

Insights into the **interaction
between people and technology**
in a deep energy renovation:
2nd Skin pilot.

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10
months



 **2ndskin[®] pilot**

 **Climate-KIC**

Innovatieve concept, realised efficiently and well

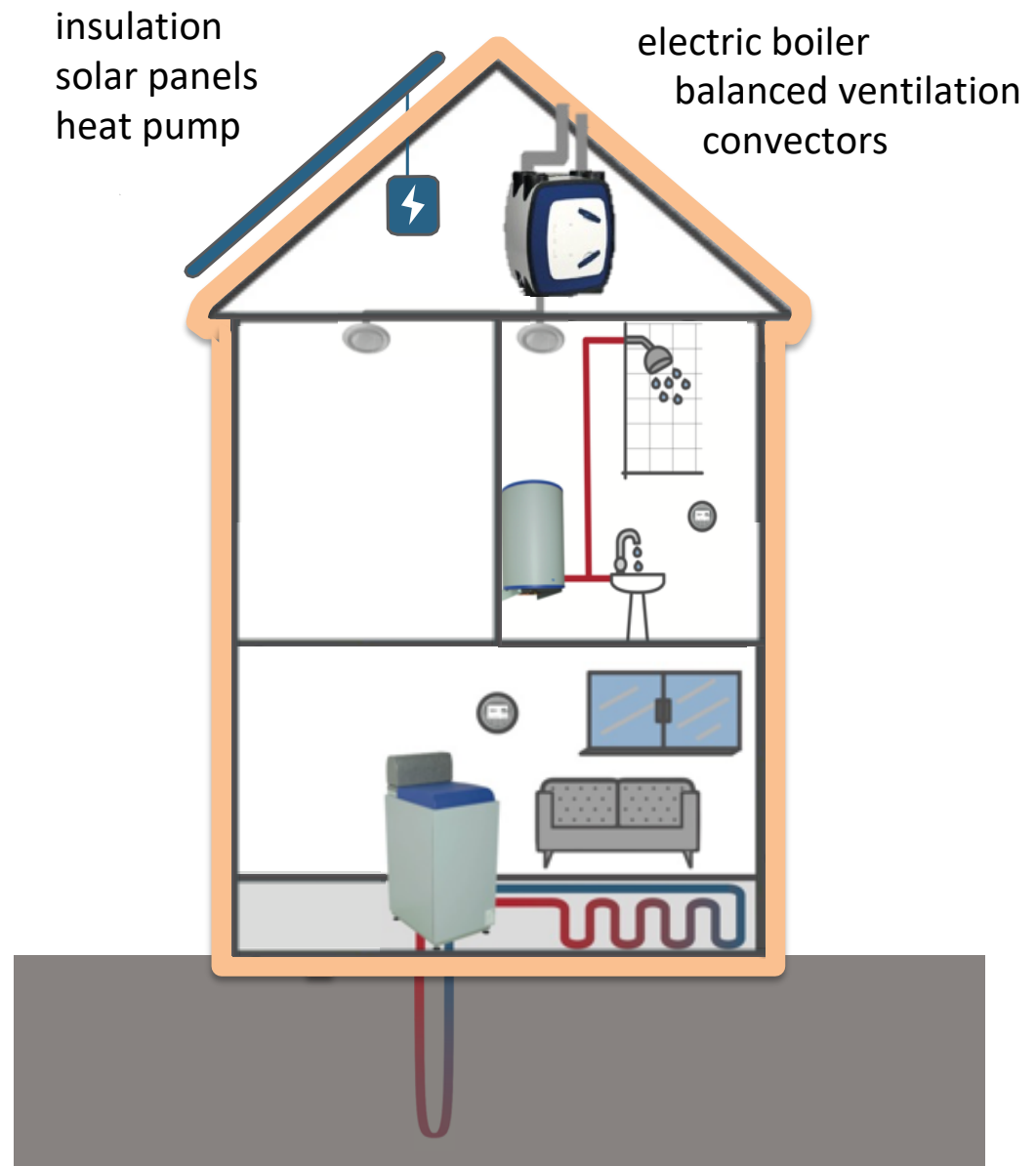
March 2017

Oct 2017

Feb 2018



2nd Skin pilot Renovation concept



2nd Skin pilot realisation

- Renovation is done well and efficiently.
- Customer and residents very satisfied
 - with indoor climate, more even
 - with the new look of the building
- 2nd Skin has since scaled up with NOM-ready realisations

Experiences on the interaction between residents and their renovated home? Lessons learned

THERMAL COMFORT

- Residents told: “best not touch it at all”
- Heating range: 18-22° (though setpoint appears to go to 24°)
- Residents learn to distrust the heating, buy electric heaters.
- Residents leave the thermostat on 24° – to catch any heat they can possibly get.

LESSON:

- Monitor reasons for setpoint. Monitor extra sources.
- Create greater variability in heating to see preferences
- Heating capacity calculations not on dwelling level but per project
- Smarter heating configurations to allow for greater flexibility in use?



Experiences on the interaction between residents and their renovated home? Lessons learned

NEED FOR FRESH, CLEAN AIR

- Residents are not familiar with the ventilation principles of a ZE house.
- We see some non-use of the ventilation control.
- We sometimes see high CO₂ values over several hours in some rooms.



Experiences on the interaction between residents and their renovated home? Lessons learned

VENTILATION

- What do residents think of it?



Experiences on the interaction between residents and their renovated home? Lessons learned

WINDOWS

- Windows are THE trustworthy interface to residents! They rely on them to have trustworthy ventilation – summer and winter!
- Residents have a broader set of uses than the windows support:
 - Aerating, or letting pets in and out
- Residents complain that windows are too heavy, require hand strength.
- Residents drill holes into window frames to put them ajar.

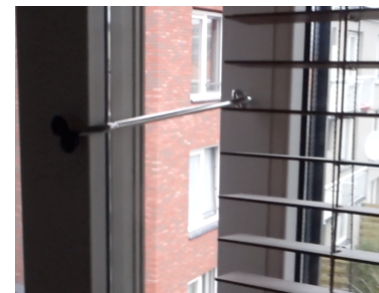


Experiences on the interaction between residents and their renovated home? Lessons learned

NEED FOR FRESH, CLEAN AIR

LESSONS:

- Monitor HRV (WTW) use, window use and CO2.
- How to configure? Automatic or manual? *Both. System should monitor itself.*
- Windows are an underestimated design element! If residents feel a need for something, they will try to realise it – and windows are the best interfaces.
- How to instruct? Verbally? In drawings? Movies? Once? Continuously? *All of those. And monitor effect.*



Experiences on the interaction between residents and their renovated home? Lessons learned

MAINTENANCE

There are **contradictions** in how residents are expected to interact with their house.

- **Low involvement:** Thermostat: don't touch it ideally, forget you even have it, keep it on 20° always
- **Medium involvement:** Ventilation control: put it on the timer after showering and cooking
- **High involvement:** Clean/exchange filters: go to this complicated technical place outside your house every three months or so, prise open a difficult-to-open box, pull out a dusty floppy filter, figure out a way to put a vacuum cleaner to it outside your house, stuff it back into a narrow opening without creasing it, then do the same with a second filter you cannot even reach: it's behind a wall. Then use a display with 6 button presses to reset the filter. Then



Experiences on the interaction between residents and their renovated home? Lessons learned

MAINTENANCE

There are **contradictions** in how residents are expected to interact with their house.

- **Low involvement:** Thermostat: don't touch it ideally, forget you even have it, keep it on 20° always
- **Medium involvement:** Ventilation control: put it on the timer after showering and cooking
- **High involvement:** Change the filters on your ventilation unit in the installation box outside your apartment.

LESSON:

Set up a coherent interaction concept for your deep renovation, based on the needs and experiences of residents in combination with your technology – then monitor if it works.



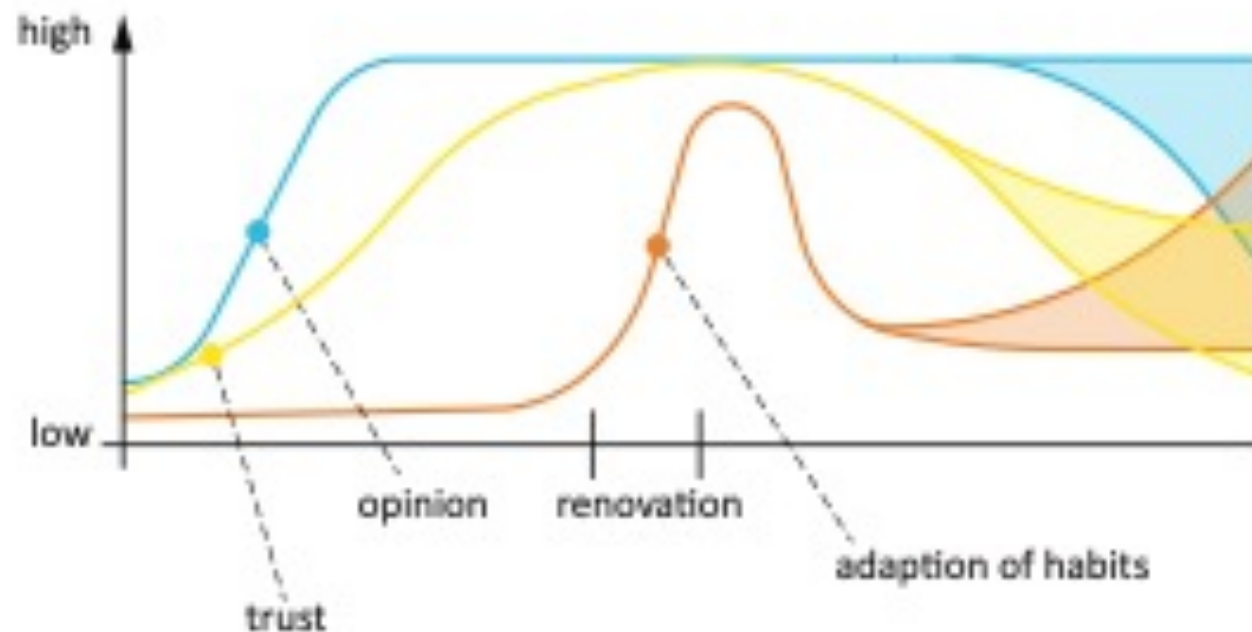
Experiences on the interaction between residents and their renovated home? Lessons learned

CHANGE OVER TIME

- Behaviour change does not happen overnight.
- After initial disruption, things calm down – the real opportunity is after 6+ months

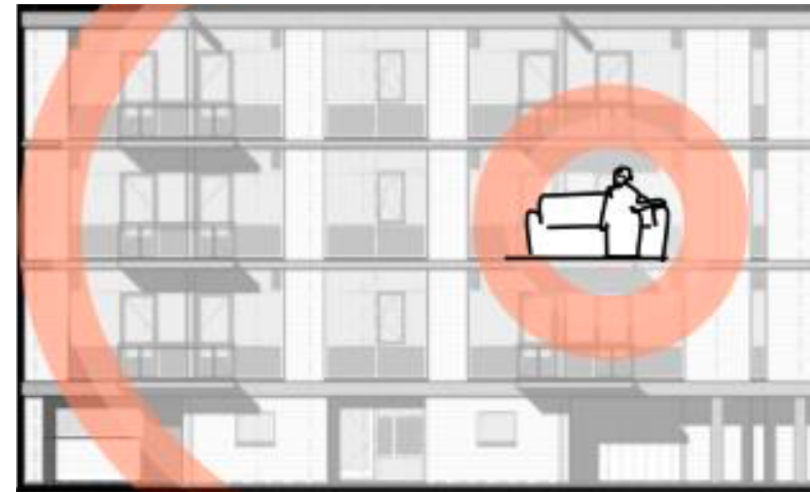
LESSON:

- Ensure that people have not lost enthusiasm and trust by then – monitor their satisfaction and interaction over time, act on it.



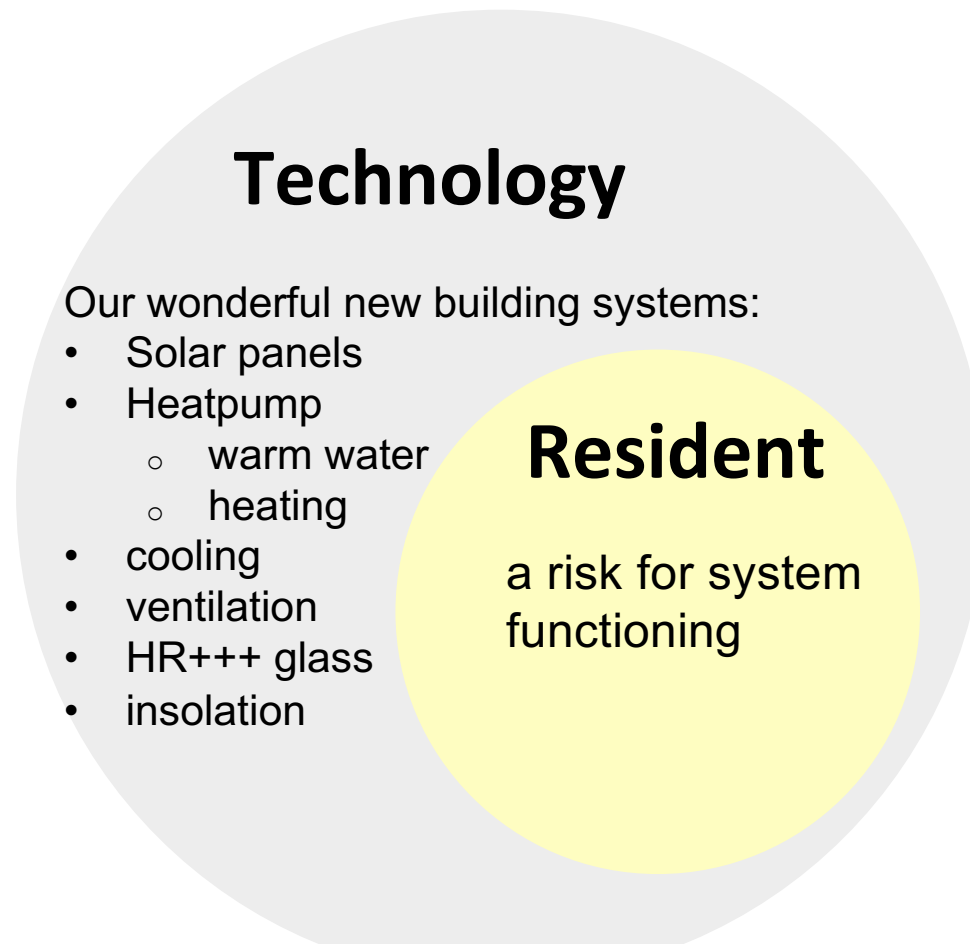
Lessons learned: to get satisfied residents in ZE housing, DO:

1. Design for people's needs
 - a) Anticipate how the needs will be served
 - b) Involve them in decisions
2. Match people's needs with technical possibilities
3. Communicate extremely well what the new features are and how they relate to daily life.
 - a) In the residents' (image) language
 - b) Not just send but also receive: listening service organisation
4. Be willing to adapt technologies and configurations after the renovation



Lessons learned: DON'T stay only in the technology view

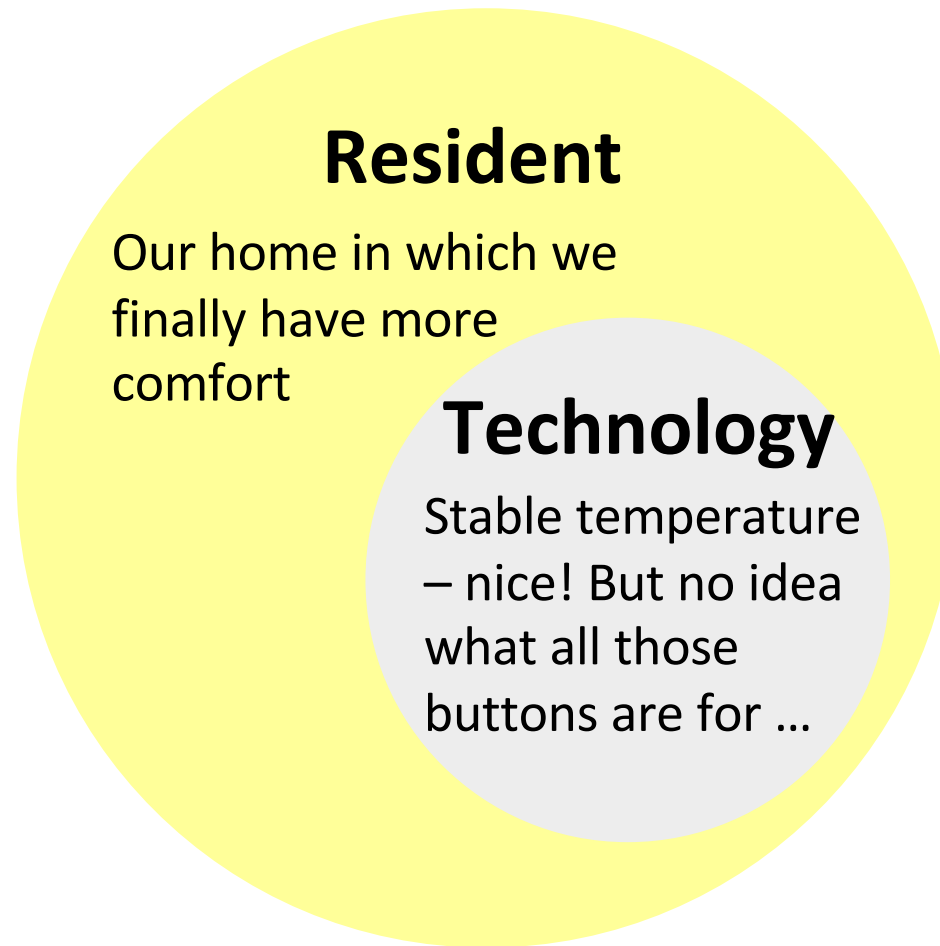
The
technology
view



“We see the craziest things: switching off systems, pulling plugs in order to save energy. Etc etc.”

Lessons learned: DON'T stay only in the technology view

The
residents'
view



We often think we're already providing good information – but actually we don't.

The residents' values

Residents' values with regard to their home, researched previously:

- Grip on the future
- Fair treatment
- Ideals met
- Supported in their lifestyle
- Control over health, comfort, new home systems.

Guerra-Santin, O., Boess, S., Konstantinou, T., Herrera, N. R., Klein, T., & Silvester, S. (2017). Designing for residents: Building monitoring and co-creation in social housing renovation in the Netherlands. *Energy research & social science*, 32, 164-179.

