



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

Energy Certification of Buildings is a derivative requirement of the [2002/91/EC Directive](#) regarding energy certification. This Directive and 2010/31/EU Directive of 19th May, on energy efficiency of buildings partially transposes into Spanish law by 235/2013 Royal Decree of 5th April, by which **the basic procedure for energy efficiency certification is approved, for both new and existing buildings.**

The standard programs that have been developed for energy certification of buildings (Calener for new buildings and CE3 and CE3X for existing buildings) do not include the possibility of analyzing buildings connected to District heating and cooling (DHC) systems. Parallel to these general tools, ADHAC (the Spanish District Heating and Cooling Association) has developed a new tool (currently recognized by the Ministry) for the correct energy rating of buildings connected to DHC systems. The tool, called Post-Calener, is useful only for new buildings so far. Soon there will be published the version for existing buildings.

It should finally be noted that since Calener was published (tool for energy certification of buildings) in 2009, until having the PostCalener tool in 2011 (for buildings connected to district heating and cooling), has not been possible to carry out energy certifications of buildings connected to DHC systems This is just an example of the current situation of these systems in Spain: DHC is not still a very common alternative.

The tool allows considering all kind of heat sources, but there is no a specific calculation methodology for solar thermal plants.

PostCalener can be downloaded from the website of the Ministry of Industry, Tourism and Commerce.

<http://www.mityc.es/energia/desarrollo/EficienciaEnergetica/CertificacionEnergetica/ProgramaCalener/Paginas/DocumentosReconocidos.aspx>

2. *Practical example of calculation.*

The rating process of DHC systems consists of making a simulation with Calener (including conventional equipment) and then modify it with Post-Calener program (replacing conventional systems by the heating and cooling network to which the building is connected); parameters that quantify the efficiency of the DHC system will be considered.

Considering a building with following demands:

	Demand (kWh/year)
Heating	22.575
DHW	817,3
Air conditioning	13.280

And these are the features of the heating and cooling network to which the building is connected:

Concept	Specific consumption in heating per MWh	Specific consumption in cooling per MWh
Biomass	1,23	0,54
Natural gas	0,07	-
Electricity	0,01	0,19

This means that for each MWh of heat delivered to the users from this network, the operator has used 1,23 MWh of biomass, 0,08 MWh of natural gas and 0,01 MWh of electricity.

Therefore, the specific energy consumption for each network operator will be:

Concept	Specific consumption per MWh	Building consumption (kWh)
Heating		
Heat supplied		22.575
Biomass	1,23	27.658,69
Natural gas	0,07	1.556,49
Electricity	0,01	321,19
DHW		
Heat supplied		817
Biomass	1,23	1.000,98
Natural gas	0,07	56,33
Electricity	0,01	11,62
Air conditioning		
Cold supplied		13.280
Biomass	0,54	7.116,51
Natural gas	-	-
Electricity	0,19	2.549,98

Once these values are introduced into the program, it is possible to carry out the simulation. Below are the obtained results:

Conventional systems for heat and cold production		Connected to the DHC system indicated above	
KgCO2/m2·year	Energy rating	KgCO2/m2·year	Energy rating
99,83	E	55,14	C

As seen, the network connection considered as example, entails improving the energy rating of the building from Category E to Category C.

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

In this section, the official tools for energy certification of buildings are briefly explained:

- Calener: This Software is a computer tool to obtain the energy efficiency certification of a new building, both in its planning stage and the finished building.
 - o Calener-GT: for large tertiary buildings
 - o Calener-VYP: for residential and small and medium tertiary buildings
- CE3 and CE3X: These are software tools to obtain the energy efficiency certification of an existing building.
- Simplified procedures:
 - o CERMA software: Computer tool to obtain, in a simplified way, the energy efficiency rating of residential buildings.
 - o Prescriptive Simplified Procedures: these are technical documents to obtain the energy efficiency rating of buildings in a simplified way.

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

The legislative framework reflects the present situation in Spain regarding heating and cooling networks and SDH: Although it is possible to evaluate a solar thermal plant, the established methodology for energy efficiency in buildings does not do a special emphasis on SDH. The reason is that there are some centralized solar thermal plants in Spain, but unlike other countries there are not large plants connected to a thermal network.

The most important barrier for the evolution of SDH is that the presence of heating and cooling networks is still very low. As the most remarkable opportunity, in addition to solar availability, should be emphasized that the heating and cooling networks are increasing and a significant rise in the coming years is expected. In conclusion, it could be said that is not expected a substantial increase in new SDH systems in the short term, but could be in medium to long term.

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

The potential for improvements concerning SDH is high, considering that:

- Until recently there was not an official tool for the evaluation of buildings connected to DHC systems..
- The existing tool is very generic, and a special calculation methodology for solar thermal plants does not exist.
- Nowadays, the large solar thermal plants are not the priority for the companies in the field.

However, it is difficult to establish or propose improves on a technology (SDH) which is still novel and there is no experience about it.