Northwest Energy Systems Symposium 2022
PacifiCorp's Distribution System Plans Tools & Advancing the Future

Heide Caswell-PacifiCorp: Director Asset Performance/Wildfire Mitigation

April 6, 2022






PACIFIC POWER
POWERING YOUR GREATNESS

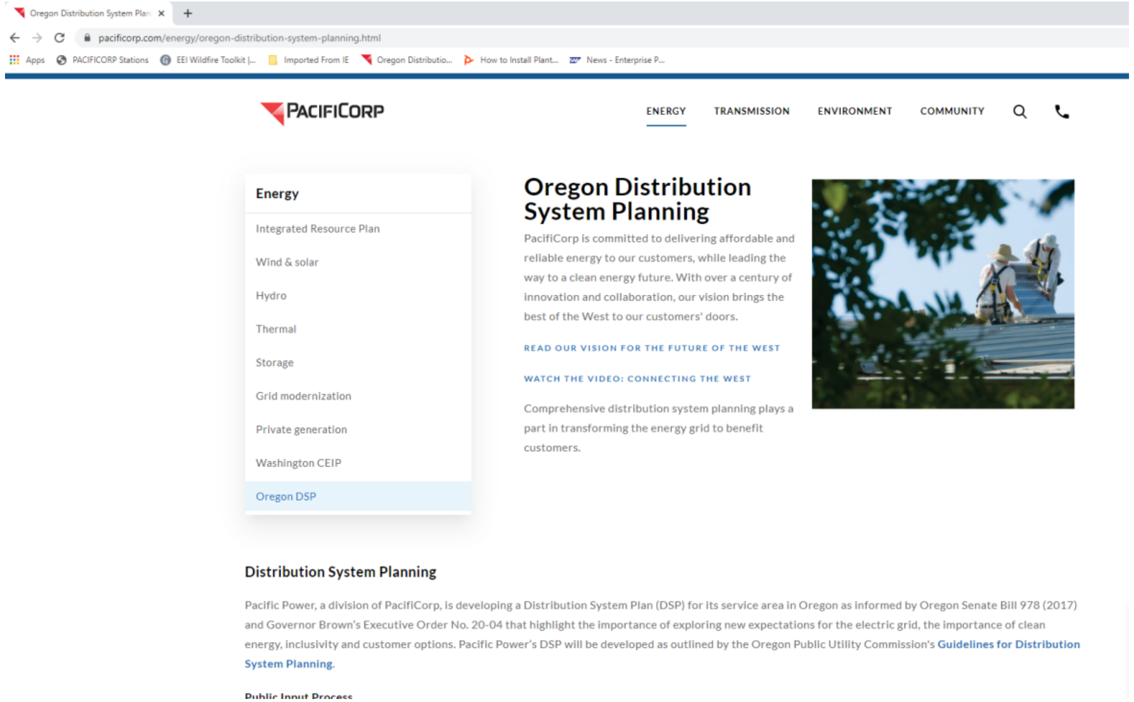
Oregon DSP: How did we get here?

- ✓ Regulators felt there was less "transparency" into the decision making process than ideal
- ✓ Oregon required various "smart technologies" to be evaluated by IOUs
- ✓ Intervenors felt unclear and perhaps excluded from the company's evolution process
- ✓ Focus on community benefits could be part of a more open decision making process
- ✓ Stakeholders and parties for whom costs would result might be able to help prepare a more valuable "portfolio" of investments, similarly conceived as how the IRP functions
- ✓ Order UM2005 initiated to explore
- ✓ Workshops conducted evaluating a wide range of considerations including current investment approaches, non-wires alternatives and their consideration, anticipated technology adoption, solutions implemented in other states, industry think talk visions
- ✓ Order initiated in December 2020 which required:
  - ✓ Part 1 filing on October 15, 2021
  - ✓ Part 2 filing on August 15, 2022
  - ✓ Requires developing long-term plan
- ✓ Plan 2 preparation is underway

Oregon DSP: Key requirements

- ✓ Part 1: October 15, 2021
  - ✓ Baseline data & system assessment
  - ✓ Hosting capacity options analysis
  - ✓ Community engagement plan
  - ✓ Long-term plan
  - ✓ Development plan for Part 2
- ✓ Part 2: August 15, 2022
  - ✓ Forecasting for base load growth in addition to customer side adoptions (DERs, transportation electrification, etc)
  - ✓ Grid needs identification
  - ✓ Solution identification, including evaluation of 2 non-wires alternatives in traditionally underrepresented areas
  - ✓ Near term action plan
  - ✓ Any needed changes to long-term plan

PacifiCorp's Oregon DSP Resources


Oregon Distribution System Plan

pacificorp.com/energy/oregon-distribution-system-planning.html

Apps PACIFICORP Stations EEI Wildfire Toolkit |... Imported From IE Oregon Distributio... How to Install Plant... News - Enterprise P...

PACIFICORP

ENERGY TRANSMISSION ENVIRONMENT COMMUNITY

Energy

- Integrated Resource Plan
- Wind & solar
- Hydro
- Thermal
- Storage
- Grid modernization
- Private generation
- Washington CEIP
- Oregon DSP

Oregon Distribution System Planning

PacifiCorp is committed to delivering affordable and reliable energy to our customers, while leading the way to a clean energy future. With over a century of innovation and collaboration, our vision brings the best of the West to our customers' doors.

READ OUR VISION FOR THE FUTURE OF THE WEST

WATCH THE VIDEO: CONNECTING THE WEST

Comprehensive distribution system planning plays a part in transforming the energy grid to benefit customers.

Distribution System Planning

Pacific Power, a division of PacifiCorp, is developing a Distribution System Plan (DSP) for its service area in Oregon as informed by Oregon Senate Bill 978 (2017) and Governor Brown's Executive Order No. 20-04 that highlight the importance of exploring new expectations for the electric grid, the importance of exploring new expectations for the electric grid, the importance of inclusivity and customer options. Pacific Power's DSP will be developed as outlined by the Oregon Public Utility Commission's Guidelines for Distribution System Planning.

Public Input Process


Public Workshops

Public Workshop #1	May 2021
Public Workshop #2 – Part 1	June 2021
Public Workshop #2 – Part 2	July 2021
Public Workshop #4 – Community Engagement Questions	August 2021
Public Workshop #5 (formerly #3)	September 2021
Public Workshop #6	October 2021
Public Workshop #7	January 2022

Planning principles

- Transparent and comprehensive data sets for customers, communities and stakeholders to evaluate and set priorities as we move to a clean, equitable energy future
- Robust community engagement
- Technology adoption
- Grid resilience

Distribution System Planning Report

Pacific Power submitted its Oregon Distribution System Plan Report – Part 1 with the OPUC on October 15, 2021.

DOWNLOAD THE REPORT

Map viewer

This is a high level map showing certain information within our system including distributed generation, energy equity and incentive information, and reliability. This map will evolve over time.

SEE THE MAP

Resources

- Oregon Public Utility Commission: DSP Guidelines
- Oregon Smart Grid Report
- Oregon Transportation Electrification Plan
- PacifiCorp's Integrated Resource Plan

Submit feedback or connect with us

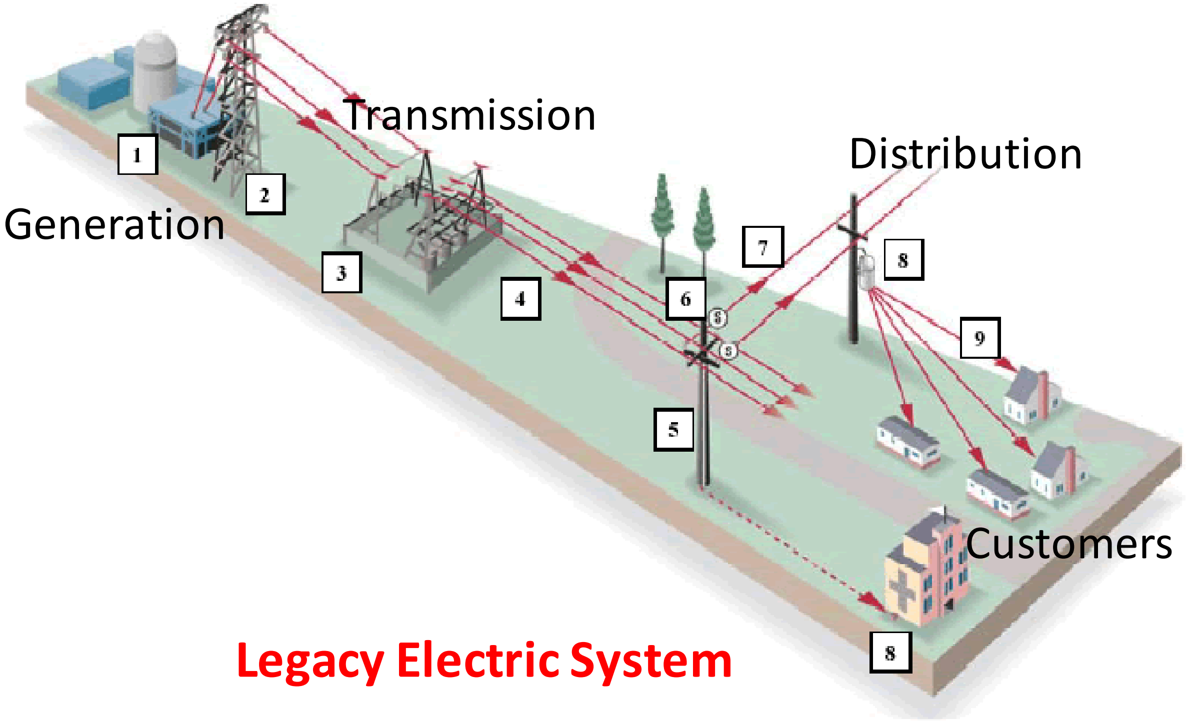
To join the distribution list and participate in this process, or for questions regarding the information provided, please email us at DSP@PacifiCorp.com.

Stakeholder Feedback Form

DSP Pilot Project Suggestion Form

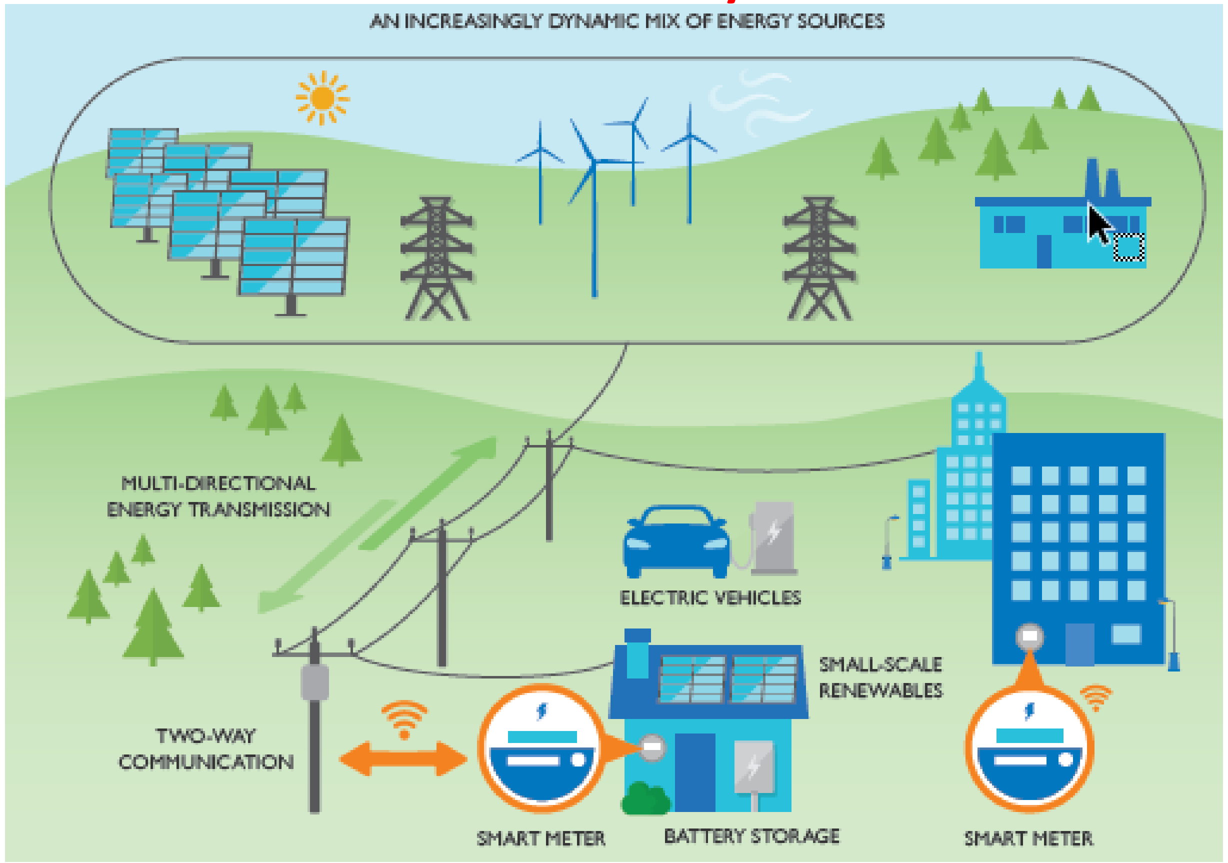
Submit completed feedback forms to DSP@PacifiCorp.com

Our Vision: Electric Utility...current & future

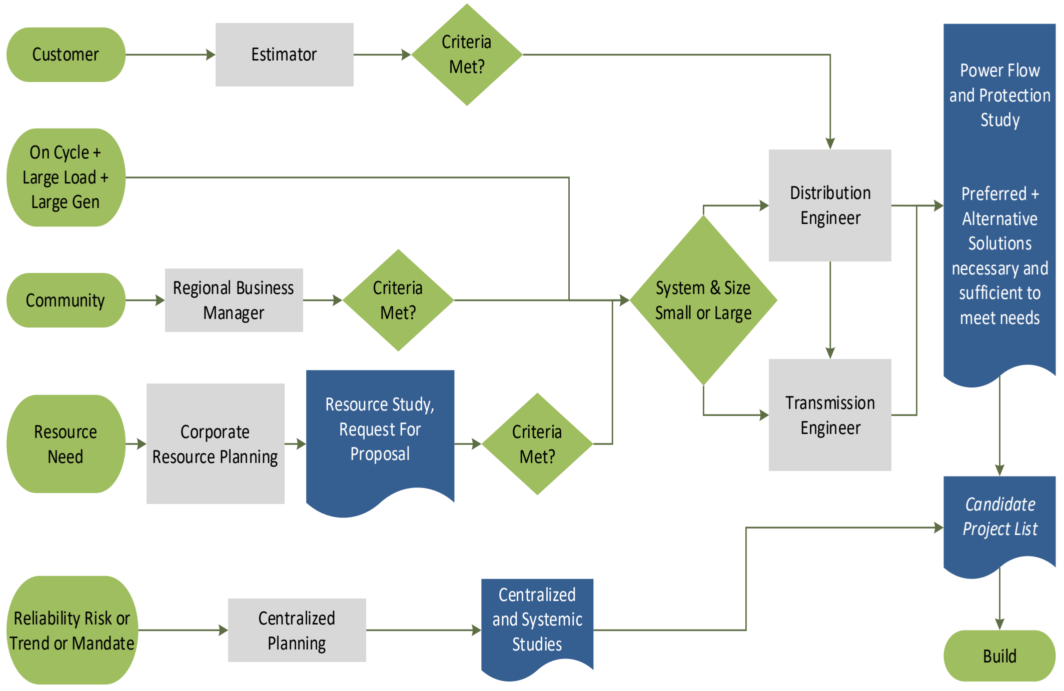


Legacy Electric System

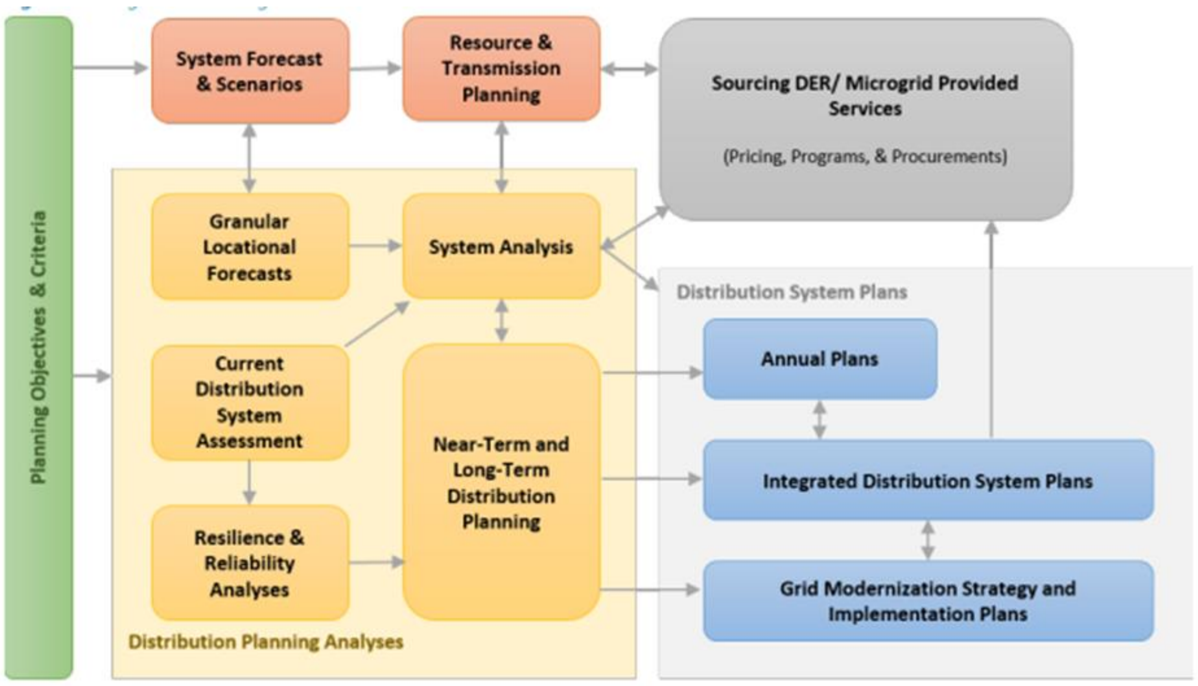
Future Electric System



Electric System Planning: Current & Future

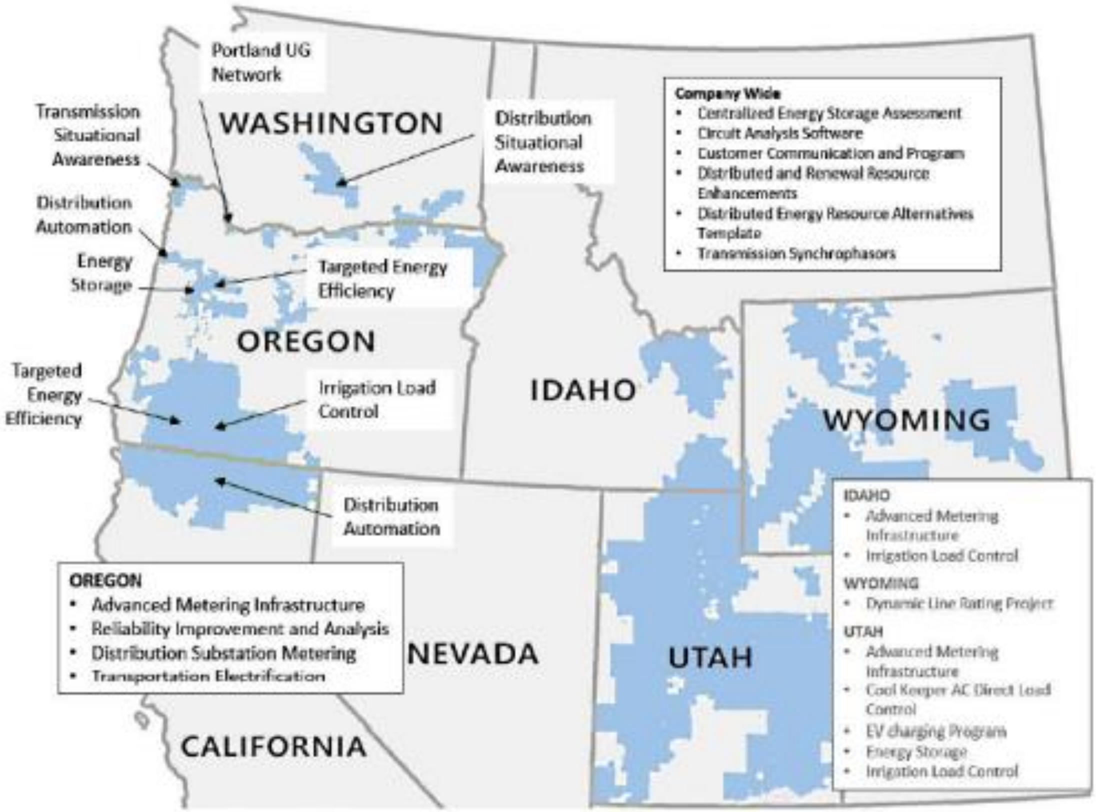


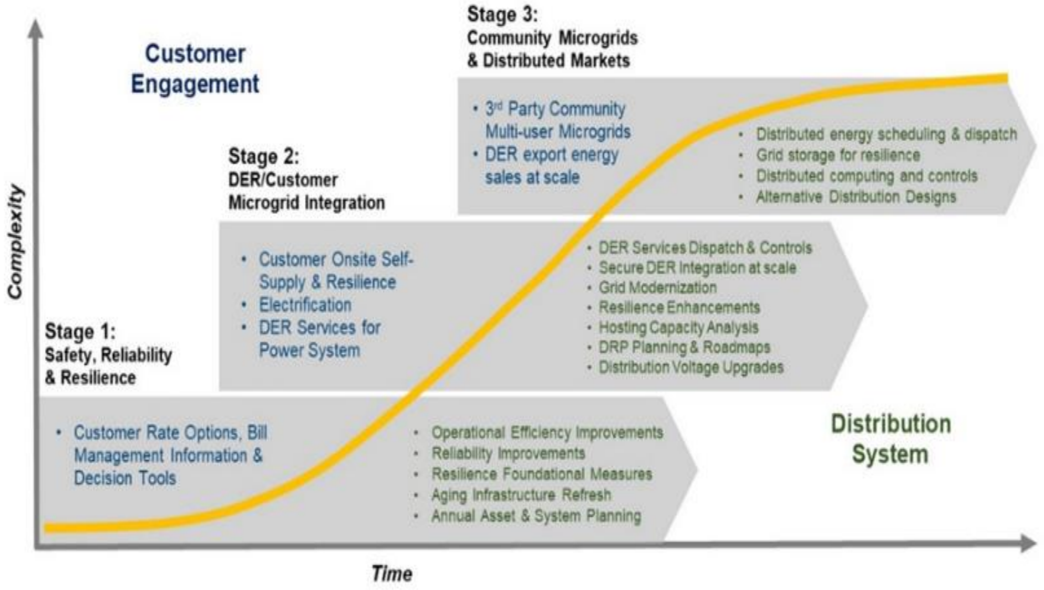
Legacy Planning Cycle



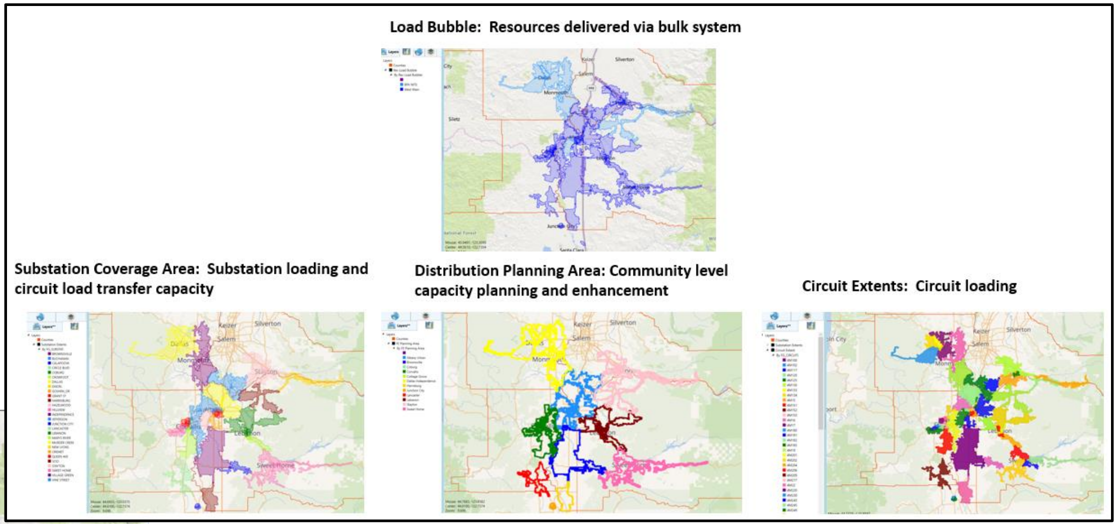
Future Planning Cycle

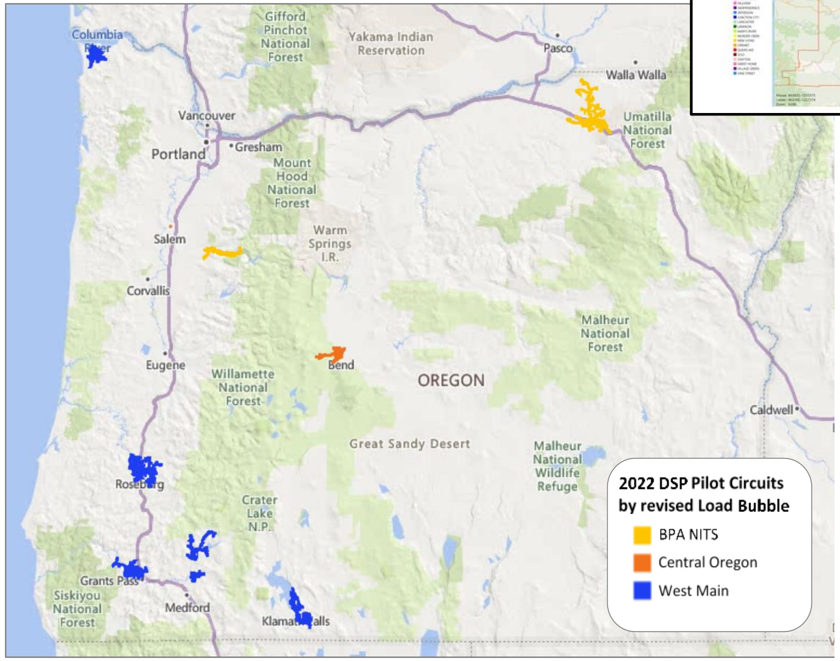
Content from our SmartGrid report and how it ties to future vision for community engagement options





2022 Transitional Plan integrating DSP with IRP

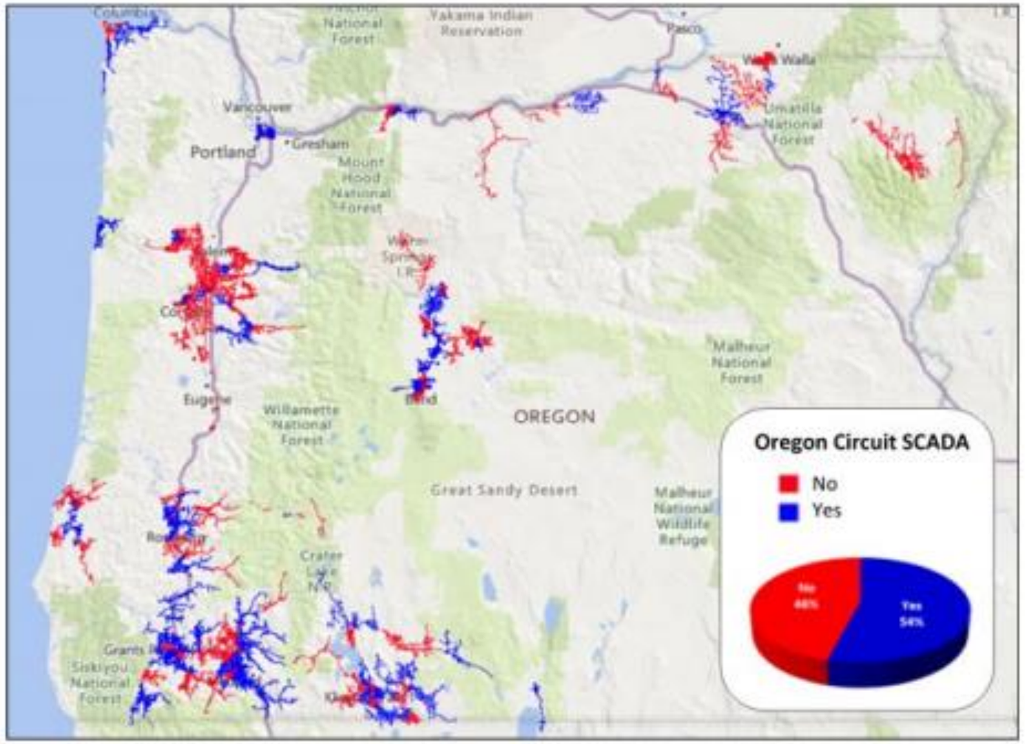




2022 Distribution System Planning Pilot Circuits									
Revised Load Bubble	**BPA NITS**		**Central Oregon**	**West Main**					
Revised Sub Load Bubble	Pendleton	Santiam	Bend	Clatsop Astoria	Southern Oregon/California				
DSP Planning Area	Pendleton	Stayton	Bend	Astoria	Klamath Urban	Merlin	Roseburg Urban	Upper Rogue
Circuits	5W202 5W203 5W401 5W402 5W403 7W451 7W452 7W453 7W454	4M120 4M70	5D10 5D12 5D155 5D196 5D238 5D241 5D243 5D411 5D413 5D418	5A204 5A211	5L112 5L113 5L45 5L46 5L48 5L49 5L54	5R232 5R234 5R248 5R251	4U10 4U22 4U30 4U31 4U38 4U39 4U5 4U81 5U15 5U17 5U19	4R13 4R17 4R9

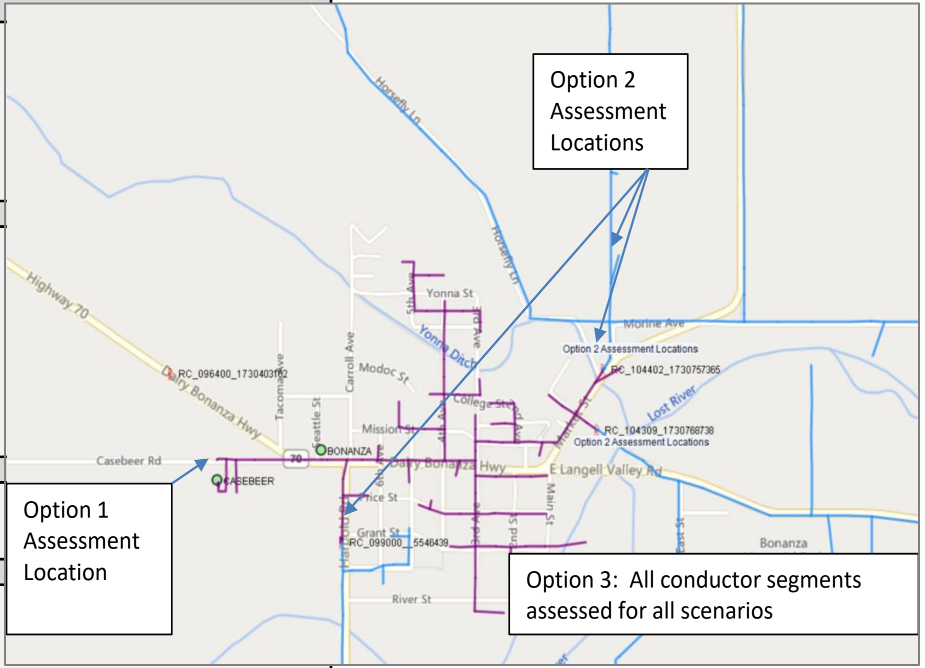
Short Term Plan & Areas of Lack of Digital Information for Circuits

Tasks	Start	Finish
File DSP Part 1		10/15/21
Stakeholder Outreach	4/2021	8/2022
Engage customers and stakeholders for feedback to DSP	4/2021	8/2022
Initiate DSP community engagement survey	1/2022	2/2022
Evaluate feedback from survey and revise communication plan as needed	3/2022	3/2022
Develop content to train internal audiences on DSP	10/2021	1/2022
Evaluate options for multi-language production of content	12/2021	1/2022
Establish method for multi-language and language-impaired DSP communications	1/2022	3/2022
Modify long term relevant to progress and feedback received	4/2021	8/2022
Evaluate Energy Equity Metrics for Stakeholders, Engineers and Regulators	11/2021	9/2022
Value & Calibrate Energy Equity Metrics	11/2021	3/2022
Review energy equity metric displays	3/2022	5/2022
Develop a dashboard of energy equity metrics	5/2022	8/2022
Capacity Planning Transition Process	10/2021	8/2022
Refine planning transition schedule	10/2021	3/2022
Review planning schedule with stakeholders	1/2022	3/2022
Modify planning schedule as necessary	1/2022	8/2022
Resource Planning Transition Process	1/2022	8/2022
Receive DSM and DG forecasts for 2023 IRP	1/2022	3/2022
Integrate DSM and DG forecasts into legacy planning areas	3/2022	3/2022
Integrate DSM and DG forecasts into transitional planning areas	3/2022	8/2022
Aggregate forecasts into load forecast load bubbles	3/2022	6/1/22
Refine implementation plan for transitional planning process	6/2022	8/2022
Pilot Projects	11/2021	8/2022
Evaluate existing area plans for GNAs for pilot	11/2021	3/2022
Evaluate transitional area plans for GNAs for pilot	1/2022	3/2022
Identify range of pilot options (Non-wires Alternatives)	4/2021	7/2022
Identify pilot locations & project types	4/2022	7/2022
Determine Pilot selection metrics	4/2022	7/2022
Conduct Public Participation to assess Pilot alternatives	4/2022	7/2022
Pilot selections	3/2022	8/2022
File DSP Part 2 Plan		8/15/22



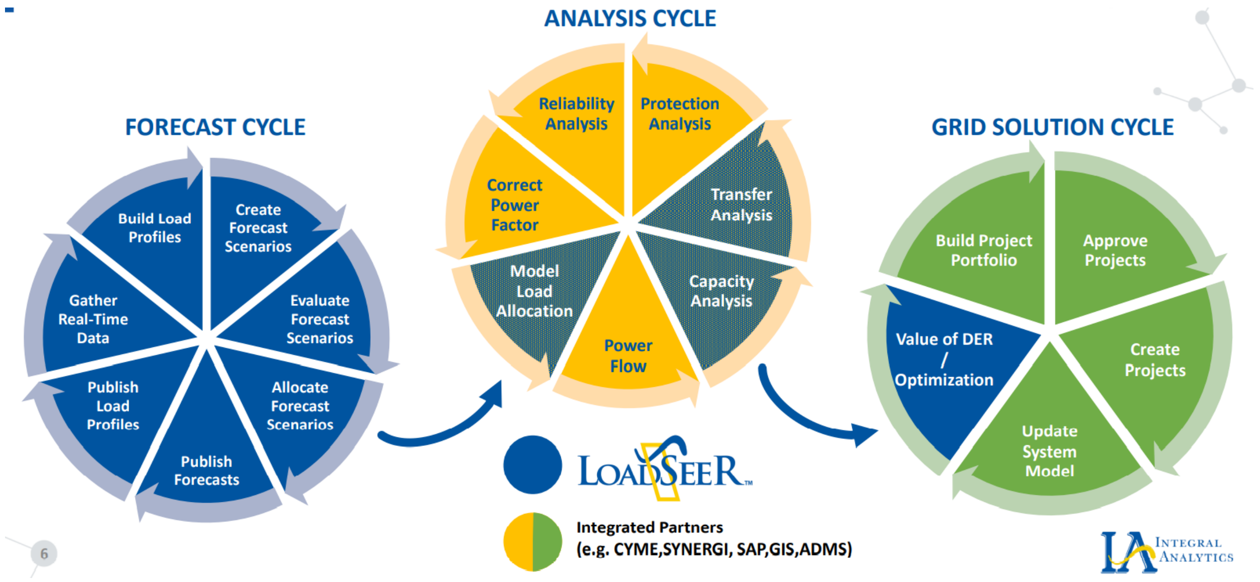
HCA Options

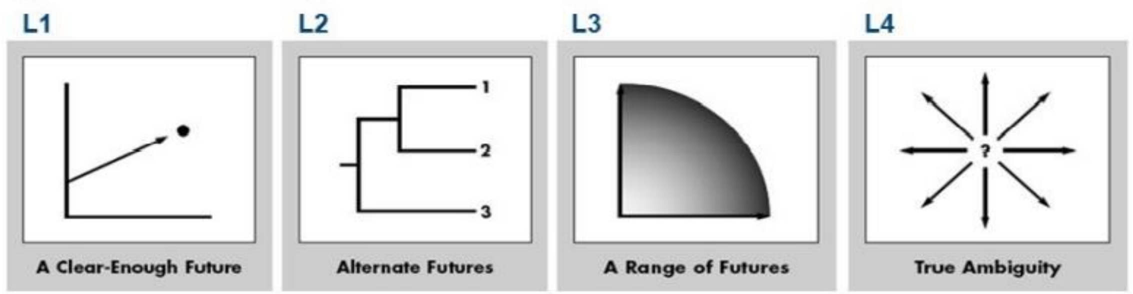
HCA Assessment			
Option	**Option 1**	**Option 2**	**Option 3**
Methodology	**Stochastic/EPRI Drive**	**Stochastic/EPRI Drive**	**Iterative**
Geographic Granularity	Circuit (substation breaker)	Feeder (momentary ZOP)	Line Segment
Data Presentation	Annual Minimum Daily Load	Monthly Minimum Daily Load	Hourly Assessment
Refresh	Annual	Monthly	Monthly
Planned/Queued Generation	Details such as number. Size, description, cost of upgrades, etc.	Details such as number. Size, description, cost of upgrades, etc.	Details such as number. Size, description, cost of upgrades, etc.
Data Security	Not a concern unless circuit only serves one customer	Becomes a concern when single larger customers are discernible against available or placed capacity	Concern is exacerbated due to ability to "learn" about placed or in progress producing projects based on temporal analysis
Result Validation	Subject matter review	Requires greater equipment and automation processes for credible reviews at feeder equipment levels	Requires greater equipment and automation processes for credible reviews at line segment levels, which requires key data points be calculated for verification and can only be performed on circuits having profile data available against time series models
Implementation Concerns	None; we did it	To maintain project confidentiality many feeder segments will require redaction and result in limited value to broad use by community stakeholders	High intensity computing requirements for limited duration applicability; work produced has a very short range or use for a high cost
Barriers	Requires development of core data to support refresh of information	Requires development of business rules to ensure proper confidentiality is retained; many line devices will have estimated results due to lack of line sensor data at momentary sectionalization level	Substantial technology, data and business rule establishment is required to support level of models being produced for external consumption and business decision processes without clear integration into the DSP transparent process
System Availability	**$ 361,920**	**$ 9,437,760**	**$ 62,714,400**
Establish Load Cases Establish Maximum Values for Equipment Identify Credible Values for Each Attribute Establish Use Cases Produce Use Case Values at Each Equipment Location Place Value in Repository and Geospatially			
Existing Inventory	**$ 90,480**	**$ 100,000**	**$ 100,000**
Summarize Placed Capacity Summarize In Progress Capacity Build integration between In Progress Projects and Issues/Alternatives System Reduce In Progress Capacity for Any Stale/Mothballed Projects Total Capacity for "Worst Case" Conditions Place Project & Capacity in Repository and Geospatially			
GIS	**$35,000**	**$ 45,000**	**$ 45,000**
Produce Map Views and Data for Current Capacity and Availability and Status Reporting			
Software Licensing & Implementation			
CYME/EPRI Drive		$ 34,500	
CYME ICA			$ 34,500
Computing Resources		$ 150,000	$ 325,000
Interface Creation		$ 325,000	$ 775,000
Report Development	$ 10,000	$ 10,000	$ 20,000
Total	**$ 497,400**	**$ 10,102,260**	**$ 64,013,900**



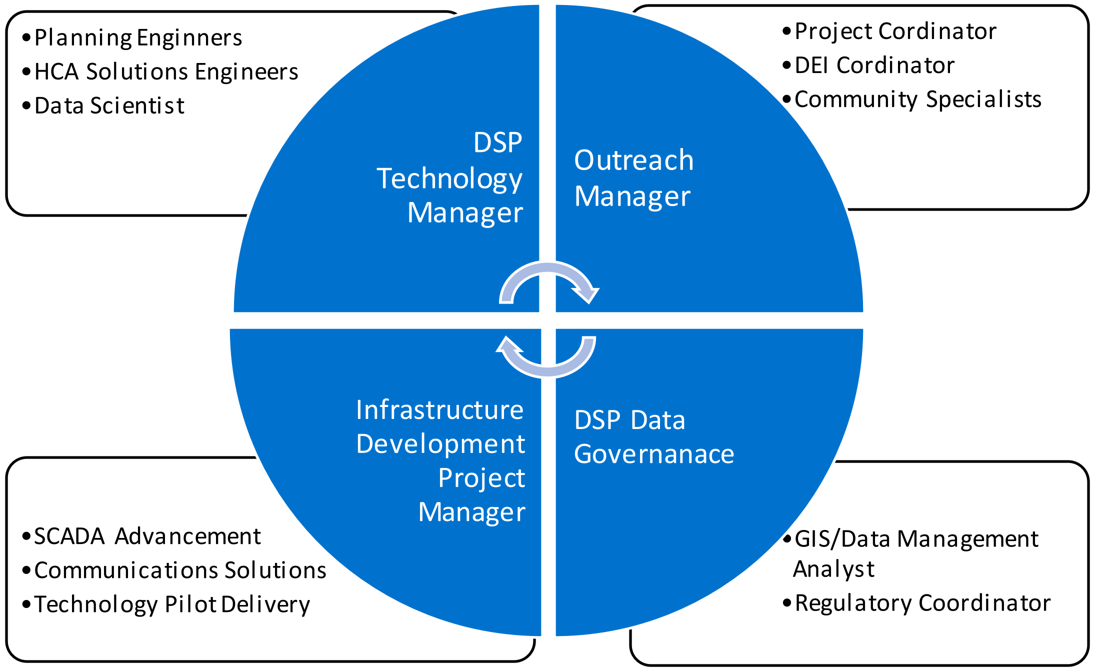
POWERING YOUR GREATNESS

Other enablers to DSP in Oregon





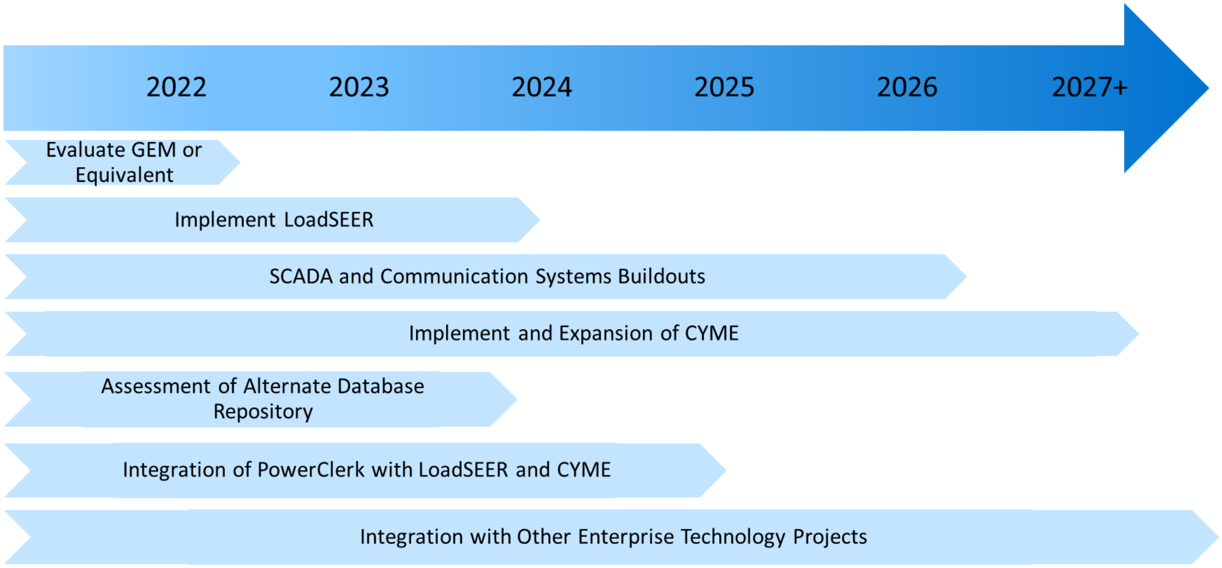
Source: Harvard Business Review



Plan Options and Long-Range Plan

Long Term Plan	One Time Cost	Annual Cost
Total Option 1 HCA	$20,118,263	$7,615,440
Total Option 2 HCA	$29,723,123	$17,220,300
Total Option 3 HCA	$83,634,763	$12,546,840
SCADA build out (over five years of deployment) - 2026	$2,754,000	$350,000
Extensible base communication system to substations - 2026		$275,000
Leases	$250,000	
Fiber	$8,700,000	
Multiple Address System (MAS)	$775,000	
LoadSEER software license - 2022	$3,276,000	
Implement LoadSEER (if implemented system wide could result in cost reduction) - 2024	$775,000	
Implement & expand use of CYME DERie (based on HCA Option chosen) - 2027		
Expand pilots for DA/FLISR - 2031		$1,500,000
CYME plug ins (to be further assessed through Plan 2)		
AMI integration with Dynamic Data Pull		
EPRI Adapt (Advanced Distribution Assessment Planning Tools)		
Integration Capacity Analysis/DERie/EPRI Drive		
LoadSEER Implementation - 2024	$1,000,000	
Plug in implementation - 2026	$750,000	
Evaluate and Implement Greenlink Analytics (GEM) or Equivalent - 2022	$10,863	
Create alternatives assessment repository in AMPS database - 2023	$50,000	
Integrate PowerClerk with LoadSEER and CYME - 2024	$450,000	
Integration with other enterprise technology projects - 2027		
Communications Plan Implementation	$600,000	$650,000
Standup DSP communications collateral creation	$150,000	
Community Surveys (at least annual cadence, potentially twice)	$80,000	
DSP Education Materials		
DSP Education Events		
Core DSP Activities		$4,343,040
Conduct local planning meetings		
Share alternatives advocated by communities and stakeholders		
Perform legacy studies during transition period		
Perform integrative planning functions		
Communicate options and costs		
Maintain data repositories that are critical for DSP		
Advance technology in support of DSP stakeholders and participants		
Produce content for regular meetings, specific local area topics and regulatory obligations		
	$19,620,863	$7,118,040

Hosting Capacity Options		
Option 1	$497,400	$497,400
Option 2	$10,102,260	$10,102,260
Option 3	$64,013,900	$5,428,800



Map Viewer






PACIFIC POWER
POWERING YOUR GREATNESS

Planning principles

- Transparent and comprehensive data sets for customers, communities and stakeholders to evaluate and set priorities as we move to a clean, equitable energy future
- Robust community engagement
- Technology adoption
- Grid resilience

Distribution System Planning Report

Pacific Power submitted its **Oregon Distribution System Plan Report – Part 1** with the OPUC on October 15, 2021.

DOWNLOAD THE REPORT

Map viewer

This is a high level map showing certain information within our system including distributed generation, energy equity and incentive information, and reliability. This map will evolve over time.

SEE THE MAP

Resources

- Oregon Public Utility Commission: **DSP Guidelines**
- **Oregon Smart Grid Report**
- **Oregon Transportation Electrification Plan**
- **PacifiCorp's Integrated Resource Plan**

Data Discussion






PACIFIC POWER

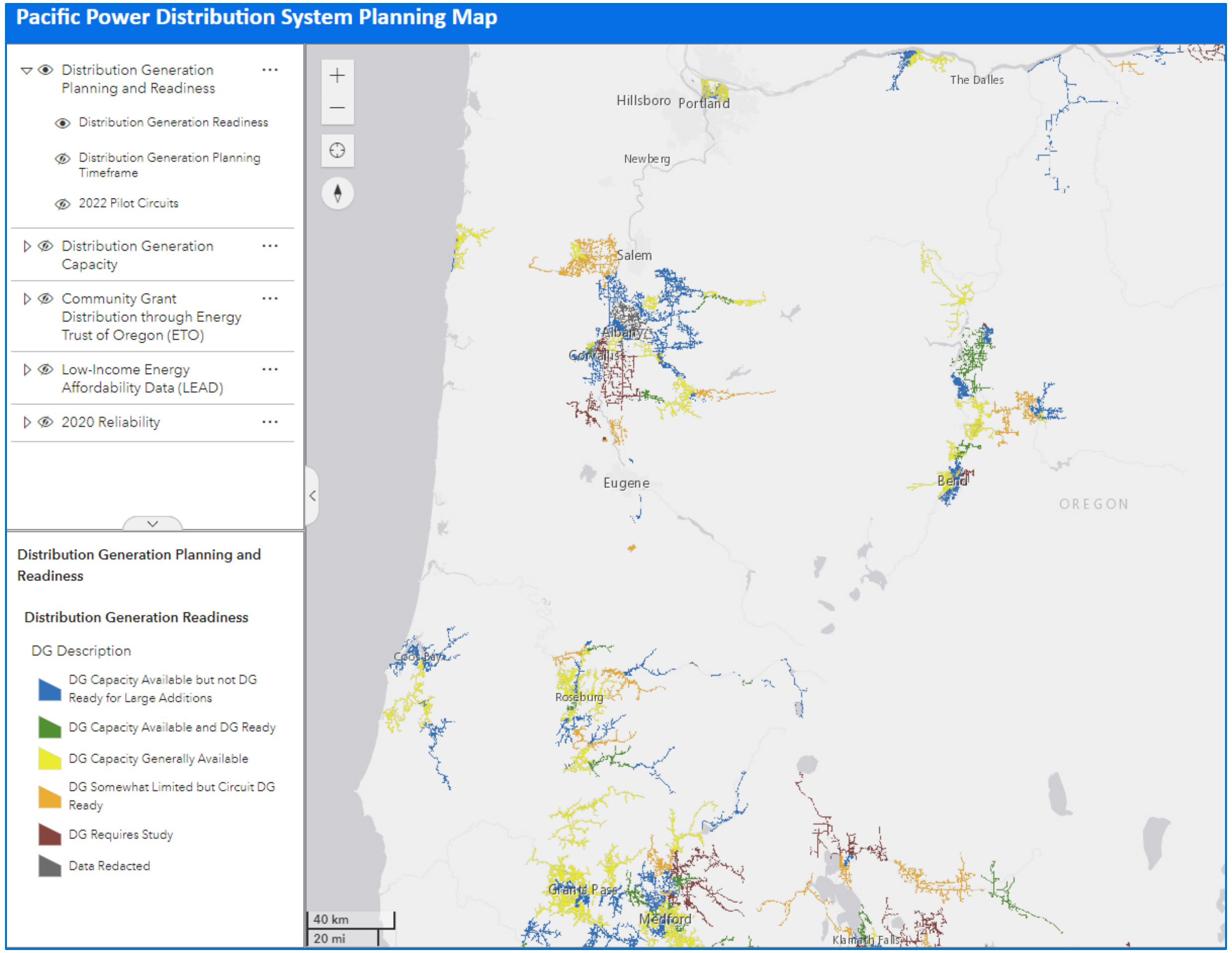
POWERING YOUR GREATNESS

DG Planning and Readiness

DG Planning involves factors that include DG capacity and readiness

- A circuit is considered more DG ready if it has DG capacity, real-time load data is available, and appropriate protection is installed for DG

- Colors listed in the map provide guidance to the user if DG can be added or if work may be required to connect DG

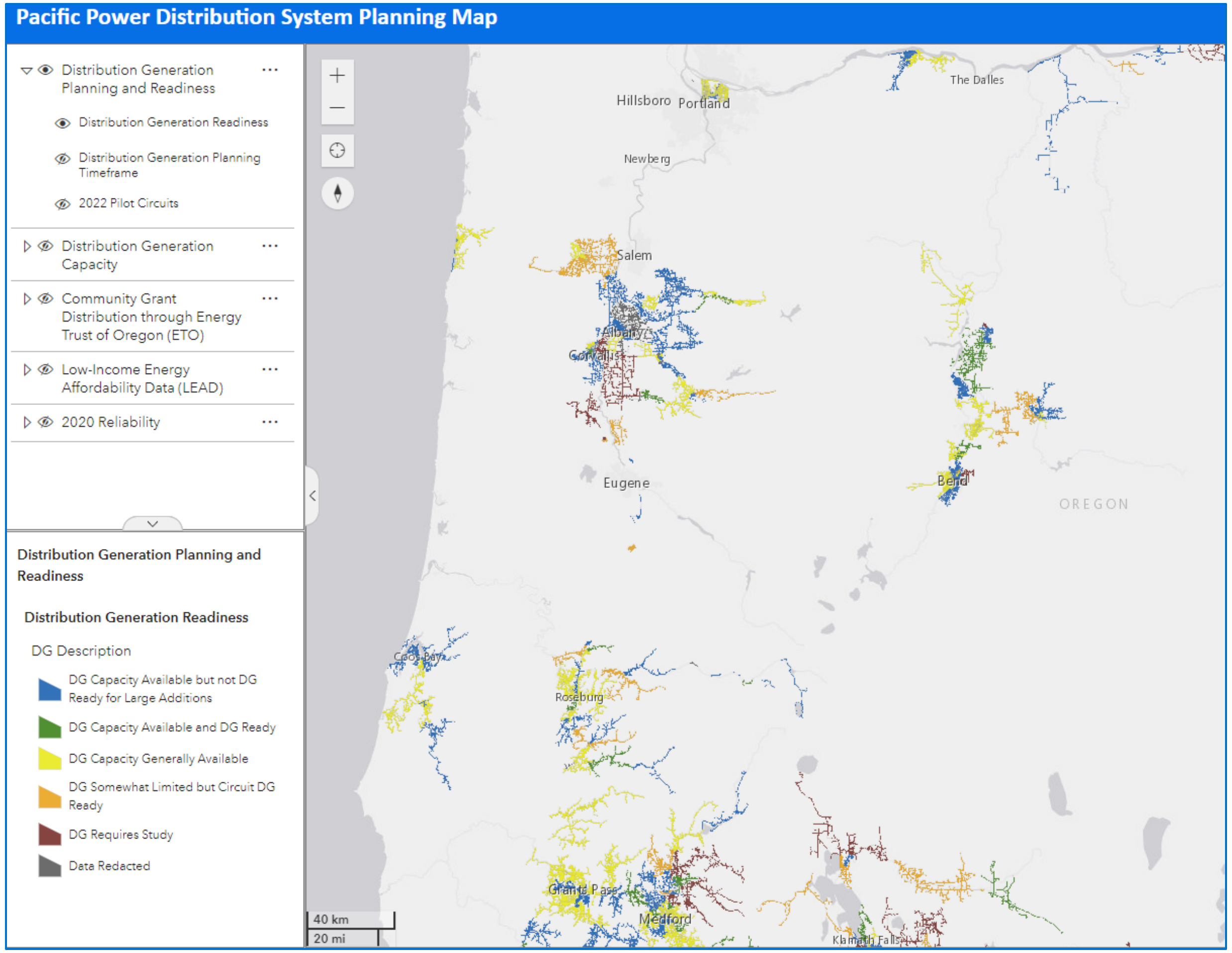


DG Planning and Readiness

DG readiness is determined at the circuit breaker level and is influenced by factors based on:

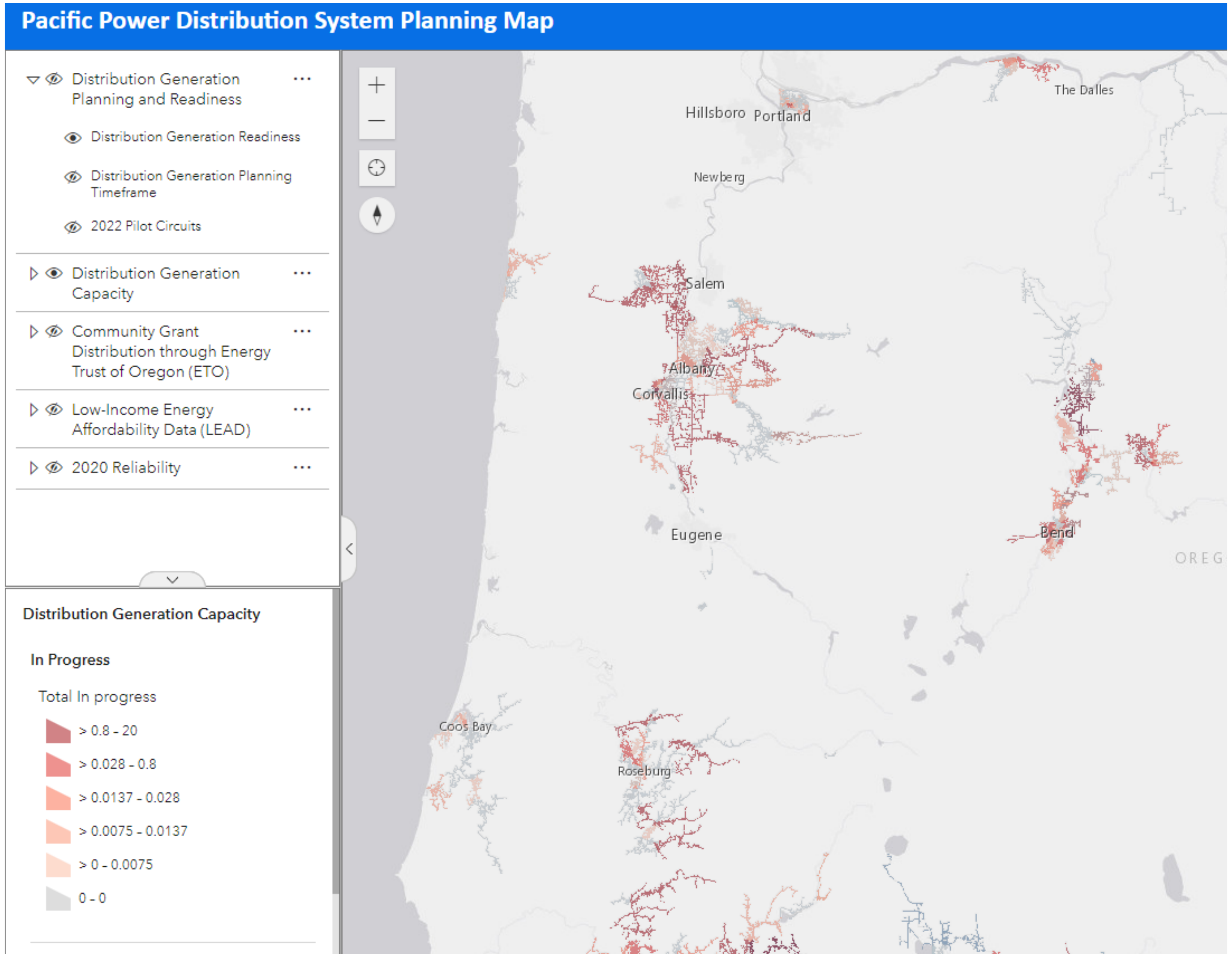
- Load data (SCADA is installed)
- Daytime minimum load capacity (positive load)
- Protection and Control (dead line check is installed)

As an example, a circuit with SCADA, has daytime minimum load capacity, and dead line check installed will have a higher rating than a circuit without any one of these items.



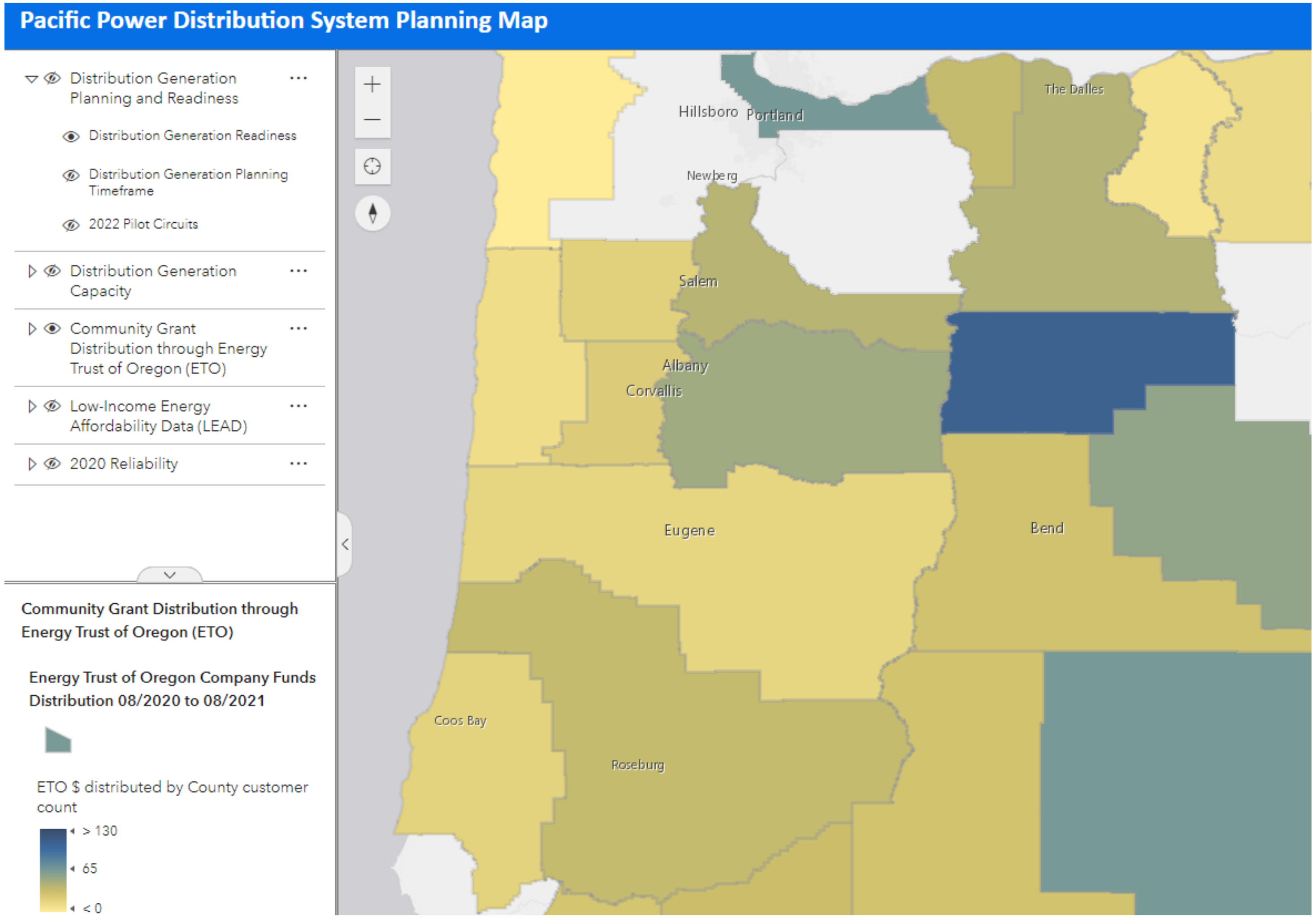
DG Capacity

- Interconnected Capacity (MW)
- In Progress Capacity (MW)
- Technology
- Net Metering vs Generator



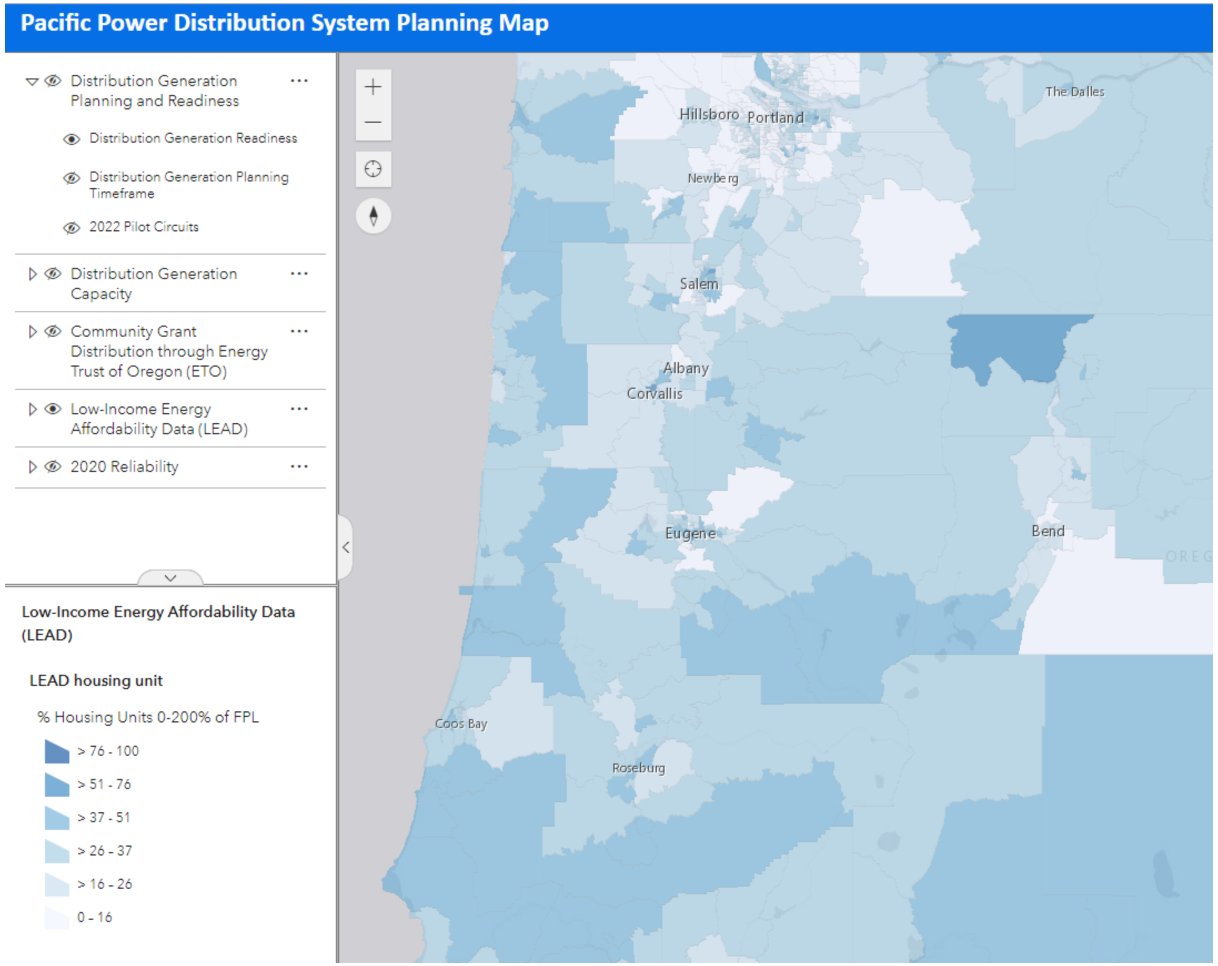
Community Grants/Incentives

- Represented by Energy Trust incentives from 8/2020 to 8/2021 on a per customer basis.
- Large projects can have outsized impact on distribution results.
- Incentives are distributed relatively well between rural and urban counties with Morrow, Jefferson and Multnomah counties being the highest and Sherman and coastal counties being the lowest.



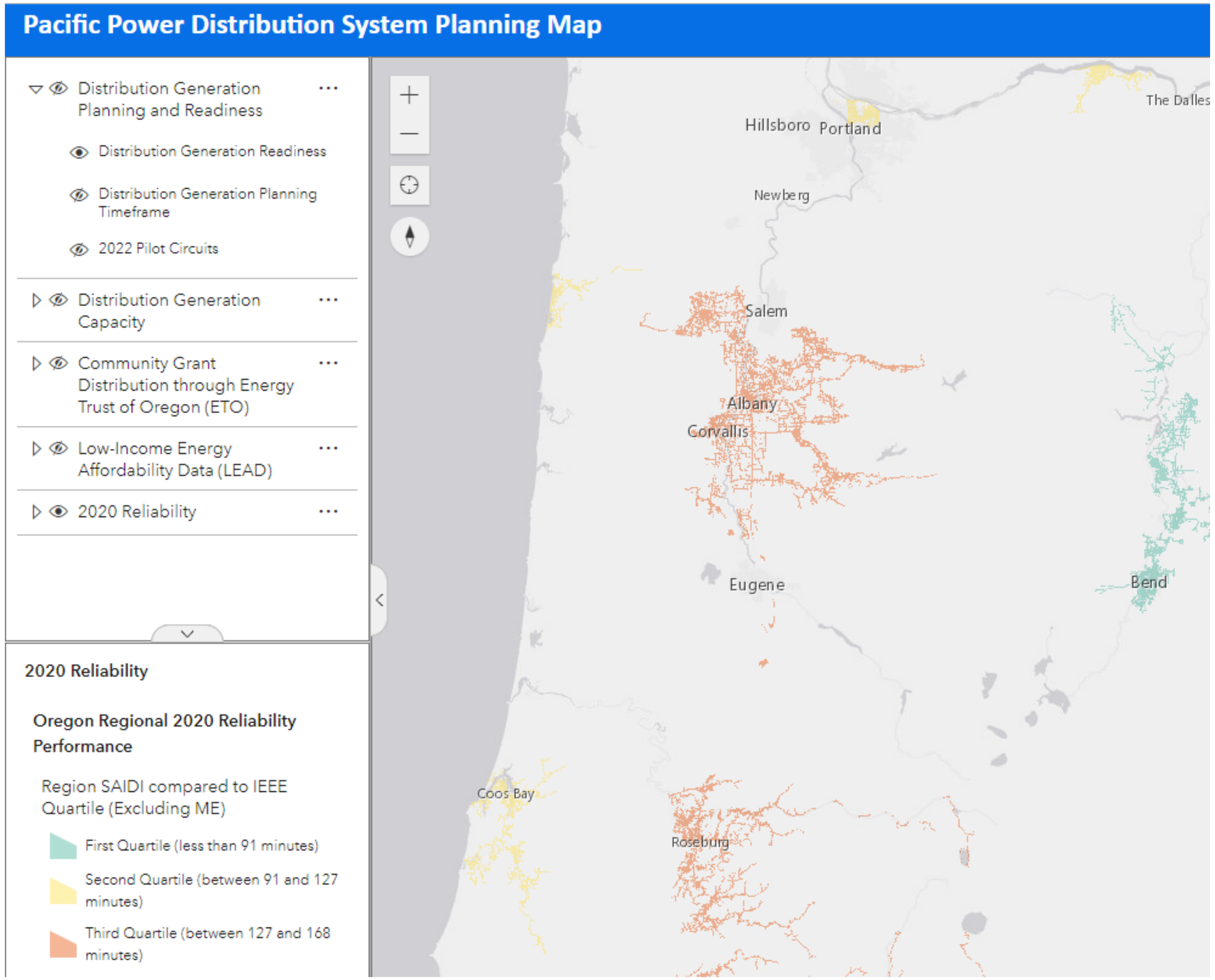
DOE LEAD Data

- Low-Income Energy Affordability Data (LEAD)
  - Energy Affordability
  - Housing Units



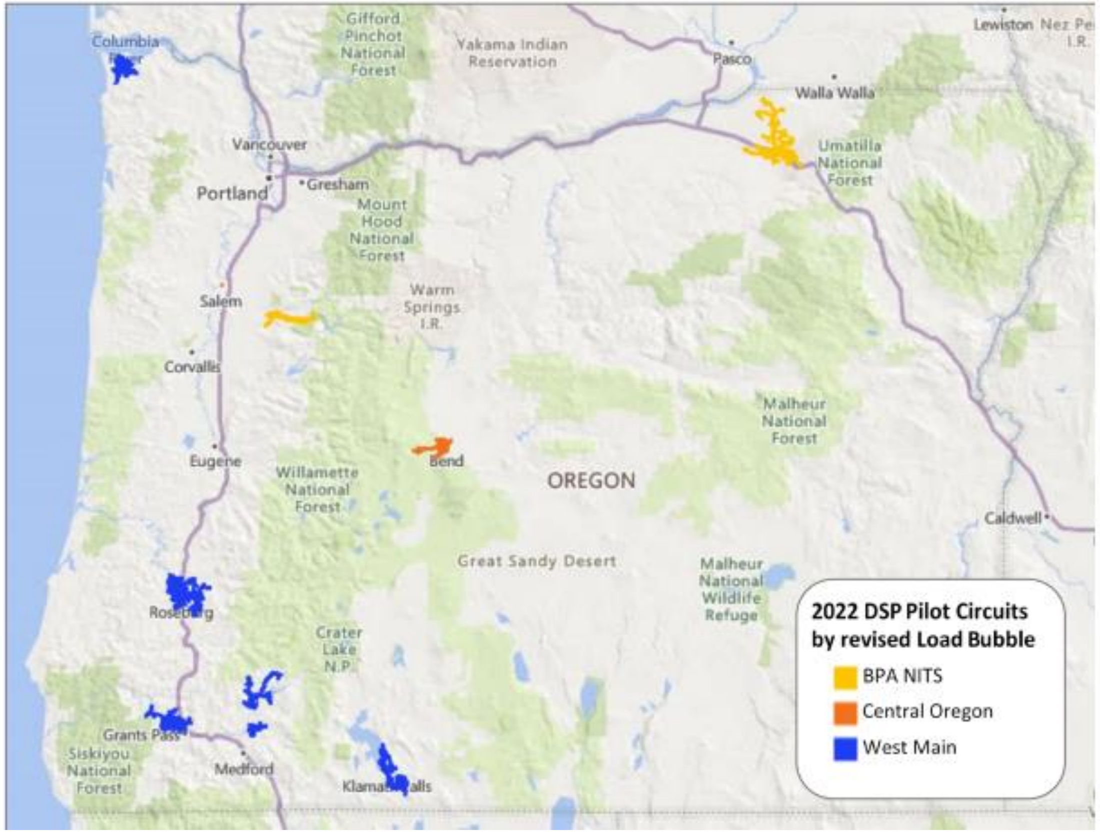
Reliability

- 2020 Oregon Reliability
  - SAIDI at a Regional Level
  - SAIDI at a Circuit Level
  - Compared against industry quartiles



Initial Transitional Planning Areas

2022 Distribution System Planning Pilot Circuits								
Revised Load Bubble	**BPA NITS**		**Central Oregon**	**West Main**				
Revised Sub Load Bubble	Pendleton	Santiam	Bend	Clatsop Astoria	Southern Oregon/California			
DSP Planning Area	Pendleton	Stayton	Bend	Astoria	Klamath Urban	Merlin	Roseburg Urban	Upper Rogue
Circuits	5W202 5W203 5W401 5W402 5W403 7W451 7W452 7W453 7W454	4M120 4M70	5D10 5D12 5D155 5D196 5D238 5D241 5D243 5D411 5D413 5D418	5A204 5A211	5L112 5L113 5L45 5L46 5L48 5L49 5L54	5R232 5R234 5R248 5R251	4U10 4U22 4U30 4U31 4U38 4U39 4U5 4U81 5U15 5U17 5U19	4R13 4R17 4R9



- In current plan for 2022 review
- Existence of circuit level SCADA
- Available capacity for Distributed Generation
- For additional areas or pilot technologies please provide your thoughts
- *We'll be adding a new pilot interest form within the next week*