Rewiring the Northwest’s Energy Infrastructure: An Integrated Vision and New Investment Strategy

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Rewiring the NW’s Energy Infrastructure: Key Findings

- Take the Long View: What kind of energy system do we want in 2040?
- The Coming Tech Revolution - no turning back
- Rethinking the Utility Business Model
- Redesigning State Policy
CSI Inaugural Report

- Rethink our infrastructure investment strategies to get better outcomes.
- Interviewed 70 thought leaders from WA, OR, and BC.
- Spans energy, transportation, water, and waste sectors.

The Multi-Billion Dollar Question:
How do we get smarter about how we’ll invest this money?
Key Innovation Principles for Sustainable Infrastructure

- Go for the Triple Crown: *Affordable, Resilient, and Sustainable*
- Encourage Silo-Busting
- Build a Better Business Case
- Choose for a Changing World
- Get Smart
- Build Community Prosperity
5 Big Goals for 2040 series: First Up - ENERGY

The Design 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?
Is there a win-win shared vision?

Can we have an energy system that performs better, for the same or lower cost, that gives our kids clean air, and in which our utilities are financially healthy...?
Constructing a 2040 Northwest Energy Vision

- Sit-down interviews with 33 energy leaders: utilities, regulators, advocates, companies, public agencies, academics...

- Supplemented by wide-ranging literature review

- Thorough review by 20-member Executive Review Team
We’re Entering a Very Exciting, Transformative New Era...

- **Rapidly declining costs** and improving performance for ‘disruptive’ new tech

- **Spreading like wildfire**: Commitment among citizens, businesses, and policymakers to shrink our carbon footprint

- **Integrated energy solutions** that dissolve boundaries b/w electric, transportation, and heating-cooling silos
Key Drivers for Transformative Change

- **Disruptive Technologies**
  - Customers will bring billions of dollars in new investment to our energy infrastructure

- **Disrupted Utilities**

- **Aging Infrastructure, Aging Workforce**

- **Clean Air and Climate Change Policy**

- **The Resilience Imperative**
Falling Costs for Clean Energy Tech
Solar PV: No Plateau in Sight for Declining Costs

Figure 39: Cost Reduction Example: USA

We see cost trajectory on pace for a ~40%+ reduction by the end of 2017

Source: Deutsche Bank
Energy Tools in Customer Hands

- Customers = People + Companies + Institutions + Governments

- The New Energy Marketplace: Save/make money and cut your carbon footprint with products to Produce + Reduce + Manage Energy

**Produce Energy:**
- Solar PV

**Reduce Energy:**
- Super-efficient equipment and buildings
- Convert from petroleum cars to EVs

**Manage Energy:**
- Store energy + flex timing of demand
The Future of Cars: Will We Witness the End of Petroleum’s 100-Year Reign?

- Tesla advertises its 2016 electric Model X as the ‘safest, fastest, and most capable SUV in history’

- Tesla’s mass market ($35k) Model 3 reservations over 400,000

- Also in the race to mass market EVs: BMW, Mercedes, GM, Ford, Toyota, Honda, Nissan, Renault and Kia

“There are an awful lot of companies right now playing with electric cars and... self-driving cars. This is the future and it might be huge ... and it is perfect territory for a company like Apple.”

-- Apple co-founder Steve Wozniak

"Our market cap would be basically the same as Apple's is today.”

Elon Musk
Tesla’s ‘Gigafactory’: A game-changer for battery costs?

Competitors aiming to scale battery production:

- BYD (Chinese, Buffet-backed)
- Samsung
- Foxconn
- Possibly Apple
Solar + Batteries: Soon-to-be ‘Clear financial choice’?

Using conservative assumptions and no incentives, our model indicates that the incremental cost of storage will decrease from ~14c/kWh today to ~2c/kWh within the next five years. When overall system cost decreases are considered, we believe solar + batteries will be a clear financial choice in mature solar markets in the future.
It’s not just about Electricity… or even Transportation...

Heating is HUGE, too!

Heat = 1/3 of U.S. energy use… another 11% is for cooling!

Today = mostly inefficient electric and fossil gas

... another 11% is for cooling!

Heat-Cool

The Invisible Half of the Energy Challenge
Is there a Future for Our Utilities?

- Today’s utility business model doesn’t work
  - ...for the coming transformed energy marketplace

- We need healthy utilities!
  - Utilities are one of the 20th century’s great social innovations, providing vital services affordably to everyone
  - Can enable us to invest in big valuable systems for broad benefit
“The 20th century model was about a shared system that created huge public benefit... The 21st century’s challenge is to keep the best - shared and public benefit - and make it clean and more resilient.” - Roger Gray
What We Need from a New Utility Compact

- Powerfully incentivize utilities to invest in smart infrastructure pathways
  - Smart investment optimizes economic, environmental, and community value on the lifecycle

- Outcomes-Based:
  - Utilities pay for performance -- actual benefits delivered to our shared infrastructure
  - Base utility returns, not on capital spend, but on achieving performance metrics that serve state- or system-wide goals.
  - Can we ensure utilities can reliably recover long-term costs for smart investments, even as the energy marketplace transforms?
Rethinking the Utility Business Model

Best investments ‘do more than one thing’
- Produce clean energy or cut energy demand
- Reduce peaks
- Provide demand flexibility
- Increase resilience, cut downtime (via microgrids?)

What’s the actual Value of Solar?
- It’s probably location specific
- There are direct benefits to the system, and broader community benefits
  - both matter, and need to be counted
Utility Workforce +
Decision-Maker Turnover

U.S. Utilities Face a Great Retirement Wave

- Currently eligible:
  - Employees: 19.3% 20.2% 20.4%
  - Executives: 24.0% 20.8% 33.0%

- Eligible in five years:
  - Employees: 37.2% 40.7% 38.9%
  - Executives: 42.9% 50.0% 63.3%

2010 2011 2012
Redesigning State Policy

State Leadership -- Key to steering change to optimize value and benefits for everyone

- State vantage point spans silos
- Serves the broad public interest

A New State Infrastructure Strategy

- Vision and System-Wide Goals
- Performance Metrics
- Principles for Innovation
- Rethink the Utility Compact
  - ...and the layers of inherited regulations, policies and processes developed for the old energy marketplace
Golden Economic Opportunity!
NW Spend on Fossil Fuels = $30B/year

Convert that $$ drain of imported energy into a faucet of local energy jobs:

✓ Energy infrastructure jobs program:
  ▪ **Aim Big**: Develop a world-class, integrated, virtually fossil-free energy system
  ▪ **Ensure strong markets** to sustain a vibrant ecosystem of local companies - including solar providers!
  ▪ **Develop the next-gen workforce**

✓ **Ramp up R&D**
  ▪ **Make the NW a Living Laboratory** for solving key advanced energy challenges
  ▪ **State investment will pull in federal and private $$**
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