

Sonderborg retrofitting package



Main sector

- District energy
- Smart electricity

Overview

In Sonderborg, 7 different social housing departments with a total of 815 apartments and 1,400 tenants are involved in the retrofitting package. The 7 departments will have different retrofitting measures implemented. The measures include insulation of facades and roofs, airtight constructions, new low-energy windows and doors, new ventilation systems with heat recovery replacing traditional exhaust air ventilation systems, new indoor LED in common areas and in kitchens and bathrooms, new outdoor LED street lighting in the housing ground areas, automatic heating control systems in district heating supply of the buildings, improvement of the indoor climate, installation of a total of 6,000 m² of integrated solar photovoltaic plants for electricity supply in the majority of the housing departments with a focus on good architectural integration of the solar panels in roofs and facades.

The objective of the measures is to reduce energy consumption for the residents, to improve the indoor climate in the buildings and to assist Sonderborg with the aim of becoming a carbon neutral city in 2029. Furthermore, the objective is to install systems which can increase the level of intelligent operation of the buildings to assist Sonderborg in becoming a smart energy city. Here, the focus is on lighting demand control, heating demand control and intelligent control of the solar panels contribution based on electricity demand.

The 815 apartments belong to 3 independent social housing associations in Sonderborg, who decided to cooperate closely in order to reduce CO₂ emissions and to save energy. To assist them in reaching this goal, the housing associations engaged an independent energy consultancy/engineering company in the city. At regular meetings among the housing associations, ideas and experiences are discussed and implemented in the building retrofitting process.

Business model

The business model for traditional energy retrofitting measures is that the rent increases for the tenants due to investments in retrofitting measures that will be compensated by a similar reduction in energy expenses for the tenants. In addition, in most cases there will also be an improvement in the indoor climate of the apartments.



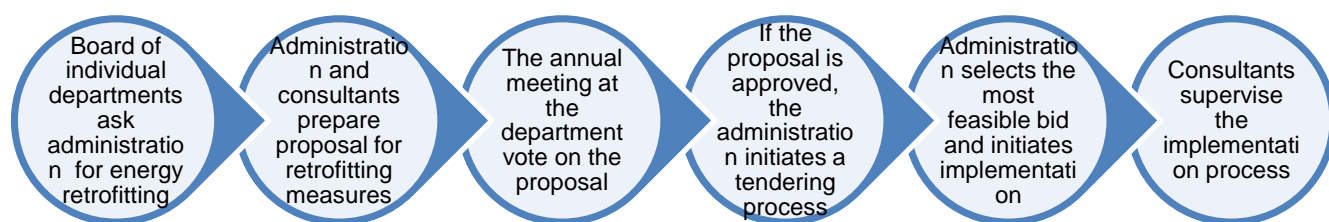
For the solar photovoltaic plants installed by most of the departments, the business model is to use the majority of the solar electricity in the apartments in the same period as the solar electricity is produced and submit the lowest possible amount to the public grid. The reason is that the solar electricity used immediately by the tenants themselves will save 0.30 EUR/kWh, while the solar electricity submitted to the grid will only be compensated with 0.11 EUR/kWh. Therefore, the solar systems are designed so that a minimum of 80% of the produced electricity can be used directly in the apartments, and a maximum of 20% will be submitted to the public grid.

A part of the business model is that the contractor/supplier provides the financing in addition to the delivery and installation of the energy retrofitting measures. The financing is paid back with the actual value of the obtained energy savings. This means that the residents do not get any savings on their energy bills until the investments have been repaid, but after that period, they will have a considerable reduction in their energy bills without having to pay a higher rent.

Citizen engagement

All individual departments have a separate board consisting of 5-8 residents from the specific department. This board is elected by all the residents in the department at an annual meeting. The administration of the housing associations together with their external consultants prepare a proposal for energy retrofitting the individual departments. The proposal includes investments, financing expenses, impact on rents, amount of energy saved, payback period and other positive results of the retrofitting like improved indoor climate, saving of maintenance expenses etc. Based on the presentation and discussions at the annual meeting, the residents present at the meeting vote yes/no for the proposal, and it needs a simple majority by the residents present to be approved. If the proposal is approved at the annual meeting, the administration will initiate the implementation of the retrofitting measures

Process



Benefits

- Increased resource and energy efficiency
- Reduction of energy bills
- Reduction of carbon emissions
- Better (evidence-based) planning
- Stable long-term return on investment
- Increased comfort
- Social integration

Stakeholders

Owner of the solution	Social Housing Associations
Service/technology provider	Consulting architects and engineers/ building contractors
Users	Residents
Investors	Social Housing Associations

Investment/Finance

Ca. 10 Million €

Potential for replication

It is anticipated that the developed methods for building integration of solar photovoltaic panels, and the developed simulation software for distributing the produced solar electricity for immediate use and selling it to the grid can be replicated in other cities. It can be done by organizing seminars and workshops for architects, building engineers and electricians, and the local electrical supply companies of course also have to be involved.

The special financing scheme provided by the contractor can also be replicated to other cities. The scheme is that the exact measured energy saving is used to pay back the investment, which means that the residents do not experience an increase in their rent and also do not get a reduction in their energy costs until the investment is paid back. This financing scheme can be organized by investors like pension funds, which have the aim to invest a part of their funds into sustainable energy projects. Stakeholders such as housing associations and municipalities can contact local or national pension funds and discuss the possibilities of creating such a financing scheme.

The citizen engagement process in social housing associations in Denmark is very rare in Europe and could be interesting for other cities and countries to replicate. It is a democratic bottom up decision making process where the tenants in each of the local housing departments elect the overall board of representatives, who elects the board of the association. Furthermore, all investments in each of the local housing departments have to be approved by the local tenants. However, these democratic approval processes of course need to be reflected in the laws of specific countries

Contact

Torben Esbensen M.Sc.
Danish Energy Management & Esbensen A/S
Consulting Engineers
www.dem-esb.dk
te@dem-esb.dk

