Wood energy is not just for the big guys. For the Blackstone Conference and Retreat Center (BCRC), wood energy quite literally may have saved the institution. The BCRC, formerly the Virginia Methodist Assembly Center, was originally founded in 1894 and operated until 1915 as the Blackstone College for Girls. The original wooden structure twice burned down before the current four story concrete building was erected in the 1920’s, ensuring it would never burn again. Today the BCRC sits on 82 acres in Blackstone Virginia, hosting groups and meetings year round. The BCRC’s 100 guest rooms can accommodate up to 400 over-night visitors who enjoy amenities including an indoor swimming pool and running track. They can also have their spirits lifted by hymns played on a 120 year old Rockwell organ, the oldest operating on the east coast, complete with the original leather baffles!

Sam McCracken took over as Executive Director at the BCRC in 2010 and found the one hundred and eight thousand square foot concrete building heated by an aging fuel oil boiler that required nearly weekly maintenance. By 2013 the boiler consumed over $135,000 in fuel oil without even heating the hot water required for the indoor swimming pool, kitchen and showers for the guests. Supplying the staff time and resources required for maintenance took from needed upkeep and renovations on the rest of the facility. Knowing he had to replace the boiler, McCracken began doing his homework. Only months into his tenure McCracken approached his board and presented what at the time was an innovative solution: a biomass boiler.

McCracken knew that biomass fuels were less expensive than fuel oil on a dollar per energy content basis. He also knew that purchasing locally produced biomass fuels instead of fuel oil would put the BCRC’s energy dollars back into the local economy. However, finding information on equipment, system designs, and engineering proved to be a challenge. He sought an American built boiler but his desire for a multi-fuel boiler to provide flexibility in fuel-sourcing let him to the Italian company Uniconfort, distributed by US Biomass Energy Solutions. Inquiries with his contractors and associates for an engineer familiar with solid fuel biomass systems led nowhere until someone recalled hearing about someone who knew someone... Eventually McCracken was in touch with Langseth Engineering out of Lynchburg, VA, specialist in biomass engineering.

Preserving the historic nature of the facility proved to be both a challenge and an opportunity. The boiler house dated back to the 1800’s and was in need of serious repairs. The Board of Architecture Review resisted proposed changes until faced with the prospect of the BCRC installing a new prefabricated building to house the boiler and allowing the original structure to collapse. Consent was given to preserve the façade and allow the necessary modifications to install a receiving bay and storage bunker on one side and the new boiler went into the 1,400 square foot renovated boiler house. From start to finish, the project took seven months to complete.

Since commissioning their new two million BTU Uniconfort EOS 50 in November of 2103, the BCRC has been producing hot water for radiator space heat, the kitchen, guest accommodations and the 40,000 gallon indoor swimming pool. The system includes a 750 gallon insulated holding tank for thermal storage at 140 °F. Permitting was not a problem for this boiler as the new system has lower emissions.
than the old oil boiler. To finance the project the BCRC worked with USDA Rural Development and the USDA Community Facilities Guaranteed Loan Program, which is available to local government and non-profits (the USDA Rural Energy for America Program, REAP, is the private-sector equivalent.) Working with their representative in Richmond, the BCRC received a loan guarantee of 3.5%, 28 year term with no payment the first year. While the biomass boiler system cost about $750K, they took out a loan for $1.1 million to cover other needed expenses, and they are expecting an 8.8 year payback.

Installation of the boiler went smoothly, the biggest challenge of the whole project was finding the right fuel supplier. After trying pellets made from locally grown warm season grasses, hardwood chips and sawdust, the BCRC settled on clean, bark-free pine chips, a byproduct from a local saw mill. The mill consistently supplies chips within 24 to 48 hours of being called, giving the BCRC reliability and peace of mind in their fuel supply. By subcontracting the delivery with local haulers, the BCRC gets fuel into their bunker for about $30 a ton (the equivalent of paying $0.50 a gallon for fuel oil or about $0.30 a gallon for propane!).

Despite the initial challenges in finding the right fuel, the BCRC spent only about $30,000 on fuel the first year! From the $100,000 in fuel cost savings, half went to servicing the project debt and the other half went into much needed repairs and maintenance in the facility. They are saving money not just on fuel but on labor too. The fully automated Uniconfort EOS 50 only requires a check in the morning and afternoons, freeing up staff time for other operation and maintenance activities.

Looking back on the last year McCracken realized there were a few things that he would have done differently. First, he would have changed the depth of the receiving bay. A deeper bay would have accommodated more chip volume. As it is, when the bay is full, excess chips end up outside the bay and have to be pushed back in later when room is available, requiring staff time and labor. Second, he would have changed the size of the feed auger that moves fuel from the metering bin to the boiler. Over-sizing the auger would reduce the likelihood of jamming when moving wood chips. Some surprises were good - before commissioning McCracken had made agreements to provide ash from the boiler to local nurseries in exchange for bedding plants. However, when burning clean, dry pine chips they are only generating a single 30 gallon can of ash a month. He also learned that a key to maintenance is to clean out the ash without putting the fire out as restarting the boiler from a cold start can take about a day. Finally, he learned that the manuals train users on the parts of the system, but tweaking the system for optimal operation comes with experience. Reflecting on his decision to go with biomass, McCracken said he definitely would do it again – the BCRC is saving money and the investment fits with their mission to be better stewards of God’s creation!
Figure 1. Blackstone Conference and Retreat Center receiving bay.
Figure 2. Blackstone Conference and Retreat Center’s Uniconfort Biomass Boiler.
Figure 3. Blackstone Conference and Retreat Center’s metering bin.
Figure 4. Blackstone Conference and Retreat Center’s bottom ash collector.
Figure 5. Blackstone Conference and Retreat Center’s fly ash collector.