

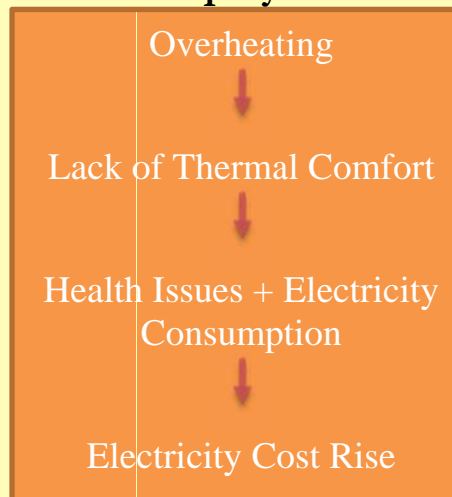
Research Question

- How can the level of thermal comfort be evaluated?
- How can thermal comfort be improved during heatwaves in various zones of a house?
- What passive/hybrid systems can be employed?

- Investigate the importance of passive/hybrid systems to improve thermal comfort in the top-floor.
- Use **CFD FloVent DesignBuilder** modelling to study the temperature and airflow in the rooms of a house.
- Data are available of the **Lochiel Park** detailed monitored houses as case study.

- **The top-floor is significantly more affected by heat events than the low-floor. Consequently, during heat events:**
 - **Top-floor has remarkable temperature fluctuation.**
 - **Top-floor air temperature is well above the acceptable thermal comfort threshold that makes it unusable for the residents.**

- **There is a serious need for evaluating thermal comfort of a dwelling in addition to the energy rating.**

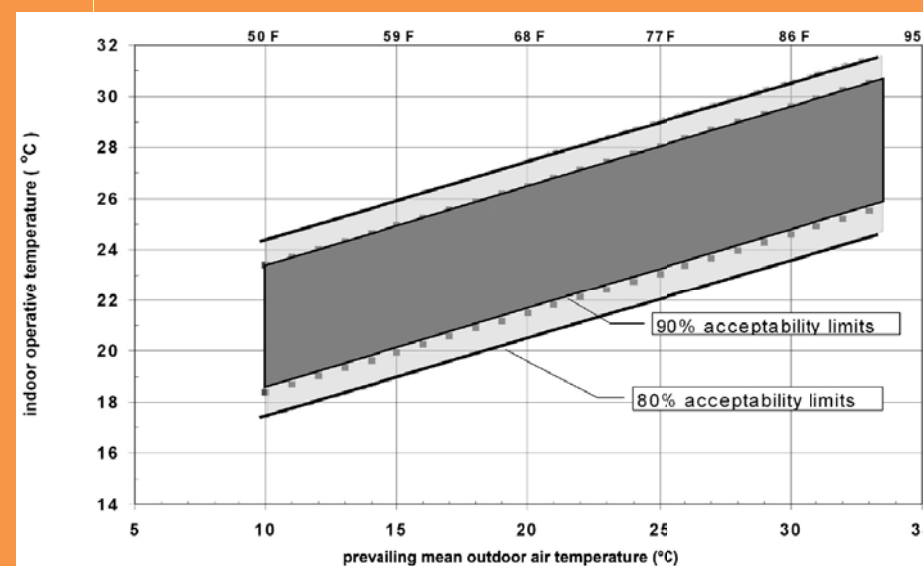


Impacts of Overheating

Methodology

- Develop a parameter to evaluate thermal comfort based on **Adaptive Thermal Comfort** and **Adaptive Predict Mean Vote**.
- Use **AccuRateSustainability** to model comfort level in various part of a house.

Adaptive Predict Mean Vote + Adaptive Thermal Comfort

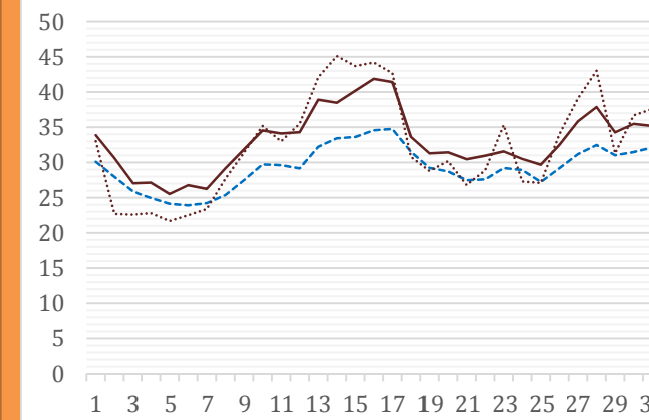


Integration of two field-study method

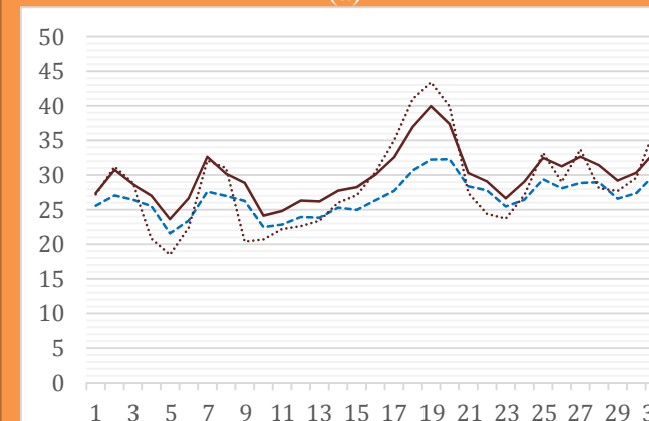
Results and Conclusions

Analysing the data of Lochiel Park shows that:

- **Most of the days in a year the top-floor is warmer than low-floor with a maximum 8 °C difference.**



(a)



(b)

Temperature variation during weather events
 Maximum daily air temperature (°C)
 ---- Ground floor maximum daily temperature (°C)
 — Bedroom upstairs maximum daily temperature (°C)

Anticipated impacts

- Introduce a method to evaluate, rate and report the thermal comfort in a home.
- Provide healthier, more liveable and energy-efficient environment

Key statement

Improving Thermal comfort in top-floor is the matter of health, energy-efficiency and quality.

Contact



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