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

Italy

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

The Italian decree containing the national guidelines for the energy labelling (D.M. 26 giugno 2009 "Linee Guida Nazionali per la Certificazione Energetica degli Edifici") which implements the European directive 2002/91/CE, doesn't define a calculation method for buildings energy performances but it prescribes to refer to UNI/TS 11300 (Standard assessment).
Some Italian regions have elaborated their own calculation method, before the generation of the national one. Lombardia, one of the region with more DH systems, published it's calculation method (D.G.R. VII/8745 del 22 dicembre 2008 e il decreto 5796 del 11 giugno 2009) based on UNI/TS 11300 too, but with the difference that the class assignment of a building is based just on the heating primary energy demand (not considering domestic hot water). Lombardia method is taken here as an example. The presence of the DH connection in a building influences the energy performance calculation in two phases:

- in the modelling of the generation system
- in the calculation of primary energy from the final energy of the building and system.

Calculation method for buildings with DH connection in UNI/TS 11300: Energy performance of buildings - Part 4: Renewable energy and other generation systems for space heating and domestic hot water production)

a. DH and generation system in the building

The system generation component in a building connected to DH correspond to the substation in the energy performance calculation. The energy supplied in the substation is calculated considering the energy demand of the building and the losses in the substation heat exchanger. The elements used in the calculation are:

- nominal thermal power of the heat exchanger,
- heat loss coefficient Kss [W/K] of the substation heat exchanger,
- average temperature in the heat exchanger.

All these data have to be provided by the DH supplier; if not, the regional regulation presents some estimation methods.

b. DH and primary energy

The second phase of the calculation influenced by the presence of the DH connection is the use of energy conversion coefficient from final to primary energy.
This coefficient should be provided by the DH company: it depends on the energy sources of the supplier side of the DH network (gas, biomass, waste to energy plant…). If not, regional regulations present some conversion coefficients for primary energy of DH systems depending on the source plant. (Lombardia: f_P = 1,2, Pr. Autonome Trento e Bolzano: f_P =0,8 for biomass, 0,9 for industrial or CHP heat recovery, 1 for fossil fuel, Piemonte : f_P = 1). For what concerns solar thermal energy as a source for the DH, there's no mention in Italian regulation.

c. Dlgs28/11

This Italian decree implements European directive "RES heating and cooling" and introduces new obligations for buildings in terms of renewable energy.

For new buildings or for important renovations, the thermal energy production systems shall cover at least 50% of the energy needs for DHW and 20% of energy needs for DHW, heating and cooling with renewable energy (20% in 2013 will change in 35% in 2016 and 50% in 2017). This obligation is completely satisfied if the building is connected to DH which covers the entire demand for heating and DHW. In this context DH gets an important role.

2. Practical example of calculation

A building energy performance calculation according to Regione Lombardia regulation is now presented, obtained using Cened+ software, the building energy labeling software. The calculation is made for two buildings: a single family house and a multi-dwelling building with 16 units both with energy efficient envelope with low thermal dispersions, low temperature radiant floors and with DHW daily storages.

The solution with DH is compared with an alternative solution of the the same building but with a traditional system composed by a condensation gas boiler, with same power as the substation, and a solar thermal system which covers 50% of DHW energy demand.

Envelope characteristics

	Exterior walls	*Roof (unheated zone)*	*Floor (unheated zone)*	*Windows*
U [W/m^{2}K]	0,27	0,24	0,3	2

DH data

Primary energy coefficient	Loss coefficient K_{ss}	Average T	Fuel
0,8	10 W/K	70 °C	Waste to energy plant

Primary energy results for heating are:

EP_H [kWh/m^{2}year]

	Condensation gas boiler + ST	DH
Single family house	39,11	37,87
Multi-dwelling building	26,86	26,92

DH, even with low primary energy coefficient (0,8 in this case), doesn't improve energy performance in significant way compared with a condensation gas boiler and solar thermal system.

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

- *CENED+ Regione Lombardia* → Regione Lombardia makes a building energy performances calculation software available, which was developed following the regional regulation method. Its name is CENED+ and it's available for download at http://www.cened.it/software
- *Edilclima* → www.edilclima.it
- *Celeste (Liguria)*

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

DH is now assuming an important role in energy and urban policy in Italy. Dlgs 28/11 decree contains an article that promotes DH, prescribing development plans in cities with more than 50000 inhabitants to promote renewable energy sources for DH and DC. For smaller towns this plans can be developed in a membership form taking advantage of the coordination action of the provinces.
Dlgs 28/11 decree relieves constructors of the obligation on renewable energies thanks to the DH connection, which assumes a particular interest in the building sector.
We should anyway consider that 2012/27/UE European directive for energy efficiency will bring to a greater presence of renewable energy sources. The result will be a shift of obligation from constructors to DH suppliers, at least in urban areas served by DH.
As it can be seen from the calculation example, the connection to DH doesn't imply big changes in the EP_H (Lombardia calculation) value comparing it with the reference case with condensation gas boiler and solar thermal collector for DHW.
For what concerns the juridical mandatory connection of building to DH, at present there's no obligation. The law "legge 10/91", updated by the following Dlgs 28/11, prescribes an obligatory predisposition of a room to host the components of potential DH connection for new buildings that are at a distance of less than 1000 m from the nearest DH network.
Dlgs 28/11 considers DH as a work of primary urbanization (but without tax facilitations, unlike other primary works) and obliges municipalities over 50000 inhabitants to make urban plans that consider this technology.

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

To improve the position of DH in the Italian legislation it would be necessary to include the substations in the group of incentive measures with the mechanism of tax deduction.