

Finding the Best Option for Upgrading JWC's Chlorine Gas System

**2023 PNWS AWWA
Annual Conference**

May 4, 2023



— Agenda

- Background
- Disinfection Alternatives Analysis
- Funding Opportunities

01

Background

Joint Water Commission

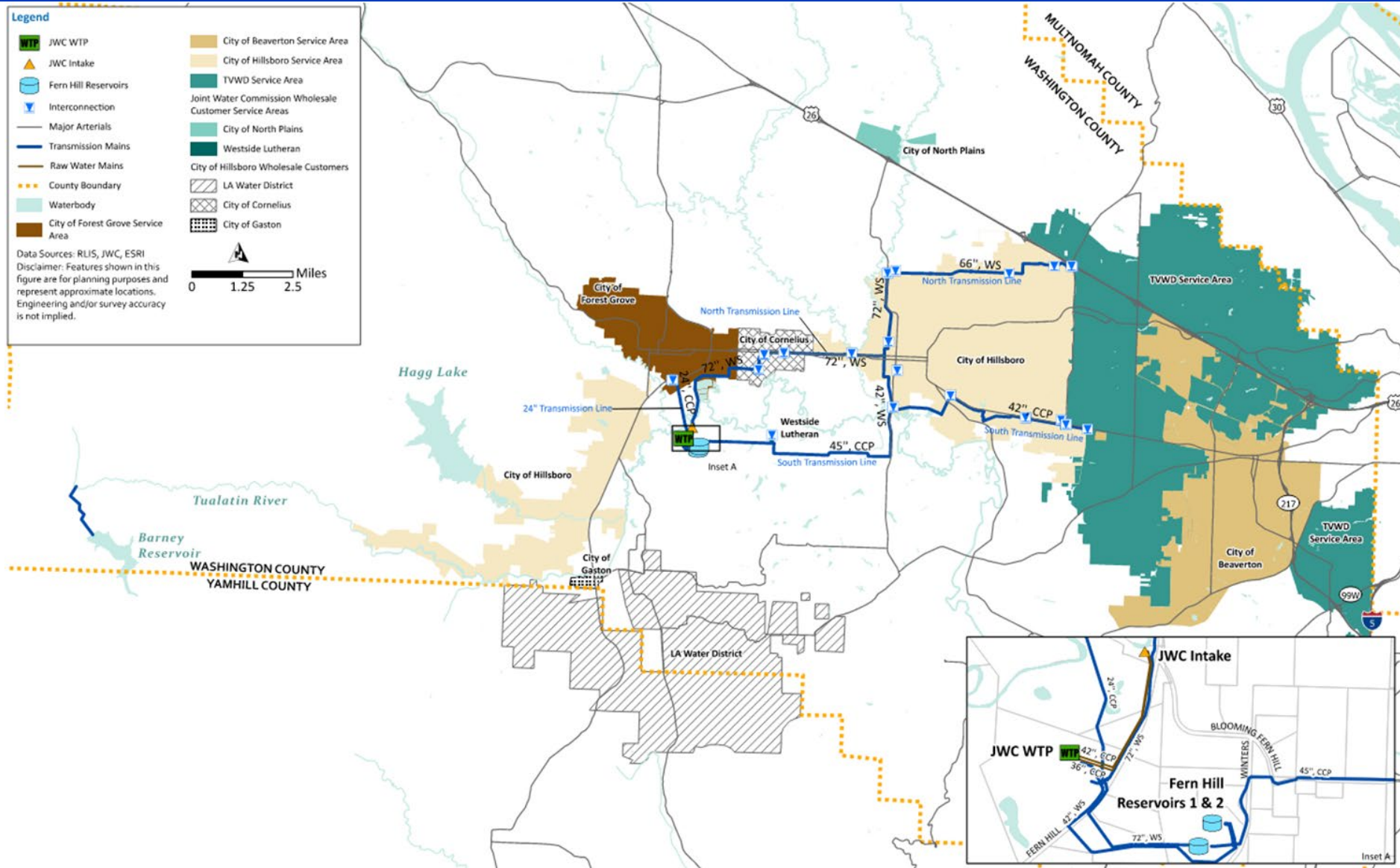
Joint Water Commission



Cities of Hillsboro,
Forest Grove, Beaverton,
and Tualatin Valley
Water District



JWC System



JWC WTP

- Conventional surface water treatment plant.
- 85 mgd capacity.
- First constructed in 1974.
- Expansions completed in 1990, 1998, and 2020.



Chlorine Gas System

Existing Chlorine Gas System Challenges

- Existing System:
 - » 3 tons chlorine gas used per week
 - » 7 chlorinators (250 – 1,000 pounds per day)
 - » Chlorine scrubber
- Challenges:
 - » Staff safety. Located in operations building.
 - » Building is not seismically resilient.
 - » Limited suppliers.



2021 Chlorine Shortage

- Operations:
 - » Decreased finished water residual
 - » Eliminated prechlorination
 - » Secured order of bulk sodium hypochlorite
- Partner Collaboration
 - » Discussed potential demand reduction
 - » Coordinated messaging
 - » Collaborative public outreach
- Regional/Regulatory Coordination



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Disinfection Alternatives Analysis

Screened Alternatives

~~Chlorine Gas~~
~~Storage facility.~~

Bulk Sodium Hypochlorite

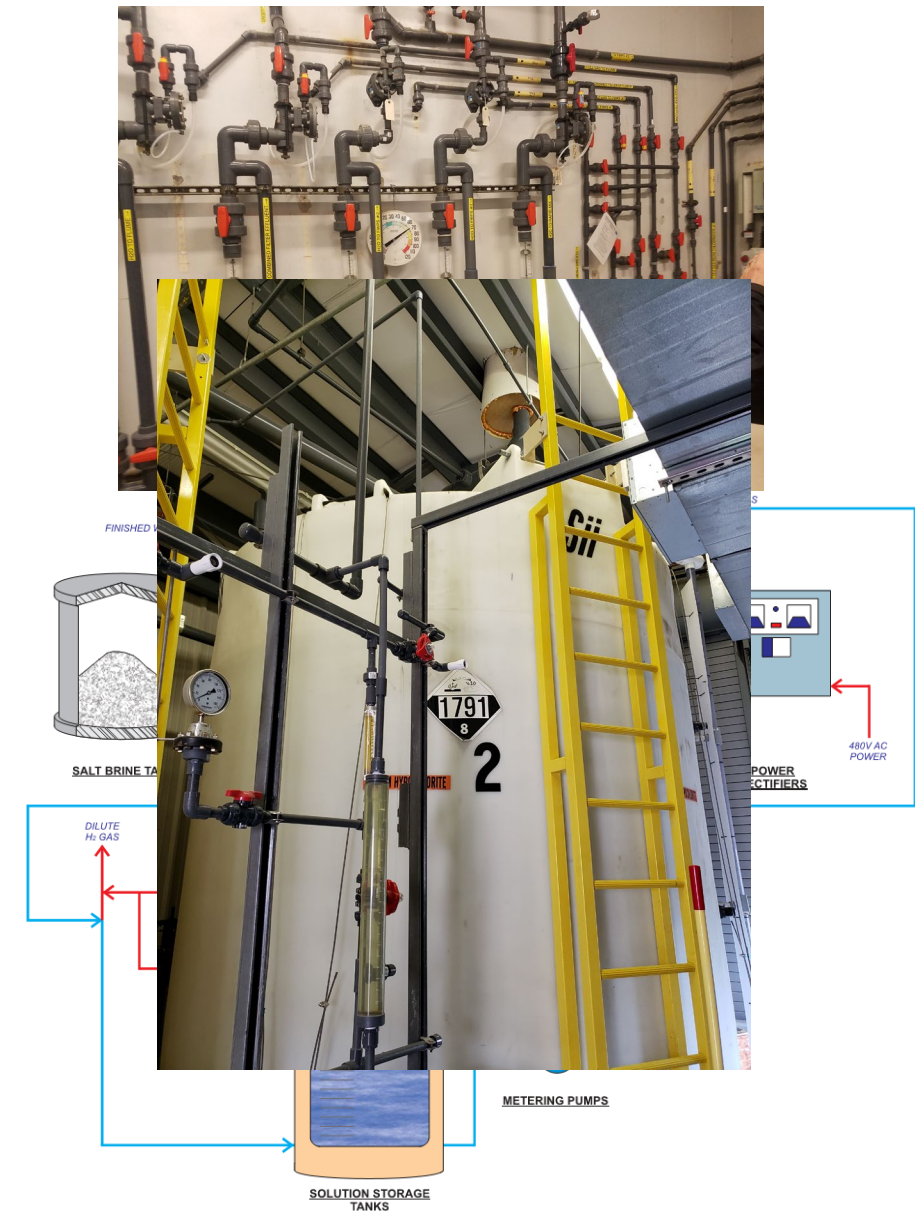
- All sodium hypochlorite is delivered.

0.8% On-Site Hypochlorite Generation

- Capacity to generate all sodium hypochlorite on-site from delivered salt.
- Delivery of bulk sodium hypochlorite can be used as backup.

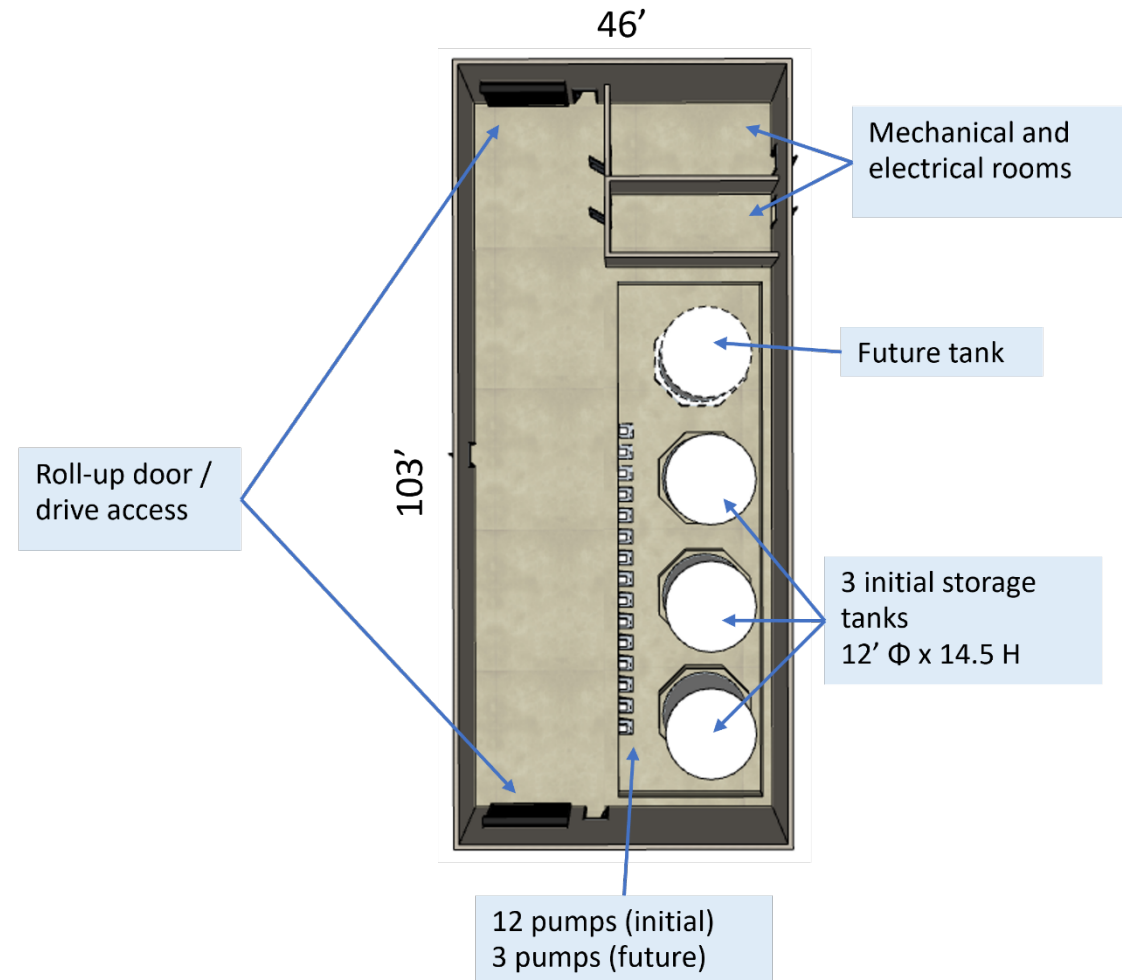
Hybrid: Bulk with Small On-Site Backup System

- Storage sized same as bulk hypochlorite alternative.
- Smaller, backup 0.8% on-site generation system included sized to meet winter average day demands (ADD) at average chemical dose.



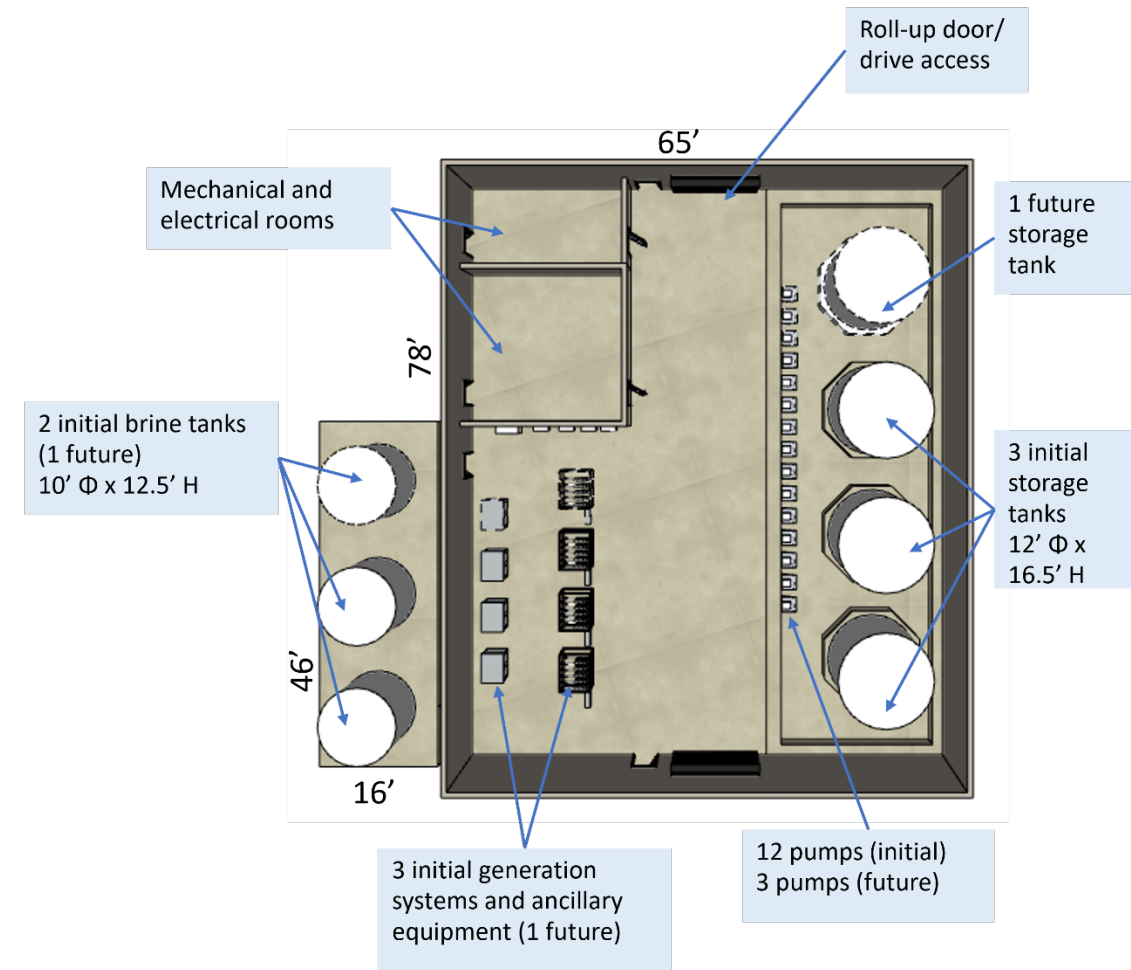
Bulk Sodium Hypochlorite

- Major Equipment:
 - » Tanks (polyethylene or FRP)
 - » Chemical metering equipment
- Chemical degradation
- Hazardous chemical requires secondary containment



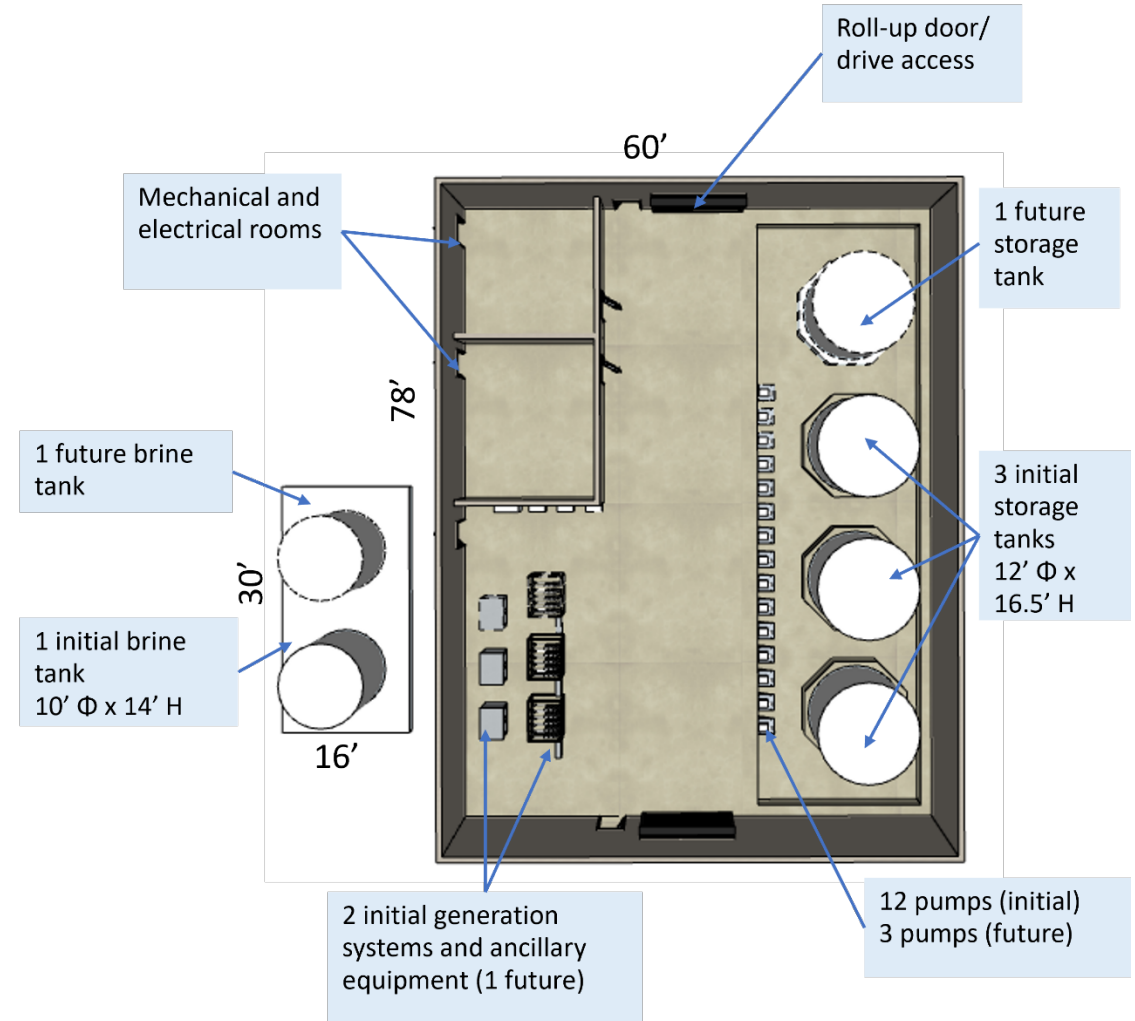
0.8% On-Site Hypochlorite Generation

- Generate dilute sodium hypochlorite from water, salt, and electricity.
- Major Equipment:
 - » Hypochlorite Tanks (polyethylene or FRP)
 - » Brine Tank
 - » Generator Units
 - » Ancillary systems (water softener, rectifier, heating)
 - » Chemical metering equipment
- Non-hazardous chemical.
- Operations and maintenance complexity.



Hybrid: Bulk with Small On-Site Backup System

- Meet peak demands using bulk hypochlorite.
- On-site generation sized to meet smaller average day demands.
- Operational and design complexity.

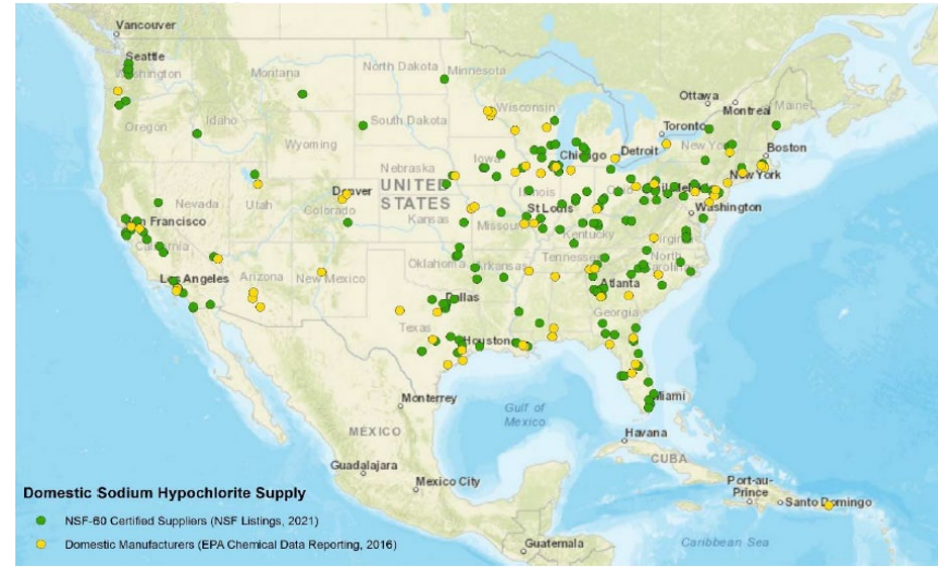


Supply Resilience

Chlorine Gas Supply



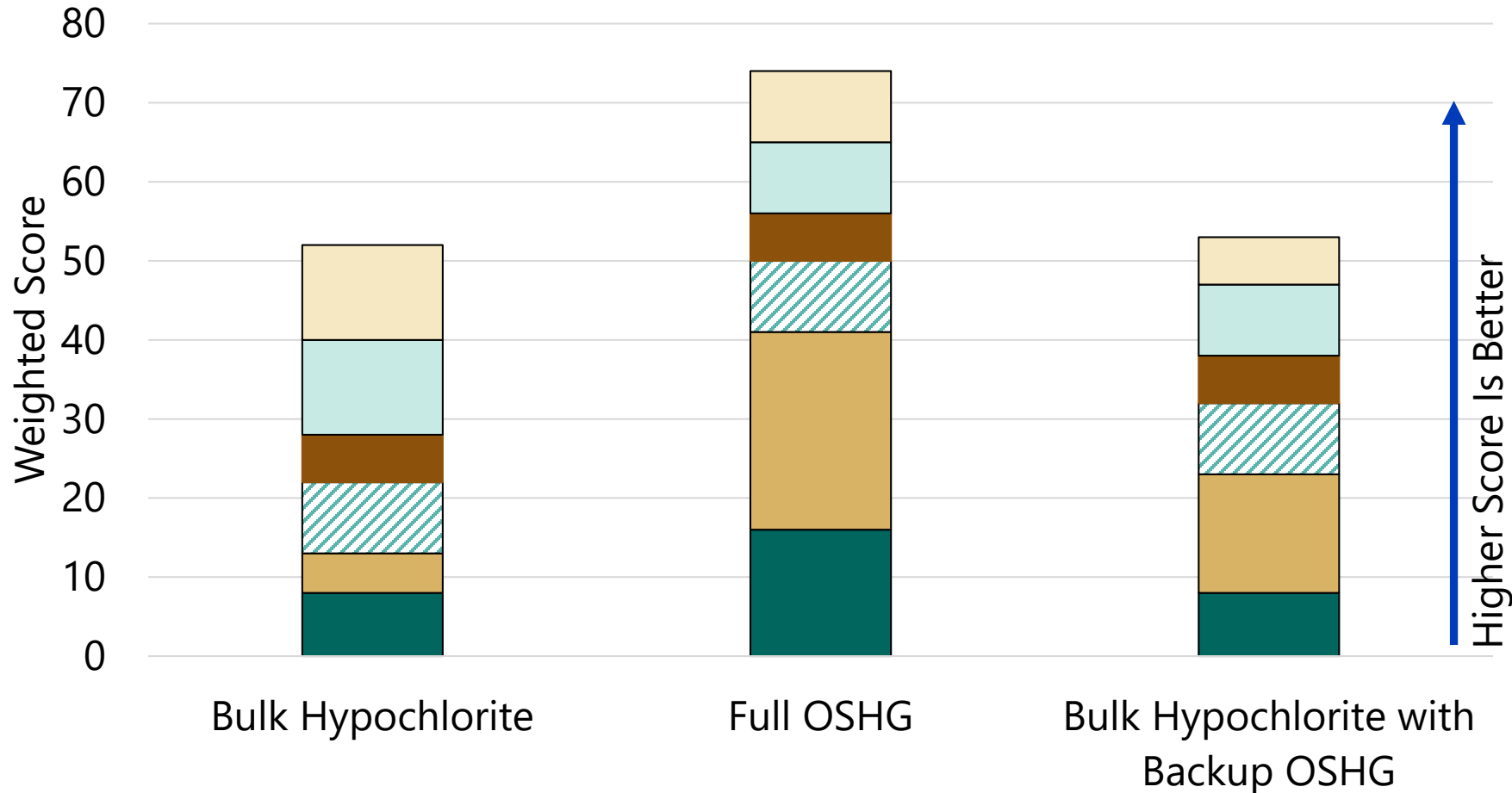
Sodium Hypochlorite Supply



Salt Supply:

- Majority domestic supply comes from Utah.
- Purification facilities distributed across US.
- Multiple suppliers with facilities in western US that supply Oregon.

Non-Economic Evaluation



- Weighting factor and scores assigned to each criterion.
- Weighted Score = Weighting Factor x Criterion Score

■ Safety

▨ Water Quality

■ Constructability

■ Resilience and Reliability

■ Environmental / Land Use Permitting

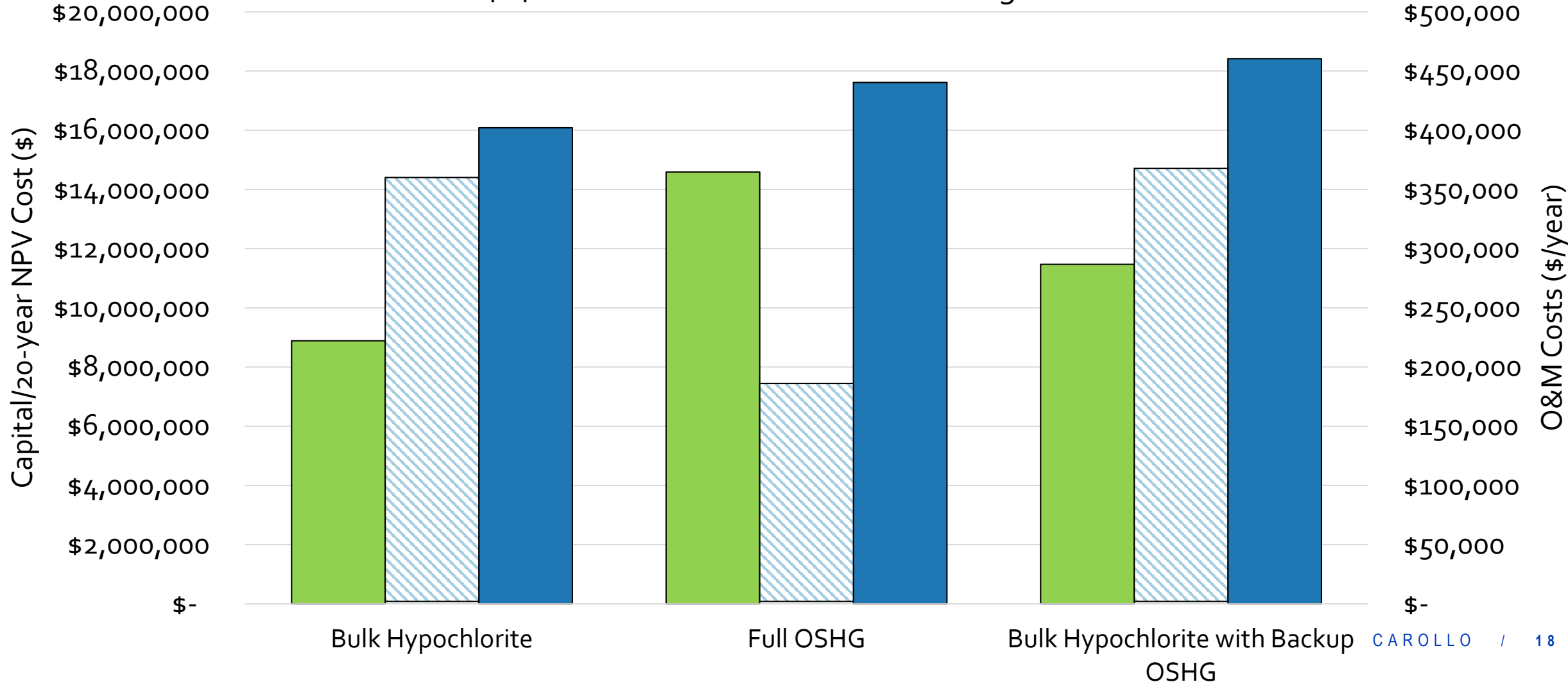
■ O&M

Comparative Cost Economic Evaluation

Capital Cost

O&M Cost

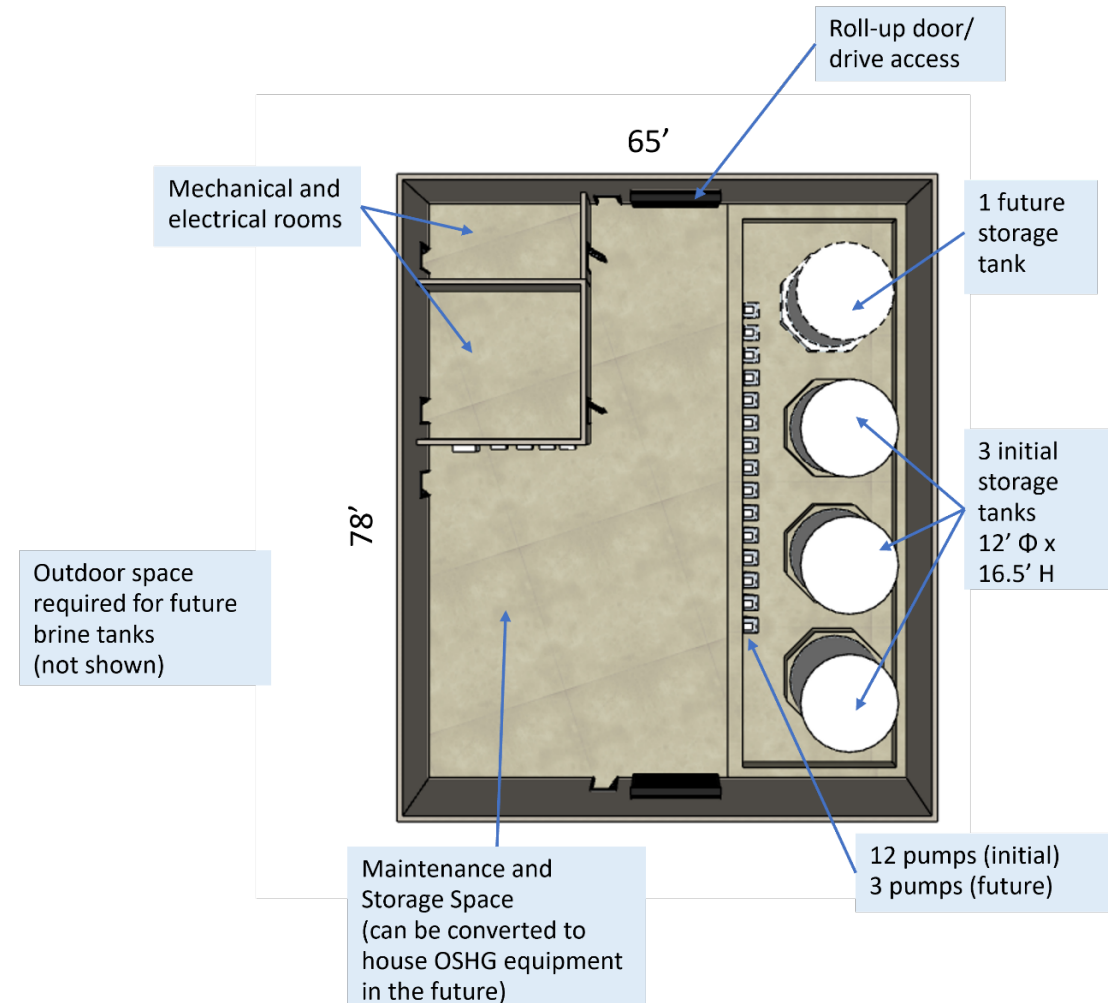
20-Year NPV



Additional information: Includes 20-year equipment power use. Includes electrical for increasing water demands.

Selected Alternative

- Near-term: Bulk hypochlorite
 - » Safer than chlorine gas.
 - » Lower capital cost than on-site generation.
 - » Design facility with provisions to accommodate switch to on-site generation.
- Long-term: On-Site Generation
 - » Safest alternative.
 - » Resilience and reliability.
 - » Lower O&M costs.



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Funding Opportunities

Available Funding Sources

- Possible Funding Sources



Hazard Mitigation Program and BRIC

- FEMA Hazard Mitigation is hit or miss; typically under \$10M in Oregon.
- BRIC is annual national competition up to \$50M per project.
- Small planning grant is less complicated.
- What types of projects funded? Broad based natural hazard definition.
- New construction not allowed; Must mitigate existing structure.
- Focus and additional points for serving distressed communities.

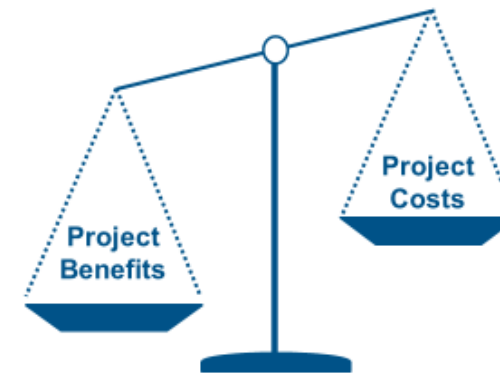


Grant Application Process

- Requirements for BRIC grant application
 - Mitigation need, schedule, budget.
 - 2 alternatives & no action alternative.
- FEMA Benefit-Cost Analysis (BCA) spreadsheet.
 - Population impact report – Critical for distressed community.
 - Pre- & post-disaster recovery time & costs report.
 - Professional reports add credibility.

What is Benefit-Cost Analysis (BCA)?

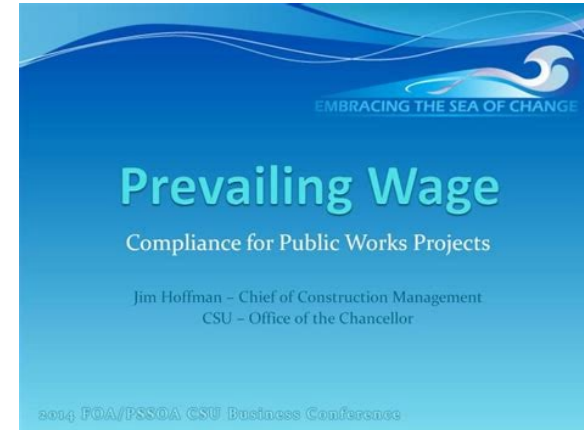
- **Benefit-Cost Analysis (BCA)** is the process of quantifying the advantages (benefits) of an action and comparing it to its drawbacks (costs).



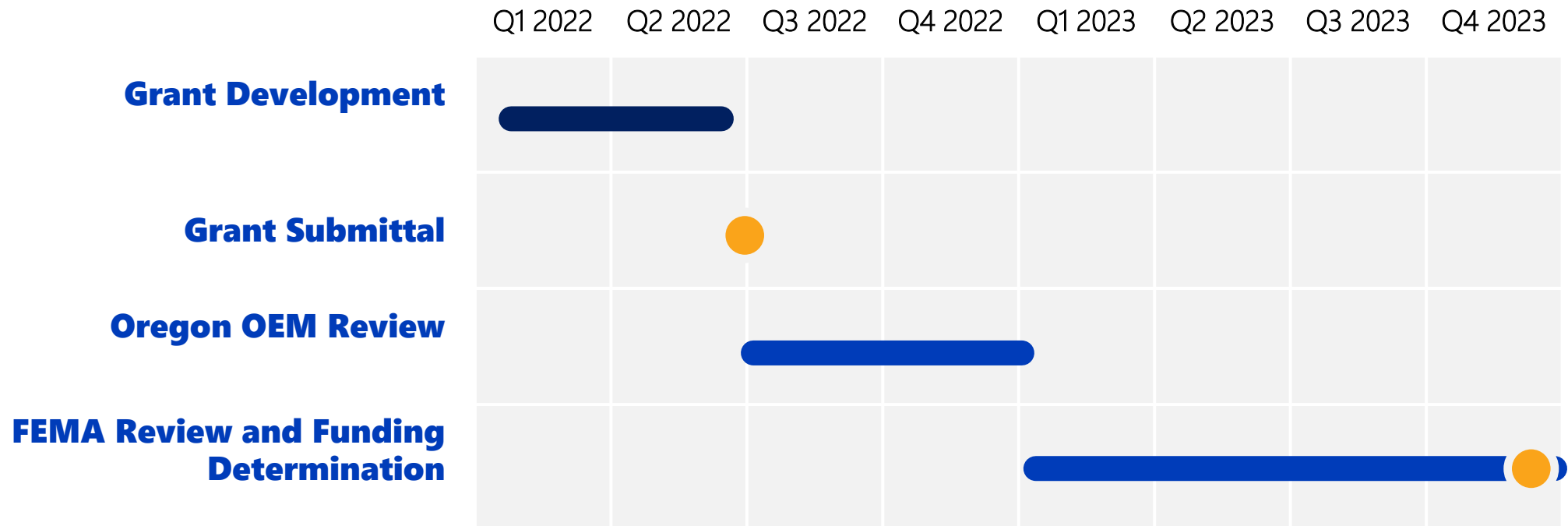
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Grant Application Lessons Learned

- Planning grant approved at State level – Population study, engineering predesign report for future BRIC application.
- FEMA BRIC grant requires significant level of effort.
 - » Grant writing is a specialized niche.
 - » Competition so you must *SELL* your grant application.
- All federal grants require compliance with federal prevailing wage, American Iron and Steel, Build America, Buy America, Historic preservation, etc.



Grant / Project Status Update



- FEMA has been significantly delayed in reviewing grant requests.
- Grant and design consultant can't be the same at Phase 1 Design and Phase 2 Construction.

Questions?

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