**Reviewing the Credit Characterizations of Clean Heat Measures**

Ken Jones, 25 November 2024

**Explaining my table**

I based the installed measure table on the November 19 or 22 Opinions Dynamic workbook that includes separate tabs for 20 different residential measure types. In many cases, there are different calculations based on building type and or fuel and or size of the installed measure.

For my table, I picked representative samples, sometimes picking specific fuels and sometimes using the “unknown” fuel which I assume would be used when the fuel replaced is not known.

I include a column “First year credit” which represents a single year tonnage reduction assuming an even distribution of reductions over the lifetime of the installed measure. (I discuss a possibility of discounting future year credits later).

**A general question**

Do the relative values make sense?

I start with a set of measure characterizations representing a fairly large (18,000 BTU/hr rating) mini-split. In this case, I include all four of the fuel replacement options provided by Opinion Dynamics. Those relative values are based on the different carbon intensity values for each of the fuels.

One early comparison is to look at whole home systems – the next three rows are three different whole home systems and their credit assignments are fairly consistent and are about 5 times the value of the mini-split. This implies that the mini-split is reducing the use of the fossil heating fuel at about 10-20% of the total home requirement. This percentage is calculated comparing the credit value for the mini-split with the credit values for the whole home systems recognizing that the whole home system credit variation is based on the size of the heating system installed. If a 36,000 BTU/hr air source system is adequate for whole home heating, then the 18,000 BTU/hr mini-split results in about 20% of the reductions compared to the whole home systems. Bigger systems (or ground source systems) will generate more credits and therefore the mini-split achieves a smaller percentage.

The small differences between the air source and the air-to-water system are minor compared to some of the other creditable activities.

The next example is a ground source heat pump and it provides a significantly greater reduction but not on an annual basis. The expected life for a Ground Source Heat pump is 25 years and other whole home systems have life expectancies of 16 years.

The first Clean Heat Measure in the table after heat pumps is for Advanced Thermostats. The first-year credit is about 35% of the value of an 18,000 BTU/hr mini-split. (This suggests a very cost-effective measure when considering the installation cost - $100 for the thermostat and $5,000 for the heat pump). The credit value also suggests a 7% reduction in fuel use which may be appropriate but only in those cases where the thermostat is used optimally. That assumption may not be consistent with the heat pump where we know that an optimally used mini-split can accomplish a greater reduction in fossil fuel use than the assumed use pattern for the credit calculation. We may want to request a reduction in the credit valuation for the thermostats.

The next four measures are wood heat related. A pellet stove is estimated to yield credits representing about a 25% reduction in fuel use. (The October workbook had twice the savings.) As with heat pumps, the use of a point source pellet stove in a building has a wide variation in its potential to displace the other heating fuels.

Note that there is no option to consider the actual fuel replaced, which may be appropriate because the information of replaced fuel may not be available.

Whole home pellet boilers have a lower credit value than pellet stoves which is surprising. Even more surprising is that an 18,000 BTU mini-split receives more credits than the central pellet system. Whole home systems are designed to replace 100% of the typical fossil fuel used prior to installation. And, because they are designed to be a whole home solution, their use pattern is much more certain.

The next two examples in the table are for heat pump hot water heaters. The replacement of a fuel oil system provides approximately the same credit value as an 18,000 BTU/hr mini-split. The unknown example includes the replacement of an electric resistance hot water heater with the heat pump hot water heater and receives almost 40% of the credit value as that received for the oil-replaced system.

The next four examples yield relatively low credit values, although the low-flow shower head is another example of a very low-cost measure that may have high cost-effectiveness.

The remaining examples are for weatherization. The first large set are for infiltration reductions and OD differentiates among many different heating systems, although the reductions are quite similar. Reducing infiltration from the low level to the medium and higher levels increase the credit values significantly, but still result in credit values less than that for the 18,000 BTU/hr mini-split.

The last two examples are for insulation and offer the possibility of larger credit values, but the calculations are based on starting points where no insulation is present (R0)

For these credit characterizations, a review by Vermont’s weatherization experts is appropriate.

**First year credit**

For many of the measure types, there is a great deal of uncertainty. It may be that there will be many examples of overstating savings. As the Clean Heat Standard gains experience, the PUC will need to revisit the credit characterizations. In many cases, there may be a need to reduce the estimate of GHG reductions. For this reason, there may be a value to discounting future credits for those measures installed in the first years of CHS implementation. I use the term “first year credit” in recognition that the PUC may reduce the credit characterization for the years after initial installation.

**Delivered measures**

I used the carbon intensity values in the OD workbook under the “VT CHS Emissions Schedule” to develop credit values for the sale of lower carbon, renewable liquid and gaseous fuels. Comparing these figures with the 18,000 BTU/hr mini-split shows that 100 gallon liquid fuels and 100 therms of renewable gas provides order of magnitude - equivalent credits.