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Energy Efficiency & Carbon Emissions Fabric First



The Problem

The latest data shows that, in 2019, the UK used a whopping 150 million tonnes of oil equivalent. The transport sector was responsible for consuming the most energy but the domestic sector wasn't far behind – and together they account for about two thirds of all energy used. Energy consumption is inexorably linked to carbon dioxide (CO₂) emissions, a major contributor to climate change, and the residential sector accounted for 20.8%, or 67.7 MtCO₂, of all CO₂ emissions in 2020.

The UK has committed to a legally-binding target of net zero greenhouse gas (GHG) emissions by 2050. In order to meet that target, homes must reduce their direct CO₂ emissions by 2030 by 24%, from 1990 levels.

Heating accounts for almost two thirds of total domestic energy use, largely supplied by fossil-fuel based natural gas. So it stands to reason that if homes can become more energy efficient and, as a result, reduce heating demands, households can have a major impact on their carbon footprint. Not only that, energy efficient homes provide better thermal comfort (keeping warm in winter and cool in summer) and help occupants reduce their energy bills. It's also important when considering low carbon heating installations or renewable technologies.

Why not jump straight into low carbon heating?

In recent years, there's been an uptick of people using biomass heating as it's considered a carbon neutral heating source. What many don't realise, however, is that wood burning isn't as environmentally friendly as it seems.

Heat pumps are also gaining favour around the country as a renewable heating source. Because this technology operates at much lower temperatures than a typical gas boiler, it works best in well-insulated and draught-proofed homes, particularly in homes with a high thermal mass.

Finding skilled installers will be important, as precise work is key for a successful insulation job. They must deal properly with all the external pipes and other gubbins so they don't leave uninsulated thermal bridges.

The Solution:

Fabric-First

Homes can significantly reduce their heating demands by taking a 'fabric-first' approach. This means insulating the shell of the building so less heat is allowed to escape. In uninsulated homes, 35% of heat loss occurs through walls, 25% through the roof, 15% through draughts, 15% through the floor and 10% through windows. Deciding what measures to install will necessarily depend on:

- Measures that have already been installed (check your home's Energy Performance Certificate (EPC) for an indication of

- what may already be present)
- Budget
- Planned home improvements
- Nature of the property (e.g., what type of walls does your home have; are they prone to driving rain; is the property in a conservation area; is it accessible from all sides)
- Tolerance of disruption (e.g., internal wall insulation or floor insulation may mean moving switches, relaying skirting boards and/or trimming doors)

As a rule of thumb, it's recommended to insulate the home in the order in which the most heat is lost, i.e. starting with the walls and finishing with the windows. Upgrading windows and insulating solid walls are typically the most expensive measures, whilst draught-proofing can be a relatively cheap and easy DIY job. When replacing windows, choose timber frames over uPVC or aluminium alternatives as these have a much lower environmental impact. The most efficient type of window pane is Argon-filled double-glazing with a 'low-e' coating. Whatever the job, ensure you are getting quality work, especially the detailing around doors and windows, as this will reduce heat loss and prevent draughts.

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Instead of considering the work as standalone measures, homeowners should take a holistic approach when retrofitting an existing property. Not doing so can unintentionally damage the building's performance, for example through inadequate ventilation, thermal bridging or inappropriately sized heating systems. Even if the work can't all happen simultaneously (e.g., budget restrictions), having a plan in place will help inform and guide the direction of travel. A phased retrofit can offer long-term savings, less overall disruption and better energy efficiency compared to piecemeal work.

The PAS2035 framework (which supersedes the PAS2030 specification) does just that by providing a comprehensive retrofit standard that ensures agreed outcomes are met based on a plan of delivery. Future energy efficiency measures delivered through government grant funding, like ECO, will have to use PAS2035.

Energy Conservation Behaviours

Occupants who want to reduce their home's carbon footprint but are unable to change the fabric of their homes – fear not! A slight shift in behaviour could be just the key. Smart meters and their In-Home Displays may help you track and manage your energy use in real time but, although helpful, these aren't necessary.

Heating

More energy is used in heating our homes than anything else. By reducing your heating, you'll be saving carbon (and money). But it's not about going without – make sure you keep warm! Consider the following:

- Reduce the thermostat setting in the winter. 18-21°C is comfortable for most people.
- Use heating controls effectively. This includes thermostats, programmers, TRVs, input/output controls (for storage heaters) and dampers (for wood burning).
- If you have a gas boiler, get it serviced annually. Ensuring the boiler is in tip top condition will mean it's safe and running efficiently.
- Bleed and/or flush radiators. If you notice the radiators don't get hot all over, either air could be trapped or sludge is building up.
- Prevent condensation - moist air requires more energy to heat up.
- Line your curtains. Long, thick curtains can trap air between their folds to provide great insulation on cold nights.
- Close off unheated conservatories in the winter. Keep the heat where you need it.

Hot water

Much of the water we use is heated, including showers, baths, handwashing, clothes washing, dishwashing and even making a cuppa. So saving water saves energy. But even when it's not heated, water has an embedded energy demand. Treating water to make it safe to drink and distributing it to where it needs to be uses a lot of energy. Try the following to reduce your water use:

- Set your hot water cylinder to 60°C, if you have one. Any higher will waste energy; any lower risks an outbreak of Legionella.
- Wash clothes in cold water and only put on full loads of laundry. This has the added benefit of extending the life of your clothes.
- Take shorter showers. See if you can keep them to 4 minutes. Try timing yourself with a shower timer or a favourite song.
- Turn the taps off when brushing teeth.
- Check your pipes for leaks.
- Water your garden only as needed. A water butt can further reduce your garden's water demand.

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Appliances

Appliances are the third biggest domestic energy consumers behind space heating and hot water. Items like TVs, phone chargers, laptops, microwaves all use electricity when switched on, but did you know they can also draw energy when they're not on? Here are some tips for reducing your appliances' demand for energy:

- Unplug devices to avoid phantom loads. Make your life even easier by using power strips so you can flip a single switch instead of unplugging multiple electronics.
- Set your fridge temperature to 3-5°C.
- Defrost your freezer when ice builds up.
- Hang dry clothes instead of using a tumble dryer. Better yet, hang them outside if you can. (If you can't, instead hang them in an airing cupboard or bathroom with adequate ventilation through exhaust fans or open windows.)

Lighting

Even the most efficient lightbulbs can't compete with common sense when it comes to energy usage. Try the following:

- Use daylighting whenever possible. Even an overcast day can provide sufficient lighting for most tasks in most places. Decide for yourself if you even need to turn on a light.
- Use task lighting. No need to light up a whole room when a task light will do the job. A lamp by the bedside or an LED strip over the kitchen counters could be just enough.
- Clean your lightbulbs. Lights shine brightest when they're free of dirt and dust.

Energy Efficient Appliances

New appliance labelling and legislation have been introduced recently. From 1 March 2021, energy labels on refrigerators, lighting, washing machines, washer-dryers, dishwashers and TVs will reset the ratings from A to G (instead of having A+++ in the top spot). The labels will also clarify how much energy these appliances use, making it easier to compare products. Other white goods' labels will remain the same for now but may be updated in 2022.

The government also announced a "right to repair", which hopes to address concerns about "planned obsolescence" and e-waste. The new rules would ensure spare parts are made available by manufacturers for appliances like fridges and washing machines and therefore extend products' lifespans. YouTube videos are a great place to start if you are keen to do some repairs yourself. Repair Cafes can also lend a helping hand and, chances are, there's one not far from you. If all else fails, please remember to recycle your electrical goods so you don't contribute to the problem of e-waste.

When it's finally time to say goodbye to your appliance, consider installing energy efficient products; these can make a big difference to your home's energy draw. Here are a few ideas to start you off: