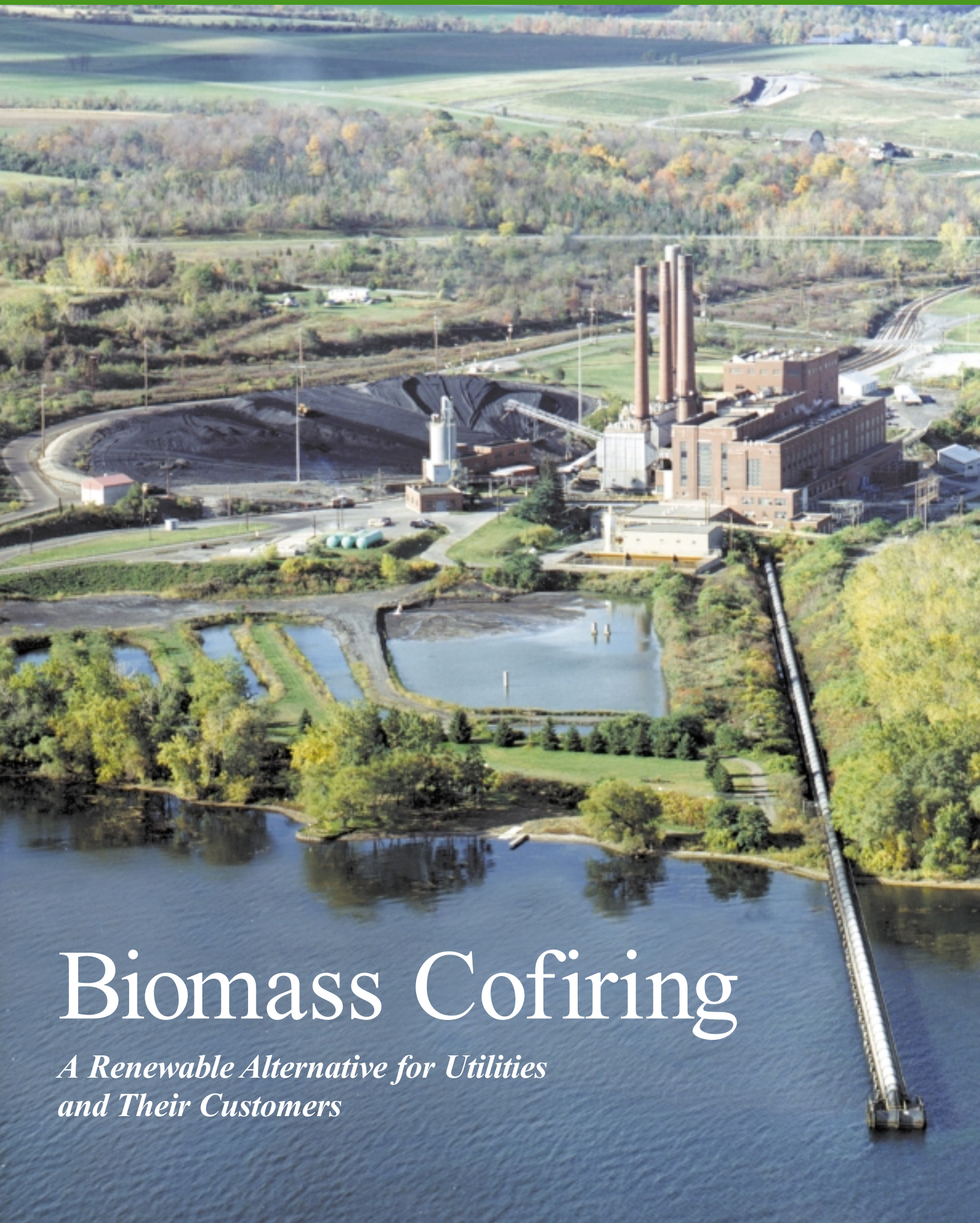
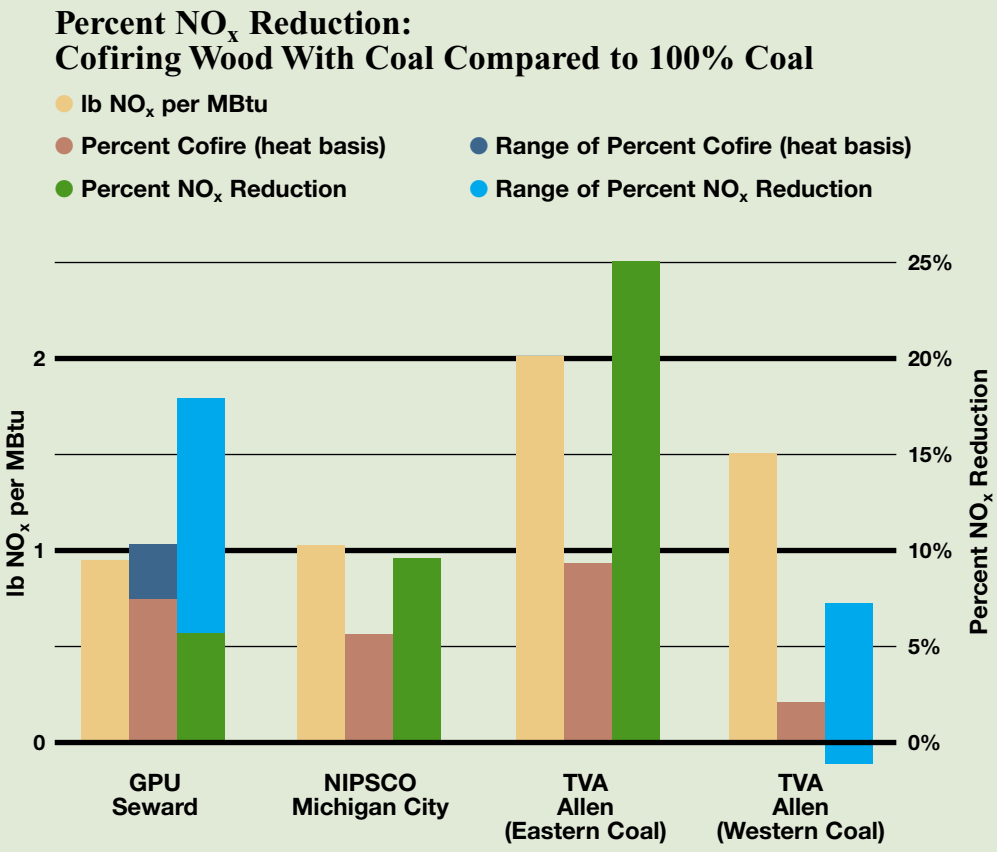


Biomass Cofiring

A Renewable Alternative for Utilities and Their Customers

Cofiring Biomass with Coal Reduces Emissions

Cofiring biomass with coal has environmental advantages, including reducing greenhouse gases such as carbon dioxide (CO_2) and acid rain precursors such as sulfur dioxide (SO_2) and nitrogen oxides (NO_x). Almost all biomass is low in sulfur content, so SO_2 reductions are typically proportional to the biomass input. Furthermore, some biomass fuels, such as wood, are also low in nitrogen content. Recent tests sponsored by the Electric Power Research Institute (EPRI) and the U.S. Department of Energy (DOE) conducted at 10 utility boilers cofiring up to 7% wood show NO_x emissions can be reduced as much as 15% compared with coal-only operation. The results—which depend on firing configuration and boiler type—did not explore optimizing NO_x reductions.



Cover photo: NYSEG's Greenidge generating station, Dresden, New York, where willow has been cofired with coal as part of the Biomass Power for Rural Development Program.

Industry Surveys Performance

Several years of operating experience and testing have allowed power companies to delineate the technical and economic issues associated with cofiring biomass with coal.

Economic Requirements

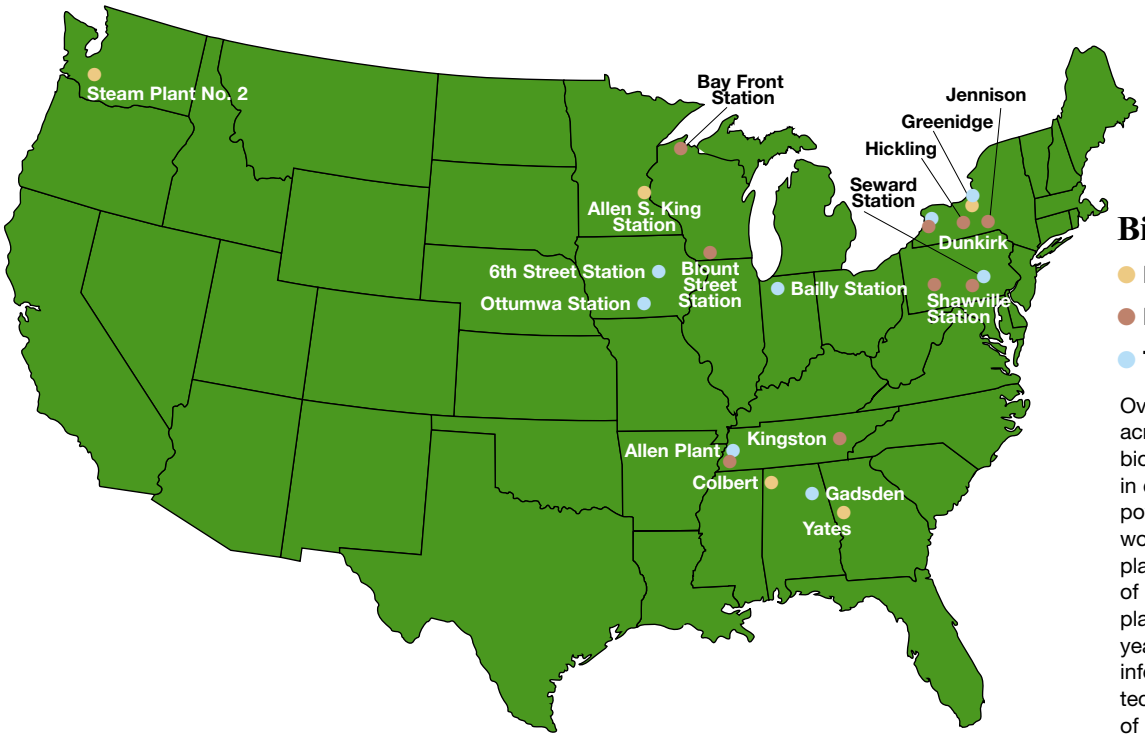
The economics of cofiring are highly site-specific and depend on the layout of the power plant and the availability of low-cost biomass fuels. A typical cofire installation includes modification to the fuel-handling system and storage for biomass. Costs can increase significantly if facilities for wood drying or size reduction are required, or if a separate feed to the boiler is required. For pulverized-coal boilers, retrofit costs range from $150 to $300 per kilowatt (kW) and higher. The lowest-cost opportunities are with cyclone boilers, for which costs may be as low as $50 per kW.

The more important cost factor, however, is fuel supply. Costs for biomass fuels depend on a number of factors such as climate and proximity to population centers and industries that handle and dispose of wood. Usually the cost of biomass fuels must be equal to or less than the cost of coal (per MBtu) for cofiring to be economically successful. Some utilities reduce fuel costs by cofiring with biomass; the Tennessee Valley Authority, for example, estimates it will save $1.5 million per year in fuel costs cofiring at its Colbert plant.

Technical Challenges

Several technical questions having to do with fuel feed, boiler chemistry, and ash deposition and disposal have been defined and are approaching resolution. Losses in boiler efficiency due to cofiring are small (0.3 to 0.6 points out of 85 to 88 percentage points) and are usually due to higher moisture content in the biomass fuels. A consensus is emerging that cofiring is feasible at the majority of coal-fired power plants.

However, many power companies sell fly ash for use in making Portland cement; currently the standard set by the American Society for Testing and Materials require only “coal ash” be used in the mixture. Until this standard is changed to specify performance instead of “coal ash,” cofiring biomass may alter the ability of plant managers to sell ash for use in making cement. Several utilities are working with the U.S. Department of Energy (DOE) to resolve this issue.



Biomass Cofiring Plants

- **In Commercial Operation**
- **Demonstrations Conducted**
- **Tests Planned**

Over the last decade, electric utilities across the country have implemented biomass cofiring in demonstrations and in commercial operations. Today, five power plants are cofiring coal with wood residue products and a sixth plant recently shut down after 10 years of operation. Five more plants are planning tests some time in the next year. As a result of this experience, information is now available on the technical and economic performance of cofiring biomass with coal.

Customers Support Clean Energy

In a deregulated market, power producers with coal generation may use biomass cofiring to improve their overall environmental performance for customers who are sensitive to environmental issues.

Biomass cofiring may represent an opportunity for both consumers and power companies. In recent polls, consumers have indicated their willingness to support green-pricing and renewable energy programs. Some consumers are paying a premium for renewable energy, typically 10% or less of their entire bill. For power generators, biomass may represent the most plentiful and economic supply of locally available renewable energy.

Cofiring may also represent an opportunity for power companies to provide new services to important customers. This opportunity exists for providing industries such as construction or transportation a way to discard large quantities of wood, or providing industries such as forestry, wood products, pulp and paper, agriculture, and food processing a way to dispose of large quantities of residues. In these locations, the cost of biomass fuels can be relatively low. Thus cofiring can provide both a service to industrial customers and renewable energy for environmentally conscious customers at the same time.

U.S. Department of Energy Biomass Power Program

The mission of the Department of Energy's (DOE) Biomass Power Program is to encourage and assist industry in the development and validation of renewable, biomass-based electricity generation systems which are capable of providing substantial economic and environmental benefits to the nation. Collaborative partnerships which are being established between DOE and the private sector will facilitate the commercialization of a range of small- to large-scale biomass-powered systems. In concert with this mission, the Program is working to enhance economic development opportunities by providing an array of coproducts—electricity, fuels, and chemicals—through the integration of biomass power with high-yielding agricultural systems. In this effort, the Program is encouraging the highest standard of stewardship of air, water, and soil resources.

For More Information:

Visit the BioPower Web site:
www.eren.doe.gov/biopower

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