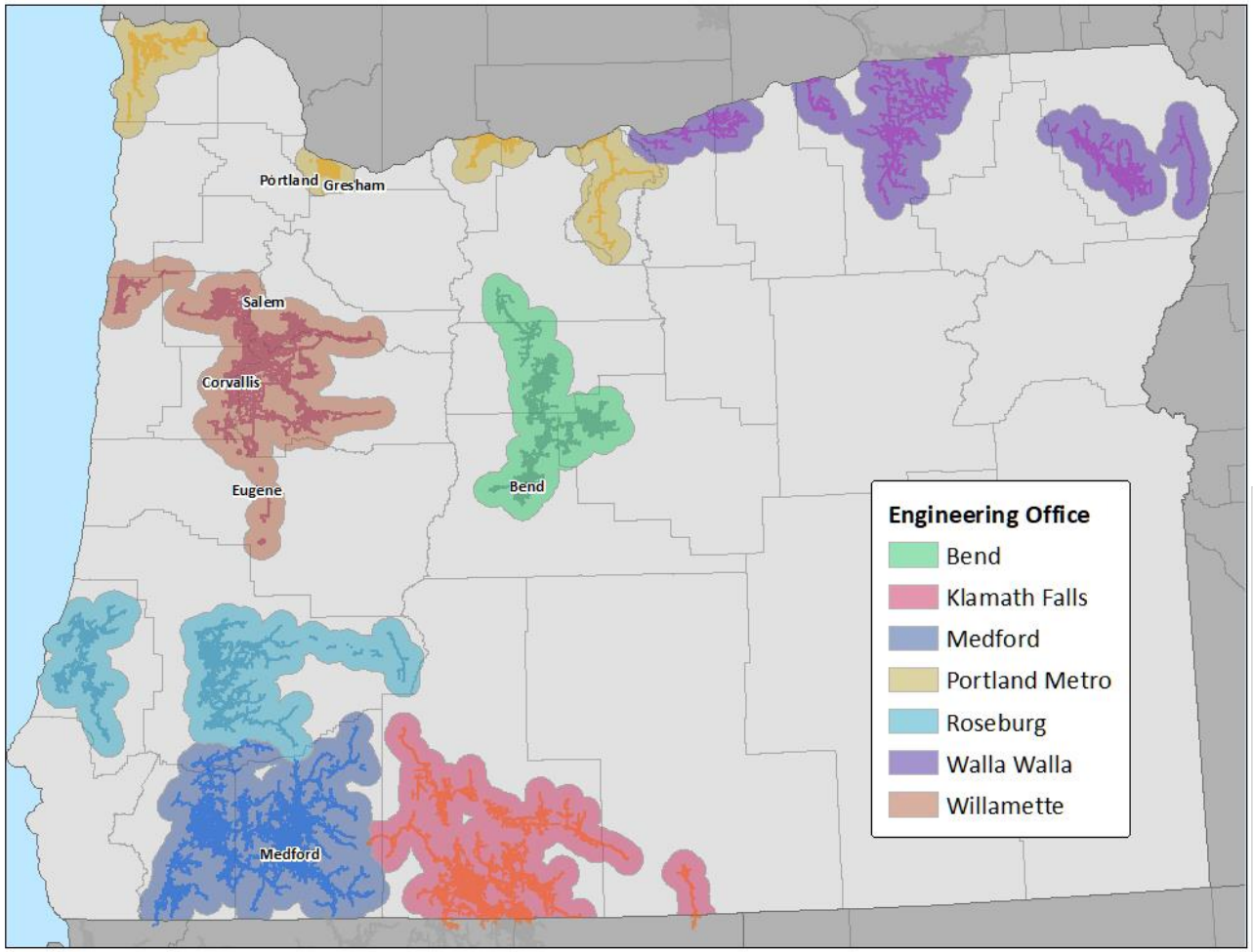
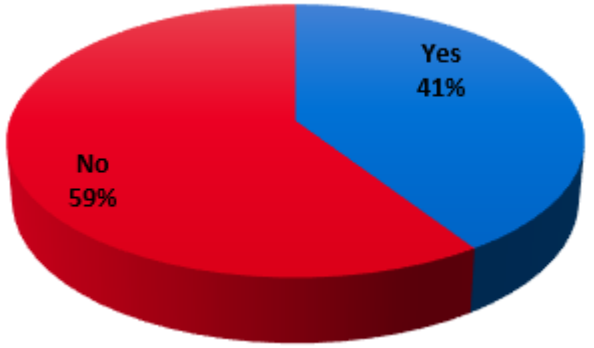
Distribution Engineering Planning Tools

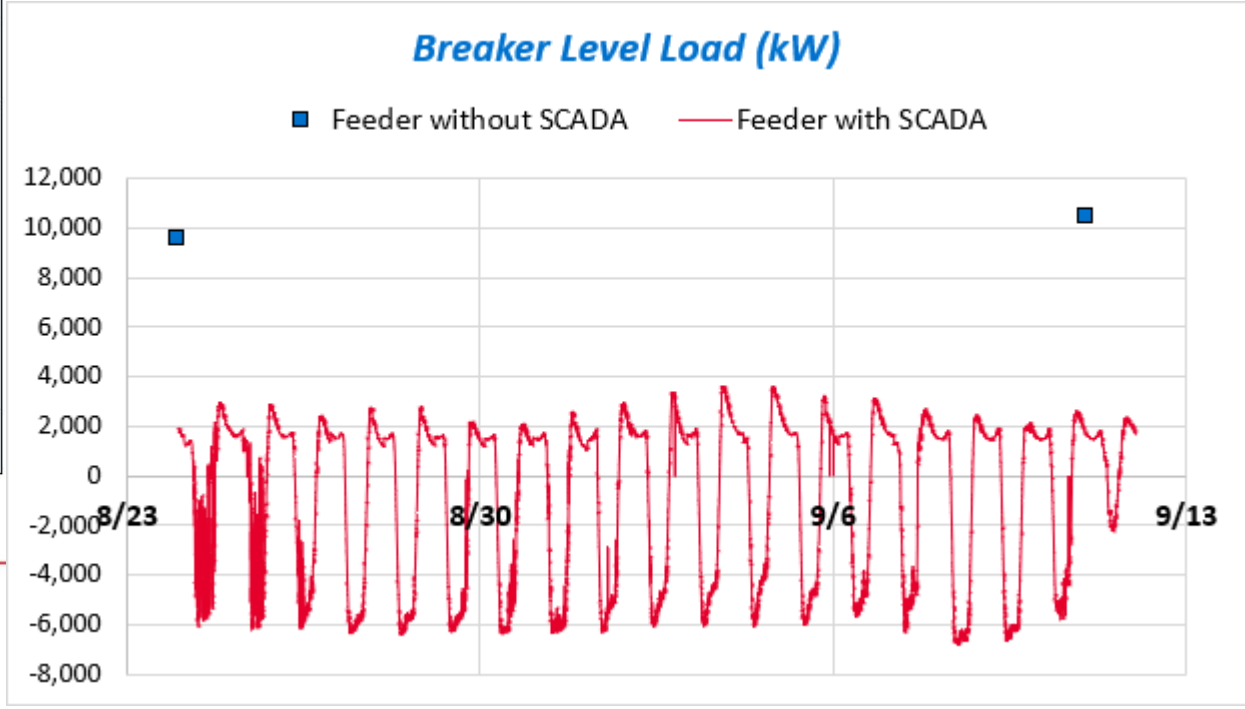
- Distribution planning tools
  - PI Historian reposes historical load, temperature and “large gen” data
  - New accounts and generators automatically enter planning applications (some delay)
  - CYME used to evaluate different scenarios (expected loads, generation output, batteries, seasons)
- The following baseline data is preliminary

Oregon Planning Baseline



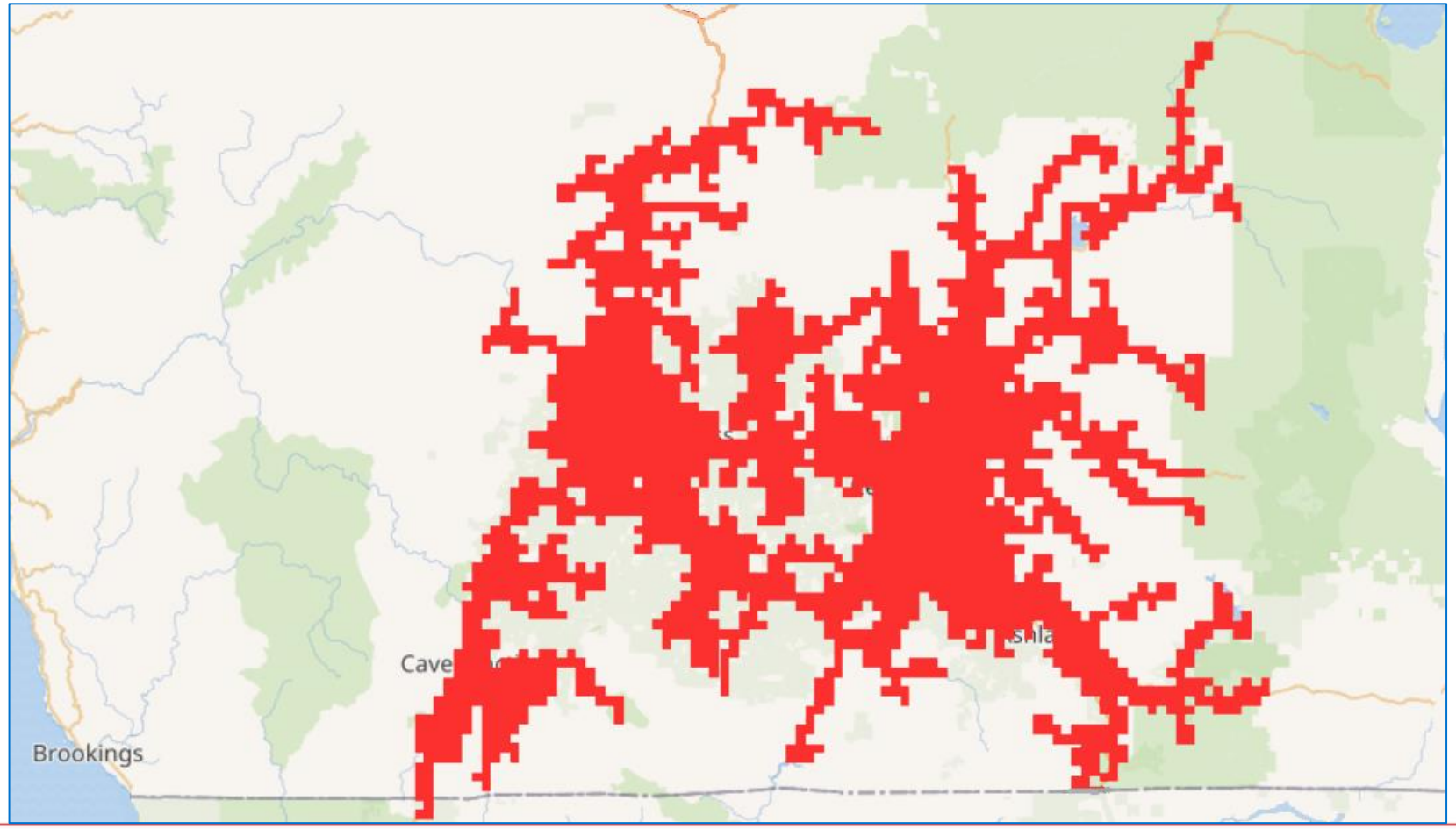
PAC Oregon circuits with SCADA



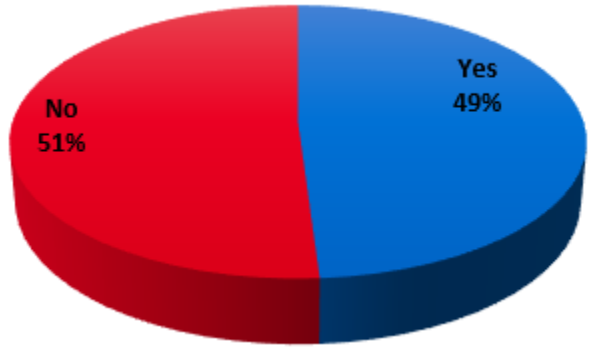


T&D Asset Performance Baseline Data

Roughly 70 miles square

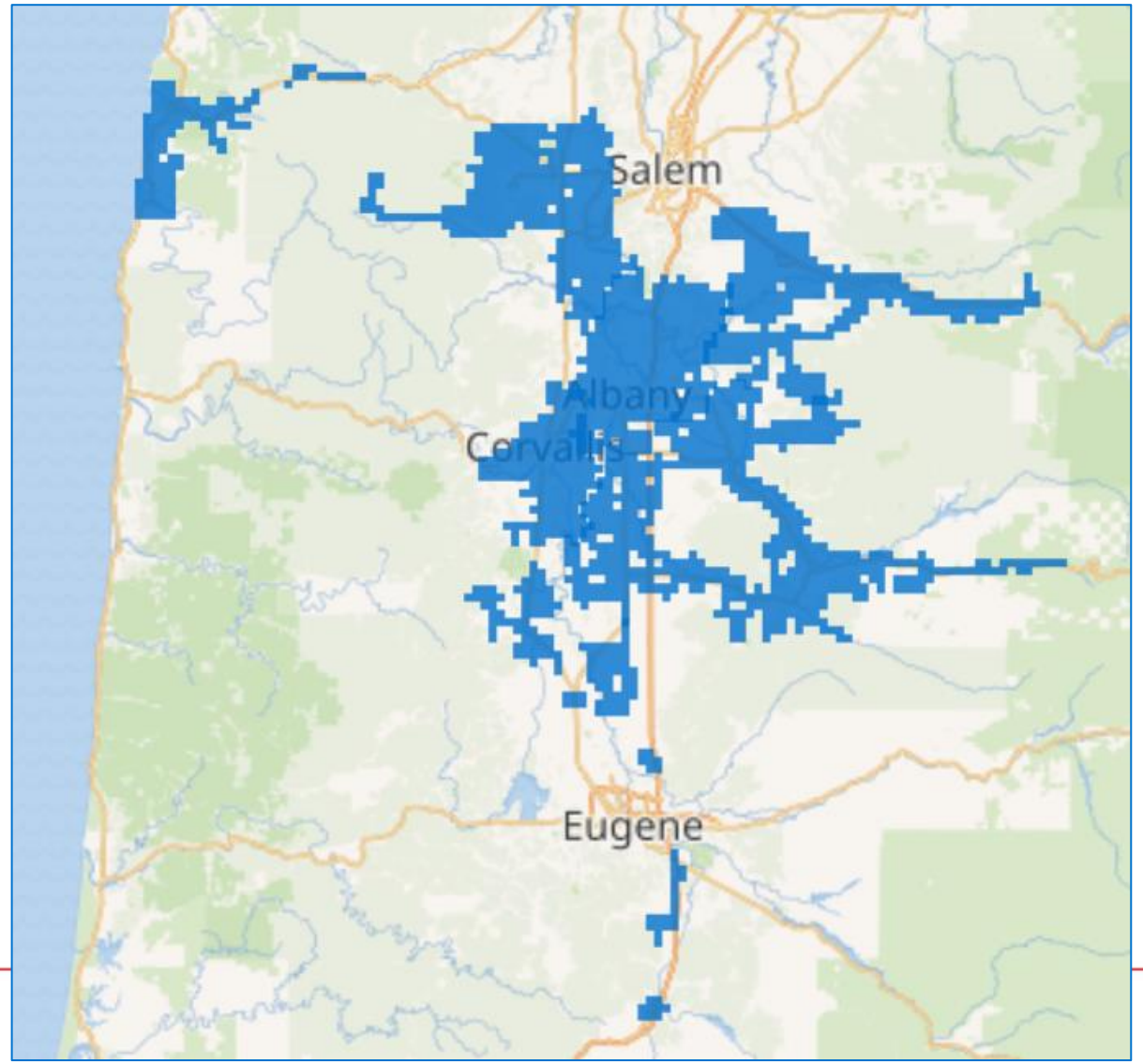


Medford (27 cust/line mile)
PAC Trans Subs: 16
Cust Trans Subs: 1
PAC Distr Subs: 44 (22%)
Cust Meters: 142,380 (23%)
Svc Transformers: 49,365 (29%)
Distr Line Miles: 5,315 (28%)
2 Distr Engineers
49% of circuits have SCADA

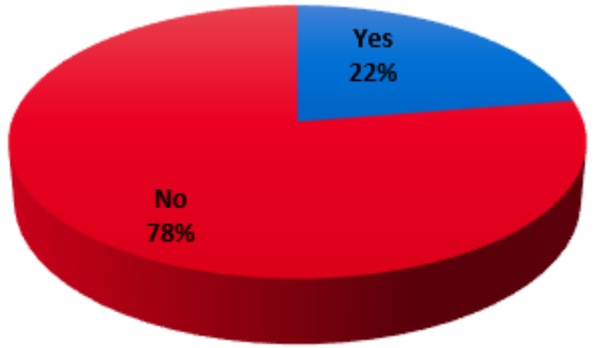


T&D Asset Performance Baseline Data

Roughly 90 miles north to south



Willamette (37 cust/line mile)
PAC Trans Subs: 16
Cust Trans Subs: 1
PAC Distr Subs: 38 (19%)
Cust Meters: 138,413 (22%)
Svc Transformers: 34,842 (20%)
Distr Line Miles: 3,700 (19%)
2 Distr Engineers



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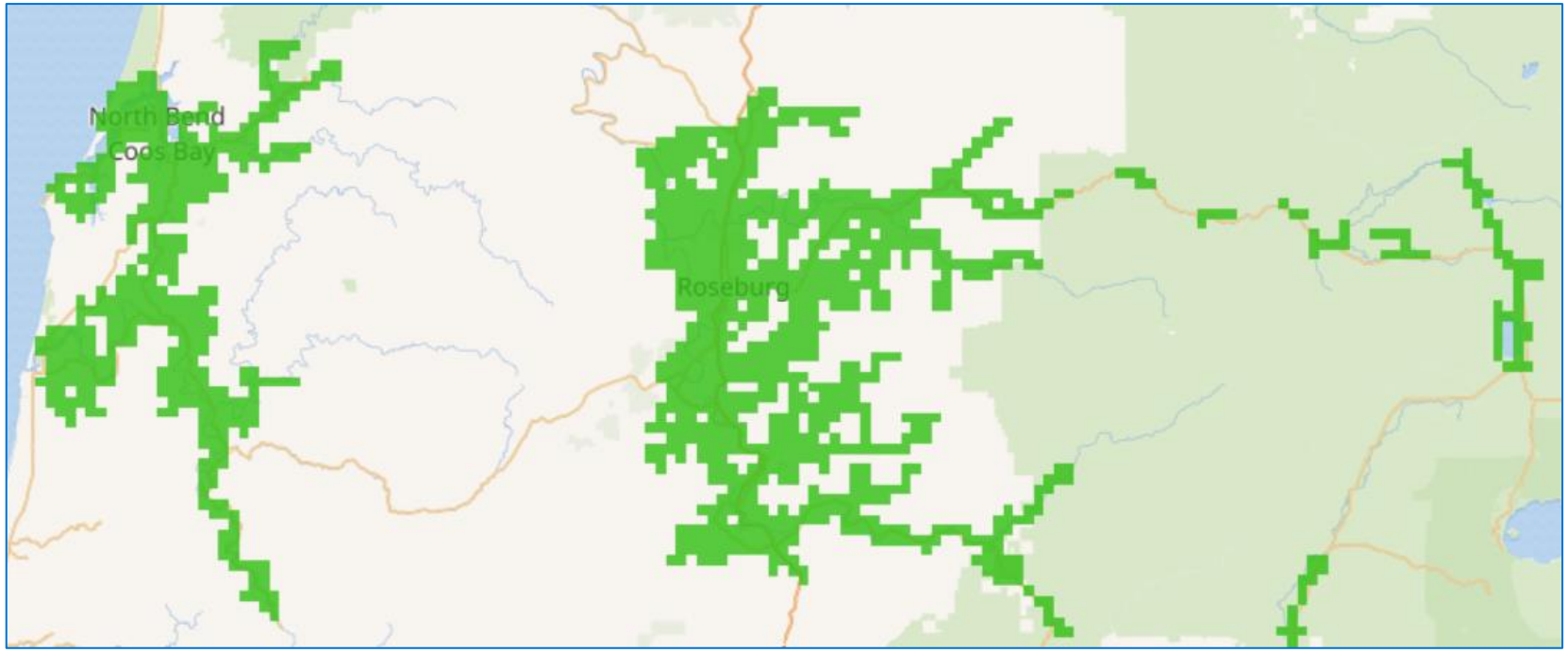
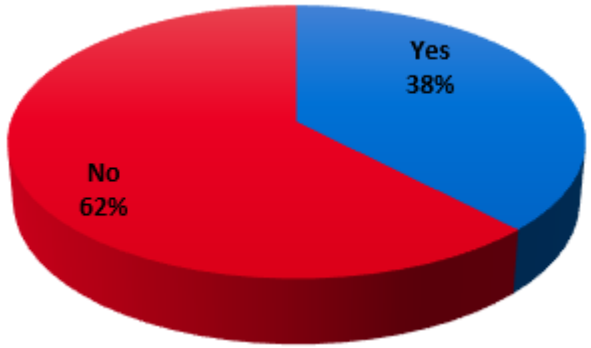


Roughly 120 miles wide

Roseburg (30 cust/line mile)
PAC Trans Subs: 19
Cust Trans Subs: 3
PAC Distr Subs: 33 (16%)
Cust Meters: 69,553 (11%)
Svc Transformers: 22,171 (13%)
Distr Line Miles: 2,336 (12%)
1 Distr Engineer



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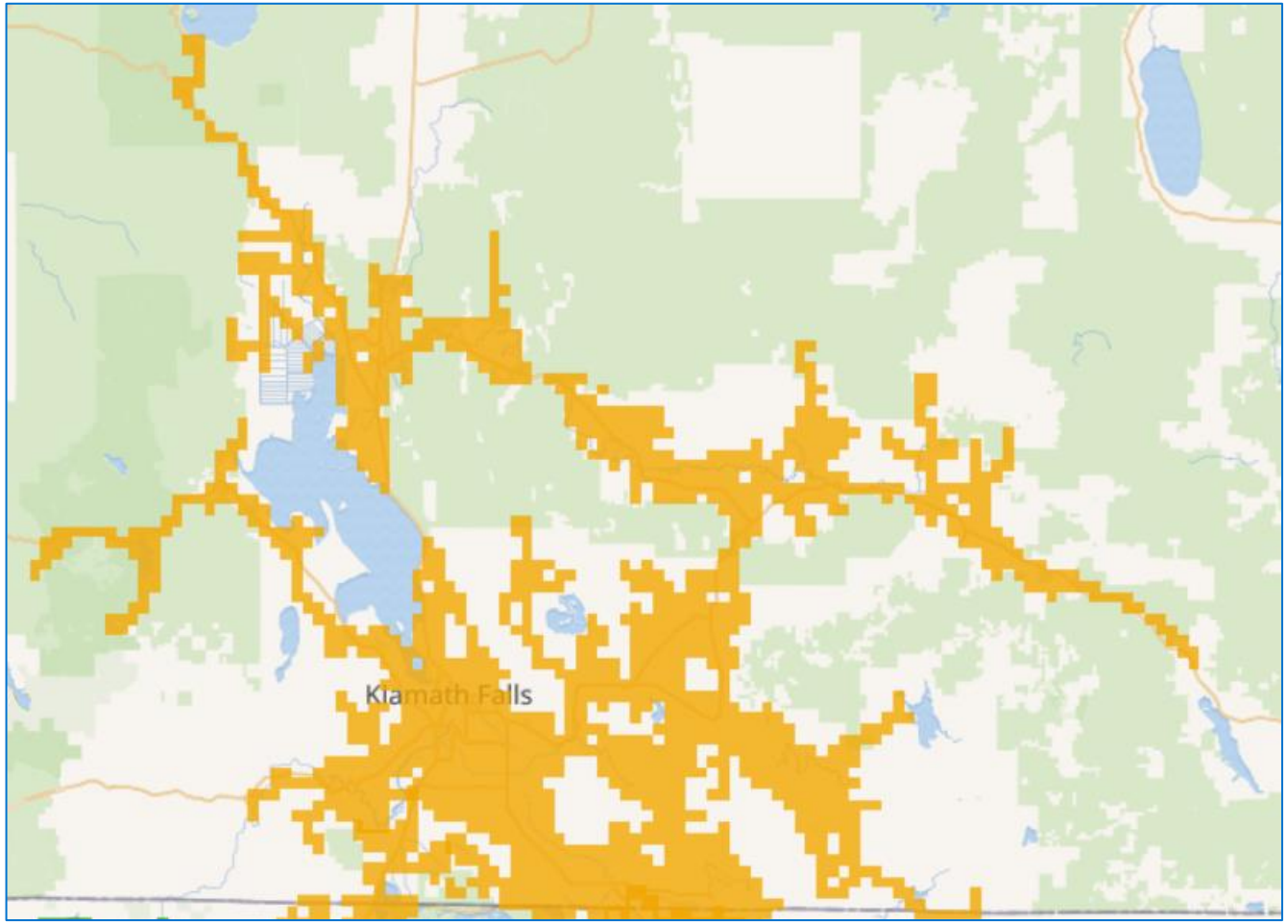
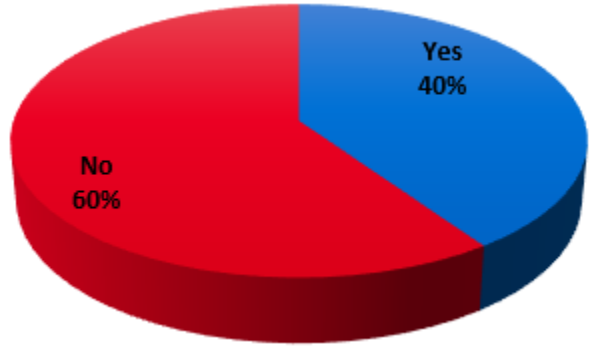


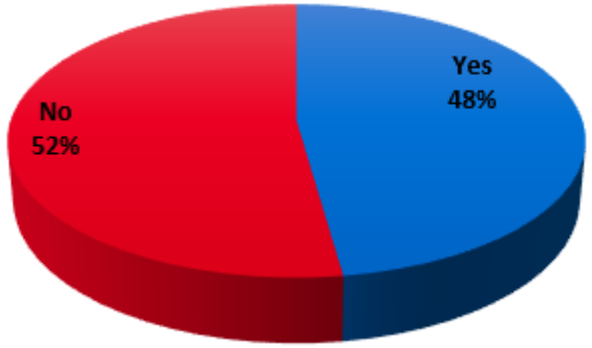
Roughly 90 miles wide

Klamath Falls (17 cust/line mile)
PAC Trans Subs: 12
Cust Trans Subs: 0
PAC Distr Subs: 24 (12%)
Cust Meters: 40,493 (6%)
Svc Transformers: 14,603 (9%)
Distr Line Miles: 2,345 (12%)
2 Distr Engineers

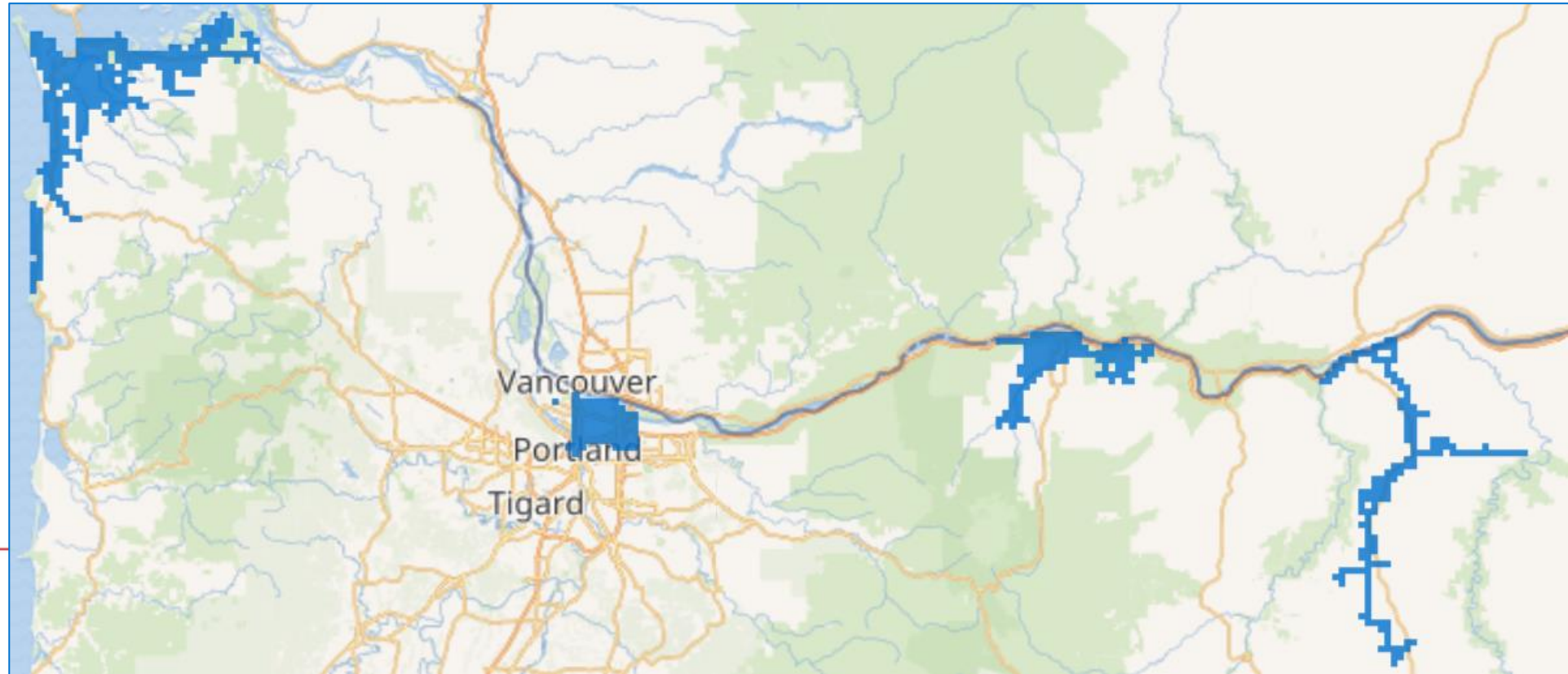


T&D Asset Performance Baseline Data

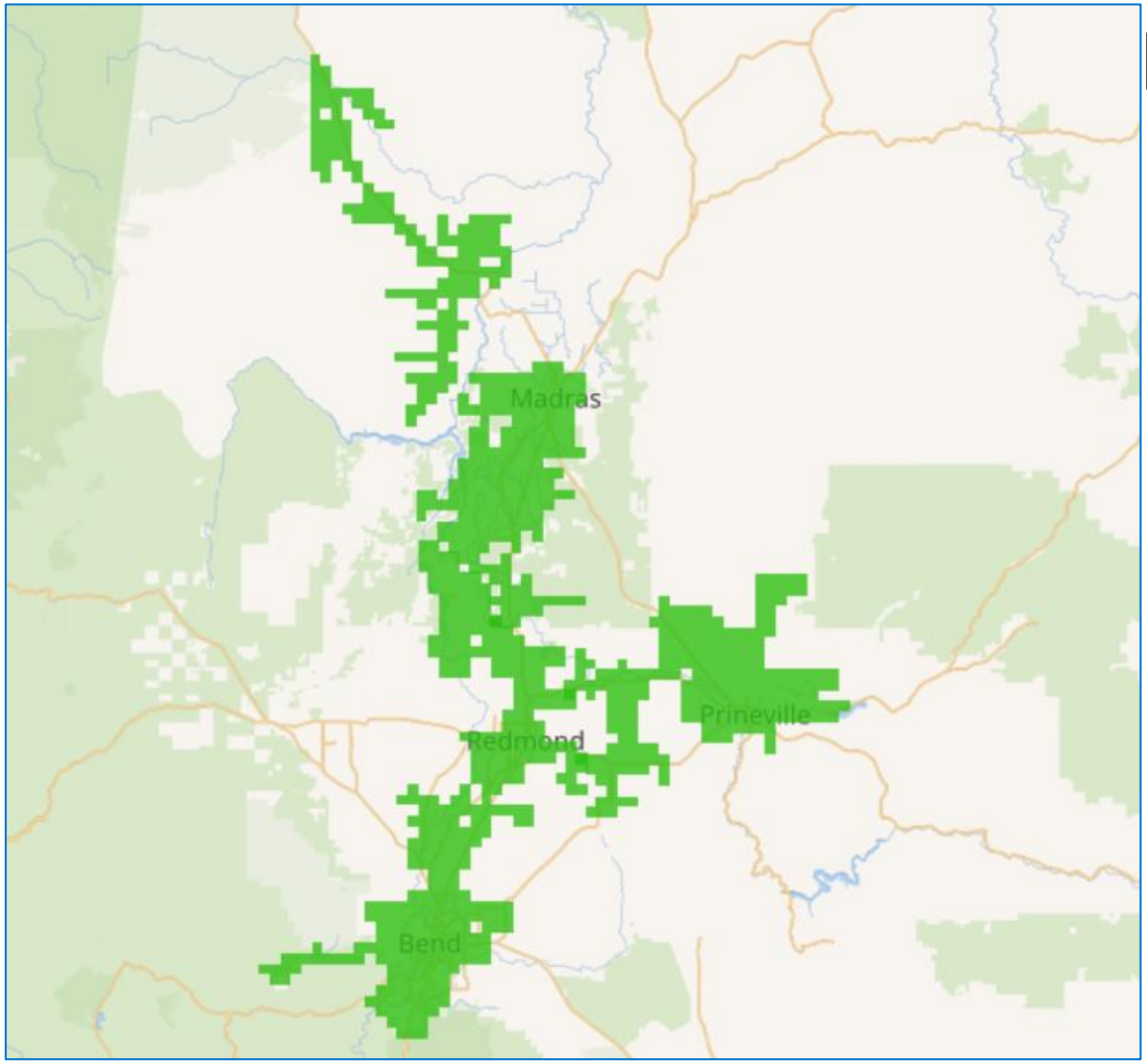
Portland (75 cust/line mile)
PAC Trans Subs: 7
Cust Trans Subs: 2
PAC Distr Subs: 25 (12%)
Cust Meters: 121,493 (19%)
Svc Transformers: 18,035 (11%)
Distr Line Miles: 1,613 (8%)
2 Distr Engineers



Roughly 130 miles wide

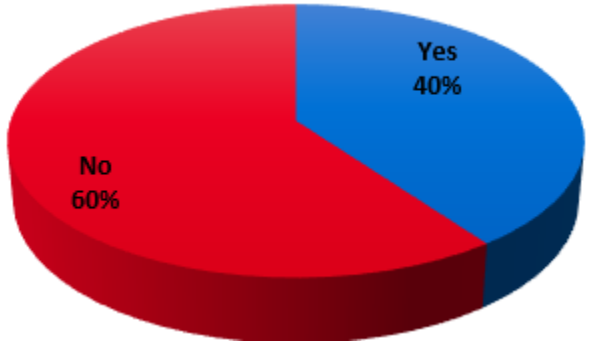


T&D Asset Performance Baseline Data



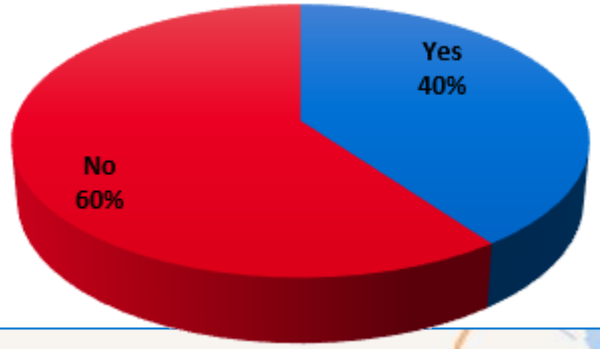
Roughly 70 miles north to south

Central Oregon (37 cust/line mile)
PAC Trans Subs: 11
Cust Trans Subs: 2
PAC Distr Subs: 18 (9%)
Cust Meters: 87,627 (14%)
Svc Transformers: 22,489 (13%)
Distr Line Miles: 2,374 (12%)
1 Distr Engineer

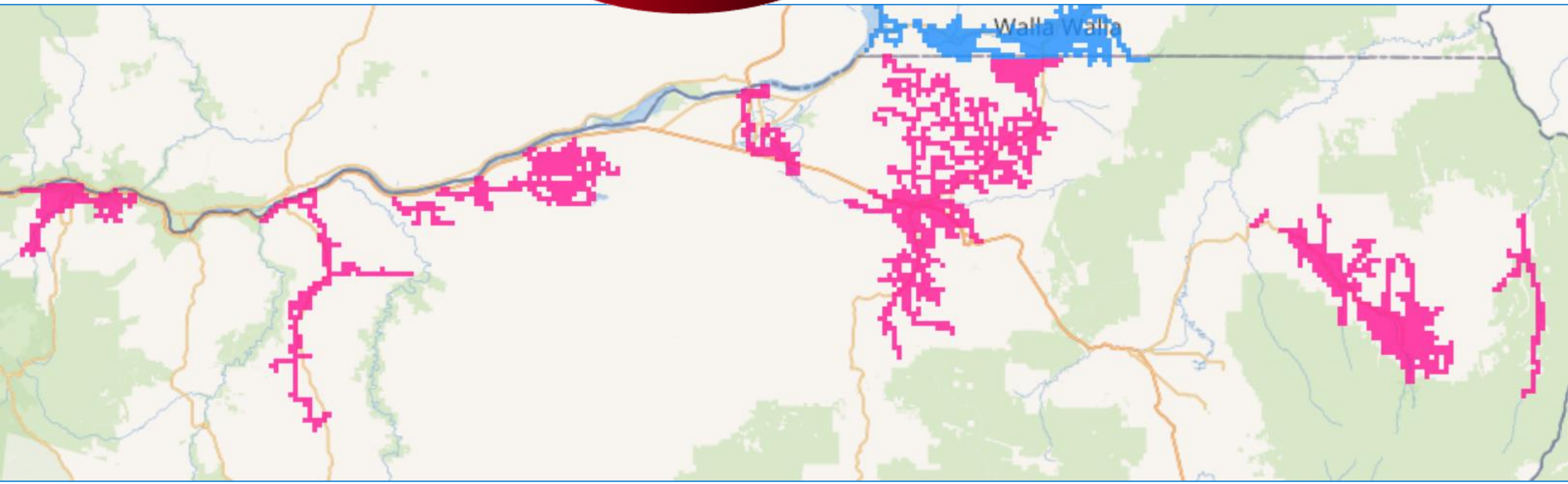


T&D Asset Performance Baseline Data

Walla Walla (16 cust/line mile)
PAC Trans Subs: 6
Cust Trans Subs: 0
PAC Distr Subs: 20 (10%)
Cust Meters: 23,833 (4%)
Svc Transformers: 8,392 (5%)
Distr Line Miles: 1,510 (8%)
1 Distr Engineer



Roughly 180 miles wide



Closing



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Next Steps

- Schedule
  - Pacific Power Public Workshop #2: Tuesday, June 29, 2021, from 10 am to 12 pm
    - Intended topics: Technology and its advancement…where PacifiCorp is (AMI, load planning, distribution automation, pilot projects, specific equipment)
  - Pacific Power Public Workshop #3: Friday, July 30, 2021, from 1 pm to 3 pm
    - Intended topics: Integration of system planning: IRP, wires (both T&D) and customer usage changes
  - Pacific Power Public Workshop #4: Tuesday, August 24, 2021, from 10 am to 12 pm
    - Intended topics: : Integration of stakeholder feedback into legacy planning processes and the roadmap toward PacifiCorp's DSP vision
  - Distribution System Plan (Part 1) to be filed on October 15, 2021

Meeting dates and times subject to change

Additional Information

- DSP Email / Distribution List Contact Information
  - DSP@pacificorp.com

- DSP Presentations
  - Pacific Power Oregon DSP Website

- Additional Resources
  - 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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