Publicly Funded Biomass Heating

Southern Berkshire Regional School

Massachusetts Department of Energy Resources

CASE STUDY

Overview

The Southern Berkshire Regional School is a 220,000 ft2 facility in Sheffield, MA that is split into a high school wing and an elementary school wing and serves 845 students and faculty. The school is heated from October to April in order to maintain room temperature for the students and faculty. Previous to the biomass project installation, the school was heated with Weil McLain oil boilers that used #2 heating oil.

The school's roof was in disrepair and the oil boilers were approaching the end of life expectancy. The District Grant Coordinator looked into the Massachusetts School Building Authority (MSBA) in the hopes of finding funding for the very expensive roof renovation and biomass boilers. Through this contact, they learned of the DOER's SAPHIRE grant for renewable thermal technologies, which prompted them to look into and eventually choose biomass boilers. The Southern Berkshire Regional School District secured grants for the biomass project from both the DOER and the MSBA totaling over 40% of the projected costs. The school expects to save approximately $66,000 per year on heating costs with the new system. Additionally, air pollutants are projected to be reduced by 80-90% with 801.4 tons of CO2 avoided annually.

As of September 2015, the boilers have arrived onsite at the Southern Berkshire Regional School and the boilers are expected to be online by the end of October 2015.

AT A GLANCE:

- 220,000 square foot school building, housing both an elementary school and a high school
- Two wood pellet boilers provide space heating with an oil boiler on standby as a backup
- Close to 60% of $1.5 million cost funded publicly by the community. Other 40% from DOER and MSBA grant money.
- Projected to save about $66,000 (33%) annually on heating costs and provide stability against future spikes in oil costs

LEARN MORE:

- Southern Berkshire Regional School renovation: http://www.sbrsd.org/news4.html
- Renewable heating and cooling in Massachusetts: http://bit.ly/renewablethermal

Southern Berkshire Regional School Aerial View

Southern Berkshire Regional School Wood Pellet Boilers

System Design and Installation

The system is made up of two Veissman Pyrot 540 wood pellet boilers and a backup oil boiler. The wood pellet boilers heat water to approximately 180 °F and use a 3000 gallon thermal storage tank as a buffer to improve efficiency. The biomass boilers are fueled by wood pellets, which are made by compressing sawdust and wood shavings under high pressure. These pellets are stored in a large metal silo in the back of the school and are automatically fed into the boilers as needed with an auger. Windows on the silo show when the level of the pellets is low. The use of a silo for pellet storage is often preferred as it can be positioned to allow for close access to the boilers. Fortunately, the position of the boiler room within the school allowed for the silo to be placed behind the school next to the school dumpster, where it would not be seen from the street, alleviating concerns about aesthetics.

During the installation, there were some delays getting the biomass boilers delivered, so the oil boiler was installed first. The backup oil boiler is sized at ⅔ capacity, so it would be able to heat the building throughout the fall in the case that the biomass boilers were not online in time. The backup oil boiler uses costly #2 heating oil when in use, but the facility manager expects to not have to use it very often once the biomass boilers are fully operational.

The school has done a number of other energy efficiency improvements in recent years, which compound with this heating system upgrade to be even more effective. In 2010, they upgraded the energy management control system, which greatly reduced the amount of energy consumed by the school. The energy efficiency gains from the energy management control system, the new roof, and the new biomass boilers will all multiply to make this building supremely efficient.

3000 gallons Thermal Storage Tank

Operations and Maintenance

To keep the wood pellet boilers running smoothly, they receive a full cleaning annually, which is comparable to the school's old oil boiler system maintenance. The new system was designed such that there is 100% redundancy, which means that heating the building while servicing a boiler won't be a problem. Ash that results from the combustion process is deposited into a bin near the boiler. The maintenance staff will empty this ash every month or so.

Community Support

Community support was very important to the success of this project. Due to the high upfront installation cost of the new boilers and the roof renovation, the school was not able to get full funding through grants. This meant that a large portion of the project would need to be paid for by the taxpayers of the community, to which the community was initially opposed. This very nearly blocked the project from going through.

The District Grants Coordinator, in charge of the project, brought in biomass technology experts to educate the community on the reliability and efficiency of biomass. This helped improve community support because it helped the citizens begin to trust the technology as well as understand how the system is cleaner and cheaper than the oil alternative. To further gain support for the project, the District Grants Coordinator published a press release detailing how much each citizen's taxes would increase as a result of the project going through. Seeing that it was only about $20/year, the support among the taxpayers again increased. Community support for this project in Southern Berkshire was grown through education and process transparency.

Project Outcomes

While the construction for the biomass boiler installation is still in progress, the District Grants Coordinator and District Facilities Manager are very excited and optimistic regarding the biomass system. The new system is projected to save the school $66,000 or 33% on heating costs annually as well as reduce the school's greenhouse gas emissions by 80-90% or 801.4 tons annually. With the arrival of the biomass boilers in late September, the system should be fully functional by the end of October in time for the winter.

Lessons Learned

To ensure a smooth startup process for new wood pellet boiler installations, the DOER has some recommendations:

- Obtain community acceptance – The taxpayers had concerns when the project was first proposed regarding the cost of funding such a large project. In order to mitigate these concerns, the school district presented the taxpayers with an exact breakdown of how much each person's taxes would increase due to the project costs. When presented this way, the project cost was much more manageable, and community acceptance was achieved. They also brought in biomass technology experts to help to educate the community members. Educating the community about these new type of technologies is very important. In order for the community to support a project like this, they need to know what it is all about.

Electric Panels

- Get multiple trustworthy opinions on the project – Since wood pellet boiler are relatively new to the United States, Southern Berkshire Regional School District had three feasibility studies done for this project. Comparing these feasibility studies, they were able to clearly see the difference in experience of the different engineering firms by the boiler sizing and cost estimates provided by each of them. The first study was done by the contractor assigned to them by the MSBA, but the school had two more studies done because they knew the first contractor lacked experience with biomass boilers. After comparing all three studies, they had a much more appropriate boiler sizing estimate and an accurate projection of how much the project would cost.