



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.*

EUROPEAN DIRECTIVE 2013/31/EU WAS IMPLEMENTED BY AN AMENDMENT OF THE ENERGY MANAGEMENT ACT NO. 406/2000 COLL. TERMS OF REDUCING THE ENERGY CONSUMPTION OF BUILDINGS ARE SET OUT IN § 7 OF THE ABOVE ACT. DUTIES FOR OWNERS AND BUILDERS OF BUILDINGS ON ENERGY PERFORMANCE CERTIFICATES ARE PROVIDED IN SECTION § 7A.

Implementing regulation of the Act, which is Decree No. 78/2013 Coll. on energy performance of buildings determines:

- a) cost-optimal levels of energy performance requirements for new buildings, major renewals of buildings, other than major changes on completed buildings and buildings with nearly zero energy
- b) methodology of the energy performance of buildings calculation
- c) model assessment of technical, economic and environmental feasibility of alternative energy supply systems (including DH)
- d) model set of recommended measures for improving the energy performance of the building,
- e) template and contents of the certificate and way of its placement in the building,

The Decree also defines indicators of energy performance of the building and their determination. Indicators are:

- a) total annual primary energy consumption
- b) total annual non-renewable energy consumption
- c) total annual energy consumption
- d) partial annual energy consumption of technical systems for heating, cooling, ventilation, humidification, hot water preparation and lighting
- e) average heat transfer coefficient
- f) heat transfer coefficients of individual constructions
- g) energy efficiency of technical systems

Values of indicators of energy performance assessment of buildings and the reference buildings are determined by calculation on the basis of the documentation. For calculation of the energy performance indicators of the reference building, the values set in the Decree Annex 1 are used for building parameters, building components, structures and building systems.

Due to the general unavailability of material parameters of technical building systems, typical use and climate data for the evaluation of EPB was created TNI 73 0331 - Energy performance of buildings - Typical values for the calculation. TNI 73 0331 is non-binding tool in a form containing a single

processing methods and commensurate values of representative parameters used in calculation of the energy performance of buildings, which includes:

- Typical values and range of inputs for efficiency parameters of technical systems
- Typical profiles of building usage (operating time, the demand for ventilation, lighting and hot water, internal heat loads from the equipment etc.) for different types of buildings
- Monthly climate data for calculation

The calculation of the average heat transfer coefficient and heat transfer coefficients of each structure at system limit is made according to Czech standards for the calculation method of thermal protection of buildings (CSN 73 0540-4 Thermal protection of buildings - Part 4: Calculation method).

The calculation of energy efficiency of heating, cooling, ventilation, humidification, hot water system and lighting is done according to the relevant Czech technical standards. Total energy consumption is the sum of the calculated energy consumption and auxiliary energy. Calculation of the total energy supplied and the energy supplied by the partial computation is performed by calculation method with the maximum interval of one month and for each zone of the building. The total energy delivered to the building is determined by the sum of partial energy delivered and expressed also by individual energy carriers. Partial delivery of heating energy is the sum of the calculated energy consumption for heating and auxiliary energy for the operation of the technical system for heating by the Czech technical standards for the calculation of the energy needs for heating and cooling (DIN EN ISO 13790 - Calculation of energy use for heating and cooling) and Czech technical standards for thermal systems in buildings (EN 15316 - heating systems in buildings) using values of typical use of buildings.

Total primary energy and non-renewable primary energy consumption of assessed building is calculated as the sum of the energy supplied in the building, distinguished by energy carriers multiplied by relevant primary energy factors listed in Annex 3 of the Decree. Energy delivered outside of the building is included in the calculation by the same procedure.

District heating systems are included in § 7 Assessment of technical, economic and environmental feasibility of alternative energy supply systems. Solar systems as a heat source for DH systems are not specifically listed in the Decree. Possible use a solar system in DH may affect a primary energy factor and primary energy consumption according to the Table 1. The primary energy factor for solar heat is 1.0).

2. *Practical example of calculation.*

A calculation of a simple model single family house was made. Different was only in the usage of heat source for heating and DHW (natural gas boiler/dh heating with 50% share of res). The fundamental difference within the evaluated indicators can be found essentially only in the case of non-renewable primary energy consumption.

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

- National kalkulační nástroj (NKN) - Development of the NKN calculation tool was performed at the Department of Building Services, Faculty of Civil Engineering of CTU in Prague based on support through grants from Czech Energy Agency (CEA). Development of the tool has been supported due to the need of instrument for calculating the energy performance of the building in accordance with act 406/2000 Sb. NKN was created as a tool for calculating the energy performance of buildings including output as a protocol and its graphical representation. Computational tool is designed as an open with option to display all links and the source code. The current version of NKN reflecting changes resulting from Decree 78/2013 Coll. will be available during the year 2014.
- Stavební fyzika (Energie 2013) – Commercial software - Software Energie 2013 is designed for comprehensive evaluation of energy performance of buildings. It enables the calculation of the average heat transfer coefficient of the building, specific heat flows, demand for heating, partial delivered energy (heating, cooling, forced ventilation, humidification, domestic hot water, lighting), energy production (solar collectors, photovoltaics, cogeneration) total delivered energy, primary energy (total and non-renewable) and CO₂ emissions. The calculation takes into account the procedures and requirements of ČSN 730540, 730329 TNI, TNI 730330, STN 730540, EN ISO 13790, EN ISO 13370, EN ISO 13789 and other European standards. The program processes the certificate of energy performance of the building by Decree No. 78/2013 Coll. and a label according to ČSN 730540-2 (2011).
- PROTECH (Průkaz 2013) – Commercial software –
Module Průkaz 2013 is designed to handle EPBC under the Decree No. 78/2013 Coll., on the energy performance of buildings. Detection module 2013 is connected to other modules of the software and it is possible to load them to prepared calculations.

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

- annex with factors of primary energy does not distinguish between RES. Solar systems generally are included among the renewable sources of energy in district heating systems.
- Inclusion of solar systems in the RES group allows their use in the DH systems to reduce primary energy factor for the EPBC calculation
- §7 imposes an obligation to assess the technical, economic and environmental feasibility of alternative energy supply systems. Solar systems are included in subparagraph a) local energy supply system using energy from renewable sources and also indirectly in point c) thermal energy supply system where the solar system is part of the source mix
- the existing legislation sets minimum efficiency requirements for energy systems including solar systems

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

The current set of requirements in the context of European and national legislation appears appropriate from the perspective of deploying solar systems in DH.

Zdroje:

[1] *Decree No. 78/2013 Sb. on energy performance of buildings.*

[2] *Urban M., Kabele K., Adamovský D., Kabrhel M., Musil R.: Výpočetní nástroj pro stanovení energetické náročnosti budov podle vyhlášky 148/2007 Sb.*