



An Energy-Efficiency Workshop and Exposition Orlando, Florida

Biomass & Biogas Energy

Presented by:

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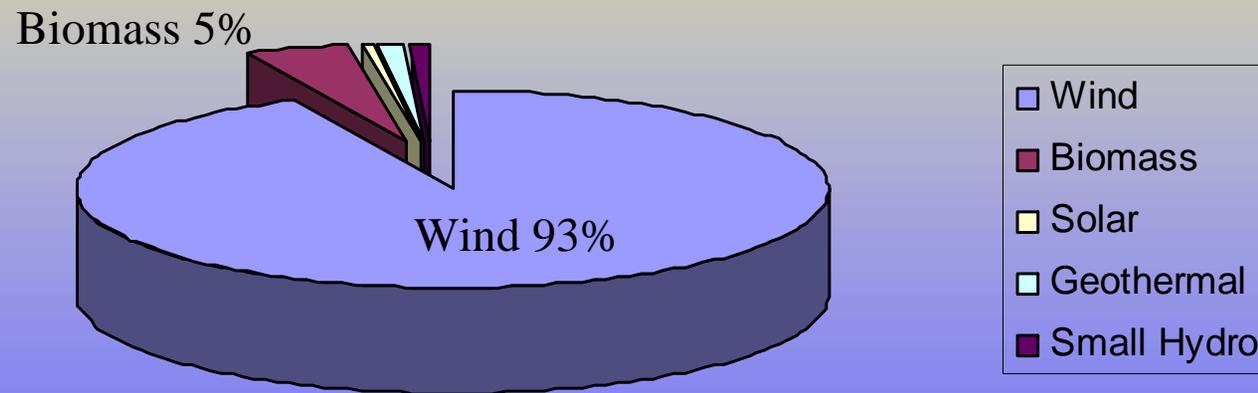
Today's Topics

- Some Context
 - Renewable Energy Market, Mandates & Incentive Programs
- Biomass/Biogas Energy: Overviews & Project Case Studies
 - Digester Gas Energy
 - Landfill Gas Energy
 - Solid Waste & Biomass Energy



Renewable Energy Market in the U.S.

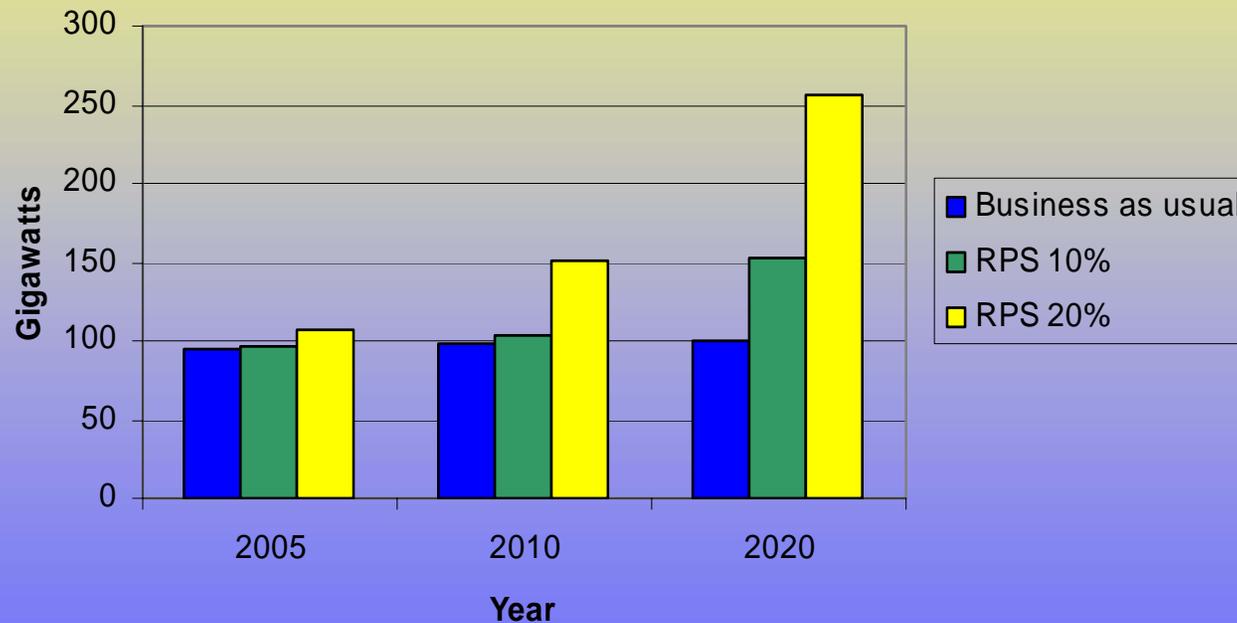
US Renewable Energy Capacity Supplying Green Power Markets - 2003





Impact of a Federal Mandate for Renewables

RPS: Expected Impact on U.S. Generating Capacity to 2020



Source: EIA



Federal Incentives for Renewable Energy

- Production Tax Credit
 - Currently provides \$0.018/kWh tax credit to certain renewable energy generators
 - Has been key to wind project developers
 - Uncertainty concerning extension led to a 73% decline in new wind capacity additions in the U.S. between 2001 & 2002
 - PTC extension to December 2006 currently part of energy legislation
- Renewable Energy Credits (RECs)
 - A robust nationwide REC market would be more efficient



State-Level Mandates & Incentives for Renewables

Incentive Program Type	# of States
Portfolio Standards	15*
Public Benefits Funds/System Benefits Funds	15
Net Metering	36
Green Power Purchasing	16
Sales Tax Incentives	17
Property Tax Incentives	25
Production Incentives	22
Generation Disclosure Programs	23

* mandated standard (12) or portfolio goal (3)



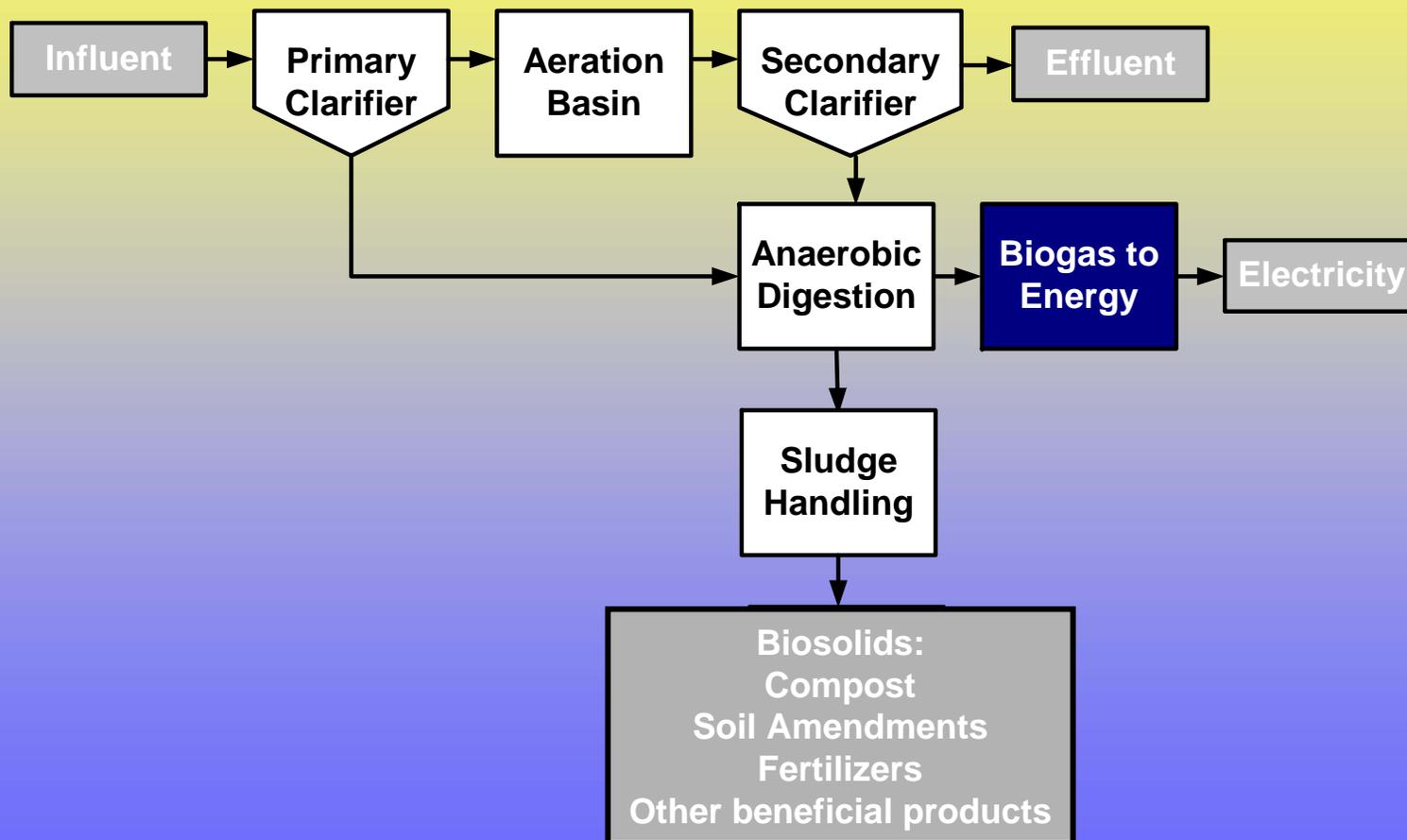
Digester Gas Energy Overview

- Anaerobic bacteria break down or “digest” organic material to produce biogas
- Anaerobic processes can be managed in a “digester” (an airtight tank) or a covered lagoon for waste treatment
 - Used in municipal wastewater treatment plants, large farm/dairy operations, food processors, etc.





Digester Gas Energy Process Concept





Digester Gas Energy Example Project

- California Energy Commission, Public Interest Energy Research (PIER) Renewable Energy Program





Digester Gas Energy Example Project

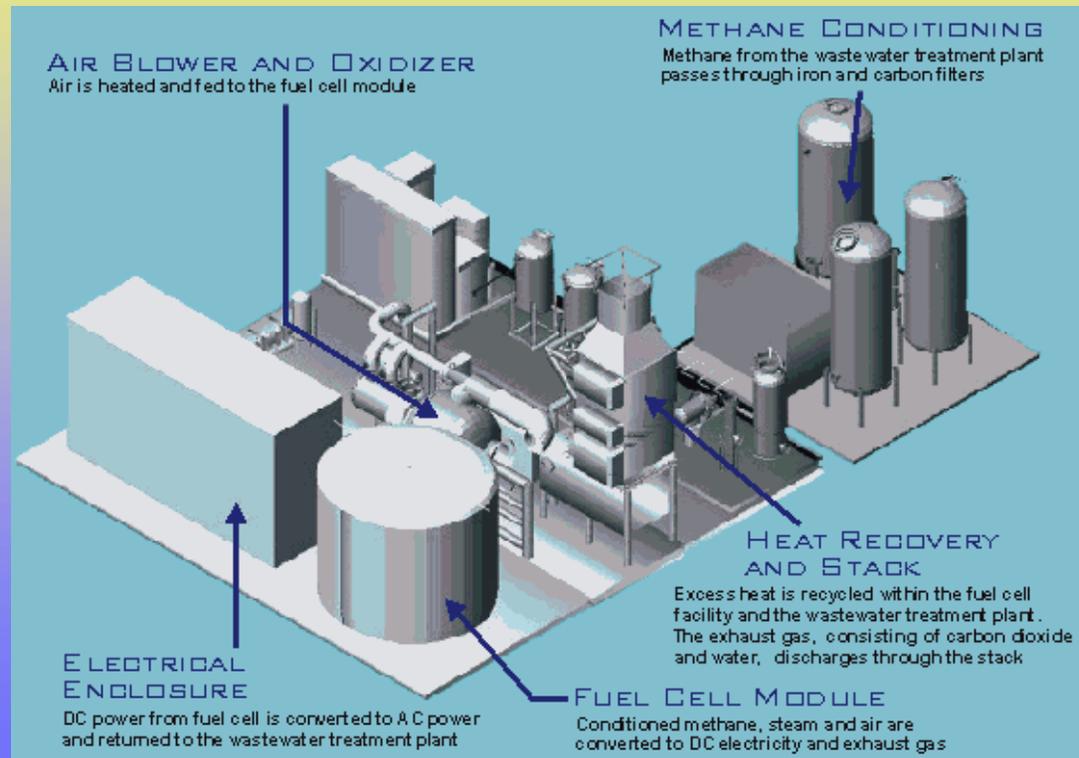
- Oceanside WWTP
San Francisco, California





Digester Gas Energy Example Project

- King County South WWTP, Renton, Washington





Digester Gas Energy

Example Energy + Materials Project

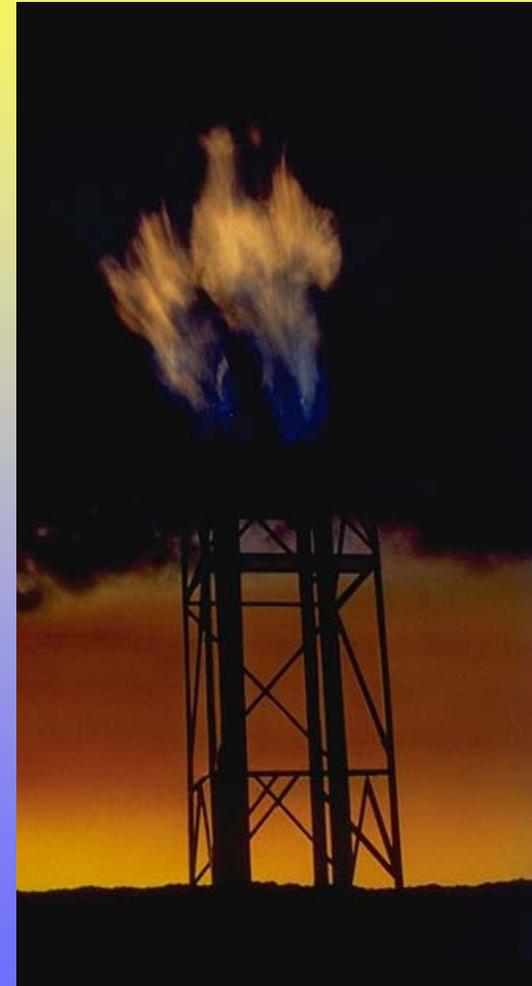
- **Las Virgenes Municipal Water District**





Landfill Gas Energy Overview

- Landfill biogas is created when organic waste in a landfill decomposes.
- The LFG can be captured and used as an energy source.





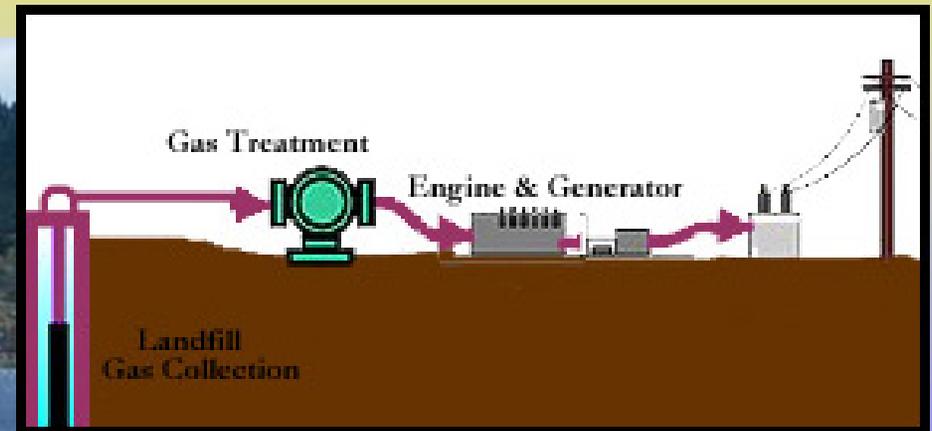
Landfill Gas Energy Process Concept





Landfill Gas Energy Example Project

- Coffin Butte Landfill, Corvallis, Oregon





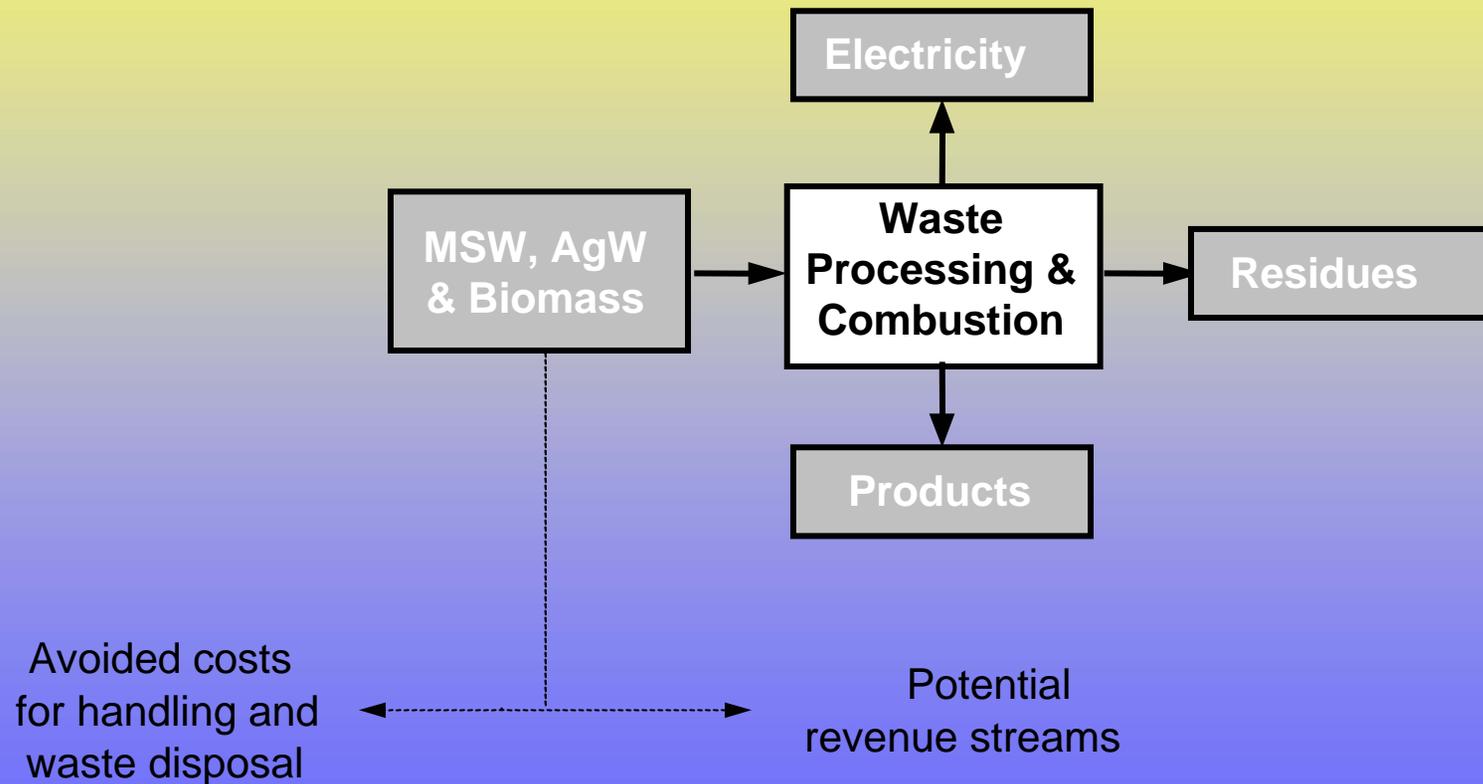
Landfill Gas Energy Example Project

- Cedar Hills Regional Landfill, King County, Washington





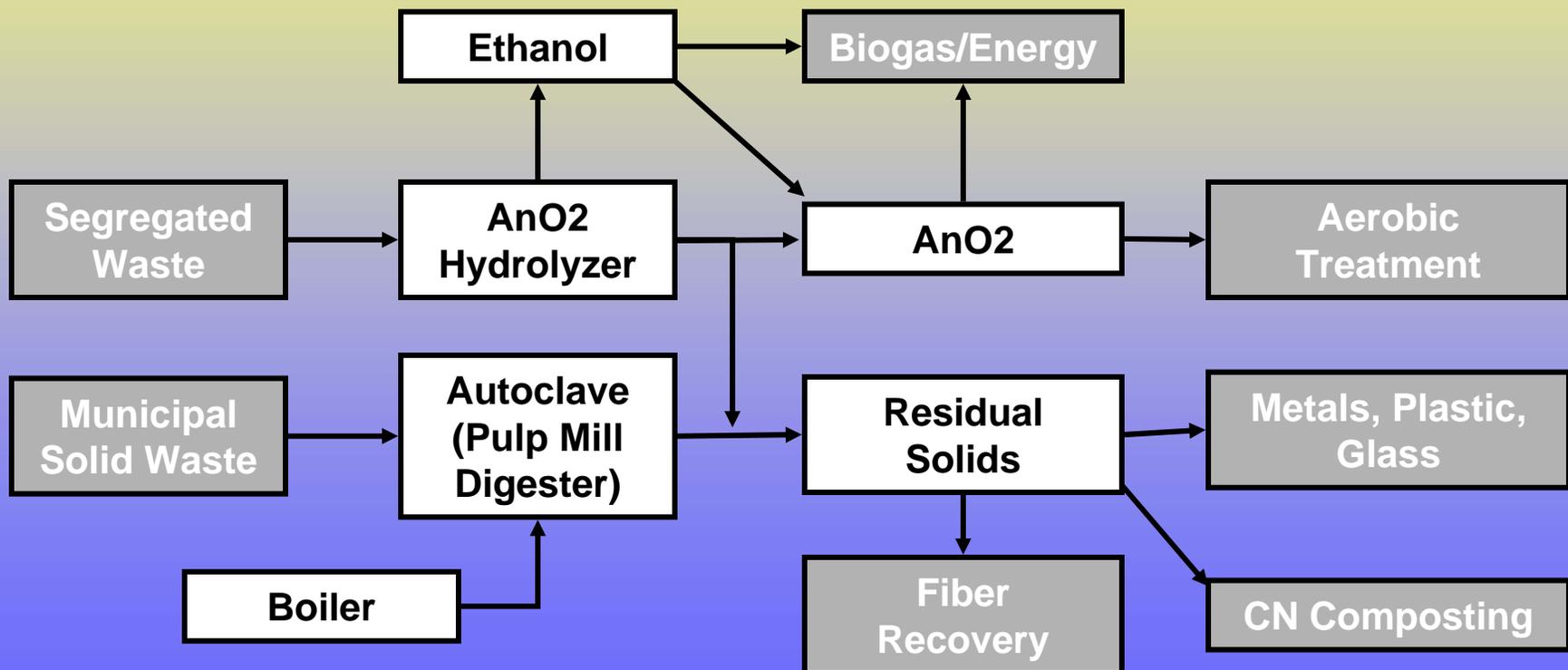
Solid Waste Energy General Process Concept





Solid Waste Energy SSSW Process Concept

- Source-Segregated Solid Waste Processing Technology





Solid Waste Energy Example Project

- Food Waste Cogeneration Project



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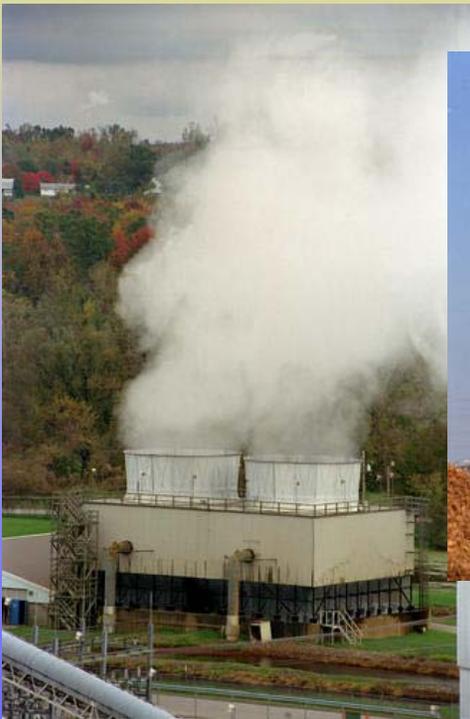
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Woody Biomass Energy Example Project

- Scott Paper Company Wood Waste Cogeneration



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