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Balancing economics and environmental protection in supplying energy to new built residential areas

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In Denmark as well as in the rest of the EU countries the EU-energy performance directive for buildings is being implemented at present. In Denmark this will lead to a 25-30% reduced energy consumption for heating and domestic hot water, and at the same time 2 new low energy standards 1 and 2 are introduced with a respectively 50% and 25% further reduction of the energy use.

Here the energy standard 2 can e.g. be seen as the expected minimum demand which will be implemented in 2010 according to the EU directive.

In table 1 there is shown an analysis of optimised energy supply options for low energy housing using RUE and RES technologies (Rational Use of Energy and Renewable Energy) based on the situation in Denmark.

This illustrates quite well that if you include distribution losses then e.g. the very used energy supply solution in Denmark with district heating based on CHP, waste incineration and biomass has serious problems because the distribution losses in the future will be high compared to the expected very low energy use in new build housing areas. E.g. with 54% losses compared to the expected energy consumption for heating and domestic hot water, and if you utilise a "passive housing" design then it is nearly 100%.

A solution here could be to utilise low temperature district heating e.g. in combination with floor heating, and utilise local solar DHW systems with electrical supplement heating. In this way more than 50% of the distribution losses can be saved. Another option for the future is a more wider use of heatpumps which however needs to be cheaper and more useful for low heating effect demands at the same time.

If you want to utilise district heating in the future for housing areas it is however very important to optimise the district heating network according to the expected low energy demands. And here it is important to actually document that a low energy consumption will be obtained in practice.

To ensure this a focus on the quality of used best practice technologies is very important. Here it can e.g. be possible to utilise results from the EU-Save project, Green Catalogue which based on a partnership co-operation in 10 countries has defined indicators and performance requirements for more than 20 best available technologies related to buildings. See also: www.greencatalogue.com.

Besides energy labelling will be a demand in the future, and you can utilise diagnostic tools for follow-up like “energy signatures” and you can utilise a tool like Ascot which can be downloaded from Cenergia’s website (www.cenergia.dk) for total economy optimisation concerning investments, operation and maintenance costs.

During 2005 Cenergia is realising the first “passive house” demonstration project in Denmark in Rønnebækshave in Næstved south of Copenhagen.

Besides analysis are being made concerning optimised energy supply for a large new build area with 1600 housing units in Ullerødbyen in Hillerød based on the new energy demands and low energy standards.

And as an example of cost effective low energy housing it is now possible to publish monitored data from a low energy housing project, Dalgasparken with 72 housing units in Herning in Denmark, where it was shown that the bills for heating and DHW were reduced by 50% compared to normal housing projects. Here the good results were mainly based on use of innovative heat recovery ventilation systems which also had a very reduced use of electricity for the fans.

Here also PV modules were used to match the electricity use for ventilation on a yearly basis.

Finally should be mentioned a very interesting solar low energy renovation project in Gyldenrisparken in Copenhagen with 500 apartments in concrete housing blocks.

This is realised in connection to the EU-6 FP project Demohouse and a special focus will also here be made on how a low energy supply option can match a low energy housing design here in connection to large scale renovation.