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Heat Pumps: The Brutal Truth

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Last month we went back to basics: remembering that the suction and discharge pressures of any vapor compression refrigeration system are vital to efficient performance. This month we start a closer look at the world of heat pumps, where some things are not like refrigeration at all, but some other essential truths remain constant.

In the very first of these columns, back in March 2012, I likened the thermodynamics of a refrigeration system to the removal of a piano from my basement to the lounge upstairs. The higher you have to lift the piano, the more work needs to be done. Running a refrigeration system is like cleaning pianos out the basement; the important thing is that you are creating space by not having a piano there any longer. However, the folks upstairs want music, but they don't really care what kind of music. If I can get my piano there quickly and easily then that will be welcome. However, if it is too difficult, or too expensive, or too dangerous then they will settle for some other form of entertainment. Perhaps a banjo player will show up; his music is cheap, portable and easy to deploy, but it is perhaps not building the lasting cultural heritage for my grandchildren that I had been planning.

The brutal truth about heat pump economics is that, unlike refrigeration, there are many ways of providing heat to a space. Burning stuff has been popular since the caveman days. It is cheap and portable, but like banjo music we have learned to be concerned about the longer lasting effects.* There are many alternatives to traditional fossil fuel consumption, varying in popularity depending on the application. Direct electrical heating is clean and easy. Combined heat and power systems seem to offer several advantages; gas-fired heating coupled with local electrical generation and giving the added bonus of some extra heat to run an absorption chiller if necessary. Now we can use biomass as a renewable alternative to fossils and resolve that pesky environmental legacy issue.

In a refrigeration system it is relatively easy to justify an energy efficiency benefit. Spend a little more and

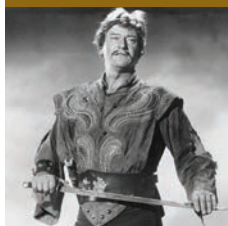
save a bit on the running cost. The only debate is how long anyone is prepared to wait until they have gotten their money back. If the cost of an upgrade is saved every month, or even every six months, most people will welcome it. If they have to wait five years for it to pay back they are not so sure. For a heat pump system the justification is more difficult. If my offering is too expensive or not efficient enough, or both, then the prospective buyer will not simply choose someone else's heat pump, he might go for some alternative environmental technology

such as a biofueled combined heat and power system or he may even embrace his inner caveman and just burn some fossils. Either way, I lose.

As a refrigeration guy it has been hard to get used to the sensitivities and peculiarities of the heat pump market. I am used to people who want pianos cleared out of basements.

They don't care what I do with the piano – I can throw it away as far as they are concerned. Now I am dealing with the folks upstairs, the music lovers. They like my piano. It is valuable to them because they need music, but frankly they have no interest in the space in my basement. It can remain empty for all they care. To stretch the analogy just one more notch, the best of both worlds is when I can deliver piano music to the folks upstairs and rent my basement to a lodger who provides a handy source of income. If it is proving to be too difficult to justify a heat pump system against other forms of heating and there is beneficial use for the cooling effect, then this might sway the decision. Government subsidy provides an alternative way of boosting the case for heat pumps. This is very welcome, but like all market interference it can have some unintended, illogical and unwelcome consequences. Watch this space. ■

Genghis had several ways to heat his space.



*No offense intended; some of my best friends are banjo players.

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