

In attendance:

Adam Hird, Pete Henderson, John Milner, Damian McDonald  
Rudolf was unable to attend as he was out of country  
Wayne did not receive meeting time correction due to incorrect mail address

Summary:

- Group discussed investigations and research into Geothermal.
- At this point, there is sufficient evidence to warrant further investigation into Geothermal options
- A more detailed analysis on the hot water and steam plant options is also necessary since long term energy usage on any of these options will be significant
- The team has done as much work as possible with the information available but work will continue on obtaining more detailed estimates. Work is continuing via Adam and Rudolf's profession contacts on Geothermal. We need to get more info on the F&D options
- Team needs to meet with F&D to be taken through the steam and hot water options. This is needed to vet steam v. hot water options and the associated maintenance and energy usage.

Notes broken down by subject

Geothermal

- Group discussed the "Hastings study" which was a geothermal retrofit that utilized centralized water/water heat exchangers in conjunction with custom built coils for the fan units in the classrooms. There was a discussion about whether this type retrofit might be possible at Haldane. Adam advised that pipe sizing in place may not be right as the Geothermal heating utilized a lower delivery temperature than a traditional hot water system. There were no action items associated with this discussion.
- Group also discussed other studies which also included supplemental heating systems for use during cold snaps. These systems were either resistance heaters or hot water.
- Discussion of Adam's cost estimates on Nat. Gas. v. Geothermal from another project. Damian mentioned that one of the main questions that needs to be answered is the benefit afforded by Geothermal in a heating only situation. Adam's figures show the majority of benefits on the cooling side with heating energy costs approximating a wash.
- We discussed the need for a compelling case for Geothermal if this ends up being a recommendation. All agreed that in new construction, Geo is likely to be the way to go. We need to find a way to get proper cost estimates on installation and energy usage.
- Adam expressed concerns about Asbestos abatement costs involved with installation of new duct work or piping for Geo. There is likely asbestos in quite a few places. All mentioned that we really need to have these discussions with Wayne, he knows the facility, heating plant, and is well versed in all the various options.
- Damian mentioned a number of US Military installations including a US Government recommendation that Geo always be considered for USMil HVAC replacements & installations.

- All agreed that there is enough data on Geothermal benefits to warrant further investigation into Geothermal. Damian advised that whatever our recommendation, it is important for us to base our recommendations on data. At this point if we think that Geo is the way to go, we need to base the decision on actual data. This is new technology and any bond must clear to the public.

#### Options checkpoint

- The group asked Adam where he thought this would end up given his experience. Adam mentioned that we would probably end up pursuing the steam option, citing that this is the least intrusive of all options. He added that the service life of the steam option will exceed that of a heat pump. Estimates for heat pump useful life is around 12 years give or take. These costs would be factored into a long term cost analysis.
- The team then discussed total cost of ownership for each of the options. We discussed Peter's spreadsheet which was created to provide a view into total cost of ownership. This discussion gave way to a discussion of long term fuel costs v. electric. The group discussed these future costs as notably absent in the analysis by F&D.
- Team identified the need for proper maintenance figures for all three options.
- The team questioned why F&D presented the hot water option if it was significantly higher. We know there are certain efficiency benefits associated with a hot water option, again, these figures or estimates were not presented by F&D.
- Energy futures gave way to a few threads, one centered on fossil fuel v. electric. While we all believe that fuel costs will rise significantly, there was discussion that electric rates will also increase, perhaps more rapidly than fuel oil. Adam stated that strides have been made in oil conservation, however the same strides have not been made in electric use and we don't have the ability to ramp up electrical production as quickly. Simple supply & demand. Overall, nobody really knows the rate at which oil or gas will rise, but we believe it is safe to say that they will increase over time and these costs should be factored into the decision.

#### Offsetting Geothermal Electric Costs

- Re: Geothermal electric costs, John raised the possibility of offsetting Geothermal electric use with Photovoltaic (PV) Arrays on the roof in a NetMetering configuration. The group discussed a few threads on this subject and (I believe, if I captured this correctly) we agreed that this may be something to pursue as an independent initiative... or at least after Geothermal pans out to perhaps offset energy usage. John had mentioned that one of the attractions to PV, is that you essentially by future production at today's rates. There is also NYS funding available at \$4/ PV watt. Last item on this discussion was in regard to net metering which Central Hudson will permit up to 10KW as standard fare. John mentioned that Central Hudson has embraced netmetering and we could probably work out an ability to netmeter in excess of 10KW if needed.
- John had also mentioned that if a new roof is needed, additional/new insulation will help bring some efficiencies to the table.

#### Need for additional data

- Peter commented that at this point, we don't have the data necessary to convince ourselves that Geothermal is the best option. The group identified the lack of information on the other two options as an issue as well.
- Discussion then focused on what we need to do to get proper data on Geothermal. We also discussed the need to get better data on the Hot Water and Steam options; again the need for TCO (Total Cost of Ownership) was cited.
- Adam advised that he has spoken with someone he knows at (Encon?). This person can run the calculations for us on Geo with the exception of the well component. For

the well figures, we will need to get in touch with a local driller who knows what's going on in the ground.

- Adam mentioned that he will need to get a set of prints for the school, either hard copy or PDF is fine.
- Damian advised that Rudolf is also working with Carl who may be able to give us some estimates.
- John asked about access to energy records for the school. Damian mentioned that some data was included in the PDF but he would follow up with Wayne.
- All agreed that we will need to get someone to run the necessary calculations. This discussion gave way to the need to coordinate a meeting with Fuller & D'Angelo.
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#### Funding Discussions

- The group discussed the challenges with getting funding for either a proper investigation into the three options as well as funding for Geothermal specifically should this be the recommended course of action.
- John Milner agreed to reach out to John Hall, Sandy Galef, and Vinny Tamagna
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#### Action Items

- Damian to follow up with Wayne on setting up another meeting since the invitations for this meeting were sent to the wrong email address
- Damian to follow up on getting energy records and prints for the school building
- Damian to follow up with Rudolf on info sent to Carl when he returns to the states
- John Milner to follow up on potential funding sources via John Hall, Sandy, and Vinny Tamagna. Also look into possibility of grants for establishing a model green school retrofit.
- Peter to continue work on spreadsheet running TCO costs 12-30 year view
- Adam to continue review once plans are received
- Damian to setup meeting with F&D and meeting with School Board on status