BARROW GREENER LIVING

Working towards a sustainable community

Air Quality & Humidity

Who's interested in the quality of the air we breathe? Do we take the quality of air in our homes for granted? These may be some initial questions about air quality, and some may ask, "Why are you being so fussy?" However, please take the time to be a little more knowledgeable about air quality and we hope this little booklet will help you to see that the invisible air we breathe is actually very important for our well-being and the buildings we live in.

Barrow Greener Living has had to consider air quality because of the work we have undertaken in relation to saving energy. Our booklet Save Energy-Save Money and Heat Loss Surveys often suggests plugging those cold draughts, but if you plug all ventilation within a house to make it warmer, humidity levels will increase, leading to condensation, damp and the development of mould. Additionally, but luess of an immediate worry is higher levels of carbon dioxide (Co2); monitoring this gives an overall impression of air quality and an overall indication of air pollutants which can build up within the home.

In this booklet we divide air quality into two parts. First, humidity and second, other air pollutants namely Co2.

Part One Humidity

What is humidity?

Humidity is water vapour, or moisture, that is contained in the air. All air contains a certain amount of moisture which is measured as a percentage. Usually, humidity in the home is between 40% and 60/65%. At higher levels it can be a problem because it can lead to condensation, damp and the formation of mould.

Humidity	Effects
Under 65%	Usually fine, particularly if room temperature is above 18C.
Above 65%	Increased risk of condensation, damp and mould on cold surfaces, particularly if room temperature is below 18C.

What produces excess moisture?

Ordinary daily activities can lead to excess humidity. For example, the perspiration and breathing of a family of four adds about half a pint of water to the air every hour; cooking three meals a day adds four or five pints; and each shower contributes another half-pint. In fact, every activity that uses water (like dishwashing, mopping floors, laundry) adds moisture

to the air. Drying clothes on radiators is also reported to cause high levels of humidity as well as being a a very inefficient use of the central heating system! To summarise, daily living activities for a family of four, in just one week, can add more than 18 gallons of water into the air. That's a lot of water!

One dog can produce an additional 42 pints of moisture per week. But mould can also be caused by leaking pipes, damaged roof tiles, damp basements and porous walls.

Condensation

Condensation is a sign of high humidity and is more common in winter but can occur wherever excess water vapour in the air meets a cold surface, typically a cold glass window or a wall surface. As a result, the adjacent air cools and cannot hold the same amount of moisture. Moisture is shed as water droplets. Condensation is the most common cause of damp which can then result in black mould - small black dots that appear near cold surfaces.

The Dew Point

The following table provides approximate indications when condensation will form on cold surfaces. It all depends upon: (1) the temperature of air in the room, (2) the amount of humidity in the air, and (3) the temperature of the "cold" surface the air contacts. This is generally referred to as the dew point. The figures in the main body of the table are temperatures of cold surfaces that would make air release its moisture in relation to humidity and air temperature.

DEW POINT CHART IN °C WaterLeak.co.uk

RELATIVE HUMIDITY %

AIR TEMPERATURE IN °C	10	20	30	40	50	60	70	80	90	100
10	-20.3	-12.1	-6.9	-3.1	-0.0	2.5	4.7	6.7	8.4	10.0
12	-18.7	-10.4	-5.2	-1.3	1.8	4.4	6.6	8.6	10.4	12.0
14	-17.2	-8.7	-3.4	0.5	3.7	6.3	8.6	10.6	12.4	14.0
16	-15.6	-7.0	-1.7	2.3	5.5	8.2	10.5	12.5	14.3	16.0
18	-14.1	-5.4	0.1	4.1	7.4	10.1	12.4	14.5	16.3	18.0
20	-12.5	-3.7	1.8	5.9	9.2	12.0	14.3	16.4	18.3	20.0
22	-11.0	-2.0	3.6	7.7	11.1	13.8	16.3	18.4	20.3	22.0
24	-9.4	-0.3	5.3	9.5	12.9	15.7	18.2	20.3	22.3	24.0
26	-7.9	1.3	7.1	11.3	14.8	17.6	20.1	22.3	24.2	26.0
28	-6.3	3.0	8.8	13.2	16.6	19.5	22.0	24.2	26.2	28.0
30	-4.8	4.7	10.6	15.0	18.5	21.4	23.9	26.2	28.2	30.0
32	-3.2	6.3	12.3	16.8	20.3	23.3	25.9	28.1	30.2	32.0
34	-1.7	8.0	14.1	18.6	22.2	25.2	27.8	30.1	32.1	34.0
36	-0.1	9.7	15.8	20.4	24.0	27.1	29.7	32.0	34.1	36.0
38	1.4	11.4	17.6	22.2	25.9	29.0	31.6	34.0	36.1	38.0
40	3.0	13.0	19.3	24.0	27.7	30.8	33.5	35.9	38.1	40.0

Other signs of too much humidity

Check for darkish damp spots on the ceiling. Water-filled blisters on outside paint surfaces may also indicate excessive indoor humidity.

Problems with excess humidity

In addition to mould, excess humidity may contribute to the deterioration of a building. Depending upon the construction, humidity can pass through walls and freeze within insulation, which then thaws when temperatures become warmer, possibly damaging ceilings and walls. No matter the sources of excess moisture, if mould is left untreated it can also damage the fabric of the building including walls and ceilings. Mould is a form of fungus and will grow in the wrong conditions.

The World Health Organization states that humidity at levels higher than 65% may aggravate upper respiratory infections, asthma, rhinitis and allergies. Conversely, very low moisture levels (below 20%) may induce skin dryness or itching.

Modern build issues and humidity

Before the energy crisis most people could afford to heat their homes and did not worry too much about draughts. Consequently, there was sufficient ventilation to keep humidity under control. Now, many cannot afford to keep their homes as warm and thus the cooler air is less able to hold as much moisture, leading to condensation.

In addition, new homes are much "tighter" with windows and doors designed to reduce air leakage, having better insulation, and possibly with vapour barriers. These new construction techniques are good at keeping cold air out but can lock moisture in. This new way of building is not inherently bad but in the wrong circumstances, moisture can build up. Therefore, it is important to manage humidity.

Managing humidity

By managing levels of humidity, you will also be managing potential mould problems.

1. Monitor humidity levels

- Humidity monitors are now very cheap to buy – every home should have at least one. The higher humidity level (measured in %) the more likely you will have problems with condensation, leading to possible problems with damp and mould. See dew point information mentioned above.
- A small investment in a humidity monitor can optimise humidity against ventilation. For example, if there are high readings you need to ventilate the building more.

2. Reduce moisture in the atmosphere.

- When cooking turn on the kitchen fan.
- And keep lids on pans to trap steam in the pot. Then cook on a simmer.
- Keep bathroom and kitchen doors closed when showering or cooking as this will stop moisture from moving around the home.
- If possible, avoid drying laundry inside. Usually, if it is not raining, it is possible to dry laundry outside.
- If it's not possible to dry laundry outside, reduce the amount of water held in the laundry by using the washing machine spin cycle twice. Use a tumble dryer or hang damp washing in a room with the internal door closed and a window open.
- Make sure clothes are completely dry before putting them in a wardrobe or drawer.
- Avoid storing firewood inside.
- As the outside air temperature drops, try to decrease humidity levels indoors.

- Do not use portable gas heaters indoors as they give off a lot of moisture.
- Only use candles for special occasions.
- Regularly wipe down surfaces where you see condensation collecting.
- Rising damp will add to humidity problems, which may involve essential building renovation.
- With persistent high levels of humidity, use a dehumidifier. They are reasonably cheap to run.

3. Ventilation

- To protect roof timbers, ensure the attic is ventilated. Insulation should not be placed to prevent fresh air entering and leaving the roof void where ceilings meet external walls.
- If your home is extremely airtight (usually only in modern homes), it may be helpful to install an air-to-air heat exchanger.
- If humidity is a problem open doors and windows on warmer days.
- Open kitchen and bathroom windows to allow steam created by cooking, showering, or bathing to leave the building.
- When you bathe or shower, turn on the fan in the bathroom until your mirror is clear. Be careful not to overheat fans by running them too long.
- If there is no fan in the bath or shower room keep the room door shut but open the window to let moist air escape.
- Vent all clothes dryers and exhaust fans to the outside.
- This may mean drying clothes in the bathroom with the window slightly open, but the bathroom door shut.
- Check extractor fans are clean and working correctly. Make sure they turn on automatically or turn on every time steam is produced.
- If constant high humidity is detected, make sure trickle vents on windows are kept open. Or permanently leave bathroom and kitchen windows slightly open (using the security latch).
- If constant high humidity is recorded, make sure that vents and airbricks are not blocked or covered up. If the vent has a cover, move it to the open position.
- If you notice mould behind sofas or other furniture, move them away from the walls to allow air to circulate around the back.
- If there are lots of people or pets in a small space, increase ventilation; we produce lots of moisture just by breathing!
- Use a humidity monitor to find out which rooms need to be ventilated more frequently.

4. Heating

- Make sure the heating system is working efficiently. It may need a service or repair.
- During colder times of year, turn your heating on regularly. This doesn't mean all day, every day, but often enough to keep your home dry or below 65% humidity. Don't forget warmer air is able to hold more moisture.
- Use a clothes airer rather than hanging washing directly on the radiator as this is an inefficient use of your heating system.

5. The use of a dehumidifier

Dehumidifiers take moisture out of the air. They can help resolve high levels of humidity especially if you have followed all the actions previously mentioned but humidity remains high.

- Set your dehumidifier to under 60% humidity if possible.
- On warm, dry days, opening a window will be just as effective as running a dehumidifier.
- If you close doors and windows in the room where the dehumidifier is on, it will work more efficiently.
- Buy a dehumidifier that will remove at least 5 litres of water every 24 hours. Avoid smaller, cheaper models. Decent dehumidifiers start at around £100 and cost around 17p per hour to run (based on a price for electricity of 27p per kWh, November 2023).

How to prevent mould

There are many different types of mould, and they can appear on different surfaces. Cold surfaces such as windowsills are common areas but mould can also develop on curtains, behind wallpaper, carpets and upholstery and more rarely, under floorboards or on attic timbers.

Do all the things previously mentioned to manage humidity. If you manage humidity, you will more than likely prevent mould.

Treating mould

It is essential to deal with the underlying cause of mould promptly, be it excess humidity, a leaking pipe or water coming in from outside. You will be fighting a losing battle if you don't.

If you do not treat and clean mould that is already present in your home, it will grow and spread to other areas. Mould spores can exist on walls up to a meter around the visible patch. Treat mould by:

- For mild contamination use a sponge and a solution of detergent and warm water is usually enough. Soak up excess moisture with a cloth to leave the area dry or use a hair dryer. Open your windows in the contaminated room and keep doors closed to prevent spores from spreading to other areas of your home.
- For more serious affected areas, and as soon as possible, treat visible mould and a further 1 metre with a spray containing bleach or a biocidal product allowing it to dry.
- Repeat.
- And repeat if it reappears.
- Dispose of furniture, soft furnishings and wallpaper that are badly affected.
- Try not to breath in or touch mould spores. Dress appropriately and wear a facemask.
- Not forgetting that prevention is better than cure.
- If there is extensive and or severe contamination professional advice will probably be required.
- It will be helpful to have a humidifier working near to the contaminated area for a period.
- But always deal with the underlying cause.

Part Two Air quality

Poor indoor air quality can aggravate conditions such illnesses as asthma, pneumonia, lung cancer, chronic obstructive pulmonary disease and cardiovascular disease.

Indoor air pollution comes from many sources like:

- Gas hobs and ovens.
- Wood burning stoves and open fires.
- Cigarette smoking.
- Mould growth.
- Household cleaning products and air fresheners.
- Personal care products like shower gels, spray deodorants or perfumes.
- Building materials.
- Outdoor air pollution, such as fumes from car exhausts.
- Air pollutants like HCHO (formaldehyde). Often found in glues.
- TVOCs (total volatile organic compounds) which can be in paints.

It is therefore important to make sure your home is well ventilated so that these harmful pollutants are replaced with fresh air.

Monitoring air quality

Monitoring air quality is a simple, low-cost way to investigate the health of your home. This information can help you make decisions about home improvements like draught-proofing, ventilation, insulation, and heating systems.

You can monitor lots of different things in your home including:

- Temperature
- Humidity
- Carbon dioxide (Co2)
- Carbon monoxide

Temperature was covered in the booklet Save Energy – Save Money; humidity has just been discussed; leaving Co2 and carbon monoxide to be covered briefly now.

The following table provides an indication what the appropriate level of carbon dioxide should be. Measured in ppm – parts per million.

CO2 Concentration	Health Effects
Under 1000 ppm	Limited or no health effects
1000 ppm-2500 ppm	Feeling tired, loss of focus and concentration, uncomfortable 'stuffy' feeling in the air
2500 ppm-5000 ppm	Headache, drowsiness, tiredness

5000 ppm-40000 ppm	Severe headaches, slight intoxication depending on exposure time
40000 ppm-100000 ppm	Immediate danger to life or health, dizziness, increased heart rate, sweating, difficulty breathing, seizures, and loss of consciousness after prolonged exposure

Where does Co2 come from?

- The air we breathe out. So, there will be more Co2 from a crowd of people.
- Gas cookers and fires
- Co2 levels in cigarette smoke is 200 times the levels in the atmosphere.
- Log burners or open fires

Reducing Co2 in your home

- Monitor Co2 levels in your home.
- Ensure you are maintaining adequate levels of ventilation,
- Adding indoor plants can help reduce Co2 levels.
- Manage the above causes of excess Co2.

Carbon monoxide

Carbon monoxide is a poisonous gas that can make you seriously ill if you breathe it in. Carbon monoxide gas is colourless with no smell, so you cannot tell if it is around you.

Symptoms of carbon monoxide poisoning include:

- Headache
- Dizziness
- Feeling sick or being sick
- Feeling weak
- Confusion
- Chest and muscle pain
- Shortness of breath

The symptoms may come and go. They may get worse when you spend time in an affected room or building and get better when you leave or go outside.

Causes of carbon monoxide poisoning

Common household appliances used for heating and cooking can produce carbon monoxide if they are not installed properly, faulty, or are poorly maintained. Appliances that produce carbon monoxide include:

- Gas boilers
- Gas cookers and clay ovens
- Gas or paraffin heaters
- Wood, gas and coal fires
- Portable generators
- Barbeques or camping stoves used inside

- Turning on vehicle or lawn mower engines in a garage can also cause a build-up of carbon monoxide.

Avoiding the problems of carbon monoxide

- Obtain a carbon monoxide alarm for each room of your home that contains an appliance that burn gas, oil, coal or wood.
- Get heating and cooking appliances properly installed and keep them well maintained/serviced.
- Make sure your boiler is serviced regularly by a qualified engineer.
- Keep chimneys and flues clean and well maintained.

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