

Behaviour, communication and technology in Zero Energy Homes

Chair

Joost Miedema – TUD

Abstract

Housing corporations in the Netherlands invest heavily in zero energy (ZE) renovations. To realize sustainability ambitions, an upscaling of these renovations is of great importance. However, after renovation, zero energy is not always 'zero', as occupants cannot, or see no reason to, adjust their behaviour to their energy-efficient homes. Housing corporations note that the current process with residents is very time-consuming, and it is insufficiently clear how residents' participation can best be shaped.

Several factors are crucial for the success (positive occupants' experiences, satisfaction; ZE behaviour) of ZE renovations. **Technology** needs to be 1) installed and functioning properly and 2) easy to use; furthermore, residents' **attitudes** on ZE behaviour (e.g., saving money, the environment, interest in innovation) influence ZE behaviour. Evaluations of ZE renovations indicate that perceived **fairness** is a third factor: not only distributive fairness (who gets what), but especially procedural fairness, or a lack thereof, is often mentioned in interviews. A fourth factor that determines ZE behaviour is the **residents' context**. Socio-economic status (such as financial scarcity, see, e.g., Mullainathan & Shafir, 2013) and level of education (e.g., illiteracy) prevent residents to fully benefit from their ZE homes.

Hanze University is running a project to develop an appropriate approach for residents, so that they are prepared in an effective and efficient manner for living in a ZE home. Questions to be addressed in this panel are: How do the above-mentioned four factors interact and predict residents' behaviour and chances for ZE success? How can an intervention/approach best be designed? How can technology be adapted, so that residents don't need to adapt?

Presentation 1

Factors in the Journey towards the Adoption of Sustainable Home Improvements by Home Owner Associations: a Qualitative Study

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Abstract

A large amount of dwellings in the Netherlands are collectively owned. They are obligated to have a homeowner association (HOA) in which owners are united. No single household is allowed to invest in sustainable improvements that affect collective parts of the property, such as the roof: homeowners will have to come to an agreement together. This makes the process complicated, and time and effort consuming. In the current research, factors are uncovered that have an effect on the agreement to implement sustainable home improvements with the goal of energy reduction and energy production.

To uncover the relevant factors semi-structured interviews were held with eight product or service providers to HOAs, and with twenty HOA members (mostly chairmen) who experienced a successful or unsuccessful process towards sustainable home improvements. Findings were mapped onto the customer journey in order to structure the experiences of HOAs during the dynamic decision making process.

The results show that HOAs go through a journey consisting of five steps, from the search for possible sustainable home improvements until the meeting where all members vote about the improvements. The journey is triggered by an internal motive (e.g., a high energy bill) or an external motive (e.g. a friend who recommends solarPV), and usually takes a couple of years. In each step there are a number of factors that play an important role, with a total of fourteen factors.

In conclusion, as a consequence of the complex decision making process HOA's aren't energy efficient nor producing energy, hereby not fulfilling the enormous assignment of the Paris Climate Goals. There is an urgency and a lot of potential to stimulate and support HOAs. Insights in the journey – and the factors in each step – can be used by product and service providers that (would like to) stimulate and facilitate HOAs.

Presentation 2

Experiences from 'Stroomversnelling'

Prof. Mieke Oostra, Hanze University of applied sciences,

Presentation 3

Designing Sustainable Urban Energy Systems through Participatory Value Evaluation

Keywords: Participatory Value Evaluation; citizen involvement; participation; economic evaluation; sustainable thermal energy systems

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The municipality of Nijmegen aims to abolish the use of natural gas in the built environment in order to become completely energy-neutral in 2045. Nijmegen selected “Hengstdal” as the first neighborhood to become completely natural gas free. There are numerous sustainable thermal energy alternatives to choose from and the municipality wants to consult all residents of Hengstdal in order to investigate which alternative they prefer.

A Participatory Value Evaluation (PVE) is conducted to investigate the preferences of the residents of Hengstdal. PVE is a web-based method in which citizens can choose the future sustainable thermal energy systems that best match their preferences out of 16 options. Residents can, for instance, choose between all-electric and district heating solutions. They receive information about the personal and collective impacts of each of the options they can choose from (e.g. costs, level of comfort, reduction of CO2 emission). PVE equips citizens with a means of designing their future thermal energy system while at the same time measuring the utility they derive from impacts of sustainable thermal energy systems. Using citizens’ individual choices, advanced behavioural choice models are estimated that subsequently form the basis for an economic evaluation of different policies. Once the residents make their choice, follow-up questions are asked about their current energy contract, network and level of insulation. The answers to these questions are then used to interpret the results of the PVE. Dutch governments recently used PVE to evaluate a transport investment plan and a flood protection program. Our study is the first application of the method in the energy domain. The data collection will take place end of June 2018.

Presentation 4

Housing sustainable transition due to residents behaviour

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In spring 2018 a ‘Community of Knowledge’ is started up to combine existing knowledge on resident behaviour related to sustainable housing, existing stock and new to built houses, to speed-up the climate-change transition. Research trajectories are started-up at universities in the Netherlands and abroad on this theme of interest. Results will be delivered in the coming years because of the time-span scientific research takes. In the meantime municipalities, social-housing companies and commercial businesses are served by consultancies and other research institutes by light-scientific more focused research working on their contribution to this transition. The unknown in most of the scientific and light-scientific research is the resident behaviour factor. Resident’s behaviour though will make the transition successful or break it down, depending on how transition policy programs take resident behaviour into account. These policies are in production now and some are even operational. For making the sustainable housing transition successful we need to bring together and enrich the available data, reports and research results where resident behaviour is part of it. These reports though are in ownership with the original contractors. That’s why a ‘Community of Knowledge’ is started in which these owners can bring-in their content. A ‘conceptual model’ is set-up by the starting group and an inventory of potential participants is made. In the panel the first

half-year results will be presented, for mutual learning by discussion and to motivate newcomers for participation too.

Result ' conceptual model with first inventory June 2018.

