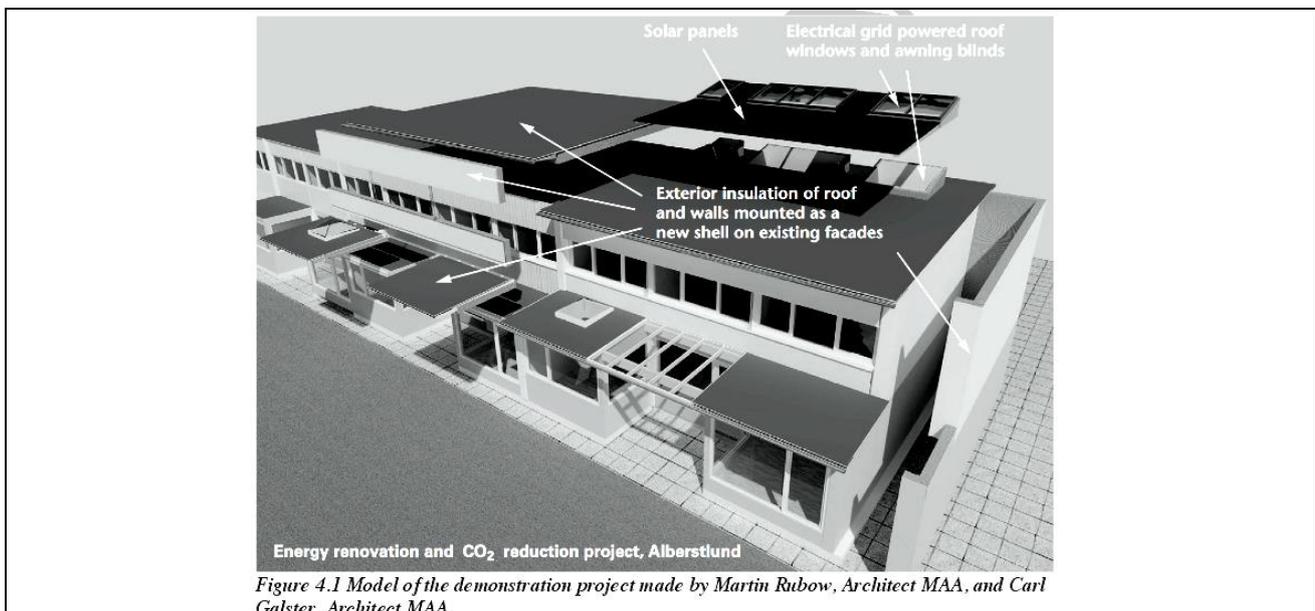


## Case 9 Albertslund, Denmark: Upgrading of the Residential Quarter 2011-12<sup>1,2,3</sup>

Primary Tool: →Tool URR 1

### Problem to resolve

In the city of Albertslund, close to Copenhagen, a residential quarter of 2200 dwellings originally built between 1960 and 1980 needed to be upgraded to modern energy standards with the aim of achieving 73% energy savings. Apart from standard solutions involving passive wall and roof insulation, active solar gain shall be added by means of also prefabricated 'Solar Prisms' to be placed on the roofs. These elements will contain solar water collectors, electro-voltaic cells, heat pumps, heat exchangers and roof lights.



## How does it work?

In mass housing schemes most units tend to have the same construction and typology and were built to low or medium standards. When it comes to urban renewal and revalorization the energy standards invariably have to be improved. By definition mass housing refers to a large number of units involved and therefore cost savings can be achieved through standardization and mass production of solutions which not only cater for insulation demand but also for the capture of natural energies. → **Tool URR 1**

## Background:

Albertslund is one of several small municipalities with 30,000 residents west of Copenhagen, the capital of Denmark. Its origin is the result of the building boom of the 1960s, and it was planned along the experimental principles of urban and traffic planning of that time. A thinly populated area was transformed into a laboratory for urban development, democracy, and industrial building - located close to green areas, close to metropolis, close to commuter train.

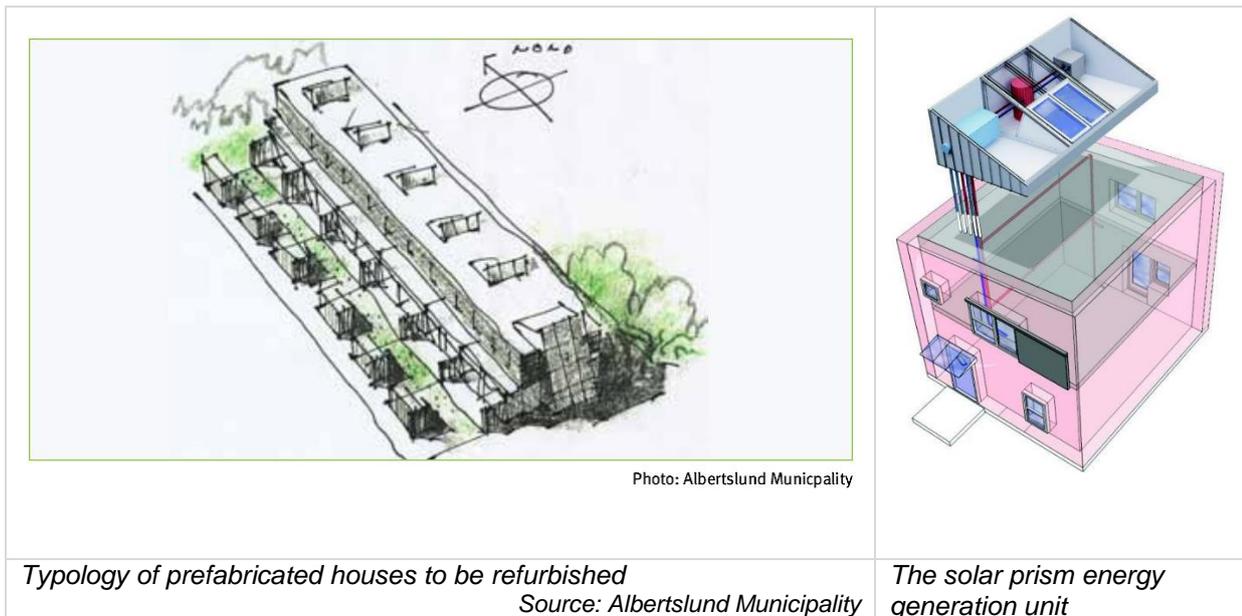
All houses in Albertslund are heated by a large district heating plant providing some of the cheapest heating costs in Denmark. Although the houses are poorly insulated and drafty, they are therefore relatively cheap to warm up. The architects and energy consultant were enthusiastic about the project and aimed for an ambitious energy renovation. This challenged a reasonable cost-benefit result that is sensible for a privately owned house.

A prototype house was to be designed as a standard solution to inspire future renovations throughout the neighborhood. The contractors' bid on the first detailed design proposal turned out to be too expensive and would have resulted in a considerable mortgage increase even when taking the lower heating costs into account. However, no one could be forced to renovate his or her house; the owner of a private property solely decides on this investment. Thus a sustainable solution was contingent on being economically viable. The project was then profoundly redesigned, cutting all high-expense and low-energy-saving ideas, including dropping insulating the footing below ground level, aligning windows and doors with the new shell, and so on. Moreover, during the actual project, many new ideas were developed regarding how to further minimize costs, including blowing insulation granulate into prefabricated shells rather than attaching insulation batts and plastering a shell onto these afterward. The result is a **renovation where the energy cost savings almost balance the investment**. And taking the additional improved environmental, comfort-related, and aesthetic elements of the project into account, the investment is broadly assessed as both beneficial and attractive. The final project comprised the following features:

- Exterior insulation of roof and walls mounted as a new shell on existing facade.
- Solar panels ensuring self-sufficiency in electricity.
- Electrical-grid-powered roof windows with rain sensors.
- Electricity-powered exterior awning blinds providing more daylight and fresh air while also preventing overheating during summertime.

The most outstanding feature is the **The Solar Prism – a truly green innovation**.<sup>4</sup> This **Pre-fabricated product** was developed by VELUX as part of the overall renovation solution and consists of the main elements:

- (1) **Surface** – Roof windows, passive solar energy, solar thermal collectors, and solar photovoltaic collectors.
- (2) **Technology** – Heat pump, solar hot water, and heat recovery ventilation.
- (3) **Interface** – Insulated prism construction, hosting the technologies.



## Lessons learnt

A cost-effective concept for energy renovation of homes has placed Albertslund Municipality among the finalists for recognition as Nordic Energy Municipality 2011. As the greatest potential for energy savings and reduction in relation to climatic pressure stem from existing buildings, the Albertslund concept aims at developing, testing and demonstrating **standardised energy saving solutions**. All buildings under the project are prefabricated. Therefore, the project has aimed at delivering prefabricated solutions which are applicable to a large number of different building types, focusing on the mass production models of the period. This method makes it possible to transfer solutions, developed under the Albertslund concept, to renovation projects all over Europe. The Albertslund concept focuses on developing methods and technical solutions which make energy renovation cheaper than it is today and thereby financially more advantageous. Another ambition is to develop solutions which better suit a holistic approach to building renovation, as this often calls for options which increase daylight access and a better indoor climate.

## Credentials

Authors: Kosta Mathey and Florian Steinberg

## References

- <sup>1</sup> <https://www.norden.org/sv/nordiska-ministerraadet/ministerraad/nordiska-ministerraadet-foer-naeringsliv-energi-och-regionalpolitik-mr-ner/nordiske-energikommuner/nominerade-kommuner/albertslund-kommunes-fact-sheet> viewed 25/05/2015
- <sup>2</sup> <http://www.nordicenergymunicipality.org/> seen 02/06/2015
- <sup>3</sup> [http://www.klimabuendnis.org/fileadmin/inhalte/dokumente/MV2010/Niels\\_Carsten\\_Bluhme16042010\\_-\\_Climate\\_Plan\\_and\\_green\\_innovation.pdf](http://www.klimabuendnis.org/fileadmin/inhalte/dokumente/MV2010/Niels_Carsten_Bluhme16042010_-_Climate_Plan_and_green_innovation.pdf) viewed 25/05/2015
- <sup>4</sup> [http://www.vejrmolle.dk/Energiprojekt\\_files/CASE%20Energy%20Renovation%20and%20CO2%20Reduction%20Project-Preprint%20version.pdf](http://www.vejrmolle.dk/Energiprojekt_files/CASE%20Energy%20Renovation%20and%20CO2%20Reduction%20Project-Preprint%20version.pdf) viewed 25/05/2015