

# DIY ENERGY SAVING



Hi my name is Paul Brohan and I'm just a retired guy with absolutely no commercial interests. but my degree is in Physics and Ive already done most of this stuff in my own house.

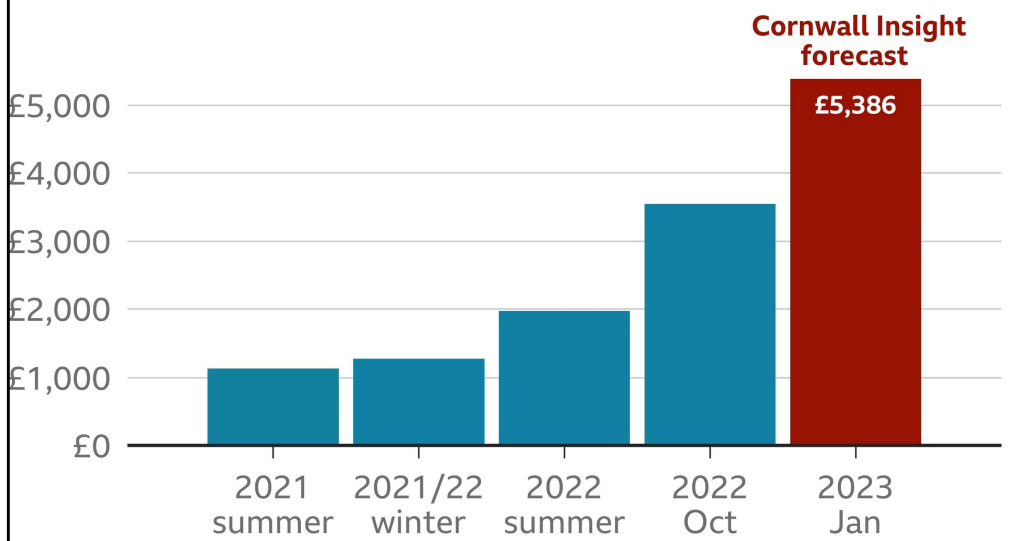
Transition Worcester is a voluntary group again with no commercial interests.

We are keen to help anyone cut their energy use. We have experience and some equipment we are happy to share for free.

Energy Tracers is a not for profit community interest company who offer thermal camera surveys to householders at modest cost.

## Energy price cap forecast to rise to £5,386

Annual bill for a typical household on a price capped dual-fuel tariff paying by direct debit



Source: Ofgem / Cornwall Insight, 26 Aug

PLC

We are now experiencing sharp increases in our Gas and Electricity Bills and this is forecast to get worse.

As you are listening to me you are probably not expecting this to be a temporary glitch but something that needs to be tackled with serious action.

# PLAN

- REDUCE the HEAT LOSSES
- MAKE HEATING MORE EFFICIENT
- CHANGE LIFESTYLE

The good news is there is huge potential to reduce what we spend on heating and most of the changes are straightforwardly available using our own or our neighbour's DIY skills and effort.

Depending on how serious you want to be, and where you are starting from, you could be aiming to halve your energy consumption .

We will be talking about steps and showing materials and examples to:

**Reduce heat losses through the Roof, Walls, Doors, Windows and Floors : (insulation and draught stopping, thinking about ventilation and condensation on the way)**

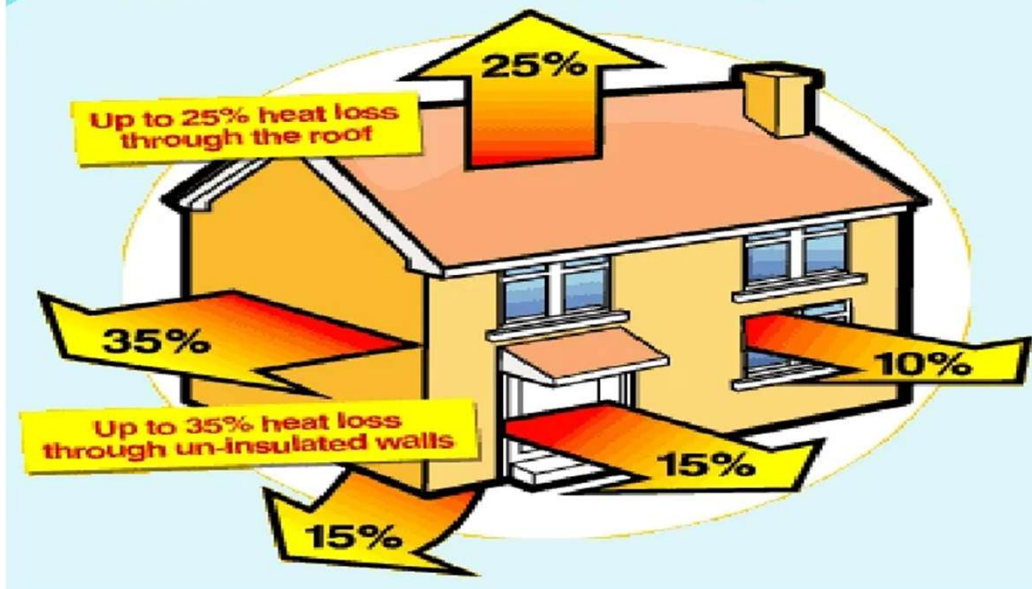
**Improve how you use the energy you pay for: choices, settings and maintenance of boilers, radiators, heaters etc.**

**Then about lifestyle choices – the biggest of all !**

The internet has lots of advice The Energy Saving Trust is particularly good

and Transition Worcester has interest and experience in all this, close at hand, and very happy to share and learn with our neighbours.

## Heat Loss from Homes



All the heat we pay for gets out of our house some way.  
These numbers add up to 100 percent!  
Reducing the draughts and improving the insulation is  
the plan here

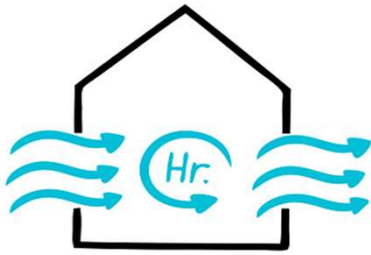
– first the Draughts.

## REDUCE THE HEAT LOSSES DRAUGHTS



We all have experience of stopping annoying draughts. But if they are really costing us money perhaps something more systematic is called for!

## REDUCE THE HEAT LOSSES DRAUGHTS



• CUBIC METERS PER HOUR

- need 112
- Probably Get 1000 +
- Some have < 60

For a small 3 bed house 100 Sq meters

We need fresh clean air to breathe and we need to get rid of moisture that we produce in our daily living.

BUT too much exchanging of cold fresh air from outside with our heated inside air puts up our heating bill.

The measure to think about is cubic metres of air change per hour. And the uk building regulations offer a lot of accumulated wisdom.

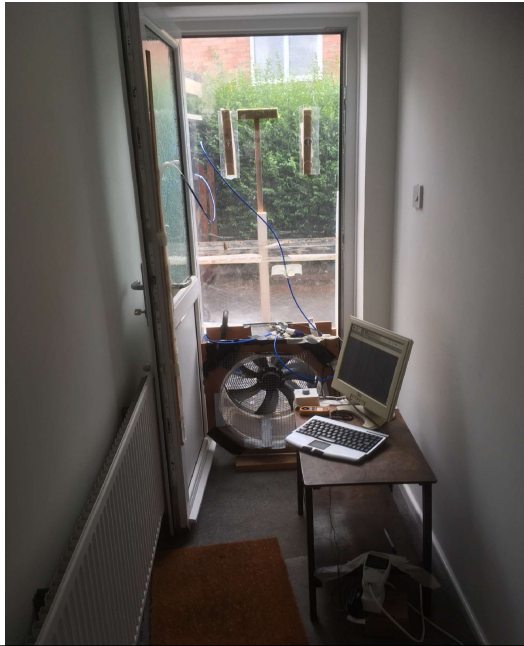
For a small three bedroom house with 4 people the building regs say:

Minimum Ventilation 112 cubic meters per hour. About 10 to go in and out of our lungs but much more to keep it fresh and get rid of moisture.

Our traditional building techniques make very leaky houses so those same regulations allow the builder 1000 cubic meters per hour (500 recommended) for new builds. More than 1000 for old houses of course!

Modern low energy houses with controlled ventilation have around 60

A pretty high percentage of your heating bill is in the draughts – which is an easy DIY fix!!



## DOOR FAN SYSTEM MEASURES

## PRESSURE and AIR FLOW

A good method of checking airtightness of a house or a room is to put a fan in the doorway.

If it's cold outside and warm inside, you feel the draughts blowing on your face from across the room.

You'll find draughts from all sorts of unsuspected places :  
Fireplaces and chimneys, Light fittings and sockets,  
skirtings and floors, as well as around doors and  
windows.

Transition Worcester can help free with fan and expertise if you want to try.

Or

Energy tracers heat camera survey shows the draughts as dark areas on a video record.

## REDUCE THE HEAT LOSSES DRAUGHTS



### **Find the draughts and seal them.**

When you've found the draughts there are lots of on-line specialist suppliers of 'seals and draught strips' so you can choose the best, or easiest, for each situation.

Transition Worcester have free expertise and advice.

If you Do it Yourself the cost is negligible compared to the savings.

Electric fittings just need a competent DIY'r who will remember to turn the power off before opening them.

Gas cookers and open gas heaters need advice from a gas safe engineer about local ventilation in the same room.

Solid fuel heaters need local ventilation and probably carbon monoxide detectors.

**BUT THE DRAUGHTS IN ALL THE OTHER ROOMS ARE FAIR GAME.**





## Condensation THE ELEPHANT IN THE ROOM

Lots of people are inhibited about sealing draughts in case they get condensation problems like damp patches.

Condensation can be surprising but the causes and avoidance are actually straightforward, and every householder can understand banish the fear.

It may be difficult to arrange conditions to eliminate condensation but knowing what needs to be achieved is more than half the battle. Relying on ventilation from random draughts is NOT the best way to go

## CONDENSATION

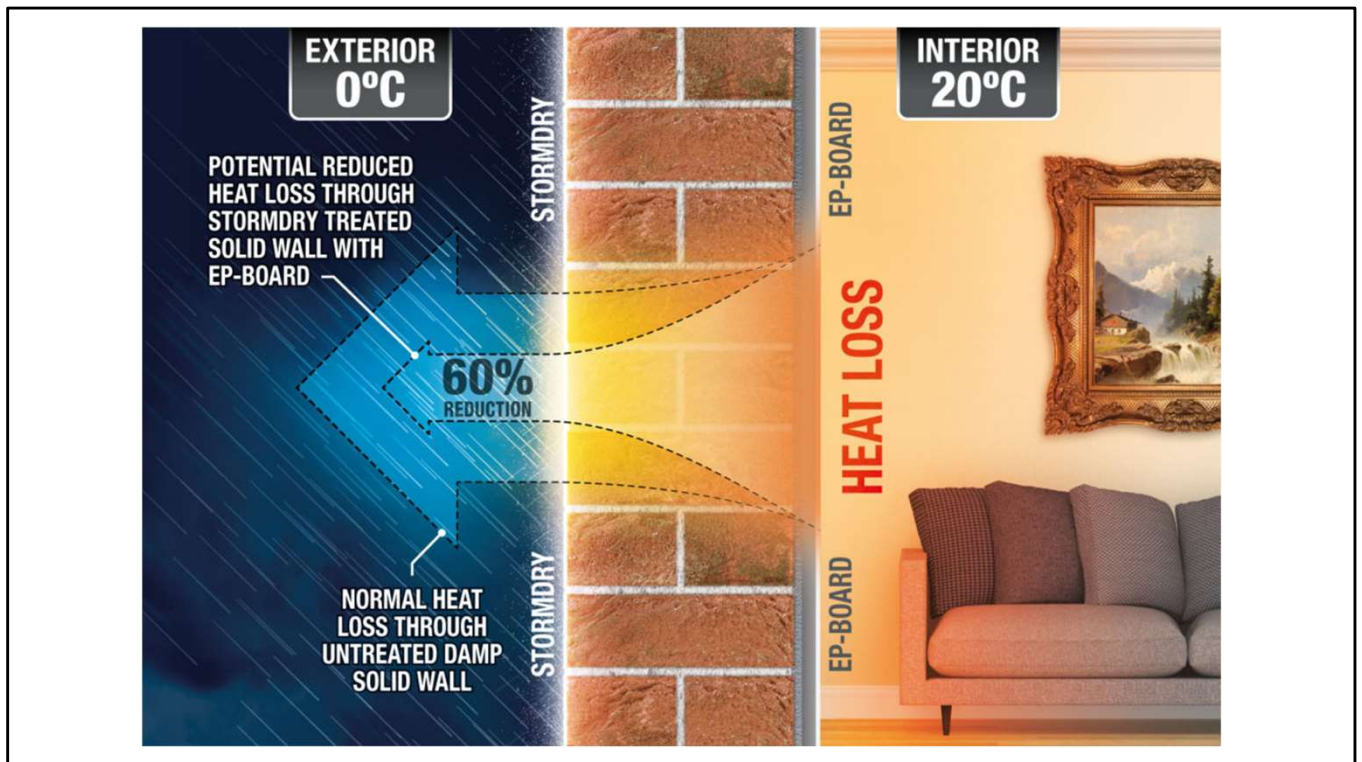


## DEW POINT



Air always holds some water vapour. This is normally not noticeable and is actually essential to life and comfort. What matters is the amount of water in the air, and this varies a lot with the temperature. There is more water in warm humid air than in cool dry air. Comfortable air at room temperature has about two teaspoons of water in each cubic metre – the air in your living room has just under half a litre of water. As air cools down it gets more humid and eventually reaches a point where drops of liquid water appear ‘fog, cloud, rain’, or ‘damp patch’. The key word here is ‘DEW POINT’. For any particular sample of air the dewpoint is that temperature at which liquid water starts to appear. For our comfortable living room air that would be around 10 degrees C. so any surface cooler than 10 degrees like a glass holding a cold drink will get wet.

The more moisture in the air the higher the dew point so if you’ve been drying washing indoors or doing a lot of cooking the circulation of air around the house means your living room air will be more moist and its dew point will be higher and any surface cooler than perhaps 15 degrees C is going to get wet.



Condensation on walls just depends on three things.

The rate of heat loss through the wall - so well insulated walls will have less damp.

The circulation of warm air warming the inside wall surface – good circulation at the wall surface gives less damp.

The moisture content of the air – extractor fans sending moist air outside from kitchens, bathrooms and laundry means less moisture in the air of other spaces and lower dew point and less damp.

## CONDENSATION



## DEW POINT



An infra-red thermometer will measure the temperature of wall surfaces.

A humidity recorder will tell you the dew point of the air around the house.

Attention to free circulation of air very close to outside walls is a matter of observation (closer than 100mm is all that matters -to ensure the inside surface stays near the room temperature).

An Energy tracers survey record would show cold areas where the insulation is less effective, on the walls doors floors and ceilings.

## REDUCE THE HEAT LOSS

## INSULATION



### U Value

WATTS PER SQUARE METER  
PER DEGREE DIFFERENCE IN  
TEMPERATURE BETWEEN  
INSIDE AND OUTSIDE..

Then there's all the heat losses through the solid fabric of the house, walls windows roof and floors.

Waving your infrared thermometer or Thermal Camera at walls ceilings floors and doors, inside and outside, on a cold day tells a wise energy buff almost everything you need to know.

Energy Tracers are now offering their service in Worcester!!

The measure of insulation is U value -  
WATTS PER SQUARE METER PER DEGREE DIFFERENCE IN  
TEMPERATURE BETWEEN INSIDE AND OUTSIDE..

Low U value is best 0.1 to 0.5 is usually good

Above 2 is really bad.

Every bit of your house envelope has a U value. As a crude indicator of your heat loss from any particular square meter multiply its U value by 60 to get its annual contribution to your kilowatt hours.

## REDUCE THE HEAT LOSSES INSULATION



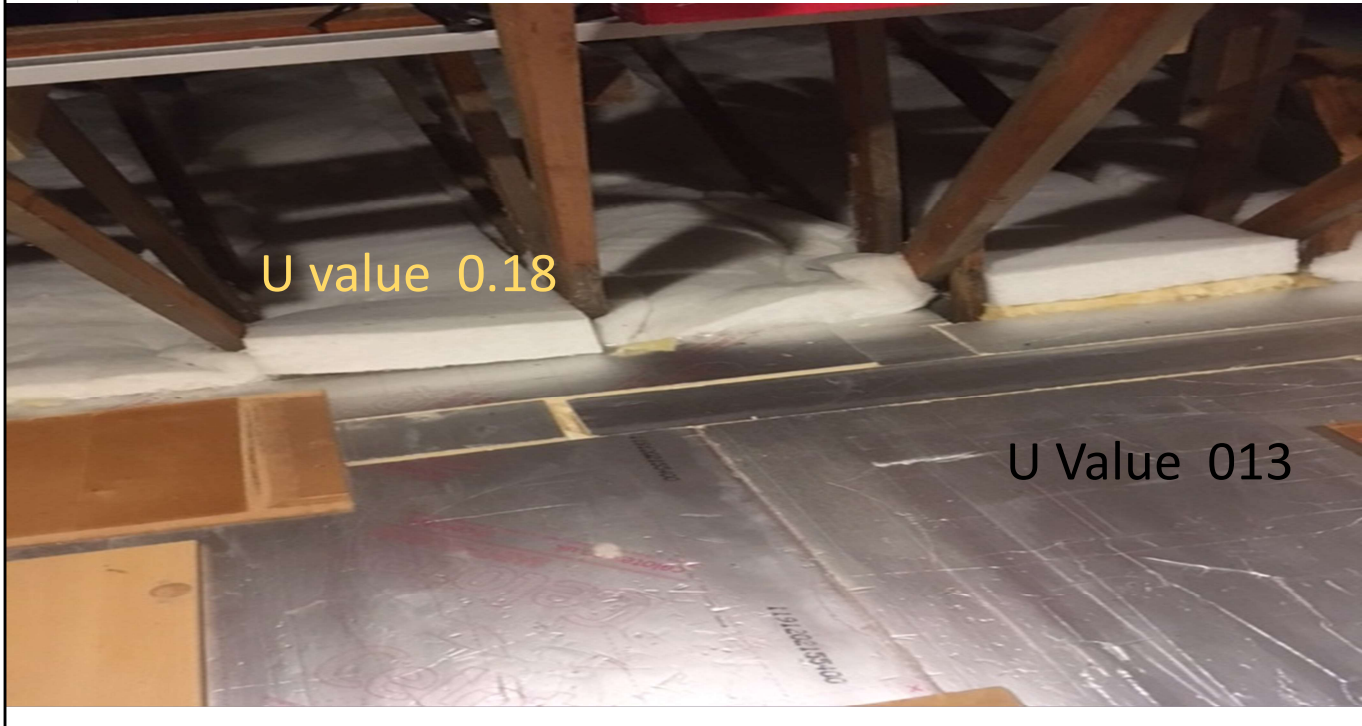
**Check loft insulation. (always the most cost effective measure)**

This old picture shows a real pussy-footing job and is totally inadequate – though of course a lot better than nothing at all.

That fibreglass needs to be at least 300 millimeters thick, criss crossed to ensure no uninsulated areas. And don't forget to insulate and draught seal the loft hatch.

Small neglected areas of ceiling in bay windows, porches and loft rooms can be significant cold spots. These are highlighted in a heat camera survey.

REDUCE THE HEAT LOSSES **INSULATION**

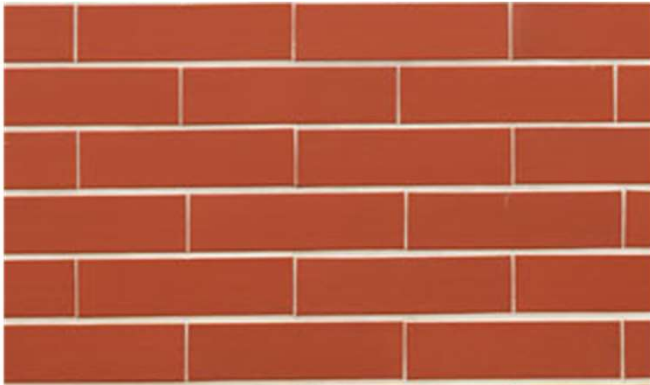


If you need a walk-on storage area consider rigid insulation there. Just remember not to mix breathable insulation (like fibreglass or acrylic wadding with impermeable insulation like the foam sheets here, on any area. You'll be surprised how much water vapour percolates through a ceiling, ready to condense on any impermeable stuff lying on top of fibreglass.

If the wiring is a mess consider refurbishing, and bringing it up a metre before covering everything.

If you don't like fibreglass insulation consider acrylic wadding instead of, or on top of, what's there.

300 mm of Fibreglass or Acrylic wadding has	U Value 0.18
150mm of impermeable Polyisocyanurate board has	U Value 0.13
Latest Building regs for roofs on new houses	U Value 0.11

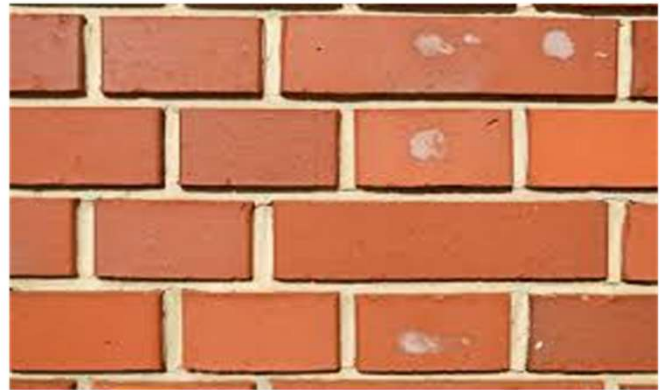


### Cavity Wall

If your home has cavity walls, the bricks will most likely have an even pattern, with each brick lengthways.

### Solid Wall

If your home has solid walls, the bricks will have an uneven pattern, with some of the bricks laid sideways so you can see the smaller ends.



**Walls** are the biggest area transmitting energy to the cold outside.

Make sure any cavity walls are filled. A filled cavity wall has a quarter the heat loss compared with a solid brick wall.

If you have solid brick walls, consider foam plasterboard on the inside of external walls. Fitting the boards as a DIY job then getting them professionally plastered can give a superb job at modest cost. Start with just the outside walls of the living room.



## INSULATION

## WINDOWS



Windows contribute a lot of heat loss in older houses All should be at least double glazed (if you can afford any triple, reserve it for North Facing side. )

If you can't justify new windows think about secondary glazing, if only cling film or bubble wrap. Factory-made secondary windows are easy to fit and can be a cost effective alternative to double glazing. But don't dismiss or despise modern plastic frame double glazed windows, especially if your existing frames are rotting.

Modern double glazing has half the heat loss of old double glazing or secondary glazing

## INSULATION

## FLOORS



Suspended wooden floors should be insulated. If you can get at the underside of the living room floor consider 50mm of foam with plasterboard – foam side against the boards, cut to fit between each rafter. The plasterboard layer is a useful fire barrier.

Solid floors may be leaking heat to outside at ground level – check on a cold day by measuring temperatures near and away from the wall. A narrow trench around the outside with extruded polystyrene slabs against the wall. Can be cost effective as DIY.

Heating

Gas or Electric



Most existing houses will be heated with gas boilers for the foreseeable future. Heat Pumps are marvellously economical for well insulated houses with water underfloor heating, but most existing houses aren't good enough to justify one.

So if you are using a gas boiler you want to burn as little gas as you possibly can.!!

Unless you've done so very recently you should talk to your gas engineer when he comes for your annual service about the likely efficiency of your boiler and system. The annual cleaning of the heat exchanger should not be missed anyway.

If your boiler was installed before 2005 it is probably worth considering a new condensing combi.

## CENTRAL HEATING CONTROL



Our central heating controller is fixing our gas bill as well as our comfort so we need to understand even if we accept its default settings.

This controller (usually in the hall or lounge) measures the air temperature at wherever it is sited and has a clock to turn the boiler on and off at pre-set times each day. During the 'ON' times, the boiler is only actually on if the Control thermostat setting is above the measured temperature. So the heating for the whole house will go on and off according to the time settings and the local temperature of the controller: This control overrides any settings on local radiator controls but doesn't change them.

## MAKE HEATING MORE EFFICIENT FLOW TEMPERATURE

• FLOW TEMP

RADIATORS



• FLOW TEMP

HOT WATER



You should review the boiler FLOW TEMPERATURE settings (you don't need the gas engineer to do that but its probably worth hearing his opinion) The flow temperature drastically affects the efficiency of the boiler.

Most boiler flow temperature settings are too high, like 75 C because that makes the radiators hotter and heats you up quicker and makes undersized radiators more effecive. 60 C is a sensible compromise. 45 C would be wonderful but your radiators are probably too small! Bigger radiators, whenever there is an opportunity to change, is a good idea.

Just try turning down the heating flow temperature to 55 and see how it goes.

See: <https://www.theheatinghub.co.uk/articles/turn-down-the-boiler-flow-temperature>.

## MAKE HEATING MORE EFFICIENT



Your radiators probably all have two valves! One at each end. Both control the flow of hot water, through just that radiator, whenever the heating is on. but have different functions!

A TRV (Thermostatic Radiator Valve) with numbers and adjusting knob. This one senses the temperature of the surrounding air and will slow then stop the flow through the radiator as your chosen temperature is reached. Number 1 = 10 degrees C, 2 is 15C, etc.. to 5 = 30C.

A ( 'Balancing' ) spanner valve at the other end of the radiator allows you to choose what proportion of your boiler's heating power is expended in each room. If we want a room to heat faster open the balancing valve a quarter turn; if that room is not so critical close it a bit to slow the flow. But remember this is about sharing: if you open some radiator balancing valves too much, others probably won't heat at all! I start with them all open just a quarter turn.

# MAKE HEATING MORE EFFICIENT TRV

- When the room drops below these temperatures, the TRV allow hot water to flow into the radiator:

- 0 = Off
- ① \* = 7°C
- ① 1 = 10°C
- ① 2 = 15°C
- ① 3 = 20°C
- ① 4 = 25°C
- ① 5 = 30°C



Just to reiterate; the room temperature settings of the TRV.

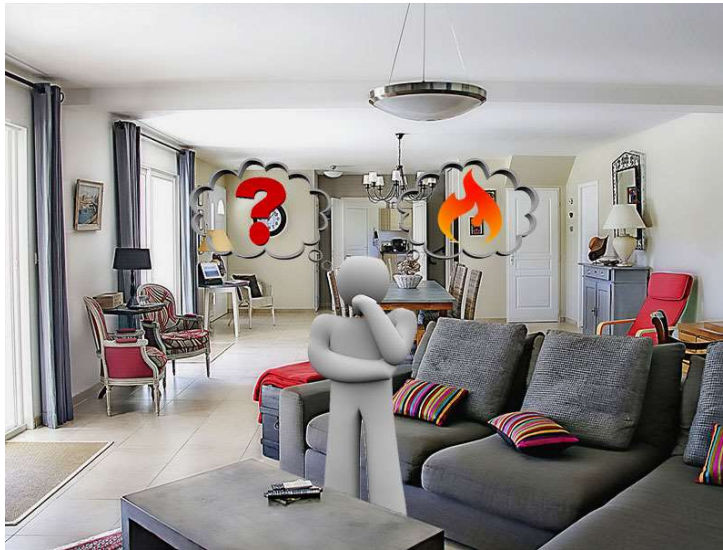
The TRV is probably the most misunderstood and abused control. And allows untold waste of Gas.

So many folk go into a room, feel cold and turn up the TRV. If the central controller happens to have the heating on at that moment - that radiator starts to heat – if not nothing happens - but will our punter carefully turn that TRV back before he goes off complaining or will he leave it to waste heat on an unoccupied room when the controller asks for heat again.

We need a strict regime so that only the person who understands the system adjusts the controls – normally the bill payer!

Certainly running round and checking all the TRV settings twice a day before each heating period may be in order for a while till the rules are established.

## LIFESTYLE



We all know that if we dressed for warmth and turned down our thermostats, we could save on our heating bills and save CO<sub>2</sub> to give our grandchildren a better chance of a life.

Think about the way you use each room and decide the level of heating, and what hours it will be in use. Then set the heating to achieve those temperatures – (remember there will be heat-up and cool down-times to plan for and pay for) There are clever systems like NEST and Smart Home to program from our mobile phone but most of us just set programmers and individual radiators by hand.

Hallways and cooking areas don't need as high temperature as sit down areas.

Bedrooms won't normally need much if any heating if you have appropriate bedding.

The bathroom will need good temperature and ventilation but only for short periods.

Concentrate attention on one comfortable sitting room, maybe even select or create a small room or 'snug' that can be economically heated

keep the doors of unheated rooms closed.

Clothing is going to make a big difference to room temperatures needed, especially when you are not moving about. Modern insulated clothing can be attractive and probably wool needs to make a come-back. There is a coming trend in electrically heated clothing using very low power and small batteries. This is pretty crude at present but very cheap – hopefully it will improve.



**FOLLOW UP**

**Notes for this Talk: DIY Energy Saving.pdf  
on Transition Worcester Website.**

**Regular Meetings with Transition Worcester Energy Group  
are open to all at 7-30 p.m. at 68 Southall Avenue WR3 7LS**

**Third Tuesday every month.**

**Contact Paul 07712276697 or [paulbrohan1@gmail.com](mailto:paulbrohan1@gmail.com).**

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