Electric System Resiliency

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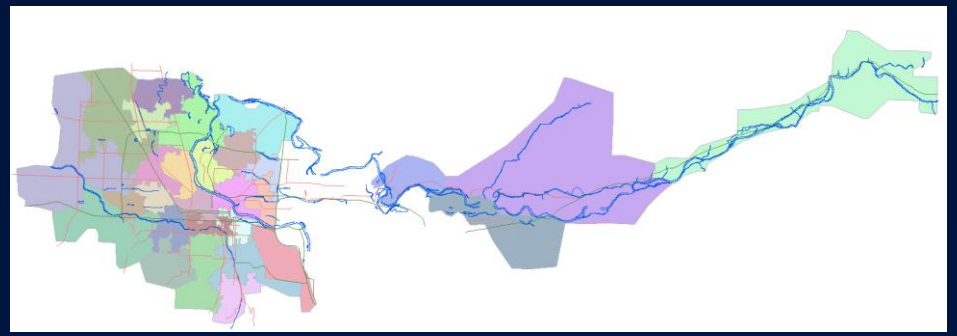
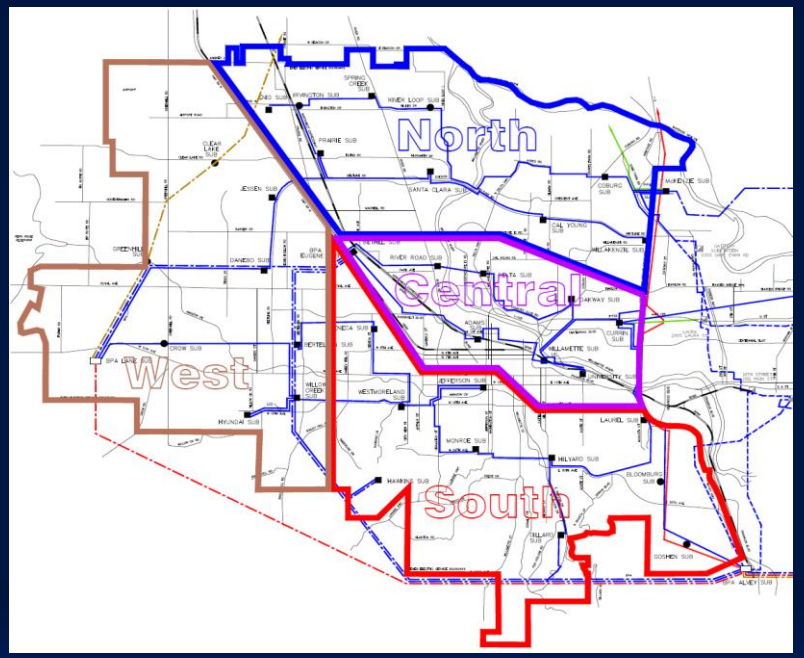
EWEB System Summary

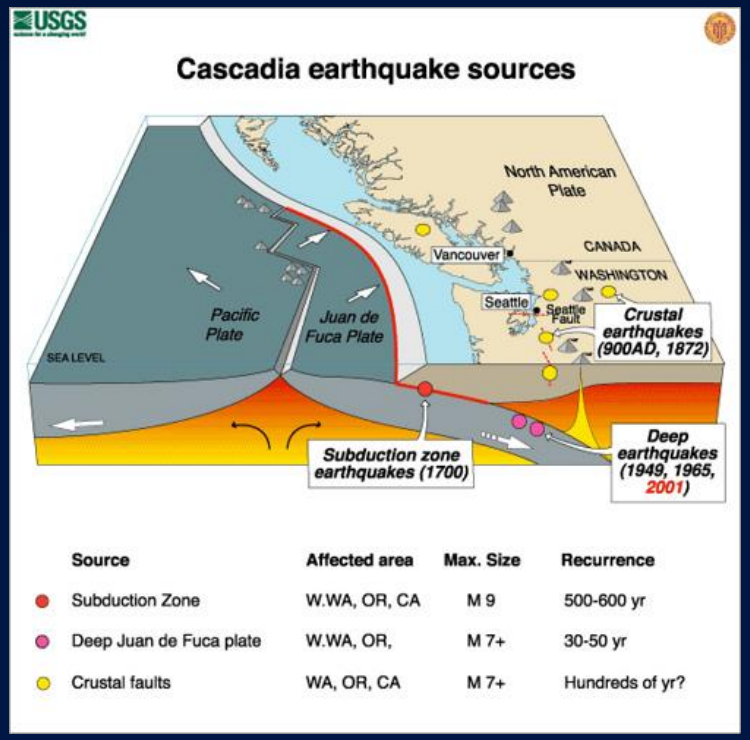
Type	Public
Customers	200,000
Services (Electric)	90,000
Services (Water)	65,000
Employees	487
Consumption	2.4B kWh/Year
Consumption	275 MWa
Consumption (Peak)	600 MWa
Service Territory	236 Sq. Miles
Power Lines	1,300 Miles
Distribution Lines	1,132 Miles
Substations	38
Generators	7 + one customer owned (~175MW capacity)

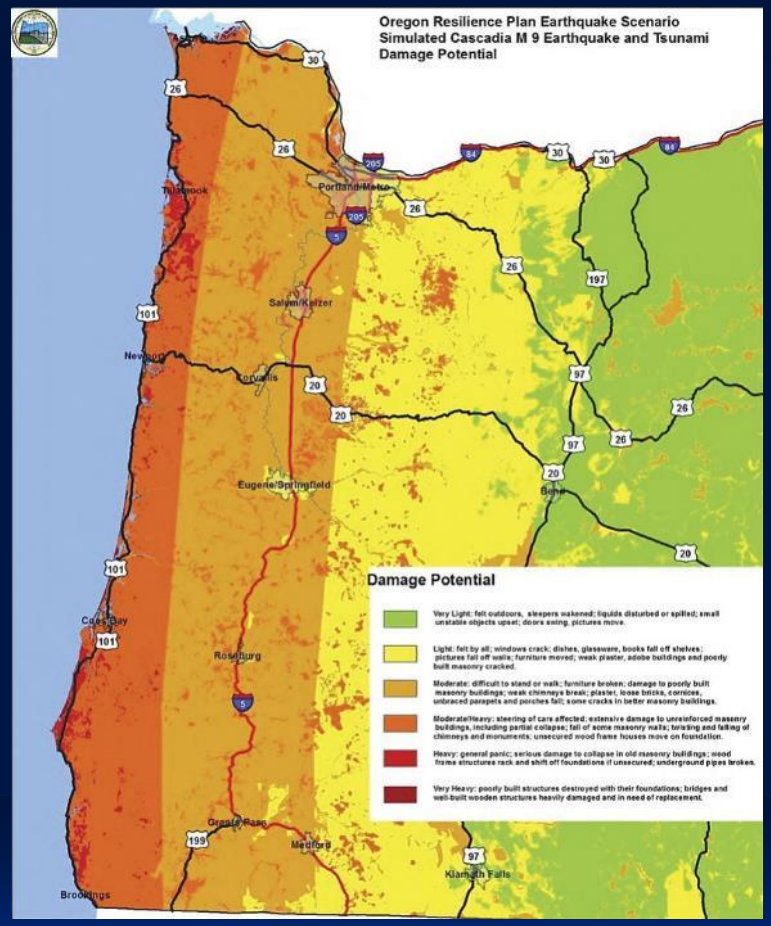




EWEB Resiliency

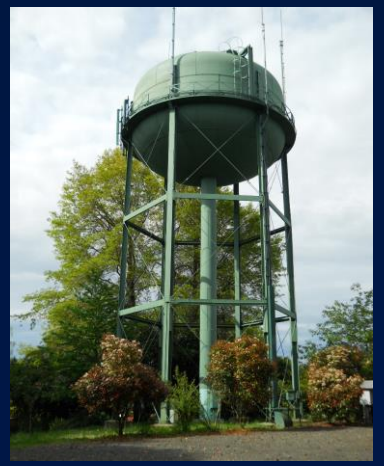
- Why? Cascadia Subduction Zone Earthquake





Focus

1. *Emergency Preparedness & Disaster Recovery*
2. *Electric Supply Resources*



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Rule of 3's

Restoration Order

3 days

Emergency Water Distribution Sites

3 weeks

Power Critical Facilities

3 months

System Repair and Restoration

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Neighborhood Emergency Water Sites

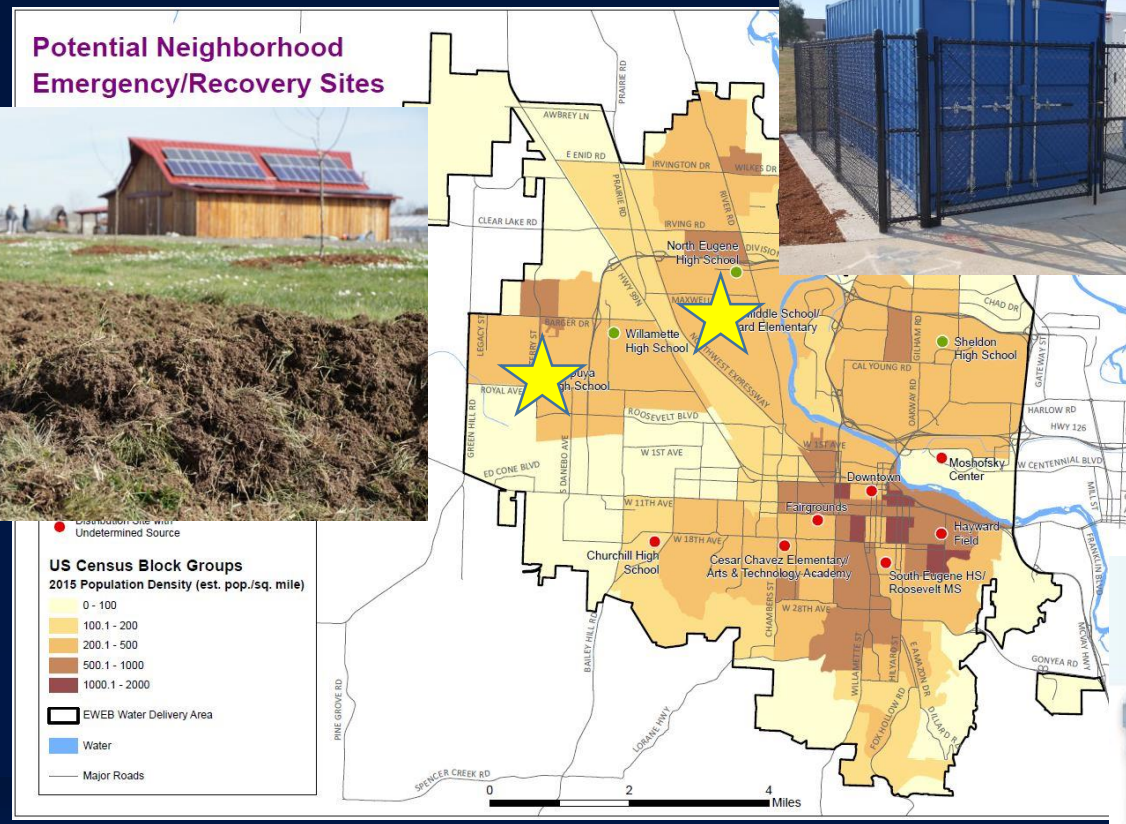
Goal: 5 sites in 5 years

Community

Focusing on schools and sites already integrated

Infrastructure

Working with local entities with common interest and facilities



Grid Edge Demonstration Project
Howard Elementary - Partners

EWEB
Sandia National Laboratories
Oregon Department of Energy
Clean Energy States Alliance
Worley Parsons
NEC Energy Solutions
Eugene School District 4J
US Department of Energy

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Grid Edge Potential Use Cases Include:

- Peak Demand Reduction / T&D Deferral
- Energy Resiliency / Back-up Power
- Voltage/VAR Support
- Frequency Regulation
- Renewable energy ramping, firming
- Energy Arbitrage
- Outage Mitigation
- Reduction of Transmission Charges (reduction of utility co-incident peak)
- Reduction of Transmission Charges (generation imbalance)

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Renewable Hydrogen Potential

- Mother Nature dispatches wind, solar and hydropower
  - Times of Abundance – clean cheap power – zero/negative pricing and curtailment in region.
  - Time of Scarcity – more expensive dirtier power, including imports – resource adequacy ?
  - Cold Dark Short Days in Winter and Potential for Wind to stop for days.

- Storage is Needed
  - Batteries have limited duration – hours.
  - Hydrogen could provide days, weeks, even months and seasons of clean energy storage.
  - Potential to decarbonize electricity & gas systems, heavy duty vehicles including marine and aviation.

- Resiliency Benefits
  - Emergency Loads running off fuel cells with hydrogen for extended periods.
  - Local transportation fuel alternative to relying on imported gasoline.
  - Blackstart Capability for local energy sources like EWEB's McKenzie Dams or Seneca Biomass Plant.

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Questions?