



# **Building Biology for Healthy Homes**

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Presented by Kelly Abeleven

# About Building Biology NSW

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- Australian Qualified Building Biologist, Advanced Diploma
- Completed a nationally accredited course in Mould Testing
- Institute of Inspection Cleaning and Restoration Certification (IICRC) Certified Water Damage Restoration professional
- Advocate for children's environmental health
- Inspiring clients to live in harmony with nature
- Supporting clients to make changes in the home to support their health and the health of their family



# **What we will cover**

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- Toxic Chemicals
- Electromagnetic Fields
- Lead
- Water Damaged Buildings

# We live in a beautiful country

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# Environmental triggers

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- Bacteria
- Fungi
- Pesticides
- Industrial pollutants
- Chemicals
- Metals
- Solvents
- EMFs
- Food
- Stress



# **We spend 90% of our time indoors**

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Building Biologists work with:

- Doctors
- Builders
- Electricians
- Mould Remediators
- Plumbers
- Architects
- Interior designers

# Environmental Sensitivities

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- Chronic Fatigue Syndrome
- Sick building syndrome
- Multiple chemical sensitivity
- Chronic inflammatory response
- Fibromyalgia.....



# Toxicants

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- There are over 141 million chemicals on the Chemical Abstract Service Registry (CAS)
- CAS REGISTRY is updated daily with thousands of new substances.
- Clothing
- Bedding
- Furniture





# Toxicants

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- TRAPS - particulate matter (PM), carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), benzene, diesel, heavy metals and hundreds of others (US EPA 2014), especially during peak hours in the morning and evening
- Flame retardants, VOCs, Phthalates, PCBs and dioxin-like chemicals
- Gas appliances - Combustion gases such as carbon monoxide, nitrous oxides and sulphur dioxide, particulates
- Drinking water
- Non-stick pans



# Air pollution hotspots

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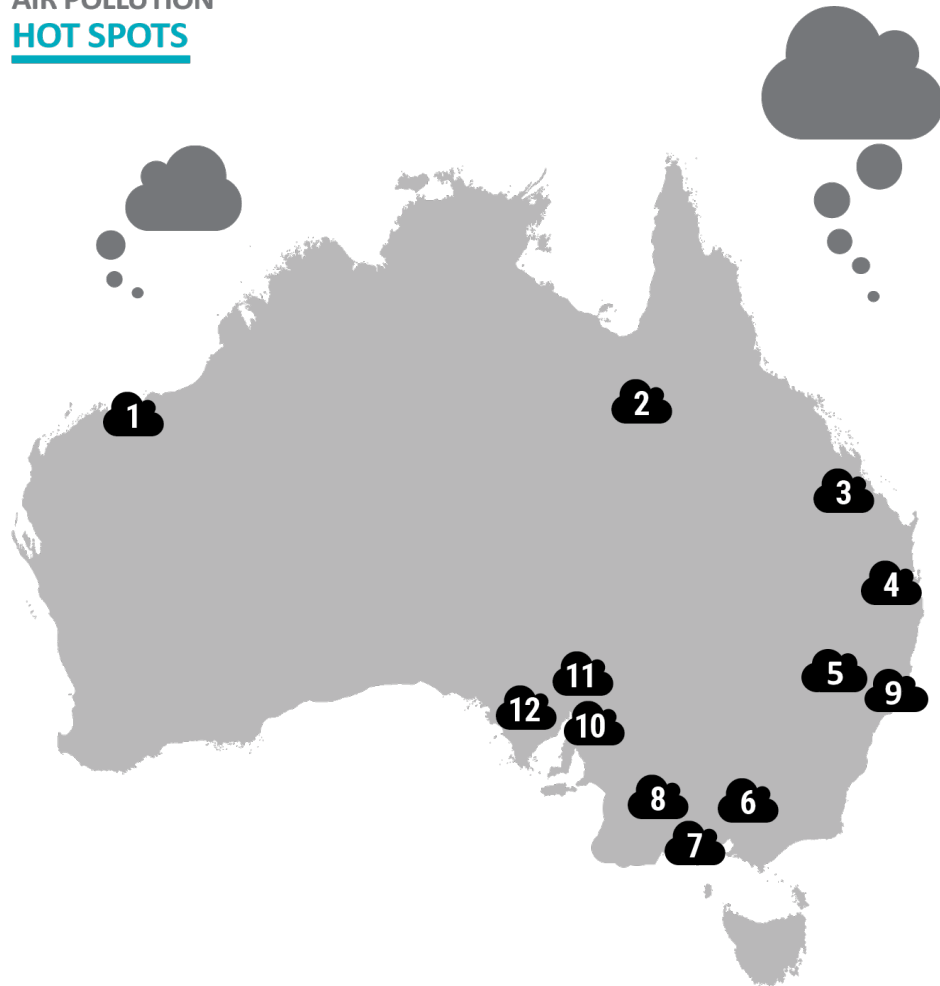
Coal-fired power stations





# Air pollution hotspots

## AIR POLLUTION HOT SPOTS



1

### PORT HEDLAND

#### BIGGEST SOURCE

Iron ore dust from port operations

#### PROBLEM

Pollution from iron ore dust regularly exceeds national standards. Hospitalisation for respiratory problems is 30% higher than WA average.

2

### MT ISA

#### BIGGEST SOURCE

Copper, lead, zinc mines

#### PROBLEM

Asthma mortality rates are 322% higher than the rest of Queensland. At least 11% of children have elevated blood lead levels.

3

### GLADSTONE

#### BIGGEST SOURCE

Coal operations, aluminum smelter, chemical manufacturing

#### PROBLEM

Community concern for years over excessive coal dust, alumina dust and other toxic air pollutants.

4

### BRISBANE

#### BIGGEST SOURCE

Coal trains

#### PROBLEM

8.6 million tonnes of coal a year transported through Brisbane suburbs in uncovered trains.

5

### HUNTER VALLEY

#### BIGGEST SOURCE

Coal mines and coal trains

#### PROBLEM

The national standard for PM<sub>10</sub> pollution was exceeded 171 times in 2013 in the Hunter region.

6

### MORWELL

#### BIGGEST SOURCE

Coal mines and coal fired power stations

#### PROBLEM

One of the highest PM pollution levels in Australia. The 2014 Hazlewood coal mine fire caused pollution 15 times the acceptable limit.

7

### YARRAVILLE

#### BIGGEST SOURCE

Diesel trucks -7000 trucks daily on one residential street

#### PROBLEM

Particulate pollution exceeds safe health levels on numerous days each year.

8

### BROOKLYN

#### BIGGEST SOURCE

Nearby industrial estate

#### PROBLEM

Worst air and dust pollution levels in Melbourne. Particulate pollution regularly exceeds acceptable limit.

9

### ANGLESEA

#### BIGGEST SOURCE

Coal mine and power station

#### PROBLEM

Power station emits high levels of sulphur dioxide

10

### PORT PIRIE

#### BIGGEST SOURCE

Lead smelter, one of the biggest in the world

#### PROBLEM

More than 3000 children had elevated blood lead levels in the last decade.

11

### PORT AUGUSTA

#### BIGGEST SOURCE

Coal mine and power station

#### PROBLEM

Power stations are the most polluting in Australia. Lung cancer rates twice the expected number. Highest rate of childhood asthma in the State.

12

### WHYALLA

#### BIGGEST SOURCE

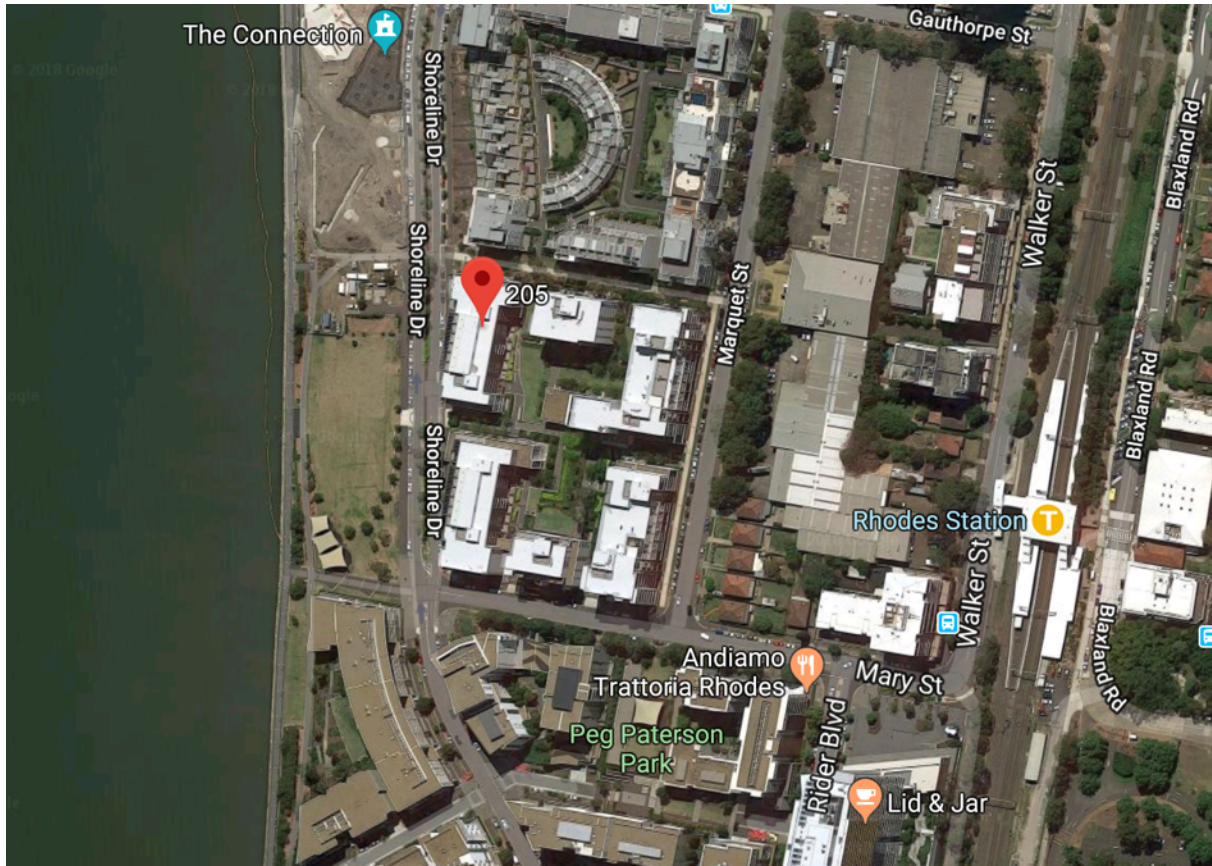
Iron pelletising plant

#### PROBLEM

Lung cancer rates are 50% higher in Whyalla than similar towns.



# Genetics loads the gun, environment pulls the trigger



Almost half of Australia's total land area – **385 million hectares** - is used for agricultural purposes, with around 24% dedicated to crops (ABS, 2016)

# It's time to act

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- In the past 35 years, new cancer diagnoses in Australia have almost tripled
- Allergic and respiratory diseases are rising
- Mental illness





# The children are our future

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- **Pandemic of childhood neurodevelopmental disorders** (Grandjean, 2013; Ross et al 2012; Grandjean & Landrigan, 2014; Fujiwara et al, 2016)
- 1 in every 35 Australian children in the 5 to 14 year old age group diagnosed with cancer (AIHW, 2017)
- 7% of children worldwide diagnosed with ADHD (Thomas et al, 2015)
- Early puberty and onset of breast development





# Solutions

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- Use an integrated pest management company or only safe chemicals for pest control
- Avoid non-stick cookware altogether. Also avoid aluminium pots, copper pots, leaded crystal and lead/aluminium glazed ceramics
- opt for products made of stainless steel, porcelain, glass, Pyrex, enamel coated iron or cast iron
- Think of the life-cycle of everything that you use – hemp, organic cotton....
- Avoid plastic – most are derived from petrochemicals Avoid #1, #3, #6, #7  
#2, #4, #5 are safer but not recyclable



# Electromagnetic Fields

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- There is international scientific consensus amongst hundreds of independent scientists (not closely tied to industry) that the current 'safety' guidelines for radiofrequency electromagnetic energy used in wireless technologies are not adequate (EMFscientist.org, 2015)
- On 31 May 2011, the WHO/International Agency for Research on Cancer (IARC) classified radiofrequency electromagnetic fields as possibly carcinogenic to humans, this puts wireless signals in the same category as lead and DDT



# Electromagnetic Fields

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- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) limit guidelines are set to prevent the heating-up of human tissue over a six-minute period
- These standards are not intended to protect against long-term exposure and do not take cumulative effects into account
- Melatonin
- a large body of research has demonstrated how radiofrequency electromagnetic energy acts on cell membranes at non-thermal levels resulting in irreversible cell changes, DNA strand breaks and oxidative stress (Yakymenko et al, 2016, Narayanan et al, 2015).





# Electromagnetic Fields

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- Powerlines
- High voltage transmission lines
- Mobile Phones – use speaker phone, air tube ear piece, flight mode, get it out of the bedroom
- Cordless Phones
- Baby monitors
- Appliances – use corded connections
- Smart appliances
- Xbox
- Other wireless devices



# Case Studies

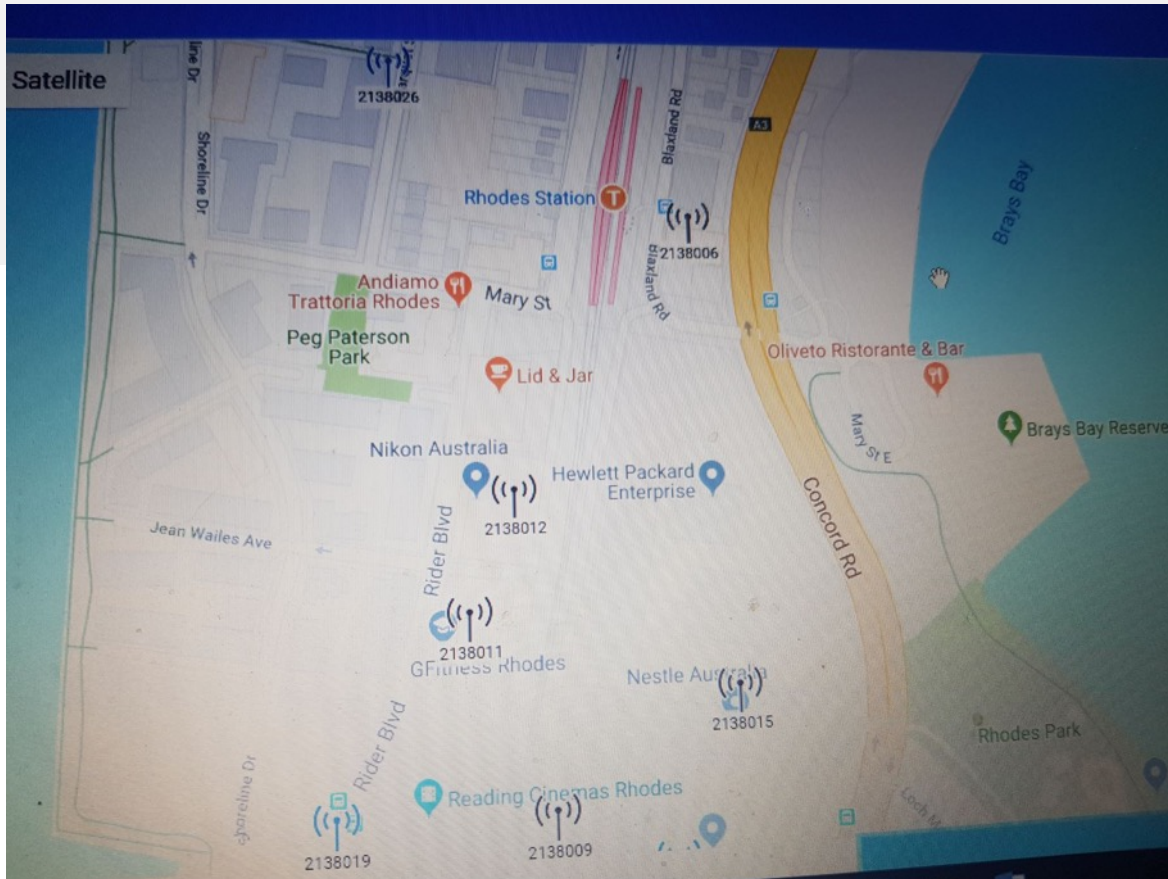
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AC Magnetic Fields and Radiofrequency Electromagnetic Energy – Most exposure in the home

# Phone Towers

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[www.rfnsa.com.au](http://www.rfnsa.com.au)





**A gram of prevention is  
worth a kilogram of cure.**

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*Benjamin Franklin, 1735*

# Lead

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- Lead is a widespread environmental chemical which have been linked to adverse health effects.
- Lead can be transferred by maternal blood to the fetus via the placenta, and exposure continues throughout life.
- For the general population, exposure comes mainly from water and food consumption, including breast milk (Rebelo, Caldas 2016).
- It is important to note that even low level exposure rates may represent a risk to human health especially at critical stages of development in utero and beyond. Heavy metals can be found in the body for years following the original exposure and can remain in body tissues.



# Lead

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- Despite all the Australian literature referring to the paint on pre-1970 homes and offices as being a potential lead problem, it was only in 1997 that the allowable level of lead in residential and commercial paint in Australia went down to 0.1% which is still higher than the US 1978 standard of less than 0.06% lead.
- Non-residential paint was only controlled for its lead content since 1st January 2010.
- If you are about to embark on management of pre-1997 paint, we recommend that you either assume the paint is leaded (>0.1%) or get it tested



# Lead

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- Symptoms of lead exposure aren't always obvious and symptoms often go unrecognised. (NSW Health 2016; Hon, Fung & Leung 2017)
- The symptoms of lead exposure are systemic. At high levels of human exposure there is damage to almost all organs and organ systems. At low levels, numerous biochemical processes are affected and psychological and neurobehavioural functions are impaired. (Tong, Von Schirnding & Prapamontol 2000)
- Children and infants are most vulnerable to the neurotoxic effects of lead due to their small size, rapidly developing brains and under developed blood-brain barrier. (Hon, Fung & Leung 2017; NHMRC 2016; Hauptman, Bruccoleri & Woolf 2017; NSW Health 2016; US EPA 2017)
- There is an association between blood lead levels and adverse cognitive effects (reduced IQ, learning difficulties) and behavioural problems (attention, impulsivity and hyperactivity) in children. (Gottesfeld 2013; NHMRC 2016; NSW Health 2016)





# Case Study

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# Lead

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- Lead Dust – soil, attic space
- If you can't afford full paint removal, then lead-safe paint preparation is the minimum requirement to manage the paint, ie wet-scraping, wet-sanding, then sugar-soap and then wipe down with water.
- After this preparation, the new paint should adhere as long as you have also solved any damp or mould problems also. Even when over-coated with well-adhering non-lead paint, the old lead paint underneath is still a potential hazard down the track when it needs repainting again.
- Testing:

<http://www.lead safeworld.com/>

Safe removal:

<http://adra.com.au/>



# Water Damaged Building

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## Healthy home

Predominantly **gram positive bacteria** like Staph. aureus, Staph. epidermidis, Micrococcus spp... which don't contain endotoxins

## Water-damaged building

Predominantly **gram negative bacteria like Actinobacteria** which contain endotoxins (LPS) which trigger the innate immune response

- **24% of the population can't make antibodies to antigens in a WDB** which results in persistent inflammation that affects multiple organ systems (Shoemaker, 2010)

# **Water Damaged Building**

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**Flu like symptoms:** nose and throat irritation, fever, cough, headache, nausea (Henrik & Wolf, 2011; National Academies Press, 2004).

**Allergens increase significantly in a WDB:**

house dust mites and pests (cockroaches, rodents...),

**Cause: moisture (external, internal, construction)**

# Water Damaged Building

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There are currently no exposure standards relating to mould or biotoxins in a water damaged building, however recently, the Australian Government released their report on Biofoxin-related illness. Four of the seven recommendations included in the report were:

The Committee recommends that the Department of Health produce and publish in the short term a fact sheet, and in the medium term undertake further research on:

- the potential health effects of exposure to damp and mould;
- the prevalence of dampness and mould in the built environment; and
- advice on the prevention and removal of mould.

The Committee recommends that the Australian Government work with the states and territories to ensure that tenants in rental properties, aged care facilities, and community, social and public housing are provided with timely information about disclosure and rectification of any previous or existing mould and/or water damage issues in a property before entering into a residential leasing agreement.

The Committee recommends that the Australian Government work with states and territories to conduct further research into the adequacy of current building codes and standards related to the prevention and remediation of dampness and mould in buildings.



# **Chronic Inflammatory Response Syndrome**

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Fatigue, headache, light sensitivity

**Brain fog:** memory loss, poor concentration, anomia, vertigo, confusion, disorientation and mood swings (Policy Holders of America, 2010; University of Connecticut Health Center for Indoor Environments, 2004)

**Musculoskeletal:** aches and joint pains; morning stiffness, tremors

**Eyes:** red eyes, blurred vision, tearing

**GIT:** abdominal pain, diarrhoea, metallic taste, appetite swings and **FOOD SENSITIVITIES**

**Skin:** sensitivity, numbness and tingling

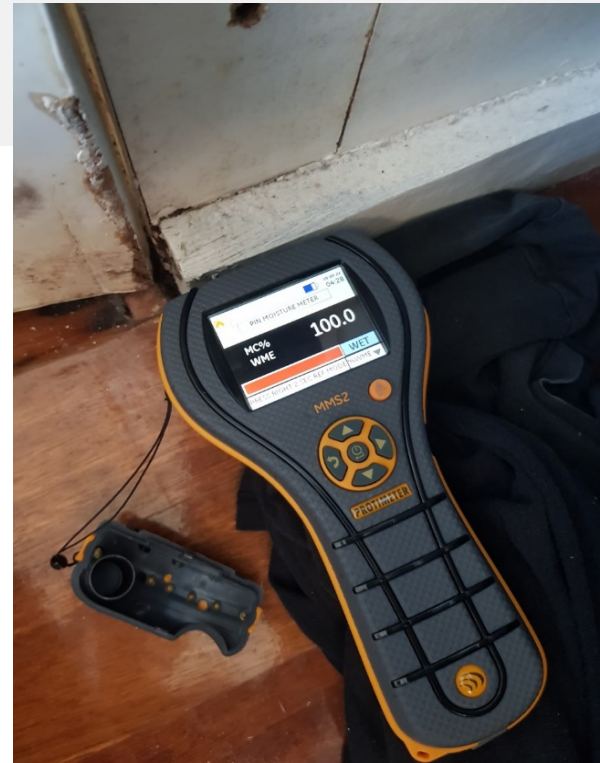
Night sweats, temperature dysregulation

**Respiratory:** sinusitis, cough, shortness of breath



# Case Study

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# Case Study

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# Case Study

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# Case Study

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# Standards

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Fail to consider:

- Mixture effects (synergism, additives.....)
- Timing and duration of exposure
- Transgenerational epigenetic effects
- Impact of diet and lifestyle
- Children's exposure levels
- Long term, low level exposure rates



# Improve Indoor Air Quality

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# Improve Indoor Air Quality

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Take shoes off

Use damp microfibre cloths



## PEACE LILY

I AM ONE OF FEW PLANTS THAT WILL RELIABLY BLOOM INDOORS

I EXCEL IN THE REMOVAL OF ALCOHOLS, ACETONE, TRICHLOROETHYLENE, BENZENE AND FORMALDEHYDE

I LIKE MY LEAVES WASHED OCCASIONALLY TO PREVENT INSECT ATTACK

I LIKE TO BE FED REGULARLY BUT DON'T NEED AS MUCH FOOD OR WATER IN WINTER

I ENJOY SITTING IN A SEMI-SUN TO SEMI-SHADE POSITION

MY ABILITY TO REMOVE INDOOR AIR POLLUTANTS AS WELL AS MY EXCELLENT ALL ROUND PERFORMANCE MAKES ME ONE OF THE BEST HOUSEPLANTS AVAILABLE



I HAVE A HIGH TRANSPIRATION RATE WHICH PRODUCES MOVEMENT OF AIR AND HELPS REMOVE TOXINS FROM THE INDOOR ENVIRONMENT

I AM EASY TO GROW AND MAINTAIN

I RELEASE PHYTOCHEMICALS THAT SUPPRESS MOULD SPORES AND BACTERIA IN THE AIR

Building Biology NSW

# Use a filter or be the filter

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**Somewhere inside all of us is  
the power to change the  
world.**

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*Roald Dahl*



# Get in touch

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**Email address**

[kelly@buildingbiologynsw.com.au](mailto:kelly@buildingbiologynsw.com.au)

**Phone number**

0402 857 555

Follow me on social media - @buildingbiologynsw