

At the Selectboard meeting on June 8, 2022, the Nelson Town Buildings Committee would like to discuss several projects that we are considering:

- Additional solar to power the Town Hall, Library, and Town Office ASHPs
- Plan an RFP for ASHPs for other municipal buildings
- Research whether an Electric Vehicle Charging Station makes sense
- Research related grant funding

In addition, we are sharing the attached letter responding to the Selectboard letter of April 13, 2022, and clarifying the answers to some questions you had outlined.

Lisa Sieverts
Chair, Nelson Town Buildings Committee

The Nelson Town Buildings Committee is here sharing our response to the Selectboard letter of April 13, 2022, on the topic of the Air-Source Heat Pump (ASHP) proposal accepted during the RFP process held in Fall 2021.

As you know, the Town Buildings Committee does not support the BOS decision to purchase the ASHP system outlined in the Zajac proposal.

Furthermore, there were several errors of fact in the Selectboard letter that must be corrected for the sake of the public record.

We request that the referenced BOS letter of April 13, 2022, and this response to it, be read into the Minutes of the BOS meeting at which it is reviewed and discussed.

First, we want to respond to comments about the buildings and the ASHP proposals.

1. Town buildings have small rooms that make heating difficult: Ductless ASHP systems allow for heating to be zoned to spaces in which it is needed. Very small spaces should be heated with electric resistance heaters.

2. Town buildings are not well insulated and cannot be heated efficiently no matter the heating system that is used: On the contrary, the Buildings Committee facilitated a study of municipal building heat losses resulting from air leaks and inadequate structural insulation. Using the results of that study, the BOS hired the Newell and Crathern Company in 2018 to seal the air leaks and install needed insulation. Subsequent to that work the BOS contracted with The Resilient Buildings Group to determine the heat loads of our buildings and to design ASHP systems suitable to meet the heat load demands of each building. Ductless ASHP systems can meet the heating needs of our buildings and as the TBC data show, do so in a more efficient manner than the ducted system that was recently selected.

3. The data that the TBC presented to the BOS is questionable since no heating system is 100% efficient: No specific reference to ASHP's having efficiencies of 100% was made in the ASHP performance data table submitted by the TBC to the BOS. A careful reading of the data provided will show that a parameter called Heating Capacity Ratio (5°F/47°F) was listed. A Heating Capacity Ratio (5°F/47°F) of 100% simply means that the heating capacity of an ASHP system operating at 47°F will remain constant down to a temperature of 5°F.

Interestingly, however, resistance electric heaters do have an efficiency of 100%. For every kWh of electrical energy consumed, a kWh of heat is produced. ASHP's are even more efficient than electric resistance heaters because they use electric energy to extract heat from the outside ambient air rather than directly creating heat themselves.

The Coefficient of Performance (COP) numbers for ASHP's express how efficiently they perform. COP is the ratio of **energy supplied to the space/ energy input to the heat pump**. For example, if 4.6 kWh of heat energy is supplied to the space (the room in which the mini-split cassette is located) for every 1.0 kWh of electrical energy used to produce that amount of heat, then the COP would be equal to 4.6.

COP values as high as 4.6 are shown in the data table. At this level of performance, an ASHP will deliver 4.6 kWh of heat for every 1 kWh of electricity it uses. Thus we can say that it is 460% efficient.

4. The efficiency of mini-splits is undermined by the need to heat small spaces that are not open to larger spaces, i.e., bathrooms: Those who are familiar with the layout of our town buildings know that the vast majority of their interior spaces are open. Engineering studies and contractor recommendations state that small spaces such as bathrooms and storage rooms should be heated with electric resistance heaters.

5. Using the existing ductwork to distribute heat to all spaces seems to be the best choice: Ducted ASHP systems are not as efficient as their ductless counterparts, they do not allow for heating to be zoned to the spaces that are in use, and they do not address the heating problems in the lower level of our library created by the design of the ductwork system that is presently in place.

Second, there are a set of environmental comments which require a response from the TBC.

6. Solar and wind power are not totally green and are unreliable sources of energy: The majority of solar and wind energy systems are grid-tied, supplying clean power to the grid when it is available and using grid power when conditions make doing so necessary.

7. Windmills are noisy, destructive to birds and visually unappealing: Modern wind turbine blades are designed with trailing edges that minimize noise generation. Annually, billions more birds are killed by house cats, and clean glass windows, than by wind turbines. Note that at this time, the TBC is not considering wind turbine projects.

8. Child labor is often used in lithium mining: Socioeconomic problems in foreign countries exceed the scope of this effort. A solution could be to purchase raw materials only from countries that enforce proper safety and health standards for all workers.

9. The disposal of batteries is not environmentally friendly: Recycling technologies exist for all types of batteries.

10. Electric cars are often charged with electric energy produced using fossil fuels: Individual Nelson residents charge their electric cars with solar electric power created on site. The Nelson Community Power Committee is currently working to provide the option of clean renewable electric power to all Nelson residents. Eversource itself has a goal of being carbon-neutral by the year 2030.

11. Fossil fuels are used in the construction of electric cars, batteries, and windmills: Actually most manufacturing today is done with processes and machinery powered by electrical energy. More and more of this energy can be, and is being, generated by clean renewable sources.

12. Propane is a relatively clean fuel: Actually, propane is not as clean a fuel as one might think. Granted, burning a gallon of propane produces 12.7 pounds of CO₂ versus 22.3 pounds for a gallon of fuel oil. However, one must burn 1.5 gallons of propane to obtain the same amount of **heat** as would be produced by burning 1 gallon of fuel oil. 1.5 times 12.7 pounds of CO₂ equals approximately 19 pounds of CO₂. But that's not the complete picture. Propane is produced by refining natural gas or petroleum. Natural gas is comprised of at least 80% methane. Methane is a nasty greenhouse gas, its 20-year Global Warming Potential (GWP) is approximately 80, thus 80 times more than CO₂. Natural gas/methane losses from the wellhead and the refinery contribute to making propane production a dirty process.

Third, there are some assumptions made about the Nelson Town Buildings Committee that we would like to clarify.

13. The TBC supports the use of "Totally Green" heating systems in town buildings: The burning of fossil fuels used to heat town buildings results in an annual emission of approximately 50 tons of CO₂. The overall goal of the TBC for converting the present fuel-burning heating systems in our town buildings to ASHP's is to reduce that amount of CO₂ emission by 90% by the year 2025. Our objectives are to recommend the most functional, most efficient, and least environmentally harmful heating systems that are available on the market at the time.

14. Efforts to reduce CO₂ emissions from town buildings will have practically no effect on "the greater global issue", (Global Warming/Climate Change): As Rob Werner, New Hampshire state director for the League of Conservation Voters and a city councilor in Concord, said after attending COP26 in Glasgow, Scotland last fall, "Local action to implement state, national, and international climate and clean energy goals will continue to be the most important venue for developing practical and

sustainable solutions." As a town, we can do things that are more difficult at the state and federal levels. Any action by one town encourages another, as when Hancock told Nelson about the success of their solar panels in January 2015. We recommend that the BOS join Clean Energy New Hampshire to learn what our sister cities and towns are doing. The link to the "Municipal Members" section of their website is <https://www.cleanenergynh.org/municipal-members>.

15. The costs to Nelson residents of all proposals must be balanced with their environmental impact: Every small town in New Hampshire has to be careful with taxpayer-funded spending. The TBC works to balance costs with both short and long-term benefits. Voters have consistently supported these types of projects by comfortable majorities at prior Town Meetings.

A useful summary of the latest IPCC report is entitled the *IPCC Survival Guide*. A 14-minute YouTube video discussing it can be found at <https://www.youtube.com/watch?v=vxWNWxgMyyQ>

Respectfully,
The Nelson Town Buildings Committee
June 1, 2022



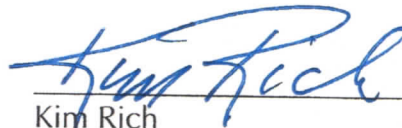
Lisa Sieverts, Chair

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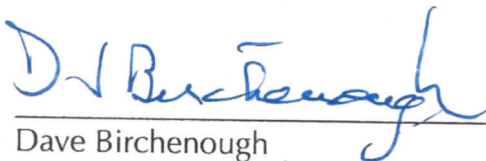
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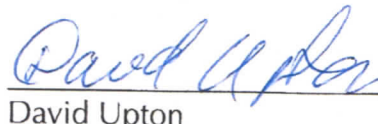
Patsy Beffa-Negrini



Kim Rich



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