

Energy 101

A Presentation to the
House Energy and
Environment Committee



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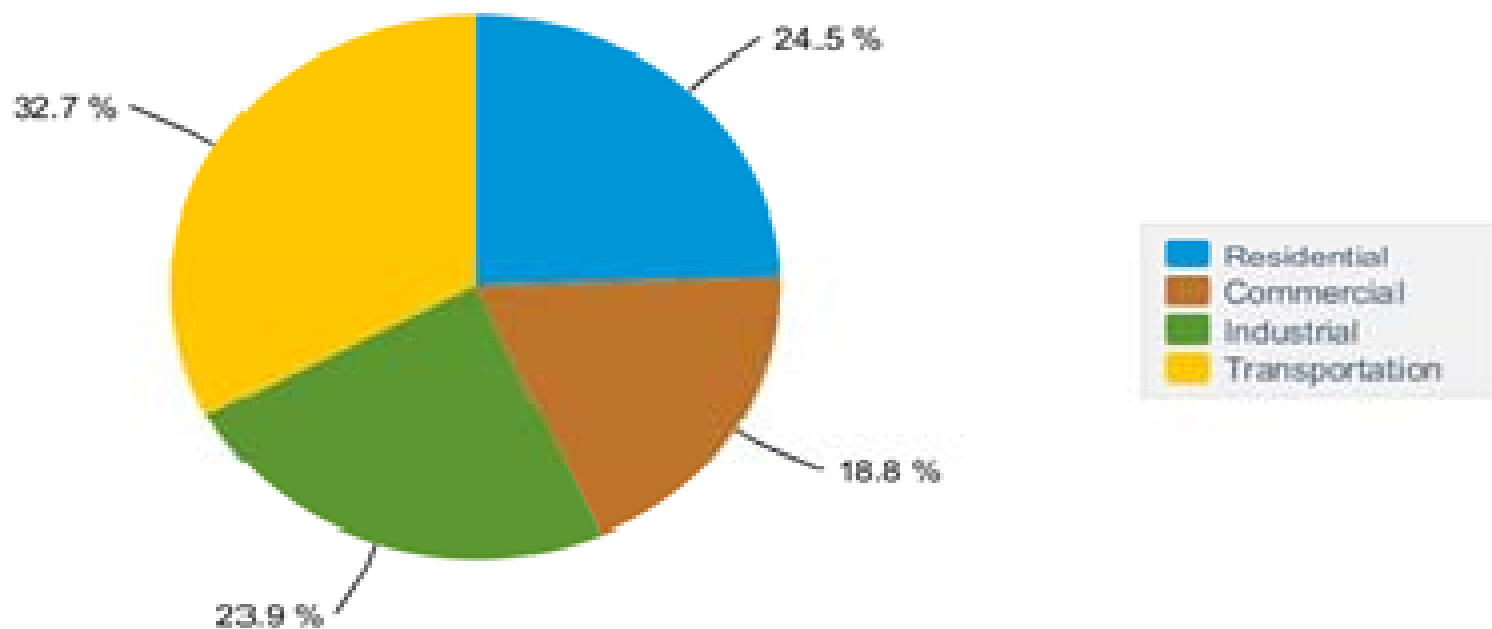


2013



Introduction

Oregon Energy Consumption by End-Use Sector, 2010



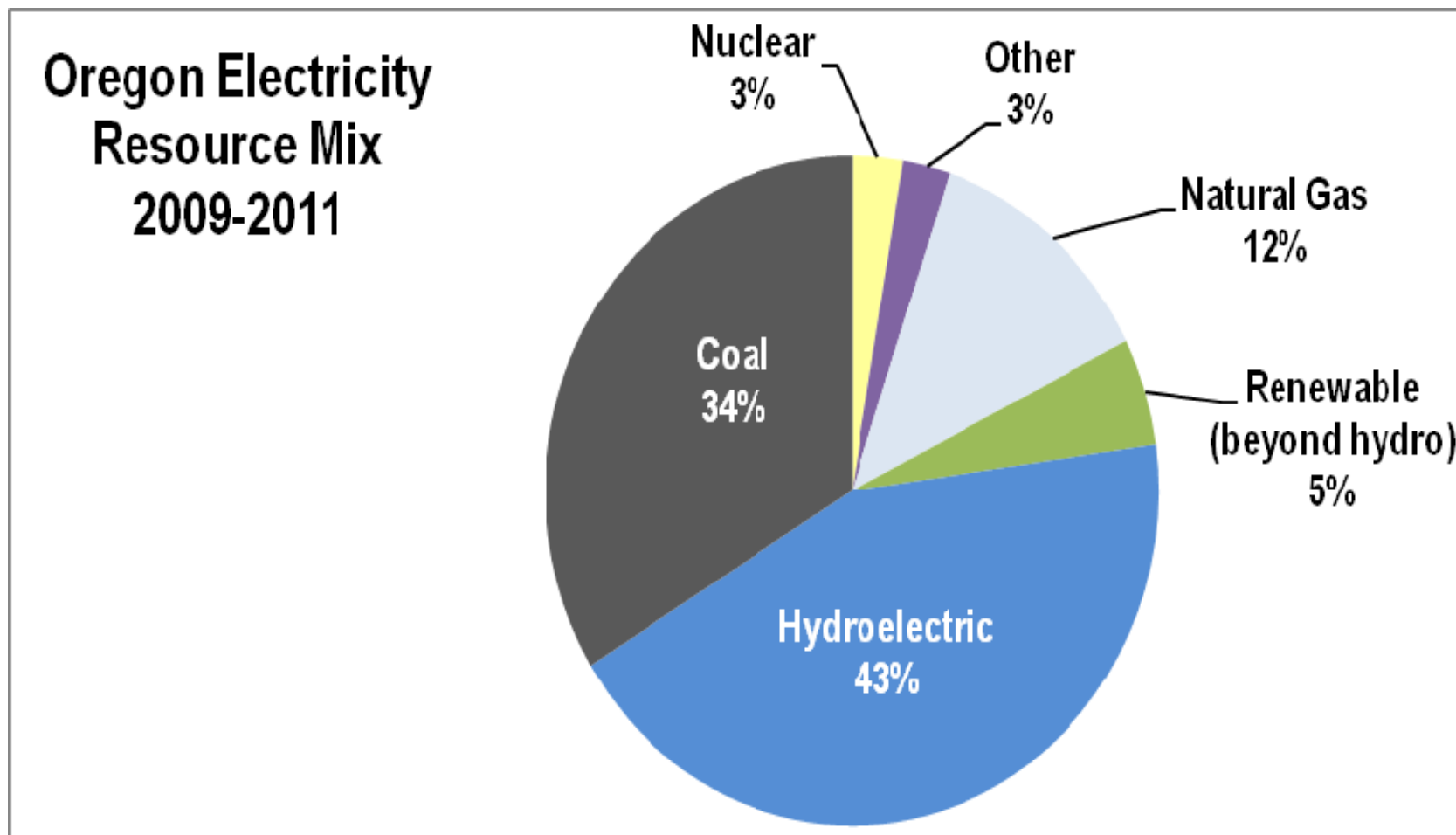
Source: Energy Information Administration, State Energy Data System



Introduction

- Energy is a significant economic driver in both Oregon and the United States.
- Oregonians spend about \$6.5 billion on energy annually, not including transportation.
- About 40% of electricity consumed in Oregon is produced in-state and most of that is from renewable sources, mainly hydropower.

Electricity – Oregon Resource Mix



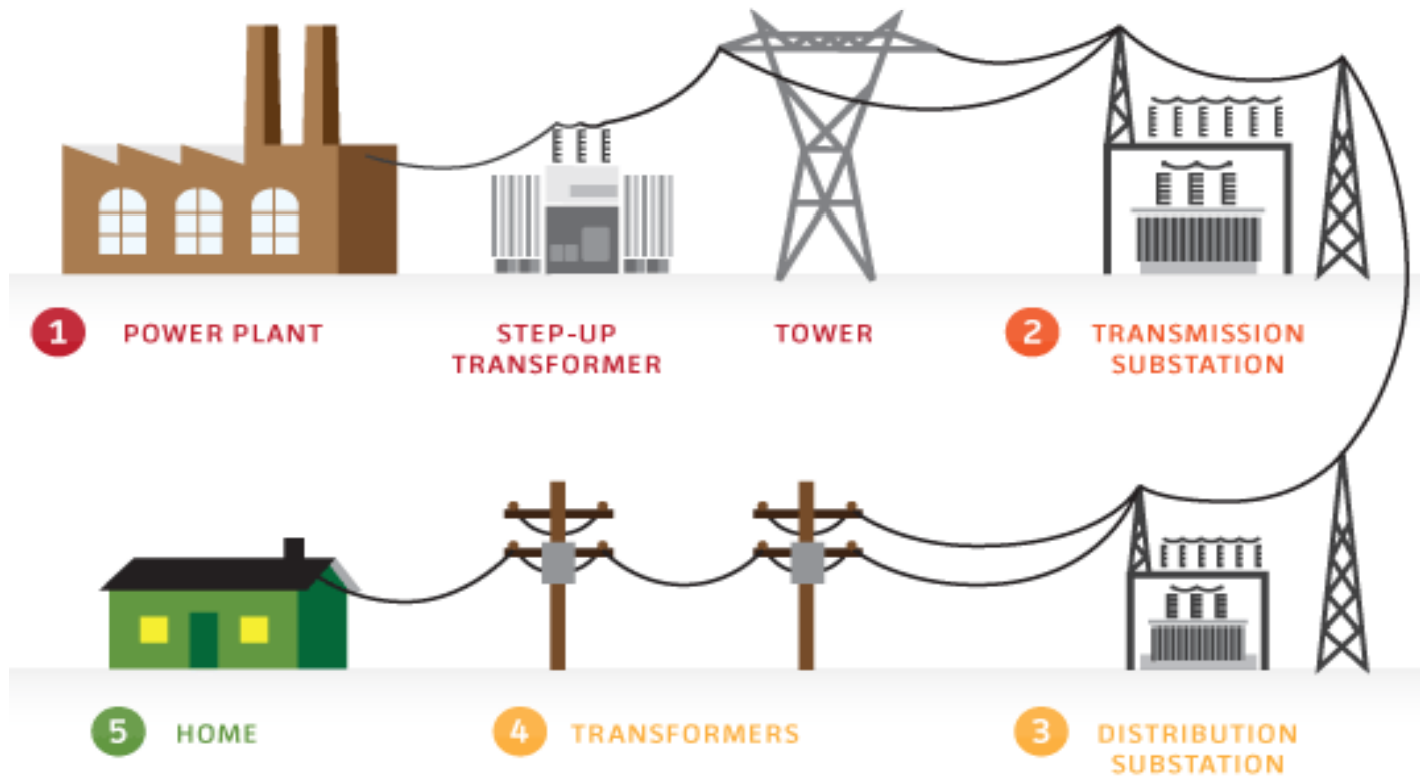
Source: ODOE

Electricity

Types of Electric Utilities (2011 OPUC statistics)

- Investor-Owned Utilities – *68.3% of Oregon sales*
 - Three regulated by OPUC: PGE, PacifiCorp, Idaho Power
 - 73.8% of electric customers
- Consumer-Owned Utilities – *29.4% of Oregon sales*
 - 19 Cooperatives – 10.5% of customers
 - 12 Municipals – 9.7% of customers
 - 6 Peoples Utility Districts – 6.0% of customers
 - Consumer-owned utilities are governed by their own boards.
- Electricity service suppliers – *2.3% of Oregon sales*
 - Nonresidential consumers of PGE and PacifiCorp may elect to buy electricity from alternative providers.

Physical Electric Plant





Electricity – Regional Players

Bonneville Power Administration (BPA)

The Bonneville Power Administration is a Power Marketing Administration, an arm of the U.S. Department of Energy.

- Markets energy from federal dams on the Columbia River system, equal to about one-quarter of the region's firm energy, and the Columbia Generating Station nuclear plant.
- Owns and operates about three-quarters of the regional transmission system.
- Funds fish and wildlife mitigation projects to reduce the Federal Columbia River Power System's impacts on fish and wildlife.
- Operates core energy efficiency programs for its consumer-owned utility customers.

Electricity – Regional Players

Bonneville Power Administration

- BPA provides cost-based rates and maintains public and regional preference in its marketing of power. BPA sets its rates as low as possible consistent with sound business principles and the full recovery of all of its costs, including timely repayment of the federal investment in the system.
- Consumer-owned utilities receive lowest cost Tier 1 rates from BPA.
- Investor-owned utilities participate in a Residential Exchange Program created to provide residential and small farm customers of Pacific Northwest utilities a form of access to low-cost Federal power.



Electricity – Regional Players

NW Power Planning and Conservation Council

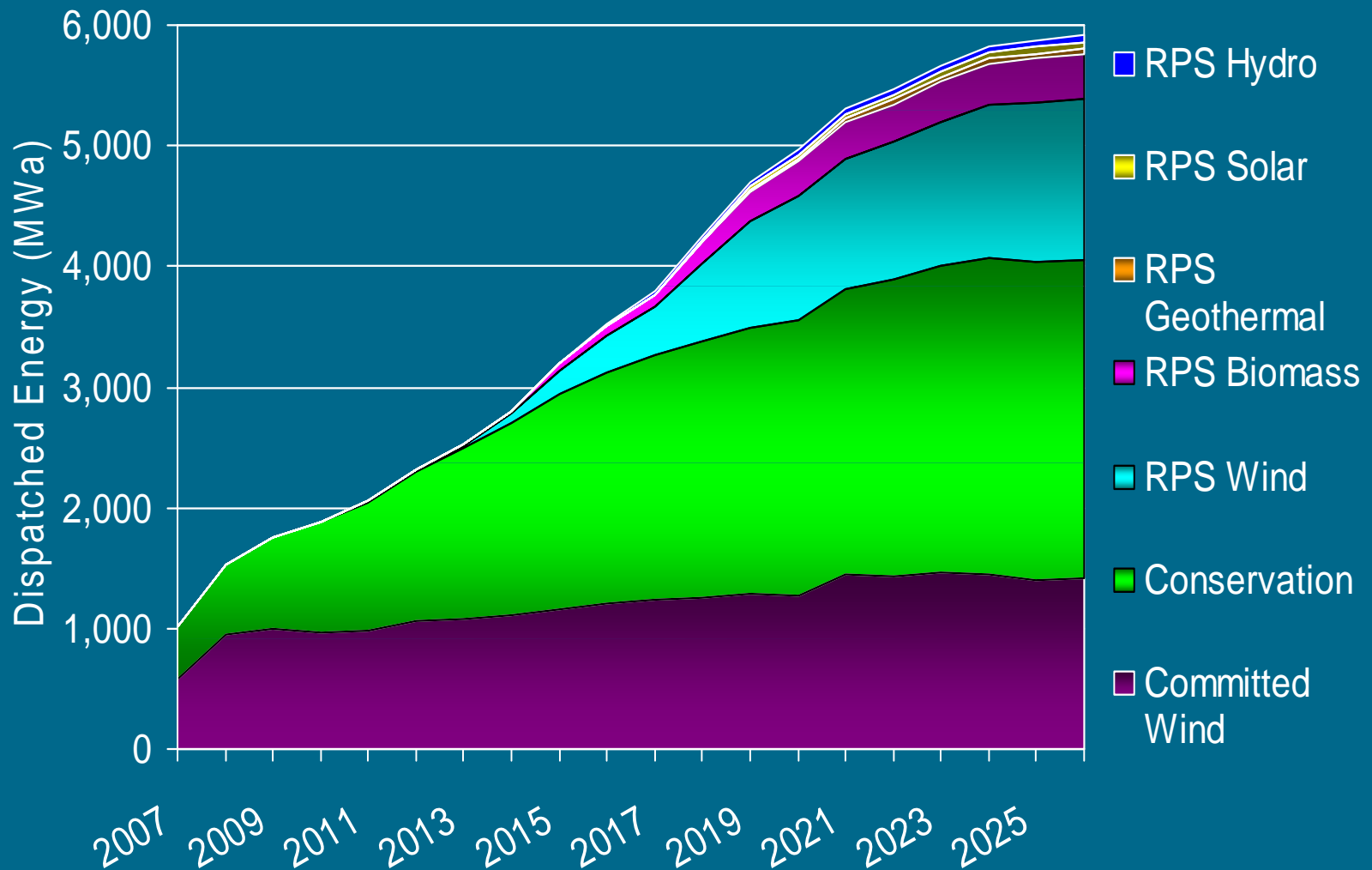
- Interstate compact with two members from each state: Oregon, Washington, Idaho and Montana
- NW Power Act directs the Council to develop:
 - A 20-year regional plan to assure the Northwest an adequate, efficient, and economical power supply
 - A plan to mitigate the effects of the dams on the Columbia River system
- BPA resources must be developed consistent with the Council's power plan.

Electricity – 6th Power Plan

Power Plan components

- 20-year demand forecast
- Conservation supply curves (availability, cost)
- Electricity price forecasts
- Generating resource alternatives (availability, cost)
- Action Plan

6th Power Plan Results



Electricity – Regional Players

- **NW Energy Efficiency Alliance**
 - Regional nonprofit investing in market-transforming energy efficiency initiatives and emerging technologies
 - Funded by BPA (on behalf of consumer-owned utilities), Energy Trust (on behalf of Oregon investor-owned utilities) and other regional utilities
 - Energy-saving initiatives such as heat pumps, street lighting, irrigation and industrial refrigeration

Energy Stakeholders – Examples

- Citizens' Utility Board
- Industrial Consumers of Northwest Utilities
- Northwest Industrial Gas Users
- Northwest Intermountain Power Producers
- Renewable Northwest Project
- Northwest Energy Coalition
- Northwest Energy Efficiency Council
- Labor

Electricity

- **Usage**

- A typical household in Oregon uses about 1,000 kilowatt hours (kWh) of electricity per month.
- Costs in Oregon are lower than the national averages.

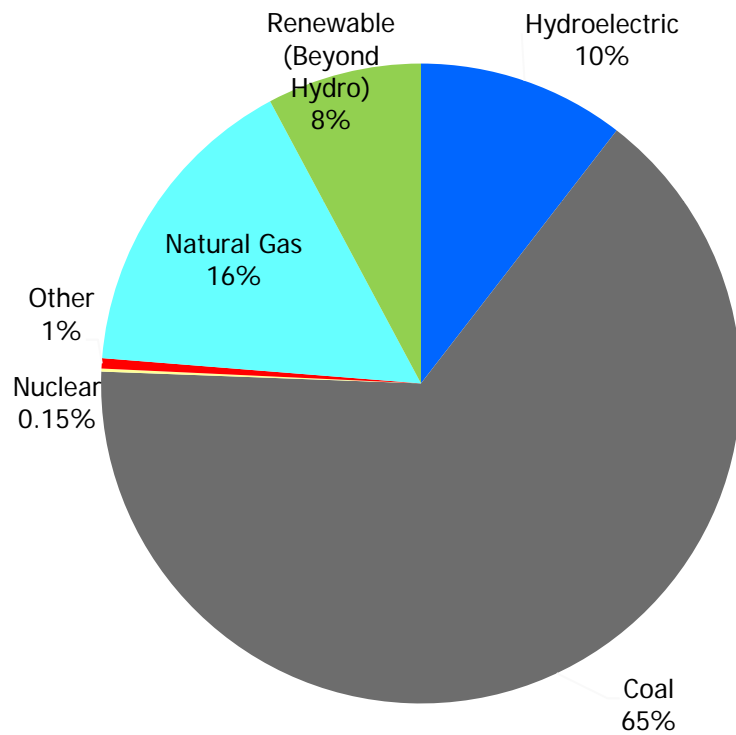
Electricity	Oregon	U.S Average	Timeframe
Residential	10.04 cents/kWh	12.03 cents/kWh	Oct. 2012
Commercial	8.43 cents/kWh	10.11 cents/kWh	Oct. 2012
Industrial	5.79 cents/kWh	6.65 cents/kWh	Oct. 2012

- **Sources**

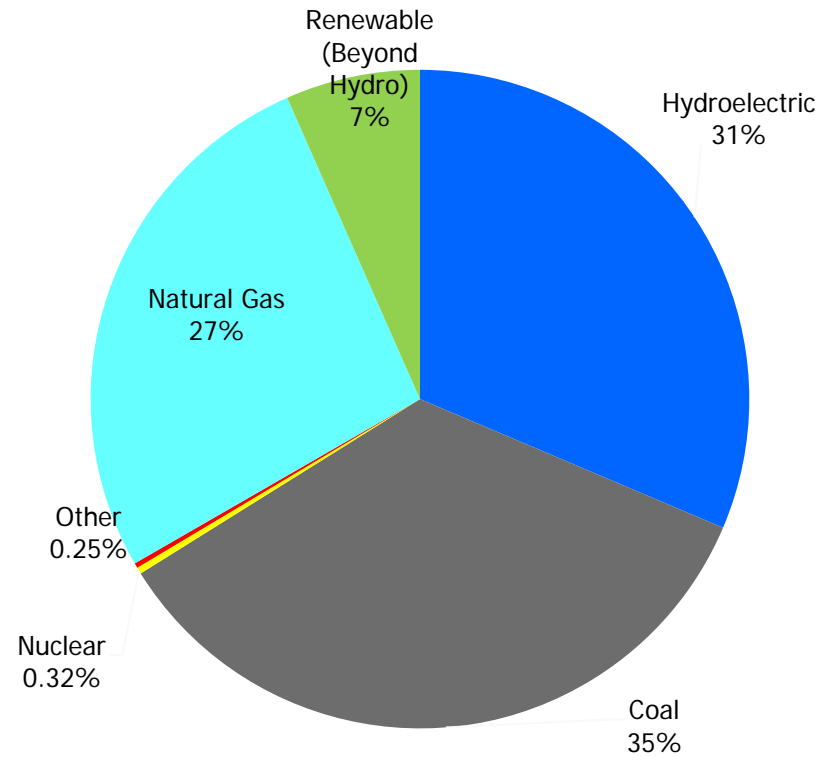
- Investor-owned utilities have different resource mixes than consumer-owned utilities, which receive most of their power from the federal (BPA) system.

Electricity

PacifiCorp 2010 Electricity Resource Mix



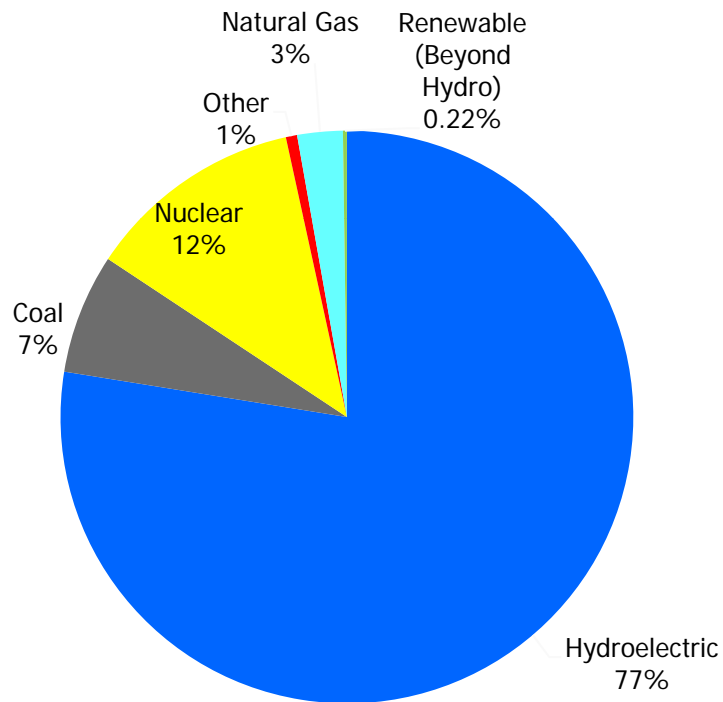
Portland General Electric 2010 Electricity Resource Mix



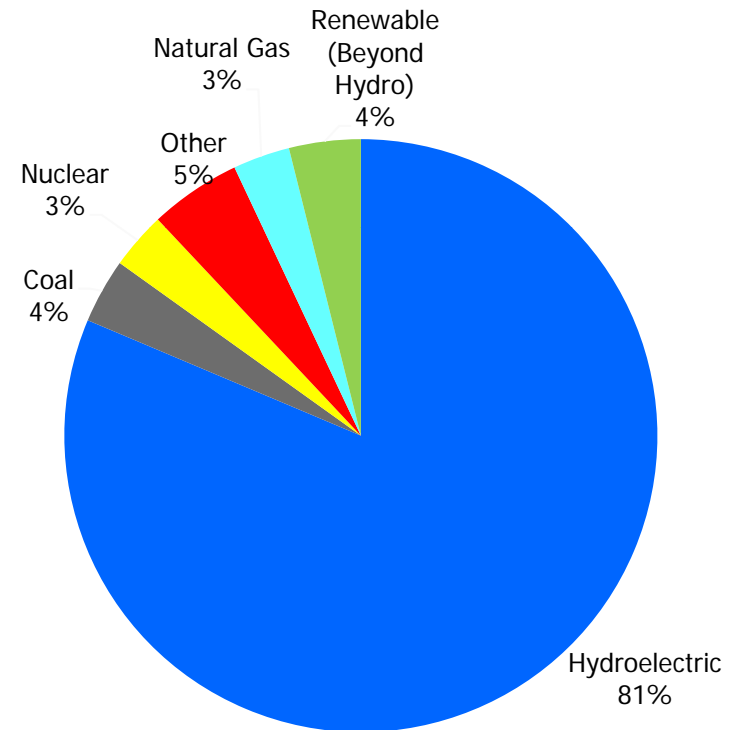
Source: ODOE

Electricity

Consumer Owned Utilities 2010 Electricity Resource Mix

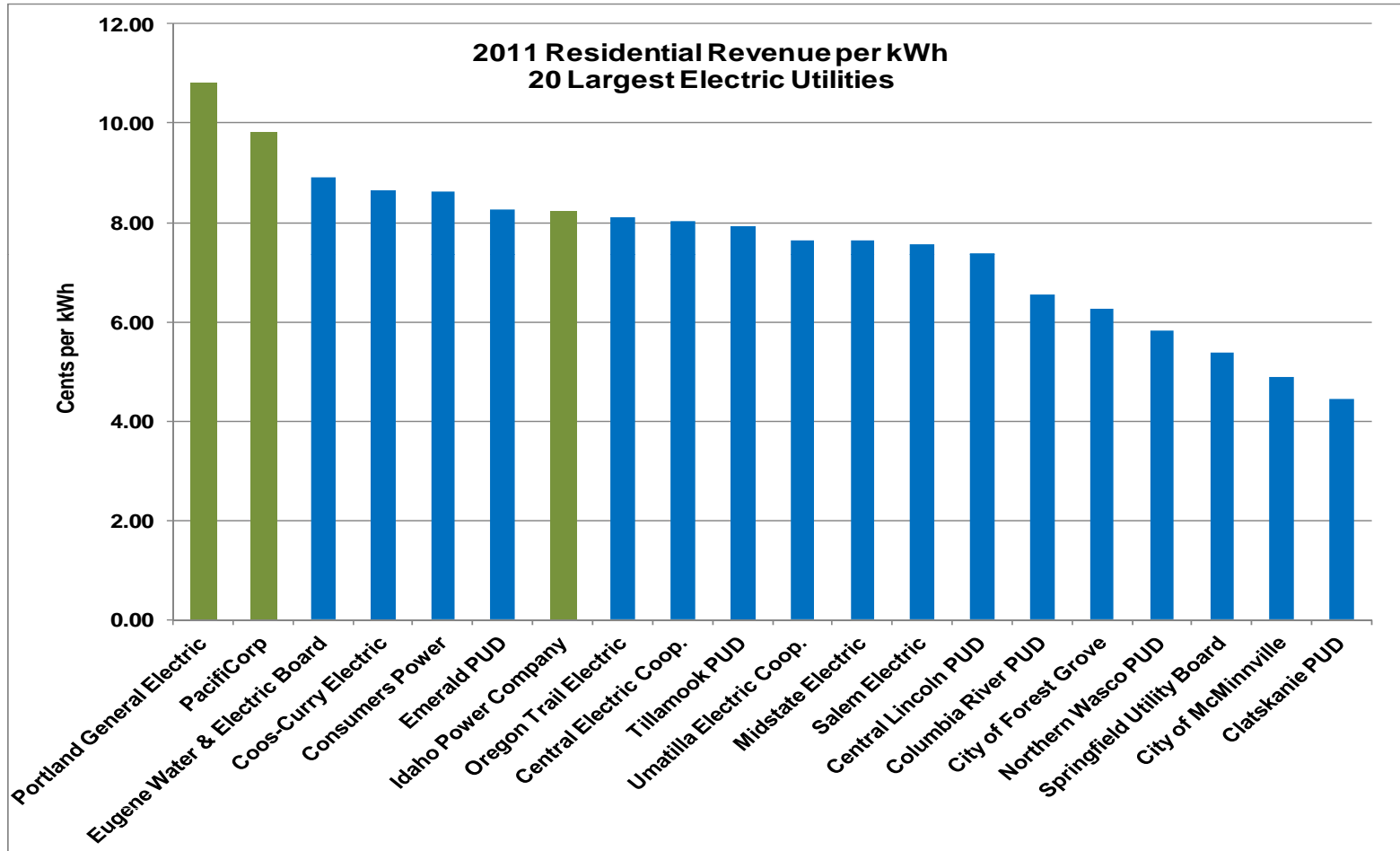


EWEB 2010 Electricity Resource Mix



Source: ODOE

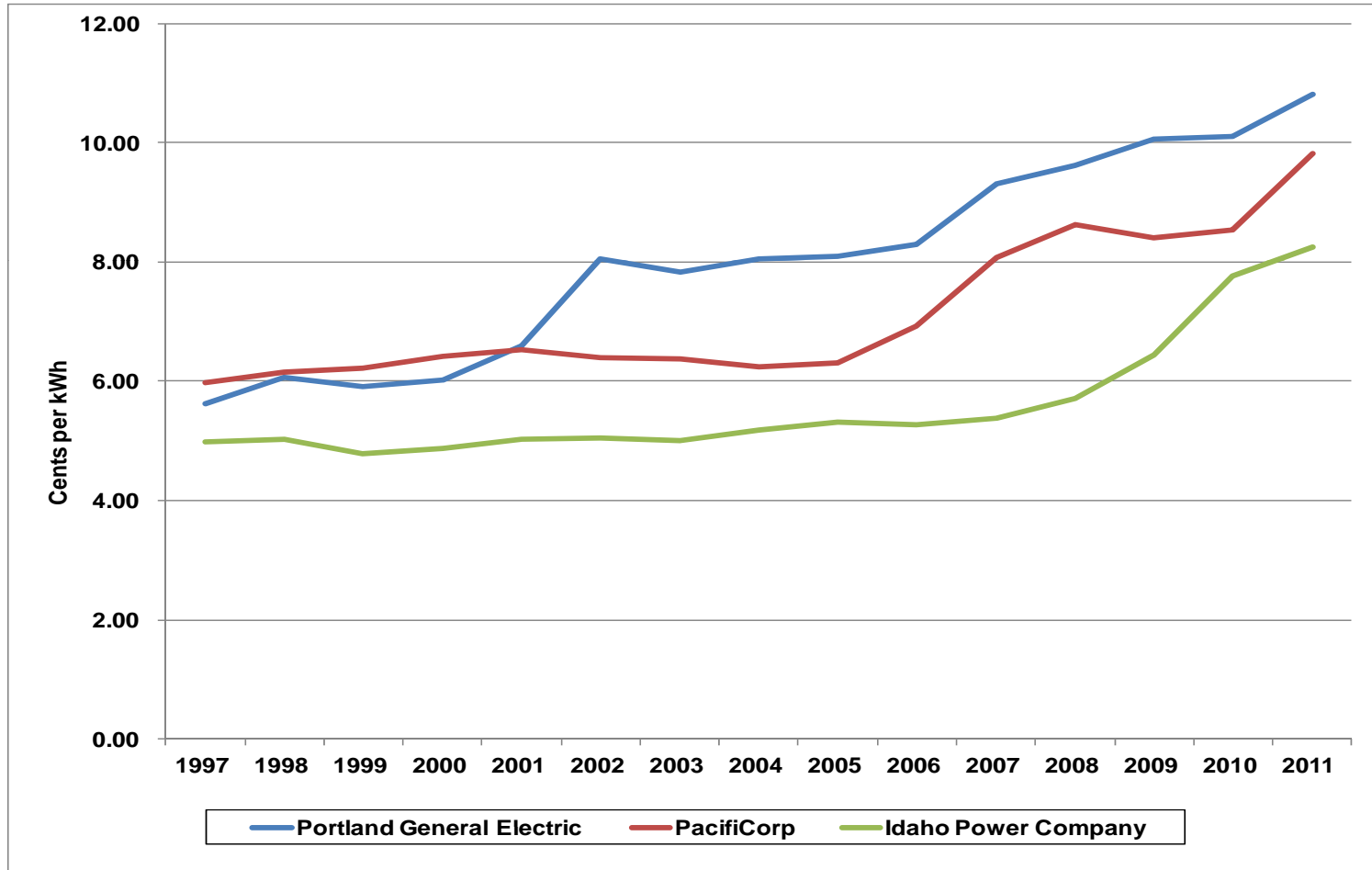
Electricity



Electricity

- **Investor Owned Utilities** (2011 statistics)
 - Portland General Electric
 - 823,171 customers, 39.2% sales in Oregon
 - PacifiCorp (Pacific Power)
 - 558,721 customers, 27.8% sales in Oregon
 - Idaho Power
 - 18,385 customers, 1.4% sales in Oregon

Electricity





Electricity

Two methods of meeting electricity needs:

- **Supply side**
 - Generation and power purchase agreements
- **Demand side**
 - Energy efficiency and demand response



Energy Planning

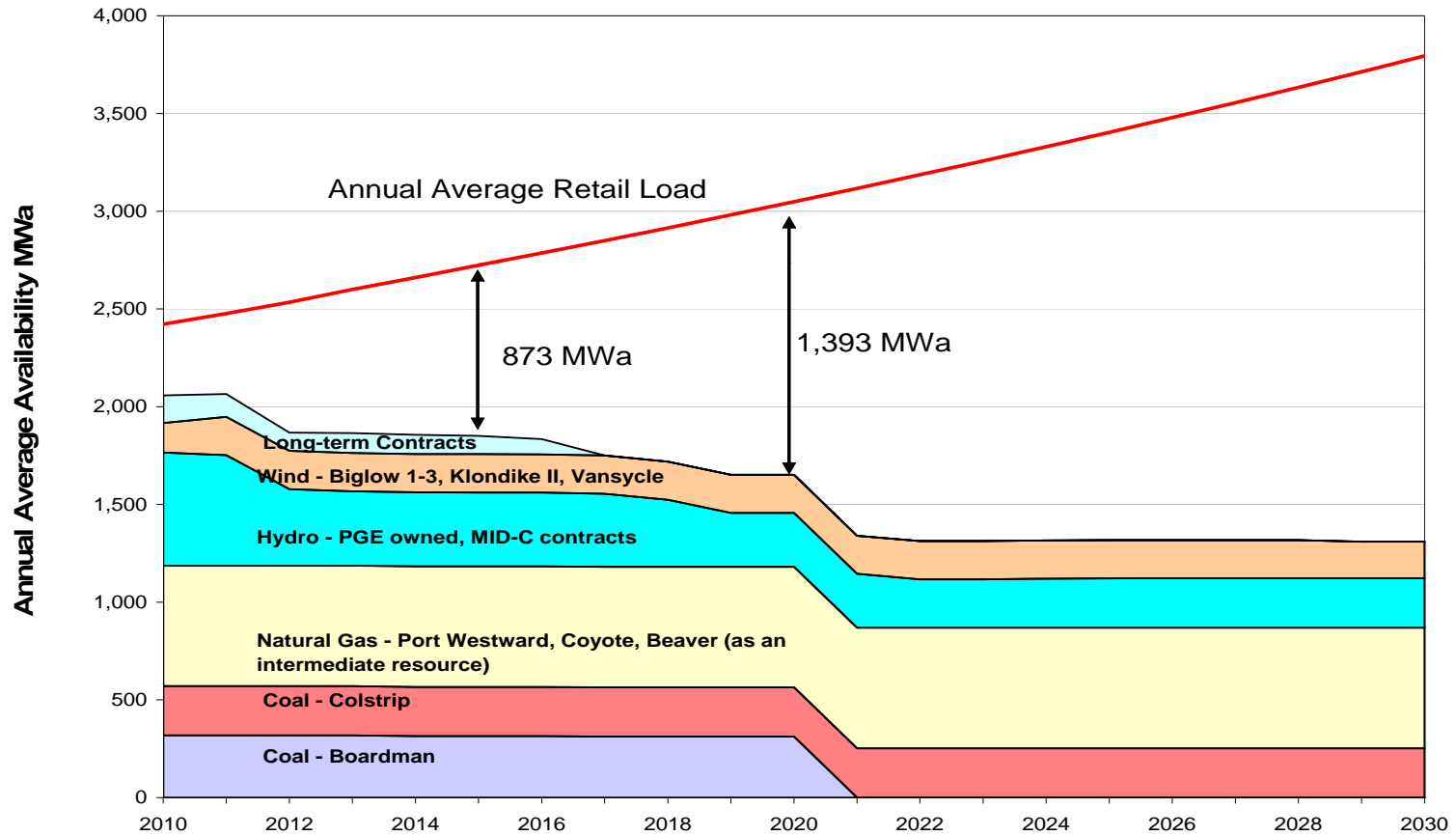
Integrated Resource Planning

OPUC requires investor-owned utilities to file plans regularly to:

1. Evaluate resources on a consistent and comparable basis;
2. Consider risk and uncertainty;
3. Make the primary goal of the process the selection of a portfolio of resources with the best combination of expected costs and associated risks and uncertainties for the utility and its customers; and
4. Create an action plan that is consistent with the long-run public interest as expressed in Oregon and federal energy policies

Electricity

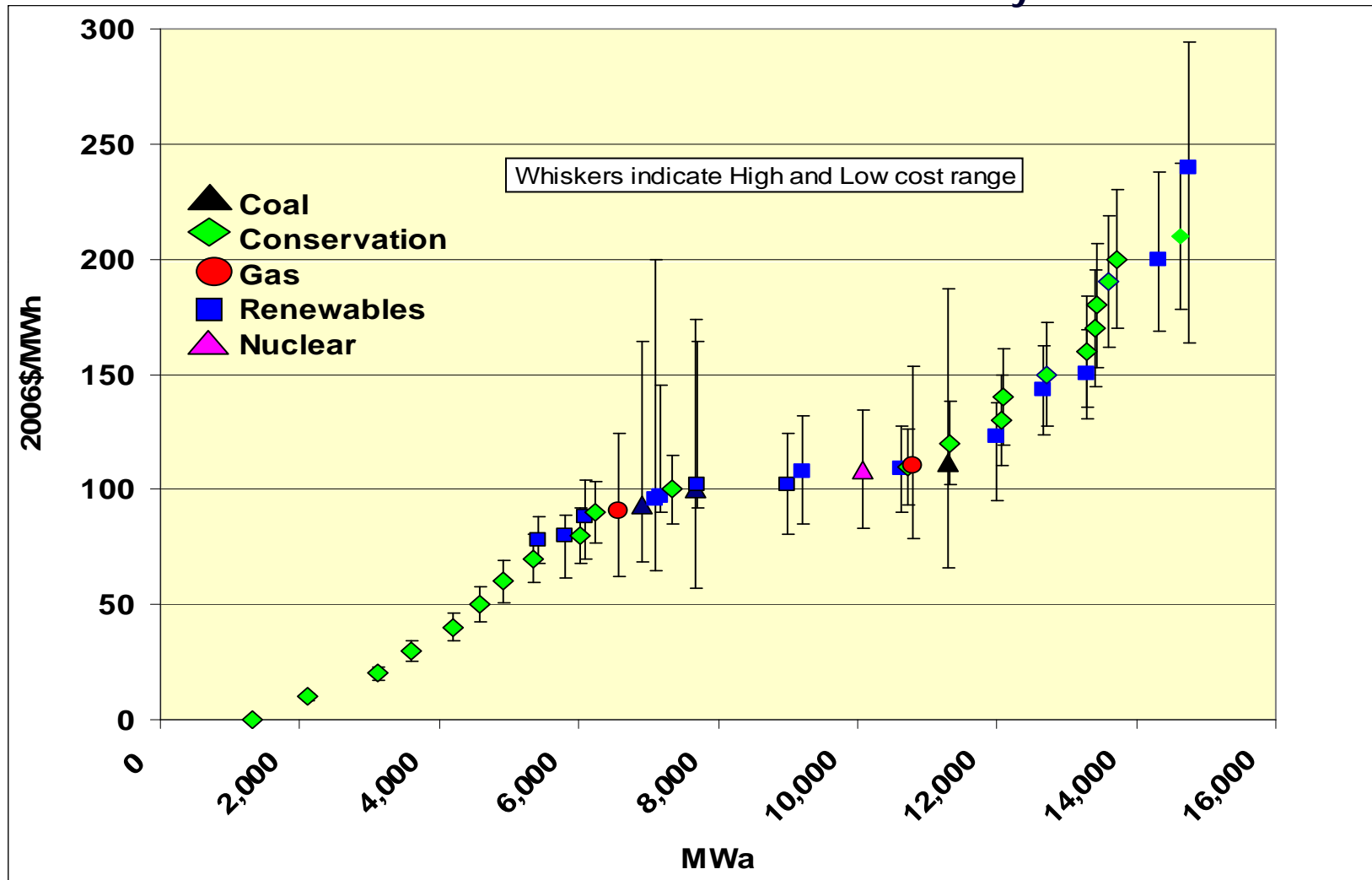
Example: PGE Needs



An average megawatt (MWA) is 8,760 megawatt-hours – the continual output of a resource with 1 megawatt of capacity over a full year.

Electricity

Resource Curve and Cost Uncertainty



Cost of New Generation in the U.S.

Plants entering service in 2017	Average Total System Cost per kWh	Notes
Hydropower	8.9 cents	Assumes seasonal storage
Woody Residues	11 cents	Depends on fuel supply
Natural Gas	6.6 cents	Combined cycle
Solar	15 cents	Utility scale, grid connected
Wind	9.6 cents	No fuel cost
Coal (conventional)	9.8 cents	NW Council's 6 th Power Plan estimate for IGCC is 14 cents
Geothermal	9.8 cents	91% capacity factor

Source: US EIA– July 2012 Energy Outlook

Average Generation Emissions Northwest Power Pool

Generation Type	Carbon Dioxide lb/MWh	Sulfur Dioxide lb/MWh	Nitrogen Oxides lb/MWh
Coal-fired	2,167	5.26	3.45
Natural gas-fired	1,091	0.14	3.43
Oil-fired	1,008	5.00	12.4
Other fossil	749	0.05	2.33
Biomass-fired*	341	1.84	1.92
Wind and solar	0	0	0
Hydro	0	0	0

Source: EPA
eGrid 2012,
data year
2009

*Emissions from the combustion of biomass or biogas are considered to be part of the natural carbon cycle because these materials would otherwise release CO₂ (or other greenhouse gases) through natural decomposition.

Electricity - Demand

Energy Efficiency

- Energy efficiency is the cheapest resource.
- Cheaper to save energy than to buy or produce it.
- Costs about 3¢ per kilowatt-hour compared to 6-9¢ per kilowatt-hour to build or buy from power plants.
- Energy Trust runs energy efficiency programs for large electric and natural gas utilities in Oregon.
- Energy Trust “buys” energy efficiency by paying incentives to customers for projected savings.
- Third-party evaluations check savings.



Electricity - Demand

Energy Trust of Oregon

- Energy Trust of Oregon (ETO) is an independent nonprofit organization dedicated to helping utility customers benefit from saving energy and generating renewable energy. ETO is the energy efficiency delivery agent for customers of Portland General Electric, Pacific Power, NW Natural and Cascade Natural Gas.
- ETO works with the utilities through their Integrated Resource Plans to determine the appropriate level of cost-effective energy efficiency acquisition for each utility.

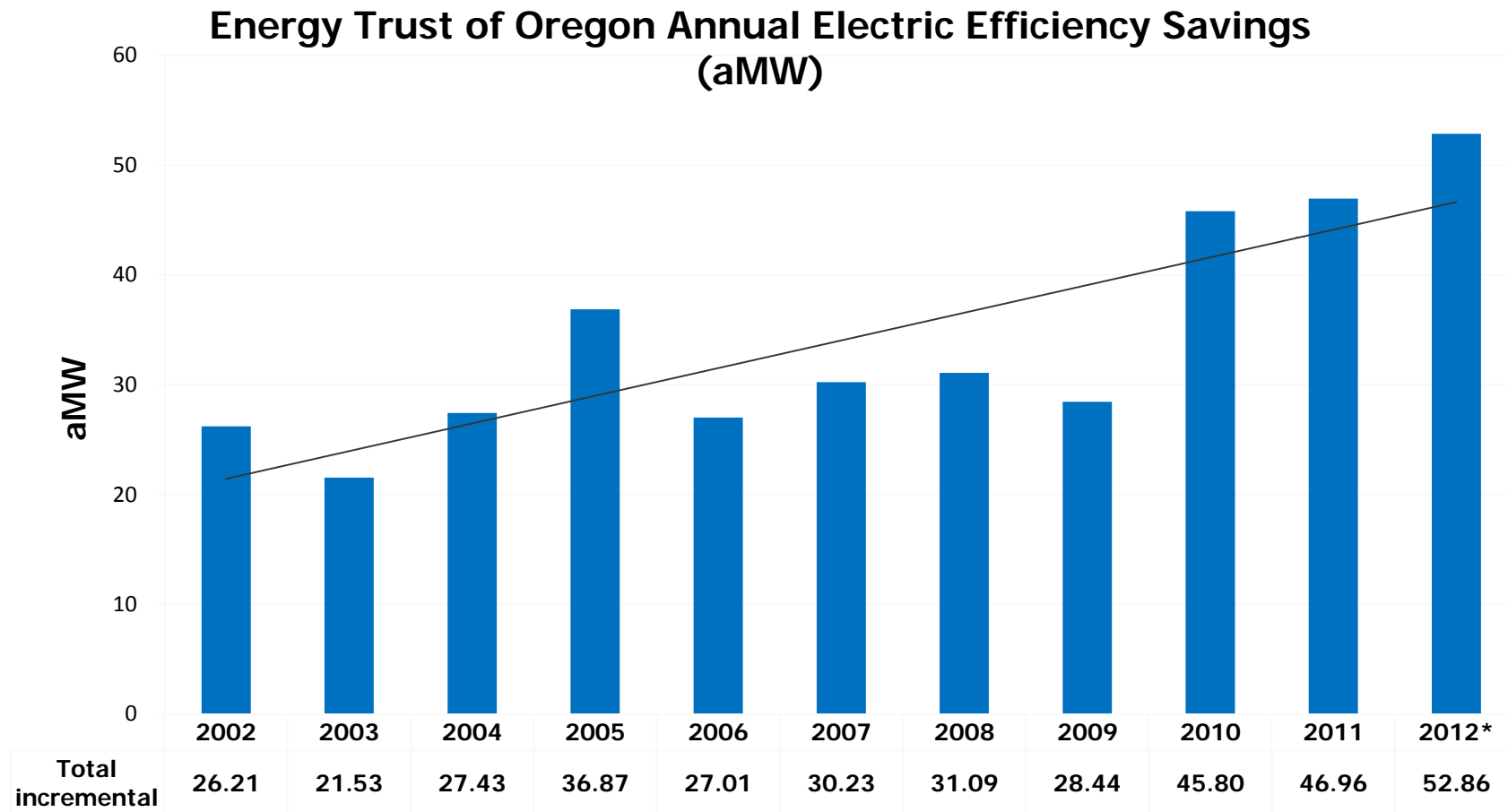


Electricity - Demand

The PUC oversees the Energy Trust of Oregon to ensure that it produces good results (in terms of conservation savings and renewable resource development) and that it does so efficiently. PUC oversight includes:

- Yearly performance measures
- Grant agreement that describes ETO obligations
- Quarterly and annual reports to PUC
- Regular management coordination meetings between organizations
- Reviewing yearly budget and action plan
- Management audit every five years
- Financial statement audits every year

Electricity - Demand



Total cumulative savings is 374 aMW.



Natural Gas

- **Investor-Owned Natural Gas Utilities**
 - NW Natural – 766,566 customers
 - Avista – 95,413 customers
 - Cascade Natural Gas – 64,355
- **Gas Transmission Pipelines**
 - Williams – Northwest Pipeline
 - Trans Canada – GTN
 - Ruby Pipeline (El Paso Corporation)



Natural Gas

- **Storage**

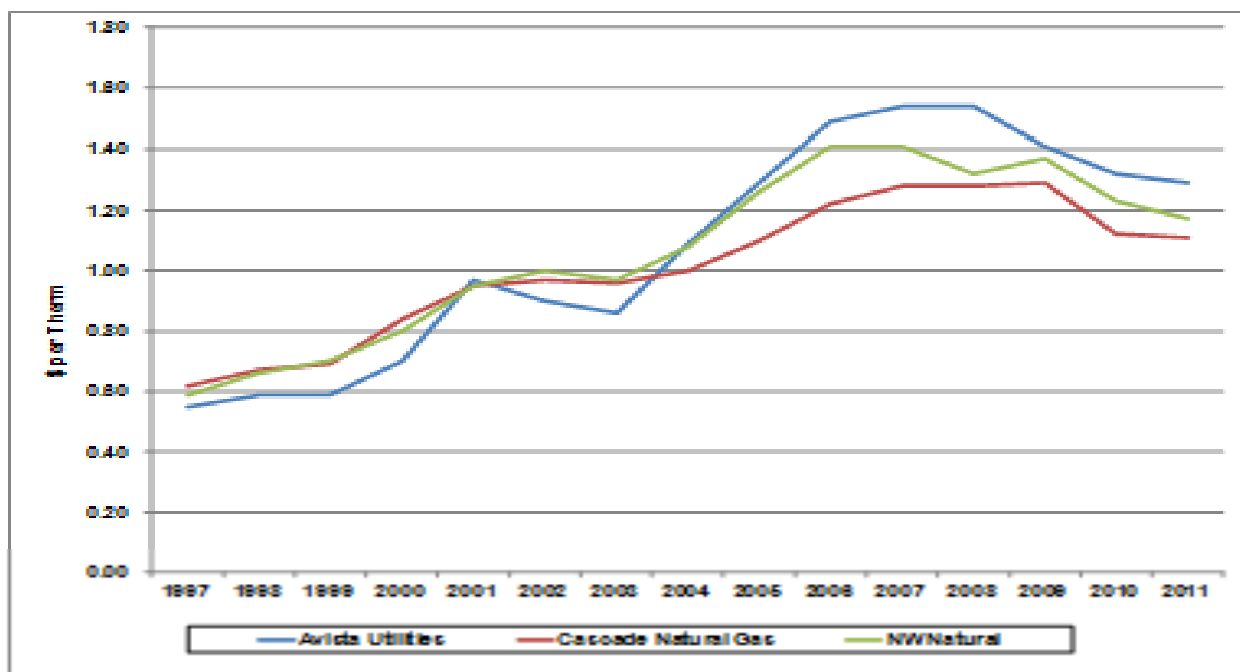
- Mist (NW Natural)
- Jackson Prairie (Avista)

- **Liquefied Natural Gas**

- NW Natural, Portland – 7.2 million gallons
- NW Natural, Newport – 12 million gallons

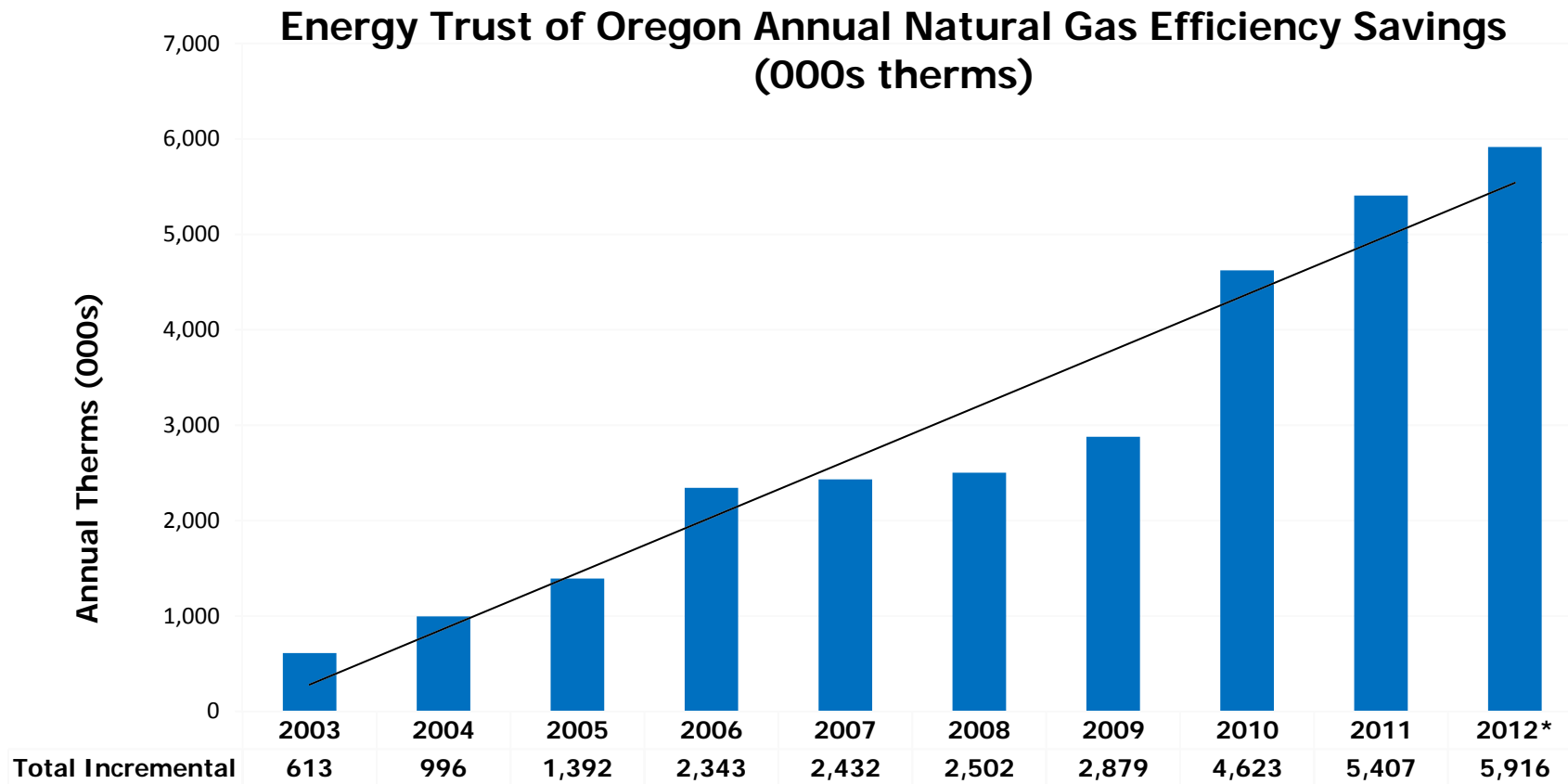
Natural Gas

IOU Residential Rates 1997 - 2011



- Average monthly residential use is approximately 75 therms

Natural Gas - Demand Side



•Preliminary cumulative natural gas savings equivalent to heating more than 57,000 average Oregon homes for a year.



Natural Gas

- The PUC gas safety section conducts inspections and enforcement activities across the state working with 17 natural gas operators, with systems comprised of over 1,500 miles of intrastate transmission pipelines, 16,000 miles of distribution pipelines, 700,000 services pipelines, and two liquefied natural gas peak shaving facilities.



Natural Gas

Oregon Utility Notification Center

- The Oregon Utility Notification Center (OUNC) is the state agency that administers the statewide "One Call" system.
- The PUC Gas Safety Section had an active role in the drafting of the Oregon One Call Law and has supported the OUNC ever since, by holding a position on the Board of Directors.
- The PUC holds the authority to enforce the One Call law and administers that process.
- In the last six years, damages to underground natural gas facilities have been reduced from over 2,040 to 847 per year through the aggressive educational programs of the OUNC/PUC.



Renewable Energy

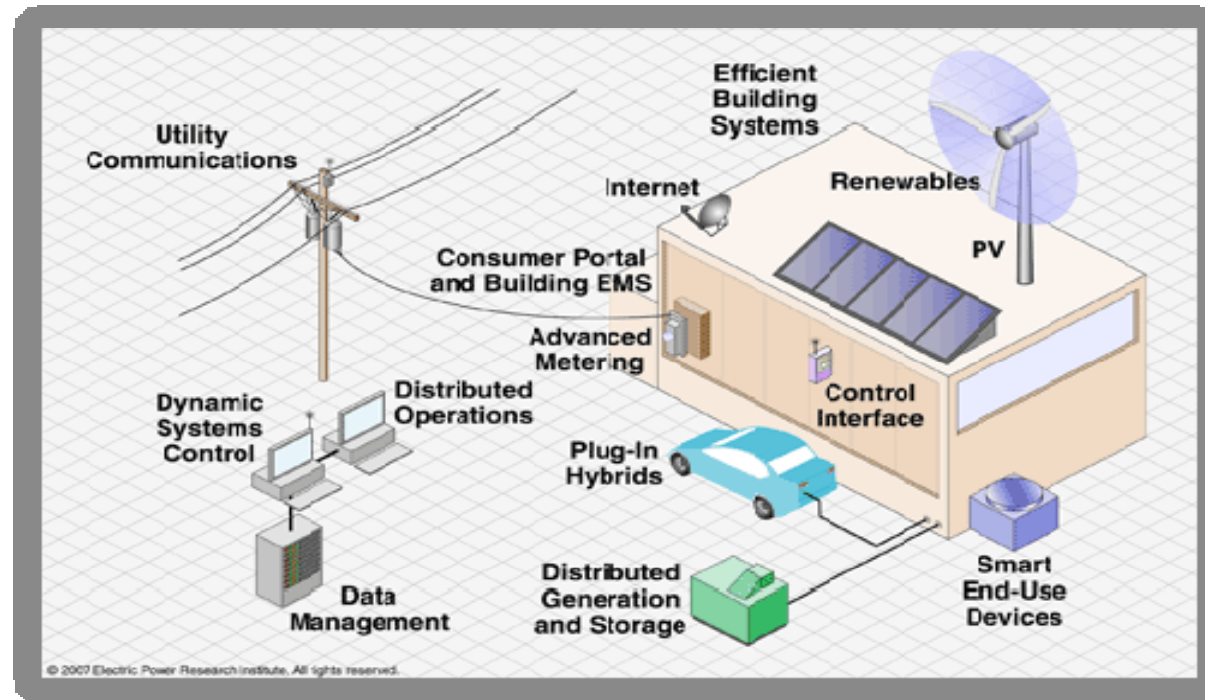
Renewable Portfolio Standard

The Renewable Portfolio Standard (RPS) was enacted by the Oregon Legislature in 2007. The aim is to stimulate *new* renewable resource development. Renewable energy facilities developed before 1/1/95, including existing hydro, are not eligible.

- Unlimited efficiency upgrades to existing hydro are eligible.
- Low-impact hydro is eligible up to statutory limits.

ODOE has certified 218 Oregon-eligible RPS generators for the renewable energy credit tracking system used in the Western U.S.

Smart Grid



An interconnected system of information + communications technologies that works with the electric system to:

- Help consumers manage energy use
- Increase system reliability through automation
- Improve integration of wind and solar



Compressed Natural Gas

- There are 13 CNG refueling stations along the I-5 corridor, one in Klamath Falls.
- Only two (Medford) are accessible to the public.
- The primary driver for CNG fleet vehicles are cost savings and environmental compliance.
- Shale gas supplies are driving the expectation that abundant domestic natural gas will lead to stable, low prices in the foreseeable future.
- The spread between natural gas and oil prices is expected to remain favorable to natural gas. On average, CNG costs 47 percent less than gasoline.
- CNG has lower emissions than gasoline.



OPUC Mission

Ensure that safe and reliable utility services are provided to consumers at just and reasonable rates through regulation and promoting the development of competitive markets.

The PUC receives no General or Lottery funds. Commission responsibilities are funded through a per month charge on regulated natural gas, electric, telecommunication, and water utility bills (approximately \$0.16 per residential bill).



OPUC Energy Regulation

- Three private electric utilities (PGE, PacifiCorp, and Idaho Power)
 - 1,396,500 customers
- Three private natural gas utilities (NW Natural, Avista, and Cascade Natural Gas)
 - 760,886 customers



OPUC Responsibilities

- Set utility rates for homes and businesses.
- Set and enforce price and service rules to protect customers.
- Ensure that private energy utility companies meet customer needs at lowest cost and risk.
- Set and enforce service quality standards.
- Ensure pipeline, power lines, transformer stations, and energy facilities operate safely.
- Resolve customer complaints about their utilities.



OPUC Responsibilities

- Set and enforce rules for fair competition in energy.
- Approve a wide variety of utility transactions including mergers.
- Advocate for Oregon in regional and federal forums.
- Oversee the Energy Trust of Oregon.
- Oversight of regulated energy providers concerning seismic preparedness.



ODOE Mission

- The Oregon Department of Energy reduces the long-term costs of energy for Oregonians.
 - Oregonians spend more than \$13 billion a year on energy, and much of that money leaves the state.
 - We reduce that cost by focusing on energy efficiency and Oregon's own energy resources.
- We are supported by federal funds, fees for service and an Energy Supplier Assessment. More than two-thirds of our funding comes from non-limited sources to support the Small-scale Energy Loan Program.



ODOE Authorities

- State policy behind 1975 creation of Oregon Department of Energy:
 - Continued growth in demand for nonrenewable energy forms poses a serious ... problem. It is essential that future generations not be left a legacy of vanished or depleted resources, resulting in massive environmental, social and financial impact.
 - It is the goal of Oregon to promote the efficient use of energy resources and to develop permanently sustainable energy resources. The need exists for comprehensive state leadership in energy production, distribution and utilization. (ORS 469.010)
- Enabling statute spells out Department's roles, such as:
 - Siting energy facilities
 - Collecting and analyzing energy statistics, data and information
 - Educating the public about ways to conserve energy
 - Protecting Oregon from the radioactive material at Hanford



ODOE Goals

- Maximize acquisition of cost-effective energy efficiency
 - State's lead agency for schools and government buildings
 - Information, technical/financial assistance for residents and businesses
- Develop infrastructure for clean energy resources
- Protect Oregon from contamination at Hanford
- Ensure state preparedness to respond to emergencies at energy facilities, during transportation of radioactive materials and in the event of petroleum shortages
- Conduct objective planning, policy and technical analysis on a statewide basis to prepare for future electric, thermal and transportation energy needs
- Meet needs of those we serve: offer information, find solutions and provide excellent customer service



Energy Facility Siting

- ODOE staffs the Energy Facility Siting Council, a seven-member volunteer board appointed by the Governor and confirmed by the Senate.
- The Council evaluates proposed energy facilities based on a set of standards. If a facility meets the standards, it gets a site certificate. Appeals of decisions go directly to the Oregon Supreme Court.
- Staff is currently reviewing:
 - Two major transmission lines
 - 4,000 megawatts of wind projects
 - 1,400 megawatts of natural gas-fired power plants
 - One biomass facility
 - Amendments for eight facilities that have site certificates

Among ODOE's Accomplishments

- \$11 million savings/year for energy measures in new and remodeled state buildings through 2011 (adjusted for measure life)
- Energy audits for 1,630 schools resulting in \$6.3 million in annual savings from measures implemented to date
- Certified 134 industrial efficiency projects worth about \$25 million
- Helped develop electric vehicle charging stations at ~300 locations
- Convinced USDOE to begin groundwater treatment at Hanford
- 19 hospitals, schools and offices are using biomass heating and saving up to \$100,000 on energy bills each year
- Administered \$52 million in federal Recovery Act funds to support 272 energy projects in Oregon saving \$8 million annually
- Legacy tax credit program for businesses helped fund nearly 25,000 energy-saving and renewable energy projects totaling \$3.1 billion of investment and cumulative savings/generation equal to the annual energy use of more than 1 million households



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