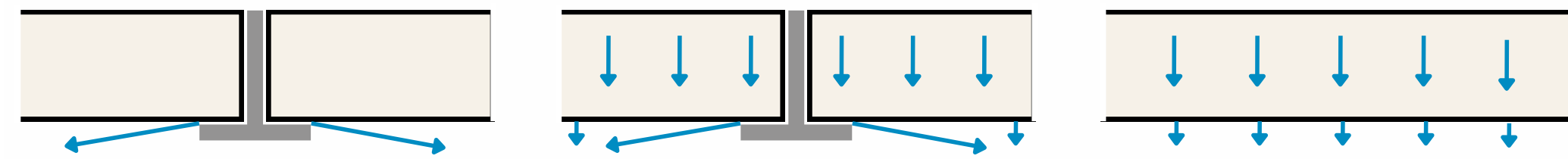


A Configuration tool for diffuse ceiling ventilation

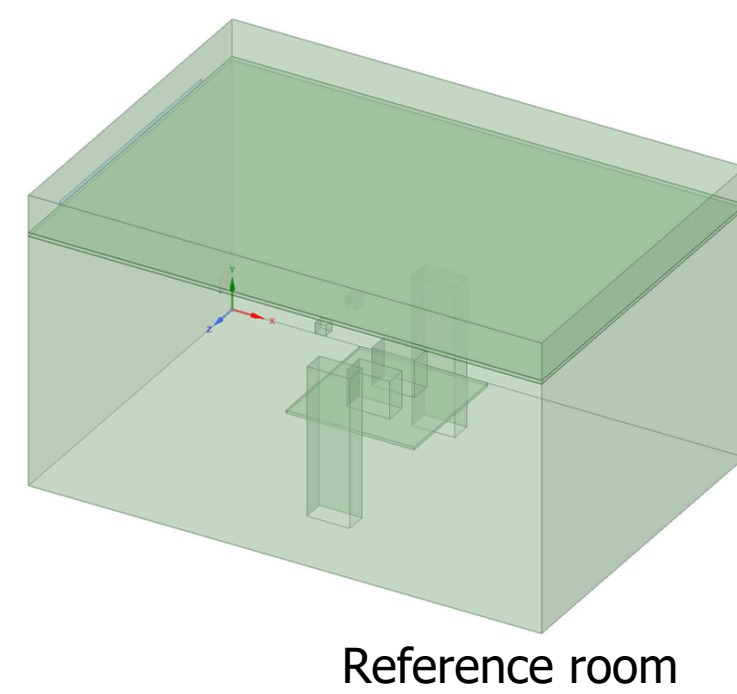
Air paths through the suspended ceiling



In DCV, the air can have different paths through the suspended ceiling. It can either be through slots and/or perforations in the ceiling slab.

Geometry

Other studies showed that geometry affects DCV performance, with higher ceilings and longer rooms reducing cooling capacity and increasing draught risk.



Reference room

Exhaust

Exhaust placement affects DCV performance, with high exhausts improving cooling and low exhausts benefiting heating.

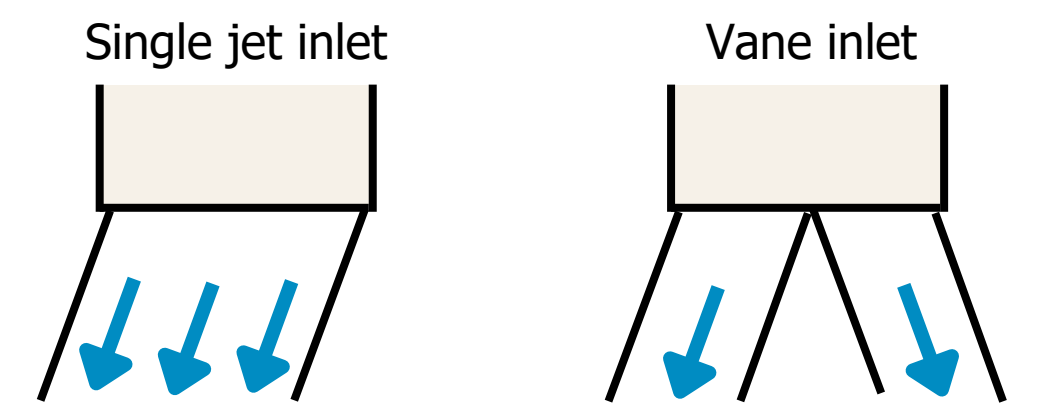
Panels

Active panel number and placement strongly affect DCV cooling efficiency, with fewer, compactly arranged panels performing best when not placed directly above heat sources.

Plenum

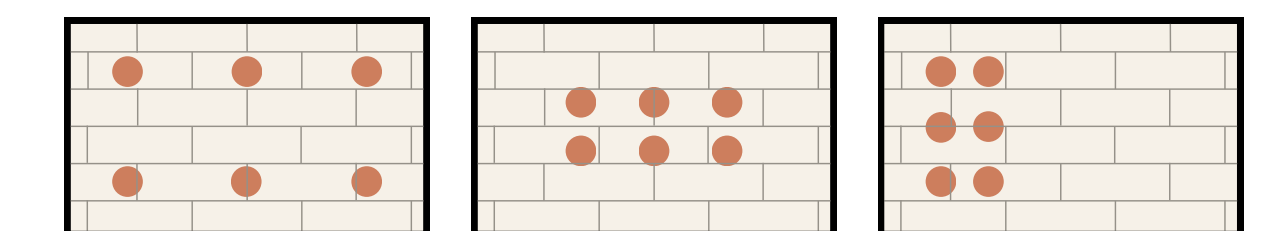
Low plenum heights can increase draught risk and lead to uneven air distribution in DCV systems.

Inlet



Inlet configuration significantly affects air distribution in the plenum, with vane inlets improving uniformity and reducing temperature variation.

Heat source placement



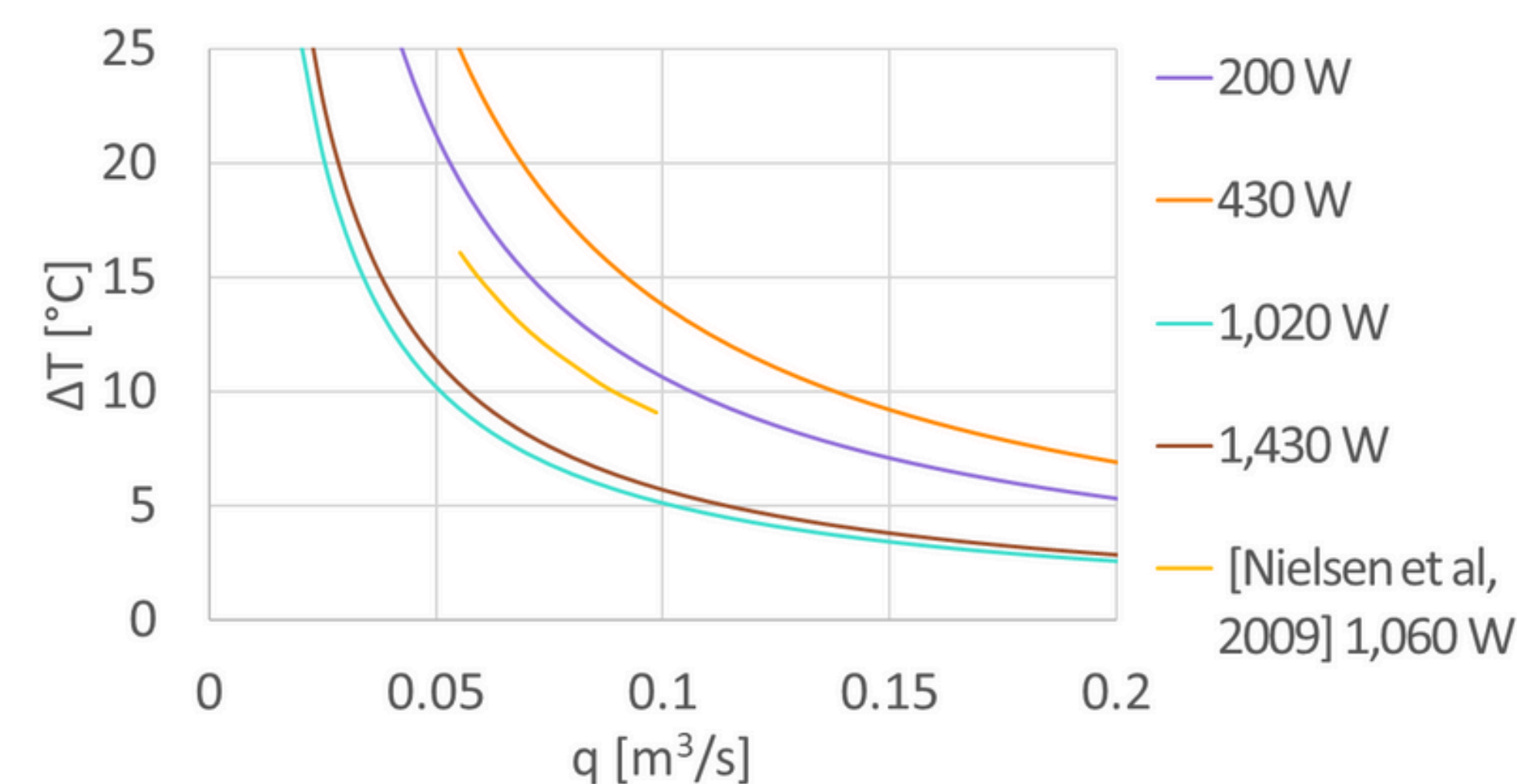
Heat sources play a crucial role in the mixing of air within a room with DCV. Evenly distributed heat sources reduce the risk of draught, where uneven distribution can cause unstable airflows.

Draught rate

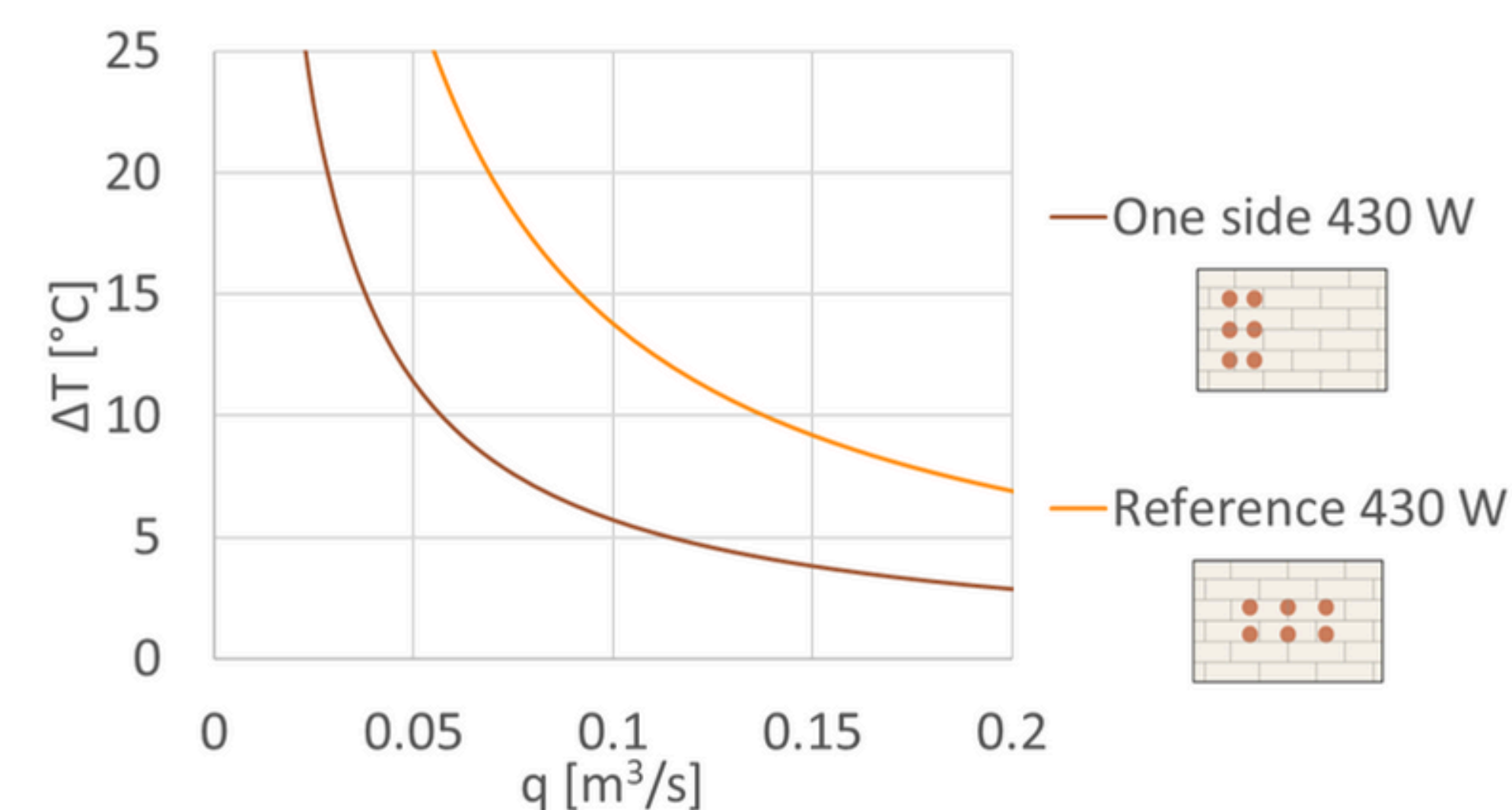
DCV generally ensures low draught rates, even at high temperature differences and low inlet temperatures.

Investigation results

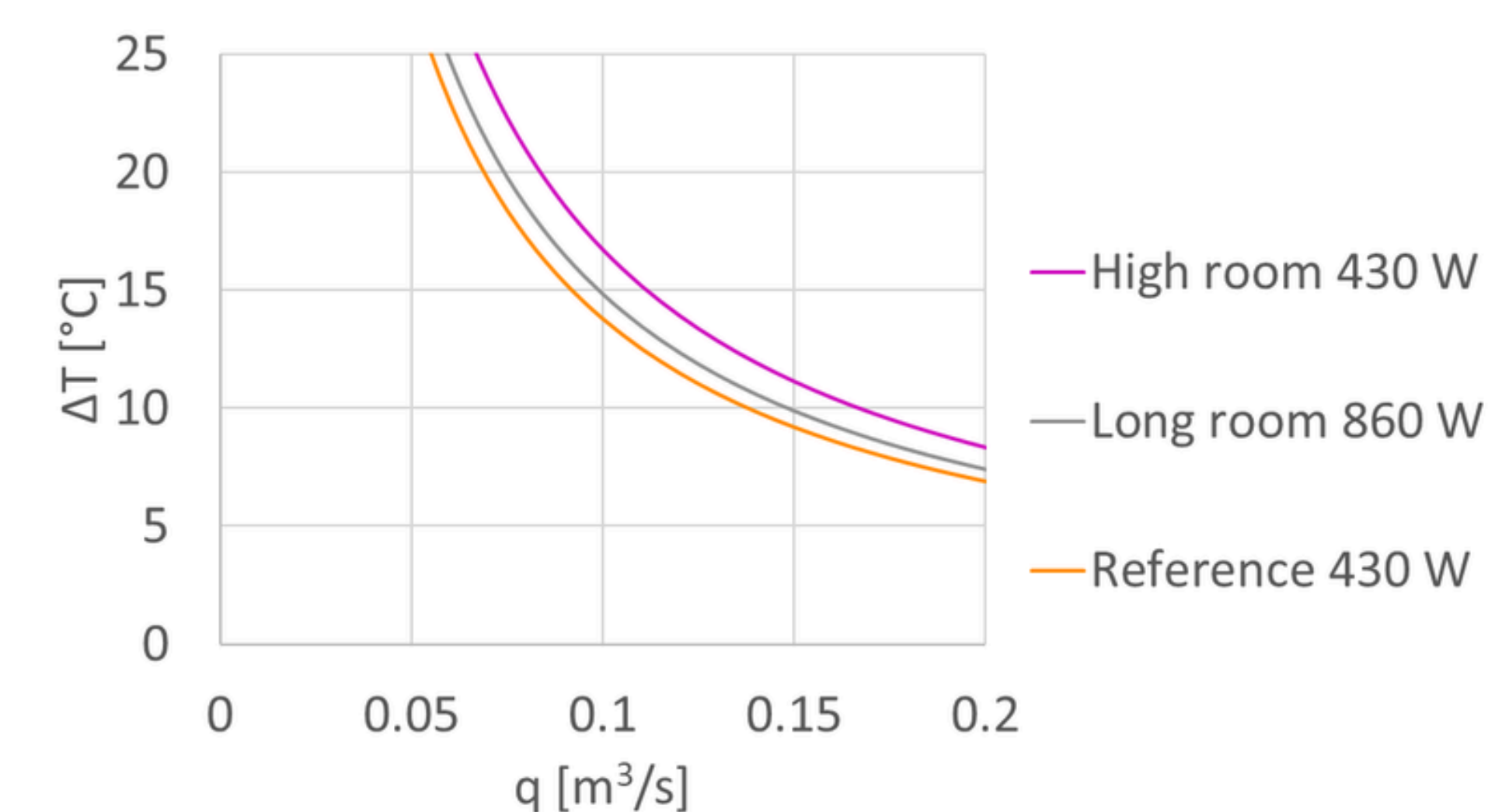
A numerical analysis of different parameters was conducted, and the results were converted into design charts indicating the system's cooling capacity under conditions that maintained occupant comfort.



Different heat load intensities are compared in the reference room. The highest cooling performance is present in the 430 W scenario.

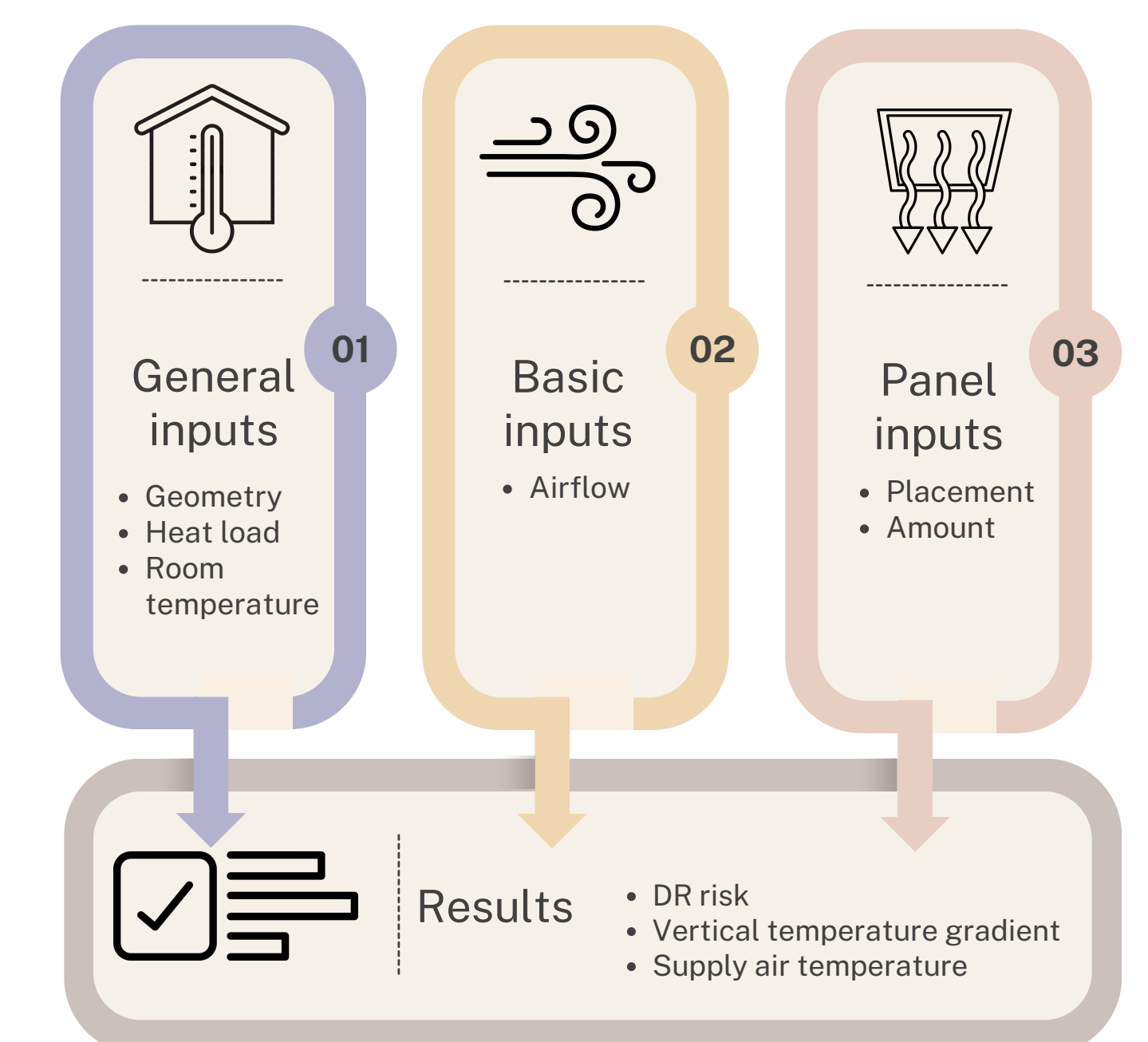


Heat load distribution was compared, both with a heat load intensity of 430 W. The centred distribution has a higher cooling capacity compared to the one-sided heat load.



Room geometry was varied by changing height and length in separate models, compared to the reference room. Room geometry does not seem to influence the performance. This is inconsistent with the literature, likely due to uncertainties.

Configuration tool



The configuration tool is a prototype that will use design charts to evaluate DCV performance.