

Social housing for seniors: best practices on achieving comfortable and energy efficient buildings



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Between 2010 and 2015, housing providers in Europe have invested more than €32.8 billion in refurbishment projects in the domain of clean energy transition in 1,843,000 dwellings generating a total of over 500,000 full-time jobs, according estimations by Housing Europe. This paper deals with sustainability and clean energy solutions for social housing for older people in the Netherlands.

Generally, Europeans are living longer than ever in history, and by the year 2020 around 25% of the population will be over 65. The increasing group of older people poses great challenges in terms of creating suitable living environments and sustainable housing facilities (van Hoof & Westerlaken, 2013). In the search for sustainable buildings, building services need to become increasingly energy efficient, or contribute to the concept of energy neutral or energy-producing buildings. It is important to see how such strategies take place in practice and contribute to the innovative capacities in the domain of housing.

In the Netherlands, there are over 7 million dwellings of which 2.4 million are owned by social housing associations that are members of Aedes which amounts to 32 percent of the total housing stock. Aedes is the national Dutch organization promoting the interests of social housing associations. Of these 2.4 million dwellings,

over 700,000 units provide a home for people aged 65 years and older. Recent market explorations by ABN AMRO bank (2016) have studied the status of the Dutch healthcare real estate in terms of sustainability performance and the related requirements for change and need for financing. The total surface area of real estate in long-term care is about 22 million m². As this surface area is vast, the bank advises to focus on real estate with an average age between 6 and 15 years old. The premises are adequate in terms of user-friendliness and health but do not yet exploit all potential for energy conservation. The bank, also, estimates that about 5 to 10% reduction in CO₂ emissions is possible by a change of behavior of the occupants, for instance, by tuning the need for lighting and heating. The main solutions for energy savings lie in the installation of LED lighting systems (with sensors to detect the presence of people and availability of daylight), solar panels and heat pumps, which comes at a cost of €185 per m².

This leads to a reduction in CO₂ emissions of over 60%. ABN AMRO further estimates that for the total long-term care sector, €900M suffices to make real estate sustainable. The payback time would be less than 10 years.

According to Aedes, a total of 142,000 dwellings in the Netherlands were retrofitted in terms of energy performance between 2010 and 2015. There is an increasing number of dwellings that are being retrofitted over time, a number that has more than trebled over the last 7 years. This trend is reinforced by a sense of urgency amongst national and local politicians that encouraged the creation of a package of energy efficient measures in combination with yielding positive effects on the purchase power of tenants. This means that energy efficiency in the built environment is a significant domain for business for construction companies and building services engineers.

This paper focuses on the domain of social housing for older people, and presents a number of best practices on energy consumption and sustainability from The Netherlands.

Profile of Habion

The Netherlands has a long tradition and history of social housing, providing housing to people with limited financial resources. Habion is a social housing association specialized in housing for older people in need for care and services. The average age of the residents is 80 years. The association is active in 71 Dutch municipalities.

In 2016, Habion owned 5797 housing units for independent living, 66 residential care facilities and 19 nursing homes. These residential care facilities and nursing homes comprised 4847 units in total. The average rent of a dwelling was €575.42, and the overall rental income totaled €73.1M in 2016.

In 2016, Habion witnessed a number of important events, namely a number of transformation projects in which former aged care facilities were transformed into new living communities for older and younger tenants, which still offer amenities for the provision of healthcare but have a different focus. The quality of housing, community and living together prevail over an institutional model of care. This means that old real estate is re-used and retrofitted also in terms of installing new building services throughout the premises. This is part of the sustainability strategy as included in the association's mission statement. The

general tendency in the Dutch care sector is that buildings have an average functional lifespan of 30 to 40 years and, thereafter, disposition or demolition takes place due to an increased frailty of the older residents.

Habion and sustainability

Habion has included sustainability in its extended mission statement on the basis of people, planet and profit. For Habion, this means 'building together', 'a minimal use of resources', and 'flexible buildings'. In collaboration with (future) residents, partners in healthcare, other suppliers and the local community, Habion develops and redevelops its real estate portfolio. The re-use of structures and materials is a foundation stone in these processes. Other key words are energy-neutral buildings, circularity ('Habion no longer demolishes buildings, but reinvents them'), and smart technologies.

The average Energy Index – a Dutch index in use since 2015 for social housing associations which influences the level of the rent - of Habion's portfolio is 1.58. A further improvement of this index is foreseen in the future and it is part of the active mission of the association. In the long run, the Energy Index of the portfolio is expected to come down to less than 1.41. Qualitatively, this roughly corresponds to an improvement from Energy Label C, according to the pre-2015 method¹, to Energy Label B. In order to limit hindrance to its occupants, Habion chooses to improve the energy performance of a building at the moment of new construction or renovation. Overall, the measures taken should not only improve the Energy Index and the sustainability of a dwelling itself, but also contribute to the comfort of the tenants and minimizing the cost of living.

Projects of Habion

In 2016, a number of initiatives in the domain of sustainability were commenced, namely:

- All residents received a letter from a supplier of green energy only (*Woonenergie* company). About 2.5% of the tenants applied for this green energy package.
- In various locations, Habion facilitated the establishment of a building lease to install solar panels on roofs of real estate that is part of Habion's portfolio by other parties.

In the previous years, Habion facilities participated in an energy competition.

¹ This Energy Label consisted of only 9 energetic aspects of a dwelling. The new Energy Index encompasses 150 characteristics of a dwelling and provides a more detailed view of a building's energy efficiency.

Solar panels

Habion has decided to continue its participation in the 'Zon op Zorg' initiative. Together with the Dutch sustainability organization Urgenda², Habion started the initiative Zon Op Zorg (*-Sun on Top of Care*) in order to install solar panels on as many aged care facilities in the Netherlands as possible. Through the help of the joint crowdfunding website www.zonnepanelendelen.nl³ (*-sharingsolarpanels.nl*), anyone can be a co-owner of a solar panel that is to be installed on top of an existing or new care building. Habion provides its rooftops for the project but it is not involved in the ownership of the panels or the generation or distribution of the electricity. Together with tenants and www.zonnepanelendelen.nl three crowdfunding actions were started to install solar panels onto Habion's rooftops. The interest in society to participate was substantial: in the first project, it took six weeks to receive sufficient funding, in the second about three weeks, and in the third project just over one week. About 1,300 solar panels were installed at three sites: at De Benring in Voorst in 2015 (**Figure 1**), and at De Molenhof in Zwolle and 't Kampje in Loenen aan de Vecht in 2016. About 20% of the investment is funded through a national scheme for stimulating green energy solutions. The total reduction in CO₂ emissions amounts to 127,000 kg per year. With new projects on the way in 8 Habion facilities, the future reduction will be even larger at an estimated magnitude of 549,000 kg per year. The installation of solar panels meant that an additional electrical infrastructure had to be installed by skilled workers (**Figure 2**).

The return on investment, with a term of 16 years, is predicted to be 3.5% on average per year. This is much higher than the current interest rates for Dutch savings accounts which are around 0%. Residents



Figure 1. Solar panels on the roof of De Benring building.

and non-residents can invest in the crowdfunding actions. Residents and people living in a limited radius of the building are giving priority in buying bonds. Grandparents are called upon to invest in solar panels

In case of De Benring, it took 26 days to raise €160,000 (or sell 6400 bonds) among 119 participants for 512 solar panels (type 512 x CSUN 255 Poly, 255 Wp). The minimum investment was €25 per person, with a single 'solar part' producing about 16 kWh of power per year, or €350 per person for a single solar panel. The output is estimated to be 872.3 kWh/kWp and in the first year the panels produce 114 kWh worth of energy. This equals about 33 household's worth of energy.

In case of De Molenhof, 300 panels (type 300 x REC – REC265PE) were installed, and a total of 136 participants raised €100,000 (or purchased a total of 4000 bonds) for the project. The output is estimated to be 886 kWh/kWp and in the first year the panels produce 70 kWh worth of energy.

In case of 't Kampje, 480 panels (type 480 x REC – REC260PE) were installed and a total of 206 participants raised €150,000 (or purchased a total of 6000 bonds) for the project. The output is estimated to be 904.4 kWh/kWp, and in the first year the panels produce 113 kWh worth of energy.

² The Dutch Urgenda Foundation aims for a fast transition towards a sustainable society, with a focus on the transition towards a circular economy using only renewable energy. It works on solutions for this transition, including for example the introduction and realization of 'energy neutral' houses and the acceleration of electric mobility. <http://www.urgenda.nl/en/>

³ <https://www.zonnepanelendelen.nl/project/debenring/project-update/zon-op-zorg-van-start>



Figure 2. Installing solar panels in existing building, requires installers to improve electrical infrastructure.

for their grandchildren, for instance, to save money for future studies and tuition fees. Bonds can even be part of the inheritance when passing away. The tenants of the Habion facilities themselves are benefiting from the Zon op Zorg project as well, through the concept of the Green Wall. This wall displays the amount of energy generated and contains plug sockets that can be used free of charge in order to charge the batteries of mobility scooters. The overall services costs can be lowered as some of the energy generated is used to power the lighting in the shared spaces such as corridors. A small amount of the revenues are used to fund activities of residents, preferably so-called 'green activities' and this amount is kept by the manager of the building.

Energy competition

In the Netherlands, costs for care and costs for housing in aged-care facilities used to be part of a single financial government arrangement. In aged-care facilities, older residents are now more often being obliged to pay for their own expenses for housing and, thus, also for the utilities. In 2012, Habion investigated

the quality of its portfolio and this analysis showed that the institutional care facilities showed a large potential for energy savings. Habion has formulated goals for sustainability which are based on the strategic starting-points of controlling costs of housing and being economically profitable. Parallel to setting these goals, Habion engaged in dialogues with societal partners in order to engage in concrete sustainable initiatives that would lead to lower costs for energy. In a time of rising rents and pension rates that remain on an equal level, cutting down on energy may be a way to both be environmentally responsible and save on scarce financial resources. In 2012, the energy costs were about 25% of the total costs of housing, or €150 per month. Being able to save about 10 to 20% per month equals an amount of €30, which can be substantial when one's pension is low.

Therefore, Habion has participated in the so-called Energiestrijd Zorghuizen⁴ (*Energy Battle Care Homes*), together with the aforementioned organiza-

⁴ www.Energiestrijd.nl/zorghuizen

tion Urgenda and Meneer de Leeuw (*~Mister Lion*)⁵, in order to create awareness among tenants concerning the costs of energy, as well as change people's behavior doing things together and with enthusiasm. The main goals were the reduction of CO₂ emissions, the control of costs for housing and living and increasing comfort and indoor environmental quality. The Energy Battle is a competition between aged care facilities on energy savings. Every year, residents and staff battle from December 21st to March 21st (start and end of the winter season), by monitoring their energy consumption and by finding out who did best in terms of energy savings. Habion stimulated the participation in the Energy Battle because of the goals it set out in terms of sustainability and affordability also by paying half of the participation fees (€2.000). In the winter of 2014–2015, a total of 38 aged care facilities joined the Energy Battle of which six were Habion locations. In mid-2015, these aged care facilities together managed to cut down €200.000 on the utilities bills, which amounts to a 16% cut in energy consumption without sacrificing comfort and without pre-investments. The winner of the battle managed to save a staggering 55% which amounted to €20.000 for 70 residents, or, on the individual level, €286 per resident. Habion and Urgenda calculated that for the 76 care facilities Habion had in its portfolio, over €1M could be saved. For all 1900 long-term care facilities in The Netherlands, annual savings could be between €20M and €40M.

In fact, all participants of the Energy Battle were winners and each one of them managed to save energy and, thus, costs. Some of the successful solutions were the application of a set-back mode for collective heating installation, the reduced use of lighting in shared spaces, separate day and night modes for air handling units and a check of the controls of central heating installations. The most important lessons learnt were that, apart from creating awareness and behavioral change, it was fairly easy to save on energy for heating without sacrificing the perceived thermal comfort. Staff and residents also stated it is 'good fun' to compete with other aged care facilities.

⁵ Mister Lion is an Amsterdam-based lab for societal change. Mister Lion organizes local and transnational innovation communities around sustainability issues and has expertise in co-creation and transition management. Mister Lion's work includes interventions in regional development, urban mobility, urban climate mitigation, energy saving, youth employment, international cooperation, refugee shelter, healthcare and civic participation. <http://www.meneerdeleeuw.nl/abroad/>

Take home messages

Habion shows that real estate, that seems functionally outdated, can still be useful. As the older people in our societies are growing increasingly older, older dwellings are needed from a demographic perspective in order to provide adequate housing. This means providing housing of a scale and size that fits the needs of one's life stage. The crowdfunding actions have demonstrated a substantial willingness in society to invest in green energy partly because of the return on investment. Investors contribute to both financial and societal returns. Many older people participate by buying bonds. This enables them to leave something for their (grand)children: a better world, bonds, and financial revenues. Habion is working hard to achieve an annual reduction in CO₂ emissions of over 1 million kg per year by making its real estate more sustainable. When transforming healthcare real estate, sustainability and energy producing building services technologies should be an integral part of the strategy. Sustainability means business and can be at the basis of collaboration between social housing associations and the building services sector. Chain partnerships can lead to mutual benefits in which real estate for older people and the behaviors of the residents can contribute to the goals set out for a sustainable society. ■

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