Heating:

Heating – the systems explained

Left: Paul Tomolowicz - Do we want to be compromising on comfort?

Producing energy by solar, heat and biomass.

THERE IS PLENTY OF TALK ABOUT RENEWABLE ENERGY SOURCES, THE CORRECT WAYS FOR GOVERNMENTS TO BE UTILISING OUR NATURAL RESOURCES AND HUNDREDS OF HEATING RESEARCH AND DEVELOPMENT PROJECTS ON A GLOBAL SCALE.

However at this point in time there are not many practical solutions that aren't going to break the bank, so where is the future heading? Well in this article I have selected two systems that I wanted to take a more detailed look into and explain some of these technologies - Far infrared and eSolar.

Going back to the basics there are three methods for heating: - Convection (movement of air); Conduction (transfer of heat from one object to another); Radiant (infrared transfer of heat at the speed of light).

From a heating perspective any system that is ducted, this means that the warmer air that is produced by the system is simply pushed or blown into a larger volume of space. This is known as convective heating. This form of heating is subject to poor levels of comfort mostly attributed to the fact that "hot air" rises and therefore in a room you can see as much as 10 degrees Celsius difference between the floor and ceiling temperatures.

Conductive systems are not so common although many heating systems do depend on conduction to some extent, for example under floor heating systems. First, the heating elements directly warm the floor (conduction) and then the warmer floor will begin to slowly warm the remainder of the room only to a certain distance above the floor. These systems can take even up to a few days to get to desired temperatures.

Radiant systems usually comprise of a heating panel being either mounted on the ceiling or wall. The panels have a special heating plate surface that is able to emit infrared heat (radiant). This heat is then absorbed by the buildings floor, walls and furnishings without directly heating the air. This radiant heat is invisible to the human eye (it's just below the visible colour red - that's also how it got its name meaning "below red").

This heat is further broken down into three categories Near, Mid and Far. Far Infrared is the most difficult to produce out of the three, however it is the most crucial infrared heat for best and most efficient heating performance.

Radiant systems have scientifically been proven to provide the best comfort levels compared to convective systems within a volume of space. Some Far Infrared systems for example are able to provide comfort levels within 2 degrees Celsius between the floor and ceiling temperatures.

At this point in time there is a compromise between traditional heating systems that offer poor efficiencies yet relatively good comfort levels in comparison to more efficient new emerging eco-friendly technologies which offer good efficiencies but can't provide the same comfort levels.

Do we want to be compromising on comfort? No doubt there will be a handful of consumers that are happy to compromise on comfort levels to do their part with respect to helping the environment and reducing green house gas emissions.

Then there will be the other side of the fence that don't want to compromise and are putting more pressure on the governments to invest in alternative utility power sources. For example wind power and solar power farms already in operation and new emerging technologies that are currently being tested and close to roll out stages such as eSolar – which is a utility-scalable solar power station utilising small mirrors to track the sun and with high precision reflect the sun's heat to a tower-mounted receiver, which boils water to create steam. This steam powers a traditional turbine and generator to produce solar electricity.

Ultimately the most crucial component to get right from the start - is to build a well designed building. There are now thousands of building products available to help provide good thermal mass, insulation and minimised heat loss.

The buildings orientation design is a crucial part of the puzzle. Incorporating sustainable design elements into the building will keep it comfortable year-round and save on heating and cooling costs. You'll reduce your electricity bill, save money and produce fewer greenhouse gas emissions.

Passive ventilation is an important principle for sustainable design minimising mechanical or electrical power systems to move the air inside a building. This can be harnessed by understanding local weather patterns including wind direction.

For example thermal winds in mountain ranges or sea breezes in costal environments. Sustainable design encourages hot air to rise and escape from a room naturally (this study is known as thermodynamics) and directs cool air into a room.

Windows account for large amounts of heat loss in winter periods and up to 50% unwanted heat gain in summer. Windows should be naturally shaded in summer with either extended eaves, pergolas or by surrounding tree canopies/foliage.

A typical well insulated building, with ordinary clear single glazing, loses up to 49% of heat through windows in winter. Single glazing will also allow up to 87% of solar heat gain in the middle of summer. There are now hundreds of glass products available that help prevent heat gain and insulate against heat loss.

Heating and cooling a building to compensate for poor sustainable design can account for up to 30%.

It's a interesting time in heating industry as many R&D projects slowly come to fruition a sustainable future is on the horizons. ■

Paul Tomolowicz *- Managing Director, Heat-On Heating Systems*