



Northern Wood

POWER PROJECT

**A PSNH plan for
Renewable Energy in New Hampshire**




PSNH Schiller Power Station, Portsmouth New Hampshire

Is it possible to generate cleaner, greener electricity without charging more for it?



There are times when resources, ideas and technologies converge to chart a new direction in power generation. For PSNH, and the people of New Hampshire, one of those times is now. And the result is the Northern Wood Power Project.

The direction? Efficient operation of an existing electrical generating station that will produce cleaner, greener, renewable energy at competitive rates with greatly reduced emissions




The resource? A 50 megawatt steam turbine currently operated by a coal-fired boiler at the Schiller power plant in Portsmouth, New Hampshire

The technology? A new fluidized-bed boiler will replace an existing coal burning boiler, that will burn whole-tree wood chips, sawmill residue and other clean low-grade wood products

The goal?

- 50 megawatts of cleaner, greener electricity without a rate increase
- A reduction of over a hundred thousand tons of coal burned annually—replaced by renewable fuel
- The reduction each year of thousands of tons of emissions
- Purchasing wood from New Hampshire sources to help sustain the New Hampshire timber industry
- Millions of dollars added to the New Hampshire economy
- An increase in tax revenue to Portsmouth



Fueling Change

The burning of renewable fuels to make electricity is not a new idea. A nationwide oil crisis during the Carter administration caused Congress to act. It quickly passed laws requiring utilities to purchase electricity from generators using renewable fuels. To make sure they thrived, Congress ensured that utilities paid a higher rate for their power, and wood-chip burning power plants sprang up around the country.

Contracts to buy energy from these sources will expire soon, but the benefit of buying wood from the New Hampshire wood supply industry remains. Also using a renewable indigenous fuel has value. These facts, coupled with lower emissions and no cost increase to customers provides value for all.

Given PSNH's commitment to fuel diversity, and in support of the Clean Power Act, PSNH began looking at ways to use its generating facilities to help the state's low-grade wood market, while also looking for ways to improve power plant emissions.

PSNH looked at several options. One possibility was to build a new power plant that would burn wood chips and other clean low-grade wood products. But building a completely new plant would be cost prohibitive and too expensive to run given that a new staff would be required to operate it.

That's when PSNH began looking at the idea of burning wood at the historic Schiller facility—a 150-megawatt coal-fired power plant nestled along the Piscataqua River in Portsmouth, New Hampshire.



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Today, individual coal-fired boilers drive Schiller's three steam turbines. Collectively, they burn approximately 400,000 tons of coal a year, providing enough energy to power the equivalent of 150,000 homes. Replacing one of those boilers with one that burns wood yields a wealth of advantages.

The Plan

Over the next two years, PSNH plans to build a state-of-the-art, fluidized bed, wood-fired boiler adjacent to the current plant. At the same time, a covered wood-chip storage facility will be built on the property, along with a covered conveyor to deliver chips to the boiler.

Building the boiler next to the plant will allow Schiller to operate normally during construction. As the new boiler nears completion, the middle boiler and stack at Schiller will be retired. The new boiler will be connected to the existing steam turbine and the Northern Wood Power Project will begin producing power as one of the largest, cleanest renewable energy plants in New England. In order to maintain fuel diversity, the new boiler will also have the capability of burning coal, as a back up source of energy, but the focus will be on burning wood.

Immediately, Schiller will be storing and burning one-third less coal. The result will be greatly reduced emissions as well as increased energy production and efficiency in power generation.

The Cost

Though the conversion cost of \$70-million is certainly significant, it's much less than creating a new power plant, which would require the cost of building a new steam turbine along with the hiring of personnel to run the new plant. And given the confluence of economic advantages in converting the plant, the goal is to create this fuel efficient, clean burning project without charging customers extra for it.

Environmental Benefits

There are a wealth of environmental benefits to switching from coal to a wood-fired boiler. Most wood-fired boilers are Stoker Grate boilers, wherein wood chips are fed via a rolling grate into the boiler. By the time the chips get to the other end, they have burned, yielding heat to the water, which turns into high-pressure steam to spin the turbine. The Schiller facility will utilize a fluidized-bed boiler. The principal difference is that the wood chips are blown up into the fire chamber during burning—resulting in an improved combustion process with lower emissions.

The result is a 75% reduction in oxides of nitrogen (NOx) emissions, a 98% reduction in sulfur dioxide (SO2) and a reduction of 91% in mercury. And, because these types of biomass plants are considered carbon dioxide (CO2) neutral, no additional CO2 is added to the environment as a result of burning wood. The only visible difference to those looking at the power plant is that the wood-fired stack will generate a lot of steam, because the wood chips are very moist—generating steam until they are completely burned. All told, the new wood-fired boiler will lower emissions by many tons annually compared to coal while helping PSNH meet the requirements of New Hampshire's Clean Power Act.



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Economic Benefits

Building REC room

For a project like this to work it has to make good business sense. At the heart of making the investment and effort to convert a coal-fired unit to one fueled by wood chips are Renewable Energy Credits (RECs).

In order to encourage the development of generators powered by renewable fuels, Connecticut and Massachusetts energy providers are required by law to purchase a certain number of Renewable Energy Credits each year from plants that utilize renewable fuels while maintaining strict emission standards.

Because the Northern Wood Power Project will burn wood chips while meeting those strict emissions standards, it will generate approximately 350,000 RECs each year. PSNH plans on selling these credits in markets with notable demand in Massachusetts and Connecticut, with the goal of completely offsetting the cost of building the project so that PSNH customers won't have to pay increased rates to finance the project.

Of course, none of the above would matter if the new facility couldn't produce power efficiently and reliably for the right price. Fortunately, the high-tech boiler and the overall scale of the operation make the new system very efficient. And because the boiler is new, it is estimated to be more reliable than the current boiler.

Benefits Near and Far

The benefits of the Northern Wood Power Project go beyond clean, efficient electricity. It will have a positive and significant impact on the region. The closure of some smaller, independently owned wood-fired power plants has slowed the wood supply industry recently. Introducing wood as a primary fuel at Schiller will create an important new market for the New Hampshire timber industry and for the workers who depend on that industry for their livelihood.

Overall, it's estimated that the new facility will add \$20 million annually to New Hampshire and the regional economy with much of that going to the state's timber and transportation industries.

Being a Responsible Neighbor

PSNH looked at many factors when deciding where to operate a wood-fired boiler. The Schiller plant offers many advantages, including ease of access to a good transportation network, the opportunity to tie-in to an existing plant's infrastructure, and the environmental benefit of reducing the plant's overall emissions.

PSNH recognizes that sustainable forestry and purchasing wood materials from New Hampshire forests is an important part of the Northern Wood Power Project. The plan is to purchase significant amounts of whole tree chips, sawmill residue and other clean low-grade wood materials and wood byproducts from New Hampshire and NH-based suppliers so long as it remains economically responsible.



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POWER PROJECT

Turning
wood chips
into electricity



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Good for
New Hampshire's
environment
and economy



**Public Service
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The Northeast Utilities System

For more information on the Northern Wood Power Project, go to psnh.com

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