

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.



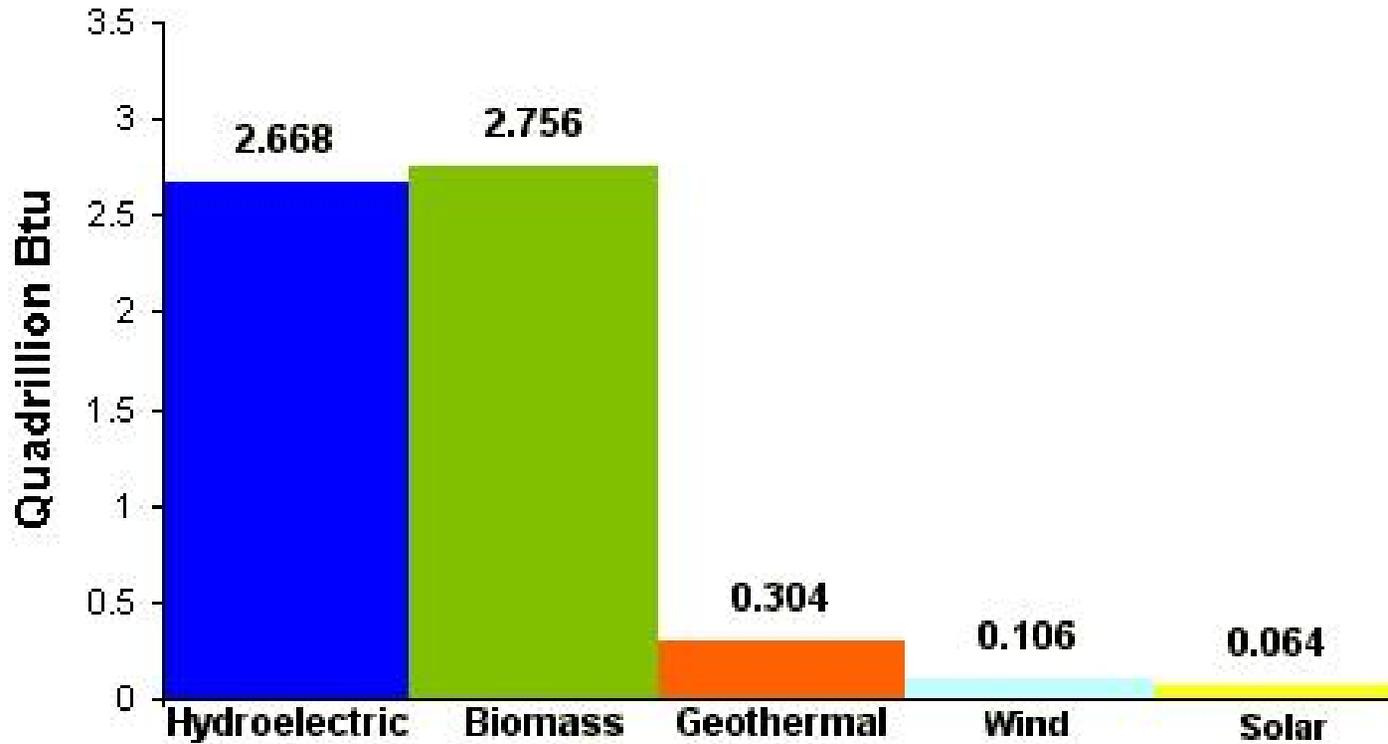
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Overview

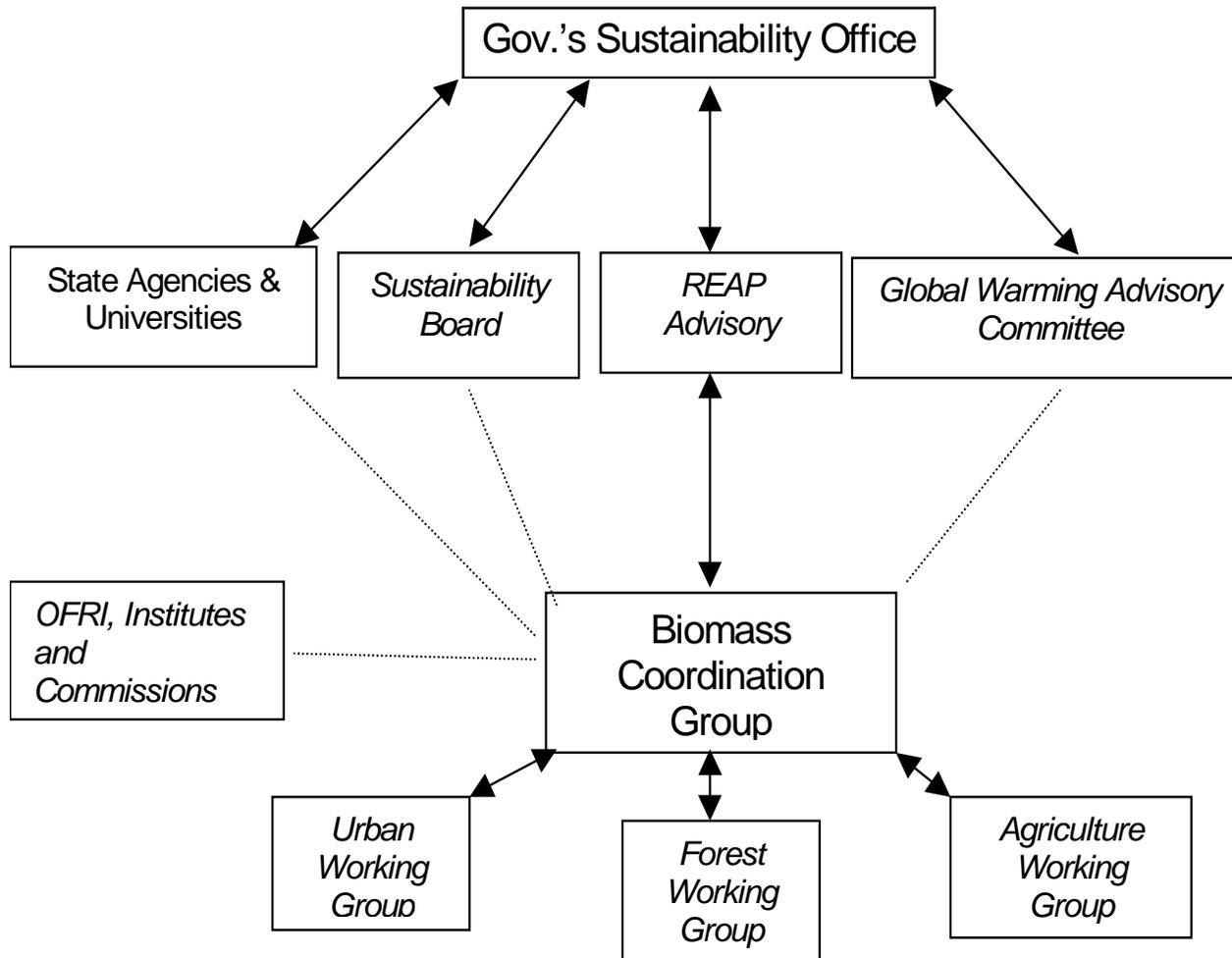
- ◆ Biomass Energy Use In Oregon
- ◆ Biomass Working Groups
- ◆ Biogas
- ◆ Woody Biomass
- ◆ Biofuels
- ◆ Biorefineries
- ◆ Services, resources and incentives



National Renewable Energy Use



Oregon Biomass Efforts



Biomass Coordination Group

- ◆ Characteristics
 - ◆ Multi-agency, Universities and Governors Office
 - ◆ Meets bi-monthly
 - ◆ Representatives on each of working groups
- ◆ Action Areas
 - ◆ Reduce duplication of effort
 - ◆ Coordinate efforts and agency resources
 - ◆ Develop consistent messages for public awareness
 - ◆ Economic and market development opportunities
 - ◆ Identify and remove common barriers to development
 - ◆ Integrate efforts w/ outside resources



Forest Biomass Working Group

- ◆ Characteristics
 - ◆ Charter
 - ◆ Diverse 30+ membership
 - ◆ Geographically represented
 - ◆ Three meetings
- ◆ Action Areas
 - ◆ Predictable supply
 - ◆ Stakeholder and public awareness
 - ◆ Economic and market development
 - ◆ Extraction and production infrastructure
 - ◆ Supportive regulatory environment
 - ◆ Research and technology develop.



Agriculture Biomass Working Group

◆ Characteristics

- ◆ Departments of Energy and Agriculture
- ◆ Specific markets tactical approach
- ◆ REAP goals specific

◆ Action Areas

- ◆ Cattle holding digesters
- ◆ Acceptance and growing biofuel crops
- ◆ COOP fuels production
- ◆ Public information - case studies - research
- ◆ Funding opportunities facilitated



Urban Biomass Working Group

- ◆ Characteristics
 - ◆ Departments of Energy and Environmental Quality
 - ◆ Specific markets tactical approach
 - ◆ REAP goals specific
- ◆ Areas of Action
 - ◆ Landfill gas recovery and energy production
 - ◆ Wastewater gas recovery (thermal and electric)
 - ◆ Inventory wood in metropolitan solid waste
 - ◆ Solid waste energy production evaluation



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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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

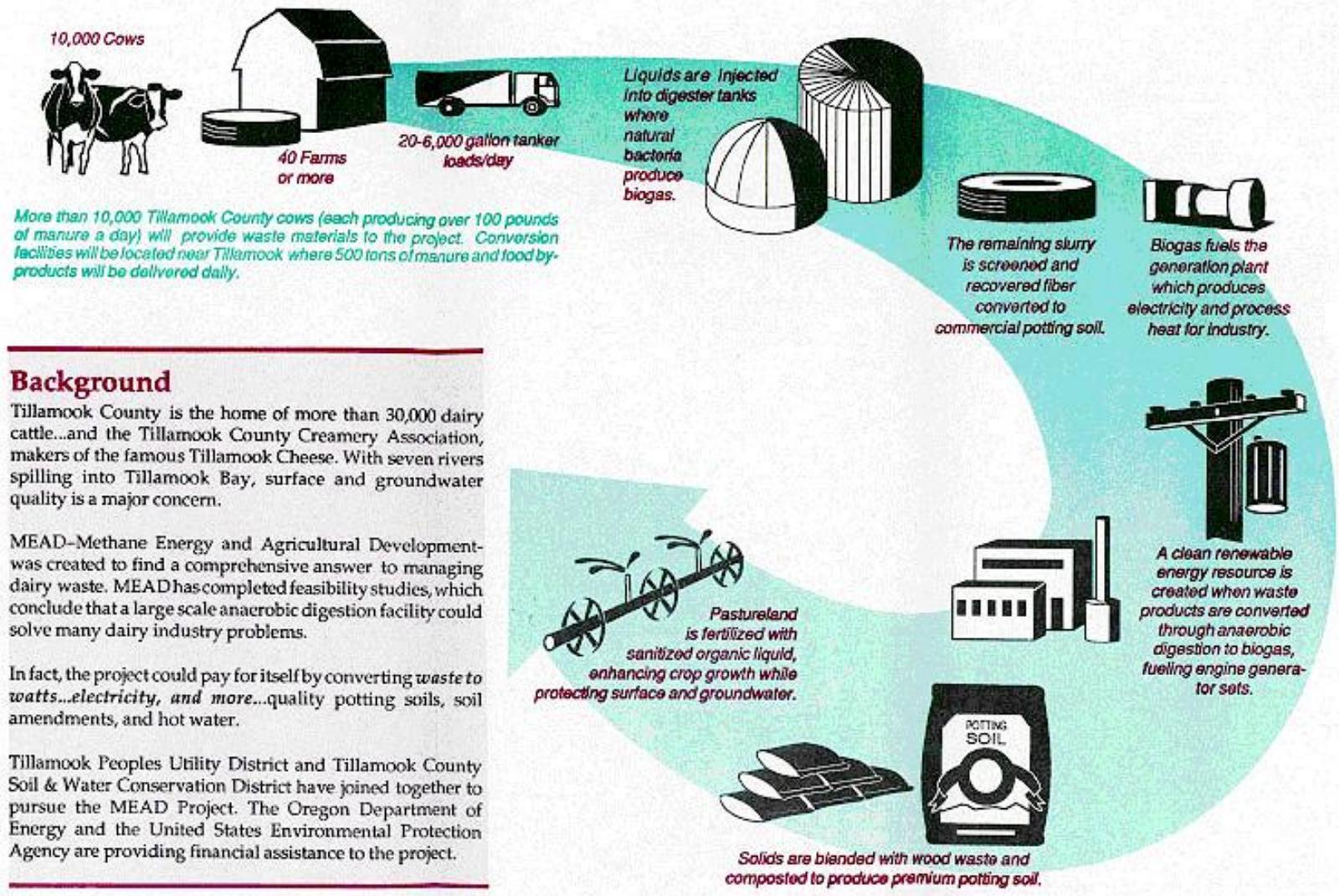


Oregon Organic Waste Digesters

- ◆ 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 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



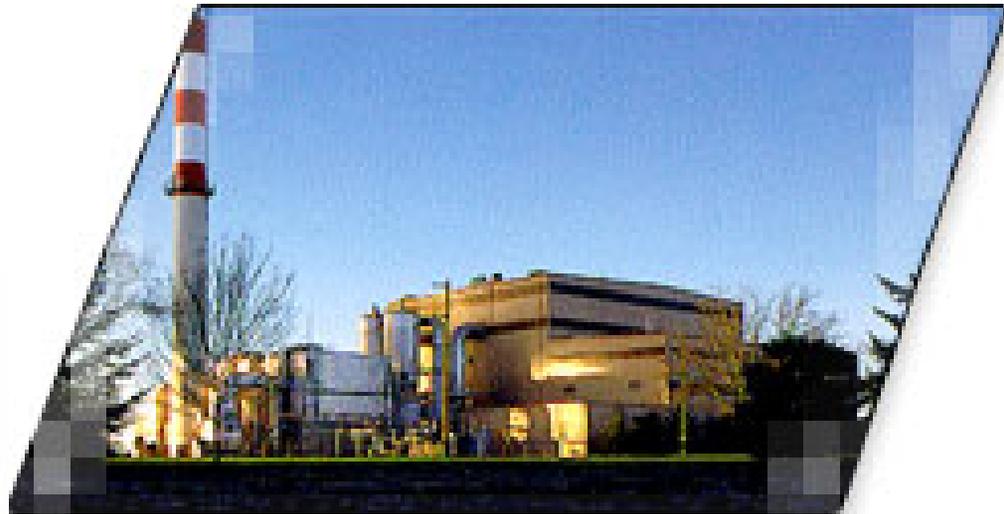
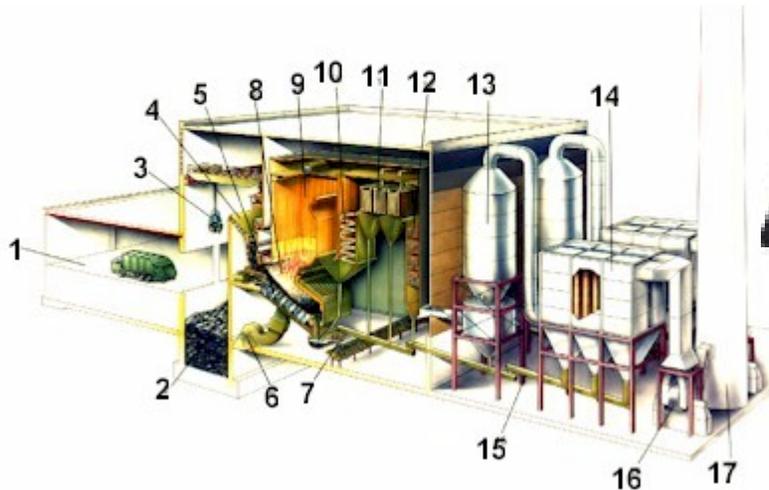
Oregon Commercial Biomass

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



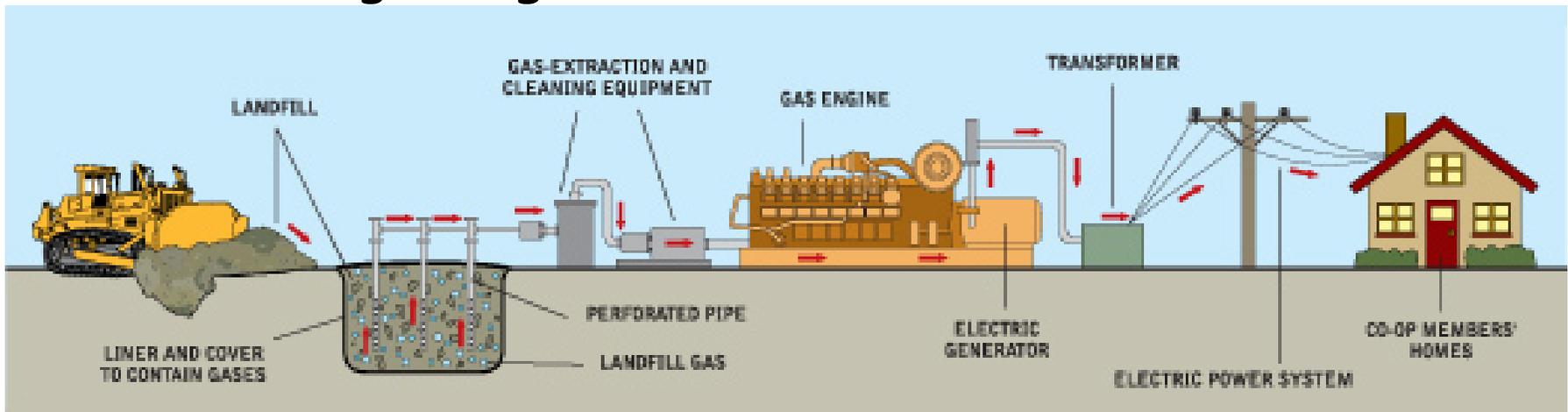
Oregon Metropolitan Solid Waste

- ◆ 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

