Indoor Environment Quality (IEQ)

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Creating homes and neighbourhoods that work well into the future and don't cost the Earth

What we have been working on:

- Unflued gas heaters value case
  - compilation of ‘fact bank’
  - spreading the facts
- Forced ventilation research
  - ventilation
  - monitored systems
  - Temperature and moisture analysis

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HSS IEQ benchmarks

HSS Benchmarks for Indoor Environment Quality	
Temperature	•Living room evening in winter >18°C •Bedroom overnight in winter >16°C
Relative humidity	•Living room evening in winter 40-70% •Bedroom overnight in winter 40-70% •Surface relative humidity <80% year round
Checklist	•Mechanical extract ventilation of kitchen, bathroom and laundry •Means to passively vent dwelling •No unflued gas heaters •No indoor clothes drying •Under-floor vapour barrier

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The problem

- ~1/3 of houses with unflued gas heaters
- Combustion emissions
  - Moisture and other nasties
  - Need for extra ventilation – fresh air
- Health issues
  - Asthma
  - 74,000 to 114,800 preventable school days absent per year

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The problem

- Fire risk
  - 6.2 fires per 100,000 cabinet heaters compared to 2.3 per 100,000 portable electric heaters
- Moisture issues
  - Mould
  - Increase in building maintenance
  - Extra energy for dehumidifiers

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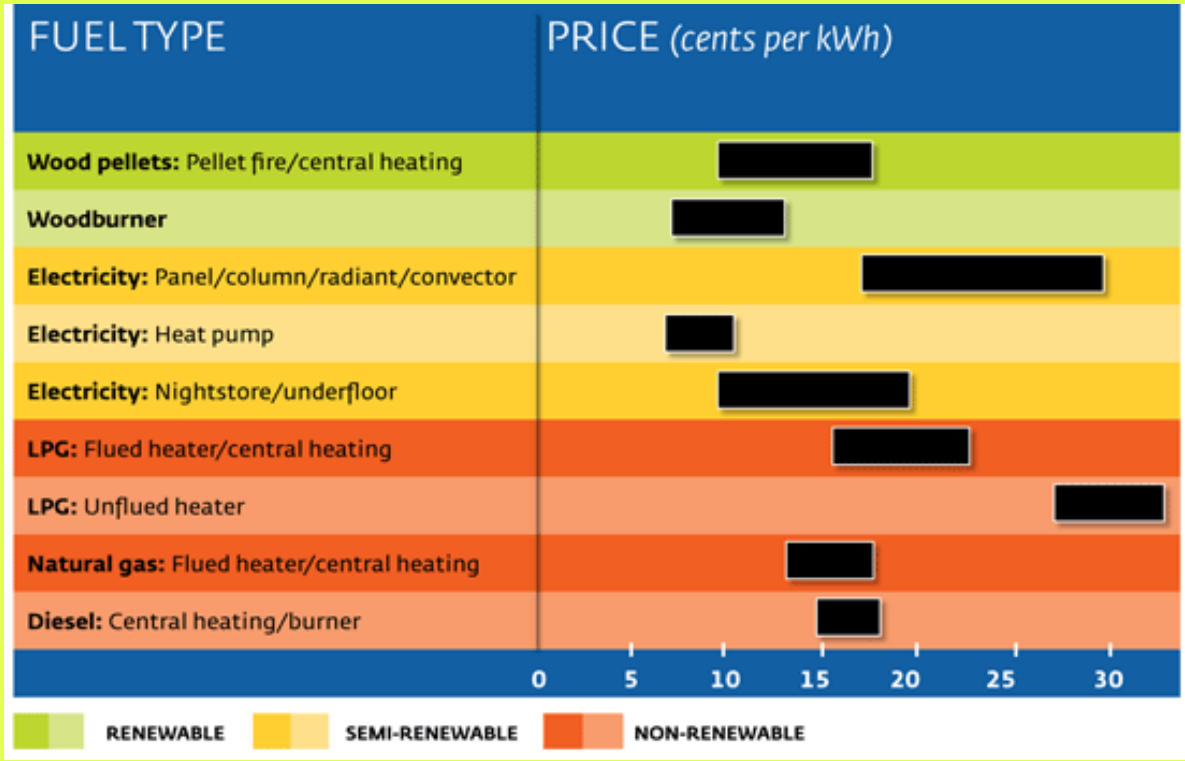
The problem

Extra costs



www.consumer.org.nz/reports/heating-options/fuel-prices-compared

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Raising awareness

- MED Review
- Industry engagement
  - PlaceMakers
  - The Warehouse
  - TradeMe
- Community based energy advi

groups

Forced air ventilation systems

- Increase in popularity
- Little research has been done
- Multiple examples in market

- Monitored case studie

Airtightness Categories

Type description	Base Infiltration [ac/h]	Building description
Airtight	0.3 ac/h	Post 1960 houses with a simple rectangular single story floor plan of less than 120 m^2 and airtight joinery (windows with airtight seals).
Average (BC requirement)	0.5 ac/h	Post 1960 houses of larger simple designs with airtight joinery. Building may be two stories
Leaky	0.7 ac/h	Post 1960 houses of more complex building shapes and unsealed windows.
Draughty	0.9 ac/h	All pre 1960's houses with timber strip flooring and unsealed timber windows.

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Airtightness Results

House	Age	Floor Area [m²]	Infiltration [airchanges/hour]	Classification
A	1900’s	97	0.88	Draughty
B	1930’s	121	0.75	Draughty
C	1950’s	102	1.10	Draughty
D	1950’s	92	1.24	Draughty
E	1960's	164	0.52	Average
F	1930’s	113	1.03	Draughty
G	1950’s	125	1.27	Draughty
H	1950’s	107	1.08	Draughty

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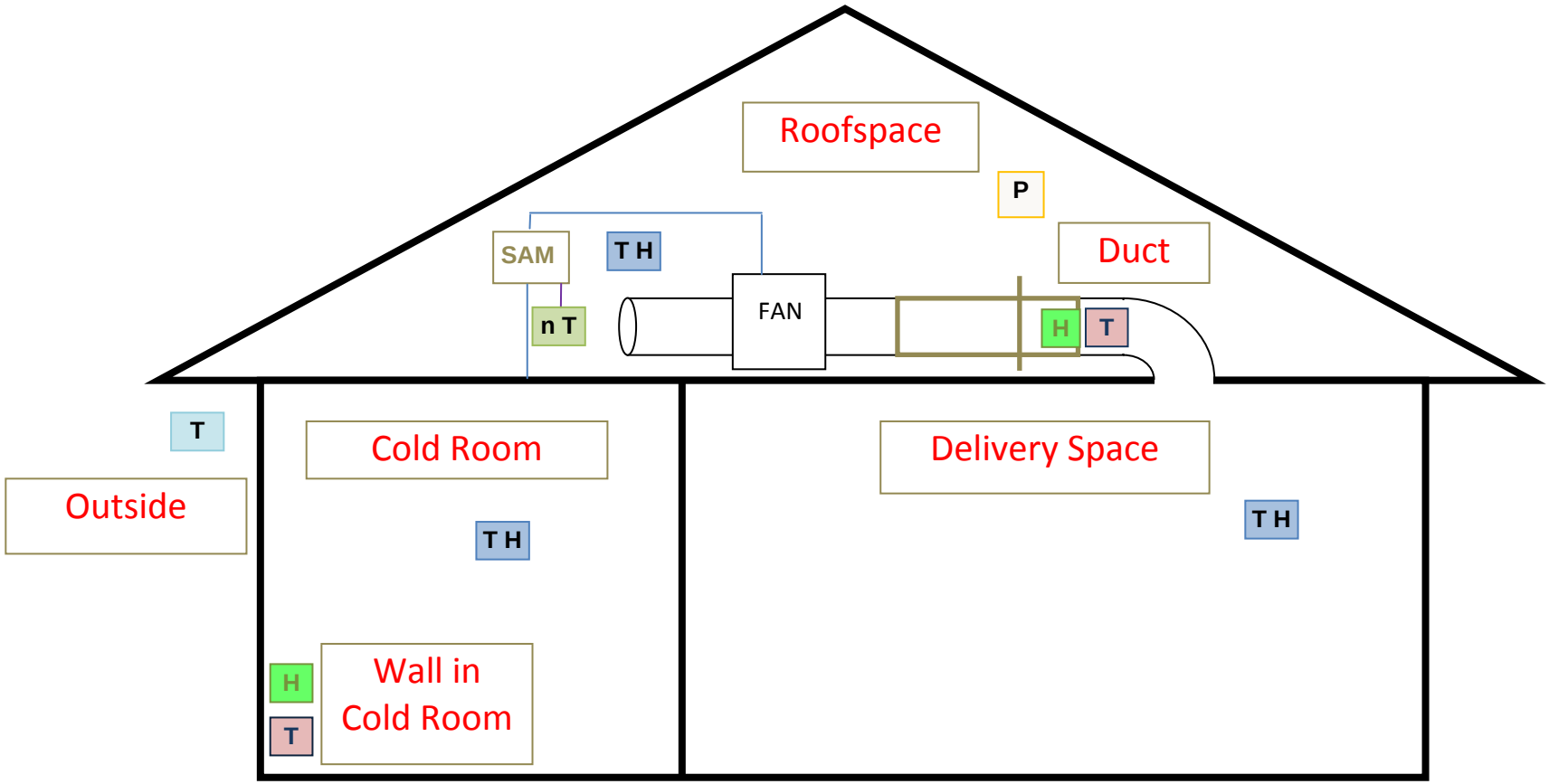
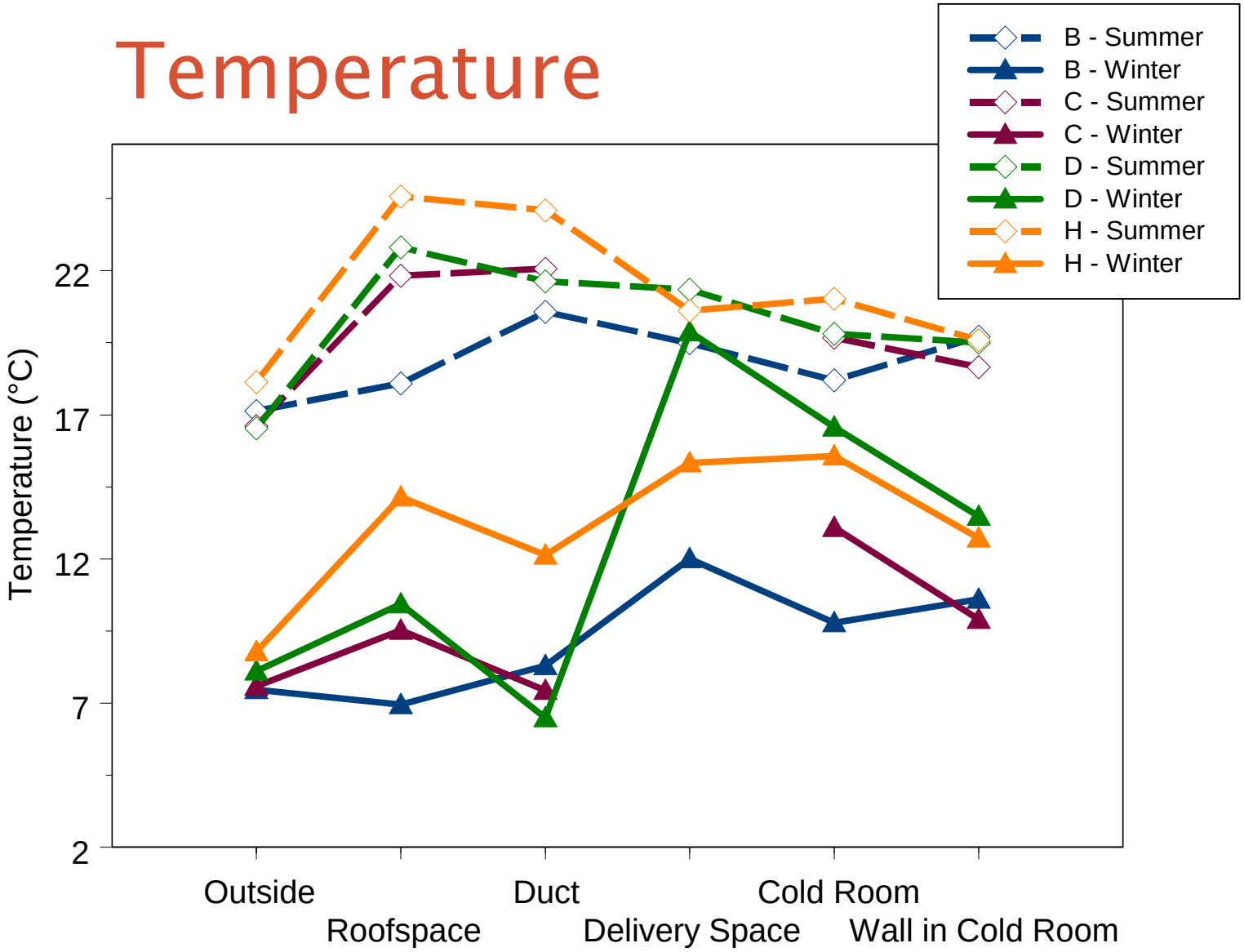
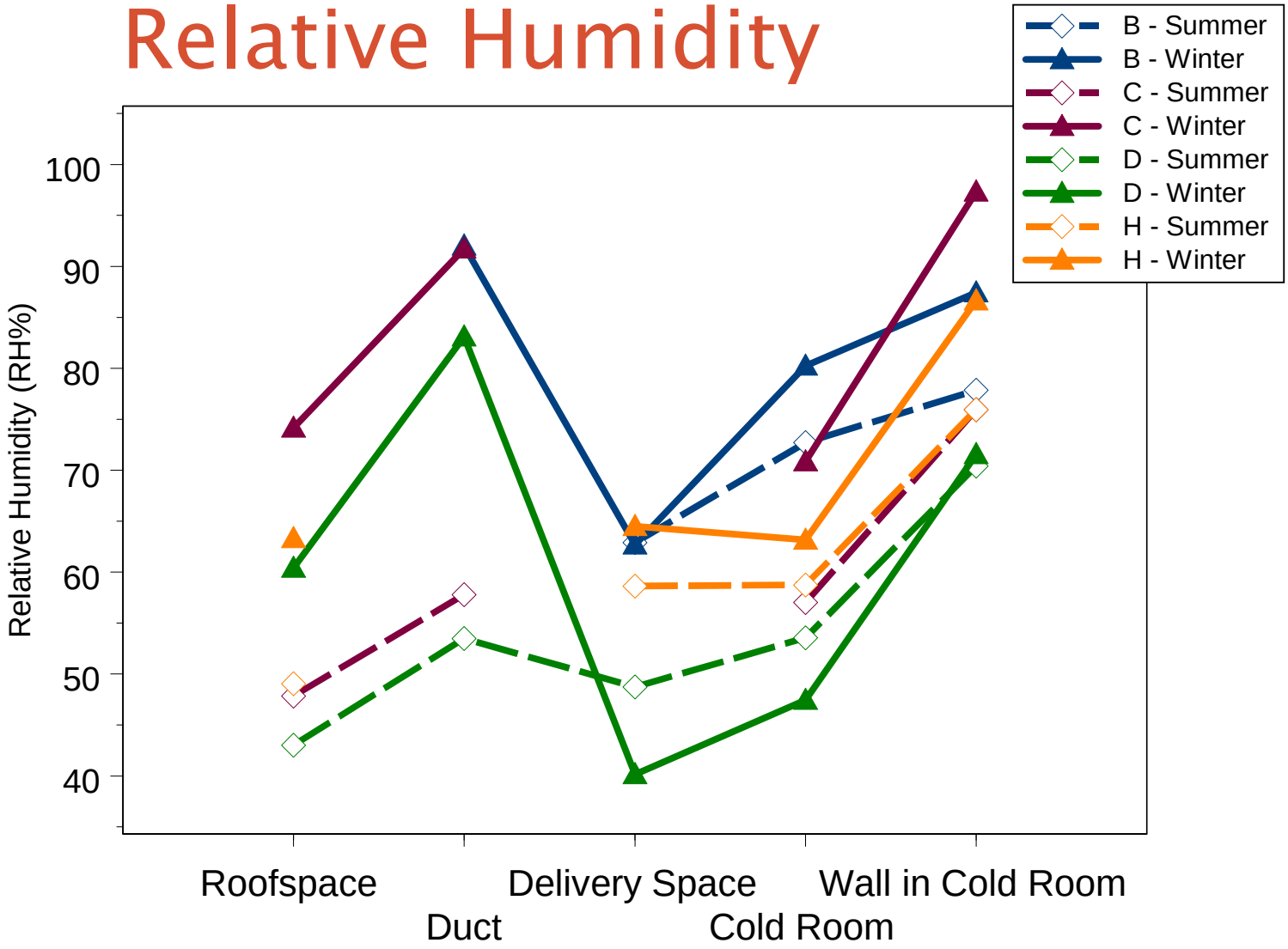
Measurement Locations



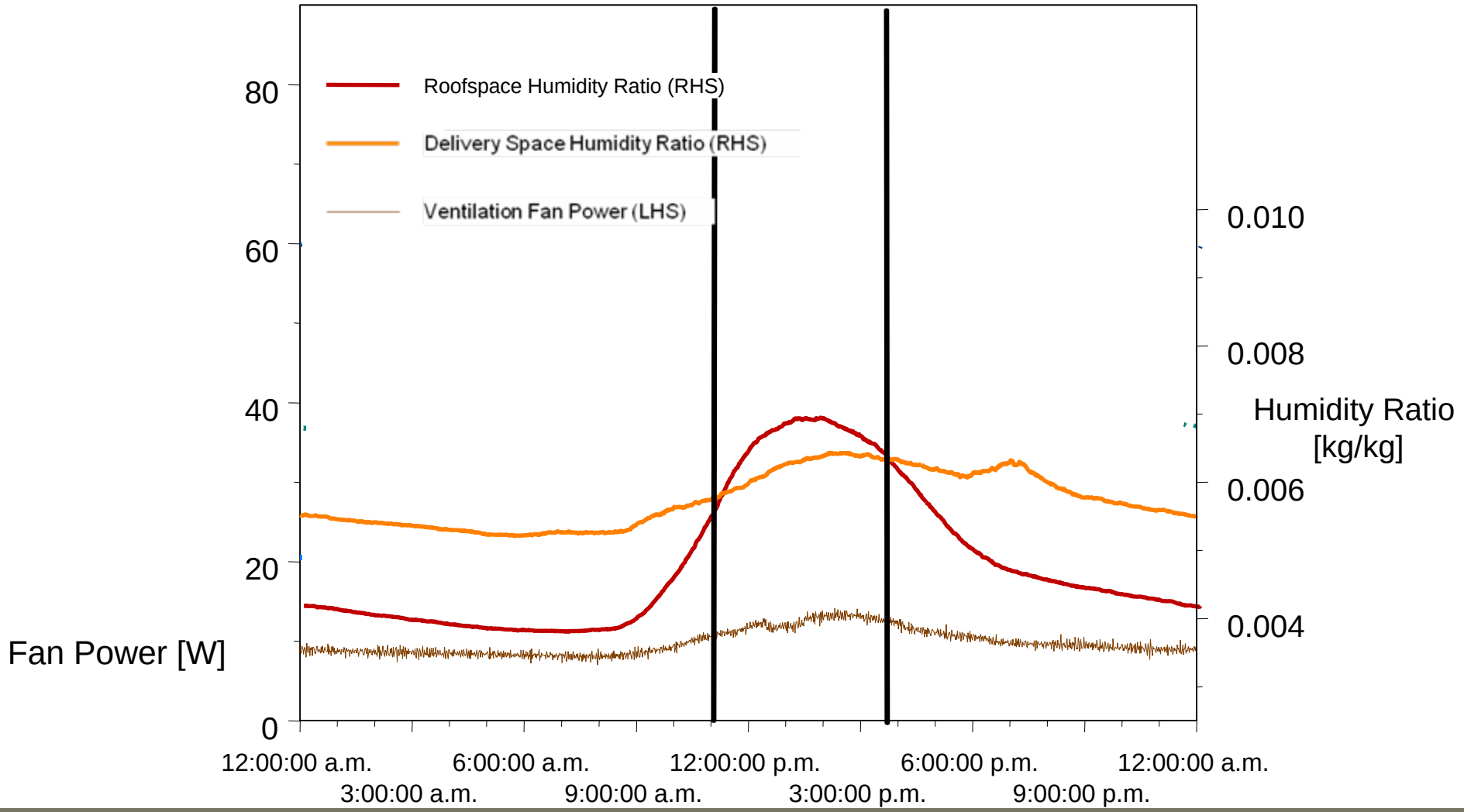
Temperature



Relative Humidity



House B Winter time of day



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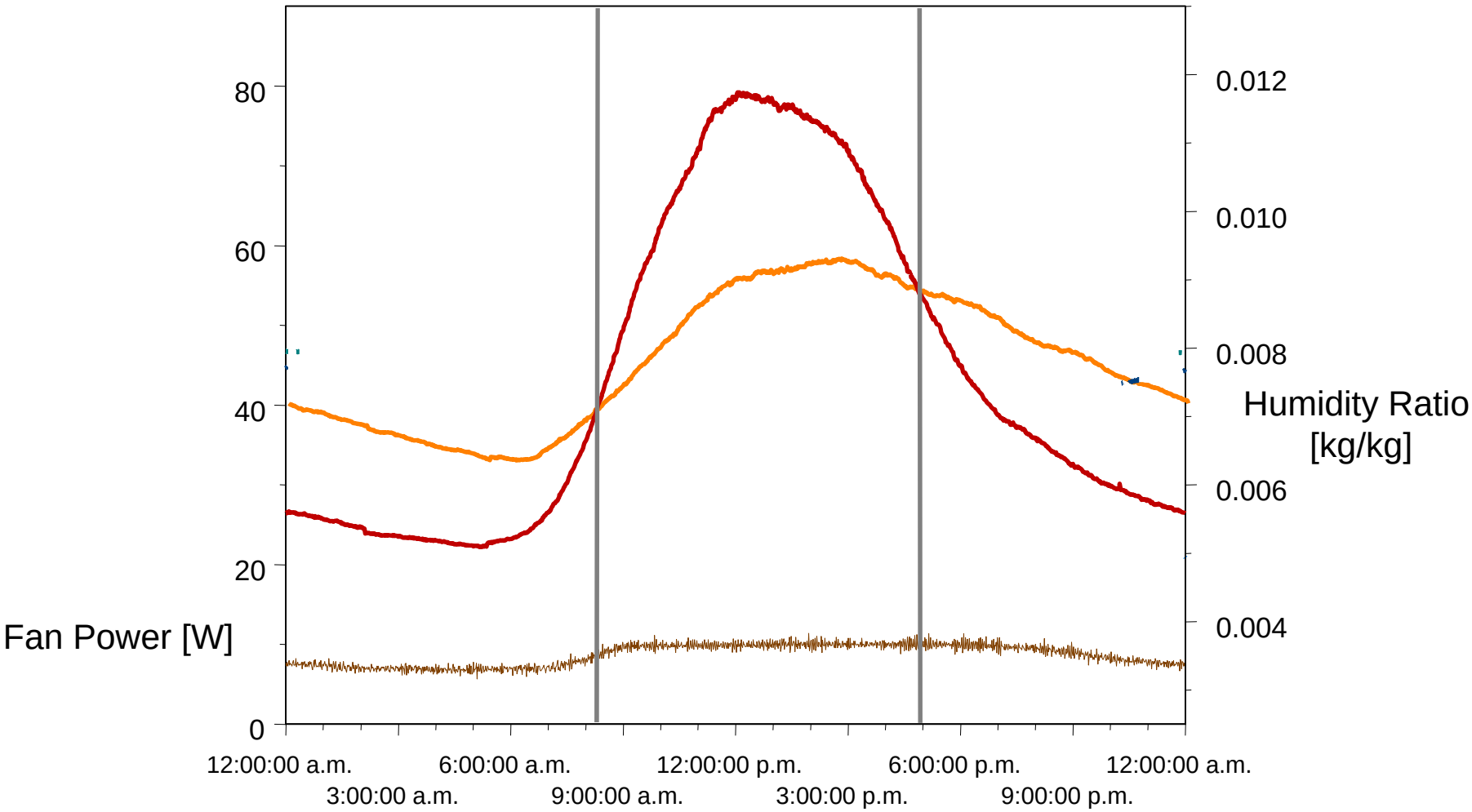
House B Summer time of day



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Conclusions

- Moisture problem arise for a number of reasons
  - Poor moisture control
  - Poor thermal envelope
  - Under heating
  - Poor ventilation - these houses were already well ventilated
- Roof space has higher amounts of moisture (daytime) and colder temperatures(night time) than the house
- Fan is controlled by temperature not moisture