SDH solar district heating

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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Impact of District Heating (DH) to certification of energy efficiency in buildings

Project „ SDHplus - New Business Opportunities for Solar District Heating and Cooling“ is directed towards solar district heating (SDH) to consumers via towns DH networks. Residential multi-apartment houses, public, commercial and industrial buildings are considered as potential consumers. DH covers approximately 65 % of total heat market in Lithuania. About 72 % of DH is consumed by multi-apartment residential buildings [1]. It is expected that SDH will be directed for preparing hot tap water in DH companies and buildings in Lithuania.

The defining of energy efficiency classes for buildings is regulated by revised Building Regulations of the Republic of Lithuania STR 2.01.09:2012 „Energy Efficiency of Buildings. Energy Efficiency Certification“ [2]. The Annex II of above Regulations [3] describes methodology for estimating of energy consumption in buildings and assessment of energy efficiency class for the building with regard to consumed renewable energy sources (RES).

Energy efficiency class of the building is defined by the values of heating, ventilating, lightening indicator C_1 and hot water consumption C_2 indicator. The buildings of respective energy efficiency class must meet the following requirements of energy efficiency indicators C_1 and C_2 (Table 1):

Table 1. Indicators of energy efficiency classes for buildings

Class of Building	*Indicator*	*The values of indicators for certified buildings**	*Class of Building*	*Indicator*	*The values of indicators for certified buildings**
A++	$C_1 < 0{,}25$ and $C_2 \leq 0{,}70$	No certified	D	$1{,}5 \leq C_1 < 2$	*C_1* appr. *130-550 kWh/m^2/m*
A+	$0{,}25 \leq C_1 < 0{,}375$ and $C_2 \leq 0{,}80$	*C_1 appr. 24 kWh/m^2/m, and summary 49 kWh/m^2/m*	E	$2 \leq C_1 < 2{,}5$	*C_1* appr. *150-1200 kWh/m^2/m*
A	$0{,}375 \leq C_1 < 0{,}5$ and $C_2 \leq 0{,}85$	*C_1 appr. 4-24 kWh/m^2/m, and summary 41-60 kWh/m^2/m*	F	$2{,}5 \leq C_1 < 3$	*C_1* appr. *500-1600 kWh/m^2/m*
B	$0{,}5 \leq C_1 < 1$ and $C_2 \leq 0{,}99$;	*C_1 appr. 30-130 kWh/m^2/m, and summary 70-140 kWh/m^2/m*	G	$C_1 \geq 3$	*C_1* appr. *500-2600 kWh/m^2/m*
C	$1 \leq C_1 < 1{,}5$ and $C_2 \leq 0{,}99$;	*C_1 appr. 80-260 kWh/m^2/m, and summary 120-290 kWh/m^2/m*			

* The values of indicator came from practice of energy efficiency certification [7]

Methodology distinguishes indicator K_{ers}, which defined the share of renewable energy consumed by the building of A++ energy efficiency class only. This indicator is not applied for the buildings of lower energy efficiency class. New buildings built after year 2014 must meet the requirements of B energy efficiency class, and renovated buildings – o C class [3].

Indicators C_1 and C_2 define the ration between non-renewable estimated primary energy consumption and standard non-renewable primary energy consumption. Non-renewable estimated primary energy consumption evaluates renewable energy consumption assigned to the building, and standard non-renewable primary energy consumption are all energy consumption in the building [3].

Heating

Indicator C_1 assesses the ratio between estimated and standard energy consumption required for space heating, ventilation and electricity consumption for lightening, expressed per non-renewable primary energy factor for heat generation or DH system and average electricity generating installations. Standard non-renewable primary energy consumption (all consumption) for heating, ventilation and lightening are estimated based on requirements defined in Construction Technical Regulations [4].

Non-renewable primary energy factor is estimated and presented in the methodology for used fuel and energy types, heat and power generation technologies, separate DH companies and Lithuanian DH average. The value of indicator C_1, which defines energy efficiency class of the building, depends on heat and power energy consumption of the building, on heat and power generation sources, on used ventilation system. The value of indicator C_1 is increased by the following factors: the value of renewable primary energy factor for heat generation source; ventilation with recuperation in the building; the consumed energy is generated by solar, wind and hydro energy plant and is assigned to the building.

Hot water

Indicator C_2 assesses the ratio between estimated and standard energy consumption required by the building for hot water preparing. The value of this indicator is ratio between estimated non-renewable primary energy and standard non-renewable energy consumption estimated according to requirements of Construction Technical Regulations [5, 6]. Standard energy consumption for hot water – all energy consumption for hot water preparing and maintaining of required temperature (recirculation). Standard non-renewable non-renewable primary energy consumption assesses energy consumption for preparing hot water, losses in pipelines, installations and systems of the buildings, expressed per non-renewable Primary Energy Factor of the source. Since most residential multi-apartment houses use DH systems for hot water preparing, the estimate assesses standard non-renewable primary energy factor for this DH system.

Estimated non-renewable primary energy consumption for preparing hot water define the following: heat demand of hot water preparing system; system efficiency; energy volume for hot water preparing assigned to wind, hydro and solar collectors; non-renewable primary energy factor of the source; and non-renewable primary energy factor for preparing hot water assigned to RES.

Software for defining energy efficiency for the building

Currently energy efficiency classes for buildings are defined using software tool „NRG-sert“. Algorithm of this tool was adapted for former methodology of Building Regulations of the Republic of Lithuania and does not distinguish C_1 and C_2 indicators and does not evaluate the use of RES. The tool defines the building under certification as follows: building, certificate and customer information. Every information group has obligatory and additional info fields.

Building info fields:

Obligatory fields:	***Additional fields:***
Unique Building no	Title – title of the building
Municipality	Designed by- author of building design project
Town	Gen. contractor – main contractor of the building
Street	Construction year – year of building construction
House number	Reconstruction year – year of building reconstruction
	Comment – Personal remarks concerning building

Certificate information

Obligatory fields	*Info fields*	*Additional fields*
Building certificate no – the main feature if Your certificate, which is used in Register of Certificates. Number consists of two letters, which are selected automatically according to the purpose of the building; No of Expert Qualification Certificate (selected automatically); and No assigned by Certification Expert (e.g. PE-0001-0003).	Issued – field provides issue date of the Certificate	Registered – feature shows if Certificate is registered
		Application to perform certification of the building – comments on application
	Valid – field shows validation date of the Certificate	Paid – comments on payment for certification
		Other information – Your personal comments on Certificate

Customer information

Additional fields								
Customer – customer data	E-mail	Mobile	Phone	Fax	Municipality	Location	Address	Other information – Your personal comments

The tool provides the estimated results, which define energy efficiency class, based on input data. The tool results field shows: energy efficiency class of the building; heat losses through walls, roof, floors, windows, thermal bridges, internal heat emissions, energy consumption for space heating, hot water, ventilation, and summary energy consumption, etc.

The advantages and disadvantages of the methodology in assessment of solar district heating

Described former and still in use software tool for defining energy efficiency class of the building does not assess the use of RES, does not non-renewable primary energy consumption separately for heating and hot water preparing. The main factors, defining higher energy efficiency class of the building are the efficiency of heat generating source and ventilating system with recuperation. Currently updated methodology for Construction Regulations and the updated software tool (based on this methodology) will assess non-renewable and renewable Primary Energy Factors for heat generating source.

References

1. Economic Activity overview of Lithuania's district heating companies in 2011 (Lietuvos šilumos tiekimo bendrovių 2011 m. ūkinės veiklos apžvalga), by Lithuanian District Heating Association, http://www.lsta.lt/files/statistika/2011_statistika.pdf
2. Building Regulations of the Republic of Lithuania STR 2.01.09:2012 „Energy Efficiency of Buildings. Energy Efficiency Certification", http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=431646
3. Building Regulations of the Republic of Lithuania STR 2.01.09:2012 „Energy Efficiency of Buildings. Energy Efficiency Certification". Annex 2.
4. National Standard LST EN ISO 13790:2008 „Energy Characteristics of Buildings. Estimate of energy consumed for space heating and cooling (ISO 13790:2008)";
5. National Standard LST EN 15316-1:2007 „Space heating systems of buildings. Method for assessment of system energy demand and system efficiency. Part 1. General issues";
6. National Standard LST EN 15316-3-2:2008 „Space heating systems of buildings. Systems energy demand and system".
7. http://www.spsc.lt/cms/index.php?option=com_wrapper&view=wrapper&Itemid=288