



Oregon Biomass Resources



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DEPARTMENT OF
ENERGY

Biomass

Biomass is the organic matter in trees, agricultural crops and other living plant material. It is made up of carbohydrates — organic compounds that are formed in growing plantlife. Biomass is solar energy stored in organic matter.

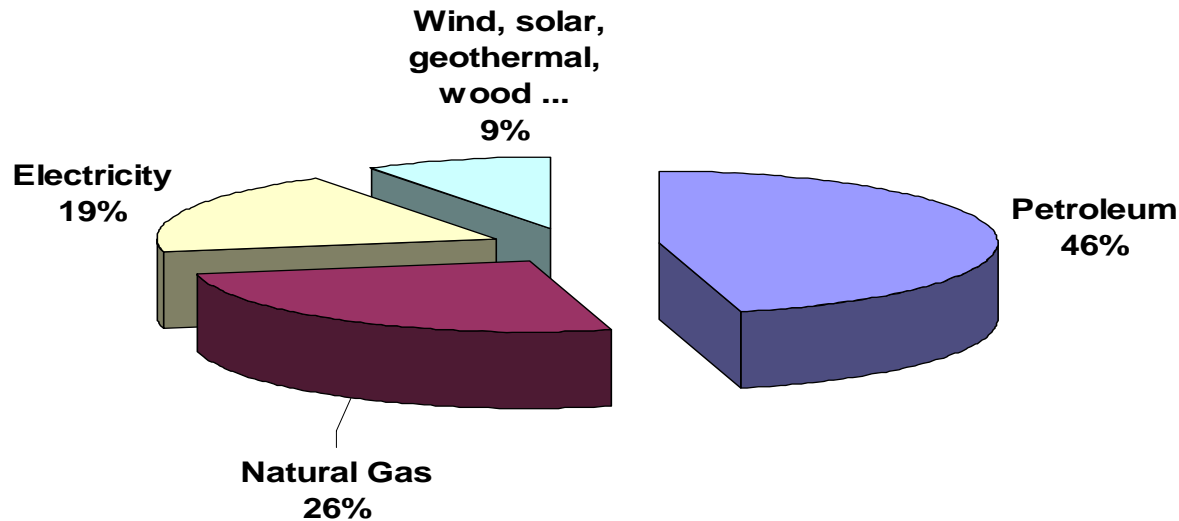


Overview

- ◆ Biomass Energy Use In Oregon
- ◆ Biomass Working Groups
- ◆ Biogas
- ◆ Woody Biomass
- ◆ Biofuels
- ◆ Biorefineries
- ◆ Services, resources and incentives



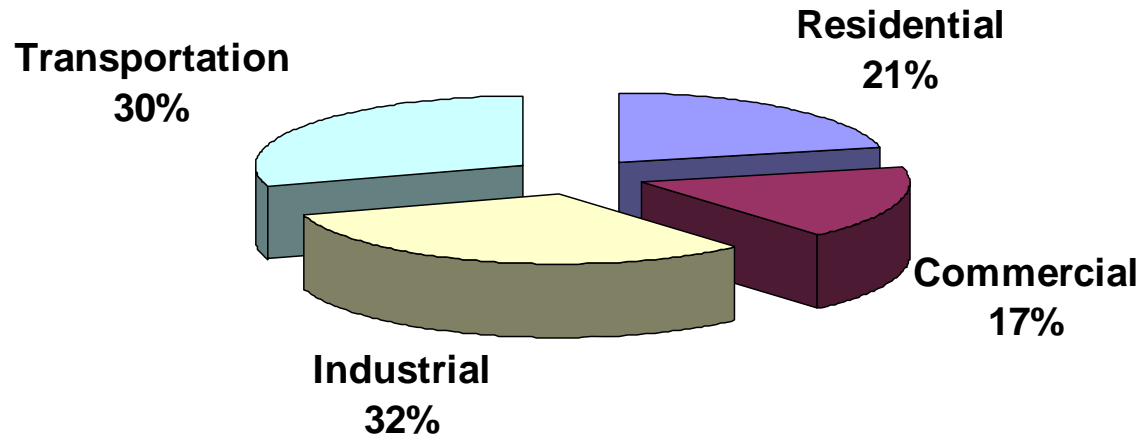
Oregon Energy Use by Fuel



- ◆ Natural Gas - 219 Trillion Btu/yr
- ◆ Electricity - 30,290 million kWh/yr
- ◆ Petroleum - 3.0 billion gallons/yr
- ◆ Other (wood, landfill gas, wind, solar, geothermal ...)



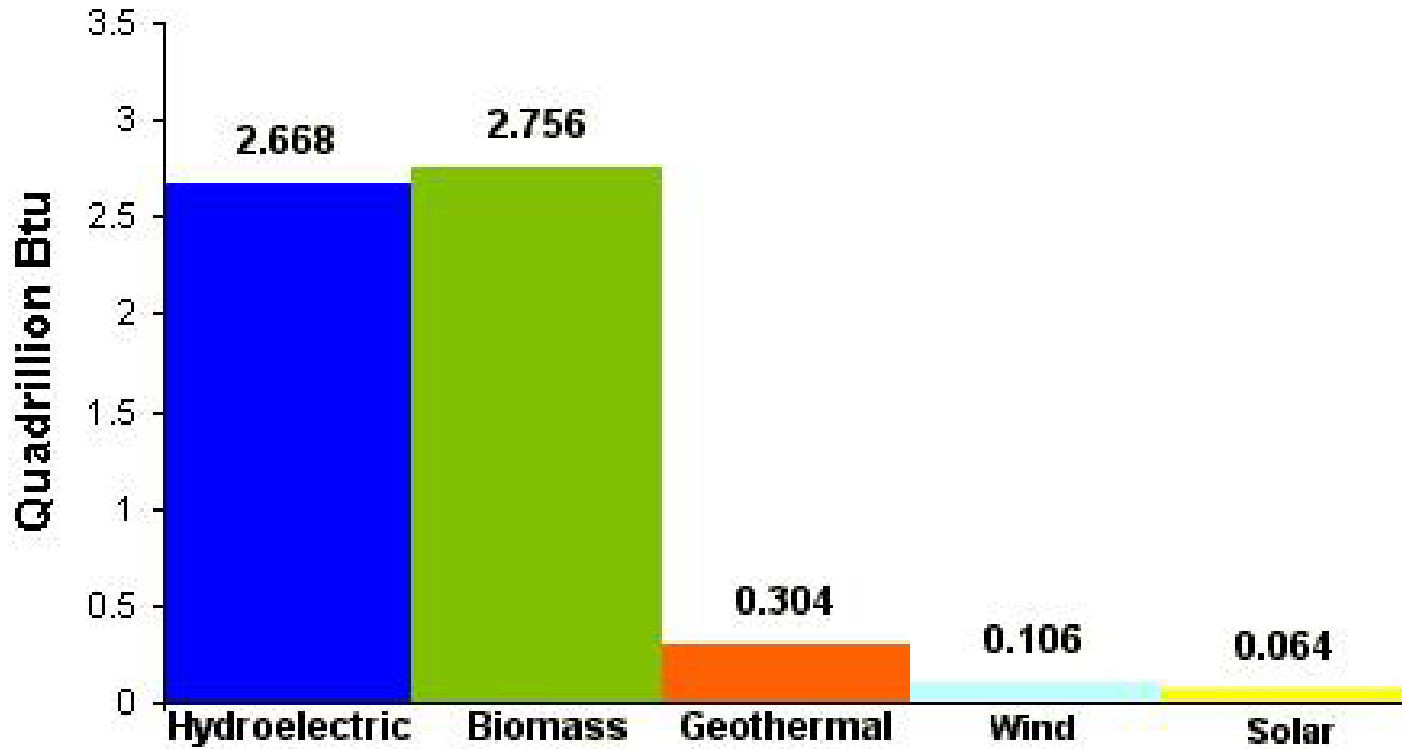
Oregon Energy Use by Consumer



- ◆ Residential - 219 Trillion Btu/yr
- ◆ Commercial - 190 Trillion Btu/yr
- ◆ Industry - 352 Trillion Btu/yr
- ◆ Transportation - 328 Billion Btu/yr



National Renewable Energy Use



Oregon Annual Biomass

- ◆ Biomass is 45% of all renewable resources
- ◆ Biomass represents 4% of all Oregon Energy Use
- ◆ 12.7 million bone dry tons of woody biomass produced
- ◆ 9.8 million bone dry tons woody biomass available
- ◆ 25% of available used in pulp and paper
- ◆ 2.5 million bone dry tons annually used for energy
- ◆ Wood products, forest residue, hybrid poplar
- ◆ Biogas, biocrops and metropolitan solid waste < 10%



Oregon Wood Products Biomass

- ◆ 3.3 million bone dry tons of forest biomass residue
- ◆ 1.6 million bone dry tons of biomass fuel used
- ◆ Wood fiber combustion boilers at 49 industrial sites
- ◆ The boilers supply heat for industrial processes
- ◆ Ten steam-driven generators produce electric power
- ◆ 942 million kilowatt-hours in 2004
- ◆ Six pulp mills operate pulping liquor recovery boilers
- ◆ Two pulp mills cogenerate steam and electricity
- ◆ Pulp and paper 206 million kilowatt-hours



Oregon Wood Products Biomass



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Resource Recovery Potential

- ◆ 28 green tons of biomass per acre,
 - ◆ 40% sawlogs, 60% biomass, \$125/acre
- ◆ 48 green tons per acre
 - ◆ 51% sawlogs, 49% biomass, \$255/ acre
- ◆ 18 green tons of biomass per acre removed
 - ◆ 35 loads of sawlogs, 65 loads of chips - 108 acres
 - ◆ Bid \$197 per acre for services
 - ◆ Paid \$3.76 per green ton to remove material
 - ◆ Average cost per acre was \$129



Oregon Wood Products Biomass



Courtesy of Quincy Library Group



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Oregon Forest Biomass Removal Example

- ◆ Hauling characteristics/considerations need clarity:
 - ◆ 15 bone dry tons per acre (reliable potential)
 - ◆ 12 bone dry tons per load (appx.)
 - ◆ \$1.90 per haul mile (typical)
 - ◆ \$30 per bone dry ton FOB at mill site (possible)
 - ◆ \$130 per acre removal cost
 - ◆ \$4 avoided slash handling/burn costs
 - ◆ ... Lets do the math and make markets !!



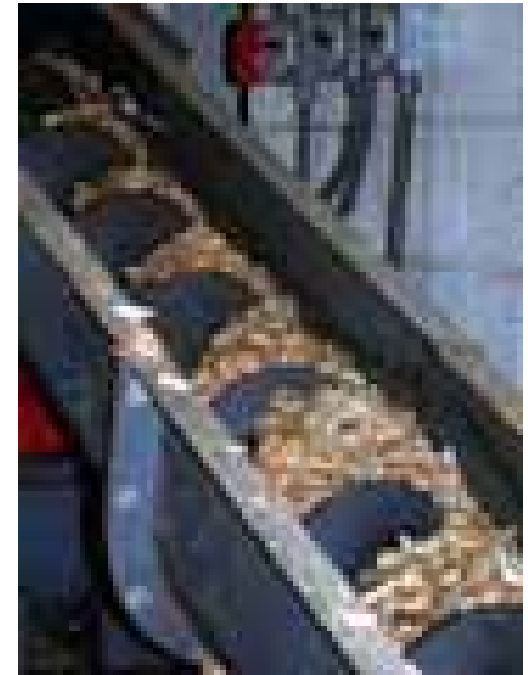
Oregon Residential Biomass

- ◆ 22 % homes use firewood for heat or backup
- ◆ 490,000 cords of firewood in 2004
- ◆ Energy value of 10 trillion Btu
- ◆ Two companies produce pellet fuel
- ◆ One produces charcoal briquettes
- ◆ Three produced about 239,000 tons of these fuels
- ◆ Energy value of the fuel was about 4.5 trillion Btu



Oregon Commercial Biomass

- ◆ Fuels for Schools (Montana, Idaho, Vermont...)
- ◆ Systems proved
- ◆ Variety of systems available
- ◆ Secure, quality fuel supplies require attention
- ◆ Most rural Oregon has feedstock



Oregon Agriculture Biomass

- ◆ 1.5 million dry tons of agricultural residue
- ◆ Energy content about 27 trillion Btu
- ◆ Could generate 213 average megawatts of electricity
- ◆ Grass and winter wheat straw only
- ◆ More nursery farm woody biomass available
- ◆ Culled fruit to ethanol
- ◆ Hazelnut hull and thinning recovery

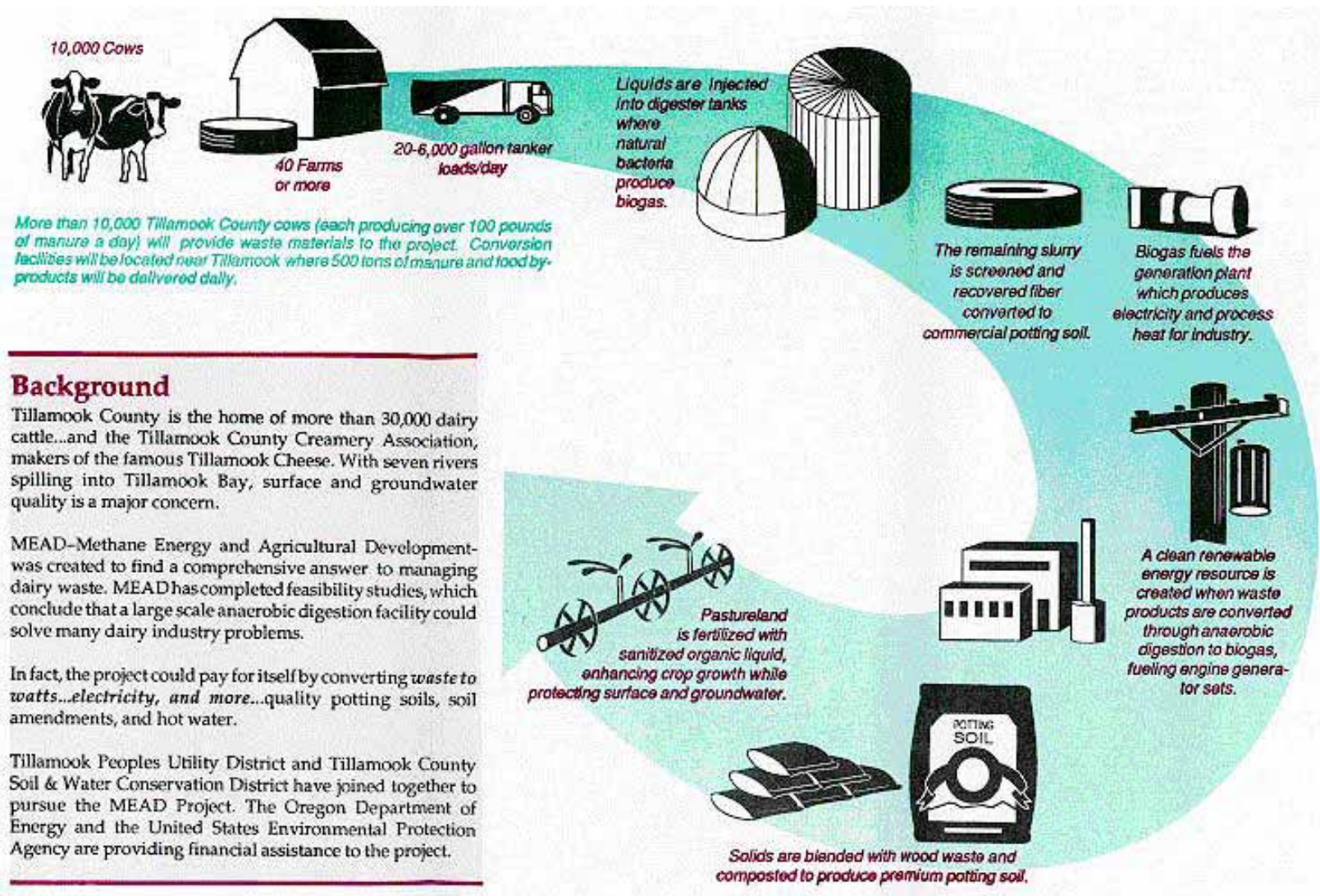


Oregon Organic Waste Digesters

- ◆ 111 dairies in the state with herds of 500 or more
- ◆ 3,400 million cubic feet of biogas possible
- ◆ 13 average megawatts of electricity potential
- ◆ Tillamook (MEAD) 4000 dairy cows
 - ◆ MEAD generated 1.3 million kilowatt-hours
- ◆ Calgon Farms digester 400 dairy cows
 - ◆ Calgon generated 236,000 kilowatt- hours



Organic Waste Digesters



Background

Tillamook County is the home of more than 30,000 dairy cattle...and the Tillamook County Creamery Association, makers of the famous Tillamook Cheese. With seven rivers spilling into Tillamook Bay, surface and groundwater quality is a major concern.

MEAD—Methane Energy and Agricultural Development—was created to find a comprehensive answer to managing dairy waste. MEAD has completed feasibility studies, which conclude that a large scale anaerobic digestion facility could solve many dairy industry problems.

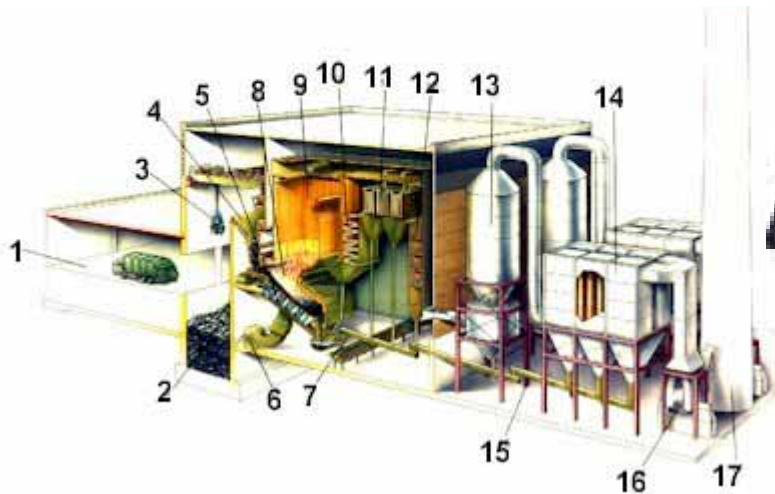
In fact, the project could pay for itself by converting waste to watts...electricity, and more...quality potting soils, soil amendments, and hot water.

Tillamook Peoples Utility District and Tillamook County Soil & Water Conservation District have joined together to pursue the MEAD Project. The Oregon Department of Energy and the United States Environmental Protection Agency are providing financial assistance to the project.



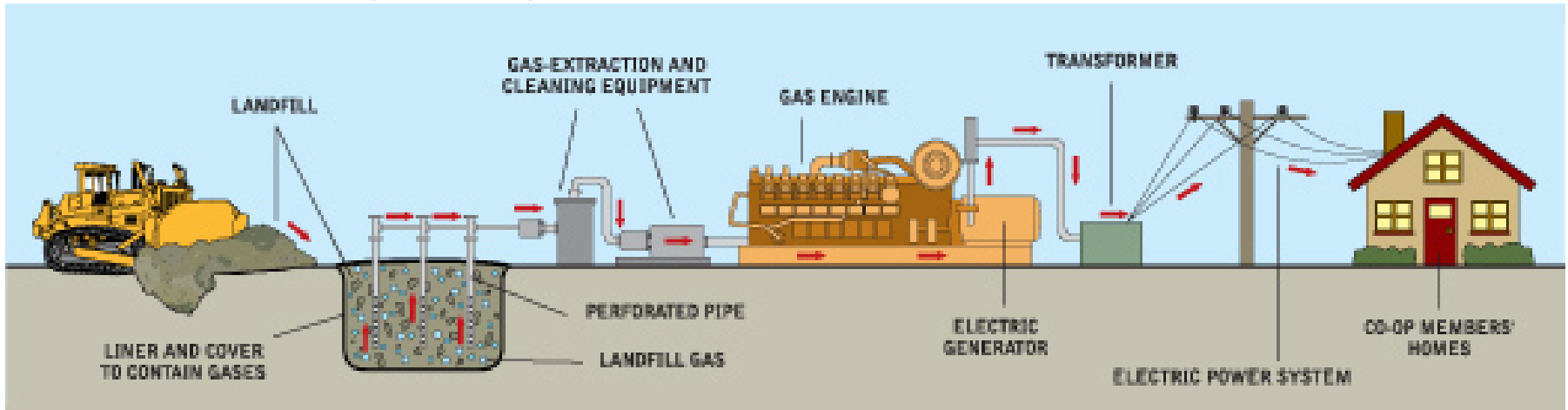
Oregon Metropolitan Solid Waste

- ◆ 0.32 million bone dry tons of wood from waste
- ◆ 0.19 million bone dry tons for energy
- ◆ 550 tons per day mixed waste to energy (.2 million)
- ◆ 13.1 Megawatts Capacity (99 Million kWh)
- ◆ 8,100 tons of MSW/yr
- ◆ 37 % recycled
- ◆ 120 MW Possible



Oregon Landfill Gas

- ◆ Estimate of six candidate landfills in Oregon
- ◆ Two recover gas for electricity (Coffin, Short)
- ◆ Four more have collection systems installed
- ◆ Findley Butte and Dry Creek are next
- ◆ 4,600 million cubic feet of landfill gas available
- ◆ 22 Average Megawatts Possible



Oregon Wastewater Biogas

- ◆ 28 large wastewater treatment plants in Oregon
- ◆ Wastewater flow of one million gallons per day
- ◆ Digester gas energy value of about 0.8 trillion Btu
- ◆ Nine wastewater plants generate electricity
- ◆ 26 million kilowatt-hours in 2004

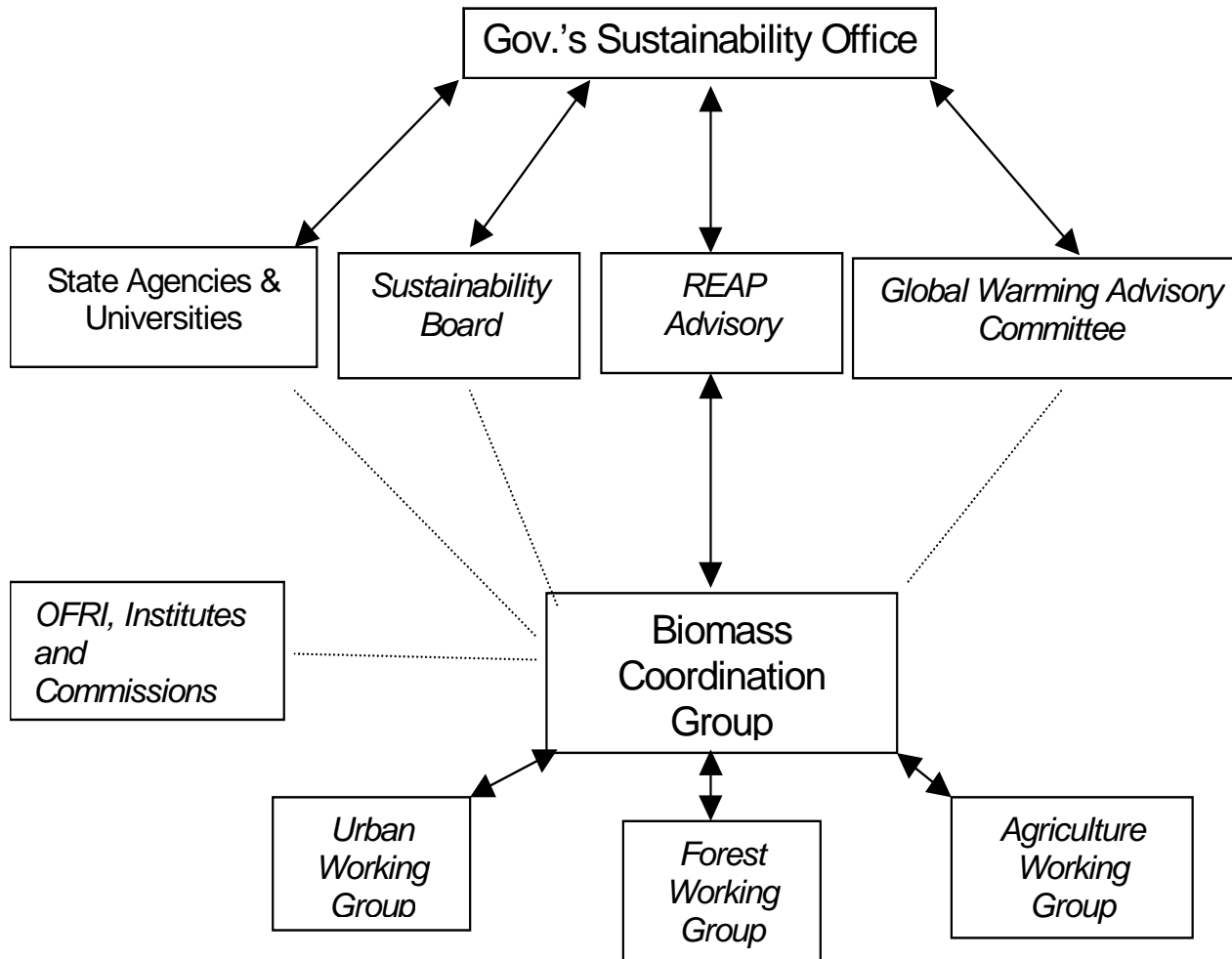


Oregon Biofuels/Biorefineries

- ◆ 4 ethanol plants being planned
 - ◆ Hard red wheat
 - ◆ Mid-west corn
 - ◆ Ethanol a by-product of nutraceuticals
- ◆ 1 Biodiesel production facility in place
- ◆ Waste yellow grease primary biofuel feedstock
- ◆ Cannola, sunflower, meadowfoam likely crops
- ◆ 15 million gallons biodiesel per year produced here
- ◆ 60 million gallons of ethanol used here



Oregon Biomass Efforts



Oregon Biomass Working Groups

- ◆ Forestry Biomass Working Group
 - ◆ Public Awareness
 - ◆ Regulatory Hurdles
 - ◆ Forest Inventories
 - ◆ Pilot Projects
- ◆ Agriculture Biomass Working Group
 - ◆ Cattle Holding Digesters
 - ◆ Biodiesel Crops and COOP Production
- ◆ Urban Biomass Working Group
 - ◆ Landfill and Wastewater Gas Recovery
 - ◆ Inventory Wood in MSW



Biomass and Efficiency Incentives

Oregon Business Energy Tax Credits

- ◆ Business tax credit of up to 35% of cost
- ◆ Credit claimed over five years (10%,10%, 5%,5%,5%)
- ◆ Projects under \$20,000, credit claimed in one year
- ◆ Eligible projects: energy conservation, recycling, renewables, transportation fuels
- ◆ “Pass-through” allows a third party to claim tax credit
- ◆ Projects have saved or generated energy worth \$100 million per year



Biomass and Efficiency Financing

Oregon Small-Scale Energy Loan Program

- ◆ Loan officers and technical staff available
- ◆ Loan fees usually less than .5%
- ◆ Fixed rates between 5 and 6.5 %
- ◆ Fixed terms of five, ten or fifteen years common
- ◆ Loans up to \$100,000 take 2 - 3 weeks to approve
- ◆ Loans over \$100,000 require committee approval



NW Organizations Providing Incentives

- ◆ Energy Trust of Oregon
- ◆ Public Utilities
 - ◆ Cooperatives
 - ◆ Municipals
 - ◆ Utility Districts
- ◆ State Agencies (ODOE, ODEQ, Agriculture, Forestry...)
- ◆ Federal Government (USDA, BLM, Forest Service...)
- ◆ Regional Efficiency Organizations (Climate Trust...)
- ◆ Public Foundations
 - ◆ http://www.eere.energy.gov/sro/financial_opps.html



Supporting Efficiency/Renewables

- ◆ Choose to purchase green power supplies
- ◆ Own an energy and waste efficient home
- ◆ Reduce your families vehicle miles traveled
- ◆ Insist on efficient schools, and public infrastructure
- ◆ Participate in public energy decision making
 - ◆ Energy Trust of Oregon
 - ◆ Utility rate cases (PGE, PacifiCorp, BPA...)
 - ◆ Community budget making...
- ◆ Advocacy collaboratives - Biomass Working Groups
- ◆ Support efficiency/renewables legislation
- ◆ Develop and advocate for organizational energy policy



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- ◆ Oregon has been able to improve energy efficiency and limit CO₂ emissions without harming the economy.
- ◆ Education, standards, technical assistance and incentives are key.
- ◆ Conservation and renewable resources are the state's preferred resources.
- ◆ A robust and competitive marketplace will select the best resources.



<http://www.energy.state.or.us>