



Eugene Water & Electric Board

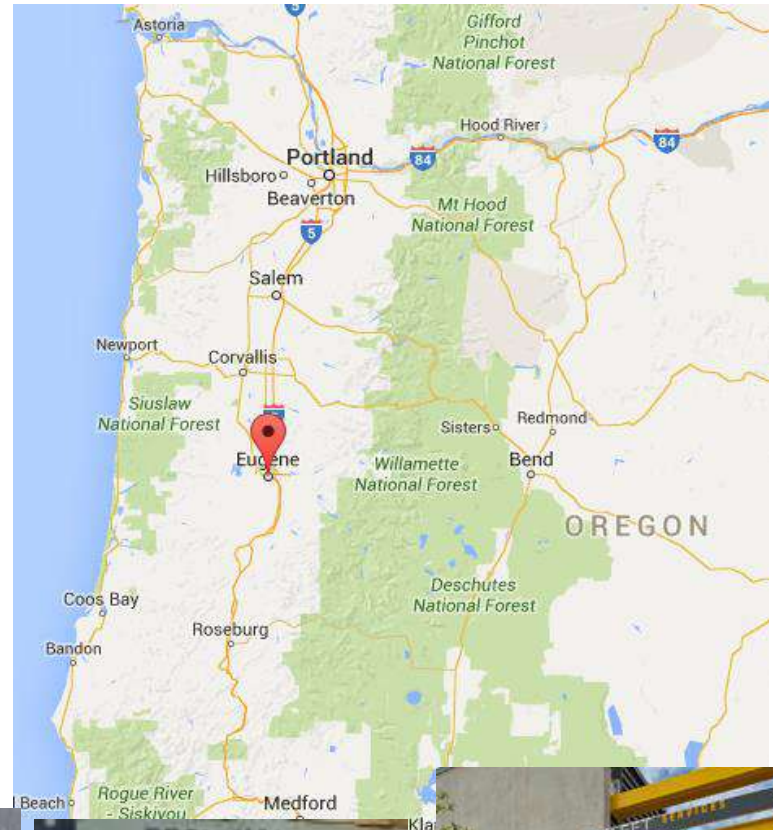
Eugene Water & Electric Board

Demonstrating Community Resiliency at the Edge of the Grid

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The Eugene Water & Electric Board

- Oregon's largest customer-owned utility
- EWEB provides utility services to 89,000 electric and 52,000 water customers



The Value of Public Utilities



The only reason public utilities exist is to serve the community.

We don't need to grow to pay dividends to shareholders, but we do need to be responsive to the changing needs of our communities.

Changing Utility Landscape



- Flat or declining load
- Falling prices (gas & electric)
- Fuel switching
- Integrating renewables
- Western regional markets
- Changing customer sentiment
- Technological advances in storage & DG
- New regulations - GHG / RPS / OMG!

EWEB Challenges

- Aging Infrastructure
- Need to modernize distribution grid
- Hydro Relicensing
- Alternative Water Supply
- Surplus Power
- Falling market prices

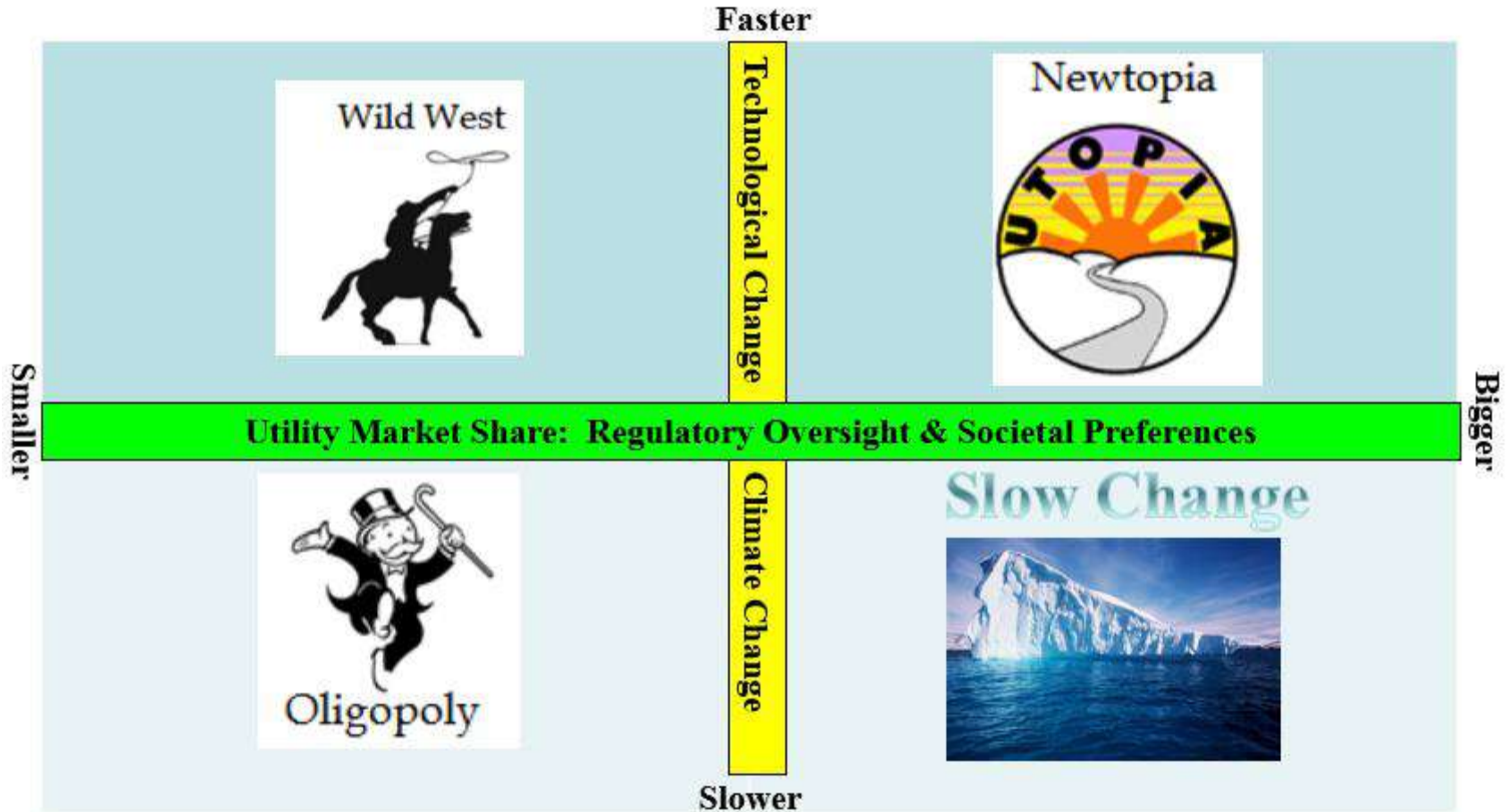


2012 IERP (renewed in 2016)



- ✓ Pursue conservation to meet all forecast load growth
- ✓ Partner with customers to avoid new peaking power plants
- ✓ Continue to rely on and expand regional partnerships
- ✓ Pursue new large load strategy, if needed
- ✓ Review progress and key assumptions annually

2014 Scenario Planning

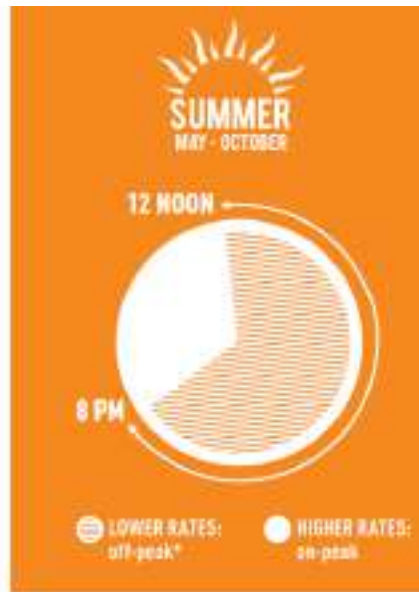
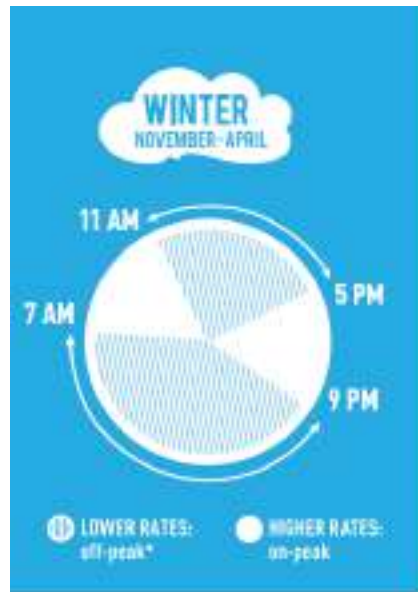


EWEB R&D

**Cold Storage
Demand
Response**

**Wastewater
Demand Response**

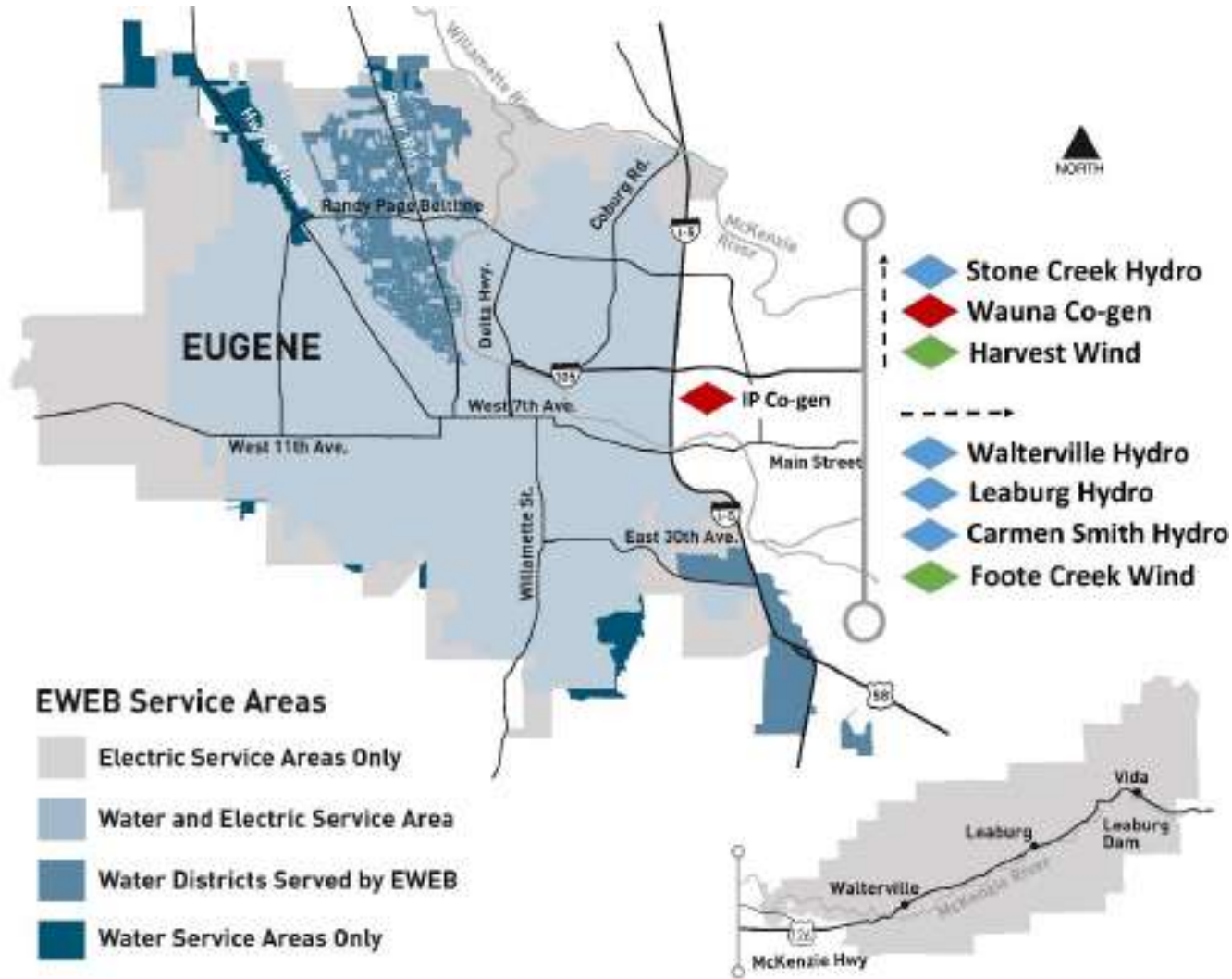
**Water Heaters as
Thermal Storage:
intra-day and
intra-hour**



**Time of Use
Pricing**

**Grid Edge
Demonstration
Project**

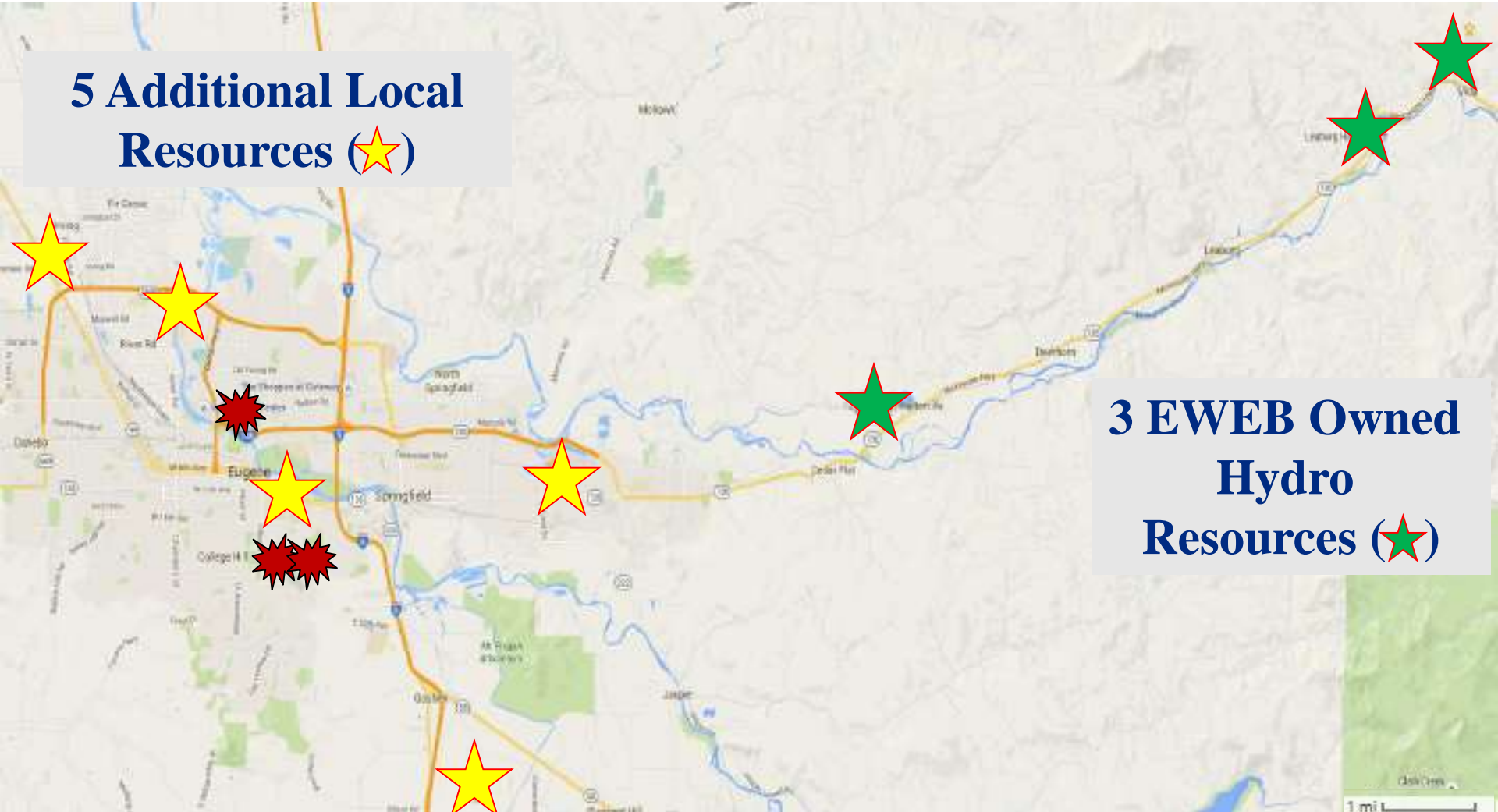
Owned Assets & Service Territory



Local Generation

5 Additional Local Resources (★)

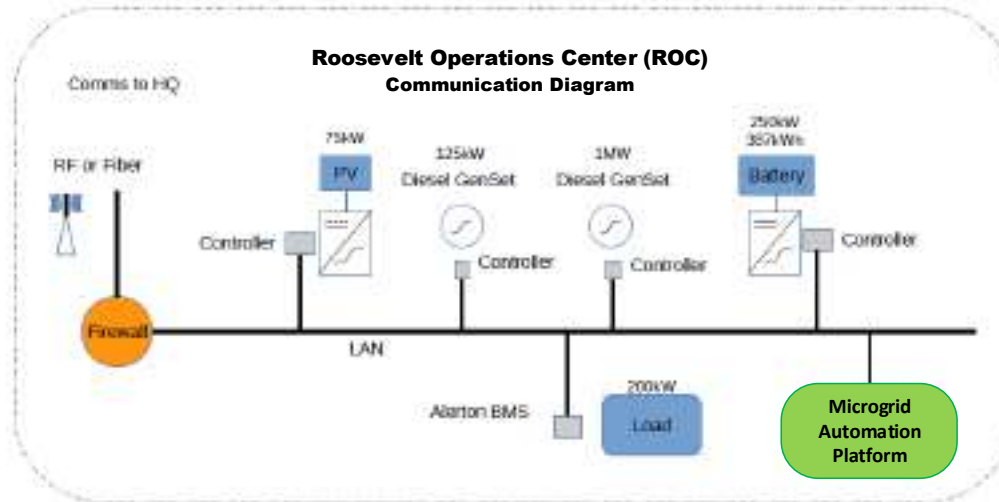
3 EWEB Owned Hydro Resources (★)



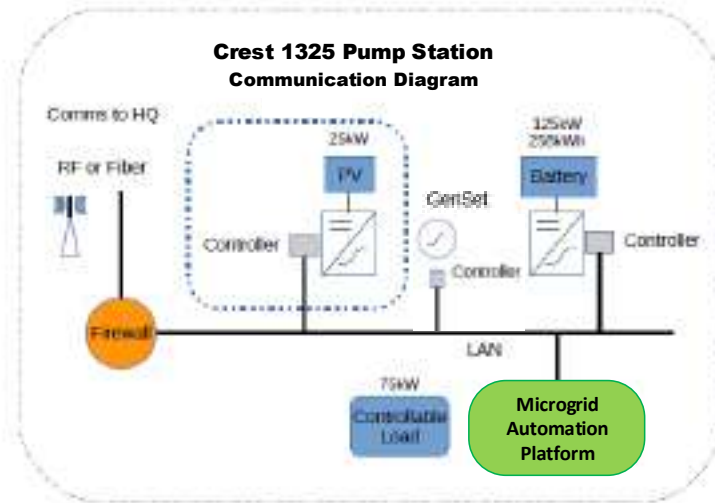
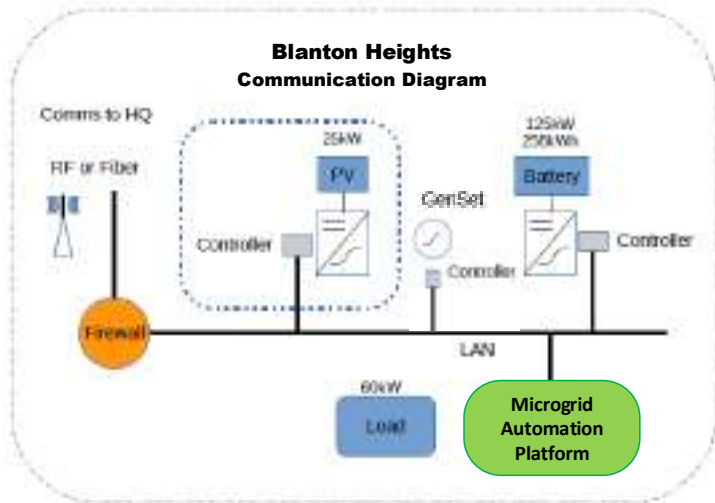
Grid Edge Demonstration Project

- Explores ability to *move toward* Distribution System Operator (DSO) model
- Ability to integrate customer- *or* utility-
owned distributed energy resources (DER)
 - ✓ *Community resiliency/disaster recovery*
 - ✓ *Integrating renewables*
 - ✓ *Peak reduction*
 - ✓ *Ancillary grid services*
 - ✓ *Explore shared community investment strategy*

Grid Edge Demonstration Project



- Microgrid Automation Platform**
- Cloud-based Integration
 - Graphical user interface
 - User authentication
 - Alarm & events
 - Equipment scheduling
 - Data acquisition services
 - Device configuration
 - Field comm. protocols

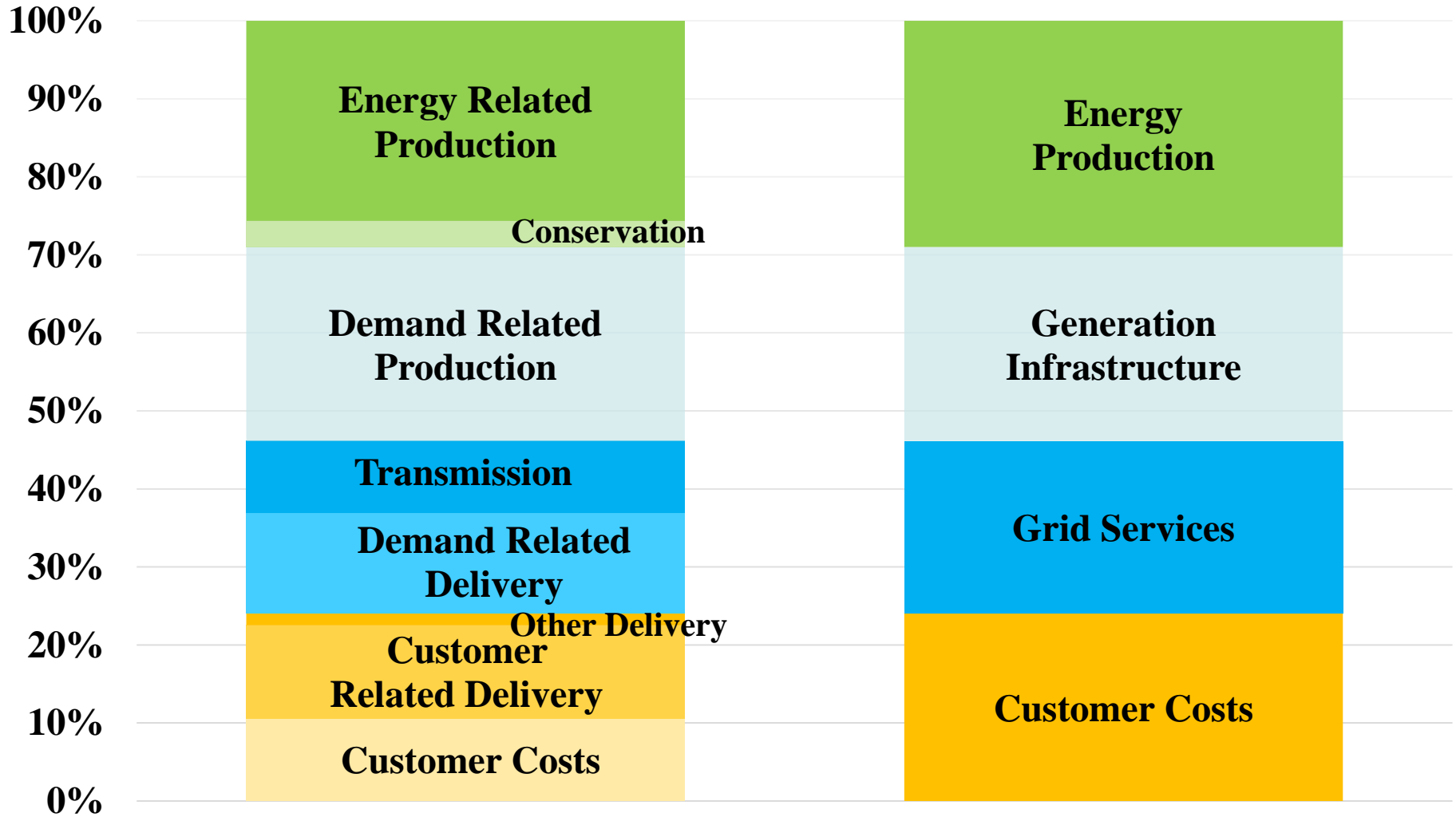


Assessing Value Streams Beyond Disaster

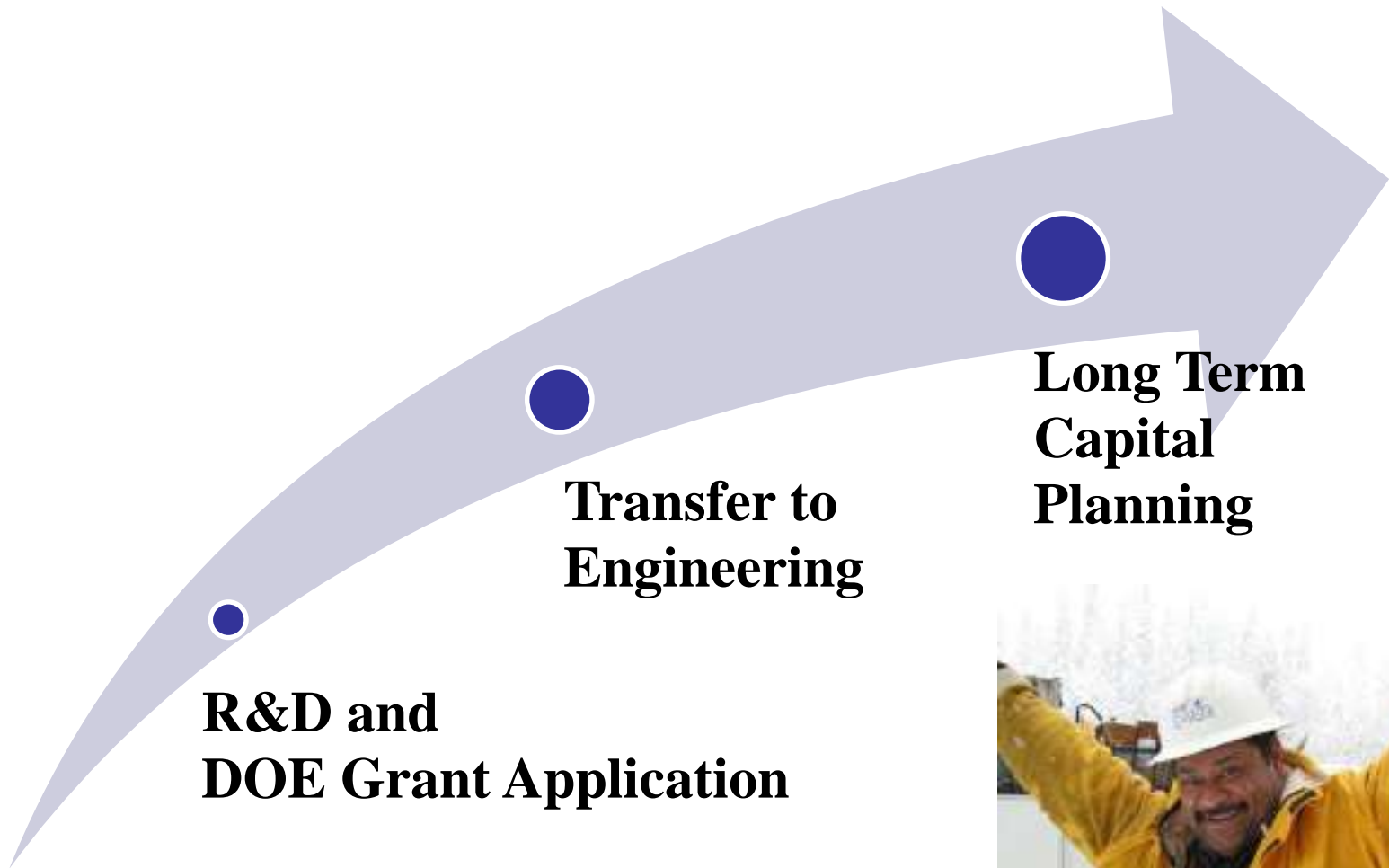
Recovery: *Early Thinking*

Use Case	Valuation
Demand Response	Value represents short term market value for daily option call (avoided cost)
Peak Shift	Energy cost differential on-off peak
Transmission/ Congestion	Network Transmission charge from BPA
AGC Control	Expected value of avoided persistent deviation charges
Energy Arbitrage	Calculations assume 88% roundtrip efficiency and 2014-15 wholesale market spreads (LLH vs. HLH spread)
PQ/Volt- VAR	Possible benchmarks are capacitor bank and advanced inverters
Resource Adequacy	Implied capacity value of required resource additions or market cost to procure

Pricing Reform Needed



Grid Edge Demonstration Project Phases



Partners



Rely on us.