SDHplus

Solar District Heating in Europe

WP2 – SDH enabling buildings with high energy performance

Task 2.1 – Survey and horizontal review of the existing models

D2.2 – Information sheet on building legislation and district heating

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Country

Denmark

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Based on Building Regulations per. 24/8-2012 and Energy Saving Agreement of 13 November 2012.

1. *How DH is accounted for in the calculation of energy performance of buildings according to national laws, with specific attention to SDH.*

Denmark has decided to introduce two building classes that already includes describing the requirements for energy performance of buildings that will be applicable to buildings in 2015 and 2020. Buildings can be designed according to these requirements or for a less demanding minimum standards introduced in 2010.

Requirements from year:	Housing [kWh/m^2]	Offices [kWh/m^2]
2010	52,5 + 1650/A	71,3 + 1650/A
2015	30 + 1000/A	41 + 1000/A
2020	20	25

Table 1: Limits on energy consumption of buildings depending on the year of construction. A is the heated floor area in m2.

In 2010 is used a factor of 2.5 for electricity for heat-production. For buildings built as low-energy buildings in 2015, a factor for electricity of 2.5 and for district heating a factor of 0.8. For other types of heat used a factor of 1.0 and the relevant efficiency. For buildings built after building class 2020, a factor for electricity of 1.8 and for heating a factor of 0.6. For other types of heat applied a factor of 1.0 and the appropriate benefit. The factors are summarized in the table below. An example of the use of these factors can be found in section 2

Factor from year::		El	District Heat	Others (inclusive biomass)
2010		2,5	1,0	1,0
2015		2,5	0,8	1,0
2020		1,8	0,6	1,0

Table 2: Factors for different types of heating.

The factors are elected political factors and uniform throughout Denmark. It therefore takes no account of the actual primary energy factors for a specific district heating system. Solar implemented in a district heating system (LDS) has also no effect on the calculation of the building's energy performance and there is no political intention that it should have it.

For solar applies incidentally: "The new construction or renovation of buildings **outside existing district heating areas** where the expected hot water consumption exceeds 2,000 liters pr. days, must be established solar power systems that can cover an energy demand equivalent to hot water consumption under normal operating conditions ".

A distinction is also made between Common RE plants and Individual RE plants.

For common VE system applies: "If a new settlement is established with a joint renewable energy plants, this is recognized in the energy framework, provided that the owners of the buildings contribute financially to the establishment thereof. The calculation takes into account all losses. Examples from a solar heating system can be heat loss from the storage tank, pipeline losses to the individual building, as well as electricity for pumps and automatics. For solar thermal systems is the possibility of recognition

in the energy frame for facilities to be established as part of a new settlement outside a district heating area. This limitation includes not, for example solar or wind turbines. "Common solar thermal plants can not enter into the calculation of the district heating areas.
For individual plants, it's different - it says the following: "RE plants on the building or in connection with the building included in the energy frame of the building."

Where solar included in the calculation with a factor of 1.0.

2. *Practical example of calculation.*

Based on the DTI test house EnergyFlexHouse is carried out calculations of the energy performance of different types of installations with heating or air-water heat pump and in combination with solar heating or solar cells. EnergyFlexHouse has a heated floor area of 216 m2 and is built to be energy neutral. The building envelope is roughly equivalent to what would be the requirement in 2020. The table below shows installation solutions and the calculated energy performance.

		2010	2015	2020
System	Installation Solution	kWh/m^2	kWh/m^2	kWh/m^2
0	**Requirements of the Building Regulations**	**60,1**	**34,6**	**20,0**
1	District heating unit and hot water tank, 100 liters *	36,3	30,8	22,8
2	District heating unit + 200 liter solar tank for domestic hot water + 5.1 m2 solar panels *	28,3	24,7	18,2
3	Block Heating supply system to 10 houses + 62.5 m2 solvarmetag on 1 house + water heater and hot water tank, 100 liters in 10 houses + 4000 liter storage tank	(30,7)	(26,5)	(19,6)
4	District heating unit and hot water tank, 100 liters + 3.8 m2 solar cells *	30,1	24,5	18,3
5	Air / water heat pump and hot water tank, 200 liters	27,8	27,8	20,0
6	Air / water heat pump + 200 liter solar tank for domestic hot water + 5.1 m2 of solar panels	22,3	22,3	16,0
7	Air / water heat pump + 1000 liters solar cylinder for both domestic hot water and space heating + 12.5 m2 of solar panels	20,2	20,2	14,7

Table 3: Examples of experimental house *EnergyFlexHouse's* calculated energy performance. Installation Option 3 is a common green plant that supply 10 houses and where the facility apart from contributing to the hot water, is designed to produce so much heat that can compensate for cable loss, losses in acc. tank etc. and in the network between the 10 houses. The results are shown in brackets, as it referred to above it is not a permissible solution in DK for the moment.

3. Standard methods and software tools usually used for such normative calculations.

There are used the Danish standard tool for calculating the energy performance Be06/Be10, developed by the Danish Building Research Institute (SBI).

4. Limits and opportunities for SDH according to the existing methodology.

There are no immediate opportunities to take the SDH in the calculations. However requires a factor of 0.6 for district heating in 2020 further expansion of renewable energy in the network, so you could say that the many Danish SDH initiatives indirectly are included in the calculations.

5. Possible improvements for the methodology and for the current legislation.

There are also other legislative initiatives that are helping to promote SDH - instance "Agreement of 13 November 2012 on energy companies' energy saving efforts ", where District Heating Supply Companies have the possibility of – in the required energy savings activities – to include the establishment of large-scale solar in the period from 2013 to 2015.