MSAD 75 - Mt Ararat High School

Building Systems and Sustainability Sub Committees

Meeting Date: October 26, 2016 Location: MSAD 75 Central Office

Attendees: Brad Totten, Kim Totten, Brant Miller, Michael Chonko, Chris Shaw, Karen Tilbor, Ian MacDonald, Alan Kuniholm, Vamshi Gooji.

1. Ian described the systems that were included in the energy model. Baseline system is a water source heat pump, similar to the Middle School. The proposed system is a geothermal water cooled VRF (Variable Refrigerant Flow) for the new high school. The expectation is that the VRF system will be higher performing than the geothermal system in the energy model. VRF is eligible for a $0.50/SF Efficiency Maine incentive, regardless of whether or not the building is constructed to meet Maine Advanced Buildings.
2. VRF life expectancy is in the 15 year range. Air cooled could be shorter, water cooled as proposed is anticipated to be as stated. Life cycle costing will be reviewed to determine whether the VRF or a more traditional heat pump water system serving a fan coil system, will be more cost effective. Allied will research VRF longevity, particularly for the water cooled versions and report back to the committees with his findings. Note: The updated life expectancy for water cooled VRF is in the 20-25 year range.
3. The ventilation system is proposed to be generated with an energy recovery ventilation system.
4. The current Efficiency Maine incentives for the proposed building are at a minimum of $0.50/sf.
5. Entry vestibules, lobbies, locker rooms and public restrooms will be heated with radiant floor heat by a water to water heat pump.
6. Discussed if the VRF system generated a refrigerant leak, air in the space could be displaced and represent a life safety concern. This needs to be reviewed for each space served to ensure that there are no issues with occupant safety. This will be a task undertaken by the design team during the design process.
7. We reviewed the latest energy model results. The baseline system which is a water source heat pump system (DOE funded, code minimum building) has an EUI of 36 kBTU/SF-YR. The proposed geothermal system has an EUI of 25 kBTU/SF-YR. This model includes the additional classrooms and the larger gymnasium. This results in a modeled annual energy savings of $47,000. The projected additional local cost for geothermal is approximately $500,000. This generates a simple payback of 10.6 years.
8. We reviewed the wall insulation study comparison. A wall R value of 25 meets a reasonable improvement without impacting the standard wall design in the geothermal system, and thus the construction cost of that wall. The DOE (building code) will fund an R value of 20 in the exterior walls.
9. Roof area is approximately 109,000 SF. Wall area is approximately 50,000 SF. Insulation improvements in the roof will likely generate a greater return in investment. The PDT design is currently at an R value of 48 for the roof. The DOE base code building roof R value is 40.

10. The proposed building occupancy will be based on an occupancy of 1,050. This is 750 for the base school, 200 for the additional 8 classrooms, and 100 staff. Summer occupancy will be reduced from 80% to 50% in the energy model and re-run. Because the high school system is expected to be much more efficient than the current middle school system, it is likely that the summer programs will be moved to the high school.
11. Glazing (windows) will have a solar coating but similar R value to meet the code requirement. Triple glazed windows will be in the administration area where people are sitting close to the windows for most of the day doing their job. Triple glazed windows will be included in the learning commons and the dining commons where there is a large percentage of the exterior wall in the form of glazing.
12. The baseline energy model has no cooling other than the administration areas, where the DOE will fund this system. The proposed has mechanical cooling everywhere in the building except the gym, locker rooms, kitchens and storage areas.
13. The design team will generate a simple cost payback analysis for the overall building envelope upgrades including the walls, roof and select areas of window upgrades.

The design team will generate the following items:

- Geothermal system payback
- Building envelope payback (walls, windows, roof) (If no geothermal then better insulation systems are needed)
- Photovoltaics – allows solar power cost reductions
- Solar Hot Water payback
- Commissioning/Testing/QC – offset prior issues (Chris Shaw examples previously discussed)
- Snowmelt – safety, cleanliness and materials longevity both inside and outside

The next meeting will be determined when the design team requires more information from these committees.