

# The Green Dividend is available to all

**Nicholas Cox from Earthcare Products explains why the building services industry needs to be aware of the changing nature of our planet**

Business, government, and public and private institutions are more aware than ever before of the threat to the environment posed by their activities. Whether through simple energy savings or an improved standing among stakeholders, a whole range of major companies and organisations is seeking to reap the Green Dividend. Current and proposed EU legislation will make it even more important to meet environmental best practice requirements.

The savings offered by adopting new best practice technologies make a major contribution to the capital costs involved. Happily, by scheduling changes during the normal course of refurbishment, much can be done without excessive capital expense. The implementation of a rigorous environmental policy will provide protection against increasingly tough regulation and produce considerable long-term energy and capital savings.

This will maximise the Green Dividend by reducing running costs and avoiding replacement costs, while making a significantly smaller demand on the Earth's resources.

The scientific community has reached a consensus on human-induced climate change. The Intergovernmental Panel on Climate Change published its first assessment in 1990 and a second in 1995. Its broad conclusion is that the earth's atmosphere is warming due to radiative forcing, the

imbalance between the energy absorbed by the earth and the energy emitted from it.

It is affected by many conditions including intensity of solar radiation, reflectivity of the earth's surface and the presence of greenhouse gases. The IPCC estimated that the continued release of greenhouse gases will lead to a 0.3°C global temperature increase per decade, resulting in a 6 cm sea level rise per decade.

Events have already overtaken scientific reports. The Republic of Kiribati (formerly the Gilbert Islands) is already experiencing severe effects from the rise in sea levels, vulnerable islands are beginning to be lost beneath the water. Insurance groups are now beginning to take climate change as a significant factor in their assessment of risk. Industry leaders, such as BP, are making strategic commercial decisions on the basis of the IPCC's prognosis. Since the Intergovernmental Conference on Climate Change at Kyoto in 1997, governments too have begun to prepare future policies and legislative programmes on the basis that global warming poses a serious threat to their national interests.

The problem is made more acute because, in addition to the gradual warming implied by the projections of climate models, we are likely to see an unpredictable series of natural disasters resulting from the progressive heating of the atmosphere.

## The Greenhouse Effect

About 60 per cent of man-made global warming is attributed to carbon dioxide emissions. The largest source of such emissions can be attributed to the increased burning of fossil fuels. The second biggest source, about 20 per cent, is from methane, emitted from the ever increasing herds of livestock bred to feed a larger and more demanding population.

Originally the world's forests – natural carbon sinks – would have soaked up much of the volume of these warming gases. However, the voracious deforestation of the world's forests has destroyed much of the tree cover upon which we depended. This is producing a three fold effect: the reduction in carbon sinks, the increase in land given-up to methane producing cattle and the destruction of the richest habitats on earth.

The third biggest source of global warming is from halocarbons – principally CFCs, HCFCs and now HFCs. The IPCC scientists now attribute about 14 per cent of the human-made greenhouse effect to these gases. The balance, about 6 per cent, can be traced to nitrogen oxides.

The Government wants 3.8 million new homes built by 2021. Recent fuel price rises mean that heat pumps now offer the cheapest form of heating. If considering

the purchase of a heat pump for environmental reasons you should be aware that most of the products on the market use synthetic refrigerants such as HFCs, restricted under the Kyoto Protocol due to their very high global warming potential, typically 1900 times higher than CO<sub>2</sub>.

HFCs cause significant environmental impact during their manufacture, as a result of leakage during use, and during disposal at the end of their life. Alternatively, heat pumps using natural refrigerants are available from specialist suppliers.

## Comparison of Different Heating Systems

In the next 15 years, worldwide demand for energy is forecast to increase by 75 per cent. Building services will account for around 45 per cent of this figure. This scenario is wholly unsustainable using fossil fuel combustion technologies.

Although the concept of heat pumps is not new, the fact that the emerging heat pump market relies heavily on environmental rather than economic drivers makes it difficult to see how a mass market in heat pumps can be achieved using synthetic rather than natural working fluids in heat pump applications. (See table below)

Heating System	Price P/kWh per kWh fuel	CO <sub>2</sub> emissions (Kg CO <sub>2</sub> /kWh)	Efficiency %	CO <sub>2</sub> emissions per kWh useful heat (Kg CO <sub>2</sub> /kWh)	Price per useful heat output p/kWh	Annual running cost for 4 bed detached house
LPG Condensing Boiler	4.62	0.25	90	0.28	5.13	734
Off peak electric storage	3.73	0.42	80	0.53	4.67	667
Oil boiler (28 sec)	3.63	0.27	80	0.34	4.54	649
Coal boiler	2.12	0.29	70	0.41	3.03	432
Wood logs	1.82	0.03	70	0.04	2.60	372
Mains gas	2.55	0.19	90	0.21	2.83	405
Condensing boiler						
Typical air source heat pump	7.01	0.42	330	0.13	2.12	448
Optimised hydrocarbon heat pump	7.01	0.42	370	0.11	1.89	400
refrigerant air source						
Typical ground source heat pump	7.01	0.42	390	0.11	1.80	245
Optimised hydrocarbon refrigerant ground source heat pump	7.01	0.42	510	0.08	1.37	187