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From science to sales: changing representations of zero emission housing

RESEARCH

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ABSTRACT

Research projects on neighbourhoods with zero greenhouse gas (GHG) emissions often emphasise technological solutions. Does the representation of this technological emphasis appeal to potential homeowners and occupants? How can sustainable neighbourhoods with low or zero GHG emissions be represented in an attractive manner? A pilot project in Elverum, Norway, to develop a zero emission neighbourhood (ZEN) called Ydalir is examined for its efforts to attract potential homeowners. This paper investigates how the suggested meaning and use of this ZEN have been produced through these efforts. Drawing on the concept of socialisation, the analysis shows that the involved actors' efforts to fit the ZEN concept into the local market have moved the understanding and representations of Ydalir ZEN from 'a facilitator for zero emission buildings' to 'a facilitator for sustainable practices'. As part of this shift, the promotion of technology has gone from an enabler of the neighbourhood to a bonus factor. In addition, the roles ascribed to the residents have changed from passive receivers of technical energy-saving solutions to responsible participants in sustainable activities. A stronger narrative connection between the social and technological attributes of the neighbourhood should be reflected in both the research agenda and the representations of the areas.

PRACTICE RELEVANCE

This paper uncovers efforts to make the ZEN concept attractive in a local market. A disparity is found between the project's initial (technological) focus and what is foreseen to have meaning and appeal to potential residents. The energy-saving technologies have less appeal than the social attributes, *e.g.* sharing solutions and a strong community, which are considered more compelling. The social qualities, rather than the technology, provide more suitable entry points in the efforts to make the ZEN concept attractive. A consequence is that social and technological attributes are separated. Researchers and the supply side need to better understand and communicate the vital link between social sustainability and technological innovation.

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1. INTRODUCTION

Today, several concepts are used in the scientific study of developing climate-friendly neighbourhoods. Terminologies such as positive energy districts (PEDs), nearly zero energy districts (nZEDs), low carbon neighbourhood (LCN), low carbon district (LCD) and zero emission neighbourhoods (ZEN) represent just a few. Brozovsky *et al.* (2021) provide an overview of terms. This reflects a research agenda that, over the past years, has increasingly extended from the building level to the district level. This extension is mainly technologically and economically motivated as interconnected buildings allow for better utilisation of energy performance and renewable energy production (Amaral *et al.* 2018; Woods *et al.* 2019). However, taking into account that using a building and using a neighbourhood are quite different, this requires a research approach that addresses peoples' everyday lives both inside and outside of the home (Woods & Berker 2022) and that includes the social dimension of sustainable communities (Shirazi *et al.* 2022). Thus, going from the building level to the district level creates greater scope for how the built environment can support the transition to a low-carbon society. In consequence, this has left room for broader and more diverse understandings of what climate-friendly neighbourhoods might be and how to best incorporate such areas into society.

A key tenet in the science and technology studies literature is that consumers use and master technology differently in different cultural and social contexts. They do not consume new technology in the ways imagined by the producers (Woolgar 1990; Akrich 1992). Domestication theory (Silverstone *et al.* 1992; Lie & Sørensen 1996) shows how end-users construct different practices, meaning and cognitive processes related to learning in the enactment of new technologies (Sørensen 2006). The processes of incorporating new technologies into society involve actors other than the producers and the users. Advertising companies, web designers and other marketing consultants are often hired to create representations that attract potential users. Such work can involve attempts to fit new technologies into different local contexts by suggesting their meaning and use. Thus, representations affect both the domestication and the potential buyers' decision-making processes. These efforts to socialise technology (Bijker & D'Andrea 2009) are often black-boxed by simply labelling them as marketing or sales strategies and are not paid sufficient attention to (Pinch 2003). By scrutinising the processes of producing representations, efforts to bridge new technological concepts and the local context of peoples' everyday lives will be illuminated. Such insight is crucial in order to better understand how new technologies can be successfully incorporated into society.

In one of the initiatives mentioned above, FME ZEN in Norway, new solutions for sustainable neighbourhoods are being developed. The centre aims to reduce greenhouse gas (GHG) emissions to zero by developing energy-efficient buildings, increasing energy flexibility, and optimising the interaction between local energy systems and larger systems. The centre also aims to stimulate sustainable behaviour (*e.g.* walking and cycling instead of driving or joint ownership of facilities instead of private possession). However, the main research agenda of the centre is focused on reducing GHG emissions with the help of technological solutions. This is reflected in the ZEN definition guidelines (Wiik *et al.* 2022).

The solutions developed in FME ZEN are being implemented and tested in nine pilot projects. In the most mature pilot, the Ydalir project in Elverum, the first homes were placed on sale at the beginning of 2022. Despite the ZEN centre's core locus, technology receives minimal attention in the representations of Ydalir. Instead, location and social values, such as the neighbourhood's facilitation for a strong community and sharing solutions, are being emphasised. This approach aligns with previous studies showing that residents seldom buy houses because of their energy profile (Hauge *et al.* 2011; Thomsen *et al.* 2017). Instead, buyers consider other aspects and amenities (*e.g.* location and a balcony) more essential qualities (Hauge *et al.* 2011).

When living in an energy-efficient home, even those who define themselves as 'not technological' still spend time understanding and engaging with the energy-efficient technologies available in their home (Shirani *et al.* 2022). Thus, simply leaving the technologies with little attention in the representations of the houses does not remove technology's impact on the residents' everyday life.

This paper examines the production of the visual and textual representations of Ydalir. Through interviews, documents and observations, the analysis follows how the socialisation strategy of the Ydalir ZEN project has developed from when Ydalir became a pilot project in 2016 to the first houses being ready for sale in the first quarter of 2022. The paper asks: How has the process of making the Ydalir ZEN attractive in the local housing market affected the suggested meaning and use of the ZEN concept?

The paper is structured as follows. Next, a brief introduction to the context of FME ZEN and the Ydalir pilot is provided. Section 3 presents the theoretical framework of this paper. Section 4 introduces the methods. The analysis in Section 5 identifies key socialisation strategies and agents. The analysis in Section 6 points to how these strategies aim for successful domestication by suggesting practices, meaning and sources of learning.

2. BACKGROUND

FME ZEN was established in 2016 as a successor to the research centre on Zero Emission Buildings (ZEB) (lasting from 2008 to 2016). The centre is organised by the requirements of the FME scheme (Centre for Environment-friendly Energy Research), which entails binding cooperation between two major Norwegian research organisations, the Norwegian University of Science and Technology (NTNU) and SINTEF (an independent research organisation), and relevant user partners from the industry, trade, public administrations and other societal partners (The Research Council of Norway 2021). All partners are required to actively take part in the planning and follow-up of activities and in the dissemination of the results. This work is, in large part, organised through nine pilot projects in Norway. Here, new solutions are being developed, implemented and tested in collaboration between researchers and partners.

An important part of the work in FME ZEN is to provide a definition of a ZEN. This involves developing assessment criteria and key performance indicators (KPIs) that address aspects of energy, economy, power, emissions, mobility, urban form and land use (Wiik *et al.* 2022). Such definition work is essential because it serves as a guiding principle for the centre's research and the pilot areas. Additionally, it is often perceived as crucial to enable upscaling (Woods & Berker 2021), a common ambition for pilot projects (Ryghaug & Skjølsvold 2021).

The ZEN concept builds upon the United Nations' Sustainable Development Goal (SDG) 11, which aims to 'make cities and human settlements inclusive, safe, resilient, and sustainable'.[1] Thus, ZEN is an urban concept. This is supported by the assumptions of infrastructure, density and large population, usually characteristic of urban areas. Nevertheless, not all pilots in FME ZEN are in big cities. Some are found in more rural areas, such as the Ydalir pilot, which is located in Elverum, a small town with only 14,000 inhabitants. The pilot project was established because Elverum municipality saw it as a good opportunity to act on their ambitious climate plans. Ydalir, which was originally a gravel and sand pit right outside the city centre, had already been pointed out as a site for new houses, a school and a kindergarten. The aim is to develop 800–1000 residential units within a timeframe of 10–12 years, dividing the development into different construction steps. Each step contains different houses and buildings and is performed by different development companies. The new school and kindergarten were finished in 2019 and received much attention both locally and nationally for their architecture and climate-friendly solutions. However, the area's development has encountered some obstacles, especially concerning mobility. Due to Elverum's limited population, public transport is less developed. Settlement is scattered, so mobility for most people in Elverum is by car. Thus, the suggestion that Ydalir should have less room for private cars has raised some scepticism among potential residents.

In Norway, as much as 82% of the population owns their own homes (SSB 2021). This is much a result of the Norwegian governmental housing model that emphasises ownership as part of the welfare state and provides tax reductions on housing loans. Thus, in the majority of new housing developments, the units are being sold directly to the residents. However, despite tax reductions, buying a home is still a huge investment for most Norwegians. Making the investment

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seem worthwhile is thus crucial in order to attract potential buyers. As most of the homes in new developments are being sold before they are built, the textual and visual representations of the houses and the neighbourhood play an important role in attracting buyers. In Ydalir, the Elverum municipality has been in charge of developing the overall representation of the area. This has been done in collaboration with both ZEN actors and local actors. Drawing on the overall representations, each developer is responsible for representing and selling houses in their own projects.

3. MAKING SENSE OF SUSTAINABLE NEIGHBOURHOODS

While the climate-friendly neighbourhood is not a standardised concept, attempts have been made to categorise the diverse set of interpretations of what a sustainable place might represent. Guy & Farmer (2001) identify six competing logics of sustainable architecture: the eco-centric, the eco-aesthetic, the eco-cultural, the eco-medical, the eco-technic and the eco-social. Their identification is not solely based on building images but also includes idealised concepts of place, the role of technology, images of space and the environmental knowledge that the logics build upon. They describe the first four logics as revolving around different levels of living in harmony with nature, focusing on how sustainable housing is about values, senses, bioregionalism and spiritual wellbeing. In sharp contrast, they identify the eco-technic logic by its techno-rational approach, following the belief that science and technology can manage or control the environment and thereby solve environmental problems. This viewpoint can easily be recognised as an ambition of modernity (Stirling 2019/2021). Central to this logic is the global viewpoint, where environmental issues are elevated to a universal level, focusing on problems such as global warming or transnational pollution. This can result in local conditions and knowledge being ignored (Macnaughten & Urry 1998). The sixth logic, the eco-social, explains the root of the environmental crisis through wider social factors such as issues of democracy. Thus, a sustainable place is found in a community that serves common needs and goals driven by inhabitants who care for the environment by reducing material goods and focusing on human resources. This is in line with an emergent sustainability transformation that builds on the values of care (Arora *et al.* 2020). Values of care are materialised in practices, and caring is about engaging in practical activities such as caring for and taking care of others (Mol 2008). The eco-social logic is also recognised by its local point of view, aiming for healthy societies through local control, participation and freedom.

With a research agenda mainly concerned with the development of energy-related technology and definitions expressed in quantities of energy consumption and GHG emissions, it is clear that FME ZEN follows the eco-technic logic. When the standards and definitions of FME ZEN were introduced into the pilot projects, gaps were identified between what the standards are based upon and the actual conditions in the pilot area. This has, in part, been accommodated by FME ZEN through attempts to make the KPIs and assessment criteria more adaptable to diverse local contexts (Wiik *et al.* 2022). Still, in order to make the ZEN concept attractive in the local market, the pilots must tailor the suggested meaning and use in order to adapt to the local context. This work can be viewed as socialisation efforts.

In social sciences, the concept of socialisation often refers to individuals' learning processes, interactions or changes in ownership (Sørensen 2023). Here, the understanding and use of the concept build upon Bijker & D'Andrea's (2009: 62) term 'socialization of scientific and technological research', which they define as:

> the process involved in the production, use, and circulation of scientific research and its products in an inseparable connection with its social context.

This concept differs from the more instrumental 'deployment of technology' perspective. As the latter can be described as mainly focusing on how to remove barriers to deployment (*e.g.* Müller *et al.* 2011), the socialisation approach targets the potential to *facilitate* society's uptake of new science and technology. While Bijker & D'Andrea (2009) mainly have a normative approach, aiming to improve the science–society relationship, Sørensen (2013) has pointed out the concept's

capacity to empirically analyse socialisation efforts. Using the concept as an analytical lens entails putting the unit of analysis on the sites, agents and strategies used in the efforts to incorporate new science and technology into society.

The starting point of this paper is the pilot area as a site for socialisation. Considering that also things have agency (Latour 1987), identifying socialisation agents includes both human and non-human actors. How non-humans can have importance in such processes can be seen in, for example, the embedding of the car in Norway (Østby 1995), where the development of roads was crucial, making this infrastructure a socialisation agent. The strategies used in socialisation can take different shapes, targeting different stages of technological development and incorporation. Skjølsvold (2012) point to three dimensions in which the socialisation of technology can occur; framing, embedding and practices of innovation. In this study, the analytical focus is put on framing endeavours.

Framing can be understood as providing technologies with meaning. According to Bijker's (1997: 191) concept of technological frames, such frames:

> provide the goals, the ideas, and the tools needed for action. They guide thinking and interaction.

This work of providing a concept or technology with images and ideas of use may start even before it exists (Skjølsvold 2014) or is taken into use. Thus, it can be viewed as a preparation for successful domestication. Sørensen (2023) suggests that socialisation efforts need to address the three dimensions of domestication: practices, meaning and learning (Sørensen 2006). Bringing this into the analytical approach entails identifying (1) how the technology or concept is foreseen to be used, (2) how the technology or concept is envisioned to create meaning and identity for the users, and (3) where the users are suggested to learn about the technology or concept. Opening up how the socialisation strategies prepare for different domestications provide a useful insight into why, or why not, technologies are successfully incorporated into society.

4. METHOD

The paper draws on critical visual methodology (Rose 2016). This emphasises that the meaning of an image is made through four sites: the production, the image itself, its circulation and its audience. The application of this approach to Ydalir ZEN is that meaning and use are developed through the production of the representations (both visual and textual) and the representations themselves.

Eight key actors from the municipality and other companies involved in the development and marketing of the Ydalir pilot project were interviewed. The interviewees represented the pilot owner, an architectural company involved in the concept study, a design company involved in creating a branding concept and visual identity of Ydalir, an advertising company hired to refresh Ydalir's website and make a film to inform about the project, the development company in charge of the first building step, and the associated architectural company (Table 1). The interviews were conducted based on a semi-structured interview guide. All interviews were conducted in Norwegian and via video calls in January–February 2022. The interviews were digitally recorded and transcribed before being coded. In addition, visual and textual representations that were created or commissioned by the interviewees were analysed (see the additional data source in Table 1).

Table 1: Interviewees and connecting data

Note: ZEN = zero emission neighbourhood.

Pilot owner 1 Pilot owner 2 Pilot owner 3	2016–	• An illustration made during the first feasibility study, commissioned by the pilot owner	2015
		• An illustration made in connection with an application for financial support from ENOVA (a state enterprise owned by the Norwegian government set up to support and deploy energy and climate-efficient technologies). The illustration was commissioned by the pilot owner	2016

(Contd.)

Architect 1	2016–17	• A PDF of the presentation/pitch held for the pilot owners (including hand drawings and conceptual sketches)	17 January 2017
		• A PDF of the presentation given in a meeting where several actors involved in the Ydalir project were present	2 March 2017
		• Three architectural illustrations/renderings of the Ydalir ZEN	Early 2017
Designer	2017	• A PDF of the presentation presenting the findings from the 'identity' workshop and the design company's suggestion for a branding platform and visual identity	4 March 2017
		• 14 photographs commissioned by the interviewee used to support the branding platform and identity of the Ydalir ZEN	2017
Art director 1	2021	• A video (duration of 69 seconds) made to promote the Ydalir ZEN and to reflect the content of the webpage	May 2021
		• The webpage of Ydalir (ydalirbydel.no)	May 2021
Architect 2	2021–	• A PowerPoint presentation (including notes) of the Ydalir project, mainly focusing on the visual aspect	Second half of 2021
		• A PowerPoint presentation (including notes) of the Ydalir project, mainly focusing on the energy- and emission-reducing aspects of the buildings and area	Second half of 2021
Developer 1	2016–	• The website of the first building step (ydalirtorg.no)	Second half of 2021

A third data source included in the analysis is data from a workshop on sharing solutions which was conducted in Ydalir in August 2021. The workshop was organised and led as part of a collaboration between the pilot owner and two researchers from ZEN. The background for this workshop was a desire from the pilot owner to learn more about how to best organise and deploy sharing solutions from a neighbourhood perspective. In addition to observational notes from the event, the data material includes several presentations made during the workshop and summaries of the results made afterward (Table 2).

Table 2: Observations from a workshop and connecting data

ACTIVE PARTICIPATION/ OBSERVATION	ADDITIONAL DATA	DATE
Workshop on sharing solutions in Ydalir	• PDFs of three inspirational presentations made by connected partners • PDF of the introduction made by pilot owner 1 (interviewee) • PDF of an inspirational presentation made by developer 1 (interviewee) • PDF with a sum up of the results from the workshop	26 August 2021

The analysis started by ordering a timeline for when the informants were engaged in the project. The interviews were then searched for how the informants made sense of the Ydalir ZEN by coding in five categories:

- Use: how the area is foreseen to be used by the inhabitants
- Meaning: how the area is foreseen to create values for, and identities of, the inhabitants
- Inspiration: who and where the informants turned to for learning
- Challenges: the type of obstacles or hindrances the development and marketing had to overcome
- Technology: the perception of technologies' role in the neighbourhood

The additional data (third column of Table 1) were approached by searching for how the textual and visual representations supported the informants' sense-making. This was done by examining

whether, and if so, how, the representations made visible the various dimensions coded for in the interviews. Thus, the additional material added depth to the narratives presented in the interviews.

The data collected from the sharing solutions workshop were included by first placing them on the timeline. The observations and presentations (Table 2) were then treated as the additional data mentioned above, providing a deeper understanding of the participants' sense-making of the ZEN concept.

5. FROM SCIENCE TO SALES: A STRATEGIC DEVELOPMENT IN THREE STAGES

The following analysis traces how key pilot actors' framing of Ydalir ZEN has developed from the time when Ydalir signed on as a pilot to when the first buildings were placed on sale. Three turns in the socialisation strategy are identified, highlighting how the local context and the experience of the actors involved contribute to framing the ZEN concept in different ways as the project nears the sale of the houses. These turns also uncover how different non-human elements have worked as socialisation agents.

5.1 STARTING POINT: THE NEIGHBOURHOOD AS A FACILITATOR FOR ZEBS

When FME ZEN became operational in 2016, it was based on the work done in The Research Center on Zero Emission Buildings (FME-ZEB). The research and knowledge produced in FME-ZEB were now to be made more powerful by expanding from single-building units to a collection of units. In the first annual report from FME ZEN, a ZEN was defined as:

> a group of interconnected buildings with associated infrastructure, located within a confined geographical area, aiming at reducing its direct and indirect greenhouse gas (GHG) emissions towards zero.
>
> (Woods *et al.* 2019: 5)

Initially, physical buildings also dominated the Ydalir pilot owners' interpretation of a ZEN. Pilot owner 1 explained, 'It was mainly about the physical facilitation, physical buildings, and the technological solutions.' Pilot owner 2 added to this information by explaining that Elverum municipality, which considered itself environmentally conscious, felt committed to approaching the Ydalir project in a manner that reflected its sustainability focus. As they initiated the process of becoming a ZEN pilot, their main motivation was to obtain expert help in developing sustainable buildings and thereby speed up the process. He elaborated:

> We knew that the future was coming, so it was about building the right way. We were idealistic and maybe a bit naïve. Our thinking was that by becoming a pilot, we could try out some new stuff and get those houses built.

However, their initiative to become a ZEN pilot was not purely idealistic. The cost and prestige of developing Ydalir into a new neighbourhood were extensive. Building an area that stood out was thus important. A state-of-the-art climate-friendly approach was considered a way both to differentiate the project from other housing projects in the area and to make money. Pilot owner 2 explained, 'We saw it as a competitive advantage to be the first movers.'

Aligned with these thoughts, the emphasis was put on developing a neighbourhood that facilitated energy- and emissions-reducing technology. Before Ydalir joined as a pilot, the area had been approached like any other building project. Pilot owner 1 said the illustrations used at that point (Figure 1) did not fit their understanding of a ZEN. She elaborated:

> There was a big road coming into the area, big parking lots, and tall houses. There was a very suburban feel to it. [...] So, we had a guy make a new illustration that scaled it down a bit, with continuous paths for walking and biking and photovoltaics on the roofs.

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The new illustration she referred to (Figure 2) had also become very green. Another important change was the removal of car parks.

Figure 1: Before Ydalir became a zero emissions neighbourhood (ZEN) pilot project.

Figure 2: After Ydalir became a pilot project.

In this initial stage of the Ydalir pilot, technological optimism was apparent, and the belief in its transformational effect and attractiveness was evident. It was taken for granted that the ZEN, as a hub for energy-efficient buildings, was a unique selling point. Thus, the socialisation strategy at this point was playing on the energy performance of the buildings and that this was a neighbourhood based on cutting-edge science and technology. The ZEN centre became a socialisation agent, a way to gain trust and build confidence among the public that this was a project of the future. The visual representation (Figure 2) only in part reflected this strategy. While the wooden houses, the photovoltaics on the rooftops and the *lack* of infrastructure for cars signalled that this project was different from other neighbourhoods in Elverum, it still did not provide the impression that it was a highly technological neighbourhood. However, the overall greenness in the illustration can be viewed as a way to add a feeling of climate friendliness.

5.2 THE NEIGHBOURHOOD AS A FACILITATOR FOR SOCIAL SUSTAINABILITY

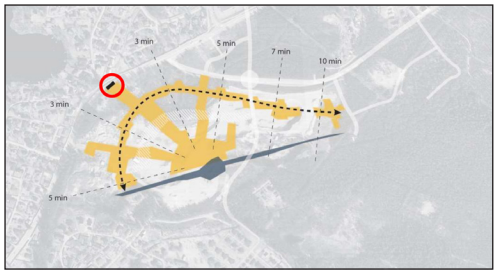
Pilot owner 1 explained that during the conception study, the need for something 'more' to illustrate and describe the qualities of the Ydalir zero-emission neighbourhood emerged. Three architects were invited to pitch their thoughts on what the area could look like. Pilot owner 1 said that one of the architectural companies stood out, presenting ideas and visions that gave the neighbourhood a wider purpose than just a hub for energy-efficient buildings. The architect in charge, Architect 1, elaborated on their approach in the interview. He explained that to take sustainability to the full would interfere too much with people's lives and culture. Drawing on contemporary neighbourhood development projects in Europe and the US, they mainly focused on two elements:

> To us, it was important to show that a place like Ydalir should have a certain hierarchy of urban spaces with a unifying heart, preferably connected to the school and a common area with some services. Second, we emphasized that this was an area that should stimulate people to park their cars and walk or bike instead.

By doing so, they highlighted the social qualities of the neighbourhood. Another social element that Architect 1 emphasised was diversity among the residents:

> We also believe that a socially sustainable neighborhood is recognized by social diversity and that this is secured through different housing types.

Thus, the neighbourhood was also presented as a site where people gathered and spent time with others unlike themselves. These ideas were supported by simple conceptual drawings (Figures 3–5) highlighting the infrastructure of the neighbourhood with a clearly defined centre, easy accessibility and with diverse housing types.



Based on the initial presentation, the architect was asked to develop new illustrations of the area (Figures 6–8). The main purpose of these illustrations, he explained, was to:

> convey identity and character to the area, and at the same time provide a backbone.

He added that these illustrations were meant to indicate that this was unfinished architecture and a work in progress.

Figure 3: Main roads for walking and cycling.

Figure 4: Accessibility by minute.

Figure 5: Diverse housing and variation.

Architect 1 hired a Spanish company to do the rendering (the work of turning three-dimensional (3D) illustrations into colourful and lively pictures). He explained that this type of outsourcing is a common practice among architects. However, they had not communicated very well, and the architect was not happy with the way the illustrations had turned out:

> I think they are really bad. It is very generic [...] it is too schematic, with not enough variation and too many trees. The spatial connections are not coming through here. [...] It is a bit strange that there are no photovoltaics on the roofs. That was an element that was confirmed at that point, but otherwise, there was not much focus on the technology. Anyway, the local technical guidelines from ZEN would not have made any difference on the shape or form of the buildings.

Figure 6: Detail of one area of Ydalir.

Figure 7: Inside the neighbourhood.

Figure 8: Overview of Elverum and Ydalir.

Nevertheless, for a long time, these illustrations were some of the most frequently used visual representations of the area. They also played an important role as inspiration for the local design company hired to develop a visual identity for Ydalir.

The initial request for the design company was to make a logo for the new Ydalir website. However, the designer in charge, Designer 1, was clear that the logo had to be based on a wider understanding of the project, a branding platform, and that the development of such a platform had to involve different actors. She elaborated:

> More important than how the logo would appear was to anchor this process with politicians, inhabitants of Elverum, neighbors, and potential homeowners to create a feeling of collaboration. [...] We thought that we would create enthusiasm and some type of popular movement.

She also explained that an essential aim of this work was to establish positive conversations about Ydalir in the local community and counter the negative voices. Thus, they arranged a workshop and invited a range of people, including developers, architects, potential homeowners, politicians, representatives from the culture sector and people involved in various voluntary associations. To put the participants in the right mood, they were introduced to examples of contemporary sustainable

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developments in Norway. They were also told about how Voss (a small village in Norway known for extreme sports and the production of exclusive water) had built a brand around its local values and bravery. Designer 1 explained that next, the participants were introduced to five personas that could be viewed as potential homeowners in Ydalir. They were then asked to define what they thought would be important for these personas, their needs, their joy in life and their challenges. The next task was to link these characteristics to Ydalir and how the neighbourhood could fill their needs and solve their challenges. At the end of the day, the participants were asked to vote for those personas they thought would be the most fitting residents of Ydalir. Young couples/families who had a connection to Elverum, but for different reasons had moved away got the most votes. In addition, older couples were considered a fitting target group.

This result was then used as input for what the design company later defined as Ydalir's main target group: the 'Y-people'. In the final presentation from the design company, the Y-people were described as:

> the gold of Ydalir, people who want to live in a way that enables the life of future generations: people who care.

How this group should be addressed to create interest, a positive reputation and sales was another important topic in the workshop. The zero-emission goal was up for discussion. Designer 1 explained:

> There was a big discussion if this was a trigger to buy a house. Do people really buy a house because it has zero greenhouse gas emissions? People were skeptical. [...] It was the other values that were highlighted, like the social aspect, sharing, easy access, and the ability to walk everywhere.

The designer pointed out that these values were not unfamiliar to people coming from or living in Elverum. Helping each other, borrowing and sharing things were considered latent in people from a small community such as Elverum. She elaborated:

> So, it was more about playing on what was already there. Even though the solutions are very green, the values of the future are already within people. And that is how the phrase 'the future is within us' came up. It is already there; it is more about bringing it out. Instead of communicating that this is something new and now we must live in a different way, we say this is a founding element in people.

In line with these thoughts, the payoff became 'the climate-friendly part comes along with the deal'. Also, the design company's work resulted in the definition of a 'value platform' for Ydalir. The three words 'close', 'lasting' and 'real' summed up the identity of the neighbourhood. 'Close' points to having everything you need within a short distance, but also being close to your neighbours; 'lasting' referred to the area being sustainable; 'real' was about how Ydalir has strong roots in nature and local history. As part of this value, joint ownership and sharing were included. To illustrate the identity of Ydalir, a series of photographs was taken to be used for different marketing purposes. The photos reflected the target groups defined and the values proposed, putting walking, nature, playfulness and the community at the centre (Figures 9–11).

Figure 9: Playfulness.
Figure 10: Community.
Figure 11: Activity.

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However, considering the time horizon of the project and that no one was hired to follow up on the communication, Pilot owner 3 explained that the work done at this stage was a bit premature. Thus, the branding platform was never fully rolled out in public as planned. Still, the work made an impact on the suggested use and meaning of the Ydalir ZEN. With Architect 1's ideas and perspectives in mind and the development of the branding platform, the emphasis was moved away from the neighbourhood as mainly a site for buildings and toward a site for people. In line with this, the socialisation strategy changed. Now the Ydalir ZEN was about facilitating the existing social values of the locals. Thus, the small-town legacy became a socialisation agent, emphasising how the newness coincides with people's values. Simultaneously, the technological solutions were toned down, making them a 'bonus', something that comes along with the deal. That the somewhat accidental disappearance of photovoltaics was not given greater attention or was corrected emphasises that the technology was no longer the most important feature of the houses or neighbourhood. The photos taken also supported this strategy by illustrating a way of living rather than a way of making the most out of technology.

5.3 THE NEIGHBOURHOOD AS A PROVIDER OF 'GREEN' SOLUTIONS

In 2021, the website, which for a long time mainly had been targeting developers, needed an update to reach out to potential buyers. A local advertising company was hired to undertake the job. Based on the work done almost four years previously, such as the architectural illustrations, the branding platform, the visual identity and the photos produced by the design company, the website took a new shape. Building on the same material, an additional 69-second video was made to provide a short introduction to the project. A representative from the advertising company, Art director 1, explained that the target group was now defined as 'everyone'. He elaborated on how they approached the task:

> We focused on the values, talking about the neighborhood being extremely climate-friendly, the purpose of the area, and that there is an outright sharing model on everything from tools to premises.

He also added that he believed that homeowners expect the technology to be integrated and not necessarily visible.

The website and the film both present climate-friendliness by referring to it as 'green' or 'a greener life'. When Figure 12 appears in the film, the voiceover states:

> This is where the future moves in with you, where you discover that it is possible to live a greener life and at the same time get things just the way you want them.

Combining a very green image from the woods with the voiceover provides a rather ambiguous understanding of what 'the green life' is really about. A similar example is found on the website, where Figure 13 is provided in combination with the following text:

> A greener life without limitations. Ydalir is on the border between the woods and the city, where the future moves in with you, and you realize that it is not just *possible* to live greener; it is exactly how it should be.

Figure 12: Still photo from the video.

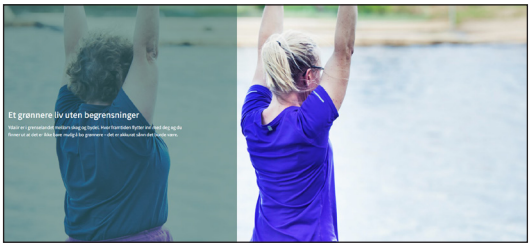

Figure 13: Homepage image: one of a carousel of homepage images.

Figure 14: Homepage image: the main front image of the carousel of homepage images.

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The main message of the website, however, is that Ydalir holds a great community, supported by the headline on the homepage (Figure 14), 'Side by side, and together'. Further down on the homepage, it is stated that 'the community is the foremost quality of Ydalir'. However, in the associated text, it is pointed out that it is up to everyone to decide *how much* they want to participate in the community. The technological solutions of Ydalir are presented behind a link titled 'Green enough, urban enough'. The landing page lists photovoltaics, district heating and well-insulated houses as the climate-friendly technologies of the neighbourhood. However, with only a short sentence describing the benefits of each of the solutions, the technology is given very little attention.

As the advertising company picked up the previous work done by the architect and the design company, the socialisation strategy remained to support social values. However, with the extension of the target groups, the small-town legacy was removed as a socialisation agent. Instead, the newness was made attractive by basically claiming that 'you will get it just the way you want it', indicating that a sustainable lifestyle is easily accessible. While the technology still receives little attention, the use of the phrase 'green' might be associated with sustainable developments, often including technological innovation.

5.4 PEOPLE AS PART OF THE SOLUTION: THE NEIGHBOURHOOD AS A SITE FOR SHARING AND CARING

As the realisation of the first construction phase approached, the developer in charge concretised the visual representations of the buildings and the spatial qualities in their construction area. New architectural drawings were made, and the sharing solutions were specified. While this work drew upon the existing representations, the developer added some nuances.

A representative from the developer, Developer 1, explained that they joined the Ydalir project as part of the company's growing investment in sustainability. The developer's perspective was that sustainability could not just be about transport and building materials. If so, Developer 1 argued, 'You would very quickly get solutions that are suboptimal.' She used the example of people buying small and energy-efficient apartments in the city only to make room in their budget for a cabin in the mountains (a practice that is highly energy intensive both regarding transport, heating and development of infrastructure).

Alongside the Ydalir project, the developer had been involved in another research project that was focused on reducing climate gas emissions. This project had a slightly different approach, concentrating on four main areas where emissions could be saved: energy use, food, transport and building materials. As they started working on how to reduce emissions from these four sources, Developer 1 explained that they quickly realised that they were able to solve much of it by focusing on the well-being *of*, and the interaction *between*, the residents. Bringing this recognition into the Ydalir project, the inhabitants' role was further emphasised. In the late summer of 2021, a new workshop was initiated. This time the topic was sharing solutions, and both developers, potential homeowners and others involved in the project were invited. The workshop aimed to define different types of sharing solutions and what resources, facilitation, organisation, *etc.* that was needed in order to successfully incorporate them. The discussions highlighted that joint ownership and sharing solutions require the homeowners to get involved and participate in the activities. While the actual organisation of the sharing solutions was proposed to be administrated by a paid employee, it was still clear that joint ownership held other elements than just the practical delegation of services and things. Strengthening the community, reducing loneliness, inclusion and integration came up as social benefits of sharing, demonstrating that involvement and care for other people are embedded in the practices of sharing. The participants were mainly positive about sharing. However, some commented on the possible downside of having to trust everyone to tend to things in the same manner as oneself. This concern illustrated that sharing also entails caring for things.

The balance between community and privacy was also emphasised by Architect 2, who made the final drawings of the first construction phase. He expressed that he had found inspiration in the characteristic alleys and the small backyards of older working-class neighbourhoods in Norway. He pointed to the illustrations (Figures 15–17) and elaborated on how he had tried to merge those qualities into the architecture:

> In the old days, people lived much closer [...]. So, I tried to find the right balance between private and public areas with a private garden in front and a public entrance from both the front and the back of the house.

He also emphasised that this was a way to fight loneliness as it increased the space for human interactions. He also expressed that he believed that too much visible technology would remove the homely feeling. On the developer's website for the project, Figure 15 was presented with a headline saying, 'New houses with solutions for a climate-friendly and social lifestyle'. The use of words such as 'future orientated' and 'green' was mainly to introduce the technological solutions.

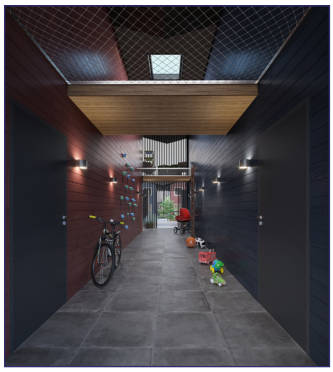

Figure 15: Public area.
Figure 16: Common entrance.
Figure 17: Front garden.

Through the work in the final stage, before the houses were put out for sale, the socialisation strategy took yet another turn. While the previous strategies had proposed the 'new' practices of Ydalir as easily accessible, the concretisation of the sharing solutions and architectural drawings put a greater responsibility on the homeowners to get involved. The recognition of care being embedded in the practices of sharing played an important part in this turn, representing Ydalir ZEN as a site for people who actively participate in sustainable practices.

6. PREPARING FOR SUCCESSFUL DOMESTICATION

The process presented in the previous section identified socialisation agents and strategies. This section considers the three dimensions of domestication to assess how the strategies suggest different meaning and use of the neighbourhood.

6.1 FROM PASSIVE RECEIVERS TO ACTIVE PARTICIPANTS

In the beginning, people's practices in the neighbourhood were not really taken into consideration. Instead, residents in a ZEN were viewed as passive (and presumably grateful) receivers of new energy-efficient solutions. However, as the process went on, the focus was turned to the activities and interactions in the neighbourhood. While people's practices received more attention, the neighbourhood was still represented as a facilitator for an easily accessible, sustainable lifestyle. This representation was sustained throughout the development of the branding platform and the work of redesigning the website. However, as the sale approached, the view on practices slightly shifted. In the process of specifying the sustainable activities that the neighbourhood provides, people's practices became *a part* of the solution. The process also amplified that practices of sharing are closely linked to practices of caring and that the Ydalir ZEN facilitates environmental sustainability through social practices.

6.2 THE ROLE OF IDENTITY AND PURPOSEFUL LIVES

With the neighbourhood as a facilitator for zero emission buildings, the area was represented as a place that would make people sustainable just by buying a house there. Thus, technology was the enabling part. After attention was brought to practices, the meaning slightly changed. By presenting it as easier for people to take on new and more sustainable practices, this was foreseen as a site for

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people who care about the future. However, it was still represented as easy. As the notion of sharing grew, the role of the inhabitants became more essential. The meaning of the neighbourhood is now imagined to be a site where people collaborate and care, supporting an identity of a life with purpose where inhabitants are responsible participants in the energy transition.

6.3 LEARNING FROM THE PAST

Throughout the process, the key actors involved have gotten their inspiration from different sources. In the beginning, the technological innovations produced in FME ZEN seemed to be the main guiding principle for the pilot owner's understanding of the ZEN concept. This was also projected in how they first represented the area. When Architect 1 and the design company entered the process, they mainly drew experience from contemporary neighbourhoods, both in- and outside Norway, putting the modern way of living as a way to make sense of a ZEN. However, the further emphasis on sharing solutions and thereby caring brought attention to another inspirational source: the past. Drawing on older working-class neighbourhoods provided guiding principles regarding both shape and balance between public and private spaces. The result can be viewed as a suggestion for people to use the past as a guide to a more sustainable lifestyle.

7. DISCUSSION

The analysis presented can be summed up in two main trends. First, technology has gone from being viewed as the enabler of the ZEN to a bonus factor. When Ydalir first became a pilot project, the forefront technological solutions were perceived as the main selling point. Through the socialisation process, technology has lost this position. However, technological solutions are still expected but are not viewed as the main reason for people buying a house there. Second, the presumption of the inhabitants of the Ydalir ZEN has gone from passive receivers of climate-friendly technology to active participants in more sustainable activities, such as sharing and caring. However, sharing and caring are not just about the environment, they also address loneliness, a sedentary lifestyle and the rising number of elderly inhabitants.

As mentioned in Section 2, the work in FME ZEN represents what Guy & Farmer (2001) refer to as the eco-technical logic. This logic was also evident in Ydalir during the first stages of the pilot project. The pilot actors had a very commercial and future-orientated approach, relying on technological innovations to be the main attraction of the area. However, throughout the socialisation process, where the social aspects of the neighbourhood have been emphasised, the representations of Ydalir have moved towards a competing logic, the eco-social (Guy & Farmer 2001). This logic:

> extends the social agenda of sustainability beyond the concern for the individual to encompass a discourse that suggests that the root of the ecological crisis stems from wider social factors.
>
> (145)

Strong communities that serve common needs and goals, and where the level of material goods is minimalised, and the use of human resources is maximised, are emphasised. By mainly associating the attractiveness of Ydalir with the social aspects of sharing and a strong community, the eco-social logic has become more dominant in the representations of the neighbourhood. This also results in moving away from 'environmental realism' (Macnaughten & Urry 1998), putting a larger responsibility on the inhabitants to solve the environmental problems. By working on the basis of two competing logics, the pilot project and the research centre are mainly accessing the solutions from two different viewpoints. While the textual and visual representations of Ydalir prepare for the ZEN concept to be domesticated with a bottom-up social approach, the main research agenda in FME ZEN suggests a technical top-down approach. These mixed messages can create a discrepancy in how the wider public understands the ZEN concept.

With care being a central part of the eco-social logic, the local context comes into play. As care is materialised through practices by diverse assemblages rather than in technologies, care is situated (Arora *et al.* 2020). This leads us to the idea of 'careful places' where care is central to both the development and organisation of the neighbourhood (Eidenskog 2021). This is reflected in the representations of Ydalir where the small-town legacy guides caring practices. While these, at this point, are *imagined or suggested* practices, the role of the local context is still underpinned.

Social sustainability has gained increased attention in neighbourhood developments over the past years (*e.g.* Hagen *et al.* 2017; Shirazi *et al.* 2022). That this attention also has influenced the process of making Ydalir attractive can, in part, be identified through the experiences and inspirations from which the involved actors drew. Also, the work in Ydalir is reflected through the development of the assessment criteria 'urban form and land use' in the ZEN definition guidelines (Wiik *et al.* 2022). However, what we see in both the ZEN centre and in the case of Ydalir is that social sustainability and energy-saving technologies are mainly represented as separate issues. A key principle in the development of socially sustainable neighbourhoods has been social interactions (Shirazi et al. 2022). Nevertheless, planned meeting points in neighbourhoods have not necessarily resulted in people making contact with someone they do not know. For instance, in Vallestaden in Sweden, the designed meeting areas along a stream ended up being emphasised by the inhabitants as meeting points with nature instead of with people (Eidenskog 2021). However, while the physical meeting points did not spark new social contacts, the inhabitant's Facebook group did. For both the ZEN centre and Ydalir, this might be worth considering, as creating stronger links between sharing and caring, and technological innovation can contribute to mutual reinforcements.

8. CONCLUSIONS

This paper has investigated how the Ydalir zero emission neighbourhood (ZEN) has gone from being represented as a hub for energy-efficient buildings to a facilitator of sustainable practices of sharing and caring. By viewing the production of visual and textual representations as socialisation efforts, the analysis shows that the social qualities, rather than technology, provide more suitable entry points in the efforts to make the ZEN concept attractive in the local market. Also, the experiences and inspiration that the involved actors drew on affected this outcome. Further, addressing the socialisation efforts as preparation for successful domestication, the analysis uncovers how the shift in socialisation strategies entails a change in the suggested meaning and use of Ydalir ZEN. When Ydalir became a pilot project, the ZEN concept was foreseen to provide passive residents easy access to innovative sustainable energy solutions. By the time the houses were put out for sale, the socialisation strategies had affected this vision suggesting that the ZEN concept facilitate sustainable activities drawing on values and practices from the past. Hence, the Ydalir ZEN now promotes a way of living rather than technological innovation. This has created a separation of the social and technological attributes of the neighbourhood, making it difficult to merge these qualities into one concept.

The process of making a ZEN pilot project attractive in a local market entails more than simply extracting selling points from the ZEN centre's vision and definition guidelines. The socialisation strategies used in the Ydalir project have illuminated local values, user preferences, social experiences and local history as influential. Further, viewing the strategies as preparation for domestication has brought a better understanding of how the process is involved in producing the concept itself. Emphasising 'the local context' as key in this process, the outcome could be different in other pilot projects or in other sustainable neighbourhood developments. However, the consequences of separating the technological and social attributes of the neighbourhood could serve as a more general lesson for actors involved in sustainable neighbourhood developments.

While Ydalir's focus on social sustainability has been met with both interest and support from the ZEN centre, the technological solutions remain vital for achieving the zero emission goal in the ZEN definition guidelines (Wiik *et al.* 2022). Thus, a stronger connection between the social and technological attributes of the neighborhood is desirable. This connection should be reflected in both the research agenda and the representations of the neighbourhood.

Drawing on the proposal that energy-efficient houses can be agents of care (Chambers 2022) leads to additional research questions to be addressed:

- How can energy flexibility support practices of sharing?
- How can energy-efficient buildings contain elements of care?
- How can we use technology to make sharing easier for the inhabitants?
- How can technology be used to support care and the development of a strong community?

NOTE

1 See https://sdgs.un.org/goals/goal11/.

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COMPETING INTERESTS

The author has no competing interests to declare.

ETHICAL CONSENT

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