# Executive Summary

The Twin Rivers Elementary/Intermediate School is a two story 127,000 sqft K-6 grade school in Mckeesport, Pa. It is 20 miles west of Pittsburgh, Pa. It is currently on track to gain LEED Gold accreditation.

The current mechanical system includes a geothermal heat pump system with accompanying air handling units to service smaller and occupancy driven areas of the building. The AHUs are supplied with energy from a condenser chiller which in turn is supported by the geothermal heat pump system. The current system contains a auxiliary loop for more extreme cases of heating and cooling that cannot be serviced by the geo system. This loop, contains a boiler and evaporative cooling towers. The natural gas boiler expends 1000 MBH into the heating load.

The domestic hot water is currently supplied by two natural gas water heaters. The hot water is to be supplied to the building at 120°F. The Cafeteria demands hot water of 140°F. The two water heaters use 285 MBH each for the DHW load.

It is suggested to install a solar hot water system using flat plate collectors in order to service the boiler and the water heaters. The location of the site and the roof area applicable to a solar array are considered for solar gain and shading. The Array will be able to support 15% of the required load. The system will pay itself back after 13 years of use. The addition of more collectors could be justified and would be possible with a larger storage tank. Currently there is not enough room in the Mechanical space for the large storage tank that would be needed.

The array will increase the dead load on the roof of the cafeteria and the gymnasium. This requires the structural design to change the roof joists to larger LH-series joists.

Since the building is complete the cost of refurbishing the site to include a solar energy conversion system would have to be taken into consideration. The gain from the solar collectors may not be the best investment to make for the Mckeesport Area School District.

The Mechanical space is enclosed with a glass wall to allow students and visitors to learn about the inner workings of the building. It is suggested to use a wall with an STC of 60 to divide a mechanical space from an ancillary learning spaces. The current design only has a STC of 29. To decrease the amount of sound entering the space it is suggested to include a sound proof window system which would have as small of an STC of 56.

Twin Rivers Elementary/Intermediate is a well designed school with little to improve upon. However, there are a few things that can increase the educational value. The solar array would increase renewable energy awareness and the sound proof glass would allow that awareness to become knowledge.