

Energy and Extension: Linking Centralized and Decentralized Technology Transfer Approaches

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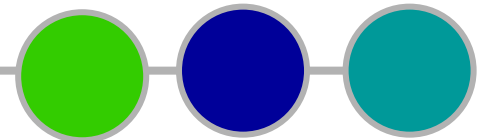
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WSU Extension Goal: Energy Security

- Enhance America's national energy security
- Enhance efficiency of research by partnering with federal and state agencies and laboratories, industry and others
- Promote agricultural diversification, profitability, and environmental sustainability
- Promote opportunities for economic diversification in rural communities

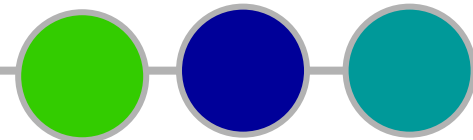


WSU Extension Energy Program

Activities: R&D, education and technical assistance and training in energy efficiency and renewable energy (statewide, regionally, nationwide)

History: Formerly Washington State Energy Office, established in 1976. In 1996 transferred education, information, technical assistance, and training programs to Washington State University Extension

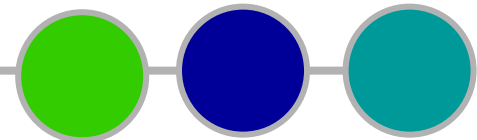
Today: ~60 staff, including engineers, software developers, energy specialists, research librarians in Olympia and Spokane



WSU Extension Energy Program

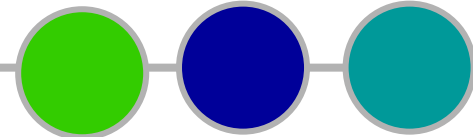
Supported through project funding partnerships with \$6 million annually:

- Federal government agencies
- Federal Power Marketing Agencies
- The Northwest Energy Efficiency Alliance
- Private sector



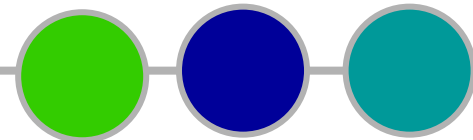
Overview

- Commercial and industrial energy efficiency engineering
- Renewable energy
- Building sciences and standards
- Distributed generation / combined heat & power
- Climate change
- Agricultural Energy
- Energy supply and consumption data
- Program research and evaluation
- Engineering software development



Commercial and Industrial Energy Engineering

- On-site audits and assessments
- Trainings and workshops
- Industrial systems consultations
- Energy efficiency software design
- Demonstration projects
- Guidebooks, tip sheets, fact sheets
- New technology assessments



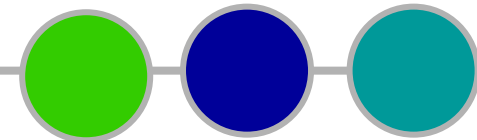
FoodProcessing Industry Resource Efficiency

Public-Private collaboration (California, Idaho, Oregon, Washington)

Goal: create an effective network for improving energy and water use efficiency of food processing industries

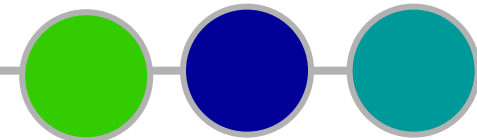
Tasks

- Identify industry needs and develop information network
- Showcase industrial efficiency best practices
- Identify emerging technologies
- Communication strategy
- Project demonstration



FIRE Outcomes

- Information delivered in coordinated, cost-effective way; collaboration efforts continue
- Industry feedback overwhelmingly positive
- Targeted and delivered information created specifically for industry well received
- Project success due in large part to involvement of trade associations and member buy-in
- When efforts are unified and organized, impacts persist over time



Renewable Energy

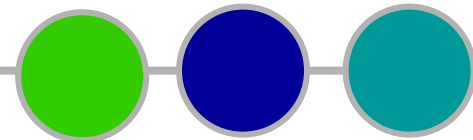


Solar and Wind Energy

- Worked with Washington State Legislature to conceive solar and wind energy/economic development incentives
- First-of-its-kind successful legislation in the nation

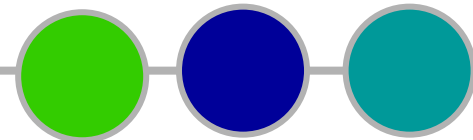
Bioenergy Outreach

- Lead the six-state Pacific Regional Bioenergy Partnership, to develop a bioenergy-based economy
- Washington State Legislature appropriated ongoing funding to provide education and outreach in Washington



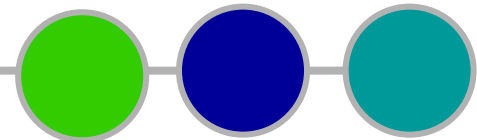
Resource Efficiency Management

Worked with the Pacific Northwest National Laboratory and the U.S Department of Energy, developed a how-to-guide for organizations interested in contracting for a Resource Efficiency Manager at schools and federal facilities



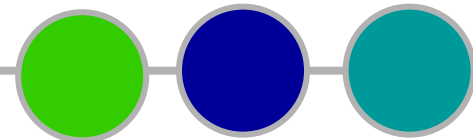
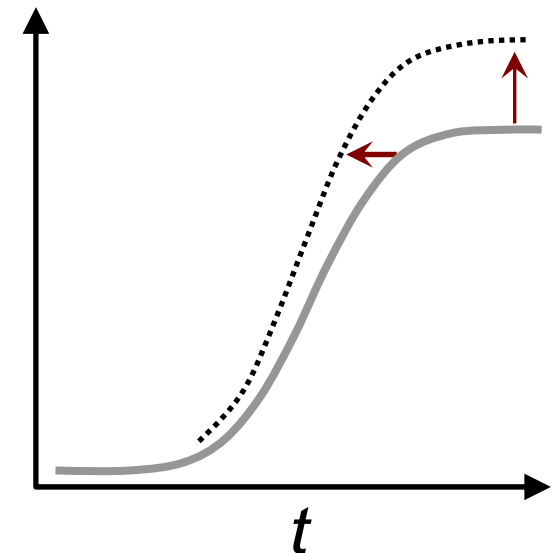
Building Science

- Operate the *Natural Exposure Test Facility* in partnership with the WSU Wood Materials and Engineering Laboratory, U.S. Department of Energy and Weyerhaeuser
- Provide code support to building community
- Publish the *Builder's Field Guide* – an online manual aimed at practical application of energy codes
- As a partner of U.S. Department of Energy's Building America Program, we are involved in the construction of 850 energy efficient homes at Fort Lewis, WA



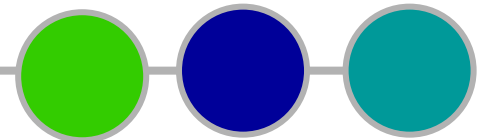
WSU Clearinghouse Goals & Services

- Help accelerate adoption of “new” technologies and practices
- Overcome informational obstacles (risk, uncertainty)
- Centralized information delivery services (via websites, toll-free hotlines, documents)
- Deliver credible, objective information, resources, technical and programmatic assistance and tools
- Build information content and channels (websites, documents, software, listservs)
- Supply individualized consultations; no cost to users



WSU Clearinghouse Business Model

- Embedded in larger Energy Program (not stand-alone)
- Operate several “branded” services using common staff and infrastructure (starting in 1990)
- Sufficient scale to take advantage of specialized teams:
 - Energy specialists
 - Energy engineers
 - Software/web specialists
 - Research librarians
 - Customer-service specialists
- 30 “core” staff
- ~30,000 inquiries annually
- Services and staff arranged in tiers



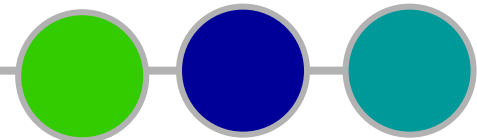
Customers and Topics

Customers

- Consumers
- Utilities
- Consultants
- Architects
- Educators
- Purchasing officials
- Military
- Local, state and federal government
- Manufacturers
- Building owners and operators
- Building officials
- Engineers
- Federal power marketing administrations
- Tribes

Efficiency and renewables topics

- biomass
- building design
- HVAC
- lighting/controls
- motor systems
- industrial processes
- pumping
- refrigeration
- solar and wind energy
- wastewater
- ... and much more





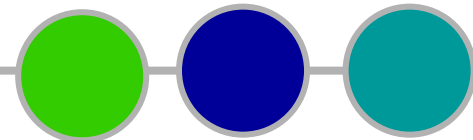
U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE)

Mission: strengthen America's energy security, environmental quality, and economic vitality in public-private partnerships that:

- Enhance energy efficiency and productivity;
- Bring clean, reliable and affordable energy technologies to the marketplace;
- Make a difference in the everyday lives of Americans by enhancing their energy choices and their quality of life.

Topical and Program areas

- Biomass
- Buildings
- Geothermal
- Hydrogen
- Industry
- Federal Energy Management Program
- Solar
- Vehicles
- Wind and Hydropower
- Weatherization and Intergovernmental





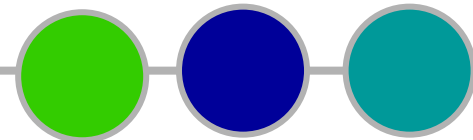
EERE Information Center

The EERE Information Center

- Answers questions nationwide on EERE's products, services and 10 technology programs;
- Helps customers find the most appropriate EERE resources; and
- Refers qualified* customers to the appropriate expert networks (including WSU technical staff).



*As per individual EERE Programs' guidelines and resources

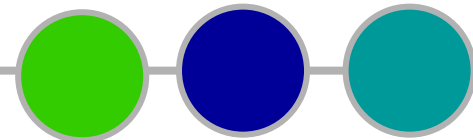




Sample Assistance

The Energy Manager for a large pharmaceutical plant requested an energy awareness calendar.

- During the course of the call, we discovered that he would benefit from technical assistance on insulating steam pipes.
- An industrial engineer provided technical assistance and publications on energy savings for their boilers, vent condensers, and blowdown heat exchangers; and on energy loss prevention in steam lines.
- The company implemented energy efficiency improvements at a cost of \$90,000, with a \$30,000 first year energy savings.

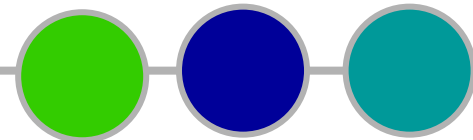




Sample Assistance

A small metal casting company needed help improving the efficiency of burners used to preheat dies in their forging plant.

- After several consultations exploring alternatives, our engineers provided assistance that helped the plant use 66 percent less energy and saved over \$300,000 annually.
- With technical assistance on compressed air system leak detection and end-use efficiency, and attendance at EERE training, the plant staff cut their energy costs by \$200,000 with an investment of only \$40,000.

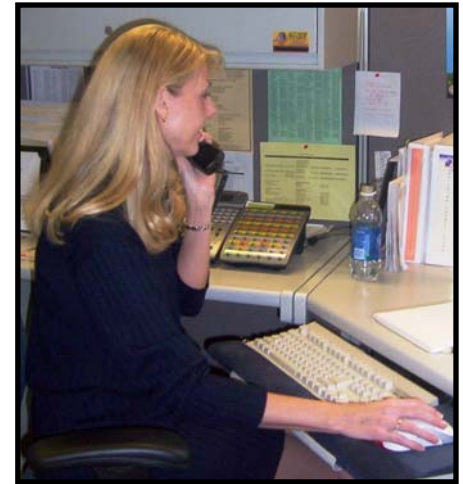




EERE Information Center

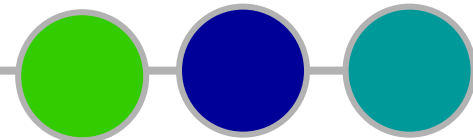
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➤ An additional level of service is offered through the Pilot Pacific Northwest Extension Energy Initiative





Summary of the Extension Energy Initiative

- Use Extension and NASULGC to help deliver U.S. DOE's Energy Efficiency and Renewable Energy resources via the EERE Information Center and local agents
- Partnership with Extension in WA, OR, ID and AK
- Increased level of technical assistance available to Extension and their customers from the EERE Information Center experts
- Pilot target audiences: Extension, local and county government officials (schools, boroughs, cities, tribes and other local government entities)
- Expertise:
 - Hydrogen/Fuel Cells
 - Transportation/Fuels
 - Geothermal**
 - Buildings, appliances**
 - Bioenergy, Agriculture, Solar, Wind**
 - Waste Heat Recovery**
 - Municipal water/wastewater, pumping**
 - ...



Energy Newsbriefs

Energy Newsbriefs: [www.energy.wsu.edu / library](http://www.energy.wsu.edu/library)

EnergyAg Newsbriefs: [www.energy.wsu.edu / projects / renewables / agriculture.cfm](http://www.energy.wsu.edu/projects/renewables/agriculture.cfm)

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Weekly Energy Newsbriefs

Articles for August 14, 2006

ENERGY NEWSBRIEFS is a weekly current awareness service provided by the Washington State University Extension Energy Program Library and written by Angela Santamaria, WSU Energy Library Manager, to assist users in tracking developments in the energy field. To view past issues or to subscribe to receive an email notification of the publication of a new issue, go to *Energy Newsbriefs* archives at <http://www.energy.wsu.edu/library/newsbriefs.cfm>.

Please be aware that although every URL is checked for accuracy prior to the publication of Energy Newsbriefs, URLs are, for various reasons, subject to change. Further, servers sometimes fail to connect to working URLs.

CONTROLS

"Building Controls: Past, Present, and Future," by Linda K. Monroe, Editorial Director, Buildings. The author gives a review of the 100-year history of building controls, from pneumatic to electric and, finally, to both early and more-recent electronic. A sidebar includes a good deal of fascinating information and speculation about the future of building controls. *Buildings*, July 2006, at <http://www.buildings.com/Articles/detailBuildings.asp?articleID=3175>.

DATA CENTERS

"Setting the Stage for Liquid-Cooled Solutions," by Vali Sorell and Terry L. Rogers, both engineers and both of Syska. The authors posit eight cooling scenarios, discuss how they work (or, in some cases, how they would work if they were commercially available). Based on their findings, each of the eight are compared to one another in terms of energy efficiency. *Energy & Power Management*, July 2006, at <http://www.energyandpowermanagement.com/CDA/Archives/39b88920ea62c010VqnVCM100000f932a8c0>.

ELEVATORS

"Avoiding Elevator Breakdowns," by James Piper, Ph.D., P.E. The author shows how, even with the careful maintenance he recommends, problems with aging elevators develop and are often not obvious. Among other

WASHINGTON STATE UNIVERSITY EXTENSION ENERGY PROGRAM

EnergyAg Newsbriefs

BIOFUELS

"Making Fuel from Biodiesel Waste – Rice engineers find way to turn biodiesel byproduct into ethanol," by staff, July 2, 2007. Read this Rice University article on the Renewable Energy Access website at www.renewableenergyaccess.com/rea/news/story?id=49164

"University of Delaware Researcher Says Seeds from Salt-Tolerant Plant a Promising Source of Biodiesel," by Randall Chase of the Associated Press. A marine biosciences professor says seeds from the seashore mallow are a promising source of biodiesel, with an oil composition similar to soybeans and cottonseed. And even better, the plant is both perennial and salt-tolerant, which makes it a biofuel crop that won't tie up agricultural land. Read the July 10th story on the Environmental News Network website at www.enr.com/today.html?id=13107

"Cow powered ethanol plant enters production," by Dana Childs of inside greentech. E3 BioFuels of Nebraska is being described as the world's first "closed-loop" ethanol plant. The plant is being fueled largely by biogas from animal waste instead of coal or natural gas, which according to company officials means significant savings in the production process. Read the June 29th story at www.insidegreentech.com/node/1402

BIOPRODUCTS

"Plastics from Sugar," by Prachi Patel-Predd of the Massachusetts Institute of Technology. Researchers at Pacific Northwest National Laboratory (PNNL) have come up with an easy, inexpensive method to directly convert glucose into a chemical that can be used to make polyester and other plastics, industrial chemicals, and even fuels. Read this June 19th Technology Review article online at www.technologyreview.com/Nanotech/18943/

CELLULOSIC ETHANOL

"FPL Deal Will Use Citrus Peel in Ethanol," by staff and wires. Peel from oranges and grapefruits will be used in the first ethanol plant in Florida. FPL Energy LLC is an investor-owned utility. Herald Tribune, July 20, 2007, at www.heraldtribune.com/article/20070720/BUSINESS/707200307

EVENTS

2007 Annual Energy Symposium, August 14-17, 2007 at the University of Nevada, Las Vegas. This is UNLV's first annual symposium dedicated to showcasing the renewable/sustainable energy projects of UNLV faculty, staff, students, and collaborators, as well as other external projects underway statewide and nationally. For more information and to register, visit <http://osep.unlv.edu/ESY2007/>



Topics of Inquiries

HVAC, building envelopes:

Heating, cooling systems; controls; heat pumps; ventilation...

Energy Use:

By building type; verification of savings; measurement and monitoring, audits...

Lighting:

Fluorescent lamps; controls; decorative; roadway; emergency, outdoor...

Other:

Tax credits; financing; water heating; biomass; codes and standards; windows; geothermal; municipal wastewater; wind; hydrogen, solar



Examples of Inquiries

Our city's street lights use high-pressure sodium lamps, which are now about 10 years old. What is the typical life span of these lamps? Should we consider changing to another type?

– City utilities manager

Is there information available that would help us justify (especially financially) hiring someone to manage our district's resources, e.g. energy, water, recycling?

– Public school district

Our water system has six 300-hp. pumps, four of which have adjustable speed drives (ASDs) installed. Is it more efficient to fill our reservoir using the pumps without ASDs, or to run several of the pumps with ASDs at partial load?

– Municipal water department



Examples of Inquiries...

I'm discussing wind power next week with our tribal government. Do you have publications I can share on benefits and issues related to wind energy?

– Tribal utilities commissioner

We're interested in using micro-turbines to generate electricity from methane produced in our treatment process. Are other facilities successfully using this "free fuel"?

– Wastewater treatment facility

We'd like to begin using alternative fuels in our fleet (garbage trucks and other government vehicles). What information and/or financial resources are available to help us get started?

– City director of general services



Observations

- History of general interest in “energy” issues has been uneven—until now
- Early lessons
 - Cultural approaches to recruiting “experts” within Extension
 - Unintended consequences—pilot catalyzed undeveloped connections that were ripe for exploitation
- Phase II approaches
 - Survey results—Extension agents and their customers need and want information and assistance
 - Balancing centralization and decentralization of services among regions, states and communities
- Pros and cons of customer segmentation and provider stovepipes
- Aligning channels reduces competition for customers’ attention
- 50% “impact” rate?

Opportunities

- Utilize all three land-grant university mission areas: research, extension, and education (graduate education)
- Capitalize upon extension university-wide, adds more resources to the ag-extension model
- Facilitate integrated projects, not just research
- Stimulate projects that include users in the planning and execution, as well as dissemination of findings
- Utilize web and online decision making tools, including eXtension

