

Infrastructure Investment: A Multi-Billion Dollar Opportunity to Get Off of Carbon

**It's happening. What now?:
Climate Change Research and Action in Washington State
-- January 13, 2016 -**



the evergreen
state college

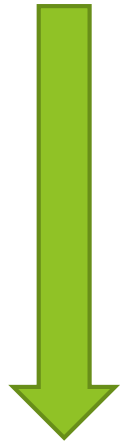
**Center for Sustainable
Infrastructure**

**Rhys Roth
Director, Center for
Sustainable Infrastructure**

Infrastructure = Boring!?

...but it's SO Important!

► Economic Development



► Environment

► Quality of Life

- Vital services
- Affordability for residents and business
- Job creator & sustainer
- Attract real estate/business investment



We're going to spend staggering sums

...in the coming decades to keep our transportation, energy, water, and waste systems in working order.

- ▶ *Globally, \$57 trillion* will be required for infrastructure by 2030 just to keep up with GDP growth -- McKinsey and Company
- ▶ *Along the Pacific Coast, \$1 trillion* needed the next 30 years -- CH2M Hill



How do we get *smarter* about how we'll invest this money?

Our Infrastructure Deficit

1. **Capital funding is lagging to restore aging facilities, and to accommodate growth.**
 - ▶ Traditional state and federal funding sources have shrunk
 - ▶ Revenues may decline as people get more efficient
2. **Budgets for O&M are under serious strain as systems age and costs escalate.**
 - ▶ Maintenance deferred is 2-4x more expensive



Innovation Required!

"We're making decisions today that we'll live with for 50 years. We can't keep doing things the way we always have."

-- Peter Binney, 2011 winner
of the ASCE President's Medal



Center for Sustainable
Infrastructure

The purpose of the Center for Sustainable Infrastructure:

- Advance a new sustainable infrastructure paradigm and practice
- Help Washington and Oregon become nationally-recognized innovators in sustainable infrastructure solutions.

Interview 70 Thought Leaders and Innovators

- ▶ From Washington, Oregon and British Columbia
- ▶ Span the energy, transportation, water and waste sectors, plus cross-cutting experts.



Infrastructure Crisis,
Sustainable Solutions:

Rethinking Our Infrastructure Investment Strategies →

Special report:

Inspiration and guidance for current and future infrastructure leaders, policymakers, and change agents.



Go for the Triple Crown: Fiscally Sound, Resilient, and Sustainable

The best infrastructure solutions optimize simultaneously for:

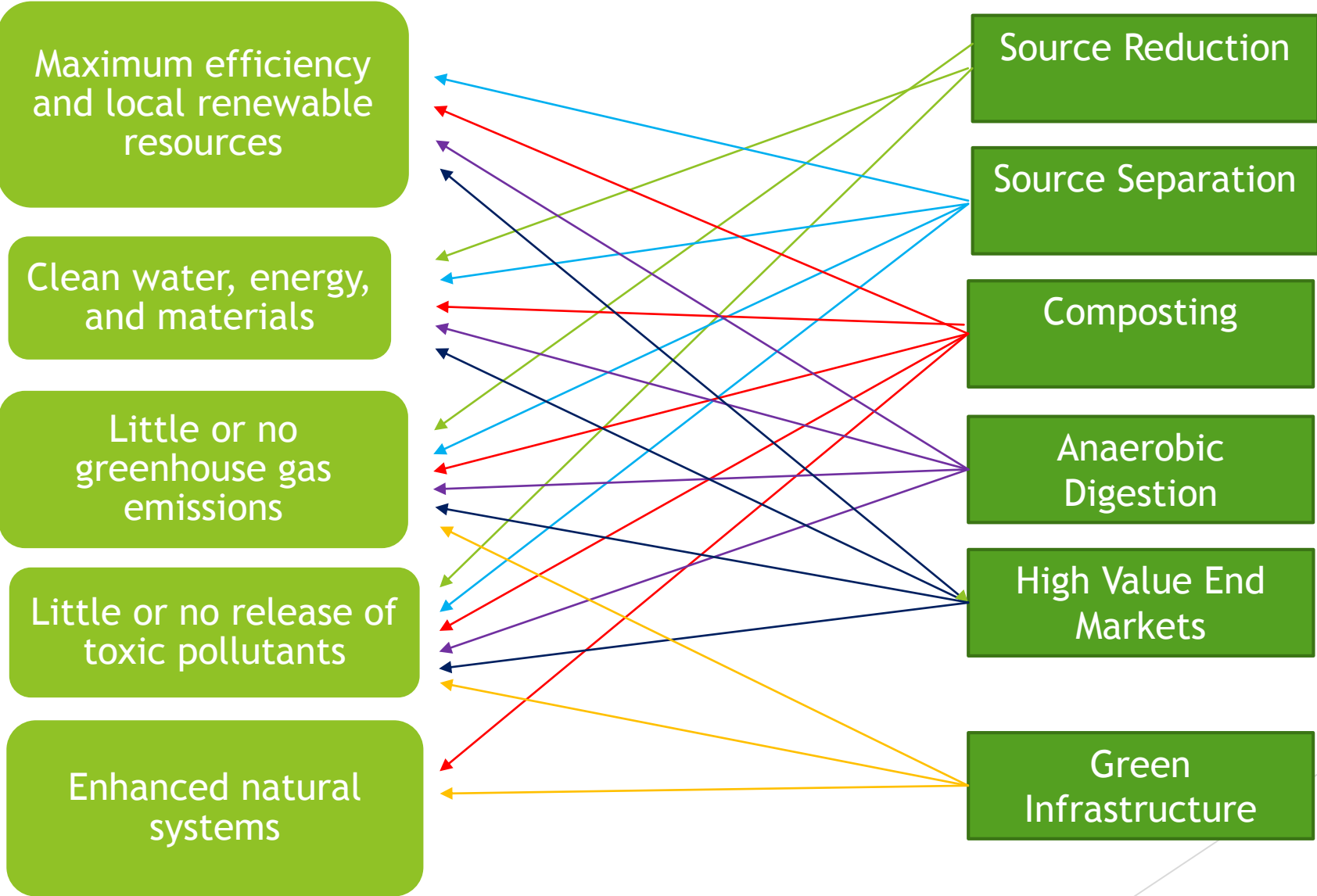
- ▶ **affordability** for residents and businesses, for the long-term
- ▶ **superior environmental performance**
- ▶ **resilience** in the face of major disruptive events

And the Fourth Crown:

- ▶ **multiple community-wide benefits** - economic, public health, social, environmental

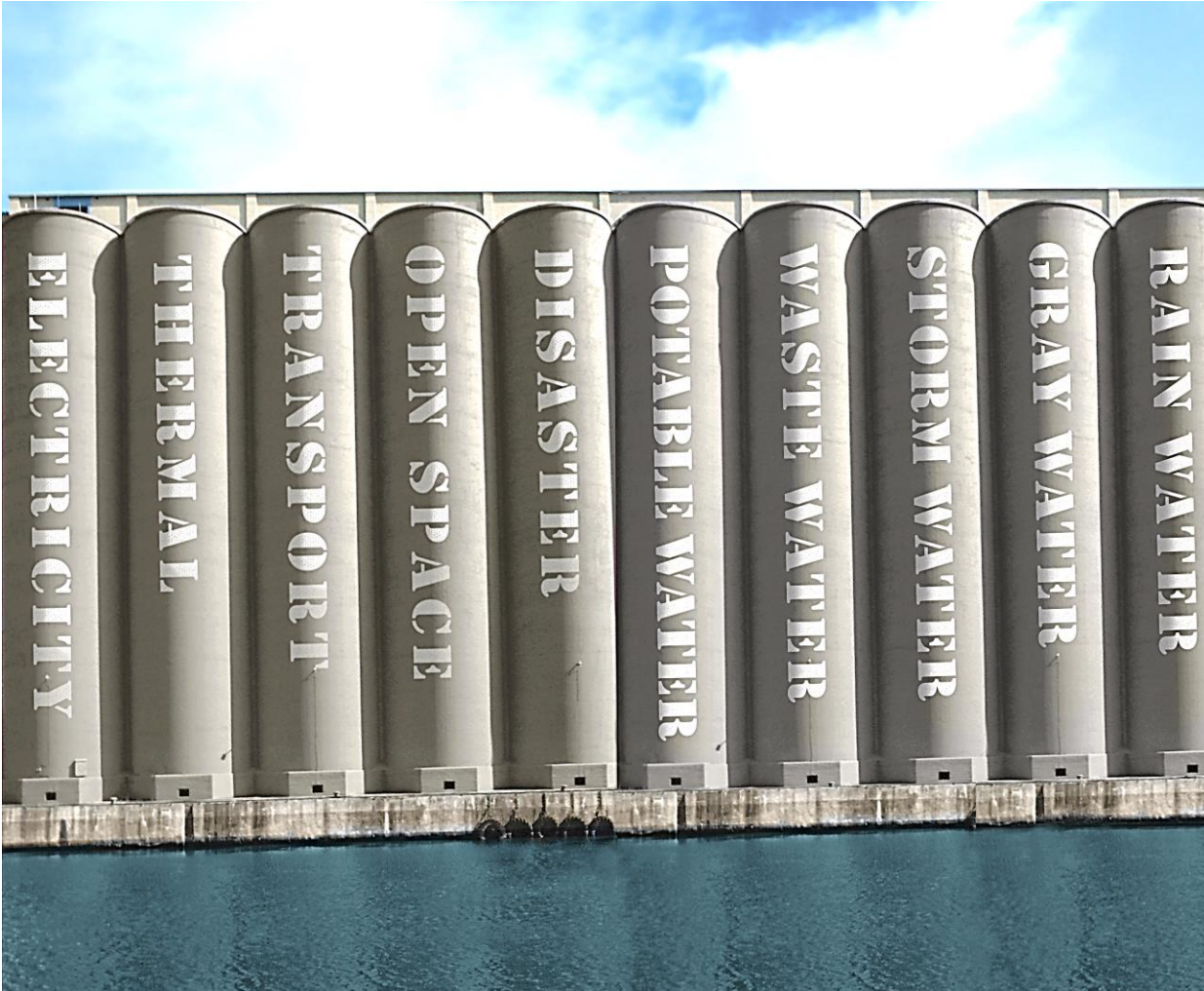


Key Sustainability Metrics



BIOCYCLE

Encourage Silo-Busting

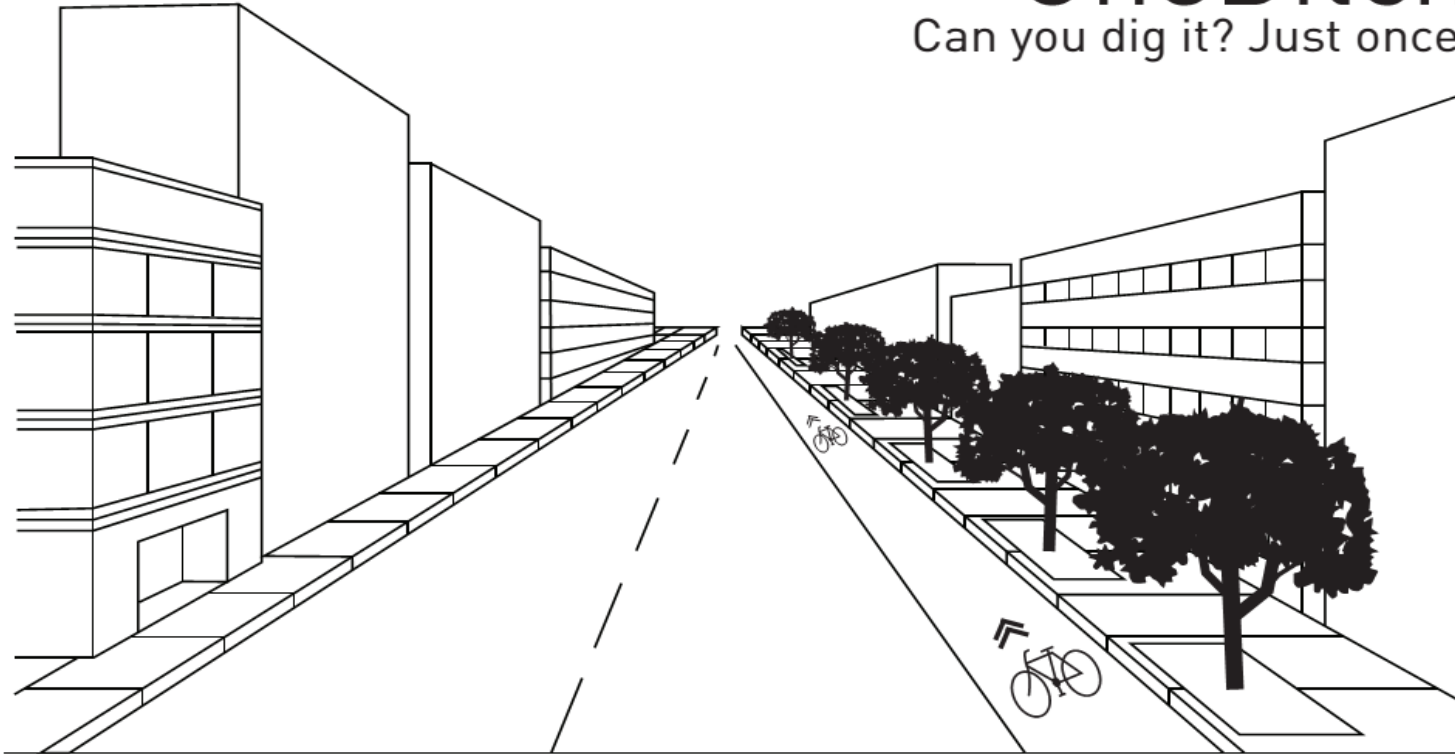


**Build
collaboration to:**

- ▶ **manage these
as parts of a
larger whole**
- ▶ **find valuable
synergies**

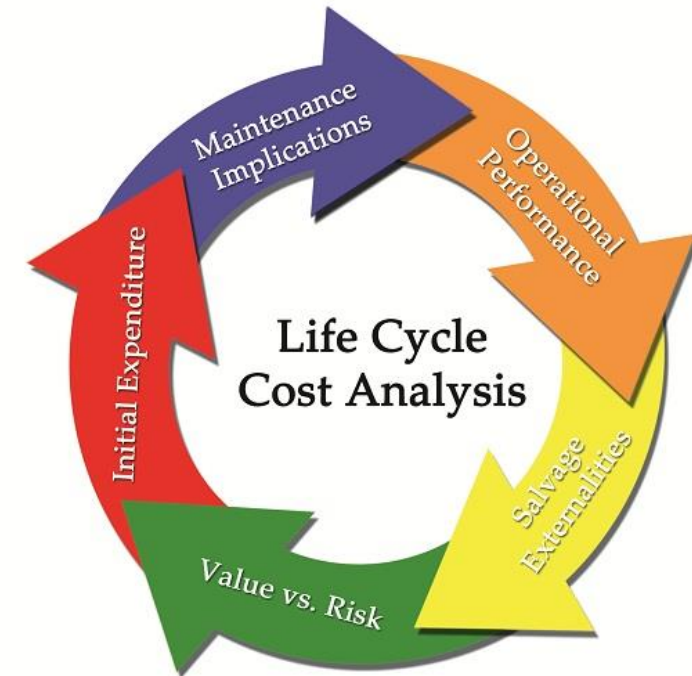
OneDitch

Can you dig it? Just once.



Build a Better Business Case

- ▶ Before committing real money to business-as-usual projects and programs:
 - ▶ Invite innovative ideas
 - ▶ Thoroughly compare options to find ones with the most community-wide benefits
- ▶ Measure full benefits and costs, and to do it on a life-cycle basis.
 - ▶ Within the department silo, to government more broadly, and to the community.



Shining Example:

Seattle
Public
Utilities

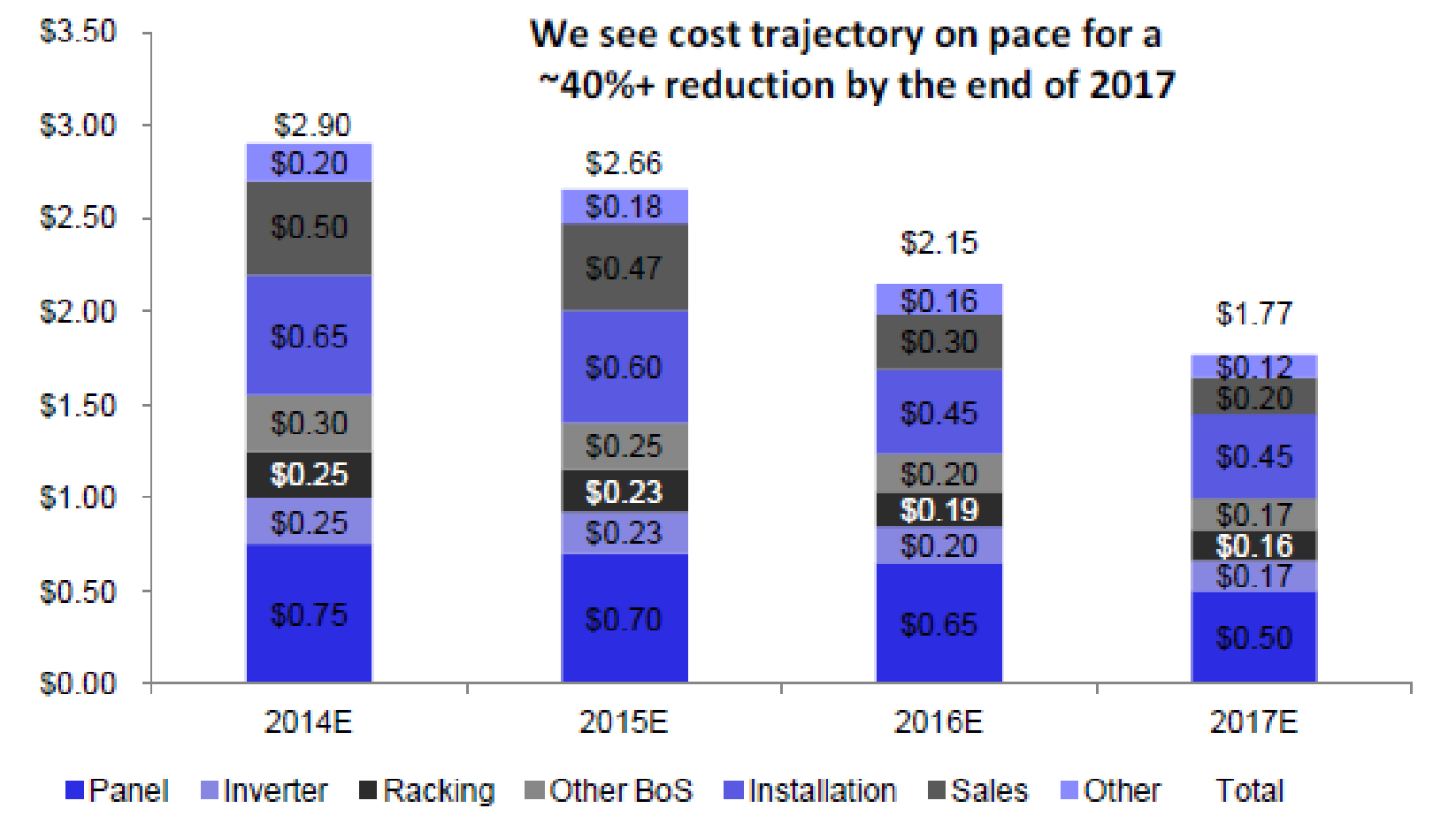


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Solar: Further Cost Declines, Market Expansion Expected

Figure 39: Cost Reduction Example: USA



Source: Deutsche Bank



419 kWh solar array at Gresham, OR's WWT Plant

Solar now supplies 1% of global electricity. Deutsche Bank forecasts solar will supply **one-third** of the (twice as big) global market in 2050.

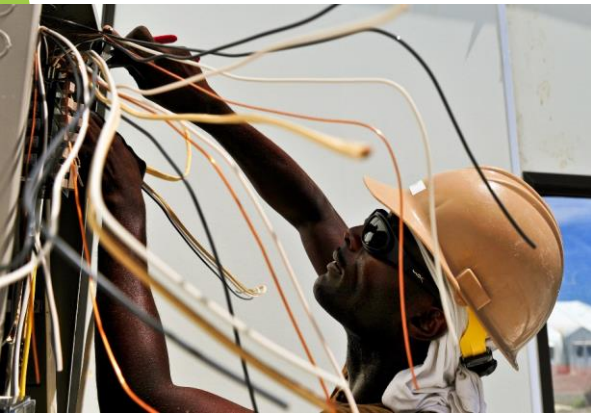
Get Smart

- ▶ Today people are packing information, communications, and monitoring capabilities unimaginable a generation ago.
- ▶ Advanced technologies are transforming many industries.
- ▶ Infrastructure managers could achieve radical cost efficiencies and service gains.



Build Community Prosperity

- ▶ Infrastructure is a **job generator** and vital to local business and **economic vitality**
- ▶ **Integrate the community's strategies** for infrastructure and economic development
 - Opportunity to **in-source quality jobs** and develop **pathways out of poverty**
- ▶ Higher education and apprenticeship programs can build the critical **pipeline of local talent**
 - **The infrastructure workforce is graying!**



Growing Appetite for a New Strategy

“We need a far-sighted **Statewide Infrastructure Strategy** that starts with meeting the needs of Washington communities and builds the capacity of our people, our economy, and our government to thrive throughout the 21st century...

“Our investments will deliver more value, multiple benefits, better asset and risk management, and improved cost-effectiveness. **At the same time, smarter infrastructure investment will help address our most pressing environmental challenges** and foster healthy, prosperous, resilient, and equitable communities.”

-- From the vision statement of
the ***Future of Washington Infrastructure*** group



Future of Washington Infrastructure - Participants

Key staff from:

- ▶ Association of Washington Cities
- ▶ Washington State Association of Counties
- ▶ Washington Association of Sewer and Water Districts
- ▶ Washington PUD Association
- ▶ Public Works Board of Washington
- ▶ Building Industry Association of Washington
- ▶ Washington Department of Ecology, Commerce, and Health
- ▶ Futurewise... and several others



Washington State
Association of Counties



WASHINGTON PUBLIC UTILITY DISTRICTS ASSOCIATION
WPUDA
YOUR connection

5 Big Goals for 2040

1. Ace the state infrastructure report cards; lead the nation in innovative projects
2. Convert 95% of all types of energy use to renewables; fully deploy efficiency to cut demand 60%
3. Wring out water waste by 60%; integrate across water-wastewater-stormwater silos on watershed basis
4. Upgrade 75% of neighborhoods to “Very Walkable”; connect cities with high speed transit
5. Ensure 90% of products are managed by producers after use, and most ‘waste’ material is recovered by local industry



5 Big Goals for 2040 series: First Up: ENERGY!

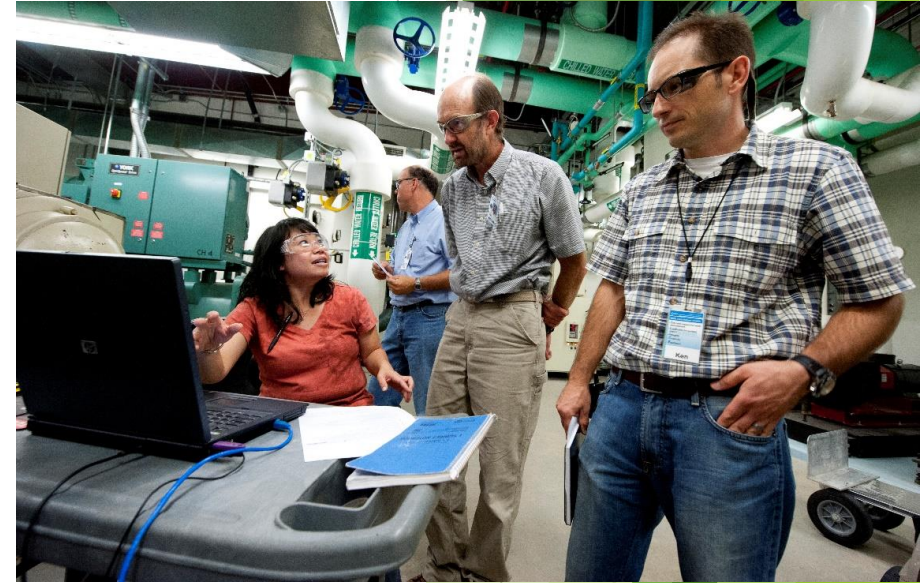
Core Question:

How can the Pacific Northwest develop an integrated energy system - for electricity, transportation, heating and cooling -- among the most sustainable, resilient, and affordable in the world?



Renewing the NW's Energy Infrastructure: A 2040 Vision

- ▶ Formal interviews with 33 top Northwest energy thought leaders and innovators
- ▶ Supplemented by wide-ranging literature research
- ▶ Thorough review by a 20-member Executive Review Team



We're Entering a New Era...

- ▶ Rapidly declining costs and improving performance for new tech
- ▶ Integrated energy solutions that dissolve boundaries b/w electric, transportation, and heating-cooling silos
- ▶ Spreading like wildfire: Commitment among citizens, businesses, and policymakers to shrink our carbon footprint



IF IT'S True...

that we can have an energy system that **performs better**, for roughly the **same or lower cost**, and **gives our kids clean air** at the same time -

why wouldn't we build *that*?



A Vision for our 2040 Energy System

Window on the Future: How a 2040 Energy System Could Work

Spotlight on the Parts: Technologies Transforming the Energy System

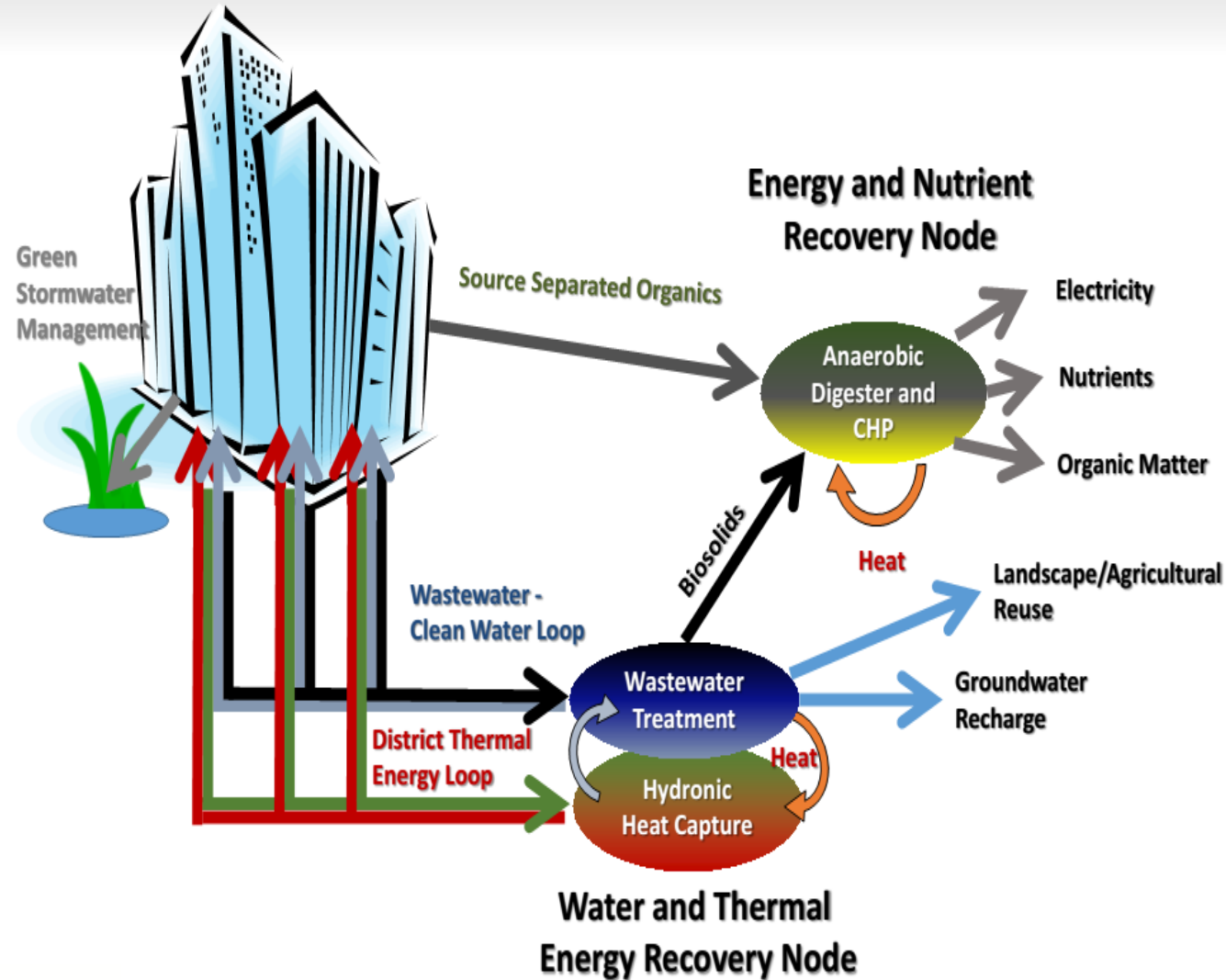
- ▶ **Energy Tools in Customer Hands**
 - ▶ Produce + Reduce + Manage Energy
 - ▶ People + Companies + Institutions + Governments
- ▶ The Flexibility Revolution
- ▶ Transmission Flexibility
- ▶ Bulk Power: Sun, Wind, and Water

Integrated, Silo-Bridging Solutions

- ▶ Driving Clean
- ▶ Clean Heat
- ▶ Waste, Water, Wastewater and Energy



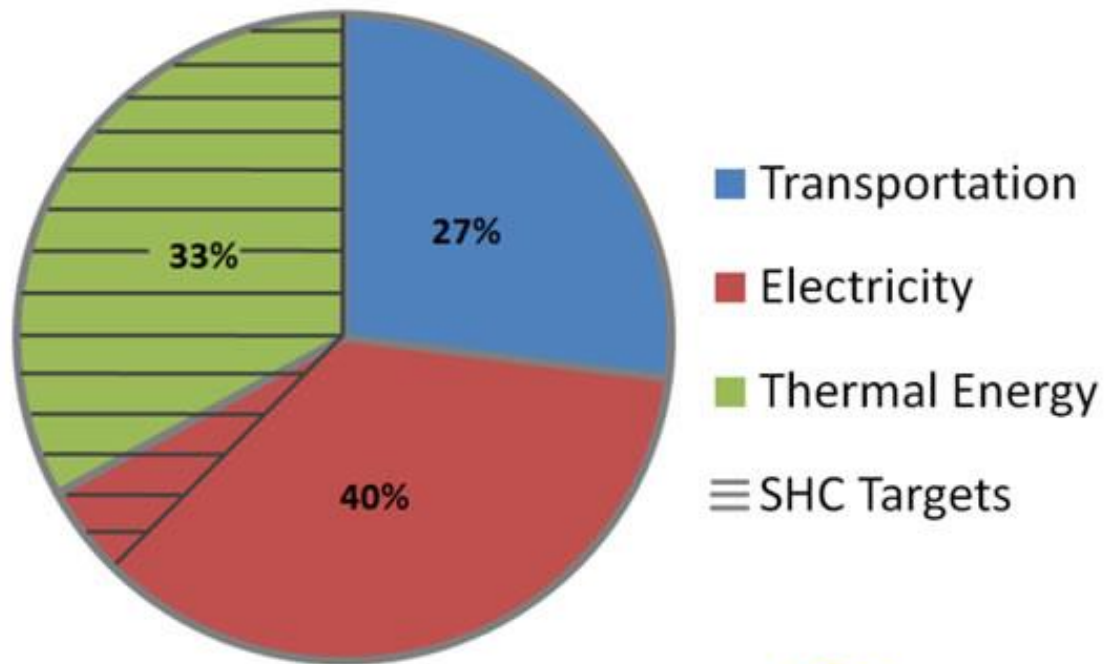
Wastewater Treatment Plant Reimagined



A Factory for:
Clean Water
Clean Energy
Rich Soil

It's not just about Electricity... or even Transportation... **Heating is HUGE, too!**

U.S. Energy Loads and Target SHC Offsets



Heat = 1/3 of
U.S. energy use

... another 11% is for
cooling!

Heat-Cool

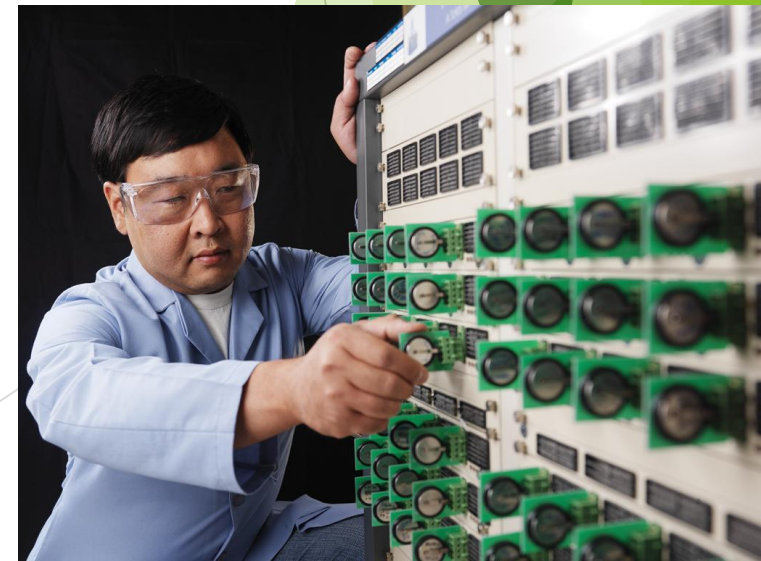
The Invisible Half of
the Energy Challenge

Fossil Fuel Energy Costs Us \$30B a Year!

Let's Get Audacious!

Three Audacious Ideas to turn that drain into a faucet of Northwest opportunity:

1. Develop a World-Class, Integrated, **Fossil-Free Energy System**
2. Launch a **Sustained Jobs Campaign** that Develops the Next-Gen Infrastructure Workforce
3. Ramp Up R&D to Make the Northwest a **Living Laboratory** for Large-Scale Deployment of Advanced Energy



Bottom Line: We Need Infrastructure Innovators!

- We're running a serious *infrastructure deficit*
- Coming Soon: *The Great Retirement Wave* (>10% of national employment!)
- *Climate change is on us*

We need to:

Reimagine our Infrastructure Systems -
Innovate!

Rethink Infrastructure Investment!

Inspire and Mentor a New Generation of
Planners and Managers!



For more information, contact...

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**Center for Sustainable
Infrastructure**