# Integrating daylighting, window view, and temperature – design of fenestration in buildings

Windows are an essential aspect of building facades. Their design influences how occupants experience buildings. Window features affect the solar heat gain, daylight access, view out, and temperature - all factors that define the indoor environment. Indoor lighting and temperature have been linked to occupants' health, comfort, and academic or work performance. Thus, proper design of fenestration will benefit the indoor environment and occupant well-being and performance.

Recent research discovered that visual and thermal stimuli have interactive physiological and psychological pathways, triggered by the response to light of the eye. Also, studies in architecture and engineering demonstrated positive effects on people's comfort and work performance of the interaction between indoor lighting and thermal conditions.

Until now, most studies used only artificial light to investigate occupant responses to the interaction between lighting and temperature. Furthermore, we know only little about this interaction when combined with a view to the outside. This knowledge gap has motivated the current study with which we aim to integrate the impact on occupant responses of daylighting, window view, and temperature. We need a better understanding of how we can alleviate thermal discomfort by ameliorating visual comfort when changing window glass properties. This could lead to a reduction in energy used for heating and ventilation.

During fall 2022, we will examine the effects of different window glazing, temperatures, and views on people. Experiments will occur in dedicated offices at the Technical University of Denmark. The study participants will be exposed to controlled visual and thermal stimuli during which we will monitor their physiological responses through wearable devices. Subjective assessments of the visual and thermal environment and participants' performance will be collected through questionnaires and validated tests.

We aim to develop models to understand and predict visual and thermal perception, performance and well-being and the interactions between visual and thermal indoor environment domains. The study outcome will address the construction industry, from producers of building components to building designers. We expect that the developed models will offer valuable input for the design of buildings, facades, air-conditioning, and smart lighting systems that meet people's indoor environment needs at low energy use.