Specific energy for heating (monthly method)

Energy balance calculation with PHPP Version 9.6a

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

The sum of the heating periods calculated through the monthly method will be presented on this side.

Interior temperature:	21,0	°C
Building type:	Nedzīvojamā ēka	
Treated floor area A_{TFA}:	1873,5	m²
Spec. Capacity:	116	Wh/(m²K)

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Month. red. fac.		G_t kKh/a		kWh/a	Per m² of treated floor area
External wall - Ambient	A	1114,72	*	0,65	*	1,00	*	119,58	=	87055	46,5
External wall - Ground	B		*		*	1,00	*		=		
Roof/Ceiling - Ambient	A	1048,60	*	0,28	*	1,00	*	119,58	=	34591	18,5
Floor slab / Basement ceiling	B	1048,60	*	2,73	*	1,00	*	19,36	=	55403	29,6
	A		*		*	1,00	*		=		
	A		*		*	1,00	*		=		
	X		*		*	0,75	*		=		
Windows	A	416,43	*	1,39	*	1,00	*	119,58	=	68975	36,8
Exterior door	A	9,29	*	2,00	*	1,00	*	119,58	=	2222	1,2
Exterior TB (length/m)	A	1962,72	*	0,13	*	1,00	*	119,58	=	30179	16,1
Perimeter TB (length/m)	P	196,70	*	0,07	*	1,00	*	19,36	=	274	0,1
Ground TB (length/m)	B		*		*	1,00	*		=		0,0
										kWh/(m²a)	
Transmission heat losses Q_T									Total	278699	148,8

				Effective air volume V_V	A_{TFA} m²	*	Clear room height m	=	m³	
					1874	*	2,95	=	5521	
	$n_{V,system}$ 1/h		η^*_{SHX}		η_{HR}		$n_{V,Res}$ 1/h		$n_{V,equi,fraction}$ 1/h	
Effective air change rate Ambient nV,e	0,262	*(1-	0%	)*(1-	0,68	)+	0,184	=	0,268	
Effective air change rate Ground nV,g	0,262	*	0%	*(1-	0,68	)		=	0,000	
	V_V m³		$n_{V,equi,fraction}$ 1/h		c_{Air} Wh/(m²K)		G_t kKh/a		kWh/a	kWh/(m²a)
Ventilation losses ambient Q_V	5521	*	0,268	*	0,33	*	120	=	58323	31,1
Ventilation losses ground $Q_{V,e}$	5521	*	0,000	*	0,33	*	109	=	0	0,0
Ventilation heat losses Q_V								Total	58323	31,1

			Q_T kWh/a		Q_V kWh/a		Reduction factor night/weekend saving		kWh/a	kWh/(m²a)
Total heat losses Q_L		(	278699	+	58323	)	1,0	=	337022	**179,9**

Orientation of the area	Reduction factor see 'Windows' worksheet		g-Value (perp. radiation)		Area m²		Global radiation kWh/(m²a)		kWh/a
North	0,25	*	0,50	*	225,9	*	345,0	=	9711
East	0,24	*	0,50	*	19,9	*	637,0	=	1542
South	0,26	*	0,50	*	170,6	*	653,6	=	14535
West	0,00	*	0,00	*	0,0	*	555,5	=	0
Horizontal	0,00	*	0,00	*	0,0	*	974,3	=	0
Sum opaque areas									9880
									kWh/(m²a)
Available solar heat gains Q_S								Total	35667	19,0

			Length Heat. Period d/a		Spec. Power q_I W/m²		A_{TFA} m²		kWh/a	kWh/(m²a)
Internal heat gains Q_I	kh/d 0,024	*	365	*	1,20	*	1873,5	=	19694	10,5

					kWh/a	kWh/(m²a)
Free heat Q_F	Q_S	+	Q_I	=	55362	29,5
Ratio free heat to losses	Q_F	/	Q_L	=	0,16	
Utilisation factor heat gains h_G				=	97,87%	
					kWh/a	kWh/(m²a)
Heat gains Q_G	η_G	*	Q_F	=	54183	**28,9**

					kWh/a	kWh/(m²a)
Annual heating demand Q_H	Q_L	-	Q_G	=	282839	**151,0**

	kWh/(m²*a)		(Yes/No)
Limiting value	-	**Requirement met?**	-

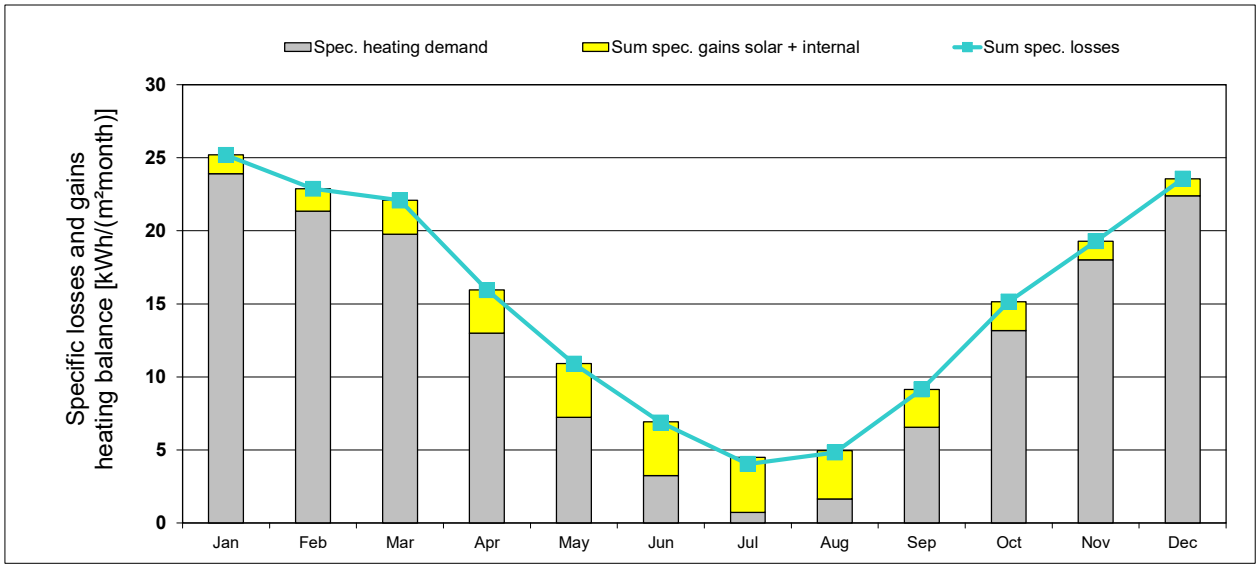
Specific energy for heating (monthly method)

Energy balance calculation with PHPP Version 9.6a

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Interior temperature: 21 °C
Building type: Nedzīvojamā ēka
Treated floor area A_{TFA}: 1874 m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Externa	17,4	15,8	15,0	10,4	6,7	3,9	1,8	2,5	5,9	10,4	13,4	16,4	120	kKh
Heating degree hours - Ground	2,1	2,0	2,1	1,8	1,6	1,3	1,1	1,1	1,1	1,4	1,6	2,0	19	kKh
Losses - Exterior	40995	37092	35248	24566	15755	9156	4283	5961	13885	24385	31498	38521	281345	kWh
Losses - Ground	6182	5751	6117	5319	4673	3742	3295	3109	3251	3980	4648	5609	55677	kWh
Sum spec. losses	25,2	22,9	22,1	16,0	10,9	6,9	4,0	4,8	9,1	15,1	19,3	23,6	179,9	kWh/m²
Solar gains - North	126	271	642	1020	1538	1701	1661	1280	803	427	154	88	9711	kWh
Solar gains - East	38	67	123	172	216	206	213	194	147	99	40	28	1542	kWh
Solar gains - South	377	650	1183	1643	1998	1882	1981	1823	1383	950	397	268	14535	kWh
Solar gains - West	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Opaque	193	360	731	1093	1467	1481	1507	1276	881	542	214	136	9880	kWh
Internal heat gains	1673	1511	1673	1619	1673	1619	1673	1673	1619	1673	1619	1673	19694	kWh
Sum spec. gains solar + intern	1,3	1,5	2,3	3,0	3,7	3,7	3,8	3,3	2,6	2,0	1,3	1,2	29,5	kWh/m²
Utilisation factor	100%	100%	100%	100%	100%	99%	88%	96%	100%	100%	100%	100%	98%	
Annual heating demand	44770	39985	37013	24339	13545	6097	1376	3072	12306	24674	33723	41938	282839	kWh
Spec. heating demand	**23,9**	**21,3**	**19,8**	**13,0**	**7,2**	**3,3**	**0,7**	**1,6**	**6,6**	**13,2**	**18,0**	**22,4**	**151,0**	kWh/m²



Annual heating demand: Comparison

Monthly method	*('Heating')*	282839	kWh/a	151,0	**kWh/(m²a)** reference to treated floor area according to PHPP
Annual method	*('Annual heati*	254617	kWh/a	135,9	**kWh/(m²a)** reference to treated floor area according to PHPP
		-	kWh/a	-	

Climate data

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Selection of climate data

Country:	ud-User Data
Region:	All
	1-Alphabetic sorting
Climate data set:	ud---01-Rīga
Climate zone:	2: Cold

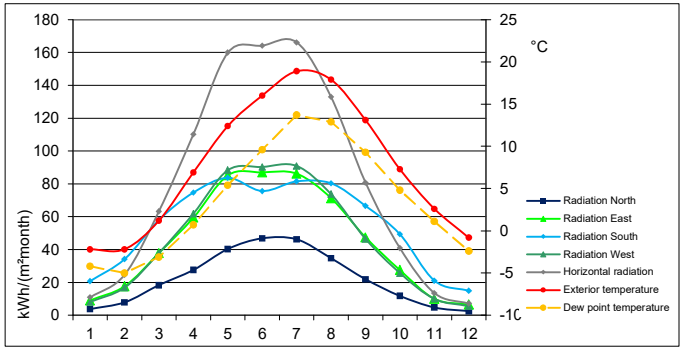
Altitude

Weather station:	3,0	m
Building location:	3	m

Result overview

Annual heating demand	151,0	kWh/(m²a)
Heating load	55,2	W/m²
Frequency of overheating	0,0	%
Sensible cooling	0,0	kWh/(m²a)
Latent cooling	0,0	kWh/(m²a)
Cooling load	-	W/m²
PER demand	733,7	kWh/(m²a)

	Data for heating Annual method	Data from monthly balance Heating	Cooling	
Heating / cooling period	223	365	123	d/a
Heating / cooling degree hours	95	120	-27	kKh/a
Radiation North	87	345	220	kWh/(m²a)
Radiation East	190	637	343	kWh/(m²a)
Radiation South	293	654	346	kWh/(m²a)
Radiation West	189	555	343	kWh/(m²a)
Horizontal radiation	313	974	623	kWh/(m²a)



	Month	1	2	3	4	5	6	7	8	9	10	11	12	Heating load		Cooling load		PER	
	Days	31	28	31	30	31	30	31	31	30	31	30	31	Weather 1	Weather 2	Weather 1	Weather 2	factors	
	ud---01-Rīga	Latitude °	57,0	Longitude °	24,1	Altitude [m]	3	Daily temperature swing Summer [K]			8,4			Radiation: [W/m²]		Radiation: [W/m²]			
° C	Exterior temperature	-2,2	-2,2	1,2	6,9	12,4	16,0	18,9	17,9	13,1	7,3	2,6	-0,8	-12,8	-9,7	25,5	22,0	1,35	Household electri
kWh/(m²month)	Radiation North	4	8	18	28	40	47	46	35	22	12	5	2	4	4	106	60	1,25	Domestic hot wat
kWh/(m²month)	Radiation East	9	18	38	59	85	87	86	71	47	28	10	7	5	5	223	163	1,70	Heating
kWh/(m²month)	Radiation South	21	34	58	75	84	76	82	80	67	49	21	15	14	14	233	268	1,20	Cooling
kWh/(m²month)	Radiation West	8	17	38	62	88	90	91	74	47	26	10	6	7	7	223	163	1,20	Dehumidification
kWh/(m²month)	Horizontal radiation	11	25	63	110	160	164	166	133	81	41	14	7	10	10	350	230		
° C	Dew point temperature	-4,2	-5,0	-3,1	0,7	5,4	9,6	13,7	12,9	9,3	4,8	1,1	-2,4			16,7			
° C	Sky temperature	-12,0	-13,3	-11,9	-7,6	-1,4	2,5	7,6	7,8	2,7	-1,7	-5,8	-10,0			14,1	12,1		
° C	Ground temperature	18,1	18,0	18,1	18,4	18,8	19,2	19,5	19,5	19,4	19,1	18,8	18,4	18,0	18,0	22,8	22,8		
	Comment:	PHPP, LBN003-19																	

PLATĪBAS, TILPUMI, TEMPERATŪRAS

			Kopējā				Apkurināmā			
Stāvs	Numurs	Nosaukums	Platība, m²	Augstums, m	Tilpums, m³	TFA koef.	TFA, m²	TFV, m³	Tin, °C	Tin avg, °C
1	1		113,20	2,98	337,34	1	113,20	337,34	21,00	1,28
	2		2,50	1,75	4,38	1	2,50	4,38	21,00	0,02
	3		15,80	3,05	48,19	1	15,80	48,19	21,00	0,18
	4		17,30	2,83	48,96	1	17,30	48,96	21,00	0,19
	5		12,40	2,30	28,52	1	12,40	28,52	21,00	0,11
	6		14,20	2,55	36,21	1	14,20	36,21	21,00	0,14
	7		17,80	2,35	41,83	1	17,80	41,83	21,00	0,16
	8		13,20	2,35	31,02	1	13,20	31,02	21,00	0,12
	9		33,80	2,35	79,43	1	33,80	79,43	21,00	0,30
	10		15,80	2,95	46,61	1	15,80	46,61	21,00	0,18
	11		35,00	2,53	88,55	1	35,00	88,55	21,00	0,34
	12		82,60	2,35	194,11	1	82,60	194,11	21,00	0,74
	13		4,10	2,35	9,64	1	4,10	9,64	21,00	0,04
	14		33,50	2,43	81,41	1	33,50	81,41	21,00	0,31
	15		11,70	2,55	29,84	1	11,70	29,84	21,00	0,11
	16		12,20	2,48	30,26	1	12,20	30,26	21,00	0,12
	17		9,30	2,60	24,18	1	9,30	24,18	21,00	0,09
	18		28,50	2,43	69,26	1	28,50	69,26	21,00	0,26
	19		8,80	3,10	27,28	1	8,80	27,28	21,00	0,10
	20		8,90	2,95	26,26	1	8,90	26,26	21,00	0,10
	21		11,20	2,65	29,68	1	11,20	29,68	21,00	0,11
	22		27,00	2,23	60,21	1	27,00	60,21	21,00	0,23
	23		14,40	2,23	32,11	1	14,40	32,11	21,00	0,12
	24		13,60	2,28	31,01	1	13,60	31,01	21,00	0,12
	25		15,20	2,98	45,30	1	15,20	45,30	21,00	0,17
	26		16,10	2,98	47,98	1	16,10	47,98	21,00	0,18
	27		14,20	2,98	42,32	1	14,20	42,32	21,00	0,16
	28		17,30	2,40	41,52	1	17,30	41,52	21,00	0,16
	29		22,60	2,45	55,37	1	22,60	55,37	21,00	0,21
	30		18,90	2,33	44,04	1	18,90	44,04	21,00	0,17
	31		31,20	2,40	74,88	1	31,20	74,88	21,00	0,28
2	1		63,90	2,85	182,12	1	63,90	182,12	21,00	0,69
	2		35,20	3,30	116,16	1	35,20	116,16	21,00	0,44
	3		19,30	3,20	61,76	1	19,30	61,76	21,00	0,23
	4		14,30	3,20	45,76	1	14,30	45,76	21,00	0,17
	5		19,50	3,30	64,35	1	19,50	64,35	21,00	0,24
	6		19,60	3,30	64,68	1	19,60	64,68	21,00	0,25
	7		33,70	3,30	111,21	1	33,70	111,21	21,00	0,42
	8		26,00	3,25	84,50	1	26,00	84,50	21,00	0,32
	9		17,20	3,25	55,90	1	17,20	55,90	21,00	0,21
	10		18,50	3,25	60,13	1	18,50	60,13	21,00	0,23
	11		38,70	3,20	123,84	1	38,70	123,84	21,00	0,47
	12		33,80	3,30	111,54	1	33,80	111,54	21,00	0,42
	13		10,60	3,20	33,92	1	10,60	33,92	21,00	0,13
	14		8,70	3,20	27,84	1	8,70	27,84	21,00	0,11
	15		9,00	3,20	28,80	1	9,00	28,80	21,00	0,11
	16		4,80	3,20	15,36	1	4,80	15,36	21,00	0,06
	1		50,80	2,80	142,24	1	50,80	142,24	21,00	0,54
	2		29,30	3,15	92,30	1	29,30	92,30	21,00	0,35
	3		11,10	3,30	36,63	1	11,10	36,63	21,00	0,14
	4		9,90	3,30	32,67	1	9,90	32,67	21,00	0,12
	5		15,20	3,30	50,16	1	15,20	50,16	21,00	0,19
	6		18,20	3,30	60,06	1	18,20	60,06	21,00	0,23
	7		19,90	3,30	65,67	1	19,90	65,67	21,00	0,25
	8		35,80	3,30	118,14	1	35,80	118,14	21,00	0,45
	9		17,10	3,25	55,58	1	17,10	55,58	21,00	0,21
	10		25,80	3,25	83,85	1	25,80	83,85	21,00	0,32
	11		10,80	3,15	34,02	1	10,80	34,02	21,00	0,13
	12		21,30	3,15	67,10	1	21,30	67,10	21,00	0,26
	13		16,50	3,15	51,98	1	16,50	51,98	21,00	0,20
	14		7,10	3,25	23,08	1	7,10	23,08	21,00	0,09
	15		7,00	3,20	22,40	1	7,00	22,40	21,00	0,09
	16		22,90	3,30	75,57	1	22,90	75,57	21,00	0,29
	17		39,40	3,35	131,99	1	39,40	131,99	21,00	0,50
	18		15,10	3,30	49,83	1	15,10	49,83	21,00	0,19
	19		5,50	3,10	17,05	1	5,50	17,05	21,00	0,06
	20		6,20	3,10	19,22	1	6,20	19,22	21,00	0,07
	21		14,30	2,05	29,32	1	14,30	29,32	21,00	0,11
3	1		82,90	2,33	193,16	1	82,90	193,16	21,00	0,73
	2		1,60	2,45	3,92	1	1,60	3,92	21,00	0,01
	3		1,50	2,45	3,68	1	1,50	3,68	21,00	0,01
	4		1,50	2,45	3,68	1	1,50	3,68	21,00	0,01
	5		17,20	2,55	43,86	1	17,20	43,86	21,00	0,17
	6		14,80	2,55	37,74	1	14,80	37,74	21,00	0,14
	7		2,30	2,45	5,64	1	2,30	5,64	21,00	0,02
	8		22,20	2,55	56,61	1	22,20	56,61	21,00	0,22
	9		28,50	2,00	57,00	1	28,50	57,00	21,00	0,22
	10		15,60	2,55	39,78	1	15,60	39,78	21,00	0,15
	11		19,50	2,55	49,73	1	19,50	49,73	21,00	0,19
	12		17,10	2,55	43,61	1	17,10	43,61	21,00	0,17
	13		32,20	2,55	82,11	1	32,20	82,11	21,00	0,31
1	1	lifta priekštelpa	16,00	3,00	48,00	1	16,00	48,00	21,00	0,18
	2	lifta telpa	19,70	11,75	231,48	1	19,70	231,48	21,00	0,88
	3	priekštelpa	7,10	3,05	21,66	1	7,10	21,66	21,00	0,08
	4	kāpņu telpa	18,30	2,65	48,50	1	18,30	48,50	21,00	0,18
	5	kāpņu telpa	14,10	3,10	43,71	1	14,10	43,71	21,00	0,17
	6	priekštelpa	4,00	3,00	12,00	1	4,00	12,00	21,00	0,05
2	7	lifta priekštelpa	16,60	3,65	60,59	1	16,60	60,59	21,00	0,23
	8	kāpņu telpa	25,70	3,65	93,81	1	25,70	93,81	21,00	0,36
	9	kāpņu telpa	11,30	2,80	31,64	1	11,30	31,64	21,00	0,12
3	10	lifta priekštelpa	18,00	3,95	71,10	1	18,00	71,10	21,00	0,27
	11	kāpņu telpa	1,50	2,55	3,83	1	1,50	3,83	21,00	0,01
		KOPĀ	**1873,50**	**2,95**	**5521,13**		**1873,50**	**5521,13**		**21,00**

Energy balance calculation with PHPP Version 9.6a

Areas determination

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Summary

Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment	Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a] 12 Months	Radiation-load cooling period [kWh/a] 4 Months
	Treated floor area	1	**1873,50**	m²	*Treated floor area according to PHPP manual*				
A	**North windows**	2	**225,92**	m²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas. which is displayed in the 'Windows' worksheet.	**North windows**	**1,390**	**9711**	**5606**
A	**East windows**	3	**19,92**	m²		**East windows**	**1,387**	**1542**	**748**
A	**South windows**	4	**170,59**	m²		**South windows**	**1,378**	**14535**	**6704**
A	**West windows**	5	**0,00**	m²		**West windows**			
A	**Horizontal windows**	6	**0,00**	m²		**Horizontal windows**			
A	**Exterior door**	7	**9,29**	m²	*Please subtract area of door from respective building assembly*	**Exterior door**	**2,000**		
A	**External wall - Ambient**	8	**1114,72**	m²	*Temperature zone "A" is ambient air*	**External wall - Ambient**	**0,653**	**3051**	**2809**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*	**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**1048,60**	m²		**Roof/Ceiling - Ambient**	**0,276**	**649**	**501**
B	**Floor slab / Basement ceiling**	11	**1048,60**	m²		**Floor slab / Basement ceiling**	**2,729**		
		12	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*				
		13	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"* Factor for X				
X		14	**0,00**	m²	*Temperature zone "X": Please provide user-defined reduction factor (0 < ft < 1):* **75%**				

						Thermal bridges - Overview	**Ψ [W/(mK)]**
A	**Thermal bridges Ambient**	15	**1962,72**	m	*Units in m*	**Thermal bridges Ambient**	**0,129**
P	**Perimeter thermal bridges**	16	**196,70**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*	**Perimeter thermal bridges**	**0,072**
B	**Thermal bridges FS/BC**	17	**0,00**	m	*Units in m*	**Thermal bridges FS/BC**	
I	**Building element towards neigh**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*	**Building element towards neighbour**	
Total thermal envelope			**3637,64**	**m²**		**Average therm. envelope**	**1,303**

Go to building components list

Area input

2-Sorting: BY ID

Area no.	Building assembly description	To group No.	Assigned to group	Quantity	x (	a [m]	x	b [m]	+	User determined [m²]	-	User subtraction [m²]	-	Subtraction window areas [m²]	) =	Area [m²]	Selection building assembly / Building system	U-Value [W/(m²K)]	Deviation from North	Angle of inclination from the horizontal	Orientation	Reduction factor shading	Exterior absorptivity	Exterior emissivity
	Projected building footprint	**0**	Projected building footprint	**1**	x (		x		+		-		)		=	0,0								
	Treated floor area	**1**	Treated floor area	**1**	x (		x		+	**1873,50**	-		)		=	1873,5								
	Exterior door	**7**	Exterior door	**1**	x (		x		+	**9,29**	-		) -		=	9,3	Exterior door	**2,00**						
1	**Z ārsiena**	**8**	External wall - Ambient	**1**	x (		x		+	**274,00**	-	**3,75**	) -	**176,9**	=	93,4	**01ud-Ārsiena ķieģeļu (māla)**	**0,809**	**40**	**90**	**North**	**0,80**	**0,60**	**0,90**
2	**D ārsiena**	**8**	External wall - Ambient	**1**	x (		x		+	**241,00**	-		) -	**102,4**	=	138,6	**01ud-Ārsiena ķieģeļu (māla)**	**0,809**	**220**	**90**	**South**	**0,80**	**0,60**	**0,90**
3	**R ārsiena**	**8**	External wall - Ambient	**1**	x (		x		+	**173,35**	-		) -	**0,0**	=	173,4	**01ud-Ārsiena ķieģeļu (māla)**	**0,809**	**310**	**90**	**West**	**0,80**	**0,60**	**0,90**
4	**A ārsiena**	**8**	External wall - Ambient	**1**	x (		x		+	**75,60**	-	**5,54**	) -	**4,9**	=	65,1	**01ud-Ārsiena ķieģeļu (māla)**	**0,809**	**130**	**90**	**East**	**0,80**	**0,60**	**0,90**
5	**1.stāva grīda uz grunts**	**11**	Floor slab / Basement ceiling	**1**	x (		x		+	**996,70**	-		) -	**0,0**	=	996,7	**02ud-1.st grīda uz grunts**	**2,857**	**0**	**180**	**Hor**	**0,00**	**0,00**	**0,00**
6	**Lifta grīda uz grunts**	**11**	Floor slab / Basement ceiling	**1**	x (		x		+	**40,00**	-		) -	**0,0**	=	40,0	**03ud-Lifta grīda uz grunts**	**0,298**	**0**	**180**	**Hor**	**0,00**	**0,00**	**0,00**
7	**Grīda uz grunts (ieejas mezgls)**	**11**	Floor slab / Basement ceiling	**1**	x (		x		+	**11,90**	-		) -	**0,0**	=	11,9	**05ud-Grīda uz grunts (ieejas mezgls)**	**0,175**	**0**	**180**	**Hor**	**0,00**	**0,00**	**0,00**
8	**Bēniņu grīda**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**996,70**	-		) -	**0,0**	=	996,7	**07ud-Bēniņu grīda**	**0,240**	**0**	**0**	**Hor**	**0,00**	**0,00**	**0,00**
9	**Terase virs ieejas mezgla**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**11,90**	-		) -	**0,0**	=	11,9	**06ud-Terase virs ieejas mezgla**	**3,571**	**0**	**1**	**Hor**	**0,80**	**0,60**	**0,90**
10	**Jumts liftam**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**40,00**	-		) -	**0,0**	=	40,0	**08ud-Lifta jumts**	**0,194**	**0**	**2**	**Hor**	**0,80**	**0,60**	**0,90**
11	**Z guļbaļķu siena**	**8**	External wall - Ambient	**1**	x (		x		+	**262,70**	-		) -	**49,0**	=	213,7	**09ud-Guļbaļķi**	**0,641**	**40**	**90**	**North**	**0,80**	**0,60**	**0,90**
12	**D guļbaļķu siena**	**8**	External wall - Ambient	**1**	x (		x		+	**224,00**	-		) -	**45,6**	=	178,4	**09ud-Guļbaļķi**	**0,641**	**220**	**90**	**South**	**0,80**	**0,60**	**0,90**
13	**R guļbaļķu siena**	**8**	External wall - Ambient	**1**	x (		x		+	**9,55**	-		) -	**0,0**	=	9,6	**09ud-Guļbaļķi**	**0,641**	**310**	**90**	**West**	**0,80**	**0,60**	**0,90**
14	**A guļbaļķu siena**	**8**	External wall - Ambient	**1**	x (		x		+	**81,06**	-		) -	**15,0**	=	66,1	**09ud-Guļbaļķi**	**0,641**	**130**	**90**	**East**	**0,80**	**0,60**	**0,90**
15	**D fibo**	**8**	External wall - Ambient	**1**	x (		x		+	**14,50**	-		) -	**2,9**	=	11,6	**04ud-Ārsiena (keramzītbetona bloku)**	**0,229**	**220**	**90**	**South**	**0,80**	**0,60**	**0,90**
16	**R fibo**	**8**	External wall - Ambient	**1**	x (		x		+	**6,99**	-		) -	**0,0**	=	7,0	**04ud-Ārsiena (keramzītbetona bloku)**	**0,229**	**310**	**90**	**West**	**0,80**	**0,60**	**0,90**
17	**A fibo**	**8**	External wall - Ambient	**1**	x (		x		+	**6,99**	-		) -	**0,0**	=	7,0	**04ud-Ārsiena (keramzītbetona bloku)**	**0,229**	**130**	**90**	**East**	**0,80**	**0,60**	**0,90**
18	**D 3.st koka karkasa siena**	**8**	External wall - Ambient	**1**	x (		x		+	**100,70**	-		) -	**19,7**	=	81,0	**10ud-Koka karkasa ārsiena 3.stāvā**	**0,275**	**220**	**90**	**South**	**0,80**	**0,60**	**0,90**
19	**Pažobeles siena 3.stāvā**	**8**	External wall - Ambient	**1**	x (		x		+	**70,00**	-		) -	**0,0**	=	70,0	**11ud-Pažobeles siena**	**0,275**	**0**	**90**	**North**	**0,00**	**0,00**	**0,00**
20					x (		x		+		-		) -	**0,0**	=									
21					x (		x		+		-		) -	**0,0**	=									
22					x (		x		+		-		) -	**0,0**	=									
23					x (		x		+		-		) -	**0,0**	=									
24					x (		x		+		-		) -	**0,0**	=									
25					x (		x		+		-		) -	**0,0**	=									
26					x (		x		+		-		) -	**0,0**	=									

Areas determination

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Summary

Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment	Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a] 12 Months
	Treated floor area	1	**1873,50**	m²	*Treated floor area according to PHPP manual*			
A	**North windows**	2	**225,92**	m²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas. which is displayed in the 'Windows' worksheet.	**North windows**	**1,390**	**9711**
A	**East windows**	3	**19,92**	m²		**East windows**	**1,387**	**1542**
A	**South windows**	4	**170,59**	m²		**South windows**	**1,378**	**14535**
A	**West windows**	5	**0,00**	m²		**West windows**		
A	**Horizontal windows**	6	**0,00**	m²		**Horizontal windows**		
A	**Exterior door**	7	**9,29**	m²	*Please subtract area of door from respective building assembly*	**Exterior door**	**2,000**	
A	**External wall - Ambient**	8	**1114,72**	m²	*Temperature zone "A" is ambient air*	**External wall - Ambient**	**0,653**	**3051**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*	**External wall - Ground**		
A	**Roof/Ceiling - Ambient**	10	**1048,60**	m²		**Roof/Ceiling - Ambient**	**0,276**	**649**
B	**Floor slab / Basement ceiling**	11	**1048,60**	m²		**Floor slab / Basement ceiling**	**2,729**	
		12	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*			
		13	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"* Factor for X			
X		14	**0,00**	m²	*Temperature zone "X": Please provide user-defined reduction factor (0 < ft < 1):* **75%**			

						Thermal bridges - Overview	**Ψ [W/(mK)]**
A	**Thermal bridges Ambient**	15	**1962,72**	m	*Units in m*	**Thermal bridges Ambient**	**0,129**
P	**Perimeter thermal bridges**	16	**196,70**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*	**Perimeter thermal bridges**	**0,072**
B	**Thermal bridges FS/BC**	17	**0,00**	m	*Units in m*	**Thermal bridges FS/BC**	
I	**Building element towards neigh**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*	**Building element towards neighbour**	
Total thermal envelope			**3637,64**	**m²**		**Average therm. envelope**	**1,303**

Go to building components list

Thermal bridge inputs

Sortierung ändern

No.	Thermal bridge - denomination	Group No.	Assigned to group	Quantity	x (	Length [m]	-	Subtraction length [m]	)=	Length ℓ [m]	User determined psi value [W/(mK)]	User determined $f_{Rsi=0,25}$ (optional)	or	Selection building system	Ψ-Value [W/(mK)]	f_{Rsi}-Requirement met?
1	**1.stāva grīda uz grunts**	**16**	Perimeter thermal bridges	**1**	x (	**156,90**	-		) =	156,90	**0,080**		or		**0,080**	
2	**Lifta grīda uz grunts**	**16**	Perimeter thermal bridges	**1**	x (	**25,80**	-		) =	25,80	**0,040**		or		**0,040**	
3	**Grīda uz grunts (ieejas mezgls)**	**16**	Perimeter thermal bridges	**1**	x (	**14,00**	-		) =	14,00	**0,040**		or		**0,040**	
4	**Bēniņu grīda**	**15**	Thermal bridges Ambient	**1**	x (	**196,70**	-		) =	196,70	**0,125**		or		**0,125**	
5	**Ārdurvis**	**15**	Thermal bridges Ambient	**1**	x (	**22,00**	-		) =	22,00	**0,095**		or		**0,095**	
6	**Logi/stiklotas k-jas**	**15**	Thermal bridges Ambient	**1**	x (	**718,02**	-		) =	718,02	**0,100**		or		**0,100**	
7	**Guļbaļķu savienojumu vietas (veikta termogr.)**	**15**	Thermal bridges Ambient	**1**	x (	**1026,00**	-		) =	1026,00	**0,150**		or		**0,150**	
8					x (		-		) =				or			
9					x (		-		) =				or			
10					x (		-		) =				or			
11					x (		-		) =				or			
12					x (		-		) =				or			
13					x (		-		) =				or			
14					x (		-		) =				or			
15					x (		-		) =				or			
16					x (		-		) =				or			
17					x (		-		) =				or			
18					x (		-		) =				or			
19					x (		-		) =				or			
20					x (		-		) =				or			
21					x (		-		) =				or			
22					x (		-		) =				or			
23					x (		-		) =				or			
24					x (		-		) =				or			
25					x (		-		) =				or			
26					x (		-		) =				or			
27					x (		-		) =				or			
28					x (		-		) =				or			
29					x (		-		) =				or			
30					x (		-		) =				or			
31					x (		-		) =				or			
32					x (		-		) =				or			

Heat losses through the ground

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Building section 1

Ground characteristics			
Thermal conductivity	λ	2,0	W/(mK)
Heat capacity	ρc	2,0	MJ/(m³K)
Periodic penetration depth	δ	3,17	m

Climate data			
Avg indoor temp. winter	T_i	21,0	°C
Avg indoor temp. summer	T_i	25,0	°C
Avg ground surface temperature	$T_{g,ave}$	8,6	°C
Amplitude of $T_{g,ave}$	$T_{g,\wedge}$	10,6	°C
Phase shifting of $T_{e,m}$	τ	1,1	Months
Length of the heating period	n	7,3	Months
Heating degree hours - exterior	G_t	100,7	kKh/a

Building data							
Area of ground floor slab / basement (	A	996,7	m²	U-value floor slab/basement ceiling	U_f	2,857	W/(m²K)
Perimeter length	P	156,9	m	TBs floor slab / basement ceiling	Ψ_B*l	0,00	W/K
Charact. dimension of floor slab	B'	12,70	m	U-value floor slab / basement ceiling i	U_f'	2,857	W/(m²K)
				Equivalent thickness floor	d_t	0,70	m

Floor slab type (select only one)

x	Slab on grade							
	Perimeter insulation width/depth	D	0,80	m	Orientation of perimeter insulation	horizontal		
	Perimeter insulation thickness	d_n	0,00	m	(check only one field)	vertical	x	
	Conductivity perimeter insulation	λ_n	0,038	W/(mK)				
	Heated basement or floor slab completely / partially below ground level							
	Basement wall height below ground le	z		m	U-Value wall below ground	U_{wB}		W/(m²K)
	Unheated basement							
	Height aboveground wall	h		m	U-Value wall above ground	U_W		W/(m²K)
	Basement wall height below ground le	z		m	U-Value wall below ground	U_{WB}		W/(m²K)
	Air change unheated basement	n	0,20	h^{-1}	U-Value basement floor slab	U_{fB}		W/(m²K)
	Air volume basement	V		m³				
	Suspended floor above a ventilated crawl space (at max. 0.5 m below ground)							
	U-Value crawl space	U_{Crawl}		W/(m²K)	Area of ventilation openings	εP		m²
	Height of crawl space wall	h		m	Wind velocity at 10 m height	v	4,0	m/s
	U-Value crawl space wall	U_W		W/(m²K)	Wind shield factor	f_W	0,05	-

Additional thermal bridge heat losses at perimeter							
				Steady-state fraction	$\Psi_{P,stat}$*l	12,552	W/K
Phase shift	β		Months	Harmonic fraction	$\Psi_{P,harm}$*l	0,000	W/K

Groundwater correction							
Depth of the groundwater table	z_w	3,0	m	Groundwater correction factor	G_w	1,22302678	-
Groundwater flow rate	q_w	0,05	m/d				

Interim results

Phase shift	β	0,78	Months	Steady-state heat flow	Φ_{stat}	6205,1	W
Steady-state transmittance	L_S	500,08	W/K	Periodic heat flow	Φ_{harm}	939,5	W
Exterior periodic transmittance	L_{pe}	198,48	W/K	Heat losses during heating period	Q_{tot}	38265	kWh
Transmittance building	L_0	2860,27	W/K				

Monthly average temperatures in the ground for monthly method (building assembly 1)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	18,2	18,1	18,2	18,5	18,9	19,2	19,5	19,6	19,4	19,2	18,8	18,4	18,8
Summer	21,5	21,4	21,5	21,8	22,2	22,5	22,8	22,9	22,7	22,5	22,1	21,7	22,1

Design ground temperature for 'Heating load' worksheet 18,1 **For 'Cooling load' worksheet** 22,9

Reduction factor for 'Annual heating' worksheet 0,13

Total result (all building parts)

Phase shift	β	0,81	Months	Steady-state heat flow	Φ_{stat}	6368,5	W
Steady-state transmittance	L_S	513,25	W/K	Periodic heat flow	Φ_{harm}	977,4	W
Exterior periodic transmittance	L_{pe}	207,75	W/K	Heat losses during heating period	Q_{tot}	39343	kWh
Transmittance building	L_0	2875,85	W/K	Charact. dimension of floor slab	B'	10,66	m

Monthly Average temperatures in the ground for monthly method (all building assemblies)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	**18,1**	**18,0**	**18,1**	**18,4**	**18,8**	**19,2**	**19,5**	**19,5**	**19,4**	**19,1**	**18,8**	**18,4**	**18,8**
Summer	**21,4**	**21,3**	**21,4**	**21,7**	**22,1**	**22,5**	**22,7**	**22,8**	**22,7**	**22,4**	**22,0**	**21,7**	**22,1**

Design ground temperature for 'Heating load' worksheet **18,0** **For 'Cooling load' worksheet** **22,8**

Reduction factor for 'Annual heating' worksheet **0,14**

Heat losses through the ground 2

Energy balance calculation with PHPP Version 9.6a

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Building section 2

Ground characteristics			
Thermal conductivity	λ	2,0	W/(mK)
Heat capacity	ρc	2,0	MJ/(m³K)
Periodic penetration depth	δ	3,17	m

Building data							
Area of ground floor slab / basement (	A	40,0	m²	U-value floor slab/basement ceiling	U_f	0,298	W/(m²K)
Perimeter length	P	25,8	m	TBs floor slab / basement ceiling	Ψ_B*l	0,00	W/K
Charact. dimension of floor slab	B'	3,10	m	U-value floor slab / basement ceiling i	U_f'	0,298	W/(m²K)
				Equivalent thickness floor	d_t	6,71	m

Floor slab type (select only one)

x	Slab on grade						
	Perimeter insulation width/depth	D	1,10	m	Orientation of perimeter insulation	horizontal	
	Perimeter insulation thickness	d_n	0,00	m	(check only one field)	vertical	x
	Conductivity perimeter insulation	λ_n		W/(mK)			
	Heated basement or floor slab completely / partially below ground level						
	Basement wall height below ground le	z	2,60	m	U-Value wall below ground	U_{wB}	3,571 W/(m²K)
	Unheated basement						
	Height aboveground wall	h		m	U-Value wall above ground	U_W	W/(m²K)
	Basement wall height below ground le	z		m	U-Value wall below ground	U_{WB}	W/(m²K)
	Air change unheated basement	n	0,20	h^{-1}	U-Value basement floor slab	U_{fB}	W/(m²K)
	Air volume basement	V		m³			
	Suspended floor above a ventilated crawl space (at max. 0.5 m below ground)						
	U-Value crawl space	U_{Crawl}		W/(m²K)	Area of ventilation openings	εP	m²
	Height of crawl space wall	h		m	Wind velocity at 10 m height	v	4,0 m/s
	U-Value crawl space wall	U_W		W/(m²K)	Wind shield factor	f_W	0,05 -

Additional thermal bridge heat losses at perimeter							
				Steady-state fraction	$\Psi_{P,stat}$*l	1,032	W/K
Phase shift	β		Months	Harmonic fraction	$\Psi_{P,harm}$*l	0,000	W/K

Groundwater correction							
Depth of the groundwater table	z_w	3,0	m	Groundwater correction factor	G_w	1,00063526	-
Groundwater flow rate	q_w	0,05	m/d				

Interim results

Phase shift	β	1,34	Months	Steady-state heat flow	Φ_{stat}	135,0	W
Steady-state transmittance	L_S	10,88	W/K	Periodic heat flow	Φ_{harm}	29,1	W
Exterior periodic transmittance	L_{pe}	7,38	W/K	Heat losses during heating period	Q_{tot}	879	kWh
Transmittance building	L_0	12,95	W/K				

Monthly average temperatures in the ground for monthly method (building assembly 2)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	6,2	4,7	4,8	6,4	9,2	12,3	14,9	16,4	16,3	14,7	12,0	8,9	10,6
Summer	6,9	5,4	5,4	7,1	9,8	12,9	15,6	17,1	17,0	15,4	12,6	9,5	11,2

Design ground temperature for 'Heating load' worksheet 4,7

For 'Cooling load' worksheet 17,1

Reduction factor for 'Annual heating' worksheet 0,67

Heat losses through the ground 3

Energy balance calculation with PHPP Version 9.6a

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Building section 3

Ground characteristics			
Thermal conductivity	λ	2,0	W/(mK)
Heat capacity	ρc	2,0	MJ/(m³K)
Periodic penetration depth	δ	3,17	m

Building data							
Area of ground floor slab / basement (	A	11,9	m²	U-value floor slab/basement ceiling	U_f	0,175	W/(m²K)
Perimeter length	P	14,0	m	TBs floor slab / basement ceiling	Ψ_B*l		W/K
Charact. dimension of floor slab	B'	1,70	m	U-value floor slab / basement ceiling i	U_f'	0,175	W/(m²K)
				Equivalent thickness floor	d_t	11,46	m

Floor slab type (select only one)

x	Slab on grade						
	Perimeter insulation width/depth	D	1,10	m	Orientation of perimeter insulation	horizontal	
	Perimeter insulation thickness	d_n	0,05	m	(check only one field)	vertical	x
	Conductivity perimeter insulation	λ_n	0,036	W/(mK)			

	Heated basement or floor slab completely / partially below ground level						
	Basement wall height below ground le	z		m	U-Value wall below ground	U_{wB}	W/(m²K)

	Unheated basement						
	Height aboveground wall	h		m	U-Value wall above ground	U_W	W/(m²K)
	Basement wall height below ground le	z		m	U-Value wall below ground	U_{WB}	W/(m²K)
	Air change unheated basement	n	0,20	h^{-1}	U-Value basement floor slab	U_{fB}	W/(m²K)
	Air volume basement	V		m³			

	Suspended floor above a ventilated crawl space (at max. 0.5 m below ground)						
	U-Value crawl space	U_{Crawl}		W/(m²K)	Area of ventilation openings	εP	m²
	Height of crawl space wall	h		m	Wind velocity at 10 m height	v	4,0 m/s
	U-Value crawl space wall	U_W		W/(m²K)	Wind shield factor	f_W	0,05 -

Additional thermal bridge heat losses at perimeter						
			Steady-state fraction	$\Psi_{P,stat}$*l	0,560	W/K
Phase shift	β	Months	Harmonic fraction	$\Psi_{P,harm}$*l	0,000	W/K

Groundwater correction						
Depth of the groundwater table	z_w	3,0	m	Groundwater correction factor	G_w	1,00000625 -
Groundwater flow rate	q_w	0,05	m/d			

Interim results

Phase shift	β	1,40	Months	Steady-state heat flow	Φ_{stat}	28,4	W
Steady-state transmittance	L_S	2,29	W/K	Periodic heat flow	Φ_{harm}	8,8	W
Exterior periodic transmittance	L_{pe}	2,29	W/K	Heat losses during heating period	Q_{tot}	199	kWh
Transmittance building	L_0	2,64	W/K				

Monthly average temperatures in the ground for monthly method (building assembly 3)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	3,8	1,4	1,4	3,7	7,8	12,5	16,7	19,1	19,1	16,7	12,7	7,9	10,2
Summer	4,3	1,9	1,9	4,2	8,3	13,1	17,2	19,6	19,6	17,3	13,2	8,4	10,7

Design ground temperature for 'Heating load' worksheet 1,4 **For 'Cooling load' worksheet** 19,6

Reduction factor for 'Annual heating' worksheet 0,75

U-value of building assemblies

Energy balance calculation with PHPP Version 9.6a

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Secondary calculation: Equivalent thermal conductivity of still air spaces -> (on the right)
Wedge-shaped assembly layer -> (on the right)
Unheated / uncooled attic -> (on the right)

Assembly no.	Building assembly description	Interior insulation?
01ud	Ārsiena ķieģeļu (māla)	

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0,13
Adjacent to: 1-Outdoor air — exterior R_{se}: 0,04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
apmetums	0,900					15
māla ķieģeļi	0,810			vidējais sv.biezums		850

Percentage of sec. 1: 100% — Percentage of sec. 2: — Percentage of sec. 3: — Total: 86,5 cm

U-value supplement: — W/(m²K)

U-value: 0,809 W/(m²K)

Assembly no.		Interior insulation?
02ud	1.st grīda uz grunts	

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor — interior R_{si}: 0,17
Adjacent to: 2-Ground — exterior R_{se}: 0,00

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
grīdas segums	1,000					20
st.betons	2,000					70
betona plātne	2,000					100
smiltis	2,000					50
šķembas	2,000					100

Percentage of sec. 1: 100% — Percentage of sec. 2: — Percentage of sec. 3: — Total: 34,0 cm

U-value supplement: — W/(m²K)

U-value: 2,857 W/(m²K)

Assembly no.		Interior insulation?
03ud	Lifta grīda uz grunts	

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor — interior R_{si}: 0,17
Adjacent to: 2-Ground — exterior R_{se}: 0,00

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
segums+izlīdz.slānis	1,500					50
XPS	0,036					100
stiegrota pamatu plātne	2,000					350
šķembas	2,000					200
smilts	2,000					200

Percentage of sec. 1: 100% — Percentage of sec. 2: — Percentage of sec. 3: — Total: 90,0 cm

U-value supplement: — W/(m²K)

U-value: 0,298 W/(m²K)

Assembly no.		Interior insulation?
04ud	Ārsiena (keramzītbetona bloku)	

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0,13

Adjacent to: 1-Outdoor air — exterior R_{se}: 0,04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
apmetums	0,900					15
siltumizolācija	0,040					120
apmetums	0,900					10
keramzītbetona bloki	0,260					300
apmetums	0,900					10

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			45,5 cm

U-value supplement: W/(m²K)

U-value: 0,229 W/(m²K)

Assembly no.		Interior insulation?
05ud	Grīda uz grunts (ieejas mezgls)	

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor — interior R_{si}: 0,17

Adjacent to: 2-Ground — exterior R_{se}: 0,00

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
segums	1,500					20
st.betons	2,000					80
siltumizolācija	0,037	FINNFOAM FL-300				200
šķembas	2,000					200

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			50,0 cm

U-value supplement: W/(m²K)

U-value: 0,175 W/(m²K)

Assembly no.		Interior insulation?
06ud	Terase virs ieejas mezgla	

Heat transmission resistance [m²K/W]

Orientation of building element: 1-Roof — interior R_{si}: 0,10

Adjacent to: 1-Outdoor air — exterior R_{se}: 0,04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
segums	2,000					20
izl.slānis (stiegrots)	2,000					60
monolītbetons	2,000					200

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			28,0 cm

U-value supplement: W/(m²K)

U-value: 3,571 W/(m²K)

Assembly no.		Interior insulation?
07ud	Bēniņu grīda	

Heat transmission resistance [m²K/W]

Orientation of building element	1-Roof	interior R_{si}	0,10
Adjacent to	3-Ventilated	exterior R_{se}:	0,10

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
beramā minerālvate	0,049					50
beramā minerālvate	0,049	sijas/latas	0,130			150
dēļu klājs	0,130					25
iekšējā apdare						

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
92%	8,0%		22,5 cm

U-value supplement [ ] W/(m²K)

U-value: 0,240 W/(m²K)

Assembly no.		Interior insulation?
08ud	Lifta jumts	

Heat transmission resistance [m²K/W]

Orientation of building element	1-Roof	interior R_{si}	0,10
Adjacent to	1-Outdoor air	exterior R_{se}:	0,04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
ruļļveida mater.	0,230					6
minerālvate	0,040			pieņemts vidēji		200
nesošais profils						

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			20,6 cm

U-value supplement [ ] W/(m²K)

U-value: 0,194 W/(m²K)

Assembly no.		Interior insulation?
09ud	Guļbaļķi	

Heat transmission resistance [m²K/W]

Orientation of building element	2-Wall	interior R_{si}	0,13
Adjacent to	1-Outdoor air	exterior R_{se}:	0,04

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
guļbaļķi	0,180					250

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			25,0 cm

U-value supplement [ ] W/(m²K)

U-value: 0,641 W/(m²K)

Ventilation data

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Treated floor area A_{TFA}	m²	1874		*('Areas' worksheet)*
Room height h	m	2,95	2,95	
Volume of ventilated space (A_{TFA}*h) V_V	m³	5521		*(Worksheet 'Annual heating')*

Ventilation type

Please select **1-Balanced PH ventilation with HR**

Infiltration air change rate

Wind protection coefficients e and f		
Coefficient e for wind protection class	Several side exposed	One side exposed
No protection	0,10	0,03
Moderate protection	0,07	0,02
High protection	0,04	0,01
Coefficient f	15	20

			For annual demand:	For heating load:				
Wind protection coefficient, e			0,07	0,18				
Wind protection coefficient, f			15	15	Net air volume for press. test	V_{n50}	Air permeability	q_{50}
Air change rate at press. test	n_{50}	1/h	2,64	2,64	5521	m³	4,00	m³/(hm²)

			For annual demand:	For heating load:
Excess extract air		1/h	0,00	0,00
Infiltration air change rate	$n_{V,Rest}$	1/h	0,184	0,461

Selection of ventilation input - Results

PHPP offers two methods for dimensioning air quantities and choosing the ventilation unit. With "Standard data input for balanced ventilation", supply or extract air quantities for residential buildings and parameters for ventilation systems with a maximum of 1 ventilation unit can be planned. Projects with up to 10 different ventilation units and air quantities determined according to rooms or zones can be entered in the 'Addl vent' worksheet. Please select your design method here:

	Ventilation unit / Heat recovery efficiency design		Average air flow rate m³/h	Average air change rate 1/h	Extract air excess (extract air system) 1/h	Effective heat recovery efficiency unit [-]	Humidity recovery efficiency [-]	Specific power input Wh/m³	Heat recovery efficiency SHX [-]
	Standard design	*('Ventilation' worksheet, see below)*							
x	Multiple ventilation units, non-res	*('Addl vent' worksheet)*	1445	0,26	0,00	68,2%	0,0%	0,57	0,0%

Cooling recovery	Efficiency SHX
	η^*_{SHX} 0%

Average interior humidity during winter operation

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
18%	17%	20%	26%	37%	48%	63%	60%	48%	35%	27%	21%

Extended input for balanced ventilation

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Planning ventilation systems with multiple ventilation units

Ventilation unit / Heat recovery efficiency design			
In Ventilation sheet (standard design)			('Ventilation' worksheet)
In 'Addl vent worksheet (this worksheet)		x	(Addl vent)
Treated floor area A_{TFA}	m²	1874	('Areas' worksheet)
Room height h	m	2,95	(Worksheet 'Annual heating')
Room air volume for ventilation (A_{TFA}*h) = V_V	m³	5521	(Worksheet 'Annual heating')
Number of occupants	P	20,0	('Ventilation' worksheet)
Room temperature	°C	21	(Worksheet 'Annual heating')
Average external temp. heating period	°C	2,7	('Ventilation' worksheet)
Average ground temp.	°C	8,6	('Ground' worksheet)
Length of the heating period	d/a	223	('Heating' worksheet)
Ventilation type		1-Balanced PH ventilation with HR	('Ventilation' worksheet)

Results of ventilation design and unit selection:

Venti-lation unit no.	Description of the unit	Design V_{SUP} m³/h	Design V_{ETA} m³/h	Annual average value V_{SUP} m³/h	Annual average value V_{ETA} m³/h	Annual average value Air ch.rt. 1/h	Effective heat recovery efficiency	Humidity recovery efficiency	Spec. input power	Heat recov. efficiency SHX
1	ENVISTAR FLEX (PN	1300	1300	296	296	---	69%	0%	0,50	0%
2	ENVISTAR FLEX (PN	1400	1400	319	319	---	69%	0%	0,55	0%
3	ENVISTAR FLEX (PN	1700	1700	430	430	---	69%	0%	0,60	0%
4	Dabīgā ventilācija	666	666	400	400	---	67%	0%	0,60	0%
5						---				
6						---				
7						---				
8						---				
9						---				
10						---				
Result for overall vent. syst.		**5066**	**5066**	**1445**	**1445**	**0,26**	**68%**	**0%**	**0,57**	**0%**

Recommendations for dimensioning air quantities

Use of low odour and low VOCs building materials/furnishings:
It is strongly recommended to use building materials that cause no or very low VOCs/odours instead of increasing the outdoor air volume in order to clear the air.
This holds true independently from the chosen approach to determine air quality; emissions of all sources in the room should be considered, e.g. furniture, carpets and ventilation or air-conditioning unit.

Assessment of volume flow rates according to the number of persons
Also in non-residential buildings, the number of persons is fundamentally important for assessing the volume air flow rates. For good indoor air quality volumes between 20 to 30 m³/h/person are sufficient.
Higher outdoor air amounts may lead to excessively dry indoor air in winter. The air flow rates are specified by classification according to EN 13779. The classification must be agreed with the client in advance.
IDA 3 is adequate for office buildings. IDA 4 has proven satisfactory for school buildings as flushing ventilation is carried out during breaks anyway. For typical outdoor air CO_2 concentrations of around 400-500 ppm, it is possible to comply even with 1500 ppm. Exceeding this figure temporarily is permissible.

Outdoor air flow rates per person:
- Recommended for residential buildings: around 30 m³/(h person)
- Recommended for offices and similar uses: around 30 m³/(h person) (AMEV: 28 m³/(h person); EN 13779 / IDA 3: at least 24 m³/(h person))
- Recommended for schools and day care centres: 15 to 20 m³/(h person) (Source: Guidelines for energy-efficient educational buildings, Passive House Institute, 2010)
- Recommendation for sport halls: 60 m³/(h person) (DIN 18032-1)

Flushing phase for intermittent ventilation operation
In case the ventilation is to be used intermittently (turned off at night), then it should be flushed in the morning, approx. 1 to 2 hours before building is occupied. This should be done in order to refresh air from emissions such as VOCs. Flushing the building causes that the ventilation system works for a longer period (utilisation time + flushing phase). Please consider this at design stage.

Dimensioning of air quantities

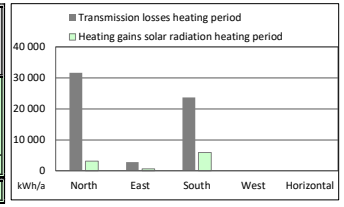
When dimensioning the air quantities, please consider the design recommendations given above.
The operation period of the ventilation can be determined on the basis of daily utilisation hours, including flushing phase if applicable. In addition, time periods with reduced ventilation requirements (operation modes) can be taken into account by means of reduction factors.

Room no.	Amount a	Room name	Allocation to ventilation unit (No.)	Area A m²	Clear height h m	Room vol. A x h m³	Volume flow per room V_{SUP} m³/h	V_{ETA} m³/h	V_{TRANS} m³/h	Air chng. rt. per room n 1/h	Utilisation times h/d h	d/week d	Duration of holidays d	Reduction factor 1	Operation red. 1	Reduction factor 2	Operation red. 2	Reduction factor 3	Operation red. 3	Annual average value: V_{SUP} m³/h	V_{ETA} m³/h	V_{TRANS} m³/h	Change rate 1/h
1	1	1.stāva telpas	1	692,30	2,58	1788	1300	1300		0,73	9	5		85%	100%					296	296		0,17
2	1	2.stāva telpas	2	772,00	3,17	2447	1400	1400		0,57	9	5		85%	100%					319	319		0,13
3	1	3.stāva telpas	3	256,90	2,42	620	1700	1700		2,74	10	5		85%	100%					430	430		0,69
4	1	kāpņ.t.+lifts	4	152,30	4,37	666	666	666		1,00	24	7		60%	100%					400	400		0,60
5														100%	100%								
6														100%	100%								
7														100%	40%								
8														100%	40%								
9														100%	40%								
10														100%	40%								
11														100%	100%								
12														100%	100%								
13														100%	100%								
14														100%	100%								
15														100%	100%								
16														100%	100%								
17														100%	100%								
18														100%	100%								
19														100%	100%								
20														100%	100%								
21														100%	100%								
22														100%	100%								
23														100%	100%								
24														100%	100%								
25														100%	100%								
26														100%	100%								
27														100%	100%								
28														100%	100%								
29														100%	100%								
30														100%	100%								
Additional lines: Please mark complete lines above, copy and paste multiple times																				1445	1445	---	0,26

Windows

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Window area orientation	Global radiation (main orientations)	Shading	Dirt	Non-vertical radiation incidence	Glazing fraction	g-Value	Solar irradiation reduction factor	Window area	Window U-Value	Glazing area	Average global radiation		Transmission losses heating period	Heating gains solar radiation heating period
Standard values →	kWh/(m²a)	0,75	0,95	0,85				m²	W/(m²K)	m²	kWh/(m²a)		kWh/a	kWh/a
North	87	0,44	0,95	0,85	0,71	0,50	0,25	225,92	1,39	159,97	111	North	31645	3137
East	190	0,43	0,95	0,85	0,69	0,50	0,24	19,92	1,39	13,82	257	East	2784	621
South	293	0,45	0,95	0,85	0,72	0,50	0,26	170,59	1,38	121,98	268	South	23684	5967
West	189	1,00	0,95	0,85	0,00	0,00	0,00	0,00	0,00	0,00	189	West	0	0
Horizontal	313	1,00	0,95	0,85	0,00	0,00	0,00	0,00	0,00	0,00	313	Horizontal	0	0
Total or average value for all windows.						0,50	0,25	416,43	1,39	295,77			58113	9725



Recommendation for $U_{W,installed}$ [W/(m²K)]

0,65	0,70	0,80	0,44

Heating degree hours [kKh/a]: 100,7

Go to glazing list Go to window frames list

Quan-tity	Description	Deviation from north	Angle of inclination from the horizontal	Orien- tation	Window rough openings: Width	Height	Installed in: Selection from 'Areas' worksheet	Glazing: Selection from 'Components' worksheet	Frame: Selection from 'Components' worksheet	g-Value: Perpen-dicular radiation	U-Value: Glazing	Frames (avg.)	Ψ Glazing edge: $\Psi_{Glazing\ edge}$ (Avg.)	Installation situation (user determined value for $\Psi_{installation}$ or '1': $\Psi_{installation}$ from 'Components' worksheet '0': in the case of abutting windows): left	right	bottom	top	$\Psi_{Installation}$ (Avg.)	Results: Window Area	Glazing area	U_w installed	Glazed fraction per window
		°	°		m	m		1-Sorting: LIKE LIST	1-Sorting: LIKE LIST	-	W/(m²K)	W/(m²K)	W/(mK)	W/(mK) or 1/0				W/(mK)	m²	m²	W/(m²K)	%
18	lifta ķieģ Z	40	90	North	1,020	4,220	1-Z ārsiena	02ud-Divstikla pakete Al rāmī	02ud-Al rāmis	0,50	1,10	1,60	0,060	0	1	0	0	0,000	77,5	59,34	1,35	77%
8	Z ķieģ	40	90	North	0,600	1,400	1-Z ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	1	0,000	6,7	4,36	1,42	65%
26	Z ķieģ	40	90	North	0,580	1,090	1-Z ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	0	0,000	16,4	10,16	1,44	62%
13	Z ķieģ	40	90	North	1,200	0,600	1-Z ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	0	1	0,000	9,4	5,95	1,43	64%
36	Z guļb	40	90	North	0,600	1,430	11-Z guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	0	0,000	30,9	20,12	1,42	65%
18	Z guļb	40	90	North	1,200	0,730	11-Z guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	0	1	0,000	15,8	10,67	1,40	68%
2	Z guļb	40	90	North	0,700	0,750	11-Z guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	1	1	0,000	1,1	0,64	1,44	61%
1	Z guļb	40	90	North	1,150	1,150	11-Z guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	1	1	0,000	1,3	0,98	1,35	74%
1	D fibo	220	90	South	1,400	2,060	15-D fibo	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	1	1	0,000	2,9	2,36	1,29	82%
6	D ķieģ	220	90	South	0,600	1,400	2-D ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	1	0,000	5,0	3,27	1,42	65%
20	D ķieģ	220	90	South	0,580	1,090	2-D ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	0	0,000	12,6	7,81	1,44	62%
10	D ķieģ	220	90	South	1,200	0,600	2-D ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	0	1	0,000	7,2	4,58	1,43	64%
18	D ķieģ Al lifta	220	90	South	1,020	4,220	2-D ārsiena	02ud-Divstikla pakete Al rāmī	02ud-Al rāmis	0,50	1,10	1,60	0,060	0	1	0	0	0,000	77,5	59,34	1,35	77%
1	D guļb	220	90	South	1,600	2,600	12-D guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	1	1	0,000	4,2	3,51	1,27	84%
32	D guļb	220	90	South	0,600	1,430	12-D guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	0	0,000	27,5	17,88	1,42	65%
16	D guļb	220	90	South	1,200	0,730	12-D guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	0	1	0,000	14,0	9,48	1,40	68%
18	D 3.stāvā	220	90	South	0,730	1,500	18-D 3.st koka karkasa siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	1	0,000	19,7	13,75	1,38	70%
6	R lifta vitrīna	40	90	North	1,000	2,150	1-Z ārsiena	02ud-Divstikla pakete Al rāmī	02ud-Al rāmis	0,50	1,10	1,60	0,060	0	0	1	0	0,000	12,9	9,36	1,39	73%
12	R lifta vitrīna	40	90	North	1,000	3,000	1-Z ārsiena	02ud-Divstikla pakete Al rāmī	02ud-Al rāmis	0,50	1,10	1,60	0,060	0	0	1	0	0,000	36,0	26,88	1,37	75%
18	R lifta vitrīna	40	90	North	1,000	1,000	1-Z ārsiena	02ud-Divstikla pakete Al rāmī	02ud-Al rāmis	0,50	1,10	1,60	0,060	0	0	1	0	0,000	18,0	11,52	1,47	64%
4	A ķieģ	130	90	East	0,600	1,400	4-A ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	1	0,000	3,4	2,18	1,42	65%
1	A ķieģ	130	90	East	1,200	1,300	4-A ārsiena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	1	1	0,000	1,6	1,19	1,34	76%
6	A guļb	130	90	East	0,600	2,200	14-A guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	1	0,000	7,9	5,39	1,40	68%
2	A guļb	130	90	East	1,200	1,300	14-A guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	1	1	1	0,000	3,1	2,37	1,34	76%
3	A guļb	130	90	East	0,600	2,200	14-A guļbaļķu siena	01ud-Koka logi ar divstikla pektēm	01ud-Koka rāmis dubultais (jauns)	0,50	1,15	1,40	0,045	1	0	1	0	0,000	4,0	2,69	1,40	68%

Aux Electricity

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Treated floor area	1874	m²
Heating period	223	d
Air volume	5521	m³
Dwelling units	1	HH

Heat recovery efficiency ventilation unit	0,68	
Operation vent. system Winter	5,36	kh/a
Operation vent. system Summer	3,40	kh/a
Air change rate	0,26	h^{-1}

Annual space heating demand	151	kWh/(m²a)
Boiler rated power	103	kW
DHW system heating demand	19115	kWh/a
Design forward flow temperature	55	°C

Column no.	1	2	3		4		5		6		7		8		9		10	11
Application	Existing [1/0]	Within the thermal envelope [1/0]	Norm demand		Utilisation factor		Period of operation		Reference size		Electricity demand [kWh/a]		Available as interior heat		Utilisation period [h/a]		Internal heat gains winter [W]	Internal heat gains summer [W]
Ventilation system																		
Winter ventilation	1		0,57	Wh/m³	* 0,26	h^{-1} *	5,4	kh/a *	5521	m³ =	4398		considered in heat recovery efficiency					
Defroster HX	0	1	Data entries in 'Ventilation' worksheet or in 'Addl vent'								0	*	0,3	/	5,36	=	0	
Summer ventilation	1	0,90	0,57	Wh/m³	* 0,26	h^{-1} *	3,4	kh/a *	5521	m³ =	2796	*	1,0	/	3,40	=		739
													Internal heat sources ' Additional summer ventilation'					0,0
Additional vent. summer	0		0,00	Wh/m³	* 0,00	h^{-1} *	3,4	kh/a *	5521	m³ =	0	*	1,0	/	3,40	=		
Heating system				Controlled / non controlled [1/0]														
Enter the rated power of the pump				W	0													
Circulator pump heating	1	1	252	W	* 1,0	*	5,4	kh/a *	1	=	1350	*	1,0	/	5,36	=	252	
Boiler electricity consumption at 30% load				W														
Aux. energy - Heat. boiler	0	0	139	W	* 1,00	*	0,00	kh/a *	1	=	0	*	1,0	/	5,36	=	0	
Aux. energy - Wood fired/Pellet boiler	0	0	Data entries in 'Boiler' worksheet. Aux. energy demand including possible drinking water production.								0	*	1,0	/	5,36	=	0	
DHW system																		
Enter average power consumption of pump				W														
Circulation pump DHW	1	1	46	W	* 1,00	*	7,7	kh/a *	1	=	357	*	1,0	/	8,76	=	41	41
Enter the rated power of the pump				W														
Storage load pump DHW			188	W	* 1,00	*	0,0	kh/a *	1	=	0	*	1,0	/	8,76	=	0	0
Boiler electricity consumption at 100% load				W														
DHW boiler aux. energy	0	0	416	W	* 1,00	*	0,0	kh/a *	1	=	0	*	1,0	/	8,76	=	0	0
Enter the rated power of the solar DHW pump				W														
Solar aux. electricity	0		152	W	* 1,00	*	1,8	kh/a *	1	=	0	*	1,0	/	8,76	=	0	0
Aux. electricity cooling and dehumidification																		
Aux. electricity cooling				kWh/a	* 1,00	*	1,0	*	1	=	0	*	1,0	/	3,40	=		0
Aux. electricity dehum.				kWh/a	* 1,00	*	1,0	*	1	=	0	*	1,0	/	3,40	=		0
Misc. aux. electricity																		
Misc. aux. electricity				kWh/a	* 1,00	*	1,0	*	1	=	0	*	1,0	/	8,76	=	0	0
Total											8901						293	780
Specific demand	kWh/(m²a) (treated floor area)										4,8							

Heat distribution and domestic hot water (DHW) system

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Interior temperature:	21	°C	Interior temperature summer:	25	°C
Building type:	Nedzīvojamā ēka				
Treated floor area A_{TFA}:	1874	m²			
Occupancy:	20,0	Pers			
Number of dwelling units:	1				
Annual heating demand $q_{Heating}$	282839	kWh/a	Annual useful cooling dem. q_{Cool}	65	kWh/a
Length of heating period:	223	d	Length cooling period:	123	d
Average heating load P_{ave}:	52,8	kW	Average cooling load $P_{Average}$:	0,0	kW
Marginal usability of additional heat gains:	100%		Marginal utility of additional heat losses:	0%	

Space heat distribution

			Inside thermal envelope					Outside thermal envelope					Total values	
			1	2	3	4	5	1	2	3	4	5	Absolute	Specific
Length of distribution pipes	L_H	m	360,9											
Nominal width of pipe		mm	21											
Insulation thickness		mm												
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)	0,038											
Heat loss coefficient per m of insulated pipe		W/(mK)	0,681											
Insulation quality of mountings, pipe suspensions, etc.		-	3 - Good	1-None	1-None	1-None	1-None	2 - Moderate	1-None	1-None	1-None	1-None		
Thermal bridge supplement		W/K	1,944											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	0,686											
Temp. of the room through which the pipes pass	ϑ_X	°C	21	21	21	21	21	6,0	6,0	6,0	6,0	6,0		
Design forward flow temperature	ϑ_V	°C	55,0	55,0	55,0	55,0	55,0	55,0	55,0	55,0	55,0	55,0		
Design system heating load	$P_{heating}$	kW	103,4	103,4	103,4	103,4	103,4	103,4	103,4	103,4	103,4	103,4		
Forward flow temperature control ('x' if appropriate)			x	x	x	x	x	x	x	x	x	x		
Design return flow temperature	ϑ_R	°C	45,3											
Annual heat emission per m of plumbing	q^*_{HL}	kWh/(m·a)	63											
Possible utilisation factor of released heat	η_G	-	100%										kWh/a	kWh/(m²a)
Annual heat losses of heating distribution	Q_{HL}	kWh/a	0										0	0,0
Annual heat losses of heating storage		kWh/a											0	0,0
Annual heat losses of heating		kWh/a											0	0,0
Performance ratio of heat distribution	ea_{+HL}	-											100%	

DHW useful heat

DHW demand for showers, per person and day (with 60°C)		litre/person/d	3,1
DHW demand others, per person and day (with 60°C)		litre/person/d	3,8
Performance of shower drain-water heat recovery		-	0%
Effective DHW demand	V_{DHW}	litre/person/d	7
Average cold water temperature of the supply	ϑ_{TW}	°C	8,6
DHW demand for washing machines and dishwashers non-ele		kWh/a	0
Effective useful heat DHW	Q_{DHW}	kWh/a	**3014**

kWh/a	kWh/(m²a)
3014	**1,6**

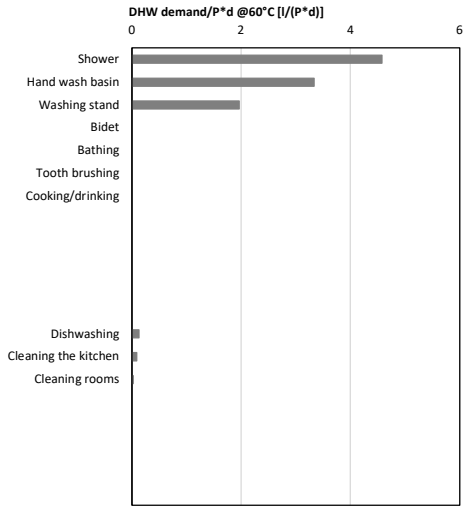
Auxiliary calculation - DHW demand calculation (for non-res)

	l/(P*d) at 60 °C
DHW demand for showering:	**3,1**
DHW demand for other uses:	**3,8**

Days of use per year [d/a]: **250**

Application		Used?	Single-lever mixer?	Time of use per use	Amount of uses according to type of use	Flow rate	Useful temperature	Equivalent average amount of water @ 60°C	Equivalent average amount of water @ 60°C	Useful heat @ 60°C
		-	-	min	-	l/min	°C	l/(WE*d)	l/(P*d)	kWh/a
Shower	Per person	x	x	1,0	1,0	8,0	38	92	5	1369
Hand wash basin	Per person	x	x	0,5	4,0	4,0	30	67	3	997
Washing stand	Per person	x	x	1,0	0,4	8,0	38	39	2	587
Bidet	Per person		x	1,0	0,1	8,0	38			
Bathing	Per person		x	10,0	0,0	15,0	38			
Tooth brushing	Per person		x	0,1	2,0	4,0	30			
Cooking/drinking	Per person		x	0,3	1,0	6,0	45			
	Per person		N/A							
	Per person		N/A							
	Per person		N/A							
	Per person		N/A							
	Per person		N/A							
Dishwashing	Per time of use	x	x	0,6	1,0	6,0	45	3	0	38
Cleaning the kitchen	Per time of use	x	x	0,5	1,0	6,0	38	2	0	26
Cleaning rooms	Per time of use	x	x	1,0	0,1	6,0	38	0	0	7
	Per time of use		N/A							
	Per time of use		N/A							
	Per time of use		N/A							
	Per time of use		N/A							
	Per time of use		N/A							

DHW demand according to use



Auxiliary calculation - shower drain-water heat recovery

DHW distribution

			Inside thermal envelope					Outside thermal envelope					Total values	
			1	2	3	4	5	1	2	3	4	5	Absolute	Specific
Temp. of room through which the pipes pass	ϑ_X	°C	21,0	21,0	21,0	21,0	21,0	6,0	6,0	6,0	6,0	6,0		
Design forward flow temperature	ϑ_{dist}	°C	55,0	55,0	55,0	55,0	55,0	55,0	55,0	55,0	55,0	55,0		
DHW circulation pipes														
Length of circulation pipes (forward + return flow)	L_{HS}	m	156,9											
Nominal width of pipe		mm	25											
Insulation thickness		mm	10											
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)	0,060											
Heat loss coefficient per m of insulated pipe		W/(mK)	0,431											
Insulation quality of mountings, pipe suspensions, etc.		-	2 - Moderate	1-None	1-None	1-None	1-None	2 - Moderate	3 - Good	1-None	1-None	1-None		
Thermal bridge supplement		W/K	6,092											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	**0,470**											
Daily circulation period of operation.	td_{Circ}	h/d	18,0					24,0						
Design return flow temperature	ϑ_R	°C	51											
Circulation period of operation per year	t_{Circ}	h/a	6570											
Annual heat released per m of pipe	q^*_Z	kWh/m/a	98										kWh/a	kWh/(m²a)
Annual heat loss from circulation lines	QZ	kWh/a	**15445**										**15445**	**8,2**
DHW individual pipes														
Exterior pipe diameter	d_{U_Pipe}	m	0,019											
Accumulated length per single pipes	L_U	m	100,00											
Amount of tapping points in building	$n_{tapping\ poin}$	-	20,00											
Average pipe length per tapping point	$L_{U,\ average}$	m	5,0											
Tap openings per person per day		-	3											
Utilisation days per year		d	250											
Heat loss per tap opening	$q_{Individual}$	h/tap opening	0,0437											
Amount of tap openings per year and person	n_{Tap}	ings per year	750										kWh/a	kWh/(m²a)
Annual heat loss of individual pipes	Q_U	kWh/a	**656**										**656**	**0,4**
													kWh/a	kWh/(m²a)
Total heat losses of DHW distribution	Q_{WL}												**16101**	**8,6**
Performance ratio of DHW distribution pipes	$ea_{,HL}$	-											**634%**	

Storage heat losses

		Storage 1	Storage 2	Buffer storage tank (only heating)	Compact unit		
Selection of storage tank		0-No storage tank	0-No storage tank	0-No storage tank	0-No		
Storage necessary for HP							
Solar DHW connection							
Heat loss rate	W/K	1,0	0,9				
Storage volume	litre	200	160		---		
Standby fraction	-						
Location of storage tank, inside or outside of thermal envelope		1-Inside	1-Inside	1-Inside			
Temperature of mechanical room	°C						
Typical storage tank temperature	°C						
Manual entry of storage temperature	°C	8,0					
Average standby heat losses storage tank	W						
Additional heat losses storage tank, solar operation	W			---	---		
Possibly utilisation factor of heat losses		---	---		---	kWh/a	kWh/(m²a)
Annual heat losses DHW storage tank	kWh/a			---		0	0,0
Annual heat losses buffer storage tank		---	---		---		

Auxiliary calculation - heat losses through storage tank according to EU efficiency classes

Storage tank volume	Litre	200,0	160,0	
ErP classification	-	A	A	C
Maximum permissible standby heat loss	W	44	41	
Heat loss ratio for PHPP calculation	W/K	1,0	0,9	

Total energy demand of domestic hot water

		kWh/a	kWh/(m²a)
Heat losses of DHW distribution and storage	Q_{WL}	16101	8,6
Performance ratio DHW-distribution + storage	$e_{a,WL}$	634%	
Total heating demand of DHW system		kWh/a	kWh/(m²a)
Including storage tank	Q_{gDHW}	19115	10,2

Electricity demand for non-residential buildings

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Treated floor area A_{TFA}:	1873,5	m²
Auxiliary electricity demand:	8900,6	kWh/a

	PER factors:	PE factors:	
Electricity:	1,35	2,6	kWh/kWh
RE gas / Natural gas:	1,75	1,1	kWh/kWh
Energy carrier for DHW:		1,1	kWh/kWh
Solar fraction of DHW	0%		
Marginal performance ratio DHW:			

Window properties (from 'Windows' worksheet):

	Shading	Dirt factor	Non-perpendicular radiation	Glazing fraction
North	0,44	0,95	0,85	0,71
East	0,43			0,69
South	0,45			0,72
West	1,00			0,00

Lighting / non-residential	Net ground area	Room category	Power of nominal lighting	Facade with windows: Deviation from North	Facade with windows: Orientation	Facade with windows: Light transmission glazing	Facade with windows: Window existing?	Geometry: input of a typical room: Room depth	Room width	Room height	Lintel height	Window width	Daylight utilisation	User data: Installed lighting power	Installed lighting power (standard)	Lighting control	Motion detector used?	Lighting check		Utilisation hours per year	User determined: Lighting full load hours	Full load hours of lighting	Electricity demand (kWh/a)	Spec. electricity demand (kWh/(m²a))
Room / Zone	m²		Lux	Degrees		-	[x]	m	m	m	m	m		W/m²	W/m²		[x]			h/a	h/a	h/a	kWh/a	kWh/(m²a)
			15																		9			
Visas telpas	1873,5	36-Other habitable rooms	300	30	North	65%	x	4,0	6,0	3,0	2,8	1,2	None	3	3,0	1		Manual	Without motion detector	2750	1750	1750	9881	5,3
						65%	x						None		0,0	1		Manual	Without motion detector					
						65%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					
						69%							None		0,0	1		Manual	Without motion detector					

Office equipment	Room category	Within the thermal envelope [1/0]	Existing [1/0]		Quantity		Power consumption [W]		Utilisation hours per year [h/a]		Relative absenteeism		Duration of utilisation in energy saving mode [h/a]		Useful energy (kWh/a)		Electricity demand [kWh/a]
	2								9	20	18						
PC 1	21-Single office	1	1	*	5	*	80	* (	1925	* (1-	0,3	)		=	539	=	539,0
PC in energy saving mode		1			5	*	2,0	*	1925	*	0,3			=	6	=	5,8
Monitor 1	30-Hotel room	1	1	*	5	*	28	* (	1204,5	* (1-	0,25	)		=	126	=	126,5
Monitor in energy saving mode		1			5	*	2,0	*	1205	*	0,25			=	3	=	3,0
PC 2		1	0	*		*	80	* (	0	* (1-	0	)		=	0	=	0,0
PC in energy saving mode		1			0	*	2,0	*	0	*	0			=	0	=	0,0
Monitor 2		1	0	*		*	28	* (	0	* (1-	0	)		=	0	=	0,0
Monitor in energy saving mode		1			0	*	2,0	*	0	*	0			=	0	=	0,0
Copier	21-Single office	1	1	*	3	*	100	* (	2750			-	0	) =	825	=	825,0
Copier in energy saving mode		1			3	*	30	*	0					=	0	=	0,0
Printer	21-Single office	1	1	*	3	*	100	* (	2750			-	0	) =	825	=	825,0
Printer in energy saving mode		1			3	*	2	*	0					=	0	=	0,0
Server	21-Single office	1	1	*	1	*	100	* (	2750					=	275	=	275,0
Server in energy saving mode		1			1	*	2,0	* (	8760			-	2750	) =	12	=	12,0
Telephone system		1	1	*	2	*	94	*	8760					=	1647	=	1646,9
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0

Kitchen / Aux. electricity	Room category (predominant utilisation pattern of building)	Within the thermal envelope [1/0]	Existing [1/0]		Days of utilisation per year [d/a]		Number of meals per day of use		Norm consumption		Useful energy [kWh/a]		Non-electric fraction	Electric fraction	Additional demand	Marginal performance ratio	Solar fraction	Non-electric demand (kWh/a)	Electricity demand [kWh/a]
					8				kWh / Meal										
Cooking:	30-Hotel room	1	0	*	365	*	20	*	0,25	=	0	*	100%				=		0,0
1-Electricity									kWh / Cover			*	0%				=	0	
Dishwashing		1	0	*	365	*	20	*	0,10	=	0	*	100%				=		0,0
2-Cold water connection									kWh/d			*	0%	* (1+	0,30	) * 1,20 *(1-	0,00	) = 0	
Refrigerating		1	2		365				1,00	=	730	*	100%				=		730,0
											0	*	100%				=		0,0
											0	*	100%				=		0,0
											0	*	100%				=		0,0
											0	*	100%				=		0,0
											0	*	100%				=		0,0
											0	*	100%				=		0,0
											0	*	100%				=		0,0
Total auxiliary electricity											8901								8900,6

Total	23769	kWh	0	0,0	23769 kWh/a kWh
Specific demand			0,0	0,0	13 kWh/(m²a) kWh

Internal heat gains for non-residential buildings

Rehabilitācijas nodaļa / Climate: Rīga / TFA: 1874 m² / Heating: 151 kWh/(m²a) / Freq. overheating: 0 % / PER: 733,7 kWh/(m²a)

Utilisation: 22-Other — IHG 1,20 W/m² — 1,20 W/m²

Type of values used: 4-PHPP calculation ('IHG non-res' worksheet) — Enter here results from cell above: 1,20 W/m²

Persons: 20,0 P — Room temperature: 21 °C

Treated floor area: 1873,5 m² — Heating period: 223 d/a — Internal heat gains aux. electricity: 293 W

Persons	Selection of user profile	Select	Activity of persons	Planning 0 = according to ground area or usable zone 1 = according to occupancy		Number of occupants		Ground area of useful zone [m²]	Average occupancy [Pers./m²]	Heat emitted per person [W]	Utilisation hours per year [h/a]	Relative presence	Utilisation period [h/a]	Average heat release persons [W]
									27		9	18		
Persons A	36-Other habitable rooms	3	>10 yr., standing or light work	1	Planning with occupancy	20	or	1874	Not a standard value	100	2750	0,50	8760	314
Persons B			Invalid input				or		Not a standard value	0	0	1,00	8760	0
Persons C			Invalid input				or		Not a standard value	0	0	1,00	8760	0
Persons D			Invalid input				or		Not a standard value	0	0	1,00	8760	0
Persons E			Invalid input				or		Not a standard value	0	0	1,00	8760	0
Persons F			Invalid input				or		Not a standard value	0	0	1,00	8760	0
Persons G			Invalid input				or		Not a standard value	0	0	1,00	8760	0
Evaporation (person specific)						20				-15	2750	0,50	8760	-47

Lighting / Equipment / Aux. electricity	Useful energy [kWh/a]	Availability	Utilisation period [h/a]	Average heat release
Lighting	9881	1	8,76	1128
Office applications (within therm. envelope)	4258	1	8,76	486
Cooking (within therm. envelope)	0	0,5	8,76	0
Dishwashing (within therm. envelope)	0	0,3	8,76	0
Cooling (within therm. envelope)	730	1	8,76	83
Other (within thermal envelope)	0	1	8,76	0
Auxiliary appliances (see 'Aux Electricity' worksheet)				293

Heat loss due to cold water (calculation from column AJ)	On/Off [1 / 0]	Predominant utilisation pattern of building (Data transferred from 'Electricity non-res' worksheet: input kitchen)		Number of WCs (user data)	Amount of WCs: Utilisation of standard values for schools?	Number of WCs (calculation value)	DT: Cold water temp. - Room temp. [K]	Occupied days per year [d/a]	Loss daytime [W]	Loss night-time [W]	Availability	Utilisation period [d/a]	Average power cold water
			2					8					
Cold water due to flushing WC	0	30	Hotel room	5		5	-12,4	365	-101	-34	1	365	0

Total IHG		W	2257
Specific IHG		W/m²	1,2
Heat available from internal sources	223 d/a	kWh/(m²a)	6

CO2 emisiju un primārās enerģijas aprēķins												
Enerģijas patēriņa pakalpojums	**Energonesējs**	**kWh/m²g**	**MWh/g**	**Sezonālās efektivitātes koeficients**	**CO_2 emisijas faktors, $kgCO_2$/ MWh**	**CO_2 emisijas $kgCO_2$**	**f_{Pnren}**	**f_{Pren}**	**PE nren kWh/m²g**	**PE ren kWh/m²g**	**PE tot kWh/m2g**	**CO_2 emisijas $kgCO_2/m^2$**
Apkure	Siltumenerģija no centralizētās siltumapgādes sistēmas, saražota koģenerācijā no fosilajiem kurināmiem [3]	150,97	282,839	1,00	**185**	52325	**0,70**	**0,00**	105,68	0,00	105,68	27,93
Apkure (papildu)	Elektroenerģija no tīkla	0,72	1,350	1,00	**109**	147	**1,90**	**0,60**	1,37	0,43	1,80	0,08
Karstā ūdens sagatavošana	Siltumenerģija no centralizētās siltumapgādes sistēmas, saražota koģenerācijā no fosilajiem kurināmiem [3]	10,20	19,115	1,00	**185**	3536	**0,70**	**0,00**	7,14	0,00	7,14	1,89
Karstā ūdens sagatavošana (papildu)	Elektroenerģija no tīkla	0,19	0,357	1,00	**109**	39	**1,90**	**0,60**	0,36	0,11	0,48	0,02
Ventilācija	Elektroenerģija no tīkla	3,84	7,194	1,00	**109**	784	**1,90**	**0,60**	7,30	2,30	9,60	0,42
Apgaismojums	Elektroenerģija no tīkla	5,27	9,881	1,00	109	1077	1,90	0,60	10,02	3,16	13,18	0,57
Dzesēšana	Elektroenerģija no tīkla	20,00	37,470	3,50	109	1167	1,90	0,60	10,86	3,43	14,29	0,62
KOPĀ:		**191,20**	**358,205**			**59076**			**142,72**	**9,44**	**152,17**	**31,53**
				CO_2 emisijas $kgCO_2/m^2$		**31,53**						
				CO_2 emisijas tCO_2		**59,08**						

PĒC

CO2 emisiju un primārās enerģijas aprēķins												
Enerģijas patēriņa pakalpojums	**Energonesējs**	**kWh/m²g**	**MWh/g**	**Sezonālās efektivitātes koeficients**	**CO_2 emisijas faktors, $kgCO_2$/ MWh**	**CO_2 emisijas $kgCO_2$**	**f_{Pnren}**	**f_{Pren}**	**PE nren kWh/m²g**	**PE ren kWh/m²g**	**PE tot kWh/m2g**	**CO_2 emisijas $kgCO_2/m^2$**
Apkure	Siltumenerģija no centralizētās siltumapgādes sistēmas, saražota koģenerācijā no fosilajiem kurināmiem [3]	104,35	195,491	1,00	**185**	36166	**0,70**	**0,00**	73,04	0,00	73,04	19,30
Apkure (papildu)	Elektroenerģija no tīkla	0,72	1,350	1,00	**109**	147	**1,90**	**0,60**	1,37	0,43	1,80	0,08
Karstā ūdens sagatavošana	Siltumenerģija no centralizētās siltumapgādes sistēmas, saražota koģenerācijā no fosilajiem kurināmiem [3]	10,20	19,115	1,00	**185**	3536	**0,70**	**0,00**	7,14	0,00	7,14	1,89
Karstā ūdens sagatavošana (papildu)	Elektroenerģija no tīkla	0,19	0,357	1,00	**109**	39	**1,90**	**0,60**	0,36	0,11	0,48	0,02
Ventilācija	Elektroenerģija no tīkla	3,84	7,194	1,00	**109**	784	**1,90**	**0,60**	7,30	2,30	9,60	0,42
Apgaismojums	Elektroenerģija no tīkla	5,27	9,881	1,00	**109**	1077	**1,90**	**0,60**	10,02	3,16	13,18	0,57
Dzesēšana	Elektroenerģija no tīkla	20,00	37,470	3,50	**109**	1167	**1,90**	**0,60**	10,86	3,43	14,29	0,62
KOPĀ:		**144,57**	**270,86**			**42916,08**			**110,09**	**9,44**	**119,53**	**22,91**
				CO_2 emisijas $kgCO_2/m^2$		**22,91**						
				CO_2 emisijas tCO_2		**42,92**						