ZERO CARBON BRITAIN and the 21st century office worker

By Mike Barnes

Making big changes to energy consumption in our energy-driven world requires big changes to the way we live our lives. And few lifestyle changes have such potential to drastically reduce energy requirements as the move from office-worker to home-worker.

There are around 10 million office workers in the UK (http://www.flexibility.co.uk/flexwork/offices/facilities1.html). There are around 200 million square metres of office space; yet average desk occupancy during the day is only around 30% (and approaching 0% at night). This is not an efficient use of resources.

My area of expertise is communications. As well as the simple old telephone, today we have very usable video telephony or telepresence, conference calling and web-sharing, email, discussion forums, blogs, wikis, video-on-demand and tele-training, and "social media" which pulls all this together into comprehensive communications platforms. So here is a radical thought: with technology which allows us to be as effective when out of the office as when in it, why have offices at all? Why not get rid of the offices, and work from home?

Homes do need heating and lighting, so working there during the day may well increase home energy consumption. But the additional home energy requirements are offset by a reduced need for office heating, lighting and cooling as well as reduced commuting.

Could it really be more energy-efficient for us all to knock about half-empty houses all day rather than more densely occupied office buildings? Consider that, in colder months, homes are heated in the morning and then again in the evening regardless of where work happens. A well-insulated home, such as we absolutely require if we are to achieve energy savings and CO_2 emissions cuts, would hold onto the morning's heat to some extent; it would also require a smaller energy injection to heat it in the evening if it had been heated during the day. It is rare, though, for homes to be unoccupied from 8am to 6pm. Many households include children, who are likely to be home from about 4pm. In many households there will be at least one adult member who does not work, or does not work full time. Then there is the variation in housing: a house with a dedicated office room may only require heating in that one room, whereas a home worker who occupies the living room may find it harder to do this. And what about heat sources - heat pumps? Oil? Gas? In the warmer months offices are often air-conditioned whereas homes are usually not.

Because of these variables, it is very difficult to get a realistic picture of how much additional energy would be required to work from home. Clearly though, heating a home from around 8am to 6pm requires energy.

Another major factor in work-related energy consumption is commuting. According to the Department of Transport, the average commute in 2009 was 10 miles each way (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/49703/Commuting_and_business_travel_factsheet___April_2011.pdf). A 40mpg car will go about 9 miles on a litre of petrol, and with petrol containing around 10kWh of energy per litre of petrol that's roughly 20kWh of commuting per person (ignoring any other methods of commuting, which may be more or less efficient). David Mackay's excellent book 'Sustainable Energy – without the hot air' suggests across the UK we use an average of 21kWh of energy, per person, on space heating, water heating and cooking. So, on average, an office worker uses roughly the same amount of energy heating the air around him or her as on the commute to and from work.

If it was just a question of on-going energy use the case is, perhaps, still split.

But consider embodied energy. Houses are required because we need to live in them, so it's hard to see how embodied energy in homes can be reduced significantly (except through more efficient building practices:

something which has no impact on existing stock). The same is true for offices of course; we can't liberate the embodied energy and re-use it. But we can re-use office space for other purposes - particularly as homes, which are sorely in demand in the UK with new home-seekers finding themselves unable to find affordable housing. If office occupancy really is around 30%, then we could mathematically remove/re-use 70% of the current office space and still provide enough space for all current office workers to continue working in an office.

But that is not my suggestion.

Getting rid of all offices in the country would be ridiculous, because people do need to meet and socialise. This isn't always best done in an office, but I firmly believe we need good access to meeting facilities on an ad hoc basis. My suggestion, then, is to get rid of most desk-space, reduce the overall office space to 30% of the current amount, and convert at least half of that remaining space into flexible meeting space - either owned or hired as needed. This provides an environment where people primarily get together to collaborate, rather than one where people primarily get together to sit at desks typing and staring at computer screens, yet still provides desk-space for those who really need it. Most people would no longer commute on a daily basis, instead they would travel to meet with colleagues on perhaps a weekly basis: reducing energy consumed by commuting by 80%.

Removing the rose-tinted glasses for a moment, the plan would need an incredible level of buy-in from businesses throughout the country as well as the government. It would be incredibly difficult to legislate. But a tax on office space, tax breaks for conversion of office space into residences, and tax breaks for home-offices would help to drive adoption.

It is only as recently as the last few years that such an idea has become viable, with the increasing reach of the internet, improvements in network speeds, ubiquitous and affordable computing resources and the software and services to take advantage of it all. Modern communications allow people to work just as effectively from a home desk as from an office desk. Offices are no longer a necessity. They are a luxury, and one we can no longer afford. Nor, I suspect, do many people want to.

If total office space were reduced from 200 million square metres to 60 million square metres, how much energy would be saved? David Mackay suggests that an energy-efficient office uses around $215kWh/m^2/y$. So that's around 40 billion kWh/y for today's office space, or 12 billion kWh/y for my office plan of the future. A saving of 28 billion kWh/y. By comparison the coal/biomass-fired Drax, the UK's largest power station which supplies 7% of the UK's electricity, produces 4000 megawatts, or 35 billion kWh/y. In 2007 Drax produced 22 million tonnes of CO_2 (http://en.wikipedia.org/wiki/Drax_power_station).

We've already seen that there are energy costs associated with home-working, and that realistically at least 20% of the commute energy will still be required. But home energy savings are already required in order to meet CO_2 reduction goals, and focussing our attention on homes, switching them to renewable, preferably local, energy sources is a much more viable proposition than doing that and in addition improving our office spaces. By taking advantage of modern communications systems which enable us to work just as effectively from a home desk as from an office desk, we can save energy, reduce CO_2 emissions, liberate more space for housing, save ourselves travel time and spend more time with our families and friends.

This is the future.

About the author:

Mike Barnes is a consultant specialising in business communications. His passion for using modern communications technology to oil the cogs of the workplace, driving information both within and between organisations, led to the publication of the book "An Infinite Number of Monkeys: A Guide to Effective Business Communications". You can find him online at www.mike-barnes.co.uk.