Using an IR camera to improve the energy efficiency of your home

This free loan scheme for members of the HGS Resident Association is an initiative of HGS REACH, the climate action group of the HGS RA. We are local residents who want the Suburb to be Net Zero by 2040, ahead of the national targets.

Thermal imaging or IR (infrared) cameras can be used with just a little information to show where obvious heat is escaping from your home. For example, it can find

- Gaps in badly fitting door and window frames;
- Missing or patchy roof insulation;
- Cold spots in floors, walls and ceilings; and
- Radiator blockages.

It can also identify moisture damage, for instance, caused by slow-leaking pipes or small gaps in the roof.

The challenge

In Hampstead Garden Suburb, we face problems in saving energy due to the historic building preservation regulations that are safeguarded by the Trust. Nevertheless, an IR camera can identify many energy-draining problems that make our homes colder and less comfortable than they should be. Many of these can be fixed by a DIYer or inexpensive home handyperson. **By eliminating cold spots it may be possible for you to reduce the thermostat setting of your whole home.**

Remember: an old house doesn't have to be a cold house.

Please also look at the HGS RA REACH webpage for more energy-saving information including information on cheap but effective secondary glazing and how to reduce the running costs of a gas boiler.

Please note, we're not architects or energy consultants. If you are planning major or permanent work to your home, please consult a building professional or a retrofit specialist. As you know, changes to the exterior of property in the Suburb or to the interior of a listed building also require HGS Trust approval. Full details on the Trust's website.

After using the camera please fill in our survey about your experience so we can improve the scheme: https://forms.gle/5oC11DTsWDyFfNLb8

The basics

- We are starting the loan scheme with a Flir One Pro IR Camera which attaches to an iPhone or iPad. You need to download the FLIR ONE app. You don't need to connect to FLIR's cloud service or accept any of their other add-ons.
- Take your iPhone/iPad out of its case when using the attachment.
- The camera should attach securely but for safety you may want to add a non-restrictive rubber band.
- The images are stored on your iPhone/iPad. But please share interesting findings with us to help other users.
- The normal loan period is 2 days. **Please be punctual when picking up or returning.**
- Please look after the camera and attach and remove your device with care.
- Do not expose the camera to rain or moisture. **Don't point it at the sun.**
- If you break or lose the camera, we will ask for a £50 contribution towards replacement.
- The app and camera use a lot of power from the phone. It's best to start with the phone fully charged.

Getting started: how to use the camera

Please also have a look at our 3-minute video guide: https://youtu.be/_52W_YqQsNE

The camera works best if there is a big difference between inside the house and outside. **So before using it turn your heating up to full for a few hours. And it's best used on a cold winter evening. The difference between interior and exterior temperatures should be at least 10°C. The wider the gap the more you will see.**

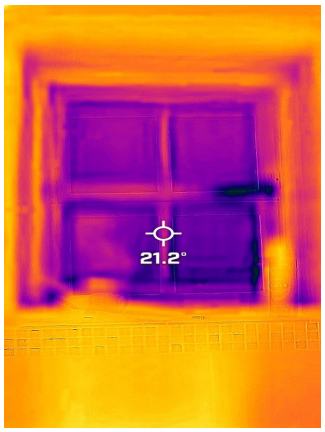
In short, you walk around inside your house looking at the phone screen. The golden rule:

Yellow or red=warm (good)

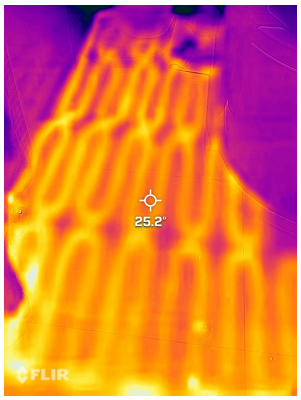
Blue=cold (bad)

Here's some things you may see:

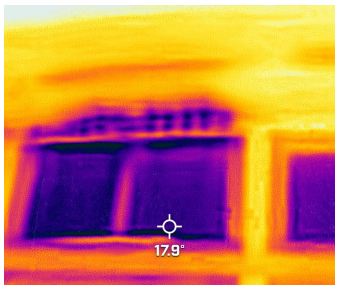
This door has good sealing around the edge but none on the lower edge. Time to get a draught excluder.



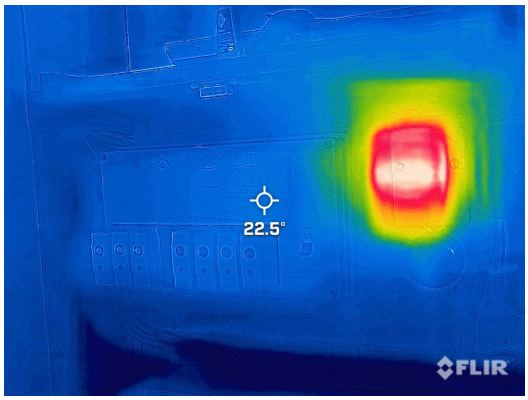
Faulty rubber seal on a window. Again, draught-proofing is needed.



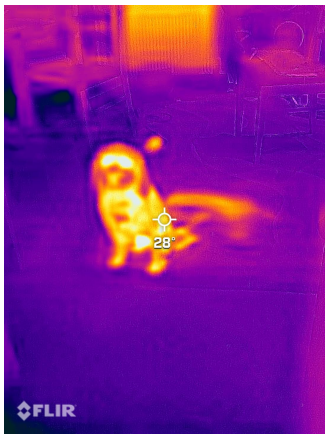
This underfloor heating is working fine. 👍



Cold air is pouring through this trickle vent above a window. Yes, your home needs ventilation but does it need this much? Also, the camera shows how much heat is being lost through the single-glazed window.



As you walk around your home, don't forget to look in hidden places such as inside cupboards, in the roofspace (if you have access), or the fuse box. This image shows the transformer for a front door bell that is no longer used as the owners now have a smart camera doorbell. However, the old transformer was left connected and is warm. It has been wasting power for years.



Dog seems to working fine, no problems here 🐶

Also look at

- Radiators to look for dead spots (try bleeding air out for a quick fix)
- Loft hatches (they can be insulated very cheaply)
- Bathroom fans (the cheapest ones leak a lot of heat, slightly more expensive ones don't)
- Ceilings (Blue spots may show lack of insulation or even a slow leak in a pipe above. Red spots may indicate a problem with roof wiring or hot water pipes).
- Floors (especially if you don't have carpet).

Please share your experiences with us (and specific images) so we can help other IR camera users.

Getting a bit more advanced

- It is not the absolute colours that matter, but rather the temperature difference between differently coloured areas. You are looking for large suspicious temperature differences. There will be a normal temperature range between different areas in the house, and

somewhat darker sections such as window panes or door frames may not be faulty. Also metal joints in plastering, for example, will show a temperature difference so please take that into account.

- Some cold spots or draughts will be confirmable by touch. If unsure, especially in the case of suspected moisture damage, you may want to take advice from a professional builder.

Going outside

If you want to step it up a level, get some warm clothes on and take the camera outside and examine your home exterior. Here, your thinking is reversed, you are looking for hot spots that show heat is escaping. So for outside, the golden rule is

Yellow or red=warm (bad)

Blue=cold (good)

When using the IR camera outside, avoid pointing it at the night sky. The sky can be -20°C and will cause the temperature scale to recalibrate. This makes it harder to see the temperature differences of your home.

Look for

- **Wall hotspots which** may indicate heat escaping from wall-mounted radiators (use reflective foil) or damp patches (may need a professional)
- **A warm chimney stack** (plenty of cheap ways of fixing this online or buy a Chimney Sheep)
- **Heat escaping around the edges of doors or windows** (window frames and sills were not always properly sealed, and even minor structural settlements over the decades may have opened small gaps around the frames)

Sometimes you may see hot or cold spots with no apparent cause (see lower warm spot on the photo left); these may require more investigation.

You can also see the impact of improved window glazing. In this image(right) the upper window has acrylic secondary glazing, the lower one does not and is glowing warm as heat is radiated out (wasting £££)

We're particularly interested in hearing about what you discover using the camera outside your home. Please share specific interesting images with HGS REACH.

Reminder: after using the camera please fill in our survey about your experience so we can improve the scheme: https://forms.gle/5oC11DTsWDyFfNLb8

Your energy-saving checklist

- Keep curtains and blinds closed at night in all rooms, keeping radiators uncovered
- Install draught stoppers or excluders around doors and windows
- Insulate keyholes, letter boxes, cat flaps, loft hatches
- Install foil backing panels behind radiators to reflect heat
- Consider additional (thermal) curtains and blinds, including external door curtains
- Rugs and underlay make a difference
- Fill gaps in floorboards and behind/around skirting boards
- Install chimney balloons in unused chimneys not required for ventilation

Taking action: more involved

- Repair identified gaps in walls, especially around ill-fitting windows and doors
- Install professional or DIY secondary glazing (see REACH guide) or double glazing (see HGS Trust guidelines)
- Replace bathroom or kitchen fans with models with a baffle (just £30 from Screwfix) or (better yet) heat recovery fans
- Consider loft or roof insulation if your loft is accessible.
- Dry air feels warmer and more comfortable, and it is healthier than damp air, so fix damp problems and consider a dehumidifier
- Insulate your water pipes and water tank
- ALWAYS ENSURE ADEQUATE VENTILATION when undertaking any insulation projects to avoid condensation and safeguard the health of the residents and integrity of the building. Take professional advice for any major structural work.
- Consider getting a professional whole-house retrofit assessment and/or a professional thermal imaging service

Additional information
(We are not affiliated to any of the external organisations and only add these as pointers for further research)

- HGS RA Reach website
- HGS Trust website
- You Tube video: Using the FLIR ONE Thermal Imaging Camera to Assess Our Home's Insulation And Air Leaks: https://www.youtube.com/watch?v=BpqbTnTtRuk
- You Tube video (for the dedicated): Thermal Imaging in Energy Efficiency Projects by Phil Beardmore: https://www.youtube.com/watch?v=bL3uM1RBcNQ
- Loft insulation: see Centre for Sustainable Energy, Loft insulation Guide, https://www.cse.org.uk/advice/advice-and-support/loft-insulation
- DIY Draught Proofing Guide, Centre for Sustainable Energy, https://www.cse.org.uk/advice/adviceand-support/diy-draught-proofing
- Draught Proofing Guide, Energy Savings Trust, https://www.energysavingtrust.org.uk/homeinsulation/draught-proofing
- Home Insulation, Energy Savings Trust, https://www.energysavingtrust.org.uk/home-insulation
- A local St Albans resident's guide to Easy Energy Saving Hacks: Stay-warm-for-less-Print.pdf (With particular thanks to the Sustainable St Albans charity for their advice and sharing their useful thermal imaging information with HGS REACH.)
- Retrofitting organisations, for example: Home | Ecofurb - Low carbon home renovations in London