



INTELLIGENT FACADE SYSTEMS

- A CONCEPT STUDY -

Objectives

This project aimed to develop a concept and a prototype of a facade system suitable for renovation under occupation. The developed facade system should be applicable to a number of different types of building structures. The design concept considered four main parts: Architecture, Structure, Energy and Control.

The concept was designed to be applicable for three main renovation scenarios:

- Complete replacement of facade,
- Additional skin added to façade incl. 'window interface'.

Approach

Key elements of the concept:

- (1) Modular and Autonomous.**
 - Single zone approach w. decentralised zone control.
- (2) Compact and Integrated:**
 - Integrated control features.
 - Integrated harvesting and storage of (renewable) energy.
- (3) Prefabricated.**

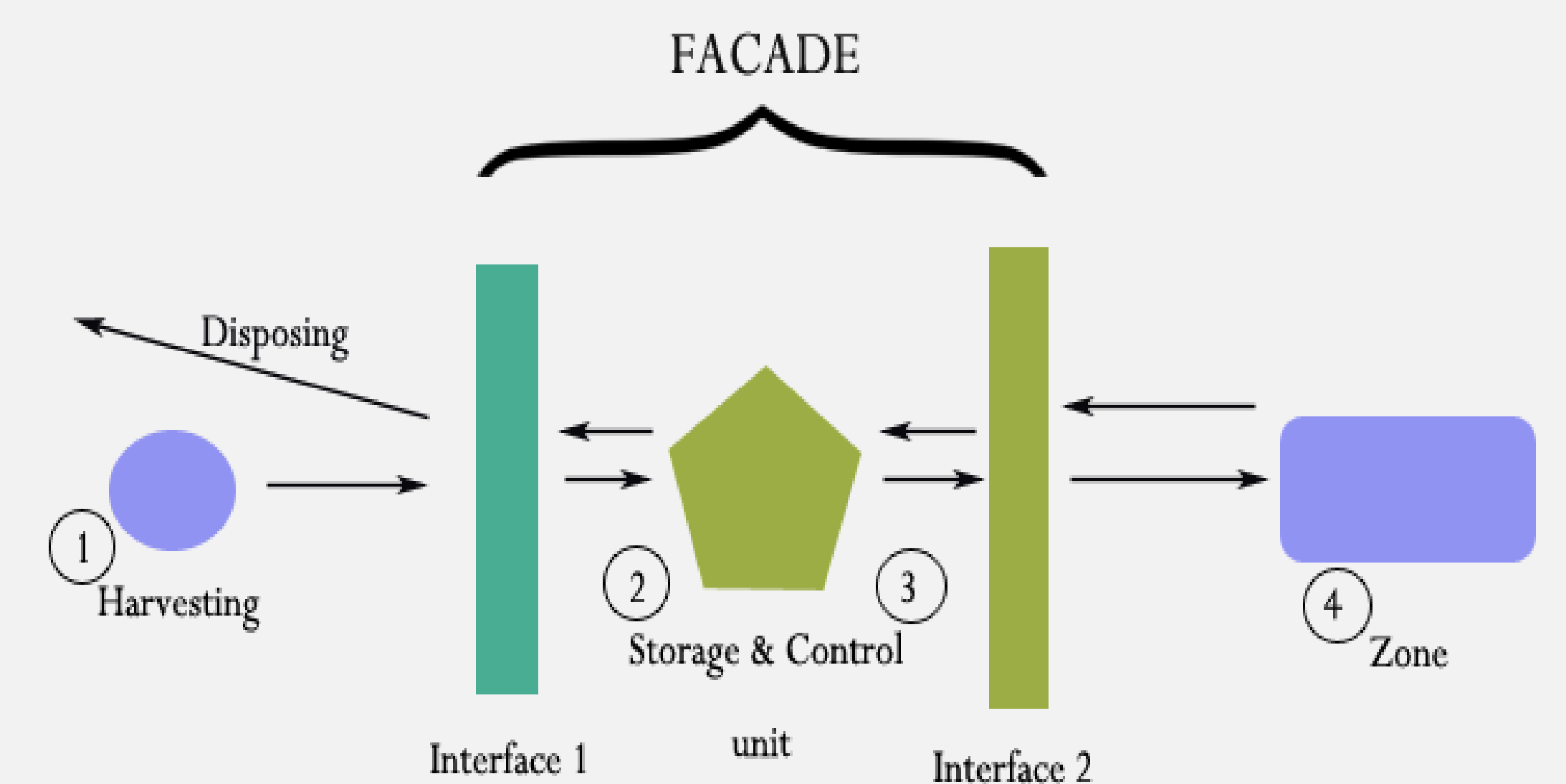


Figure 1: General design concept.

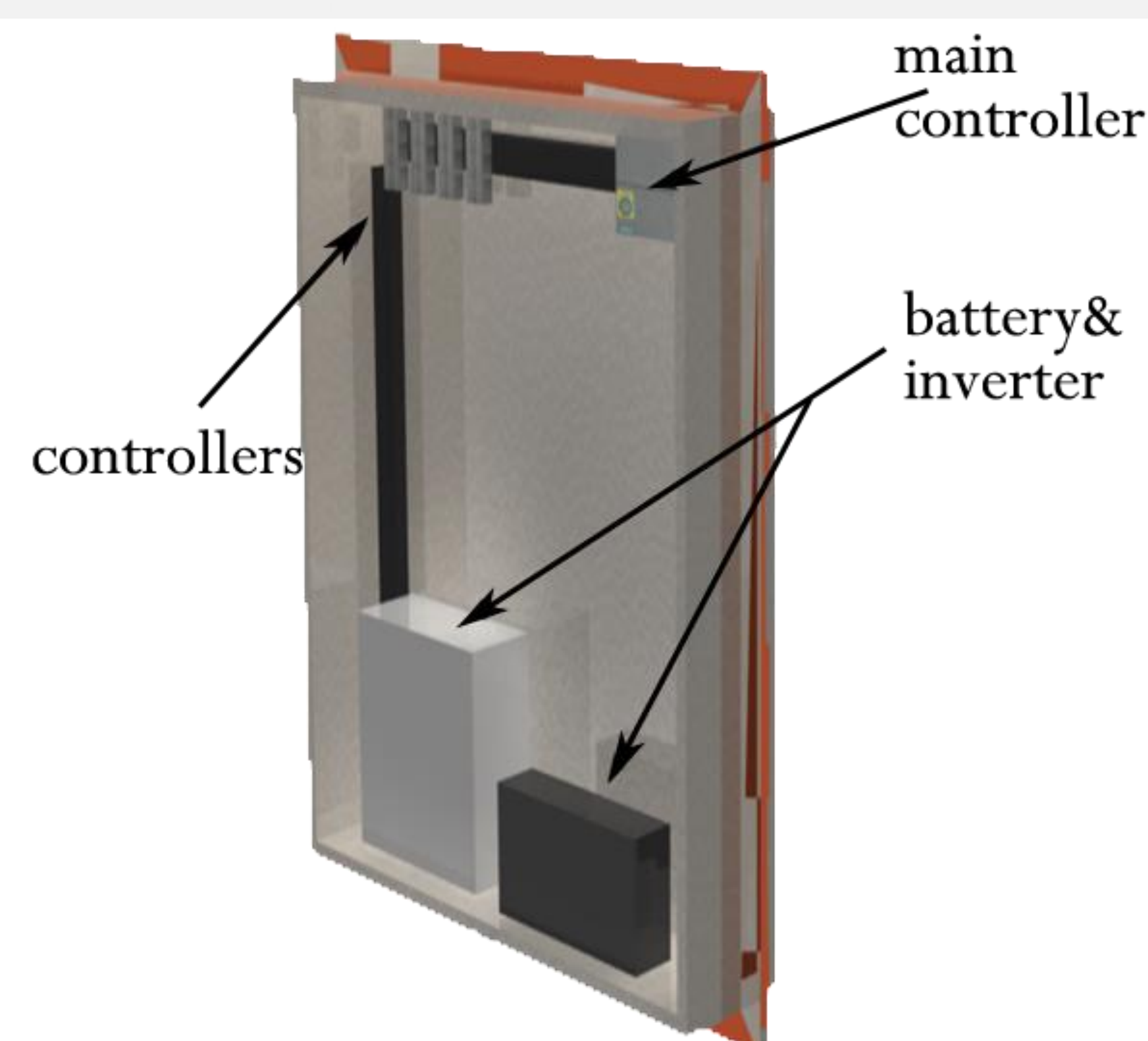


Figure 2: Panel with storage and control unit.

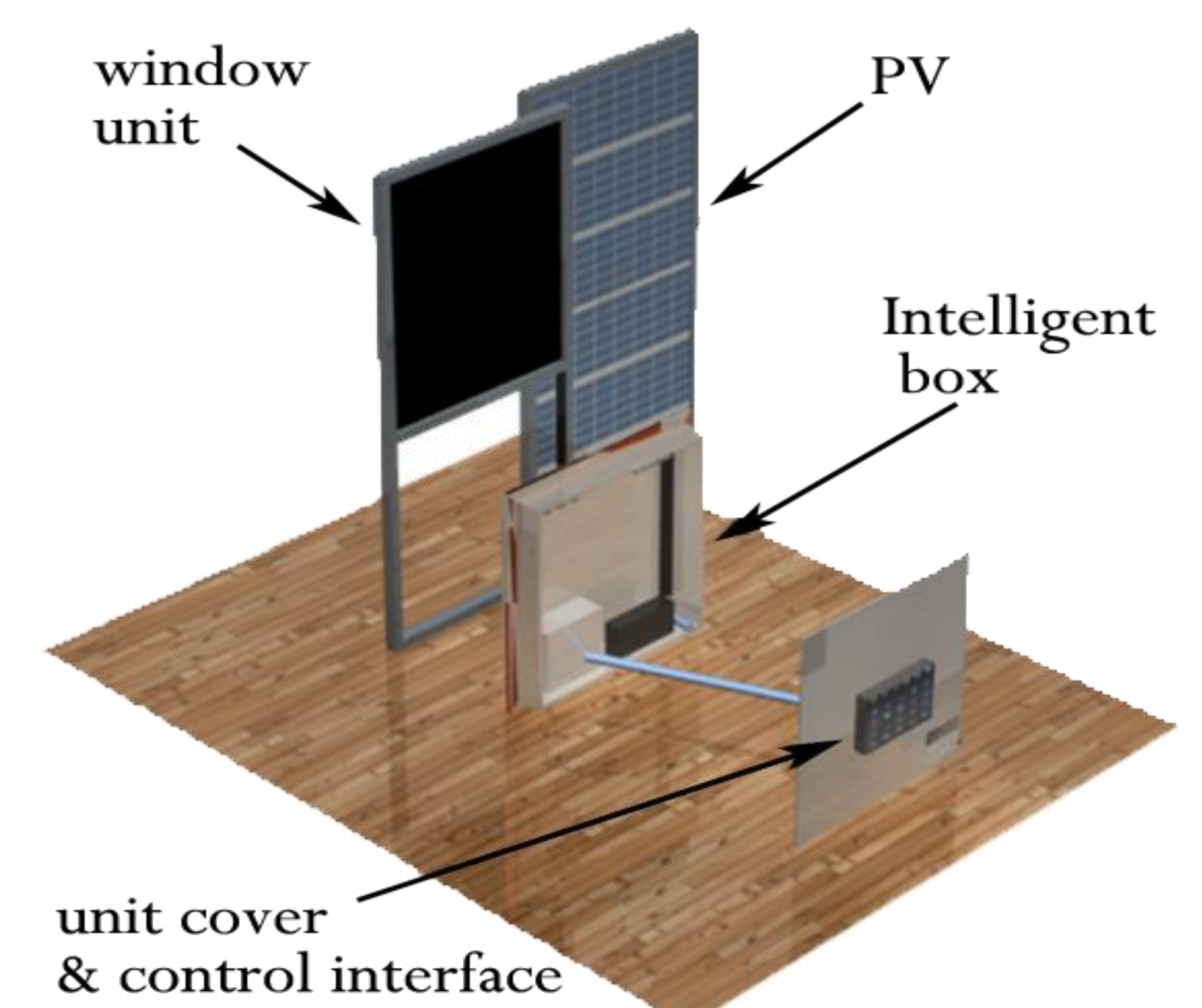


Figure 3: Panel combination w. alternative functionalities.

Case Study

- Details of the case study:
- CEE-building (inaugurated in 1910)
 - South facing computer lab selected as case study
 - Photovoltaic modules deployed on the south facade connected to the building through window interface.
 - New lab layout to allow better energy usage and reduce maintenance cost in this zone,
 - Existing lighting replaced with LED lighting.

The following parameters were studied:

- Room occupancy,
- Lighting conditions,
- Estimated solar radiation levels,
- Estimated energy generation from the PV panels,

Simulation results prove that:

- Five solar panels are sufficient to provide electricity to offset the power demand for lighting in the lab, i.e. power generated by PV-panels will be sufficient to cover LED lighting demand (except f. weeks 1-9 & 42 – 52).

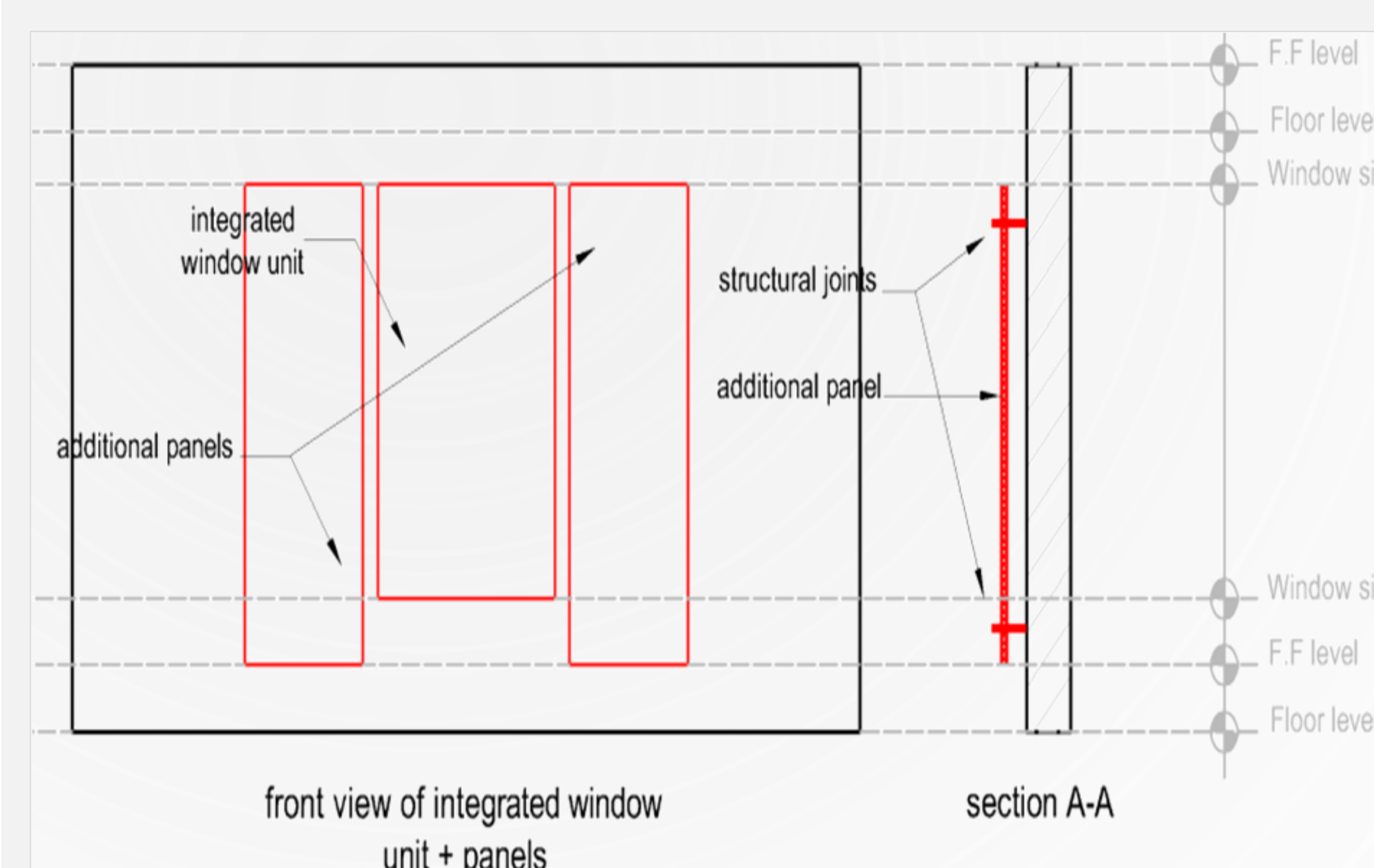


Figure 4: Elevation & section view after panel installation

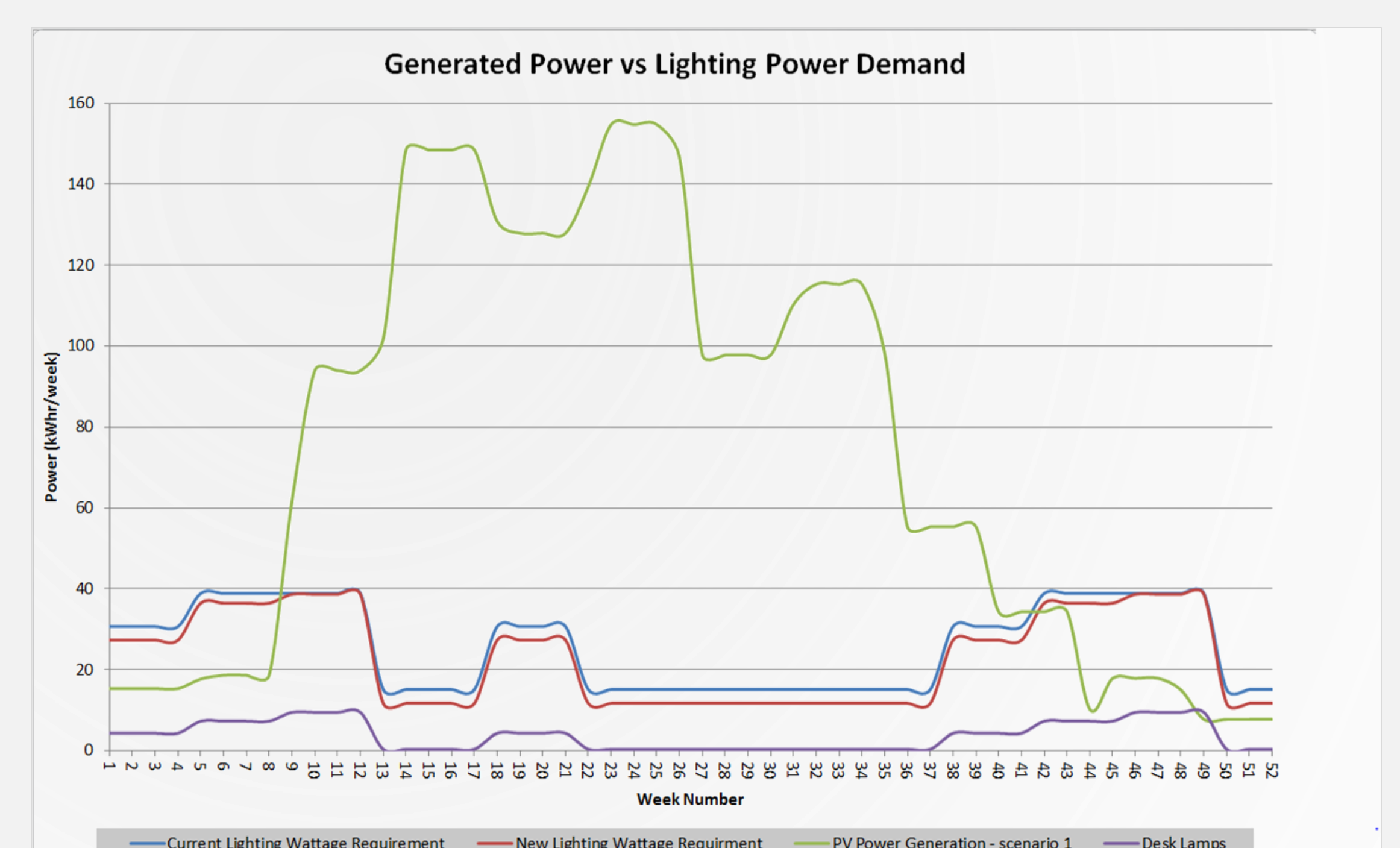
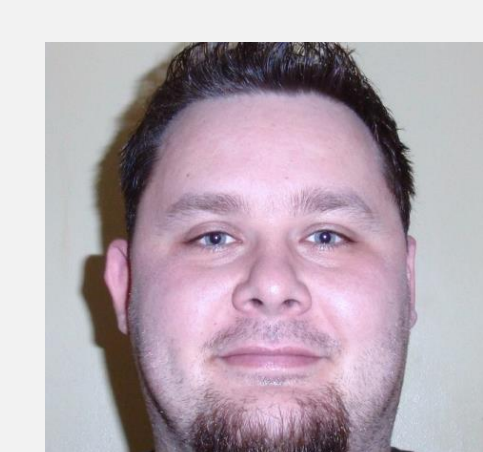


Figure 6 Electricity demand and supply for room CE108

Contact

IRUSE Researcher:
Dr. Michal Otreba (MScEng, Inz)
2.12, Western Gateway Building,
Western Rd.,
Cork, Ireland



Mentor:
Prof. Karsten Menzel
University College Cork
Informatics Research Unit f. Sustainable Eng.
Cork, Ireland
k.menzel@ucc.ie

