Energy Trends and Technologies

Background/Introductions

Jack Baker

Energy Northwest

Tracy Yount

Battelle

Paul Kimmel

Avista Corp.

Purpose/Format

- Educate
- Coordinate
- Have a conversation

Energy Northwest

Jack Baker, Vice-President

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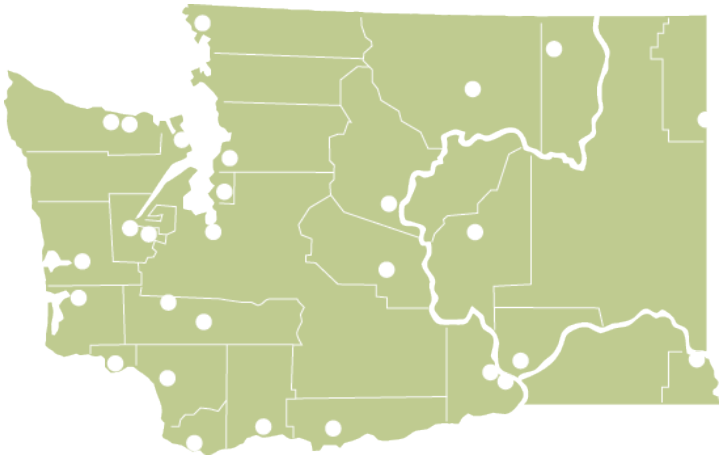
October 5, 2010

Energy Northwest – At A Glance

- Providing public power needs since 1957
- Hydro, solar, wind and region's only commercial nuclear power plant
- Projects generate carbon-free power for 1 million homes
- 10% of Bonneville Power Adminstration generation needs
- 1,100 employees

Energy Northwest – Who are We?

A not-for-profit Municipal Corporation



Asotin County PUD	Clark Public Utilities	Kittitas County PUD	Pend Oreille County PUD
Benton County PUD	Cowlitz County PUD	Klickitat County PUD	Seattle City Light
Chelan County PUD	Ferry County PUD	Lewis County PUD	Skamania County PUD
City of Port Angeles	Franklin County PUD	Mason County PUD No. 1	Snohomish County PUD
City of Richland	Grant County PUD	Mason County PUD No. 3	Tacoma Public Utilities
City of Centralia	Grays Harbor County PUD	Okanogan County PUD	Wahkiakum County PUD
Clallam County PUD	Jefferson County PUD	Pacific County PUD	Whatcom County PUD

Energy Northwest – Economic Comparison: 500 MWa

Technology	Capital Cost $/KW	Capacity Factor %	Install MWe for 500MWa	Capital Cost for 500MWa
Coal	$3300	80	625	$2.1B
Gas-CT	$1200	50	1000	$1.2B
Modular Nuclear	$4000	90	550	$2.2B
Wind	$2200	33	1500	$3.3B
Solar	$4000	25	2000	$8.0B

Energy Northwest Economic Comparison

Technology	Capital Cost 500MWa	Debt Cost 20yr/5%	O&M Costs $/ MWhr	Fuel Cost $/ MWhr	Carbon Costs $/ MWhr	Total Costs $/ MWhr
Coal	$2.1B	38	8	25	25	96
Gas-CT	$1.2B	22	5	55	10	92
Modular Nuclear	$2.2B	40	20	6	0	66
Wind	$3.3B	60	15	0	0	75
Solar	$8.0B	145	2	0	0	147
Conservation Energy Efficiency	500W savings is $329/year savings at $75/MWhr					

$2/MMBTU delivered coal 2000#/MWhr GHG – coal $25/T Carbon tax

$8/MMBTU delivered gas 800#/MWhr GHG – gas

Energy Northwest – Energy – Economy – Environment

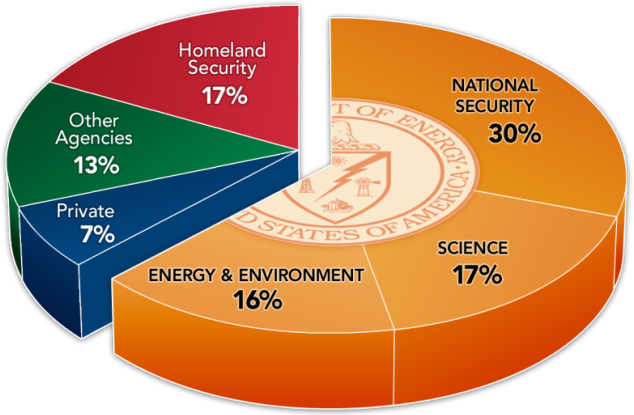
- Energy efficiency helps everything – who pays?
- Wind is energy – needs to compliment other energy options
- Solar is good for capacity management – expensive
- Traditional coal – can't permit
- IGCC – significant cost and policy issues with sequestration
- Natural gas – what will be the gas price over the life of the project and the cost of carbon
- Nuclear – public perception and economics

DOING NOTHING IS NOT AN OPTION

One Panel Question for Jack

Pacific Northwest National Laboratory

- $1.1 billion* in R&D expenditures in FY09
- 63% of funding is from DOE
- More than 4,600 staff
- 936 peer-reviewed publications
- 42 patents issues
- Operated by Battelle since 1965



*includes $96M in funding for CRL

Pacific Northwest
NATIONAL LABORATORY

Proudly Operated by **Battelle** *Since 1965*

Battelle

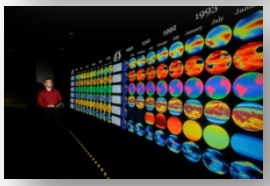
- World's largest non-profit independent research and development organization
- Four global businesses:

Pacific Northwest NATIONAL LABORATORY

Laboratory Management

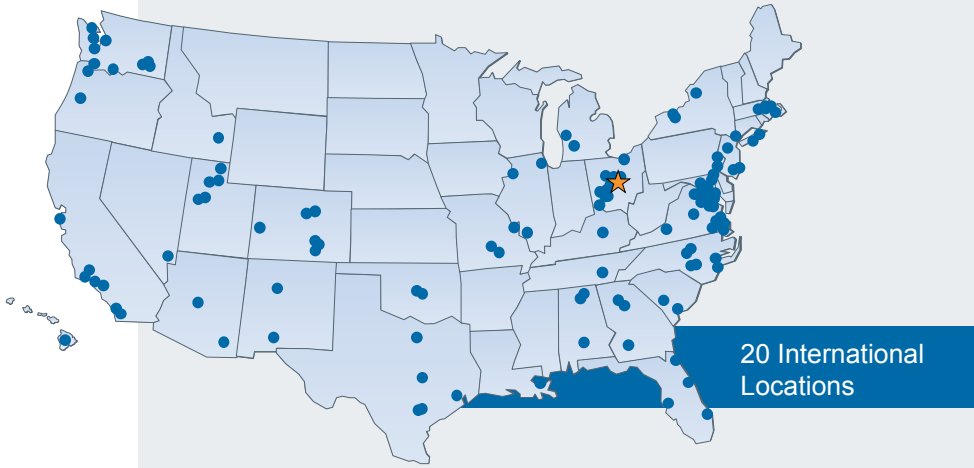
National Security

Health and Life Sciences



Energy Technology

- Generates $5.6 billion annually in global R&D
- Oversees over 20,000 employees in 130 locations worldwide



The Challenge Ahead is Complex

Historical Expectations

- Affordable, Power
- Reliable Power
- Secure Power

Emerging Expectations

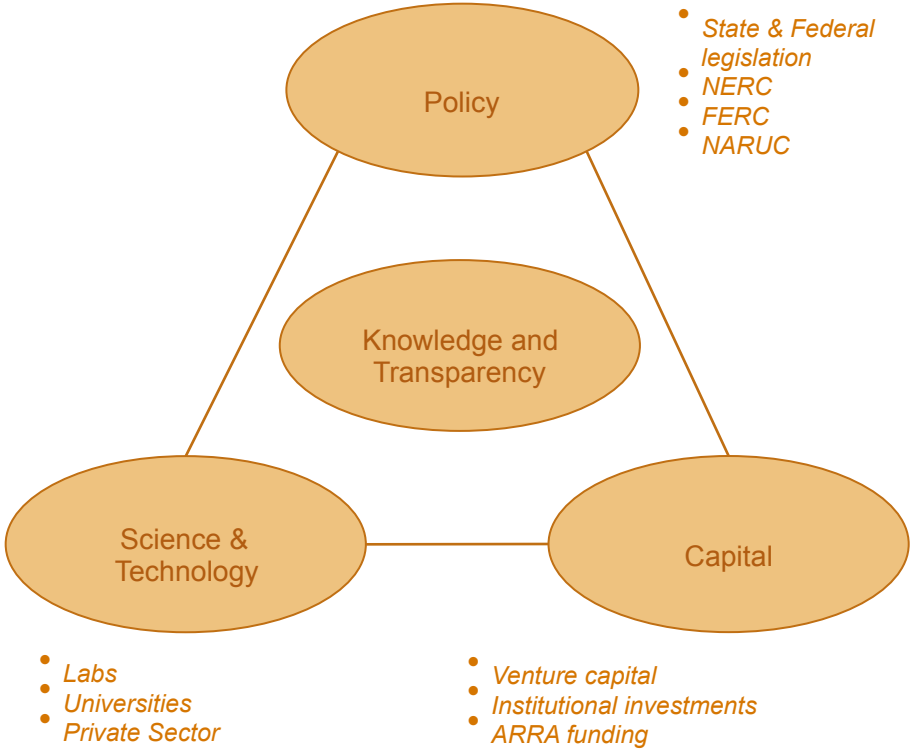
- Delivering 300 GW of renewable generation by 2025

- Maximize benefits of end-use efficiency and storage

- Electrify transportation sector to reduce dependence on imported oil

- Meet future carbon and emissions constraints

What will it take to get us there?



Battelle-led Pacific Northwest Demonstration Project

What:

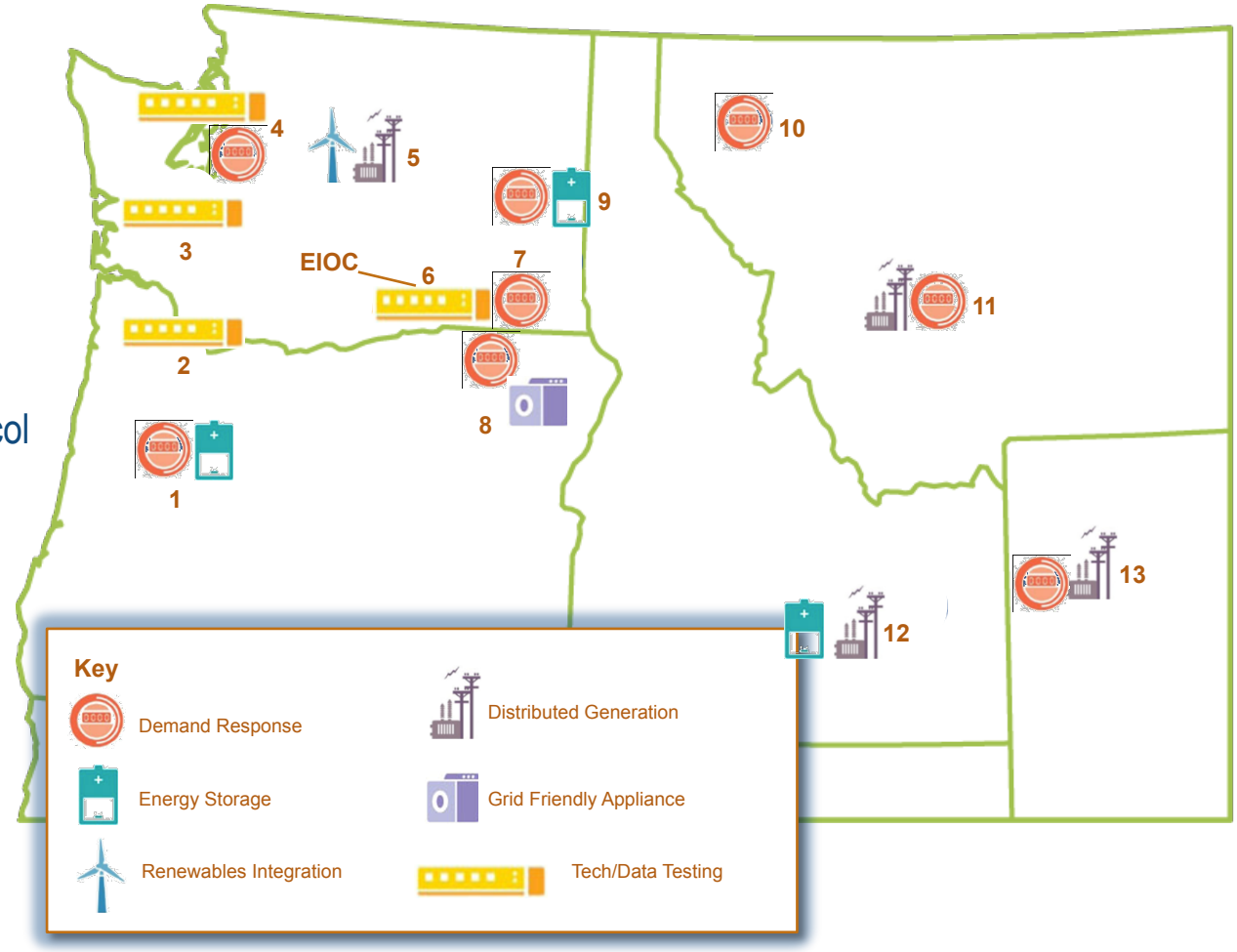
- $178M, ARRA-funded, 5-year demonstration
- 60,000 metered customers in 5 states

Why:

- Quantify costs and benefits
- Develop communications protocol
- Develop standards
- Facilitate integration of wind and other renewables

Who:

Led by Battelle and partners including BPA, 11 utilities, 2 universities, and 5 vendors



Elements of a Smart Grid

1) Existing Infrastructure
   - About 10% of the existing infrastructure is monitored in real-time
2) New transmission and generation elements
   - Wind, solar, storage, decentralized generation, etc.
3) New Technologies
   - Sensing, Measurement, and Control
4) Communications
   - From generation to consumption
5) Intelligence
   - A learning, dynamic capability to manage grid conditions

What Will be Impacted by the Grid of Tomorrow?

- Decentralized or Distributed generation will differ from traditional energy production
- Increase in transmission line corridors linking wind and other energy sources to the load centers
- Micro generation sources such as residential solar will change how utilities prepare for and maintain new electric services
- Additional communications between the consumer and generator

1 Question from Jack to Tracy

Tracy Yount, Electric Grid Research Manager
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Pacific Northwest
NATIONAL LABORATORY

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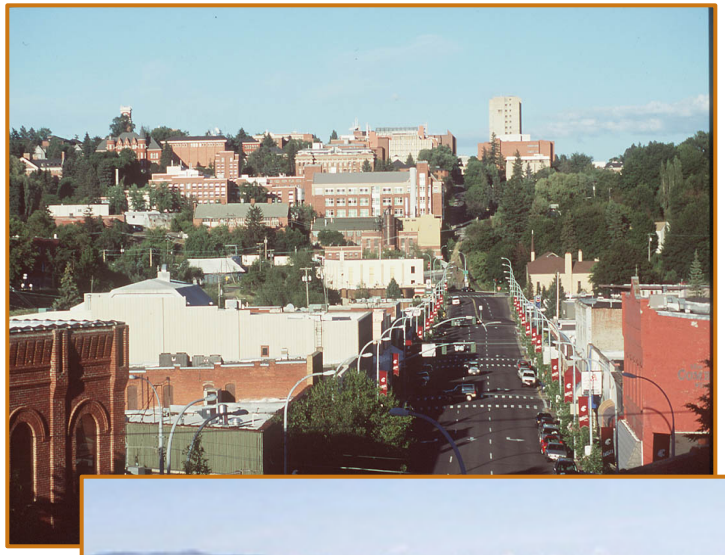
Resurgent Washington

2010 APA Washington Conference

Energy Trends and Technologies: Moving Goals and Plans Into Projects

Paul J. Kimmell
Business & Public Affairs
October 5, 2010

Exciting Opportunity "A Smart Grid City"



- Manage Supply (Energy Resources)
- Improve Reliability
- Increase Energy Efficiency
- Deliver Optimization
- Customer Participation
- Provide Enhanced Security

Avista Goals for Pullman

"A Smart Grid City"

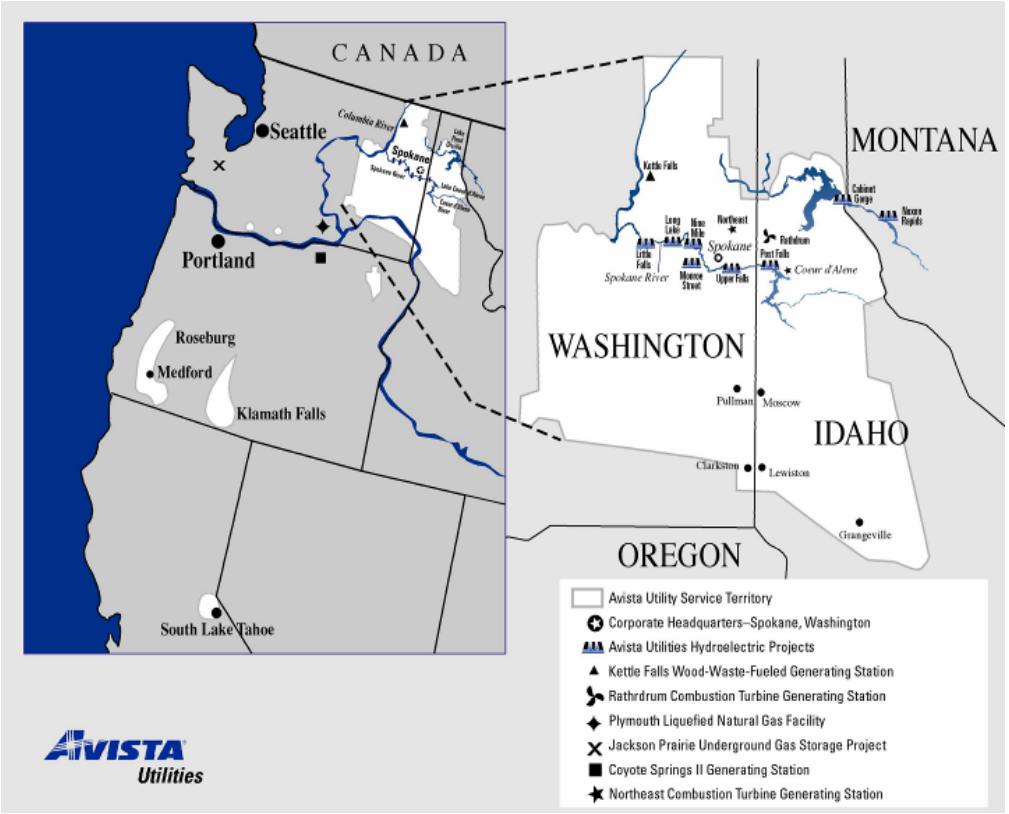
- Manage Supply (Energy Resources)
- Improve Reliability
- Increase Energy Efficiency
- Deliver Optimization
- Customer Participation
- Provide Enhanced Security

"If it weren't for electricity we'd all be watching television by candlelight."

George Gobol - Comedian

Today's Discussion:

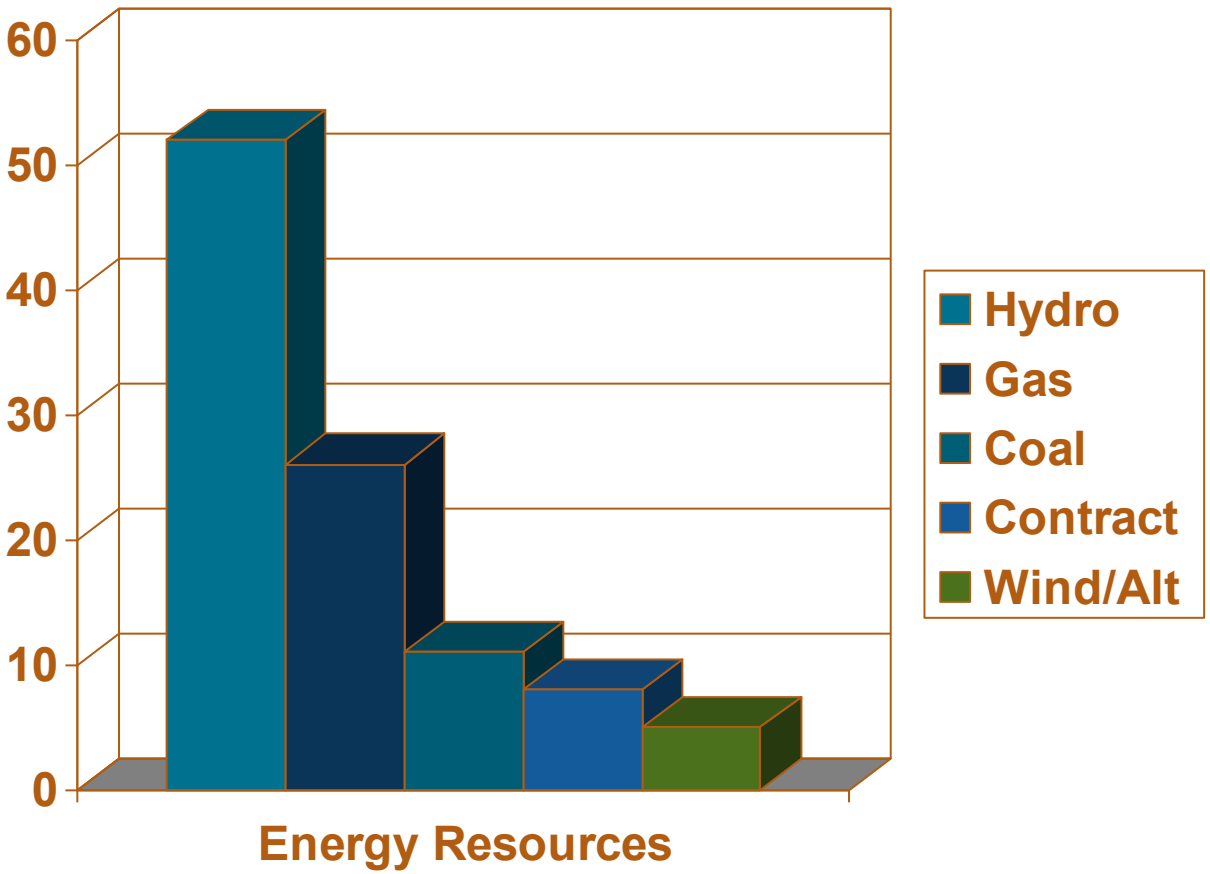
- Brief Overview of Avista Utilities
- Renewables / Wind Development in PNW
- Anatomy of a Wind Siting Ordinance – Whitman County
- Local and State Energy Policy - Thoughts



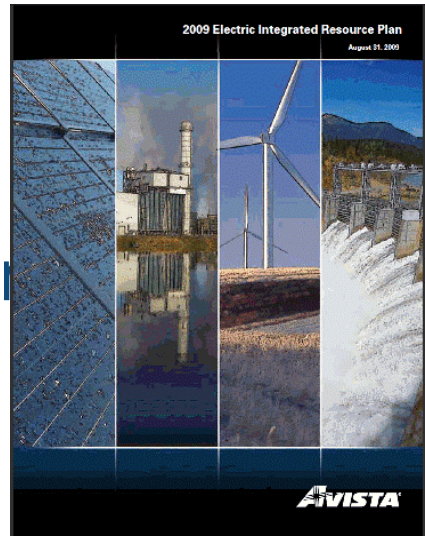
Electric Customers
352,278 Gas Customers

311,090

2010 Utility Power Supply Mix



Highlights of Avista's 2009-2010 IRP



Remixing our plans for future energy supply

Relies on a mix of renewables, hydro upgrades, EE a
natural gas

Reengaging our customers in wise use of energy and
more energy efficiency efforts

Reinforces our commitment to renewable energy and maintaining a low carbon footprint (We are one of the greenest utilities in the region!)

Renewing our commitment to applied R&D, to build prosperity

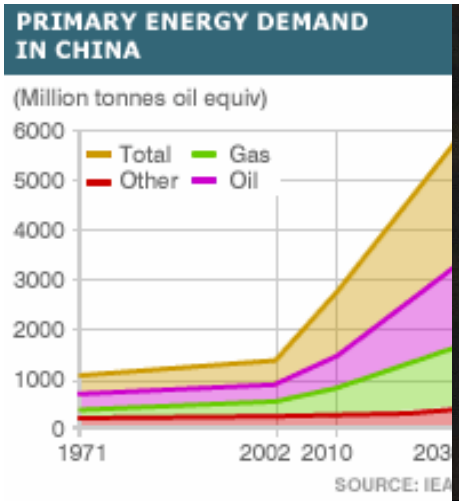
Rural Prosperity Initiative 2010

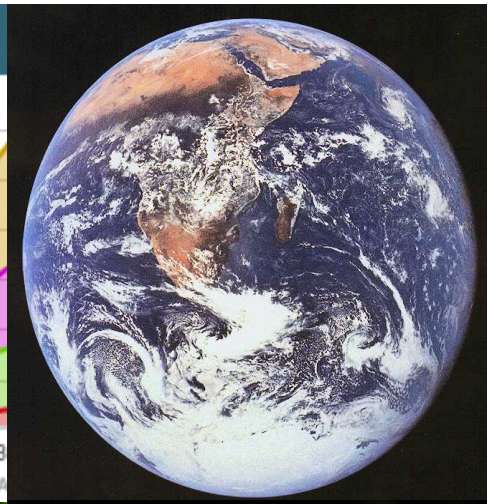
INITIATIVE PURPOSE:

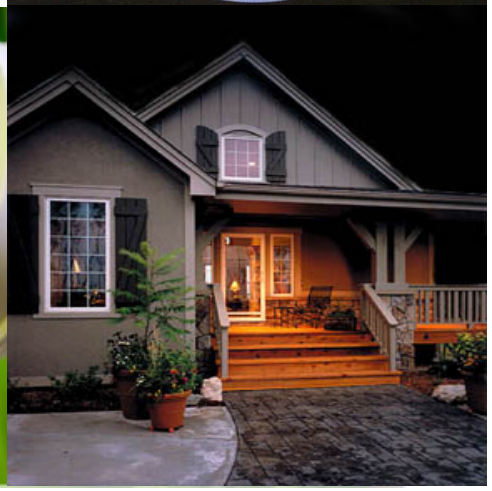
Strengthen company competitiveness and presence; raise our communities' capacity for responsible economic growth by both leading and supporting collaborative initiatives that increase long-term prosperity and help build sustainable rural communities within the Avista service territory.

Forces Shaping the Future of Energy

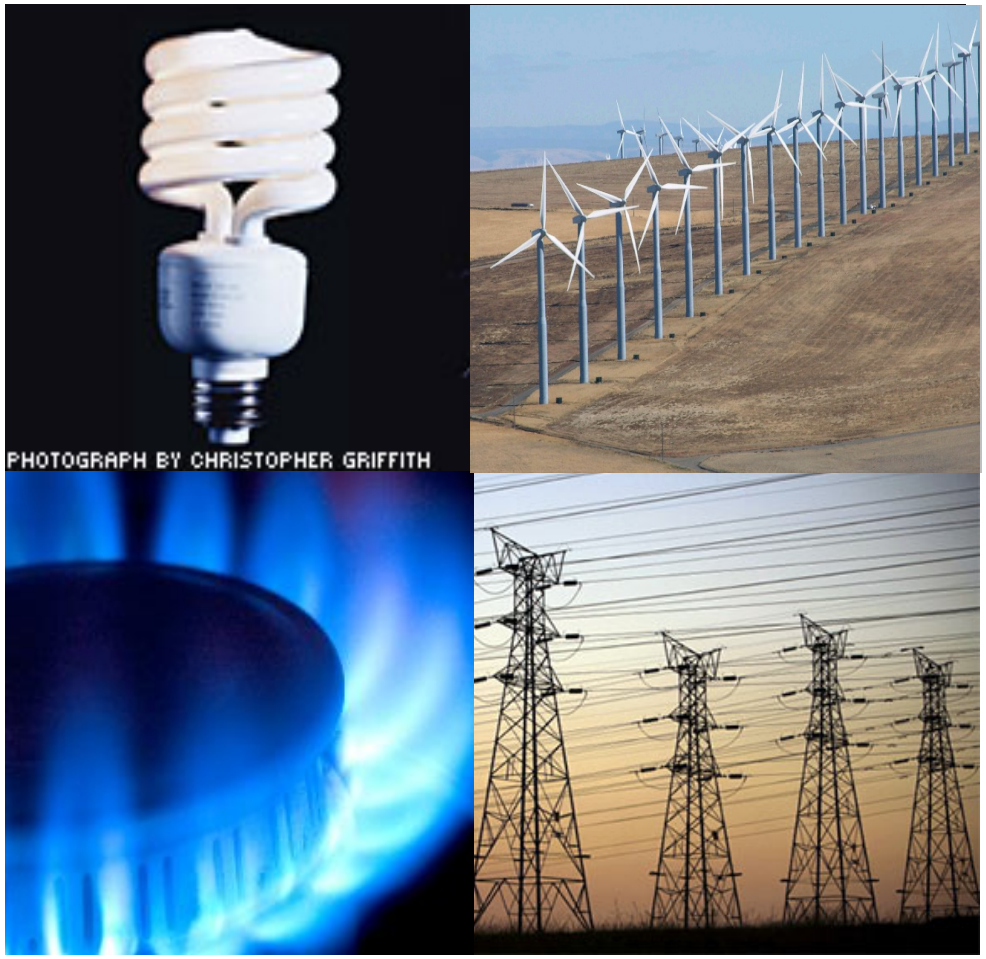
- Worldwide, demand for energy -- and costs -- are rising
- Climate change policies set environment -- not least-cost -- as new standard
- Technology is enabling new ways to get things done
- Customers want more for value for their energy dollar







Responses to the forces of change

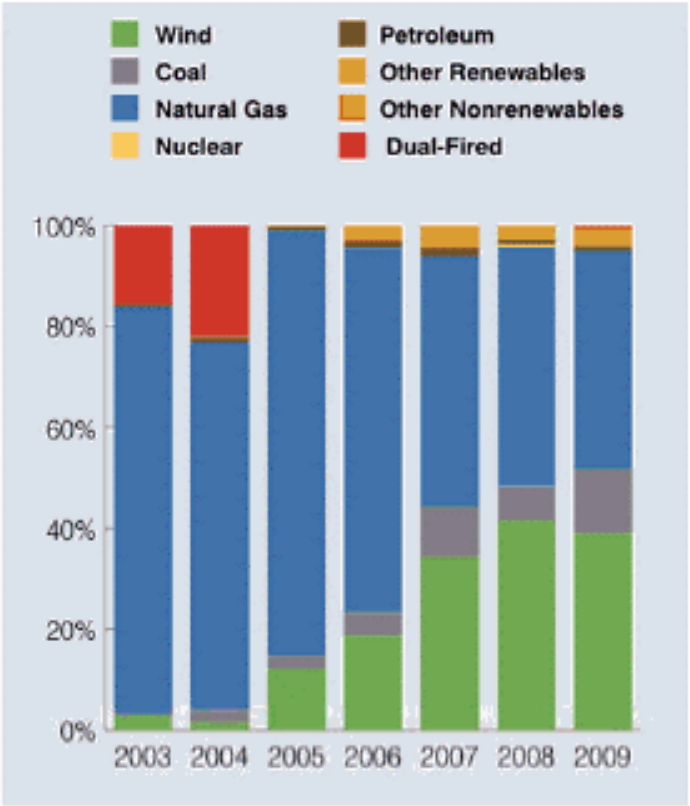


- Efficiency is the first fuel of choice – every little bit counts, for utilities and customers
- New renewable resources are a preferred but more costly way to generate electricity
- Direct use of natural gas where possible supports an energy efficiency economy
- Smart grids enabled by emerging technologies allow networks to be “participatory”

Percentage of New Capacity Additions

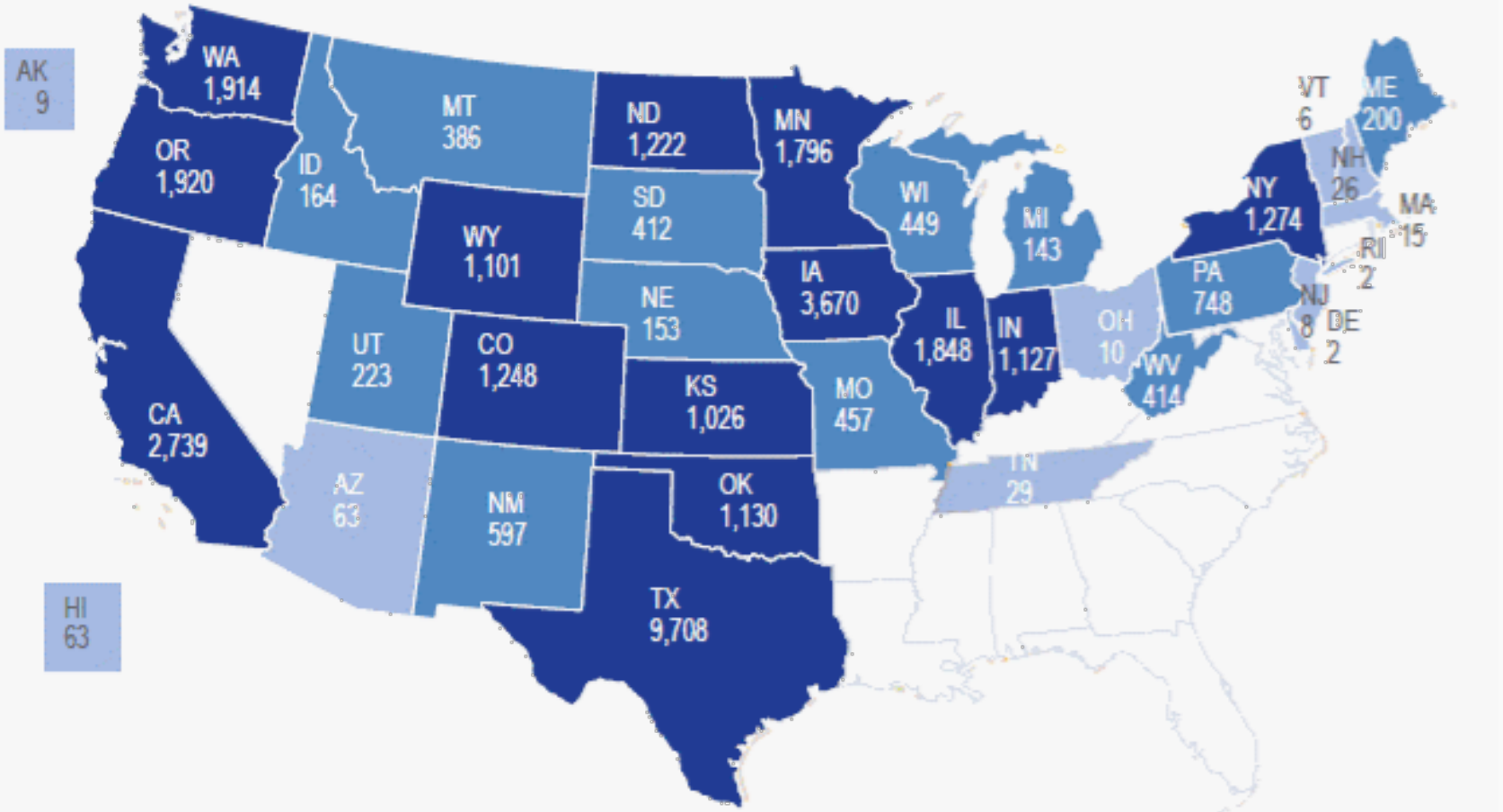
For the past five years, wind power has been one of the largest new sources for electricity generating capacity, second only to new natural gas units. In 2009, wind power provided 39% of all new generating capacity installed.

Since 2005, wind power and other renewable energy technologies, combined with natural gas, have provided over 90% of all new generating capacity in the U.S.

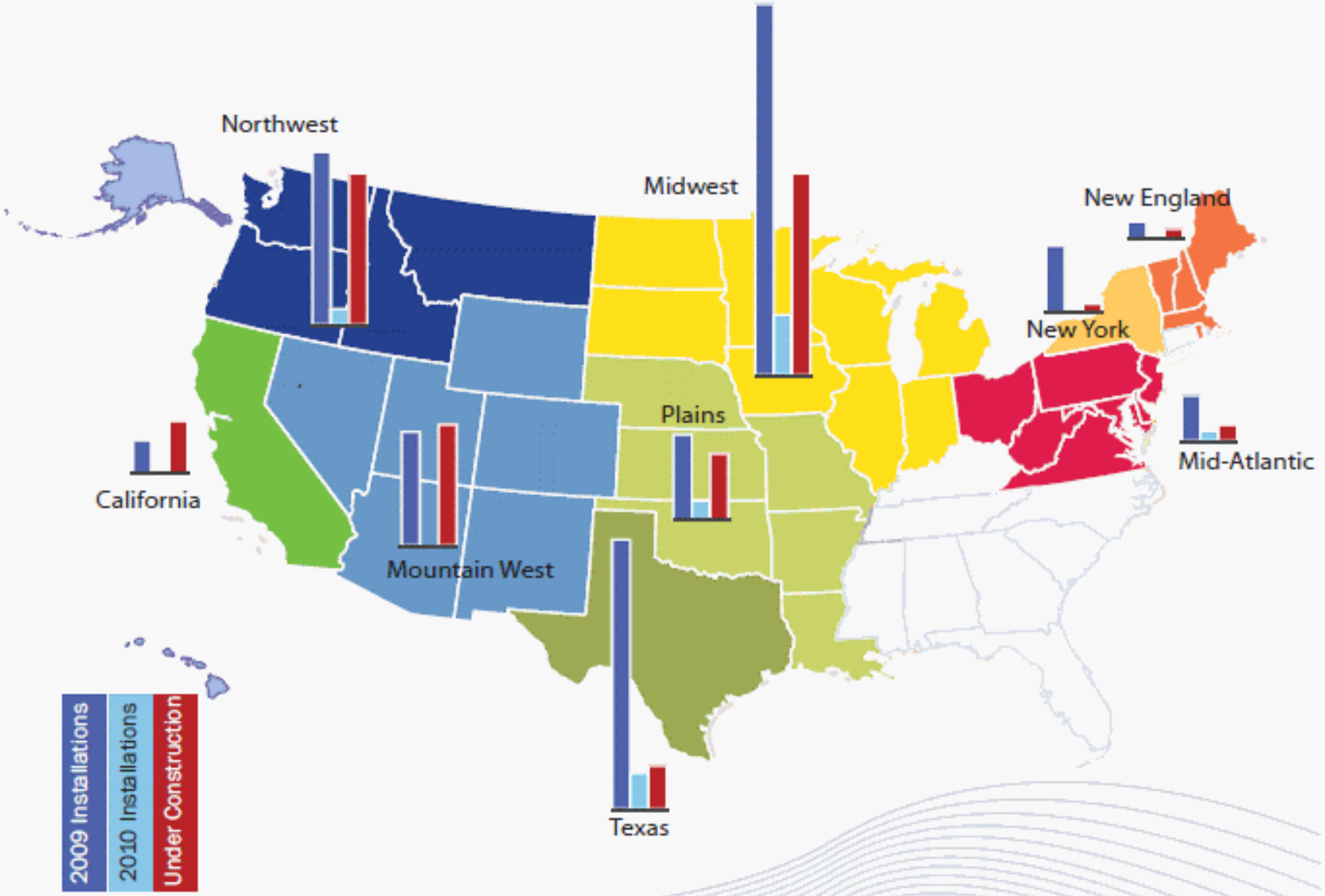


Source: American Wind Energy Association U.S. Wind Industry Annual Market Report – Year Ending 2009

Cumulative Wind Capacity by State



Installations and Under Construction Activity by Region



There is No Magic Answer to Our Energy Problems

Association of Washington Businesses
May 29, 2009

There is No Magic Answer to Our Energy Problems

- Don C. Brunell

"...while Washingtonians say they want more wind power, it's difficult to site new projects because many who settle in rural areas don't want wind farms obstructing their views."

Group Wants Limits on Wind Farms In Blue Mountains

Clearing Up
May 18, 2009

Group Wants Limits on Wind Farms In Blue Mountains
-Jude Noland

"…citizens' group opposing wind-farm development in the Blue Mountain foothills near the Oregon-Washington border say they aren't NIMBYs, and that the matter boils down to planning issues."

Washington Wind Power Blowing South

Puget Sound Business Journal
July 22, 2009

Washington Wind Power Blowing South

"A Washington wind farm that its developer calls "one of the premier wind sites in the Pacific Northwest" has been sold to a group of California utilities. So should Washingtonians be concerned that premier wind power sites are being snapped up by our neighbor to the south?" Rachel Shimshak, the director of the Portland-based Renewable Northwest Project, says no. She points to the tax revenues and lease payments the project is pumping into the local economy."

"I think the development of new renewable resources like wind in Washington is good for the economy and the environment in the state," she said."

Whitman County

Anatomy of a Wind Ordinance

Utility Industry Landscape Changes

Challenges to responsible resource planning in Washington

In Place/Pending

- **I-937 Renewable Portfolio Standards**
  - WA –15% renewables by 2020
  - OR – 25% renewables by 2025
- **Washington HB 6001**
  limiting emissions to gas plant (kills coal)
- **Western Climate Initiative**
  Agreement to reduce greenhouse gases (Washington, California, Oregon, Arizona, New Mexico)
- **Federal CO_2 Legislation**
  carbon policy cap/tax or RES?

WA Initiative 937

- Initiative 937 created a state law that requires renewable resources as part of a utility's mix.
- Wind power is really the only commercially available, utility-scale technology that can be constructed to meet the state law.
- While wind power certainly does not provide base load capacity, it can be successfully integrated into a utility's generation mix as part of it energy requirements.
- Wind power is part of the solution to the region's power supply requirements.


Thank You

Questions/Comments for Our Panelists?

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