

## Local project in Albertslund - DENMARK

The Danish Housing company, BO-VEST, is responsible for the largest and most costly renovation plan for social housing in Denmark where approximately 2200 industrialised concrete housing units from the 1960's, in the municipality of Albertslund, will go through a costly urban renewal renovation at an estimated cost of not less than 180.000 Euro per unit. In all around 360 Mio. Euro. Besides there is also childcare facilities, institutions for elderly people, a school, a library and a shopping centre.



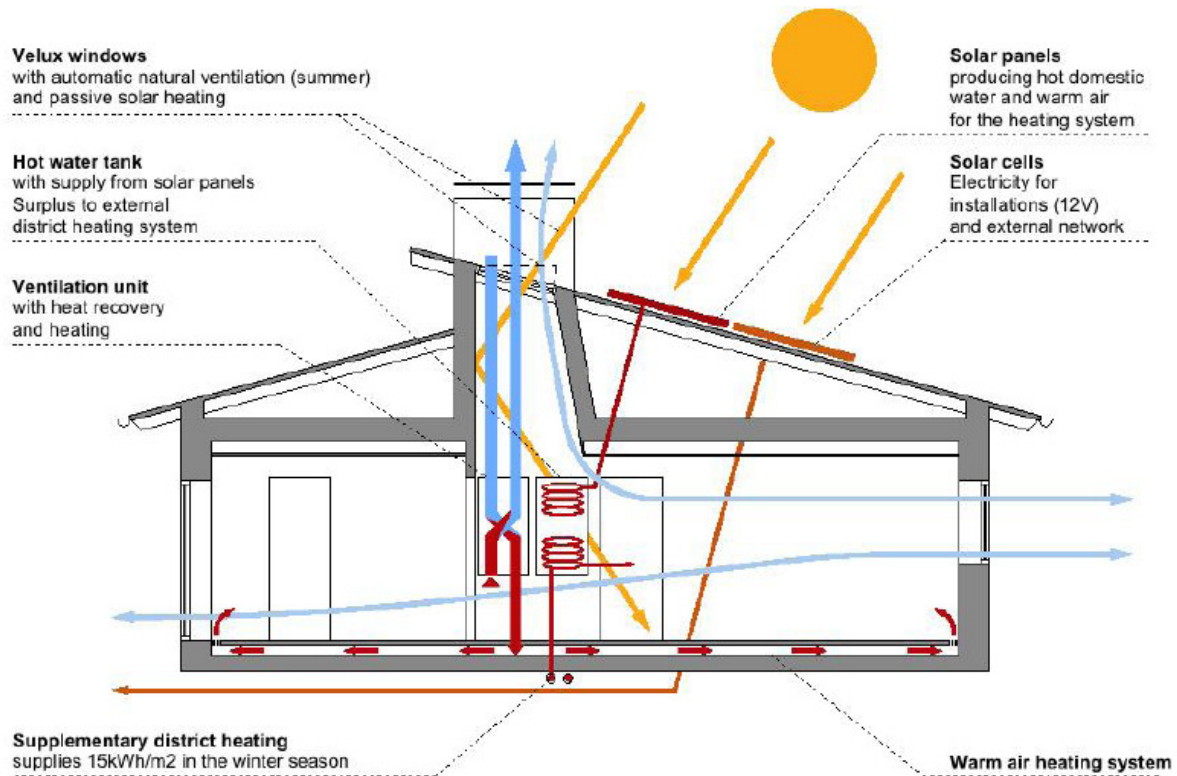
The main part of the mentioned housing schemes consist of one storey one-family housing units with a little courtyard for each dwelling and approximately 25% of the area is 2 storey row houses. Until now heating and domestic hot water have been secured by help of district heating where the district heating pipes have been placed under the dwellings in a crawlspace which is not secured concerning moisture transfer by a membrane towards the dwellings. Due to this it is expected to move new district heating pipes to an area in front of the dwellings and fill the crawlspace with insulation gravel.

Besides it has been recognised by a quality assessment study that the roofs will have to be replaced since they are not raintight and are filled with fungus. Besides there is also here the very frequent problem of a poor indoor air climate in the dwellings, in many cases with fungus problems, mainly due to poor ventilation. This is by the housing company seen as the most important quality problem which need improvement.



At BO-VEST, and in the municipality, there is a big interest to optimise the renovation approach and include a low energy renovation design with improved indoor air climate which is combined with an optimised

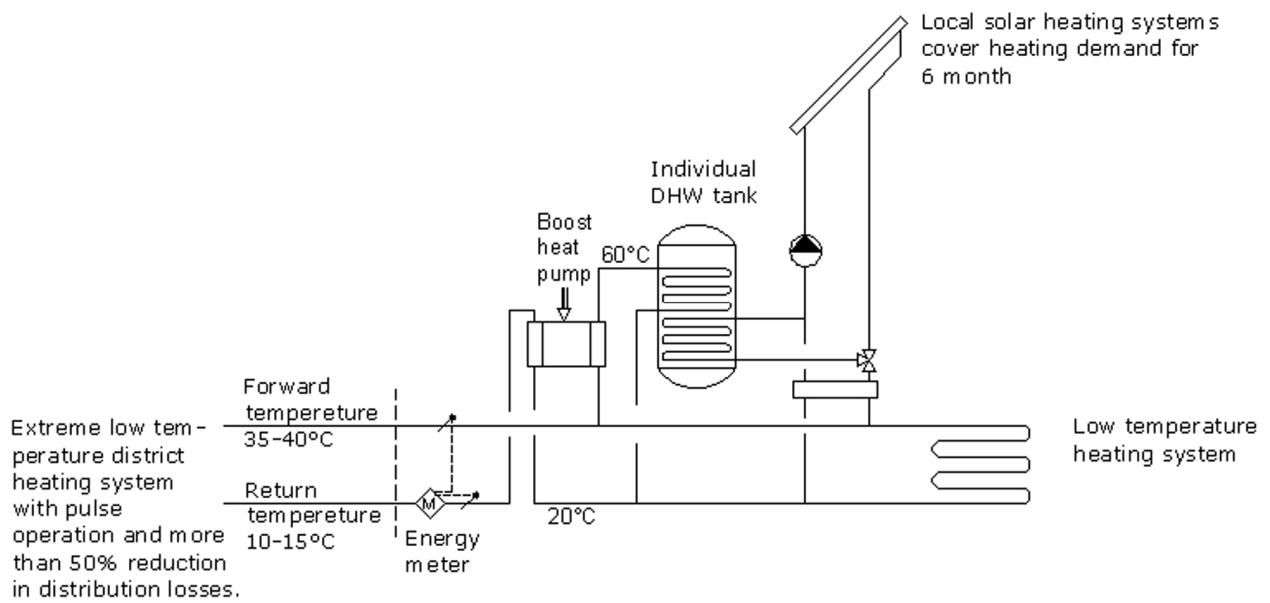
energy supply solution which includes renewables like solar heating and PV used in local building integrated power roofing designs, and where the district heating losses are reduced considerably so they have a reasonable size compared to the need for heating and domestic hot water, (max. 30% of this).



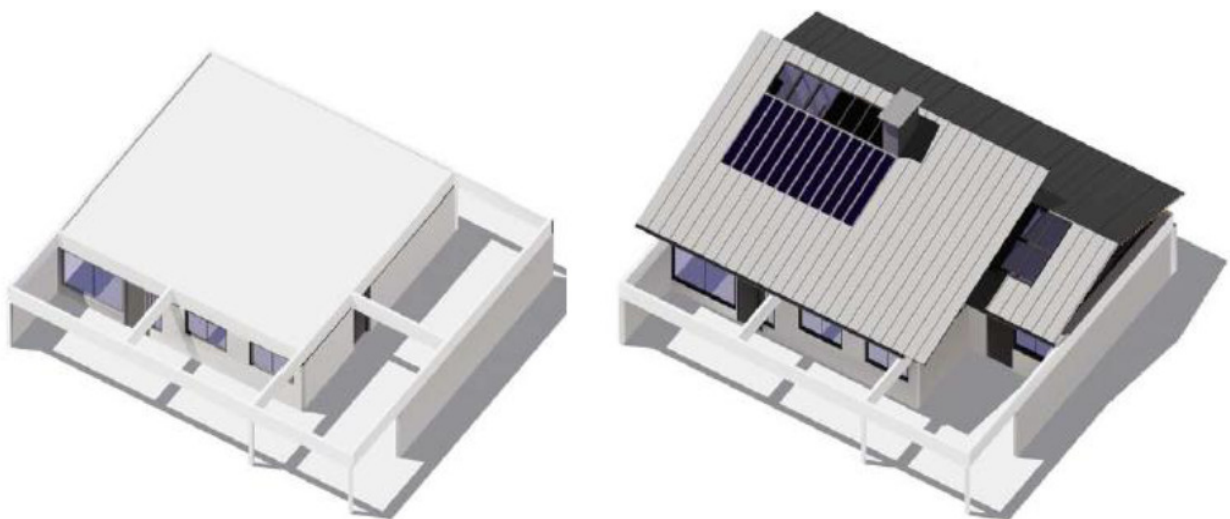
Analysis in the Empire project will focus on how to obtain an improved indoor air climate using a new type of building integrated low cost balanced heat recovery ventilation design, and different levels of low energy designs in combination with optimised energy supply solutions which also include use of renewable energy.

This will also include focus on passive house design with only 10 kWh/m<sup>2</sup>, year in room heating demand as the most advanced solution. But the main focus will be on low energy designs according to the Danish low energy class 2 and 1, (which will be minimum demands in year 2011 and 2016), and use of advanced district heating designs with low losses like e.g. one-string low temperature district heating with pulse operation and local 300 litre buffer tanks combined with a local solar heating supply to avoid summer operation of the district heating network, or use of small boost heat pumps in each dwelling to boost a 30-35°C district heating forward temperature to 55°C to provide hot water at the same time cooling the district heating return water to 10-15°C.

The here mentioned approach is of great importance if district heating shall still be an option for the low energy housing areas of the future. And this is important due to the need to utilise waste incineration, and centralised combined heat and power production which is actually the basis of district heating at the mentioned areas in Albertslund.



Also CO<sub>2</sub> neutral housing designs where PV-modules are used to provide an electricity contribution similar to the yearly electricity use will be tested.



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