ZEB Living lab: en bolig og seks ulike husholdninger

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Innhold

- ZEB Living lab
- Beboereksperimentet
- Historier
- Energibruk
- Konklusjoner?

Hva er en Living Lab?

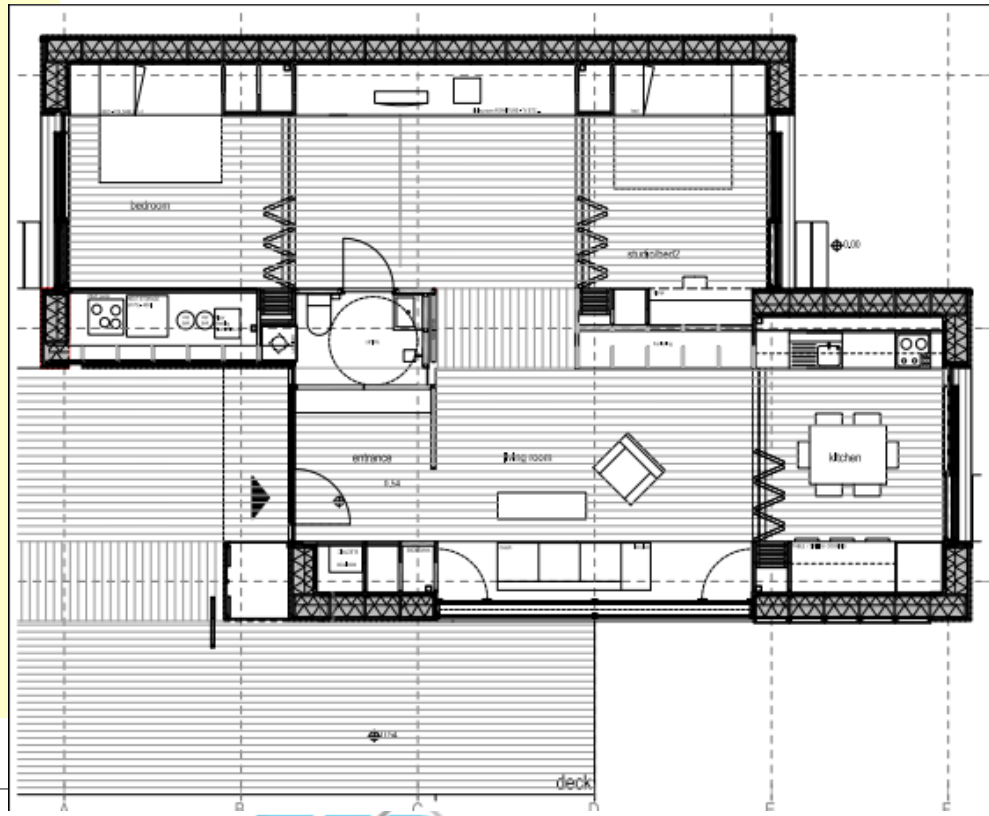
William Mitchell, MiT, 1980's: a user centered method for prototyping and validating complex solutions in what was intended to be as natural a user environment as possible, **"*a real-life context*"** (Cruz-Cunha, et al. 2009).

- Living Labs are often used as a method to achieve or understand innovation processes.

- They may be understood as an environment where interaction between humans and technology may take place.

ZEB Living Lab, Trondheim

- 100 m² living area
- ZEB-OM (Operation and Materials)
- Building integrated photovoltaics: 80 m²
- Solar panel in the facade
- Ground to water heat pump
- Heat recovery system (Flexit)
- PCM in the roof (DuPont)
- VIP in sliding doors (NorDan)
- Reflective vapor barrier (Isola)
- Mixed mode ventilation (Sapa, VELUX, and Caverion)
- LED Lights (NorDesign)



Beboereksperimentet – demografien

- 155 applied to live in Living Lab
- 3 demographic groups
- 6 residential groups, 25 days/ group

Qualitative methods

12.October-06. November	09.November 04.December	4.January-29.January	1.February-26.February	27.February-23.March	28.March-23.April
Student	Student	Family with children	Older couple	Family with children	Older couple

Group #	1	2	3	4	5	6
Category	Student	Student	Family with children	Elderly	Family with children	Elderly
Details	Male and female couple, 22 years old. Live in a 52 m2 student apartment.	Two female friends, 20 and 21 years old. Live in a shared apartment together with three other girls, built 1905.	Mother 31 years old and father 36. Son 6 years old and daughter 2. Live in an attached house of 185m2, built 2007	Husband 81 and wife 68. Live in a detached house of 170 m2.	Mother 31 years old and father 37. Two daughters of 3 and 2 years old. Live in a detached house of 135 m2.	Husband 61 and wife 56. Live in a detached house of about 120 m2.

Fig. 1. Støylen Korsnes, M. 2016

Mål: To explore the interaction between the house (which is designed to be a zero emission building) and different occupants

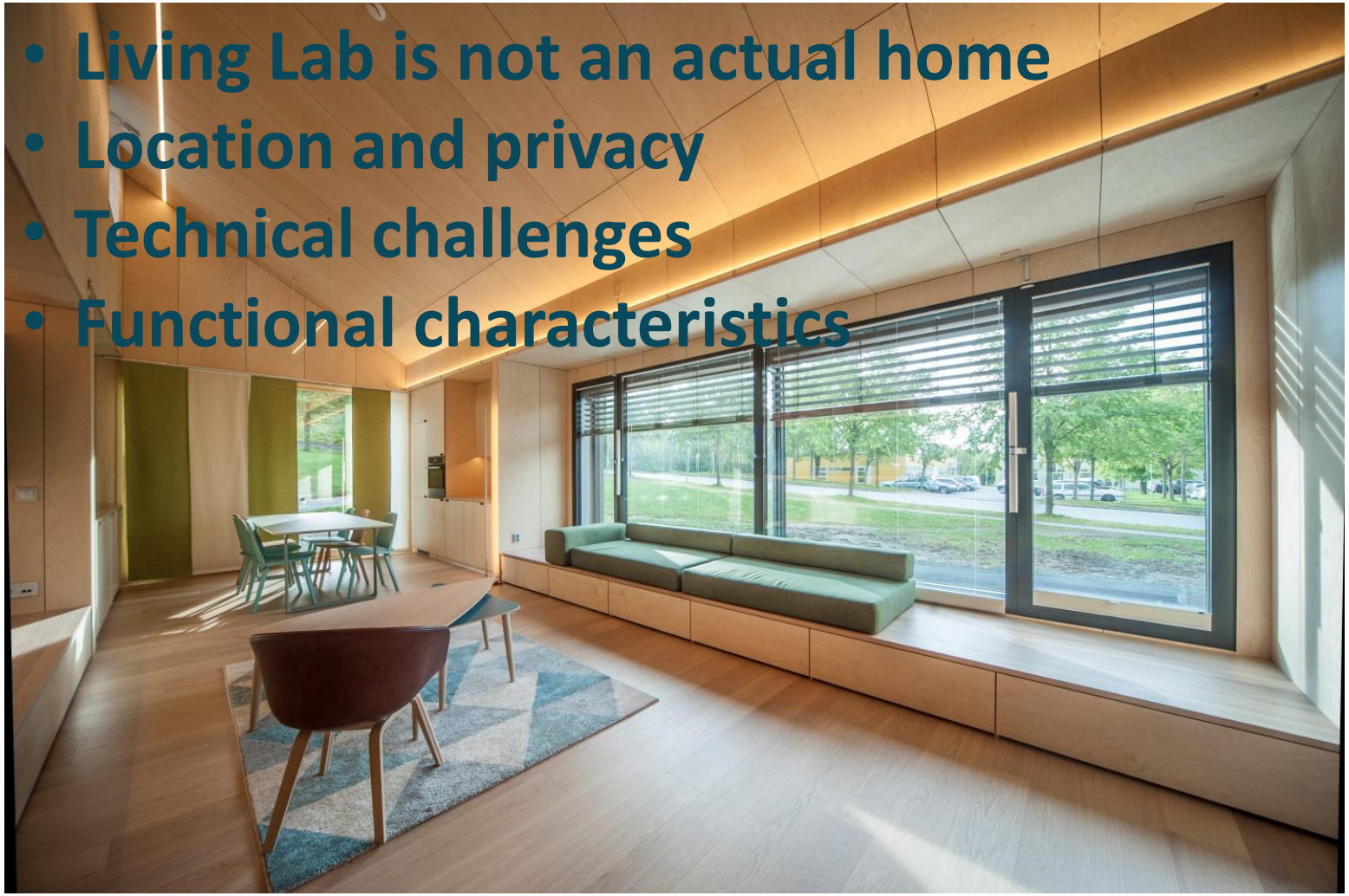
Defined:

- The equipment included in Living Lab
- How much influence residents had on the technical system
- What the residents were encouraged to bring with them
- How the residents were involved in data collection

- Residents were asked to continue with the same routines that they had in their own homes.

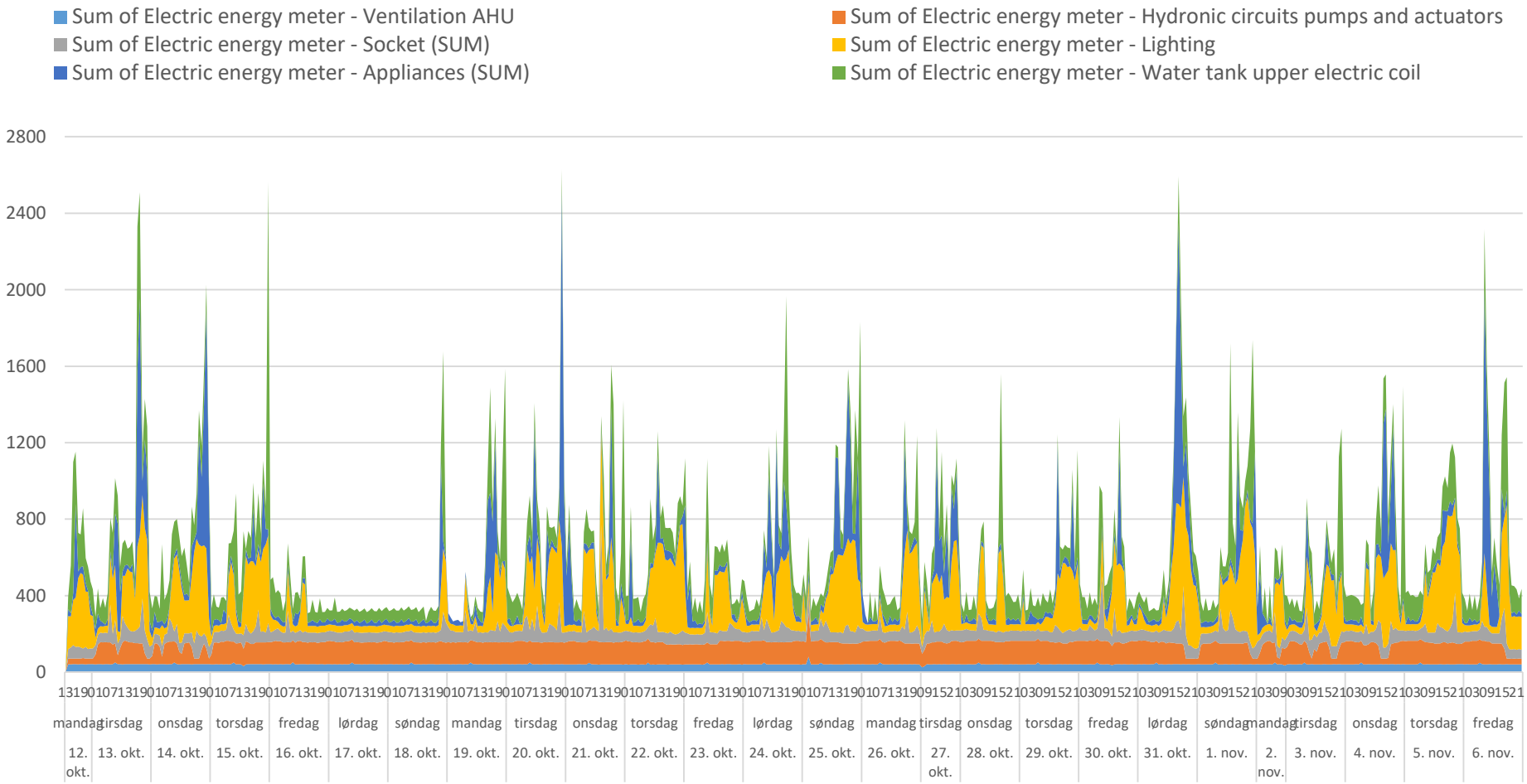
- Living Lab was expected to function as a home outside their own homes.

Utfordringene



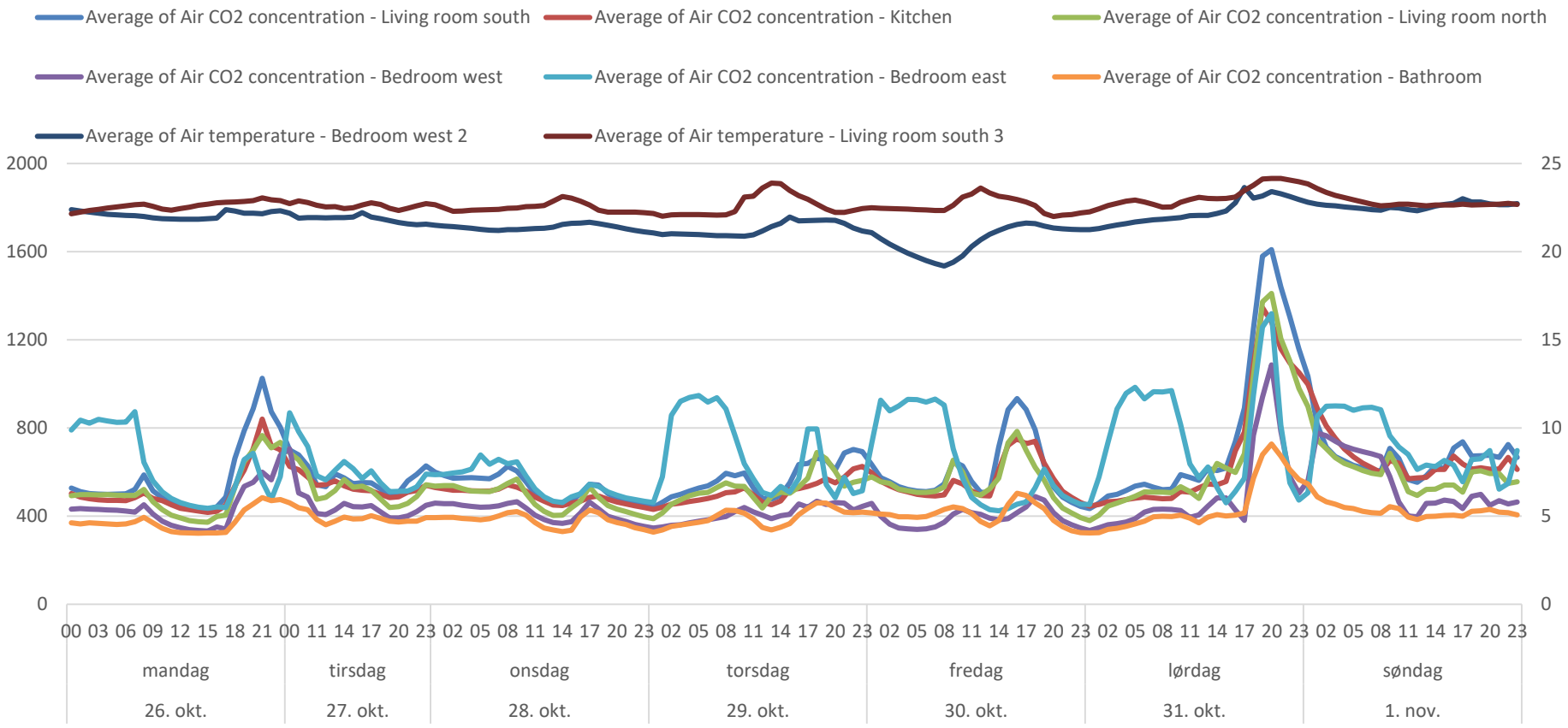
- Living Lab is not an actual home
- Location and privacy
- Technical challenges
- Functional characteristics

Electricity used during the whole period: gruppe 1



Indoor climate week 3

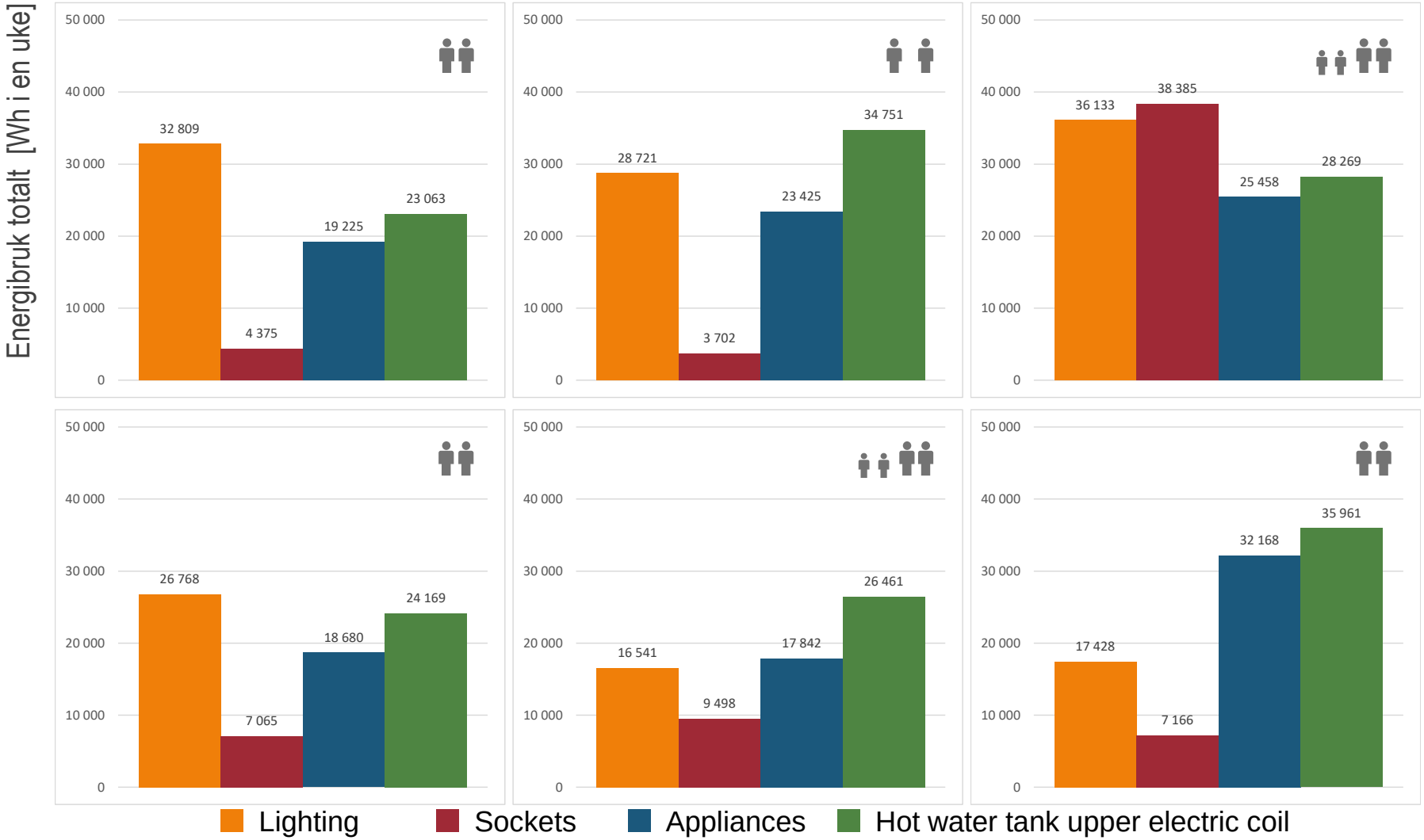
Room temperature (main bed room, living room) & CO2 levels in all rooms



Resident energy use during one week

Gruppe nr:

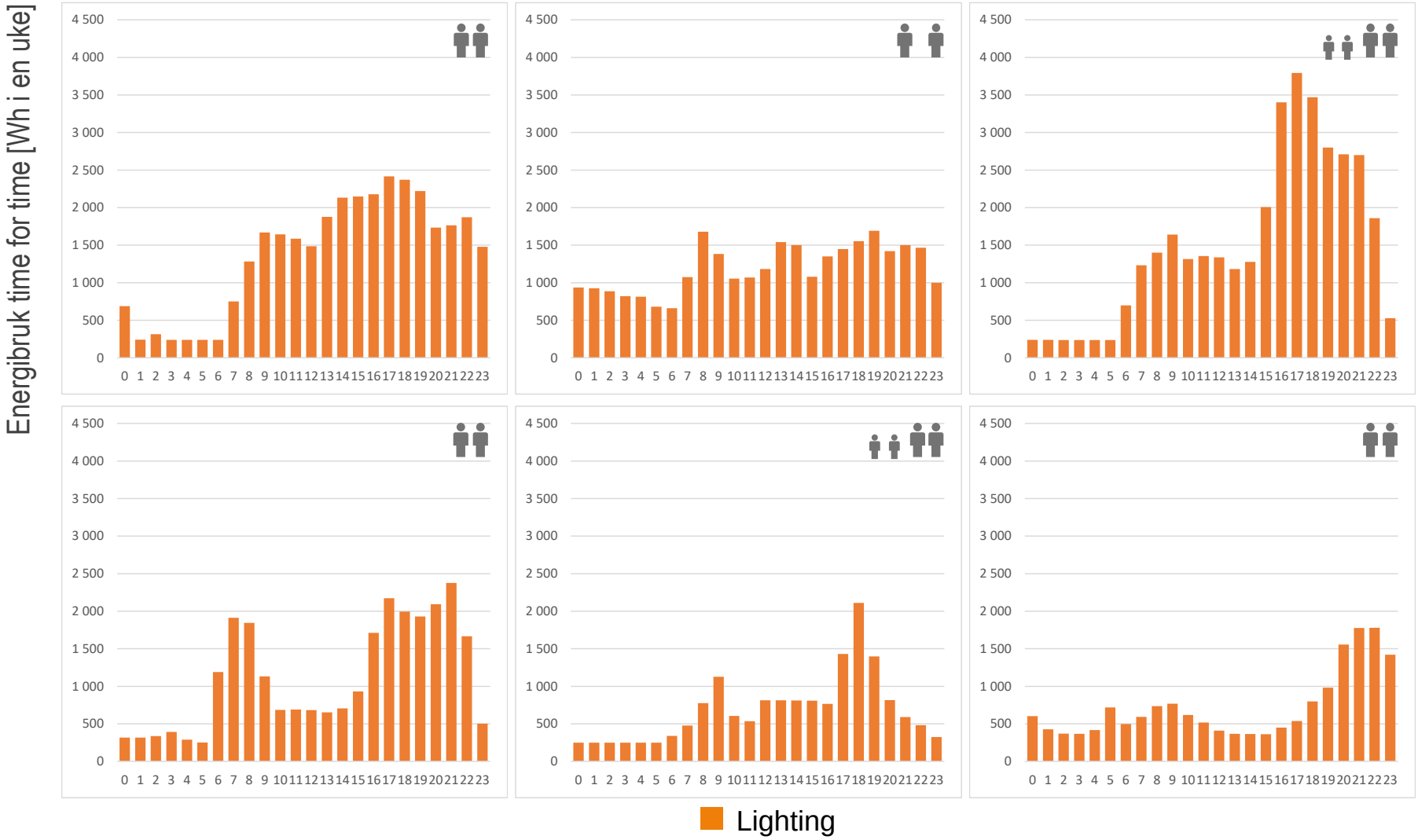
1	2	3
4	5	6



Lighting during one week

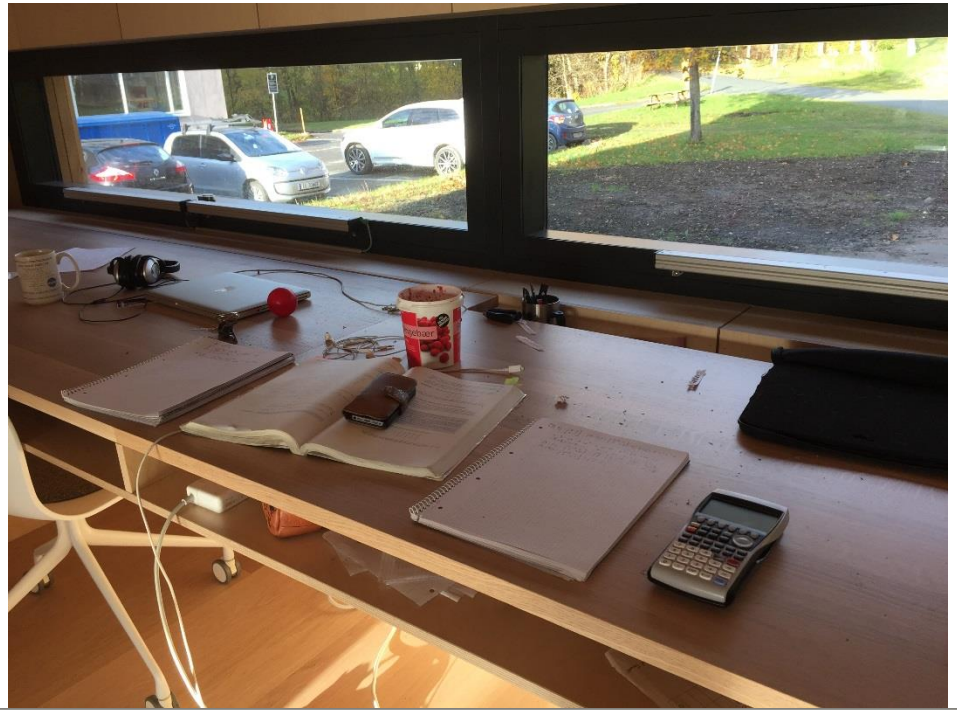
Gruppe nr:

1	2	3
4	5	6



Three main findings emerge:

1. **Occupants adapted to the building**. In some cases this meant changes in stable daily routines. For example, residents got used to sleeping with closed windows regulating temperature through lighter bedding. We also registered cases of physiological adaptation, such as in accounts of the air appearing dry in the beginning (resulting in dry skin), which was not considered a problem after four weeks of occupancy (with the skin problems disappearing). In a few cases occupants even signaled that the building has prompted more profound lifestyle changes.



2. Occupants adapted the building to their everyday life.

This happened in inconspicuous ways i.e. furniture was added or moved, but it could also mean changes that influenced the building's energy consumption. This ranged from small spikes in consumption during a party to the introduction of an additional energy consumer into the house (a space heater).

3. Few of the occupants' experiences can be connected directly to the fact that the building is a zero emission building.

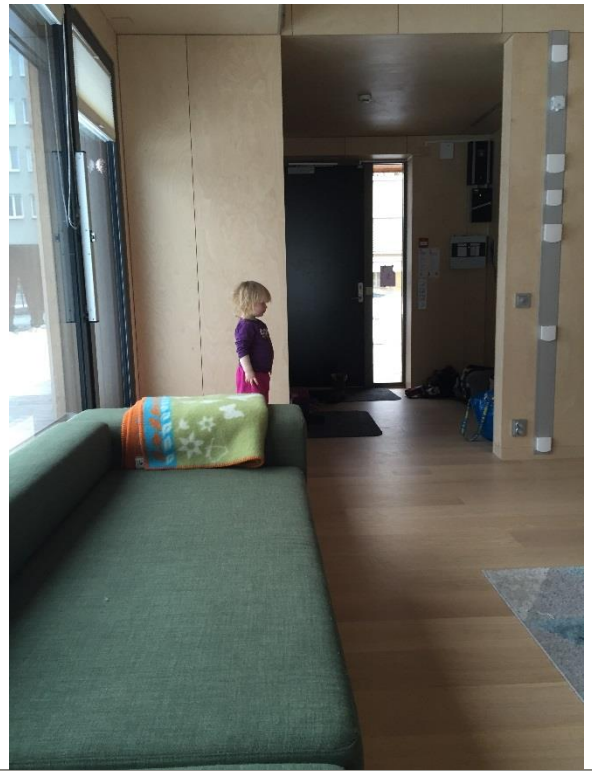
Design choices, such as the shape of the kitchen or the built-in furniture, and the particular location of the building on the campus with a lot of people passing by, was responsible for the host of positive and negative experiences.

Residents agreed that living in a Zero emission house was less technically demanding than they had expected.

Tilbake til målsettingen

The insight gathered in Living Lab will provide understanding of how a concept of home is established within a highly technical setting and the implications this has for the use of the technology being tested in Living Lab.

Supports the assessment of building performance by providing knowledge about - <u>everyday practices and expectations.</u>



Hvem er du?

Tøffelhelt eller….

Barefoot bandit?

TAKK!

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