

iSERV Measured Data Analysis by HVAC Component and Activity - Slovenia

UL

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Contents

iSERV Measured Data Analysis by HVAC Component and Activity - Slovenia	1
Contents	3
1 Introduction	6
2 Overall HVAC Component and Activities Overview plus Data Summaries	6
2.1 Overall HVAC Components and Activities Summary	6
2.2 Summary by Activity type of measured Electrical Power Demands	7
2.2.1 Circulation area (corridors and stairways) – power demand summary by component	9
2.2.2 Bathroom - Electricity Power Demand – Electricity power demand summary by component	10
2.2.3 Bedroom - Electricity Power Demand – Electricity power demand summary by component	10
2.2.4 Catering: Bars - Electricity Power Demand – Electricity power demand summary by component	11
2.2.5 Catering: Eating/drinking area - Electricity Power Demand – Electricity power demand summary by component	11
2.2.6 Catering: Full Kitchen Preparing Hot Meals - Electricity Power Demand – Electricity power demand summary by component	12
2.2.7 Catering: Limited Hot Food Preparation Area - Electricity Power Demand – Electricity power demand summary by component	12
2.2.8 Catering: Snack Bar with Chilled Cabinets - Electricity Power Demand – Electricity power demand summary by component	13
2.2.9 Catering: Vending Machines - Electricity Power Demand – Electricity power demand summary by component	13
2.2.10 Cellular Office Area - Electricity Power Demand – Electricity power demand summary by component	14
2.2.11 Cellular Office Area - multiple occupation - Electricity Power Demand – Electricity power demand summary by component	14
2.2.12 Circulation area (corridors and stairways)- Electricity Power Demand – Electricity power demand summary by component	15
2.2.13 Dept Store Sales area – chilled - Electricity Power Demand – Electricity power demand summary by component	15
2.2.14 Dept Store Sales area - general - Electricity Power Demand – Electricity power demand summary by component	16
2.2.15 IT: LAN Rooms - Electricity Power Demand – Electricity power demand summary by component	16
2.2.16 IT: Server Room - Electricity Power Demand – Electricity power demand summary by component	17
2.2.17 Laundry - Electricity Power Demand – Electricity power demand summary by component	17

2.2.18	Lecture theatre - Electricity Power Demand – Electricity power demand summary by component.....	18
2.2.19	Library-reading room - Electricity Power Demand – Electricity power demand summary by component.....	18
2.2.20	Light Plant Room - Electricity Power Demand – Electricity power demand summary by component.....	19
2.2.21	Lounges - Electricity Power Demand – Electricity power demand summary by component	19
2.2.22	Meeting Room - Electricity Power Demand – Electricity power demand summary by component.....	20
2.2.23	Nursery - Electricity Power Demand – Electricity power demand summary by component	20
2.2.24	Open Plan Office Area - Electricity Power Demand – Electricity power demand summary by component.....	21
2.2.25	Reception - Electricity Power Demand – Electricity power demand summary by component	21
2.2.26	Recreational : Changing facilities with showers - Electricity Power Demand – Electricity power demand summary by component	22
2.2.27	Recreational : Fitness Suite/Gym - Electricity Power Demand – Electricity power demand summary by component	22
2.2.28	Small Shop Unit Sales area – chilled - Electricity Power Demand – Electricity power demand summary by component	23
2.2.29	Small Shop Unit Sales area – general - Electricity Power Demand – Electricity power demand summary by component	23
2.2.30	Small Shop Unit Sales area – electrical - Electricity Power Demand – Electricity power demand summary by component.....	24
2.2.31	Stage (theatres and event buildings) - Electricity Power Demand – Electricity power demand summary by component	24
2.2.32	Storage Area/Cupboard - Electricity Power Demand – Electricity power demand summary by component.....	25
2.2.33	Toilet - Electricity Power Demand – Electricity power demand summary by component...	25
2.2.34	Unoccupied space - Electricity Power Demand – Electricity power demand summary by component.....	26
2.2.35	Warehouse storage - Electricity Power Demand – Electricity power demand summary by component.....	26
2.2.36	Workshop - Electricity Power Demand – Electricity power demand summary by component	27
2.3	Summary of measured annual energy use by HVAC Component type servicing a given activity	27
2.3.1	Activity types – annual energy use/m ² summary by Heat Generator sub-components	29
2.3.2	Activity types – annual energy use/m ² summary by Cold Generator sub-components.....	30
2.3.3	Heat Rejection – Electricity Energy Demand - Annual kWh/m ² in Slovenia	31
2.3.4	Pumps – Electricity Energy Demand - Annual kWh/m ² in Slovenia	32

iSERV Measured Data Analysis - Slovenia

2.3.5	Terminal Units – Electricity Energy Demand - Annual kWh/m ² in Slovenia.....	33
2.4	Summary of measured monthly energy use by HVAC Sub-component type servicing a given activity33	
2.5	Summary Conclusions	38
3	References	39

iSERV Measured Data Analysis - Slovenia

1 Introduction

This report presents the measured HVAC component and end use activity data obtained for Slovenia during the iSERV project. This particular report presents the recorded energy use information by floor area and HVAC components for each activity type within the iSERV system.

A separate report presents the energy use information by the floor area served only. The reports have been separated for reasons of size and clarity, as well as due to the more controversial nature of the initial benchmarks used for apportionment by activity, as reported in this document.

2 Overall HVAC Component and Activities Overview plus Data Summaries

This section covers the overall description of the HVAC components as given in the iSERV spreadsheets for Slovenia as well as summarising the measured data from the more detailed parts of this report.

2.1 Overall HVAC Components and Activities Summary

Table 1 summarises the data collected for the HVAC Components and the iSERV Activity types available in Slovenia. It can be seen that the HVAC components in this Slovenia service 38 total activity types with areas ranging in size from 13,5 to 31416 m². There were an average of 14 meters available for each system analysed.

The most frequently encountered component type in this Slovenia was Toilet. The number following the comma for each component type shows how many had sub-metering which addressed their energy use. This sub-metering could be either dedicated to the component or cover a series of HVAC components

Table 1 – Overall Systems Summary for Slovenia showing numbers of components and meters associated with each activity type. For the components columns, the first number shows total components associated with each activity. The number after the comma shows the number of submeters associated with this component type.

Activity type	Floor Area / m ²	# of spaces	Electricity	Gas	Oil	Heat	Water	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Circulation area (corridors and stairways)	16376,51	148	53						20			71			74	21			
Lifts	13,5	6	3						2			4			2				
Reception	160,93	32	12						4			9			18	14			
Cellular Office Area	3517,24	339	20						10			20			17				
Cellular Office Area - multiple occupation	11457,55	300	9						4			10			19	12			
Open Plan Office Area	13841,75	1368	29						10			28			40	14			
Lounges	3191,93	216	32						10			41			51	12			
Meeting Room	707,17	96	13						5			14			14				
Library - reading room	45,4	32	5						2			6			15	12			
IT: LAN Rooms	46,57	33	5						3			4			2				
IT: Server Room	461,17	90	7						4			4			12				
Catering: Bars	1136,78	60	7						3			10			18	12			
Catering: Eating/drinking area	2126,36	90	32						10			35			43	14			1
Catering: Full Kitchen Preparing Hot Meals	383,55	76	19						7			22			21	12			
Catering: Limited Hot Food Preparation Area	149,25	15	6						3			5			3				
Catering: Snack Bar with Chilled Cabinets	21,35	8	6						2			6			14	12			
Catering: Vending Machines	51,76	6	3						1			8			10				
Lecture theatre	1284,55	18	10						3			8			7				
Assembly areas / halls	215,9	4	4						2			2			8	12			
Stage (theatres and event buildings)	4596,14	51	2						1			12			15				
Bathroom	577,6	238	2						1						2				
Toilet	2511,53	1448	50						19			67			68	21			

Activity type	Floor Area / m ²	# of spaces	Electricity	Gas	Oil	Heat	Water	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Bedroom	2361,68	250	2						1						2				
Workshop	340,3	36	3						1			20			16				
Small Shop Unit Sales area - chilled	22278,73	654	12						5			14			25	19	1		1
Small Shop Unit Sales area - electrical	1656,19	2	2						1			2							
Small Shop Unit Sales area - general	31415,53	608	38						17			51			31	12			
Dept Store Sales area - chilled	16249,08	30	30						15			36							
Dept Store Sales area - general	17493,26	132	9						2			16							
Warehouse storage	572,37	54	15						7			21			16				
Storage Area/Cupboard	8603,38	129	47						24			58			12				
Recreational : Fitness Suite/Gym	250,2	4	4						2			2			9	12			
Recreational : Changing facilities with showers	81,22	6	3						1			8			10				
Nursery	71,9	3	3						1			8			10				
Laundry	72,8	15	11						4			13			9				
Light Plant Room	445,3	18	10						5			16			16				
External Space	27,22	6	5						1			7			5				
Unoccupied space	105,39	42	5						3			4			2				

2.2 Summary by Activity type of measured Electrical Power Demands

This summary section contains 36 tables, one for each activity type for which we have data, summarising the range of electrical power demands found across all the HVAC sub-component types monitored in iSERV.

The main observations from all these tables are:

- Only 36 activities had measured data
- Of these activities only 36 had a sufficient number of metered samples to obtain reasonably accurate benchmarks from.
- Other observations, such as components where only a small variation is found in the ranges, etc

A summary of the average **maximum** power demand benchmarks is shown in Table 2. Values in brackets indicate the standard deviation found from this average maximum. This data can be used to estimate the likely power demand to be incurred by the HVAC component while servicing this type of activity in this Slovenia. The more detailed tables also show the annual average and minimum power demands found for this equipment. Zero figures are excluded from the minima i.e. the minima show how little power might be drawn by energised equipment.

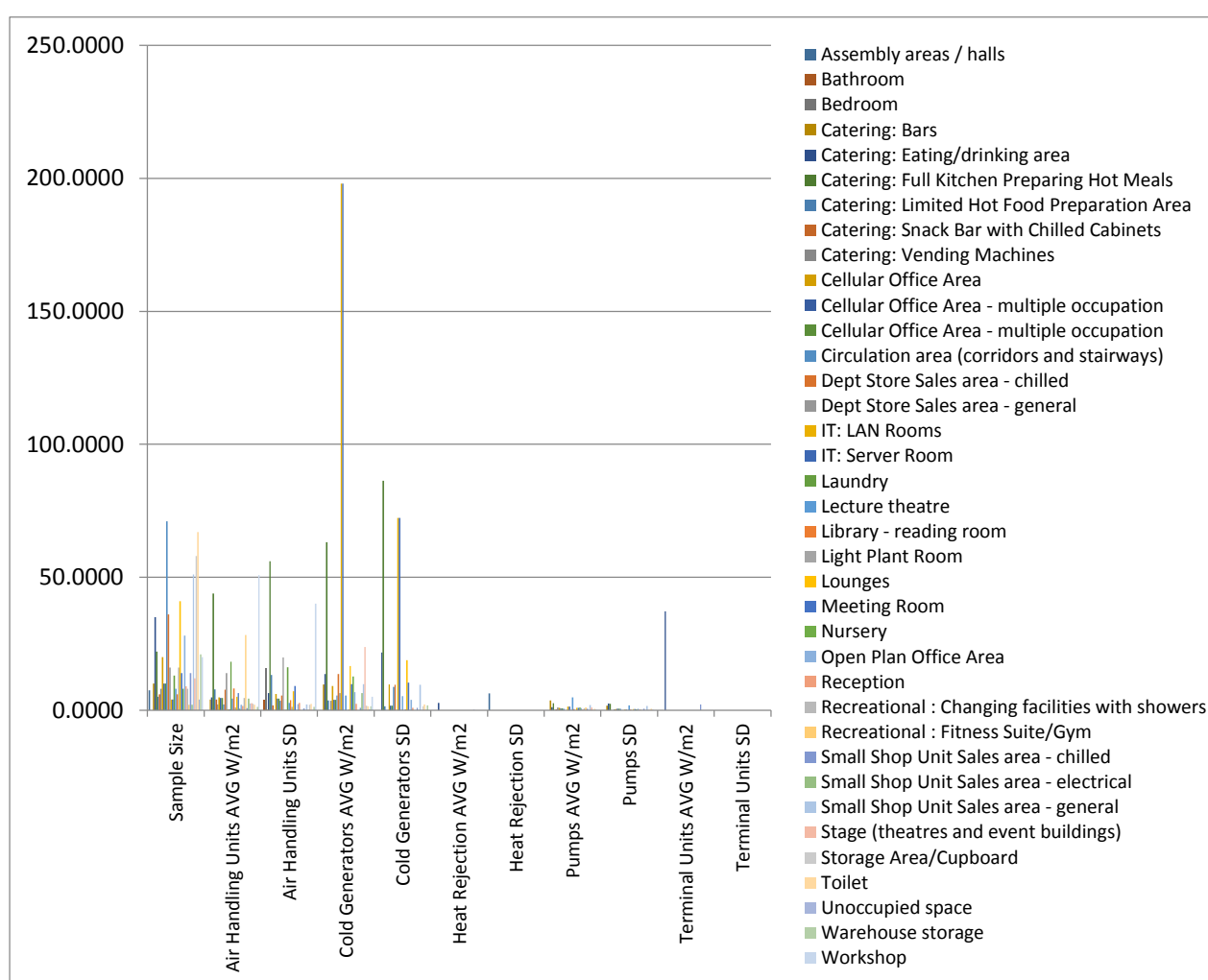
The first column shows the section number in which these benchmarks can be found. Benchmarks in red are considered to have too few samples or too short a measurement period to be reliable.

Table 2 – Benchmarks for measured Average and Standard Deviation Power Demands in W/m² Summary by HVAC Component and Activity Type for Slovenia.

Activity type	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Circulation area (corridors and stairways)		5,5047 (8,7120)			2,1330 (3,4952)			0,5742 (0,5583)				
Reception		2,3630 (0,8632)			1,5378 (2,7291)			0,2197 (0,2306)				
Cellular Office Area		9,1290 (9,6199)			4,8718 (6,0554)			0,8938 (0,4617)				
Cellular Office Area - multiple occupation		3,9423 (1,6428)			4,5841 (4,3536)			0,6717 (0,5283)				
Open Plan Office Area		6,7782 (3,8879)			2,0870 (2,2907)			0,7297 (0,5721)				
Lounges		16,6306 (18,8024)			5,0505 (7,1348)			0,8991 (0,4570)				
Meeting Room		9,8294 (10,3589)			6,4302 (9,1345)			0,8909 (0,4619)				
Library - reading room					8,2201 (3,7249)			0,4442 (0,1943)				
IT: LAN Rooms		197,9955 (72,3532)			0,3489 (0,0538)			1,3423 (0,2533)				
IT: Server Room		197,9968 (72,3538)			0,3491 (0,0537)			1,3428 (0,2533)				
Catering: Bars		9,6294			4,0570 (0,1429)			3,6624 (1,6876)				
Catering: Eating/drinking area		13,6311 (21,6705)			4,8552 (6,4755)			1,1542 (2,5312)		37,1861		2,6945
Catering: Full Kitchen Preparing Hot Meals		63,1665 (86,3060)			43,8918 (56,0652)			2,5918 (2,4372)				
Catering: Limited Hot Food Preparation Area		3,6513 (1,5222)			7,7830 (13,2033)			0,0930				
Catering: Snack Bar with Chilled Cabinets					4,0666 (1,7755)			0,3139				
Catering: Vending Machines		3,5479			2,1783			1,0484 (0,3127)				
Lecture theatre		5,5069 (5,2601)			4,3453 (2,7601)			4,7799 (1,7999)				
Assembly areas / halls					7,4532			6,2764				
Stage (theatres and event buildings)		23,8258			2,5849 (0,0001)			1,0338 (0,0001)				
Bathroom		3,9193										
Toilet		1,4955 (2,1736)			2,0041 (2,3947)			0,5207 (0,5087)				
Workshop		5,0673			50,8029 (40,1035)							
Small Shop Unit Sales area - chilled		0,8933 (0,8862)			0,8093 (0,6254)			0,5059 (0,5219)		2,1660		0,1317
Small Shop Unit Sales area - electrical		6,3978			4,4011							
Small Shop Unit Sales area - general		9,7455 (9,5665)			2,5066 (2,1881)			1,9644 (1,5538)				
Dept Store Sales area - chilled		13,5851 (9,5062)			7,7371 (5,4219)							
Dept Store Sales area - general		6,3978			13,9598 (19,8206)							
Warehouse storage		1,4883 (1,8212)			1,2027 (1,2340)							
Storage Area/Cupboard		1,7268 (1,4720)			2,3703 (2,0246)			0,0352 (0,0403)				
Recreational : Fitness Suite/Gym					28,2677			0,9614				
Recreational : Changing facilities with showers					4,5915			0,6544 (0,1971)				
Nursery		12,6729			0,5234			1,0532 (0,2966)				

Activity type	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Laundry					18,2140 (16,0911)							
Light Plant Room		0,2499 (0,3463)			1,0400 (1,2676)							
Unoccupied space		0,3488 (0,1278)			0,1206 (0,0186)			0,1072 (0,0202)				

Figure 1: Measured Overall Power Demand in W/m² by HVAC Component type. Summary for Slovenia



2.2.1 Circulation area (corridors and stairways) – power demand summary by component

The table shows the average, maximum and minimum power demands found from the data for this activity type for the overall component type shown in each column. The breakdown of these component types into the power demand ranges found for each subcomponent type are given in section 0.

Table 3– Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Assembly areas / halls - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)					2			2				
Average (Standard Deviation)					7,4532(0)			6,2764 (0)				
Maximum (Standard Deviation)					16,5665(0)			13,9508 (0)				
Minimum (Standard Deviation)					0,1041 (0)			0,0876 (0)				

2.2.2 Bathroom - Electricity Power Demand – Electricity power demand summary by component

Table 4 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Bathroom - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		1										
Average (Standard Deviation)		3,9193										
Maximum (Standard Deviation)		26,3298										
Minimum (Standard Deviation)		0,0541										

2.2.3 Bedroom - Electricity Power Demand – Electricity power demand summary by component

Table 5 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Bedroom - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		1									
Average (Standard Deviation)		15,7013									
Maximum (Standard Deviation)		105,4145									
Minimum (Standard Deviation)		0,2166									

2.2.4 Catering: Bars - Electricity Power Demand – Electricity power demand summary by component

Table 6 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Catering: Bars - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		1		10			12				
Average (Standard Deviation)		9,6294		4,0570 (0,1429)			3,6624 (1,6876)				
Maximum (Standard Deviation)		46,5639		9,0137 (0,2365)			9,0812 (4.3306)				
Minimum (Standard Deviation)		0,0007		0,0319 (0,0011)			0,0397 (0,0217)				

2.2.5 Catering: Eating/drinking area - Electricity Power Demand – Electricity power demand summary by component

Table 7 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Catering: Eating/drinking area - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		5			33			33		1		1
Average (Standard Deviation)		13,6311 (21,6705)			4,8552 (6,4755)			1,1542 (2,5312)		37,1861		2,6945
Maximum (Standard Deviation)		65,3869 (102,7517)			11,3866 (13,6883)			4,5554 (12,0926)		176,463 8		12,786 9
Minimum (Standard Deviation)		0,8168 (1,2413)			0,0915 (0,2391)			0,0717 (0,1540)		2,0791		0,1506

2.2.6 Catering: Full Kitchen Preparing Hot Meals - Electricity Power Demand – Electricity power demand summary by component

Table 8 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Catering: Full Kitchen Preparing Hot Meals - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems	Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		4			20			11				
Average (Standard Deviation)		63,1665 (86,3060)			43,8918 (56,0652)			2,5918 (2,4372)				
Maximum (Standard Deviation)		370,9043 (468,3610)			119,7357 (225,1510)			7,0365 (8,9278)				
Minimum (Standard Deviation)		1,5359 (2,6626)			0,7960 (1,2321)			0,0261 (0,0539)				

2.2.7 Catering: Limited Hot Food Preparation Area - Electricity Power Demand – Electricity power demand summary by component

Table 9 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Catering: Limited Hot Food Preparation Area - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		2		5		1			
Average (Standard Deviation)		3,6513 (1,5222)		7,7830 (13,2033)		0,0930			
Maximum (Standard Deviation)		23,5204 (4,3353)		46,2696 (96,6846)		0,2791			
Minimum (Standard Deviation)		0,0329 (0,0009)		0,1661 (0,1722)		0,0004			

2.2.8 Catering: Snack Bar with Chilled Cabinets - Electricity Power Demand – Electricity power demand summary by component

Table 10 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Catering: Snack Bar with Chilled Cabinets - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)				6		6			
Average (Standard Deviation)				4,0666 (1,7755)		0,3139			
Maximum (Standard Deviation)				5,9657 (2,9812)		0,4751			
Minimum (Standard Deviation)				0,0521 (0,0540)		0,0010			

2.2.9 Catering: Vending Machines - Electricity Power Demand – Electricity power demand summary by component

Table 11 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type for Catering: Vending Machines - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		1		8		10			
Average (Standard Deviation)		3,5479 (0)		2,1783		1,0484 (0,3127)			
Maximum (Standard Deviation)		17,1571 (0)		4,8606		2,6140 (0,7943)			
Minimum (Standard Deviation)		0,0002 (0)		0,0203		0,0118 (0,0036)			

2.2.10 Cellular Office Area - Electricity Power Demand – Electricity power demand summary by component

Table 12 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Cellular Office Area - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		5		12		12			
Average (Standard Deviation)		9,1290 (9,6199)		4,8718 (6,0554)		0,8938 (0,4617)			
Maximum (Standard Deviation)		57,5435 (64,5599)		27,4572 (49,2811)		2,2429 (1,1330)			
Minimum (Standard Deviation)		0,0905 (0,1468)		0,0179 (0,0171)		0,0100 (0,0052)			

2.2.11 Cellular Office Area - multiple occupation - Electricity Power Demand – Electricity power demand summary by component

Table 13 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Cellular Office Area - multiple occupation - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		2		10		13	
Average (Standard Deviation)		3,9423 (1,6428)		4,5841 (4,3536)		0,6717 (0,5283)	
Maximum (Standard Deviation)		25,4055 (4,6824)		8,3013 (8,4867)		1,2163 (1,0475)	
Minimum (Standard Deviation)		0,0356 (0,0009)		0,0228 (0,0307)		0,0033 (0,0039)	

2.2.12 Circulation area (corridors and stairways)- Electricity Power Demand – Electricity power demand summary by component

Table 14 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Circulation area (corridors and stairways)- Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		9		63		55	
Average (Standard Deviation)		5,5047 (8,7120)		2,1330(3,4952)		0,5742 (0,5583)	
Maximum (Standard Deviation)		37,5440 (46,7037)		6,7007(11,9205)		1,4900 (1,4220)	
Minimum (Standard Deviation)		0,1094(0,2646)		0,0163(0,0304)		0,0129 (0,0565)	

2.2.13 Dept Store Sales area – chilled - Electricity Power Demand – Electricity power demand summary by component

Table 15 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Dept Store Sales area – chilled- Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery Heat Rejection
Sample size (number)		9		24				
Average (Standard Deviation)		13,5851 (9,5062)		7,7371 (5,4788)				
Maximum (Standard Deviation)		70,6030 (43,8280)		17,4122 (20,4974)				
Minimum (Standard Deviation)		1,0735 (1,5662)		0,3084 (0,5181)				

2.2.14 Dept Store Sales area - general - Electricity Power Demand – Electricity power demand summary by component

Table 16 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Dept Store Sales area - general - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery Heat Rejection
Sample size (number)		2		16				
Average (Standard Deviation)		6,3978 (0)		13,9598 (19,8206)				
Maximum (Standard Deviation)		75,4233 (0,0001)		29,7915 (37,4815)				
Minimum (Standard Deviation)		0,0830 (0)		0,0366 (0,0325)				

2.2.15 IT: LAN Rooms - Electricity Power Demand – Electricity power demand summary by component

Table 17 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type IT: LAN Rooms - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		3		4		2	
Average (Standard Deviation)		197,9955 (72,3532)		0,3489 (0,0538)		1,3423 (0,2533)	
Maximum (Standard Deviation)		1326,1347 (224,0402)		1,1574 (0,2882)		4,4519 (1,3582)	
Minimum (Standard Deviation)		1,9385 (0,0558)		0,0040 (0,0029)		0,0152 (0,0138)	

2.2.16 IT: Server Room - Electricity Power Demand – Electricity power demand summary by component

Table 18 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type IT: Server Room - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		3		4		2	
Average (Standard Deviation)		197,9968 (72,3538)		0,3491 (0,0537)		1,3428 (0,2532)	
Maximum (Standard Deviation)		1326,1420 (224,0429)		1,1580 (0,2884)		4,4538 (1,3583)	
Minimum (Standard Deviation)		1,9388 (0,0557)		0,0040 (0,0029)		0,0152 (0,0138)	

2.2.17 Laundry - Electricity Power Demand – Electricity power demand summary by component

Table 19– Measured Overall Power Demands in W/m² Summary by HVAC Component Type Laundry -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)				9			
Average (Standard Deviation)				18,2140 (16,0911)			
Maximum (Standard Deviation)				33,7817 (37,4735)			
Minimum (Standard Deviation)				0,2528 (0,3159)			

2.2.18 Lecture theatre - Electricity Power Demand – Electricity power demand summary by component

Table 20 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Lecture theatre - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		3		8		7	
Average (Standard Deviation)		5,5069 (5,2601)		4,3453 (2,7601)		4,7799 (1,7999)	
Maximum (Standard Deviation)		18,5697 (4,7487)		7,3590 (3,2410)		9,8846 (3,2997)	
Minimum (Standard Deviation)		0,5367 (0,8906)		0,4073 (0,6303)		0,6389 (0,2721)	

2.2.19 Library-reading room - Electricity Power Demand – Electricity power demand summary by component

Table 21 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Library-reading room - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)				6		9	
Average (Standard Deviation)				8,2201 (3,7249)		0,4442 (0,1943)	
Maximum (Standard Deviation)				13,6493 (7,5084)		0,7377 (0,3921)	
Minimum (Standard Deviation)				0,0255 (0,0097)		0,0014 (0,0005)	

2.2.20 Light Plant Room - Electricity Power Demand – Electricity power demand summary by component

Table 22 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Light Plant Room - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		2		14			
Average (Standard Deviation)		0,2499 (0,3463)		1,0400 (1,2676)			
Maximum (Standard Deviation)		1,2015 (1,6860)		2,5969 (2,8441)			
Minimum (Standard Deviation)		0,0004 (0,0006)		0,0037 (0,0024)			

2.2.21 Lounges - Electricity Power Demand – Electricity power demand summary by component

Table 23 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Lounges -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		7		41		33	
Average (Standard Deviation)		16,6306 (18,8024)		5,0505 (7,1348)		0,8991 (0,4570)	
Maximum (Standard Deviation)		95,9233 (111,8792)		10,7539 (17,0579)		1,8902 (1,0732)	
Minimum (Standard Deviation)		0,4068 (0,5617)		0,0836 (0,1372)		0,0408 (0,0698)	

2.2.22 Meeting Room - Electricity Power Demand – Electricity power demand summary by component

Table 25 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Meeting Room - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		5		14		12	
Average (Standard Deviation)		9,8294 (10,3589)		6,4302 (9,1345)		0,8909 (0,4619)	
Maximum (Standard Deviation)		61,9606 (69,5238)		14,0213 (16,8871)		2,2359 (1,1334)	
Minimum (Standard Deviation)		0,0974 (0,1581)		0,0637 (0,0898)		0,0100 (0,0052)	

2.2.23 Nursery - Electricity Power Demand – Electricity power demand summary by component

Table 25 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Nursery -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		1		8		10	
Average (Standard Deviation)		12,6729		0,5234 (0)		1,0532 (0,2966)	
Maximum (Standard Deviation)		61,2813		1,1679 (0)		2,6246 (0,7582)	
Minimum (Standard Deviation)		0,0009		0,0049(0)		0,0118 (0,0035)	

2.2.24 Open Plan Office Area - Electricity Power Demand – Electricity power demand summary by component

Table 26– Measured Overall Power Demands in W/m² Summary by HVAC Component Type Open Plan Office Area -Electricity Power Demand summary by component for Slovenia - Average W/m2 and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		6		28		34	
Average (Standard Deviation)		6,7782 (3,8879)		2,0870 (2,2907)		0,7297 (0,5721)	
Maximum (Standard Deviation)		36,5767 (20,8483)		5,2585 (5,3253)		1,8364 (1,1824)	
Minimum (Standard Deviation)		0,1253 (0,2365)		0,0676 (0,1659)		0,0381 (0,0695)	

2.2.25 Reception - Electricity Power Demand – Electricity power demand summary by component

Table 27 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Reception -Electricity Power Demand summary by component for Slovenia - Average W/m2 and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		3		9		10	
Average (Standard Deviation)		2,3630 (0,8632)		1,5378 (2,7291)		0,2197 (0,2306)	
Maximum (Standard Deviation)		15,8281 (2,6710)		2,1925 (3,3149)		0,9257 (0,9487)	
Minimum (Standard Deviation)		0,0229 (0,0007)		0,0020 (0,0013)		0,0011 (0,0008)	

2.2.26 Recreational : Changing facilities with showers - Electricity Power Demand – Electricity power demand summary by component

Table 28 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Recreational : Changing facilities with showers -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)				8		10	
Average (Standard Deviation)				4,5915 (0)		0,6544 (0,1971)	
Maximum (Standard Deviation)				10,2451 (0)		1,6318 (0,5000)	
Minimum (Standard Deviation)				0,0427 (0)		0,0073 (0,0023)	

2.2.27 Recreational : Fitness Suite/Gym - Electricity Power Demand – Electricity power demand summary by component

Table 29 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Recreational : Fitness Suite/Gym -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)				2		3	
Average (Standard Deviation)				28,2677 (0)		0,9614 (0)	
Maximum (Standard Deviation)				54,2064 (0)		1,8436 (0)	
Minimum (Standard Deviation)				0,1872 (0)		0,0064 (0)	

2.2.28 Small Shop Unit Sales area – chilled - Electricity Power Demand – Electricity power demand summary by component

Table 30 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Small Shop Unit Sales area – chilled -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		3		14		19	1
Average (Standard Deviation)		0,8933 (0,8862)		0,8093 (0,6254)		0,5059 (0,5219)	2,1660
Maximum (Standard Deviation)		10,6191 (7,2719)		3,2620 (2,4977)		2,8365 (5,1789)	21,4787
Minimum (Standard Deviation)		0,0005 (0,0004)		0,0007 (0,0014)		0,0106 (0,0447)	0,0009

2.2.29 Small Shop Unit Sales area – general - Electricity Power Demand – Electricity power demand summary by component

Table 31 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Small Shop Unit Sales area – general -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		6		33		21			
Average (Standard Deviation)		9,7455 (9,5665)		2,5066 (2,1881)		1,9644 (1,5538)			
Maximum (Standard Deviation)		56,6540 (44,9854)		8,1771 (9,5710)		5,6561 (5,1789)			
Minimum (Standard Deviation)		0,1082 (0,1072)		0,0128 (0,0097)		0,0194 (0,0153)			

2.2.30 Small Shop Unit Sales area – electrical - Electricity Power Demand – Electricity power demand summary by component

Table 32 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Small Shop Unit Sales area – electrical -Electricity Power Demand summary by component for Slovenia - Average W/m2 and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		1		2					
Average (Standard Deviation)		6,3978		4,4011 (0)					
Maximum (Standard Deviation)		75,4231		28,8524 (0)					
Minimum (Standard Deviation)		0,0830		0,0845 (0)					

2.2.31 Stage (theatres and event buildings) - Electricity Power Demand – Electricity power demand summary by component

Table 33 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Stage (theatres and event buildings) -Electricity Power Demand summary by component for Slovenia - Average W/m2 and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		1		12		15	
Average (Standard Deviation)		23,8258		2,5849 (0,0001)		1,0338 (0,0001)	
Maximum (Standard Deviation)		115,2117		6,4551 (0,0003)		2,5818 (0,0003)	
Minimum (Standard Deviation)		0,0016		0,0290 (0,0000)		0,0116 (0,0000)	

2.2.32 Storage Area/Cupboard - Electricity Power Demand – Electricity power demand summary by component

Table 34 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Storage Area/Cupboard -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		11		36		6	
Average (Standard Deviation)		1,7268 (1,4720)		2,3703 (2,0246)		0,0352 (0,0403)	
Maximum (Standard Deviation)		9,0844 (6,9105)		8,6217 (16,0871)		0,1439 (0,1940)	
Minimum (Standard Deviation)		0,1331 (0,2206)		0,0862 (0,1803)		0,0020 (0,0008)	

2.2.33 Toilet - Electricity Power Demand – Electricity power demand summary by component

Table 35 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Toilet -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		9		59		57	
Average (Standard Deviation)		1,4955 (2,1736)		2,0041 (2,3947)		0,5207 (0,5087)	
Maximum (Standard Deviation)		9,1172 (12,5590)		7,0218 (14,8991)		1,3427 (1,3832)	
Minimum (Standard Deviation)		0,0275 (0,0597)		0,0144 (0,0228)		0,0057 (0,0117)	

2.2.34 Unoccupied space - Electricity Power Demand – Electricity power demand summary by component

Table 36 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Unoccupied space - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units Heat Recovery Heat Rejection
Sample size (number)		3		4		2	
Average (Standard Deviation)		0,3488 (0,1278)		0,1206 (0,0186)		0,1072 (0,0202)	
Maximum (Standard Deviation)		2,3388 (0,3996)		0,3996 (0,1002)		0,3553 (0,1091)	
Minimum (Standard Deviation)		0,0027 (0,0002)		0,0014 (0,0010)		0,0012 (0,0011)	

2.2.35 Warehouse storage - Electricity Power Demand – Electricity power demand summary by component

Table 37 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Warehouse storage - Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		4		17					
Average (Standard Deviation)		1,4883 (1,8212)		1,2027 (1,2340)					
Maximum (Standard Deviation)		8,2743 (10,0673)		9,3411 (22,4950)					
Minimum (Standard Deviation)		0,0310 (0,0591)		0,0188 (0,0280)					

2.2.36 Workshop - Electricity Power Demand – Electricity power demand summary by component

Table 38 – Measured Overall Power Demands in W/m² Summary by HVAC Component Type Workshop -Electricity Power Demand summary by component for Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Parameter	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers Dehumidifiers	Pumps	Storage Systems Terminal Units	Heat Recovery	Heat Rejection
Sample size (number)		1		20					
Average (Standard Deviation)		5,0673		50,8029 (40,1025)					
Maximum (Standard Deviation)		24,5040		126,5562 (100,5379)					
Minimum (Standard Deviation)		0,0003		0,5687 (0,4535)					

2.3 Summary of measured annual energy use by HVAC Component type servicing a given activity

This summary section contains 6 tables, one for each activity type for which we have data, summarising the range of electrical annual energy consumption per m² found across all the HVAC sub-component types monitored in iSERV.

The main observations from all these tables are:

- Only 38 activities had measured data
- Of these activities only 38 had a sufficient number of metered samples to obtain reasonably accurate benchmarks from.
- Other observations, such as components where only a small variation is found in the ranges, etc

A summary of the measured average annual energy use benchmarks by activity type and HVAC component type is shown in Table 39. Values in brackets indicate the standard deviation found from this average. This

data can be used to estimate the likely annual energy use range to be incurred by the HVAC component while servicing this type of activity in this Slovenia. The more detailed tables also show the annual maximum and minimum annual energy use ranges found for this equipment.

Table 39 – Benchmarks for measured Average and Standard Deviation Annual Energy Use in kWh/m2 Summary by HVAC Component and Activity Type for Slovenia.

Activity type	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
Circulation area (corridors and stairways)		51,0012 (76,0829)		19,1209 (33,0213)			4,9341 (4,3217)				
Reception				1,5609 (2,0406)			1,0884 (0,7447)				
Cellular Office Area		65,9052		10,7795 (8,7721)			7,2363 (3,6804)				
Cellular Office Area - multiple occupation				39,5249 (37,5249)			5,7912 (4,5541)				
Open Plan Office Area		84,4926		17,0797 (21,7795)			4,9496 (4,5118)				
Lounges		230,6620 (206,7183)		40,3928 (62,5463)			6,6099 (3,5954)				
Meeting Room		70,9728		16,6160 (13,3083)			7,2295 (3,6916)				
Library - reading room				70,8024 (32,4755)			3,8496 (1,7096)				
IT: LAN Rooms				3,1893 (0,4487)			12,2665 (2,1136)				
IT: Server Room				3,1904 (0,4484)			12,2707 (2,1124)				
Catering: Bars		64,2146		34,6148 (1,9431)			29,7001 (13,3615)				
Catering: Eating/drinking area		0,9391		24,5113 (23,6243)			2,3570 (2,6901)				
Catering: Full Kitchen Preparing Hot Meals		1386,7492		366,8205 (428,7901)			20,3876 (18,3971)				
Catering: Limited Hot Food Preparation Area				7,8678			0,8622				
Catering: Snack Bar with Chilled Cabinets				44,7124			2,7098 (0)				
Catering: Vending Machines		23,6563		18,4024			8,4762 (2,5080)				
Lecture theatre				12,0975			6,3462				
Assembly areas / halls				62,2316 (0)			52,4056 (0)				
Stage (theatres and event buildings)		158,8487		20,8565			8,3426 (0)				
Bathroom											
Toilet		11,3407 (19,3952)		13,5802 (14,2289)			4,7992 (4,3033)				
Workshop		33,7956		410,3492 (323,0114)							
Small Shop Unit Sales area - chilled		4,5352 (2,5495)		6,5335 (5,9116)			3,2408 (2,9795)		8,4451		0,5135
Small Shop Unit Sales area - general		73,5690 (68,6956)		19,5165 (15,5002)			15,5385 (11,9896)				
Dept Store Sales area - chilled		29,8274		56,2151 (35,5999)							
Dept Store Sales area - general		73,5690 (68,6956)		18,2223 (12,8888)			15,5385 (11,9896)				
Warehouse storage		18,4462		7,1022							

Activity type	Heat Generators	Cold Generators	All-in-One Systems Heat Pumps	Air Handling Units	Humidifiers	Dehumidifiers	Pumps	Storage Systems	Terminal Units	Heat Recovery	Heat Rejection
		(16,5296)		(6,0276)							
Storage Area/Cupboard		2,2792 (3,1338)		11,0709 (13,4196)			0,2967 (0,2907)				
Recreational : Fitness Suite/Gym				243,6247			8,2866 (0)				
Recreational : Changing facilities with showers				38,7816			5,2931 (1,5817)				
Nursery		84,4932		4,4213			8,5194 (2,3720)				
Laundry				93,1479 (68,7970)							
Light Plant Room		1,7150 (2,3463)		4,0351 (0,8187)							
Unoccupied space				1,1021 (0,1553)			0,9797 (0,1691)				

2.3.1 Activity types – annual energy use/m² summary by Heat Generator sub-components

The table shows the average and standard deviation annual energy use found from the data for all activity types for the Heat Generator sub-component type shown in each column.

These figures include directly measured energy use and energy use apportioned by initial benchmarks from metered data serving more than one component.

Table 40 – Overall Data Summary by Heat Generator Sub-component types. Average and Standard Deviation Annual kWh/m² in Slovenia

Activity type	Extract only	Supply only
Circulation area (corridors and stairways)	20,3601 (34,3272)	18,0367 (32,5378)
Reception	0,7968 (0,3413)	2,1339 (2,6887)
Cellular Office Area	10,7795 (9,4749)	10,7795 (9,4749)
Cellular Office Area - multiple occupation	39,5249 (39,8004)	39,5249 (39,8004)
Open Plan Office Area	18,1157 (23,5940)	16,2320 (21,3110)
Lounges	42,1318 (64,8279)	38,7780 (62,7604)
Meeting Room	16,6160 (14,3746)	16,6160 (14,3746)
Library - reading room	70,8024 (36,3087)	70,8024 (36,3087)

iSERV Measured Data Analysis - Slovenia

IT: LAN Rooms	3,1893 (0,5495)	3,1893 (0,5495)
IT: Server Room	3,1904 (0,5492)	3,1904 (0,5492)
Catering: Bars	34,6148 (2,0609)	34,6148 (2,0609)
Catering: Eating/drinking area	27,2347 (24,6164)	22,2830 (23,7380)
Catering: Full Kitchen Preparing Hot Meals	421,1206 (488,8085)	323,3804 (395,9014)
Catering: Limited Hot Food Preparation Area	7,8678	7,8678
Catering: Snack Bar with Chilled Cabinets	44,7124	44,7124
Catering: Vending Machines	18,4024	18,4024
Lecture theatre	12,0975	12,0975
Assembly areas / halls	62,2316	62,2316
Stage (theatres and event buildings)	20,8565	20,8565
Toilet	14,4182 (14,9159)	12,8515 (13,8989)
Workshop	410,3492 (331,8627)	410,3492 (331,8627)
Small Shop Unit Sales area - chilled	6,5335 (6,6093)	6,5335 (6,6093)
Small Shop Unit Sales area - general	20,1264 (15,5983)	18,9425 (15,8648)
Dept Store Sales area - chilled	56,2151 (39,8019)	56,2151 (39,8019)
Warehouse storage	7,8363 (7,7577)	6,4599 (4,4799)
Storage Area/Cupboard	11,8617 (14,1141)	10,3790 (13,7203)
Recreational : Fitness Suite/Gym	243,6247	243,6247
Recreational : Changing facilities with showers	38,7816	38,7816
Nursery	4,4213	4,4213
Laundry	113,3870 (96,3595)	77,9686 (50,5877)
Light Plant Room	4,0351 (0,8587)	4,0351 (0,8587)
Unoccupied space	1,1021 (0,1902)	1,1021 (0,1902)

Table 40 **Error! Reference source not found.** provides the range of annual energy consumptions found in different Heat Generator Component sub-types servicing the activities shown in buildings across Slovenia. Having reference to the activities serviced enables estimation of the likely range of annual energy consumptions to be found in buildings composed of multiple activities.

2.3.2 Activity types – annual energy use/m² summary by Cold Generator sub-components

Table 41 – Cold Generator – Electricity Energy Demand - Annual kWh/m² in Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Activity type	Reciprocating Liquid Chillers	Screw Liquid Chillers	Scroll Liquid Chillers
Circulation area (corridors and stairways)		57,4253 (83,2240)	18,8807
Cellular Office Area		65,9052	
Open Plan Office Area		84,4926	
Lounges		230,6620 (206,7183)	
Meeting Room		70,9728	
Catering: Bars		64,2146	
Catering: Eating/drinking area		0,9391	
Catering: Full Kitchen Preparing Hot Meals		1386,7492	
Catering: Vending Machines		23,6563	
Stage (theatres and event buildings)		158,8487	
Toilet		11,3407 (19,3952)	
Workshop		33,7956	
Small Shop Unit Sales area - electrical	7,4711	3,0673 (0,2663)	
Small Shop Unit Sales area - general		80,9130 (89,2658)	62,5531 (50,3497)
Dept Store Sales area - chilled			29,8274
Warehouse storage		18,4462 (16,5296)	
Storage Area/Cupboard		0,0633	4,4951
Nursery		84,4932	
Light Plant Room		1,7150 (2,3463)	

2.3.3 Heat Rejection – Electricity Energy Demand - Annual kWh/m² in Slovenia

Table 42 – Heat Rejection – Electricity Energy Demand - Annual kWh/m² in Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Activity type	Forced air condensers
Small Shop Unit Sales area - chilled	0,5135

2.3.4 Pumps – Electricity Energy Demand - Annual kWh/m² in Slovenia

Table 43 – Pumps – Electricity Energy Demand - Annual kWh/m² in Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Activity type	Chilled water primary pumps	Chilled water secondary pumps	Condenser water pumps	Hot water secondary pumps
Circulation area (corridors and stairways)	0,2979 (0,2287)	0,9269 (1,2018)		5,7832 (4,2132)
Reception	0,5294	2,4703		1,0356 (0,5774)
Cellular Office Area				7,2363 (3,6804)
Cellular Office Area - multiple occupation				5,7912 (4,5541)
Open Plan Office Area	0,4444	2,0737		5,4663 (4,5422)
Lounges				6,6099 (3,5954)
Meeting Room				7,2295 (3,6916)
Library - reading room				3,8496 (1,7096)
IT: LAN Rooms				12,2665 (2,1136)
IT: Server Room				12,2707 (2,1124)
Catering: Bars				29,7001 (13,3615)
Catering: Eating/drinking area	0,4541 (0,4004)	1,4126 (2,0130)		3,0533 (2,9149)
Catering: Full Kitchen Preparing Hot Meals				20,3876 (18,3971)
Catering: Limited Hot Food Preparation Area				0,8622
Catering: Snack Bar with Chilled Cabinets				2,7098
Catering: Vending Machines				8,4762 (2,5080)
Lecture theatre				6,3462
Assembly areas / halls				52,4056
Stage (theatres and event buildings)				8,3426
Toilet	0,2562 (0,2501)	0,7970 (1,2204)		5,5537 (4,2224)
Small Shop Unit Sales area - chilled	3,7721	8,8015	0,3800	2,7022 (2,4450)
Small Shop Unit Sales area - general	0,2065	0,4817		19,1136 (10,4108)
Storage Area/Cupboard	0,0759	0,1771		0,6369 (0,2546)
Recreational : Fitness Suite/Gym				8,2866

Recreational : Changing facilities with showers				5,2931 (1,5817)
Nursery				8,5194 (2,3720)
Unoccupied space				0,9797 (0,1691)

2.3.5 Terminal Units – Electricity Energy Demand - Annual kWh/m² in Slovenia

Table 44 – Terminal Units – Electricity Energy Demand - Annual kWh/m² in Slovenia - Average W/m² and SD for component and activity (Standard Deviation).

Activity type	Fan Coils – 2 or 4 tubes
Small Shop Unit Sales area - chilled	8,4451

2.4 Summary of measured monthly energy use by HVAC Sub-component type servicing a given activity

The tables in this section provide the ranges of average and standard deviation monthly energy consumptions found in different HVAC sub-component types servicing the noted end use activity across Slovenia i.e. it further subdivides Table 45 **Error! Reference source not found.**

Whilst this data has the same caveats as for the annual data in Table , what it does illustrate is how the consumption of each sub-component varies with the month of the year. From this information it can be seen.

2.4.1.1 Activity types – monthly energy use/m² summary by Cold Generator - Electricity Consumption

This table shows the measured ranges of monthly energy use recorded for this sub-component type. The sample size is shown in alternate rows for each month

iSERV Measured Data Analysis - Slovenia

Table 45 – Measured average monthly energy consumption (standard deviation) in kWh/m² by Air Handling Units - Extract only - Electricity Consumption servicing the given activity for Slovenia

Activity type	ANNUAL TOTAL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Circulation area (corridors and stairways)	25,9 (48,0)	5,1 (6,7)	4,0 (5,6)	4,3 (6,1)	4,5 (6,4)	5,0 (7,2)	4,5 (6,3)	5,4 (7,1)	5,6 (7,6)	3,4 (5,8)	2,7 (5,0)	2,8 (5,1)	3,6 (5,8)
Reception	2,1 (2,5)	6,1 (2,5)	5,3 (2,1)	5,8 (2,3)	5,6 (2,2)	5,5 (1,9)	5,4 (1,9)	5,7 (2,0)	5,7 (1,9)	0,5 (0,5)	0,2 (0,2)	0,2 (0,2)	2,8 (1,2)
Waiting Rooms													
Cellular Office Area	17,4 (16,6)	13,6 (10,1)	12,2 (9,2)	13,1 (10,3)	13,3 (9,8)	12,5 (9,5)	11,6 (9,9)	12,6 (9,6)	12,7 (9,8)	2,3 (2,1)	1,5 (0,9)	1,6 (1,4)	6,8 (5,1)
Cellular Office Area - multiple occupation	70,9 (65,0)	6,2 (5,7)	5,6 (6,4)	6,1 (6,9)	5,9 (5,2)	5,3 (5,0)	6,3 (5,4)	6,7 (6,1)	6,9 (6,4)	7,5 (8,6)	7,2 (7,7)	7,1 (7,7)	6,1 (5,8)
Open Plan Office Area	28,8 (44,3)	2,5 (4,0)	2,4 (3,6)	3,2 (4,3)	3,9 (4,6)	3,8 (4,7)	3,4 (4,6)	3,5 (4,0)	2,8 (3,4)	3,4 (3,4)	2,3 (3,6)	2,4 (3,6)	2,7 (4,0)
Lounges	82,7 (113,3)	12,5 (13,2)	11,4 (12,1)	13,5 (13,2)	14,5 (14,8)	15,0 (18,7)	13,4 (18,2)	15,1 (20,4)	14,1 (21,9)	7,8 (13,3)	6,2 (8,5)	6,2 (8,6)	8,8 (10,1)
Meeting Room	27,0 (25,3)	15,7 (18,0)	13,8 (16,2)	15,9 (17,7)	16,0 (17,4)	14,2 (17,2)	12,8 (17,0)	13,6 (17,3)	13,3 (17,7)	3,6 (3,2)	2,3 (1,4)	2,5 (2,1)	8,4 (8,7)
Library - reading room	137,9 (57,9)	12,1 (6,5)	8,8 (4,8)	10,0 (2,9)	11,6 (4,9)	12,1 (6,2)	12,7 (6,1)	12,9 (6,0)	12,8 (6,0)	11,6 (5,3)	11,9 (6,1)	11,9 (5,9)	11,7 (6,0)
IT: LAN Rooms	6,1 (0,8)	0,5 (0,2)	0,5 (0,1)	0,5 (0,1)	0,5 (0,2)	0,3 (0,3)	0,4 (0,1)	0,5 (0,1)	0,51 (0,1)	0,6 (0,1)	0,8 (0,3)	0,5 (0,1)	0,4 (0,1)
IT: Server Room	6,1 (0,8)	0,5 (0,2)	0,5 (0,1)	0,5 (0,1)	0,5 (0,2)	0,3 (0,3)	0,4 (0,1)	0,5 (0,1)	0,5 (0,1)	0,6 (0,1)	0,8 (0,3)	0,5 (0,1)	0,4 (0,1)
Catering: Bars	70,2 (3,3)	5,4 (0,5)	4,8 (0,5)	5,0 (0,1)	6,5 (0,6)	6,3 (0,6)	5,5 (0,6)	6,1 (0,3)	6,8 (0,5)	7,0 (0,8)	4,4 (0,8)	5,2 (0,5)	6,4 (0,5)
Catering: Eating/drinking area	47,2 (46,9)	13,1 (16,2)	11,8 (14,3)	14,9 (16,6)	41,7 (15,7)	16,0 (18,4)	16,0 (18,3)	17,9 (20,0)	16,8 (16,8)	6,5 (6,8)	5,6 (8,0)	4,4 (7,0)	7,3 (7,8)
Catering: Full Kitchen Preparing Hot Meals	783,6 (950,4)	55,6 (48,3)	48,3 (44,2)	60,0 (49,5)	61,6 (55,3)	67,7 (108,9)	78,4 (106,3)	99,3 (132,2)	106,9 (152,5)	86,5 (124,1)	94,6 (139,7)	84,7 (125,1)	49,8 (63,6)
Catering: Limited Hot Food Preparation Area	15,3 (0,6)	4,2 (1,1)	9,2 (1,0)	25,9696 (1,2)	24,1 (1,1)	24,1 (1,3)	26,5 (1,1)	39,5 (1,1)	12,8 (1,0)	2,1	2,8	1,1	2,1 (0,3)
Catering: Snack Bar with Chilled Cabinets	90,5 (0,9)	8,0(1,4)	6,1 (0,9)	8,6 (1,4)	8,5 (1,3)	8,1 (1,7)	8,6 (1,3)	8,9 (1,7)	8,9 (1,4)	7,6	7,5	7,6	6,9 (1,8)
Catering: Vending Machines	37,1 (0,2)	2,8	2,5	2,7	3,7	3,3	2,8	3,3	3,8 (0,3)	4,0	2,2	2,7	3,4
Lecture theatre	23,6 (0,8)	2,4	2,9 (0,4)	4,5 (1,5)	4,1 (1,5)	3,7 (2,8)	3,6 (1,8)	3,7 (1,8)	2,8 (1,6)	1,7	2,0	2,1	2,1
Assembly areas / halls	133,4 (5,1)	12,2	11,9	12,9	11,0 (0,9)	12,0 (1,6)	11,5 (1,6)	10,7 (0,7)	7,1 (5,3)	9,9	10,5	10,5	11,5
Stage (theatres and event buildings)	40,1 (2,4)	2,1	1,9	2,0	3,2	4,8	2,5 (2,6)	4,7 (0,3)	5,2	4,4	2,7	2,7	2,5
Toilet	24,3 (27,5)	6,2 (5,8)	5,3 (5,2)	5,7 (5,7)	5,9 (5,3)	6,1 (5,8)	6,0 (5,9)	6,4 (6,2)	6,6 (6,4)	2,7 (3,1)	2,4 (3,3)	2,4 (3,1)	3,8 (3,9)
Workshop	872,9 (593,4)	42,7 (33,5)	38,0 (29,8)	40,7 (31,8)	63,7 (50,6)	94,8 (77,8)	60,7 (78,7)	91,9 (73,8)	101,6 (80,8)	86,2 (69,5)	53,2 (43,3)	54,0 (43,3)	50,8 (39,8)
Small Shop Unit Sales area - chilled	11,6 (10,0)	1,0 (1,2)	0,6 (0,8)	0,5 (0,7)	0,9 (0,8)	0,9 (1,0)	0,9 (0,9)	1,0 (0,9)	1,1 (0,9)	2,2 (2,5)	0,9 (0,9)	1,1 (0,9)	1,1 (1,4)
Small Shop Unit Sales area - electrical		5,3	4,0	0,4	7,1	4,8	3,8	5,6	2,7			5,2	5,9
Small Shop Unit Sales area - general	44,4 (38,6)	2,1 (1,3)	1,9 (1,3)	2,5 (1,9)	3,4 (2,5)	4,1 (4,9)	4,0 (4,9)	4,4 (5,6)	4,5 (6,2)	4,6 (4,8)	4,3 (5,5)	3,8 (5,1)	2,9 (2,5)
Dept Store Sales area - chilled	131,6 (75,5)	7,1 (3,7)	6,5 (2,9)	8,6 (4,8)	8,3 (5,1)	9,4 (6,2)	10,3 (7,7)	13,6 (11,6)	13,7 (11,1)	5,7 (7,4)	11, (7,7)	8,1 (6,6)	7,9 (5,9)
Dept Store Sales area - general		17,4	10,5	1,2	15,4	9,1	8,7	12,1	7,2			14,1	17,7

		(29,4)	(19,4)	(2,0)	(22,2)	(12,5)	(12,3)	(19,0)	(11,2)			(22,3)	(28,3)
Warehouse storage	15,2 (13,3)	4,6 (1,5)	4,0 (1,3)	4,2 (1,4)	4,4 (1,3)	4,5 (1,4)	3,7 (1,1)	4,3 (1,3)	4,2 (1,2)	1,5 (1,3)	1,3 (1,5)	1,3 (1,4)	2,7 (1,3)
Storage Area/Cupboard	15,6 (20,2)	4,5 (3,9)	4,2 (3,4)	4,9 (4,2)	4,7 (4,0)	4,9 (4,3)	4,6 (4,2)	5,6 (5,4)	5,5 (5,2)	1,8 (2,1)	2,5 (2,6)	1,9 (2,4)	3,0 (3,1)
Recreational : Fitness Suite/Gym	499,0 (8,5)	35,0	38,4	49,4	40,2	37,3	34,9 (1,3)	39,0 (5,6)	41,0 (7,8)	52,0	47,0	46,4	35,4
Recreational : Changing facilities with showers	78,4 (0,6)	5,9	5,3	5,7	7,7	6,9	5,9	6,9	8,0 (0,6)	8,4	4,6	5,7	7,1
Nursery	8,9 (0,1)	0,7	0,6	0,7	0,9	0,8	0,6740	0,8	0,9 (0,1)	1,0	0,5	0,7	0,8
Laundry	187,0 (142,2)	55,1 (17,6)	49,7 (15,8)	54,2 (17,3)	51,8 (16,5)	48,9 (17,4)	45,6 (14,3)	50,8 (16,2)	50,9 (16,1)	18,6 (16,9)	19,3 (17,4)	18,8 (16,9)	19,2 (17,0)
Light Plant Room	10,6 (4,1)	3,8 (1,1)	3,5 (1,0)	3,8 (1,1)	3,8 (0,9)	4,2 (1,3)	4,0 (1,1)	4,1 (1,2)	4,2 (1,1)	1,3 (0,8)	0,9 (0,7)	0,6 (0,1)	0,9 (0,4)
Unoccupied space	2,1 (0,3)	0,2 (0,1)	0,2	0,2 (0,1)	0,2 (0,1)	0,1 (0,1)	0,1 (0,1)	0,2	0,2	0,2	0,3 (0,1)	0,2 (0,1)	0,1

2.4.1.2 Activity types – monthly energy use/m² summary by Cold Generator - Electricity Consumption

This table shows the measured ranges of monthly energy use recorded for this sub-component type.

Table 6 – Measured average monthly energy consumption (standard deviation) in kWh/m² by Cold Generator - Electricity Consumption servicing the given activity for Slovenia

Activity type	ANNUAL TOTAL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Circulation area (corridors and stairways)	28,0 (31,4)	0,8 (0,9)	0,6 (0,8)	0,4 (0,7)	0,6 (2,0)	2,0 (2,2)	4,5 (5,3)	7,1 (8,3)	7,3 (9,8)	4,8 (5,1)	2,0 (0,7)	0,8 (2,3)	1,1 (2,1)
Reception						0,5 (0,4)	0,4 (1,7)	0,6 (2,2)	0,8 (2,3)	0,7 (1,1)	0,4		
Cellular Office Area	67,8 (1,9)	0,1	0,1	0,1	0,7 (1,2)	7,3 (2,5)	10,6 (4,0)	11,4 (5,9)	13,5 (6,8)	3,4 (3,7)	2,5	0,1	0,1
Cellular Office Area - multiple occupation						0,9 (0,8)	2,8 (1,1)	3,7 (1,4)	3,8 (1,2)	1,8 (0,7)			
Open Plan Office Area	86,9 (2,4)	0,1	0,1 (0,1)	0,1	0,5 (1,2)	1,4 (2,5)	4,1 (5,4)	7,4 (8,2)	7,4 (8,7)	2,9 (4,2)	3,2	0,1	0,1
Lounges	150,1 (160,4)	2,5 (4,2)	2,9 (4,9)	2,4 (4,0)	4,2 (8,5)	11,8 (8,0)	19,1 (18,6)	26,1 (25,6)	29,4 (28,7)	10,2 (16,7)	2,6 (1,8)	6,0 (10,3)	5,4 (9,3)
Meeting Room	73,0 (2,0)	0,1	0,1	0,1	0,7 (1,3)	7,9 (2,6)	11,4 (4,3)	12,3 (6,3)	14,6 (7,3)	3,7 (3,9)	2,7	0,1	0,1
IT: LAN Rooms					2,3 (0,1)	39,7 (36,7)	140,4 (50,3)	183,3 (68,3)	190,3 (59,9)	91,8 (31,5)			
IT: Server Room					2,3 (0,1)	39,7 (36,7)	140,4 (50,3)	183,3 (68,3)	190,3 (59,9)	91,8 (31,5)			
Catering: Bars	66,1 (1,8)	0,1	0,1	0,1	2,4	6,4	12,5	15,2 (1,3)	17,1 (2,6)	8,6	2,4	0,1	0,1
Catering: Eating/drinking area	0,4 (0,1)	0,1	0,4 (0,5)	1,6 (1,9)	1,4 (1,7)	1,8 (2,0)	4,0 (4,9)	13,8 (20,4)	9,7 (14,0)	0,7 (0,8)	0	0	0
Catering: Full Kitchen Preparing Hot Meals	1336,8 (63,0)	26,8	31,4	25,6	13,3 (32,2)	10,8 (27,1)	27,8 (63,9)	52,3 (98,3)	58,7 (110,2)	31,7 (63,9)	17,2	65,7	59,4

Catering: Limited Hot Food Preparation Area						0,8 (0,7)	2,6 (1,0)	3,4 (1,3)	3,5 (1,1)	1,7 (0,7)			
Catering: Vending Machines	24,3 (0,7)				0,9	2,3	4,6	5,6 (0,5)	6,3 (1,0)	3,2	0,9		
Lecture theatre						0,6 (0,5)	1,8 (0,7)	4,4 (2,7)	3,7 (1,9)	1,1 (0,5)			
Stage (theatres and event buildings)	27,2 (13,0)				1,0 (0,5)	2,6 (1,3)	5,2 (2,6)	6,3 (3,1)	7,1 (3,5)	3,6 (1,8)	1,0 (0,5)		
Bathroom						0,9	1,0	0,8	1,0				
Toilet	2,8 (9,4)	0,1 (0,3)	0,1 (0,3)	0,1 (0,2)	0,1 (0,5)	1,0 (0,6)	1,5 (1,4)	1,6 (2,2)	2,0 (2,4)	0,5 (1,4)	0,1 (0,2)	0,2 (0,7)	0,2 (0,6)
Bedroom						3,5	4,1	3,1	4,1				
Workshop	5,0 (2,5)				0,2 (0,1)	0,5 (0,3)	0,9 (0,5)	1,1 (0,6)	1,3 (0,7)	0,6 (0,3)	0,2 (0,1)		
Small Shop Unit Sales area - chilled	3,2 (1,1)		0,1 (0,1)	0,1 (0,1)	0,1 (0,1)	0,3 (0,2)	0,4 (0,3)	0,5 (0,3)	0,6 (0,3)	1,1 (0,7)	0,2 (0,2)	0,1 (0,2)	
Small Shop Unit Sales area - electrical		0,3	0,2	0,2	1,7	4,1	11,1	15,3	12,8			0,4	0,3
Small Shop Unit Sales area - general	80,0 (97,7)	0,9 (1,0)	0,8 (0,9)	0,7 (0,9)	1,4 (2,4)	7,2 (10,9)	11,5 (15,3)	14,7 (18,0)	14,6 (17,8)	10,5 (14,1)	6,1 (7,2)	0,5 (0,6)	0,9 (1,0)
Dept Store Sales area - chilled	29,8	7,2 (4,4)	6,4 (4,0)	5,8 (2,4)	9,1 (4,0)	14,0 (3,8)	20,9 (4,1)	26,7 (18,2)	32,4 (11,0)	3,8 (5,7)	2,2 (1,1)	3,3	7,0 (4,3)
Dept Store Sales area - general		0,1	0,1	0,1	0,4 (0,2)	1,0 (0,6)	2,8 (1,6)	3,8 (2,2)	3,2 (1,8)			0,1 (0,1)	0,1
Warehouse storage	18,0 (12,1)	0,3 (0,4)	0,3 (0,5)	0,3 (0,4)	0,5 (0,8)	0,6 (0,8)	1,2 (1,8)	2,0 (2,4)	2,2 (2,7)	1,2 (1,6)	0,3 (0,1)	0,7 (1,0)	0,7 (0,9)
Storage Area/Cupboard	4,5	1,0 (0,7)	0,9 (0,6)	0,8 (0,4)	0,7 (0,8)	0,8 (1,0)	1,3 (1,5)	2,0 (2,6)	2,3 (2,6)	0,6 (0,9)	0,3 (0,2)	0,5	1,0 (0,7)
Nursery	86,9 (2,4)	0,1	0,1	0,1	3,2	8,4	16,5	20,1 (1,7)	22,6 (3,4)	11,4	3,2	0,1	0,1
Light Plant Room	0,7 (1,4)				0,03 (0,1)	0,1 (0,1)	0,1 (0,3)	0,3 (0,4)	0,3 (0,5)	0,2 (0,3)	0,04 (0,1)		
Unoccupied space						0,1 (0,1)	0,2 (0,1)	0,3 (0,1)	0,3 (0,1)	0,2 (0,1)			

2.4.1.3 Activity types – monthly energy use/m² summary by Heat Rejection - Electricity Consumption

Table 7 – Measured average monthly energy consumption (standard deviation) in kWh/m² by Heat Rejection - Electricity Consumption servicing the given activity for Slovenia

Activity type	ANNUAL TOTAL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Catering: Eating/drinking area				0,1 (0,1)	0,1 (0,1)	0,1 (0,1)	0,1 (0,2)	0,5 (1,0)	0,3 (0,6)				
Small Shop Unit Sales area - chilled	0,2 (0,1)									0,1			

2.4.1.4 Activity types – monthly energy use/m² summary by Pumps - Electricity Consumption

iSERV Measured Data Analysis - Slovenia

Table 48 – Measured average monthly energy consumption (standard deviation) in kWh/m² by Pumps - Electricity Consumption servicing the given activity for Slovenia

Activity type	ANNUAL TOTAL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Circulation area (corridors and stairways)	3,9 (4,9)	0,2 (0,3)	0,2 (0,3)	0,2 (0,3)	0,3 (0,4)	0,4 (0,6)	0,4 (0,6)	0,5 (0,6)	0,5 (0,7)	0,5 (0,7)	0,4 (0,5)	0,3 (0,4)	0,3 (0,3)
Reception	2,5 (1,3)	0,1 (0,1)	0,1 (0,1)	0,1 (0,1)	0,1 (0,1)	0,3 (0,2)	0,3 (0,2)	0,3 (0,2)	0,3 (0,2)	1,1 (0,9)	0,1 (0,1)	0,1 (0,1)	0,1 (0,1)
Cellular Office Area	6,8 (3,5)	0,4 (0,2)	0,3 (0,2)	0,4 (0,2)	0,6 (0,3)	0,7 (0,5)	0,4 (0,5)	0,8 (0,4)	0,9 (0,5)	0,8 (0,4)	0,5 (0,2)	0,5 (0,2)	0,4 (0,2)
Cellular Office Area - multiple occupation	5,1 (4,0)	0,5 (0,3)	0,4 (0,4)	0,4 (0,4)	0,4 (0,3)	0,4 (0,3)	0,5 (0,3)	0,5 (0,4)	0,5 (0,4)	0,6 (0,5)	0,5 (0,4)	0,5 (0,4)	0,4 (0,3)
Open Plan Office Area	4,6 (5,4)	0,3 (0,3)	0,2 (0,3)	0,2 (0,3)	0,3 (0,4)	0,4 (0,5)	0,3 (0,5)	0,8 (1,1)	0,7 (0,9)	0,7 (0,8)	0,3 (0,4)	0,3 (0,3)	0,3 (0,3)
Lounges	5,0 (3,3)	0,4 (0,3)	0,3 (0,3)	0,3 (0,3)	0,4 (0,3)	0,5 (0,3)	0,4 (0,3)	1,7 (0,3)	1,3 (0,3)	0,5 (0,3)	0,4 (0,3)	0,4 (0,3)	0,4 (0,3)
Meeting Room	6,8 (3,5)	0,4 (0,2)	0,3 (0,2)	0,4 (0,2)	0,6 (0,3)	0,7 (0,5)	0,4 (0,5)	0,8 (0,4)	0,9 (0,5)	0,8 (0,4)	0,5 (0,2)	0,5 (0,2)	0,4 (0,2)
Library - reading room	3,7 (1,5)	0,3 (0,2)	0,2 (0,1)	0,3 (0,1)	0,3 (0,1)	0,3 (0,2)	0,3 (0,2)	0,3 (0,2)	0,3 (0,2)	0,3 (0,1)	0,3 (0,1)	0,3 (0,1)	0,3 (0,1)
IT: LAN Rooms	11,9 (1,6)	1,0 (0,3)	0,9 (0,3)	0,9 (0,3)	1,0 (0,3)	0,6 (0,5)	0,7 (0,3)	0,9 (0,2)	1,0 (0,2)	1,2 (0,2)	1,5 (0,5)	1,0 (0,3)	0,8 (0,3)
IT: Server Room	11,9 (1,6)	1,0 (0,3)	0,9 (0,3)	0,9 (0,3)	1,0 (0,3)	0,6 (0,5)	0,7 (0,3)	0,9 (0,2)	1,0 (0,2)	1,2 (0,2)	1,5 (0,5)	1,0 (0,3)	0,8 (0,3)
Catering: Bars	27,5 (13,0)	1,6 (0,6)	1,4 (0,5)	1,5 (0,6)	2,1 (1,1)	3,0 (1,8)	1,9 (2,1)	3,3 (1,6)	3,6 (1,7)	3,1 (1,5)	1,9 (0,8)	2,0 (0,8)	1,9 (0,7)
Catering: Eating/drinking area	3,6 (4,0)	0,1 (0,1)	0,2 (0,2)	0,5 (0,7)	0,4 (0,7)	0,6 (0,9)	0,9 (1,5)	2,3 (5,9)	1,7 (4,1)	0,8 (1,0)	0,3 (0,5)	0,3 (0,4)	0,1 (0,1)
Catering: Full Kitchen Preparing Hot Meals	20,8 (19,2)	1,2 (1,4)	1,0 (1,3)	1,3 (1,3)	1,2 (1,3)	1,5 (2,2)	1,8 (2,0)	2,3 (2,6)	2,5 (3,0)	2,4 (2,5)	2,6 (2,7)	2,4 (2,5)	1,3 (1,9)
Catering: Limited Hot Food Preparation Area	0,8	0,1	0,1	0,1	0,1			0,1	0,1	0,1	0,2	0,1	0,1
Catering: Snack Bar with Chilled Cabinets	2,7	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Catering: Vending Machines	8,3 (2,1)	0,4 (0,1)	0,4 (0,1)	0,4 (0,1)	0,7 (0,2)	1,0 (0,3)	0,5 (0,6)	1,0 (0,3)	1,1 (0,3)	0,9 (0,3)	0,6 (0,2)	0,6 (0,2)	0,5 (0,1)
Lecture theatre	6,2 (0,2)	0,6	0,6	0,6	0,5	0,3 (0,3)	0,4 (0,1)	5,3 (0,1)	3,6	0,4	0,5	0,5	0,6
Assembly areas / halls	56,2 (2,1)	5,1	5,0	5,4	4,6 (0,3)	5,0 (0,6)	4,8 (0,6)	4,5 (0,2)	3,0 (1,8)	4,2	4,4	4,4	4,9
Stage (theatres and event buildings)	2,0 (2,1)	0,1 (0,1)	0,1 (0,1)	0,1 (0,1)	0,2 (0,2)	0,2 (0,3)	0,1 (0,2)	0,2 (0,2)	0,3 (0,3)	0,2 (0,2)	0,1 (0,1)	0,1 (0,1)	0,1 (0,1)
Toilet	4,3 (4,6)	0,3 (0,3)	0,2 (0,3)	0,2 (0,3)	0,2 (0,3)	0,3 (0,5)	0,3 (0,5)	0,4 (0,5)	0,5 (0,6)	0,6 (0,8)	0,4 (0,5)	0,4 (0,4)	0,3 (0,3)
Small Shop Unit Sales area - chilled	7,0 (3,7)	0,3 (0,3)	0,2 (0,4)	0,2 (0,4)	0,4 (0,3)	0,5 (0,5)	0,6 (0,6)	0,8 (0,7)	0,8 (0,7)	2,0 (1,7)	0,5 (0,4)	0,4 (0,4)	0,3 (0,3)
Small Shop Unit Sales area - general	18,5 (10,5)	0,9 (0,5)	0,8 (0,5)	0,9 (0,5)	1,3 (0,8)	1,8 (1,6)	1,5 (1,6)	2,3 (1,5)	2,5 (1,7)	2,1 (1,3)	1,6 (1,3)	1,5 (1,2)	1,0 (0,7)
Storage Area/Cupboard	0,8 (0,3)	0,1					0,1	0,1	0,1	0,1	0,1		0,1
Recreational : Fitness Suite/Gym	8,5 (0,1)	0,6	0,7	0,8	0,7	0,6	0,6	0,7 (0,1)	0,7 (0,1)	0,9	0,8	0,8	0,6
Recreational : Changing facilities with showers	5,2 (1,3)	0,3 (0,1)	0,2 (0,1)	0,3 (0,1)	0,4 (0,1)	0,6 (0,2)	0,3 (0,4)	0,6 (0,2)	0,7 (0,2)	0,6 (0,2)	0,3 (0,1)	0,3 (0,1)	0,3 (0,1)
Nursery	8,4 (2,0)	0,4 (0,1)	0,4 (0,1)	0,4 (0,1)	0,7 (0,2)	1,0 (0,3)	0,5 (0,6)	1,0 (0,3)	1,1 (0,3)	0,9 (0,2)	0,6 (0,2)	0,6 (0,2)	0,5 (0,1)
Unoccupied space	0,9 (0,1)	0,1	0,1	0,1	0,1		0,1	0,1	0,1	0,1	0,1	0,1	0,1

2.4.1.5 Activity types – monthly energy use/m² summary by Terminal Units - Electricity Consumption

Table 49 – Measured average monthly energy consumption (standard deviation) in kWh/m² by Terminal Units - Electricity Consumption servicing the given activity for Slovenia

Activity type	ANNUAL TOTAL	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Catering: Eating/drinking area			0,3 (0,3)	1,0 (1,3)	1,0 (1,2)	1,1 (1,2)	2,0 (2,7)	6,3 (13,4)	4,2 (8,7)				
Small Shop Unit Sales area - chilled	3,0 (1,1)		0,1 (0,2)	0,1 (0,2)	0,2 (0,1)	0,3 (0,2)	0,4 (0,3)	0,5 (0,3)	0,5 (0,3)	1,0 (0,8)	0,2 (0,2)	0,1 (0,2)	

2.5 Summary Conclusions

3 References

Knight I P – “Measured Energy Use and Power Demands in European HVAC Components”, CIBSE ASHRAE Technical Symposium, Dublin, Ireland, 3-4 April 2014.

Jomni Y, v. Deventer J and Delsing J – “Comparing heat measurement accuracy of a new adaptive algorithm with existing heat meters in accordance to the Swedish test standard”, 10th International Symposium on District Heating and Cooling, September 3 – 5, 2006.