

CASE
STUDY

**EUROVENT ENERGY CLASSIFICATION
FOR AIR HANDLING UNITS
ENERGY CONSUMPTION BY ENERGY CLASS**



IN A NUTSHELL

This Eurovent document demonstrates the differences in consumption and cost of energy associated with the operation of Air Handling Units, depending on their energy efficiency class rated under the Eurovent Certification programme. It presents case studies of typical applications and working conditions for various cities in Europe, which provides guidance on making the right choice in the design and selection of the most suitable product.

AUTHORS

This document was published by Eurovent and was prepared in a joint effort by participants of the Product Group 'Air Handling Units' (PG-AHU), which represents a vast majority of all manufacturers of these products active on the EMEA market.

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SUGGESTED CITATION

Eurovent AISBL / IVZW / INPA. (2025). Eurovent Energy Classification for Air Handling Units. Brussels: Eurovent.

IMPORTANT REMARKS

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LIST OF ABBREVIATIONS AND SYMBOLS

AHU	Air Handling Unit
CO₂	Carbon Dioxide
DCV	Demand-controlled ventilation
EEC	Energy Efficiency Classification
ESP	External static pressure
GHG	Greenhouse gas
GWP	Global Warming Potential
IAQ	Indoor Air Quality
LCC	Life Cycle Cost
PG-AHU	Eurovent Product Group 'Air Handling Units'
PM	Particulate Matter
t_{ETA}	Extract air temperature
VOC	Volatile Organic Compounds
w MR	With moisture recovery
w/o MR	Without moisture recovery

INTRODUCTION

WHY ENERGY EFFICIENT AND SUSTAINABLE MECHANICAL VENTILATION?

Indoor Air Quality (IAQ) is fundamental to the wellbeing and productivity of building occupants. Given that we nowadays spend on average 90% of our time indoors, IAQ must be the focus of attention for building designers, contractors, and users.

High IAQ, which, simply put, means low levels of harmful pollutants such as Carbon dioxide (CO₂), Volatile Organic Compounds (VOC) and Particulate Matter (PM), involves adequate indoor air exchange and filtration of the outdoor air supplied to the building. A suitable mechanical ventilation system is required to provide effective air exchange. Another key factor for the wellbeing of building occupants is thermal comfort, in other words, the correct indoor temperature, which means that ventilation air must be heated and, if needed, also cooled.

A key element of a typical ventilation system is the Air Handling Unit (AHU), which transports, heats and usually cools the air. These processes, indispensable to provide a high IAQ entail significant energy consumption. Therefore, IAQ must always be considered in conjunction with the energy efficiency of the AHU. Ensuring adequate IAQ with the lowest energy consumption is essential to optimise running costs, as well as minimise the environmental impact of the ventilation system, since energy use typically accounts for 80% of the Global Warming Potential (GWP) emissions generated by the AHU over its lifetime.

WHAT IS THE EUROVENT ENERGY EFFICIENCY CLASSIFICATION (EEC) FOR AHU?

AHUs are complex products, and their performance is specified by many parameters. This makes it difficult to easily evaluate and compare the overall energy efficiency of different units when selecting the optimal product for a project. To solve this problem, Eurovent has developed a unique and comprehensive indicator of AHU energy efficiency based on key factors affecting energy use: the heat recovery efficiency impacting heating and cooling energy consumption and the electric power input by fans transporting the air. The AHU energy efficiency is expressed by a label in classes from A+ to E. Only Eurovent certified units may be marketed with this label. The rating system includes two types of labels, for winter and for summer applications:

- The winter label applies to units in cold climates, where heating energy dominates annual thermal energy consumption and the summer temperatures and humidity are mild, making recovery of latent energy (moisture) unreasonable
- The summer label applies to units in warm climates, where cooling energy dominates annual thermal energy consumption, and the summer temperatures and humidity are high so that latent energy recovery significantly reduces cooling demand

The methodology for evaluating energy efficiency class rating is given in the [certification programme manual](#).

The comparison of energy consumption by AHU class in this case study is shown depending on the location for the winter or summer label according to the methodology rules.



INTRODUCTION

WHAT DOES THIS CASE STUDY SHOW AND HOW TO UNDERSTAND IT?

A complete analysis to select the optimal product for a project is a complex and time-consuming task. It requires considering the specifics of a given application and performing multi-variant Life Cycle Cost (LCC) calculations.

The purpose of this document is to support and facilitate this process by presenting the annual energy consumption, calculated by AHU energy class, for different locations and application groups, assuming a typical AHU configuration and operation conditions.

The document is therefore a useful tool for a preliminary estimate of which AHU energy class best suits the project needs and what energy consumption and costs are involved.

Another essential information provided in this study is a rough value of savings in energy costs over 17¹ years, which is the typical AHU lifetime assumed in the studies of Ecodesign requirements for ventilation units if an A+ class unit is installed instead of a C class unit.

This figure is the basis for making an informed decision on product selection. It avoids the common mistake of choosing the cheapest and low efficient unit to reduce investment costs, ignoring the fact that the increased lifetime operating costs will far outweigh any purchase cost savings.

It must be stressed that the values for the actual project will differ from those given in the study, as it is based on several assumptions, nevertheless, the study provides clear guidelines for making the right choices in the design process.

The document analyses in the next chapters, the following types of applications, grouped by the assumed similar scenario and time of operation.

Group 1

School, kindergarten, office building

Operating time: Monday-Friday, 07:00-20:00h

Airflow rate of 10.000 m³/h (2,78 m³/s) for supply and exhaust air, which corresponds to an AHU operating a school for around 350 students or an office building for around 280 employees

Group 2

Restaurant, eating place

Operating time: Monday-Sunday, 06:00-24:00h

Airflow rate of 5.000 m³/h (1,39 m³/s) for supply and exhaust air, which corresponds to an AHU operating a restaurant for around 140 diners with a dining area of around 240 m²

Group 3

Multifamily residential building

Operating time: 24/7

Airflow rate of 5.000 m³/h (1,39 m³/s) for supply and exhaust air, which corresponds to an AHU operating an apartment building including around 80 dwellings for around 200 residents

Energy calculations are given for several cities in Northern, Eastern and Western Europe (usually subject to the winter label) and Southern Europe (usually subject to the summer label).

The quoted annual energy consumption for the assumed airflow can be proportionally converted for other airflows, but the result will be approximate since the methodology for the energy efficiency class links the required fan efficiency to the airflow.

The case study focuses solely on the EU, and although the classification ranges from A+ to E, the study only covers classes A+ to C. AHUs in classes D and E do not meet the minimum Ecodesign requirements and cannot be placed on the EU market.

SUSTAINABLE BUILDINGS AND ENERGY CONSUMPTION

In light of the EU's goals to achieve climate neutrality, reducing greenhouse gas (GHG) emissions from buildings became one of the key challenges. The greenhouse gas emissions attributable to buildings, which determine their Life cycle GWP, include two elements: embodied emissions and operational emissions. The embodied emissions are associated with building construction, including those that arise from extracting, transporting, manufacturing, and installing building materials on site. Operational greenhouse gas emissions mean greenhouse gas emissions associated with the generation of energy consumed by technical building systems during use. For AHUs, operational emissions fundamentally outweigh embodied emissions. For this reason, in the case of AHUs, reducing GHG emissions essentially means reducing their energy consumption or, in other words, increasing their energy efficiency.

This case study does not address the operational GHG emissions by energy efficiency class, because the GHG emission intensity of energy generation varies substantially across Member States. Therefore, using an average value or differentiating it by location would be neither practical nor meaningful.

However, it should be noted that the GHG emission intensity of energy generation has been steadily declining over the past decades and this trend is projected to continue in the future at an increasing rate of decline. This means that the impact of operational emissions will diminish as the energy used will be 'green' and sustainably generated. Nevertheless, energy efficiency will remain key, as it will continue to be critical to energy consumption and operating costs.

FURTHER REDUCTION OF ENERGY CONSUMPTION: DEMAND-CONTROLLED VENTILATION

The energy consumption presented in this study was modelled assuming constant flow rate ventilation. This means that the AHU operates at the same capacity, regardless of the actual demand related to the number of occupants in the building.

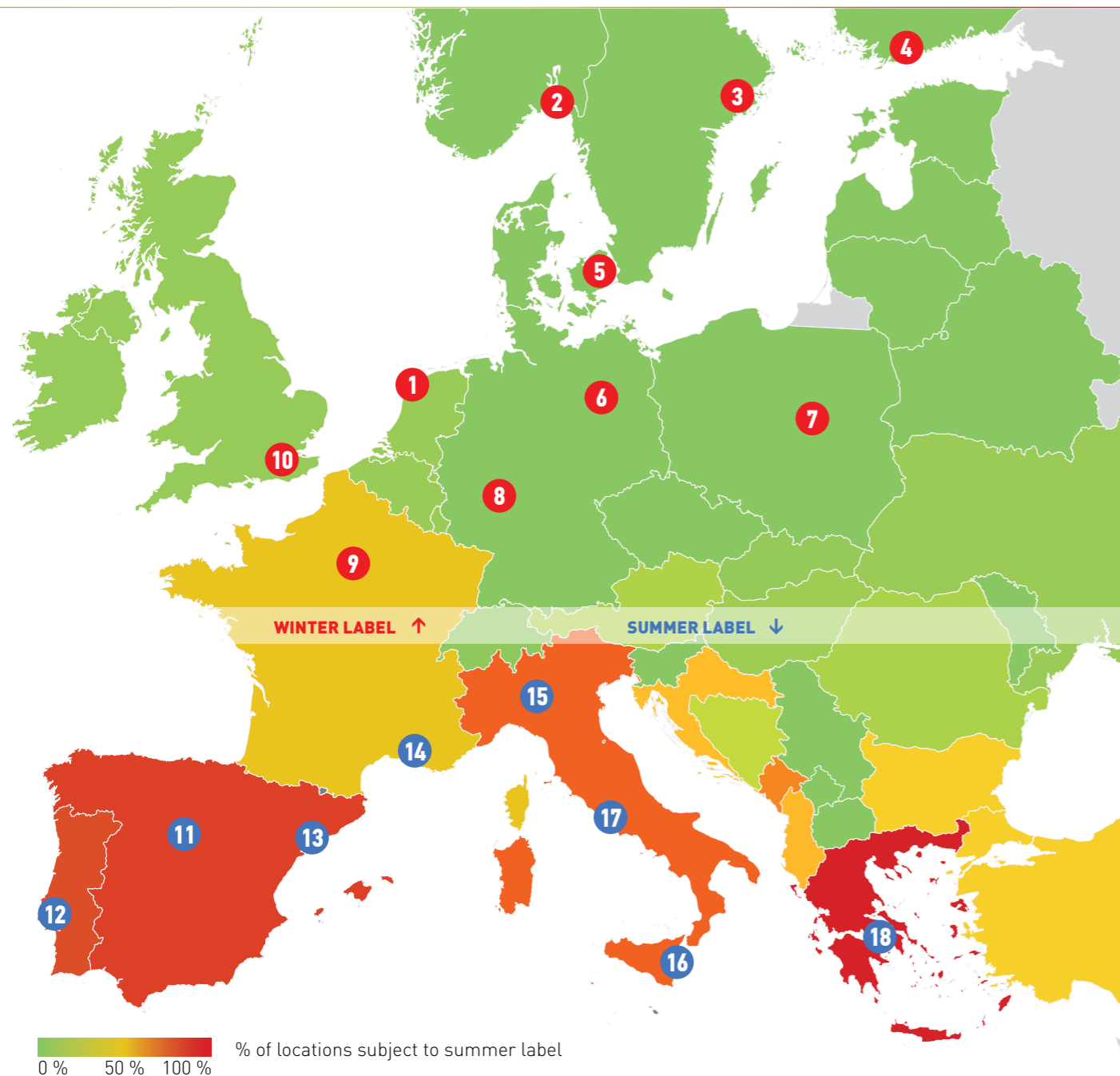
Employing a demand-controlled ventilation (DCV) system provides the possibility of achieving significant savings in energy consumption compared to constant airflow systems. DCV means that the airflow rate supplied to individual rooms or zones is adjusted to the actual number of occupants, usually by measuring CO₂ level, which is a key indicator of IAQ. When the occupancy rate is lower than the designed maximum value, the AHU operates at part load and with reduced energy consumption. The magnitude of annual savings depends on the building type and actual behaviour scenario of its occupants, so it cannot be expressed by a single typical value. However, it can be safely assumed that, in relation to a constant flow system, the annual energy consumption of a DCV system will be at least several per cent lower.

The percentage of savings due to DCV is the same for each energy efficiency class of AHU. Therefore, the way to reduce energy consumption is a high energy efficiency AHU combined with DCV.

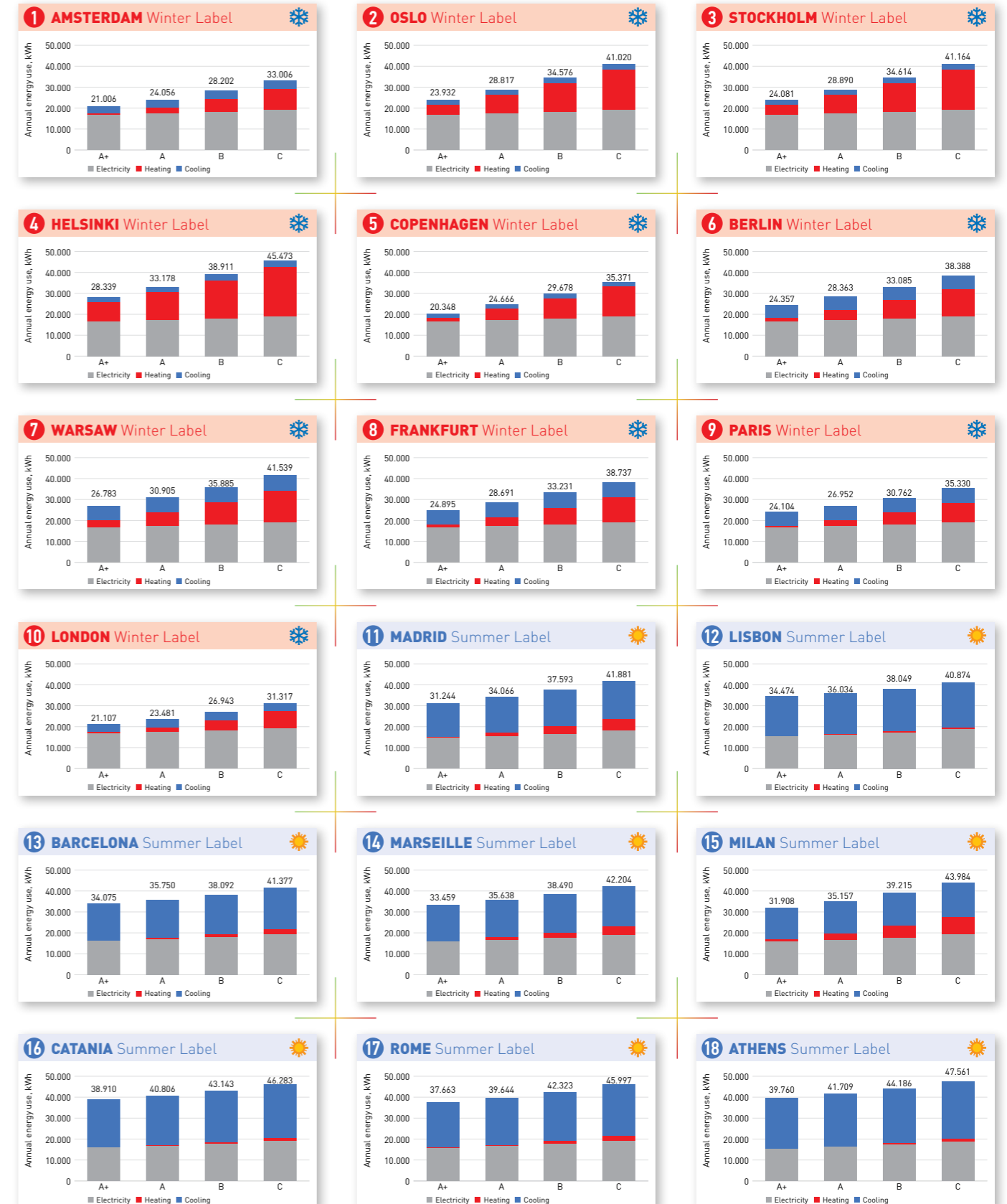
¹ <https://www.ecoventilation-review.eu/downloads/Ventilation%20Units%20TASK%202%20Final%20Report%202020-09-10.pdf>

APPLICATION GROUP 1 SCHOOL, KINDERGARTEN, OFFICE BUILDING

Operating time: Monday-Friday, 07:00-18:00h
Reference airflow rate: 10.000 m³/h



ANNUAL ENERGY CONSUMPTION BY ENERGY CLASS AND LOCATION

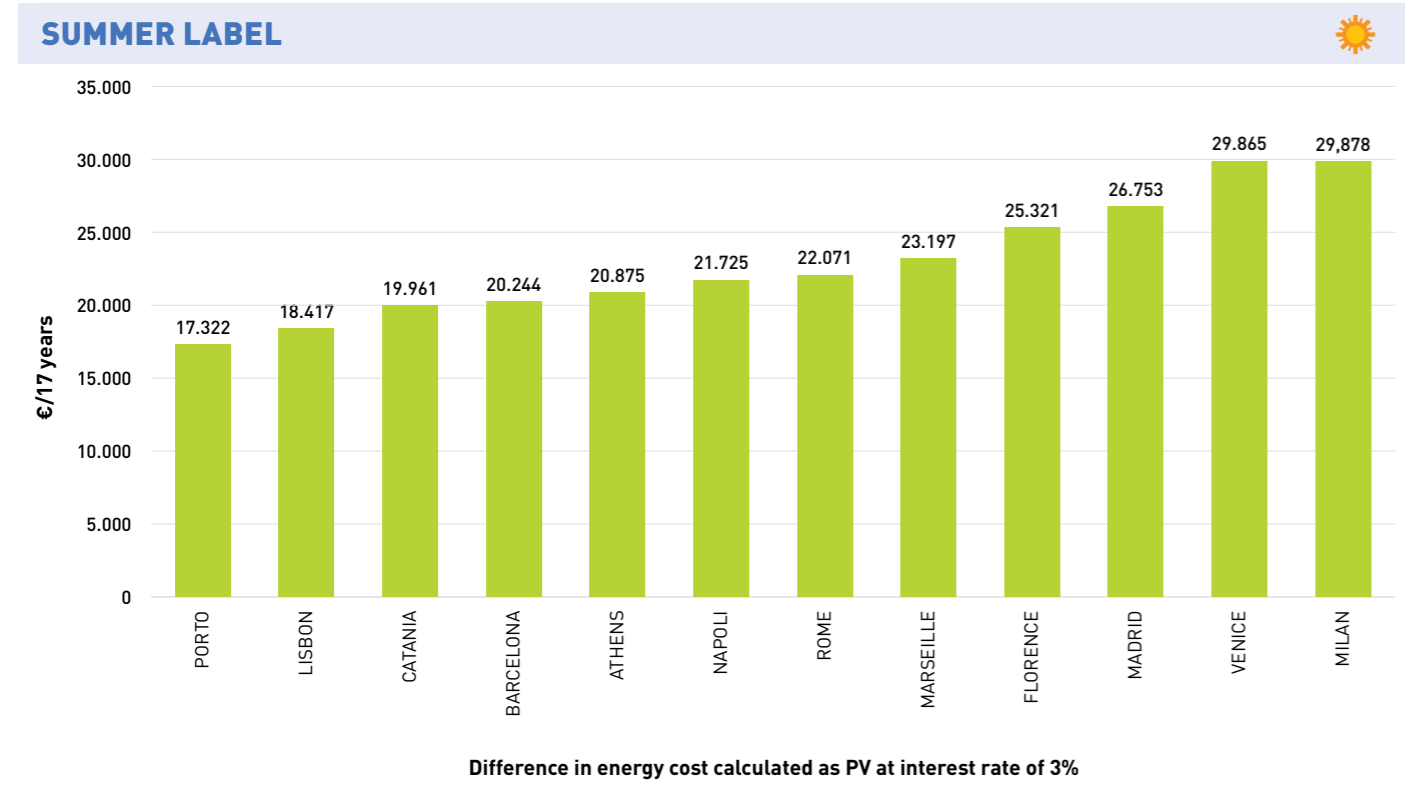
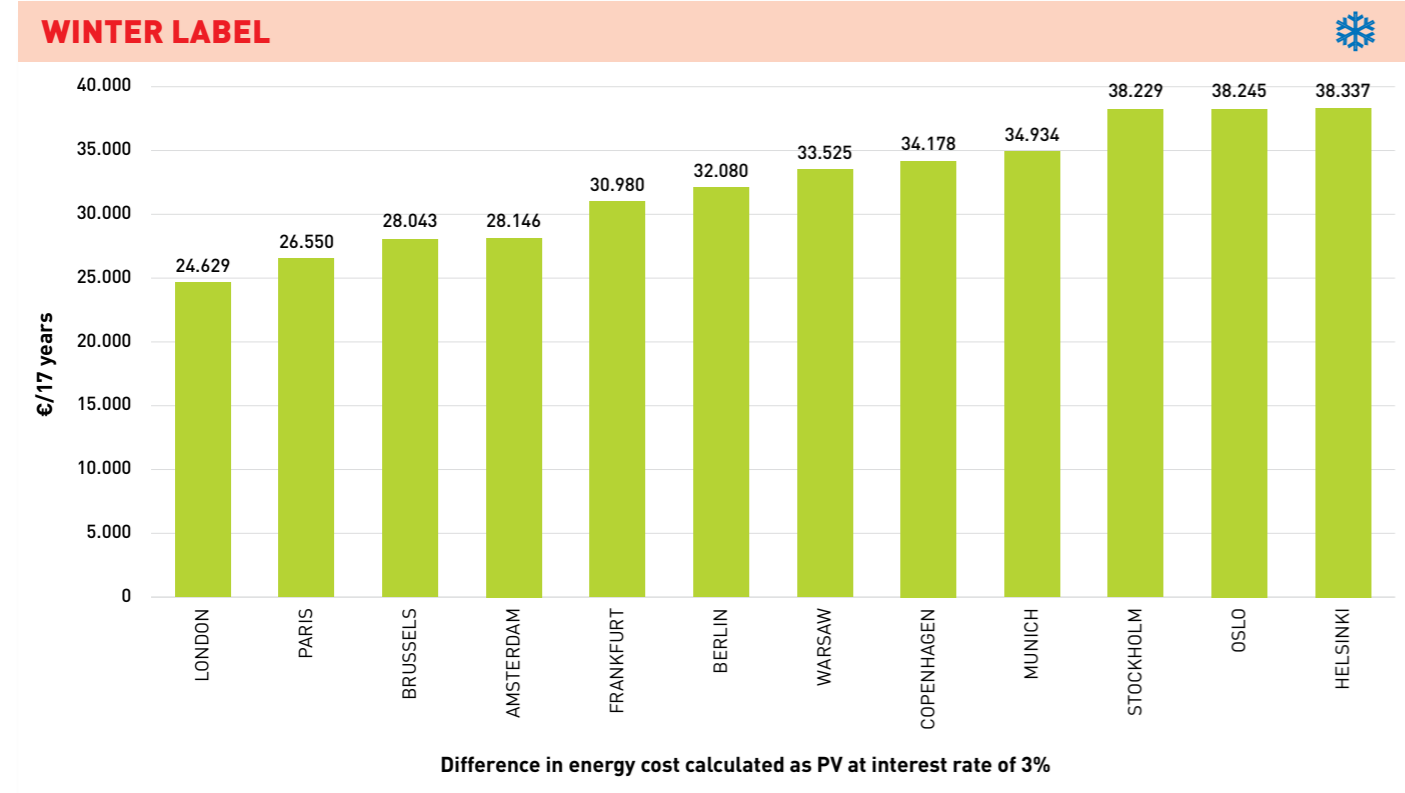


APPLICATION GROUP 1

SCHOOL, KINDERGARTEN, OFFICE BUILDING

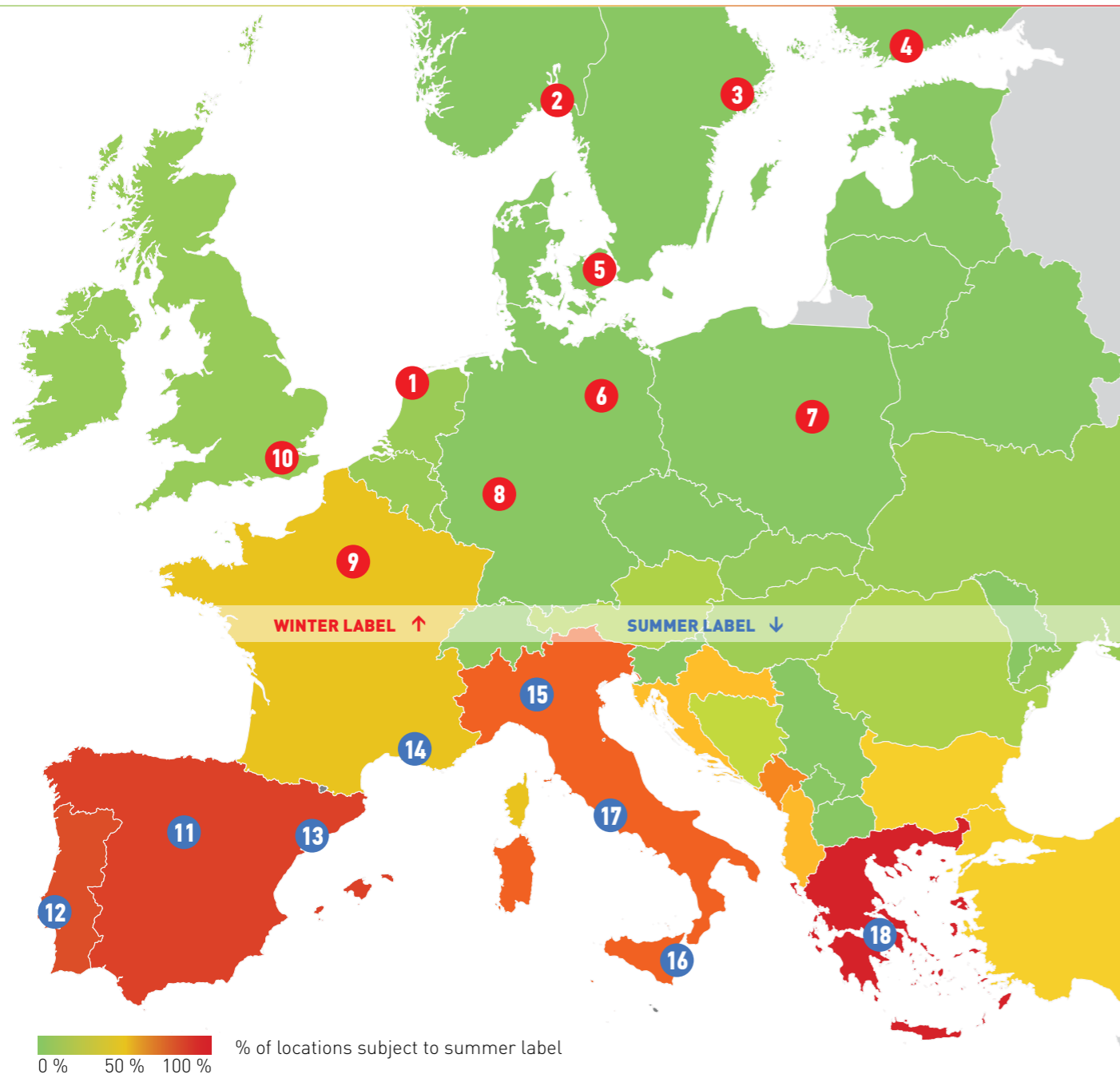
Operating time: Monday-Friday, 07:00-18:00h
Reference airflow rate: 10.000 m³/h

THE DIFFERENCE IN ENERGY COSTS BETWEEN A+ AND C ENERGY CLASS OVER THE AHU LIFETIME OF 17 YEARS

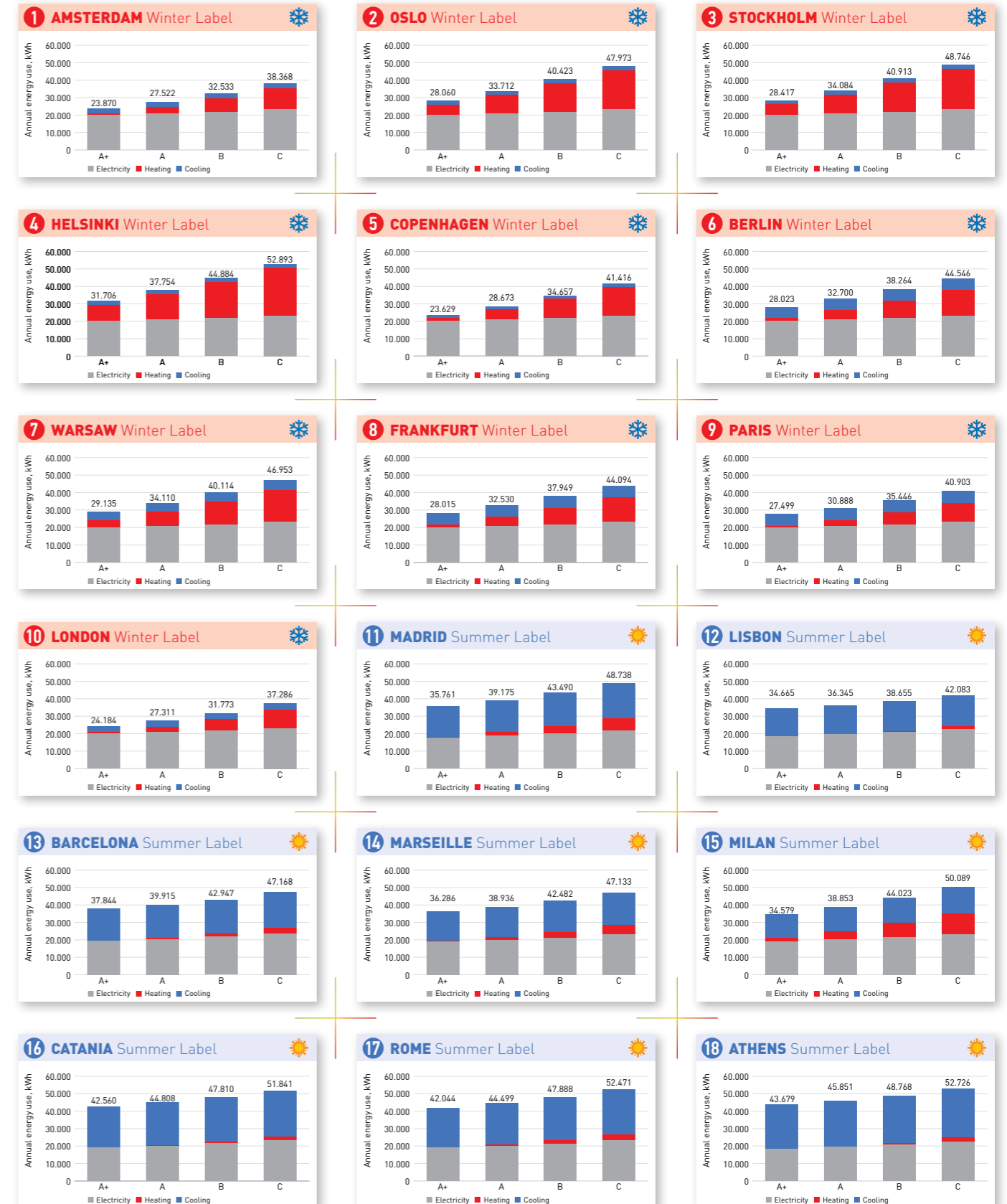


APPLICATION GROUP 2 RESTAURANT, EATING PLACE

Operating time: Monday-Sunday, 06:00-24:00h
Reference airflow rate: 5.000 m³/h



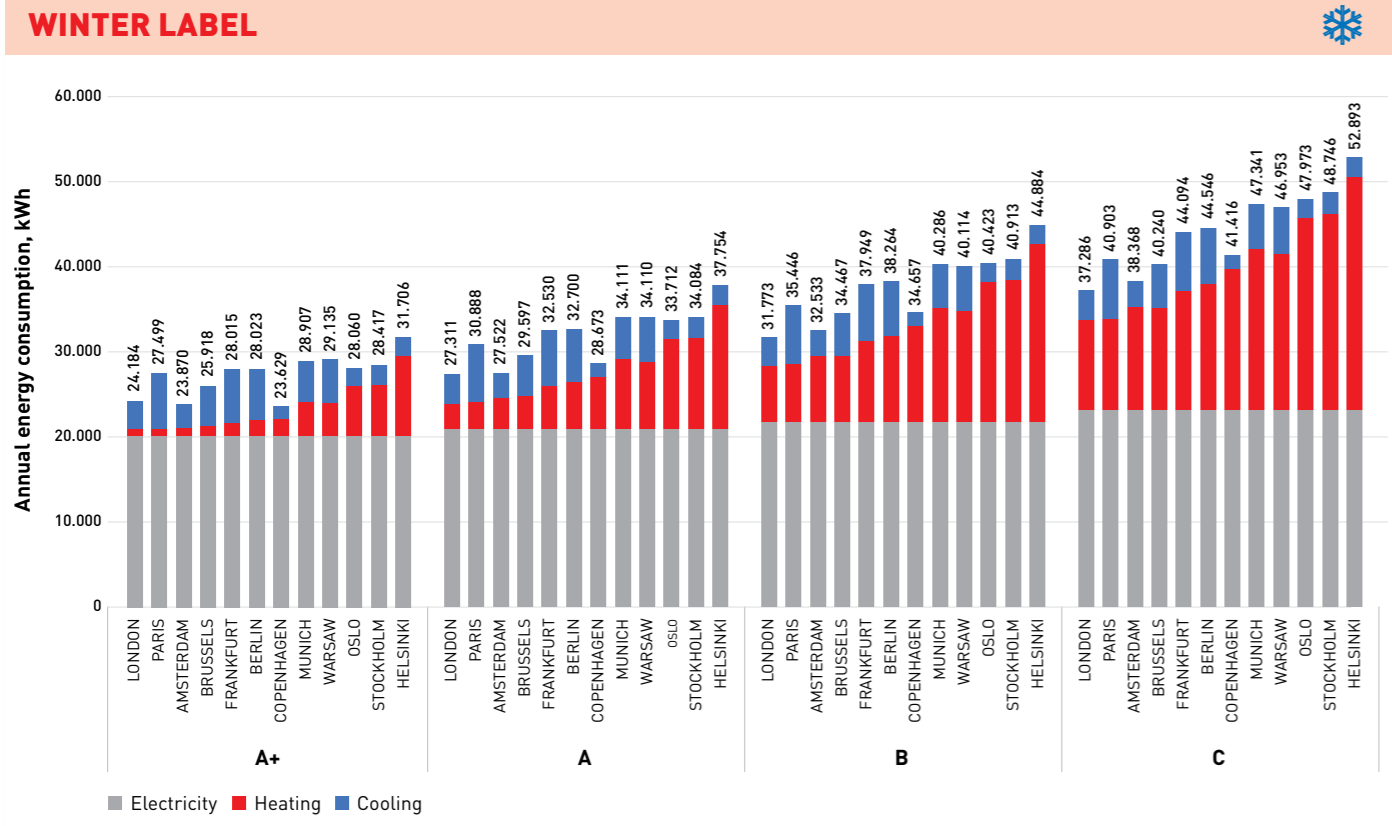
ANNUAL ENERGY CONSUMPTION BY ENERGY CLASS AND LOCATION



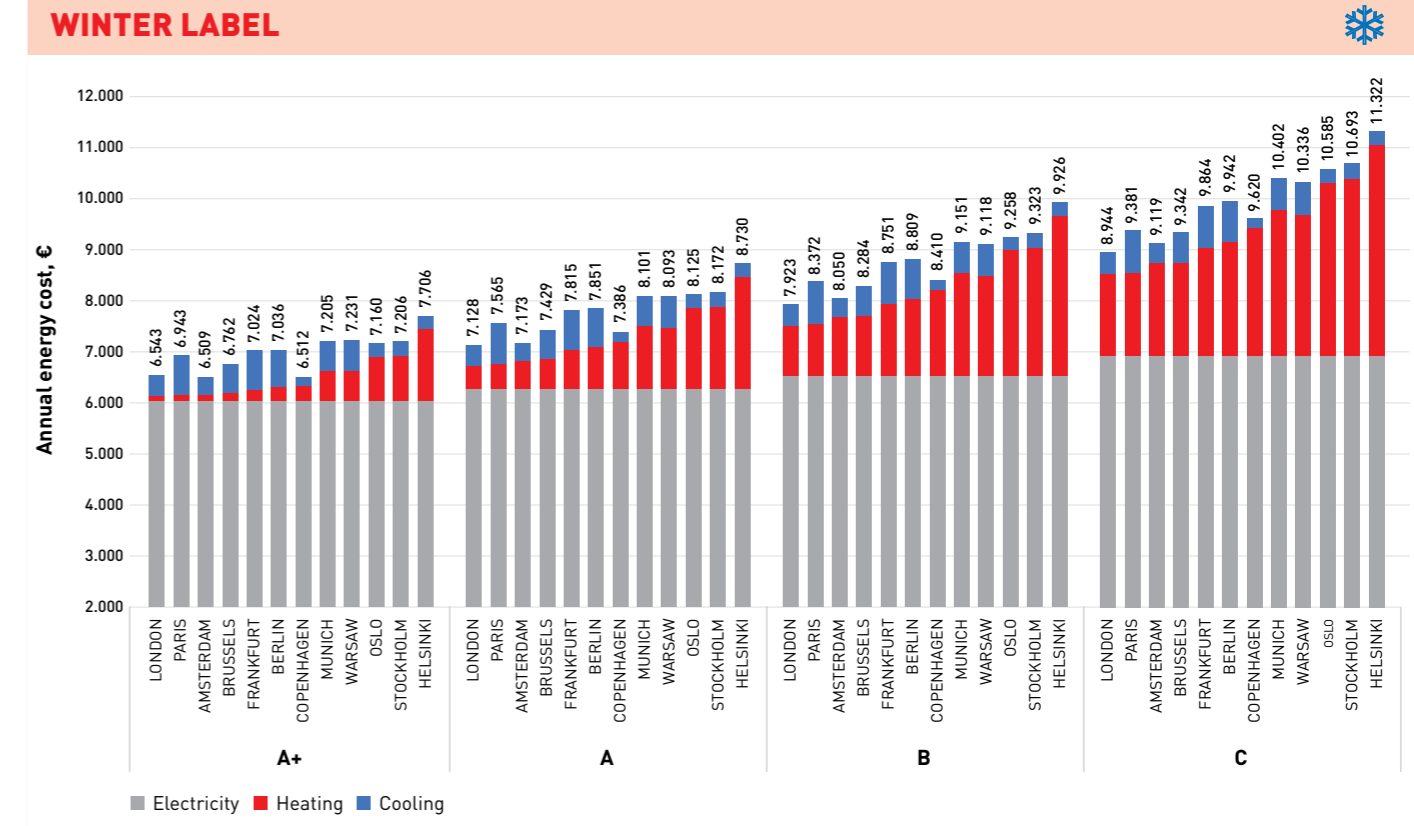
APPLICATION GROUP 2 RESTAURANT, EATING PLACE

Operating time: Monday-Sunday, 06:00-24:00h
Reference airflow rate: 5.000 m³/h

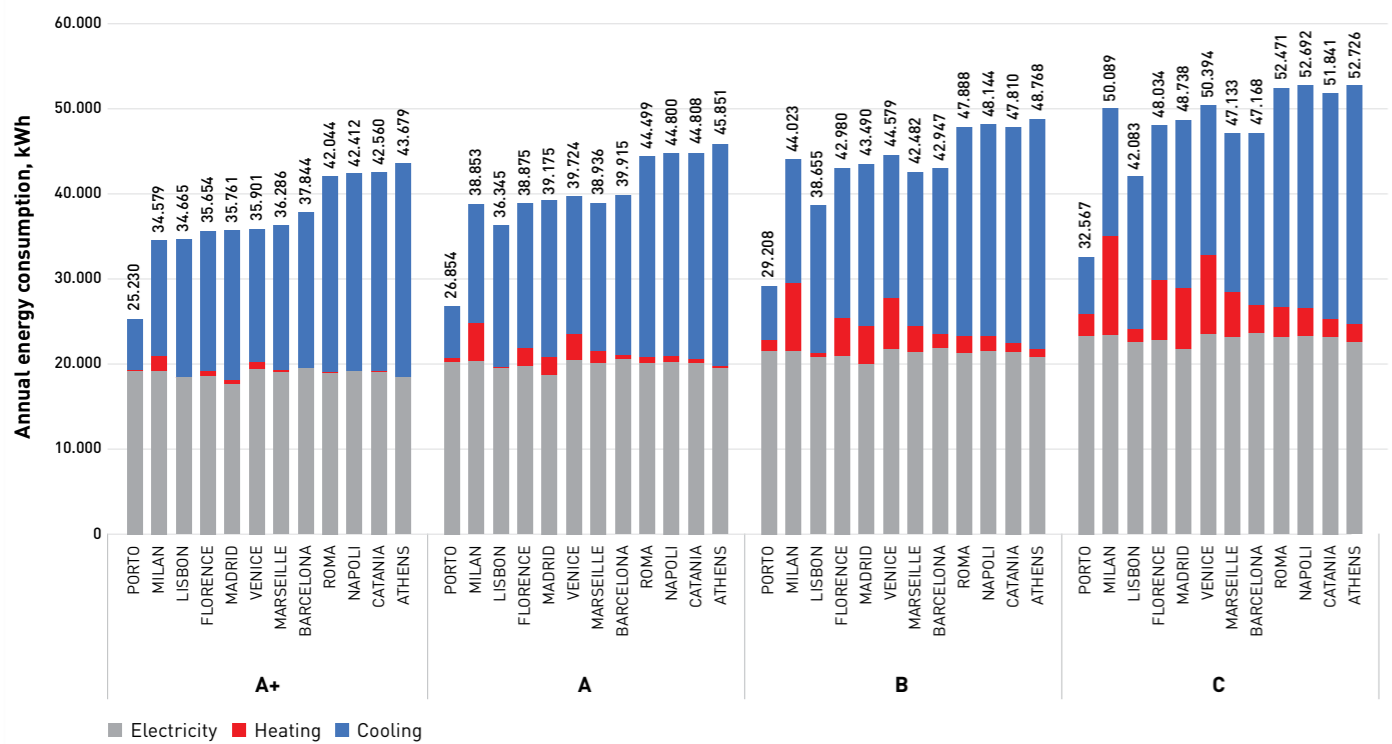
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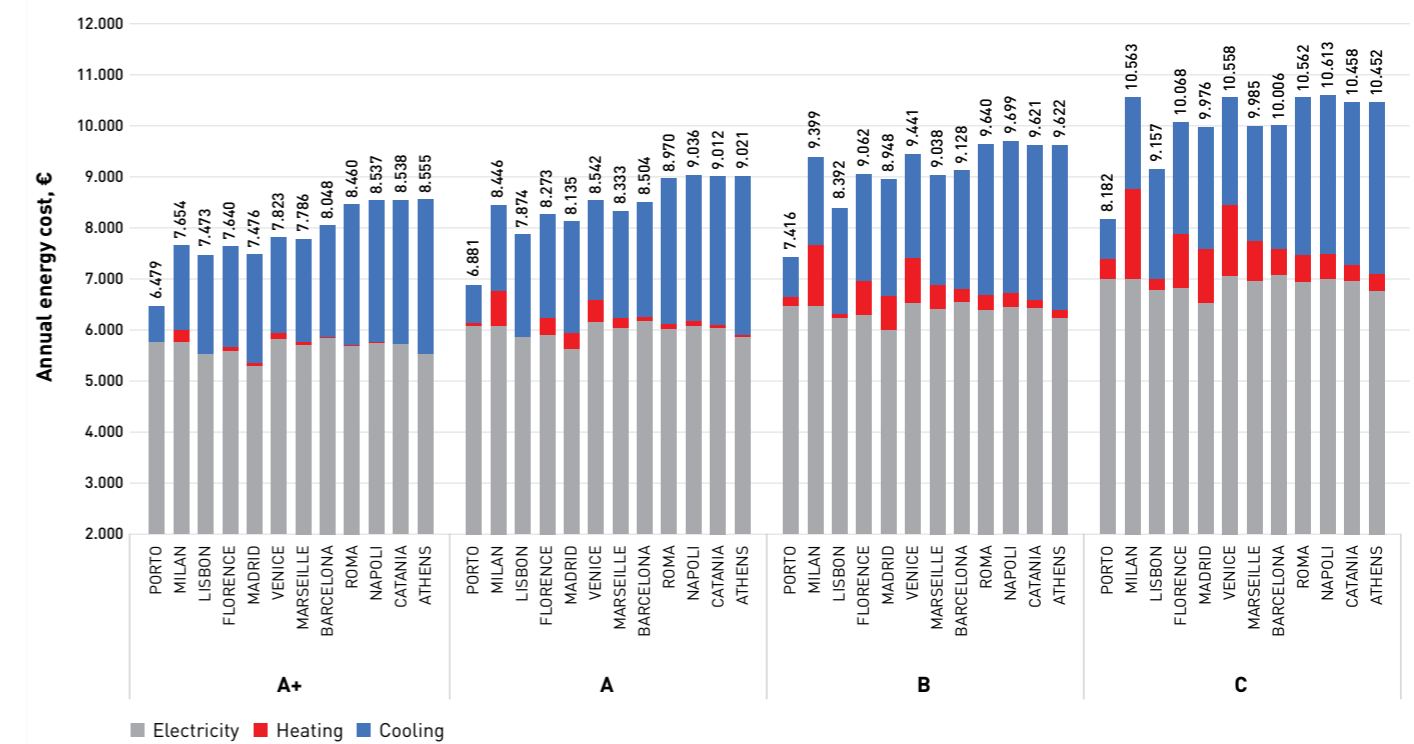
ANNUAL ENERGY COST BY ENERGY CLASS AND LOCATION



SUMMER LABEL



SUMMER LABEL

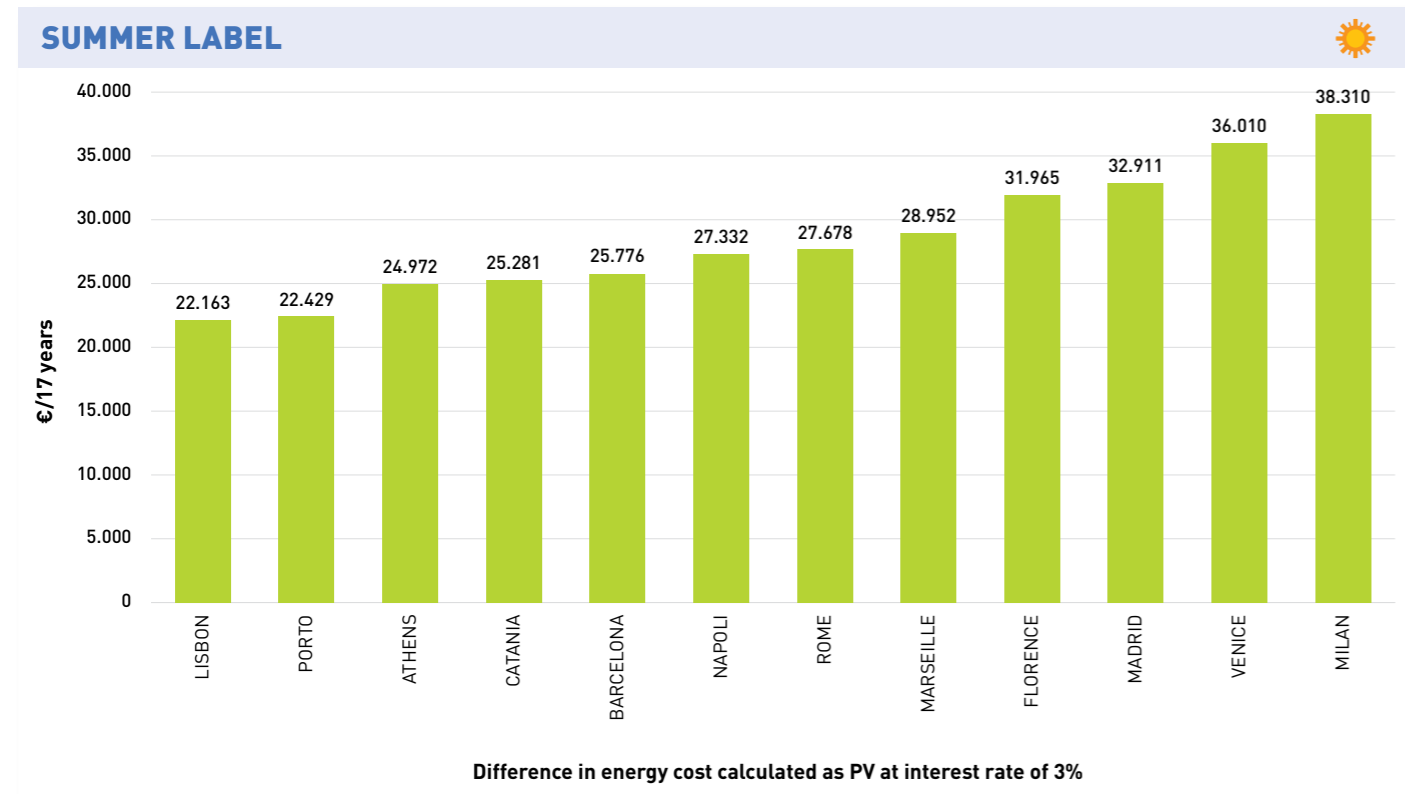
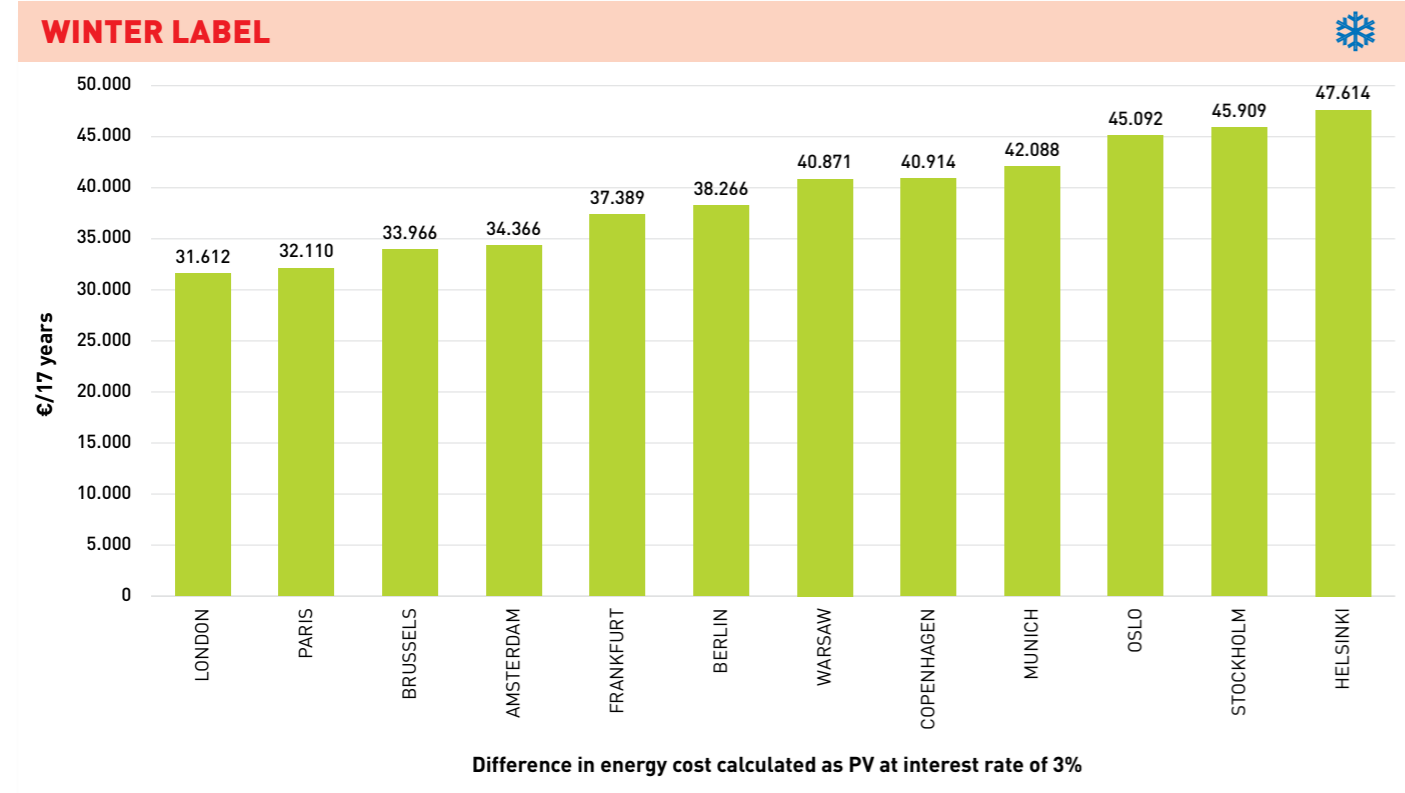


APPLICATION GROUP 2

RESTAURANT, EATING PLACE

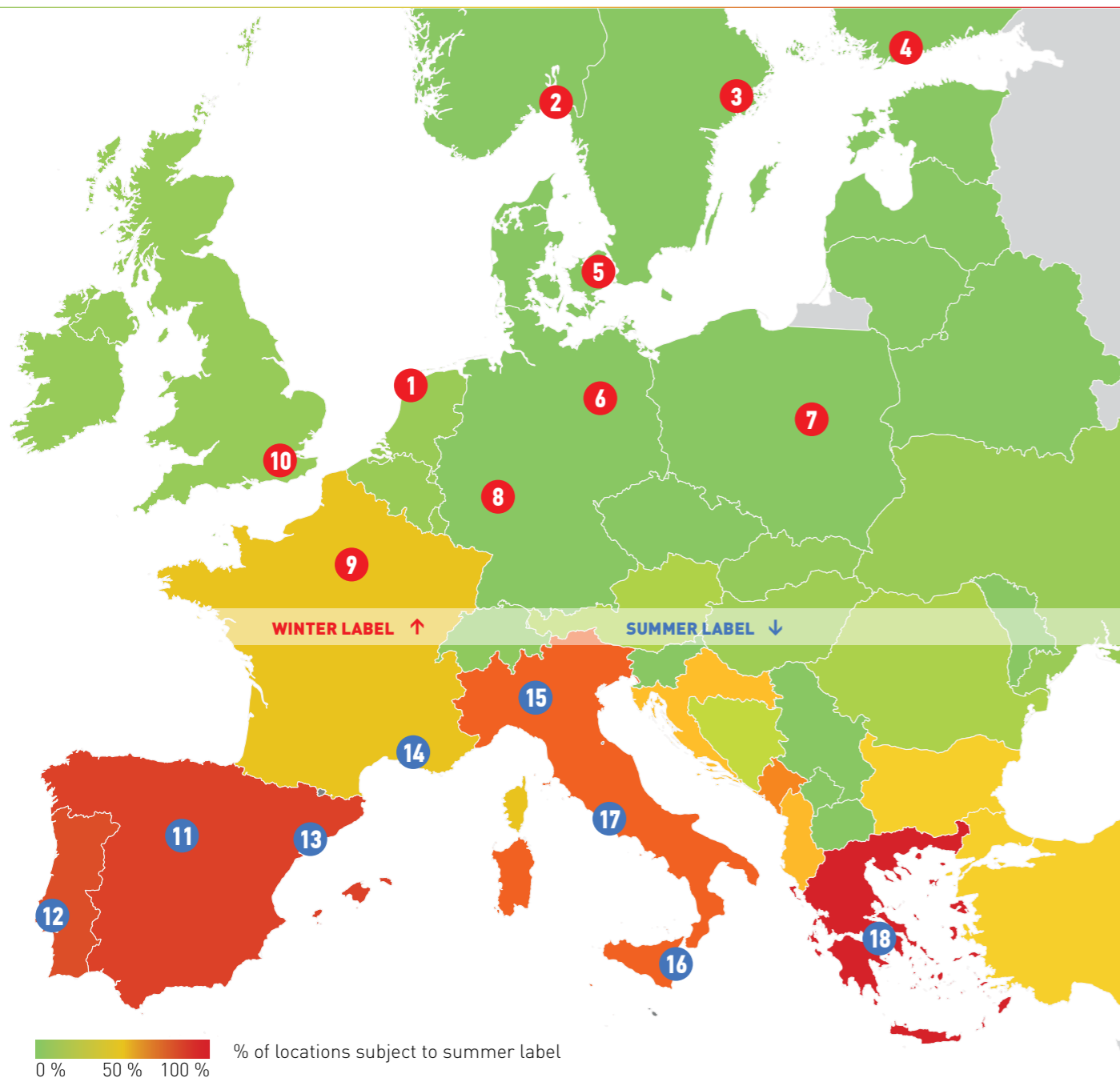
Operating time: Monday-Sunday, 06:00-24:00h
Reference airflow rate: 5.000 m³/h

THE DIFFERENCE IN ENERGY COSTS BETWEEN A+ AND C ENERGY CLASS OVER THE AHU LIFETIME OF 17 YEARS

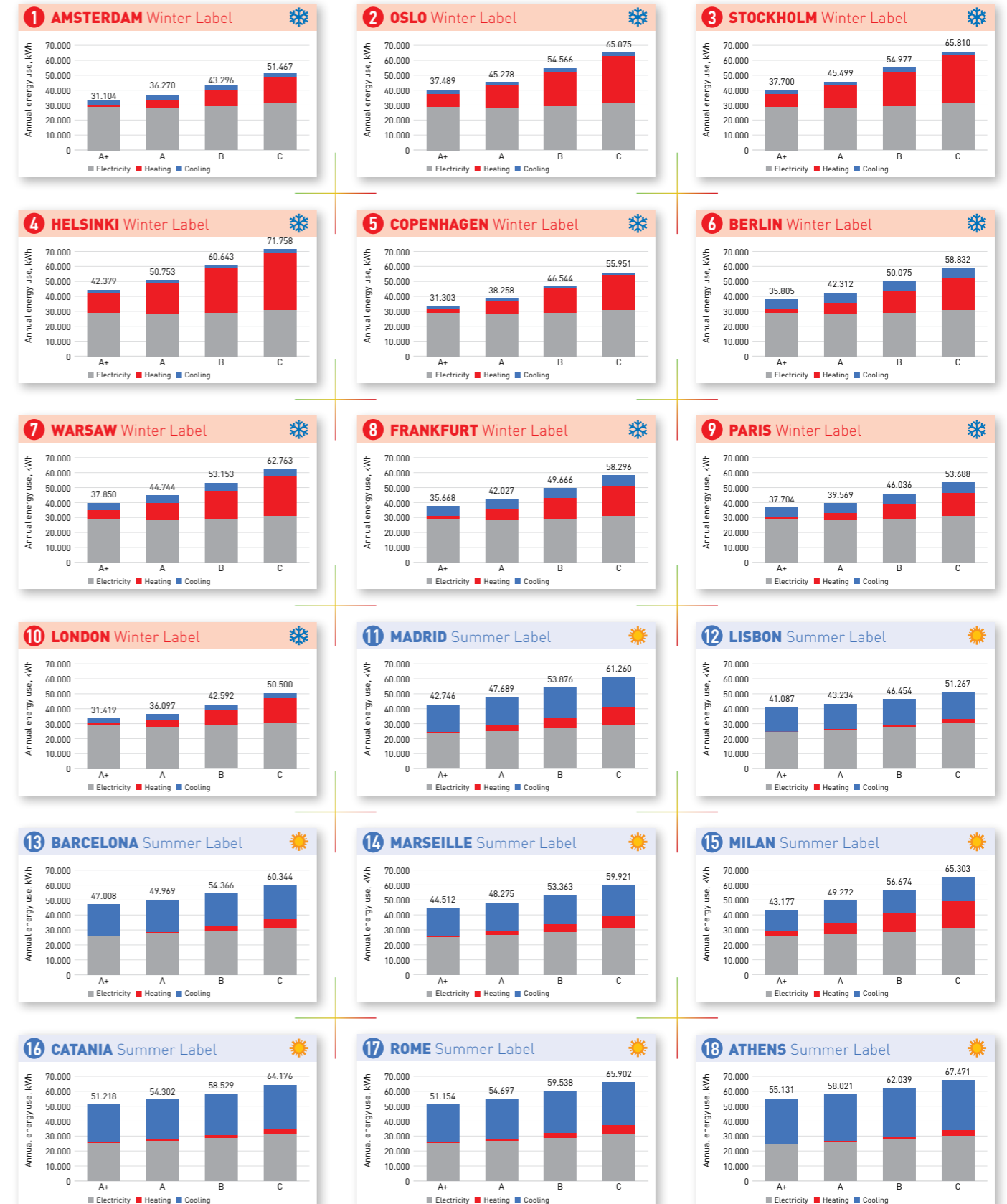


APPLICATION GROUP 3 MULTIFAMILY RESIDENTIAL BUILDING

Operating time: 24/7
Reference airflow rate: 5.000 m³/h



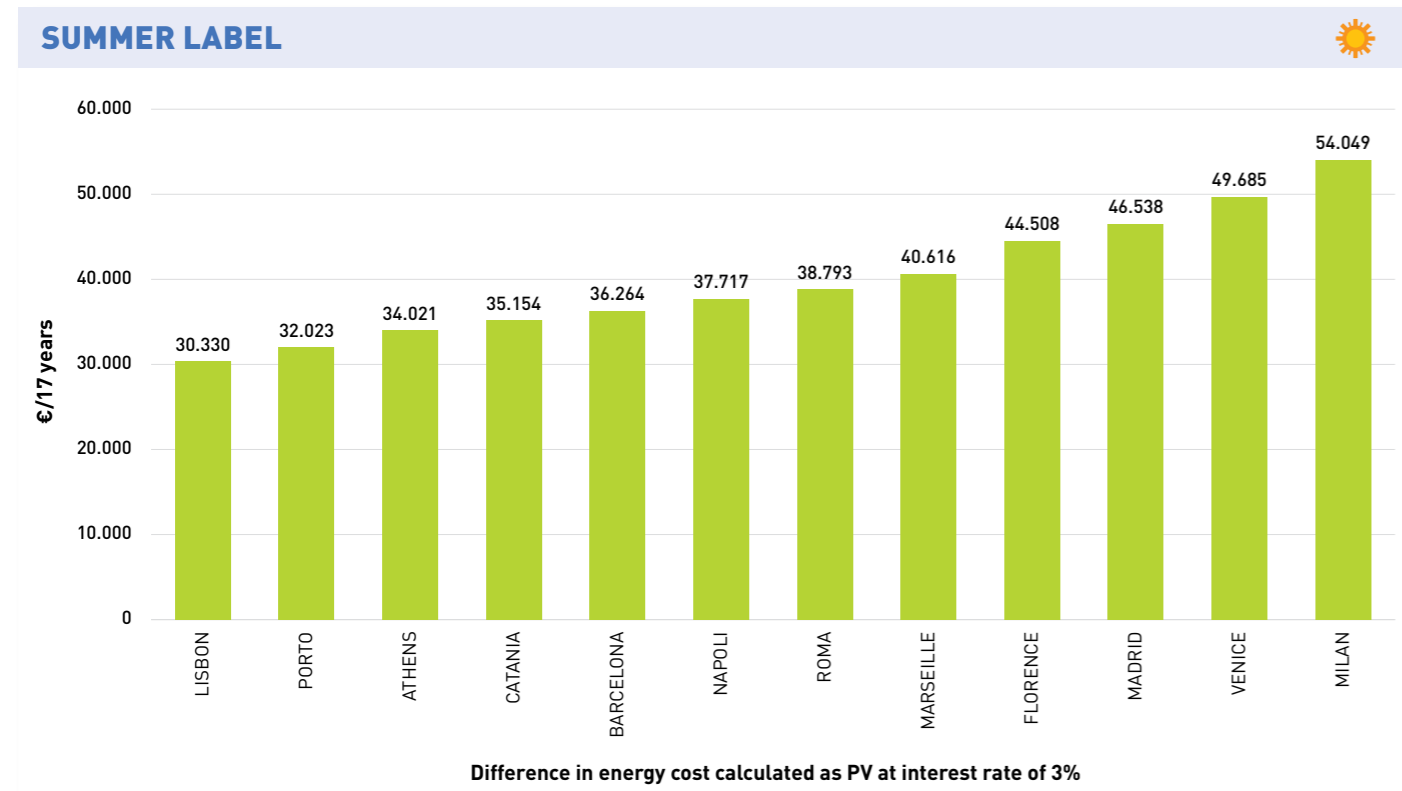
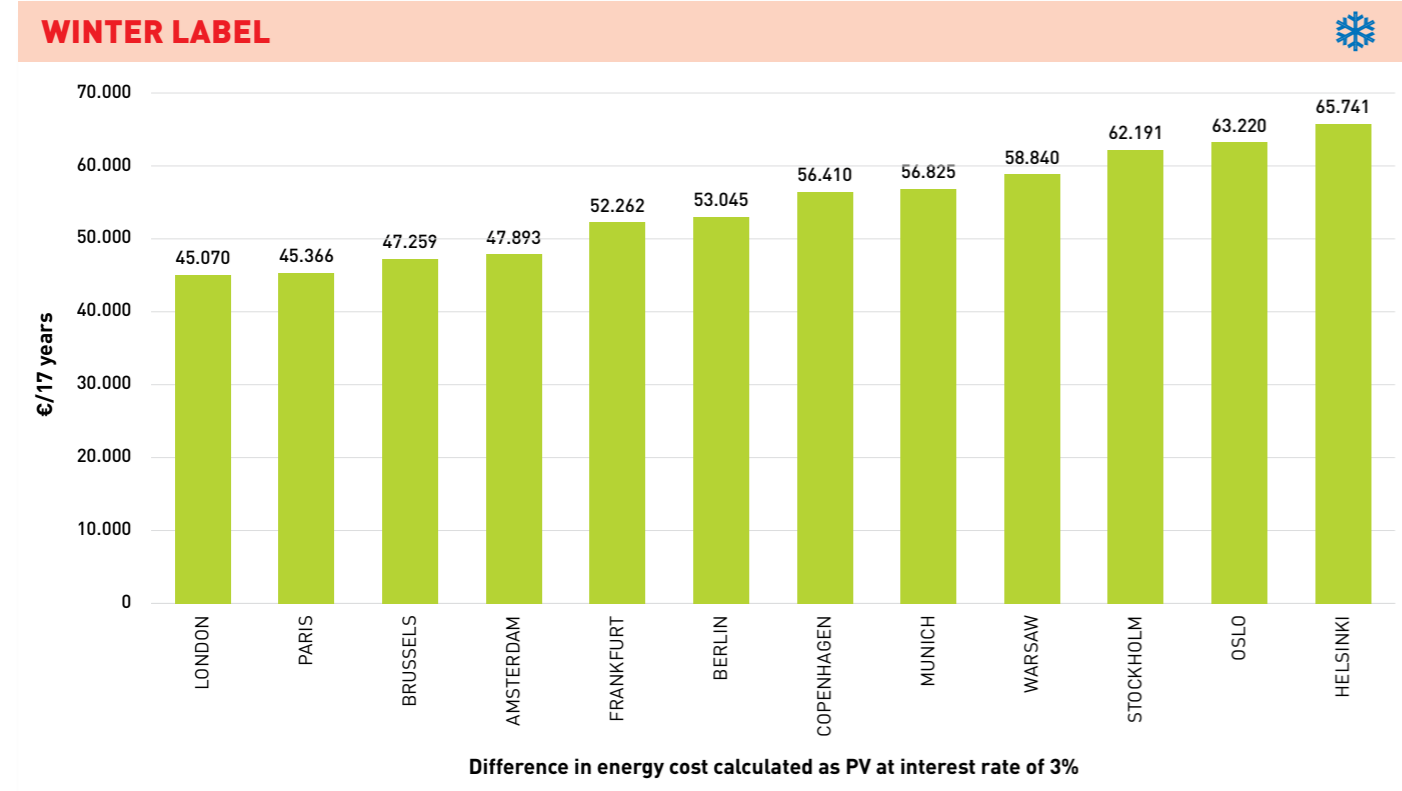
ANNUAL ENERGY CONSUMPTION BY ENERGY CLASS AND LOCATION



APPLICATION GROUP 3 MULTIFAMILY RESIDENTIAL BUILDING

Operating time: 24/7
Reference airflow rate: 5.000 m³/h

THE DIFFERENCE IN ENERGY COSTS BETWEEN A+ AND C ENERGY CLASS OVER THE AHU LIFETIME OF 17 YEARS



THE CASE STUDY EXPLAINED IN DETAIL

GENERAL ASSUMPTIONS FOR CALCULATIONS

The systems considered in the case study are intended for ventilation, to supply the required volume of outdoor air to the building. They do not serve for space heating or cooling, which means that the supply air temperature, assumed as equal to 20°C, is neutral and close to the indoor temperature all year round. Heating and cooling of the building are provided by other systems such as radiators fan coil units or VRF units. Furthermore, systems are assumed to be balanced, i.e. supply and exhaust airflows are equal and constant. Only the supply air temperature is controlled, while the supply air humidity is the resultant.

With regards to the extract air temperature (t_{ETA}), it is assumed that it is higher by 2 degrees than the supply temperature in winter and transitional period (up to an outdoor temperature of 20°C). With outdoor

temperatures higher than 20°C, the extract air temperature proportionally rises to 25°C and maintains this value at an outdoor temperature of 25°C or higher. During the summer cooling season, the indoor humidity is assumed to be maintained by an additional and ventilation-independent local space cooling system at a level of 10 g/kg, which corresponds to an exhaust air relative humidity in the range of 60% (at $t_{ETA} = 22^\circ\text{C}$) to 50% (at $t_{ETA} = 25^\circ\text{C}$).

The energy consumption for the class is calculated on the assumption that the AHU parameters exactly match the reference values for the class, as shown in Table 1 (for the winter label) and Table 2 for the summer label, and the corresponding input power of fans is calculated according to the methodology given in the Certification Manual. Energy recovery is temperature-controlled.

CLASS	All Units	Units for full or partial outdoor air at design winter temperature $\leq 9^\circ\text{C}$		Fan Efficiency Grade NG _{ref-class} [-]
	Velocity v_{class} [m/s]	Heat recovery system η_{class} [%]	Δp_{class} [Pa]	
A+ / A+C / A+↑	1.4	83	250	64
A / AC / A ↑	1.6	78	230	62
B / BC / B ↑	1.8	73	210	60
C / CC / C ↑	2.0	68	190	57
D / DC / D ↑	2.2	63	170	52
E / EC / E ↑	No calculation required			No requirement

Table 1. Reference values for winter class

CLASS	All Units	Units for full or partial outdoor air at design summer: winter dry bulb temperature $\geq -3^\circ\text{C}$ AND dry bulb temperature $\geq 30^\circ\text{C}$ OR winter dry bulb temperature $\geq -3^\circ\text{C}$ AND dew-point temperature $\geq 17^\circ\text{C}$ OR dry bulb temperature $\geq 30^\circ\text{C}$ AND dew-point temperature $\geq 17^\circ\text{C}$				Fan Efficiency Grade NG _{ref-class} [-]
	Velocity	Heat recovery system				
	v_{class} [m/s]	$\eta_{class-T}$ [%]	$\Delta p_{class-T}$ [Pa]	$\eta_{class-H}$ [%]	$\Delta p_{class-H}$ [Pa]	
A+	1.4	83	167	81	222	64
A	1.6	78	160	73	213	62
B	1.8	73	155	65	207	60
C	2.0	68	151	58	202	57
D	2.2	63	147	50	197	52
E	No calculation required				No requirement	

Table 2. Reference values for summer label

Depending on the location, the winter or summer label is selected according to the methodology rules as a reference for energy calculations. For locations subject to the winter label, only sensible heat recovery is considered in energy calculations, while for locations subject to the summer label, both sensible and latent heat recovery are considered.

OPERATION TIME SCENARIO

The operating times for each application group are based on Annex C to the European standard for the design of ventilation systems: EN 16798-1:2019.

Group 1

School, kindergarten, office building

Operating time: Monday-Friday, 07:00-20:00h

Giving 11 hours per weekday, 2.860 hours per year

Group 2

Restaurant, eating place

Operating time: Monday-Sunday, 06:00-24:00h

Giving 18 hours per day, 6.570 hours per year

Group 3

Multifamily residential building

Operating time: 24/7

Giving 24 hours per day, 8.760 hours per year

DESIGN CONDITIONS FOR AIR

The supply and extract air parameters for all application groups are taken in relation to the design indoor values according to EN 16798-1:2019, as follows:

Extract air design conditions:

Winter: 22°C

Summer: 25°C / 50% r.H.
(for outdoor temperature > 25°C)

Supply conditions:

All year: 20°C

CONFIGURATIONS AND TECHNICAL PARAMETERS OF AHUS

Supply:

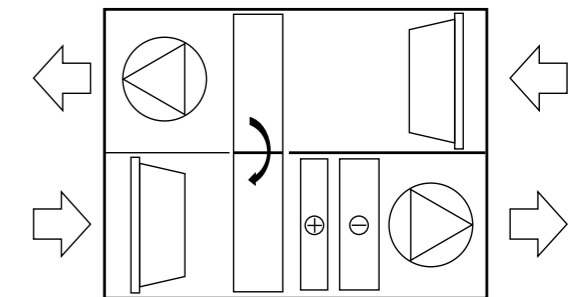
- Filter ePM1 50%
- Heat recovery system
 - Rotary heat exchanger for application Group 1 and Group 2
 - Plate heat exchanger for application Group 3
- Fan
- Heating coil
- Cooling coil

Exhaust:

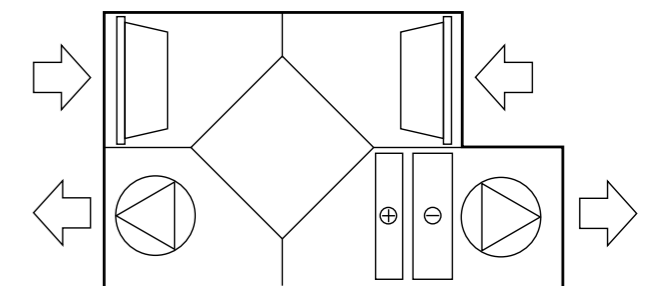
- Filter ePM10 50%
- Rotary exchanger or plate for the residential application
- Fan

External static pressure (ESP):

- Supply air side: 300 Pa
- Exhaust air side: 250 Pa



Group 1 and Group 2



Group 3

THE CASE STUDY EXPLAINED IN DETAIL

SUPPLY AND EXHAUST AIRFLOW RATE

Group 1

School, kindergarten, office building

Airflow rate of 10.000 m³/h [2,78 m³/s] for supply and exhaust air, which corresponds to an AHU operating a school for around 350 students or an office building for around 280 employees

Group 2

Restaurant, eating place

Airflow rate of 5.000 m³/h [1,39 m³/s] for supply and exhaust air, which corresponds to an AHU operating a restaurant for around 140 diners with a dining area of around 240 m²

Group 3

Multifamily residential building

Airflow rate of 5.000 m³/h [1,39 m³/s] for supply and exhaust air, which corresponds to an AHU operating an apartment building including around 80 dwellings for around 200 residents

ENERGY PRICES

For the annual energy cost calculations, the following EU average energy rates were taken:

Electricity:	0,30 EUR/kWh
Heating energy:	0,15 EUR/kWh
Cooling energy:	0,12 EUR/kWh (SEER = 2,5)

ENERGY CALCULATIONS

Annual consumption of electric energy to drive the fans and thermal energy for heating and cooling the supply air was calculated based on the comprehensive methodology set out in the [Eurovent Recommendation 6/19-1: Life Cycle Cost calculation for AHU - Part 1. Energy consumption](#)



Savings in energy costs over the AHU lifetime between class A+ and C

This figure is calculated as the Present Value (PV) of the sum of the difference in annual energy costs for class C (EC_C) and class A+ (EC_{A+}), over the assumed typical AHU lifetime period (n) of 17 years and a discount (return) rate (r) of 3%.

$$PV = (EC_C - EC_{A+}) \cdot ((1+r)^n - 1) / (r \cdot (1+r)^n)$$



ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 1

SCHOOL, KINDERGARTEN, OFFICE BUILDING

Operating time: Monday-Friday, 07:00-18:00h
Reference airflow rate: 10.000 m³/h

WINTER LABEL



AMSTERDAM		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	667	3.012	6.395	10.045
Cooling energy (cooling coil)	kWh/a	3.627	3.718	3.815	3.937
Annual energy cost. total (w/o MR)	€/a	5.549	6.096	6.815	7.687
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	100	452	959	1.507
Cooling cost	€/a	435	446	458	472
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		7.201	16.668	28.146
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	1.998	2.194	2.453	2.767

BERLIN		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	1.517	4.757	8.654	12.733
Cooling energy (cooling coil)	kWh/a	6.129	6.280	6.438	6.630
Annual energy cost. total (w/o MR)	€/a	5.976	6.665	7.468	8.413
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	228	714	1.298	1.910
Cooling cost	€/a	735	754	773	796
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		9.064	19.644	32.080
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.152	2.399	2.689	3.029

BRUSSELS		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	982	3.325	6.594	10.227
Cooling energy (cooling coil)	kWh/a	5.538	5.660	5.789	5.948
Annual energy cost. total (w/o MR)	€/a	5.825	6.376	7.082	7.955
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	147	499	989	1.534
Cooling cost	€/a	665	679	695	714
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		7.245	16.539	28.043
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.097	2.295	2.549	2.864

WINTER LABEL



COPENHAGEN		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	1.606	5.267	9.565	14.163
Cooling energy (cooling coil)	kWh/a	2.031	2.073	2.120	2.184
Annual energy cost. total (w/o MR)	€/a	5.498	6.237	7.087	8.094
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	241	790	1.435	2.124
Cooling cost	€/a	244	249	254	262
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		9.724	20.920	34.178
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	1.979	2.245	2.551	2.914

FRANKFURT		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	1.186	4.212	7.921	11.827
Cooling energy (cooling coil)	kWh/a	6.997	7.154	7.318	7.521
Annual energy cost. total (w/o MR)	€/a	6.031	6.688	7.464	8.384
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	178	632	1.188	1.774
Cooling cost	€/a	840	858	878	902
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		8.649	18.867	30.980
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.171	2.408	2.687	3.018

HELSINKI		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	8.960	13.134	18.146	23.604
Cooling energy (cooling coil)	kWh/a	2.668	2.718	2.772	2.844
Annual energy cost. total (w/o MR)	€/a	6.678	7.494	8.452	9.589
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	1.344	1.970	2.722	3.541
Cooling cost	€/a	320	326	333	341
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		10.749	23.366	38.337
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.404	2.698	3.043	3.452

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 1

SCHOOL, KINDERGARTEN, OFFICE BUILDING

Operating time: Monday-Friday, 07:00-18:00h
Reference airflow rate: 10.000 m³/h

WINTER LABEL



LONDON		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	613	2.297	5.013	8.248
Cooling energy (cooling coil)	kWh/a	3.783	3.858	3.938	4.044
Annual energy cost. total (w/o MR)	€/a	5.559	6.005	6.622	7.430
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	92	345	752	1.237
Cooling cost	€/a	454	463	473	485
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		5.872	13.994	24.629
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.001	2.162	2.384	2.675

MUNICH		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	2.901	6.505	10.904	15.590
Cooling energy (cooling coil)	kWh/a	6.186	6.326	6.473	6.653
Annual energy cost. total (w/o MR)	€/a	6.191	6.933	7.810	8.844
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	435	976	1.636	2.338
Cooling cost	€/a	742	759	777	798
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		9.765	21.317	34.934
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.229	2.496	2.812	3.184

OSLO		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	4.774	8.994	14.031	19.368
Cooling energy (cooling coil)	kWh/a	2.446	2.497	2.552	2.626
Annual energy cost. total (w/o MR)	€/a	6.023	6.846	7.809	8.928
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	716	1.349	2.105	2.905
Cooling cost	€/a	293	300	306	315
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		10.841	23.509	38.245
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.168	2.465	2.811	3.214

WINTER LABEL



PARIS		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	662	2.763	5.753	9.094
Cooling energy (cooling coil)	kWh/a	6.730	6.863	7.016	7.211
Annual energy cost. total (w/o MR)	€/a	5.920	6.436	7.103	7.937
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	99	414	863	1.364
Cooling cost	€/a	808	824	842	865
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		6.786	15.566	26.550
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.131	2.317	2.557	2.857

STOCKHOLM		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	4.794	8.934	13.932	19.370
Cooling energy (cooling coil)	kWh/a	2.576	2.630	2.689	2.768
Annual energy cost. total (w/o MR)	€/a	6.042	6.853	7.810	8.945
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	719	1.340	2.090	2.906
Cooling cost	€/a	309	316	323	332
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		10.687	23.285	38.229
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.175	2.467	2.812	3.220

WARSAW		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.711	17.326	17.992	19.025
Heating energy (heating coil)	kWh/a	3.174	6.550	10.713	15.147
Cooling energy (cooling coil)	kWh/a	6.898	7.029	7.179	7.367
Annual energy cost. total (w/o MR)	€/a	6.317	7.024	7.866	8.864
Electricity cost	€/a	5.013	5.198	5.398	5.707
Heating cost	€/a	476	982	1.607	2.272
Cooling cost	€/a	828	843	861	884
Energy cost savings compared to class A+ after 17 years 3%					
Only heat (sensible) recovery	€		9.301	20.394	33.525
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	2.274	2.529	2.832	3.191

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 1

SCHOOL, KINDERGARTEN, OFFICE BUILDING

Operating time: Monday-Friday, 07:00-18:00h
Reference airflow rate: 10.000 m³/h

SUMMER LABEL



ATHENS		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.267	16.148	17.165	18.601
Heating energy (heating coil)	kWh/a	11	202	747	1.649
Cooling energy (cooling coil) with moisture rec.	kWh/a	24.482	25.359	26.274	27.311
Annual energy cost, total (w/ MR)	€/a	7.520	7.918	8.414	9.105
Electricity cost	€/a	4.580	4.844	5.150	5.580
Heating cost	€/a	2	30	112	247
Cooling cost (with moisture recovery)	€/a	2.938	3.043	3.153	3.277
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		5.243	11.783	20.875
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.707	2.850	3.029	3.278

BARCELONA		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.152	17.013	18.021	19.461
Heating energy (heating coil)	kWh/a	51	406	1.163	2.241
Cooling energy (cooling coil) with moisture rec.	kWh/a	17.872	18.331	18.908	19.675
Annual energy cost, total (w/ MR)	€/a	6.998	7.365	7.850	8.535
Electricity cost	€/a	4.846	5.104	5.406	5.838
Heating cost	€/a	8	61	174	336
Cooling cost (with moisture recovery)	€/a	2.145	2.200	2.269	2.361
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		4.829	11.215	20.244
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.519	2.651	2.826	3.073

CATANIA		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.799	16.680	17.689	19.124
Heating energy (heating coil)	kWh/a	20	174	541	1.117
Cooling energy (cooling coil) with moisture rec.	kWh/a	23.091	23.952	24.914	26.041
Annual energy cost, total (w/ MR)	€/a	7.514	7.904	8.377	9.030
Electricity cost	€/a	4.740	5.004	5.307	5.737
Heating cost	€/a	3	26	81	168
Cooling cost (with moisture recovery)	€/a	2.771	2.874	2.990	3.125
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		5.142	11.372	19.961
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.705	2.846	3.016	3.251

SUMMER LABEL



FLORENCE		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.414	16.294	17.313	18.753
Heating energy (heating coil)	kWh/a	414	1.515	3.181	5.138
Cooling energy (cooling coil) with moisture rec.	kWh/a	17.469	18.006	18.579	19.241
Annual energy cost, total (w/ MR)	€/a	6.782	7.276	7.900	8.706
Electricity cost	€/a	4.624	4.888	5.194	5.626
Heating cost	€/a	62	227	477	771
Cooling cost (with moisture recovery)	€/a	2.096	2.161	2.229	2.309
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		6.500	14.718	25.321
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.442	2.619	2.844	3.134

LISBON		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.265	16.147	17.164	18.600
Heating energy (heating coil)	kWh/a	1	72	407	1.025
Cooling energy (cooling coil) with moisture rec.	kWh/a	19.208	19.815	20.478	21.249
Annual energy cost, total (w/ MR)	€/a	6.885	7.233	7.668	8.284
Electricity cost	€/a	4.580	4.844	5.149	5.580
Heating cost	€/a	0	11	61	154
Cooling cost (with moisture recovery)	€/a	2.305	2.378	2.457	2.550
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		4.581	10.307	18.417
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.479	2.604	2.760	2.982

MADRID		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	14.597	15.500	16.513	17.916
Heating energy (heating coil)	kWh/a	438	1.705	3.567	5.709
Cooling energy (cooling coil) with moisture rec.	kWh/a	16.209	16.861	17.513	18.256
Annual energy cost, total (w/ MR)	€/a	6.390	6.929	7.590	8.422
Electricity cost	€/a	4.379	4.650	4.954	5.375
Heating cost	€/a	66	256	535	856
Cooling cost (with moisture recovery)	€/a	1.945	2.023	2.102	2.191
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		7.099	15.806	26.753
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.300	2.494	2.733	3.032

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 1

SCHOOL, KINDERGARTEN, OFFICE BUILDING

Operating time: Monday-Friday, 07:00-18:00h
Reference airflow rate: 10.000 m³/h

SUMMER LABEL



MARSEILLE		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.765	16.645	17.669	19.103
Heating energy (heating coil)	kWh/a	245	1.049	2.336	3.967
Cooling energy (cooling coil) with moisture rec.	kWh/a	17.449	17.945	18.486	19.134
Annual energy cost, total (w/ MR)	€/a	6.860	7.304	7.869	8.622
Electricity cost	€/a	4.730	4.993	5.301	5.731
Heating cost	€/a	37	157	350	595
Cooling cost (with moisture recovery)	€/a	2.094	2.153	2.218	2.296
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		5.844	13.285	23.197
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.470	2.629	2.833	3.104

MILAN		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.915	16.782	17.810	19.234
Heating energy (heating coil)	kWh/a	983	2.980	5.591	8.408
Cooling energy (cooling coil) with moisture rec.	kWh/a	15.010	15.396	15.815	16.342
Annual energy cost, total (w/ MR)	€/a	6.723	7.329	8.079	8.992
Electricity cost	€/a	4.774	5.035	5.343	5.770
Heating cost	€/a	148	447	839	1.261
Cooling cost (with moisture recovery)	€/a	1.801	1.848	1.898	1.961
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		7.977	17.855	29.878
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.420	2.638	2.909	3.237

NAPOLI		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.873	16.754	17.765	19.204
Heating energy (heating coil)	kWh/a	55	435	1.227	2.306
Cooling energy (cooling coil) with moisture rec.	kWh/a	22.313	23.005	23.855	24.922
Annual energy cost, total (w/ MR)	€/a	7.448	7.852	8.376	9.098
Electricity cost	€/a	4.762	5.026	5.330	5.761
Heating cost	€/a	8	65	184	346
Cooling cost (with moisture recovery)	€/a	2.678	2.761	2.863	2.991
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		5.324	12.224	21.725
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.681	2.827	3.015	3.275

SUMMER LABEL



PORTO		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.905	16.773	17.784	19.224
Heating energy (heating coil)	kWh/a	36	257	774	1.584
Cooling energy (cooling coil) with moisture rec.	kWh/a	7.274	7.479	7.701	8.006
Annual energy cost, total (w/ MR)	€/a	5.650	5.968	6.376	6.966
Electricity cost	€/a	4.772	5.032	5.335	5.767
Heating cost	€/a	5	39	116	238
Cooling cost (with moisture recovery)	€/a	873	897	924	961
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		4.184	9.553	17.322
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.034	2.148	2.295	2.508

ROME		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	15.704	16.597	17.604	19.054
Heating energy (heating coil)	kWh/a	82	521	1.394	2.523
Cooling energy (cooling coil) with moisture rec.	kWh/a	21.877	22.526	23.324	24.421
Annual energy cost, total (w/ MR)	€/a	7.349	7.760	8.289	9.025
Electricity cost	€/a	4.711	4.979	5.281	5.716
Heating cost	€/a	12	78	209	378
Cooling cost (with moisture recovery)	€/a	2.625	2.703	2.799	2.930
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		5.420	12.385	22.071
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.646	2.794	2.984	3.249

VENICE		10.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	16.090	16.964	17.968	19.404
Heating energy (heating coil)	kWh/a	641	2.505	5.019	7.761
Cooling energy (cooling coil) with moisture rec.	kWh/a	15.018	15.493	16.053	16.737
Annual energy cost, total (w/ MR)	€/a	6.725	7.324	8.070	8.994
Electricity cost	€/a	4.827	5.089	5.390	5.821
Heating cost	€/a	96	376	753	1.164
Cooling cost (with moisture recovery)	€/a	1.802	1.859	1.926	2.008
Energy cost savings compared to class A+ after 17 years 3%					
Heat and moisture recovery	€		7.882	17.699	29.865
Annual energy cost per 1 m ³ /s	€/m ³ /s	2.421	2.637	2.905	3.238

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 2

RESTAURANT, EATING PLACE

Operating time: Monday–Sunday, 06:00–24:00h
Reference airflow rate: 5.000 m³/h

WINTER LABEL



AMSTERDAM		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	855	3.641	7.720	12.133
Cooling energy (cooling coil)	kWh/a	2.911	2.989	3.067	3.174
Annual energy cost. total (w/o MR)	€/a	6.509	7.173	8.050	9.119
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	128	546	1.158	1.820
Cooling cost	€/a	349	359	368	381
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		8.738	20.291	34.366
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	4.686	5.164	5.796	6.566

BERLIN		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	1.808	5.540	10.092	14.858
Cooling energy (cooling coil)	kWh/a	6.111	6.268	6.425	6.628
Annual energy cost. total (w/o MR)	€/a	7.036	7.851	8.809	9.942
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	271	831	1.514	2.229
Cooling cost	€/a	733	752	771	795
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		10.732	23.345	38.266
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.066	5.653	6.342	7.158

BRUSSELS		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	1.103	3.875	7.772	12.072
Cooling energy (cooling coil)	kWh/a	4.711	4.829	4.949	5.108
Annual energy cost. total (w/o MR)	€/a	6.762	7.429	8.284	9.342
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	165	581	1.166	1.811
Cooling cost	€/a	565	580	594	613
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		8.775	20.034	33.966
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	4.869	5.349	5.964	6.726

WINTER LABEL



COPENHAGEN		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	1.929	6.146	11.236	16.624
Cooling energy (cooling coil)	kWh/a	1.595	1.635	1.674	1.731
Annual energy cost. total (w/o MR)	€/a	6.512	7.386	8.410	9.620
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	289	922	1.685	2.494
Cooling cost	€/a	191	196	201	208
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		11.504	24.992	40.914
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	4.689	5.318	6.055	6.926

FRANKFURT		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	1.459	5.030	9.439	14.064
Cooling energy (cooling coil)	kWh/a	6.452	6.607	6.763	6.969
Annual energy cost. total (w/o MR)	€/a	7.024	7.815	8.751	9.864
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	219	755	1.416	2.110
Cooling cost	€/a	774	793	812	836
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		10.412	22.739	37.389
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.058	5.627	6.301	7.102

HELSINKI		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	9.404	14.614	20.841	27.466
Cooling energy (cooling coil)	kWh/a	2.198	2.247	2.296	2.366
Annual energy cost. total (w/o MR)	€/a	7.706	8.730	9.926	11.322
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	1.411	2.192	3.126	4.120
Cooling cost	€/a	264	270	276	284
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		13.482	29.230	47.614
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.548	6.285	7.146	8.152

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 2

RESTAURANT, EATING PLACE

Operating time: Monday–Sunday, 06:00–24:00h

Reference airflow rate: 5.000 m³/h

WINTER LABEL



LONDON		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	733	2.996	6.528	10.621
Cooling energy (cooling coil)	kWh/a	3.346	3.422	3.498	3.605
Annual energy cost. total (w/o MR)	€/a	6.543	7.128	7.923	8.944
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	110	449	979	1.593
Cooling cost	€/a	402	411	420	433
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		7.702	18.171	31.612
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	4.711	5.132	5.705	6.440

MUNICH		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	3.918	8.216	13.417	19.002
Cooling energy (cooling coil)	kWh/a	4.885	5.003	5.122	5.279
Annual energy cost. total (w/o MR)	€/a	7.205	8.101	9.151	10.402
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	588	1.232	2.013	2.850
Cooling cost	€/a	586	600	615	633
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		11.788	25.622	42.088
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.188	5.832	6.589	7.489

OSLO		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	5.811	10.621	16.423	22.580
Cooling energy (cooling coil)	kWh/a	2.145	2.199	2.253	2.332
Annual energy cost. total (w/o MR)	€/a	7.160	8.125	9.258	10.585
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	872	1.593	2.463	3.387
Cooling cost	€/a	257	264	270	280
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		12.698	27.616	45.092
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.155	5.850	6.666	7.621

WINTER LABEL



PARIS		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	800	3.250	6.803	10.739
Cooling energy (cooling coil)	kWh/a	6.595	6.745	6.897	7.102
Annual energy cost. total (w/o MR)	€/a	6.943	7.565	8.372	9.381
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	120	488	1.020	1.611
Cooling cost	€/a	791	809	828	852
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		8.192	18.821	32.110
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	4.999	5.447	6.028	6.755

STOCKHOLM		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	5.901	10.724	16.641	23.078
Cooling energy (cooling coil)	kWh/a	2.411	2.468	2.525	2.607
Annual energy cost. total (w/o MR)	€/a	7.260	8.172	9.323	10.693
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	885	1.609	2.496	3.462
Cooling cost	€/a	289	296	303	313
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		12.727	27.877	45.909
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.188	5.884	6.713	7.699

WARSAW		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	20.104	20.893	21.747	23.061
Heating energy (heating coil)	kWh/a	3.886	7.955	12.986	18.349
Cooling energy (cooling coil)	kWh/a	5.145	5.263	5.382	5.543
Annual energy cost. total (w/o MR)	€/a	7.231	8.093	9.118	10.336
Electricity cost	€/a	6.031	6.268	6.524	6.918
Heating cost	€/a	583	1.193	1.948	2.752
Cooling cost	€/a	617	632	646	665
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		11.336	24.834	40.871
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	5.207	5.827	6.565	7.442

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 2

RESTAURANT, EATING PLACE

Operating time: Monday–Sunday, 06:00–24:00h
Reference airflow rate: 5.000 m³/h

SUMMER LABEL



ATHENS		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	18.409	19.503	20.775	22.555
Heating energy (heating coil)	kWh/a	11	264	1.007	2.172
Cooling energy (cooling coil) with moisture rec.	kWh/a	25.258	26.083	26.985	27.999
Annual energy cost, total (w/ MR)	€/a	8.555	9.021	9.622	10.452
Electricity cost	€/a	5.523	5.851	6.232	6.767
Heating cost	€/a	2	40	151	326
Cooling cost (with moisture recovery)	€/a	3.031	3.130	3.238	3.360
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		6.125	14.040	24.972
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.160	6.495	6.928	7.526

BARCELONA		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.470	20.540	21.791	23.588
Heating energy (heating coil)	kWh/a	63	573	1.721	3.320
Cooling energy (cooling coil) with moisture rec.	kWh/a	18.310	18.801	19.436	20.260
Annual energy cost, total (w/ MR)	€/a	8.048	8.504	9.128	10.006
Electricity cost	€/a	5.841	6.162	6.537	7.076
Heating cost	€/a	9	86	258	498
Cooling cost (with moisture recovery)	€/a	2.197	2.256	2.332	2.431
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		6.009	14.218	25.776
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.794	6.123	6.572	7.204

CATANIA		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.054	20.132	21.402	23.199
Heating energy (heating coil)	kWh/a	49	359	1.050	2.058
Cooling energy (cooling coil) with moisture rec.	kWh/a	23.457	24.316	25.357	26.584
Annual energy cost, total (w/ MR)	€/a	8.538	9.012	9.621	10.458
Electricity cost	€/a	5.716	6.040	6.421	6.960
Heating cost	€/a	7	54	158	309
Cooling cost (with moisture recovery)	€/a	2.815	2.918	3.043	3.190
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		6.231	14.255	25.281
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.148	6.488	6.927	7.530

SUMMER LABEL



FLORENCE		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	18.576	19.680	20.945	22.730
Heating energy (heating coil)	kWh/a	583	2.178	4.463	7.069
Cooling energy (cooling coil) with moisture rec.	kWh/a	16.495	17.018	17.572	18.234
Annual energy cost, total (w/ MR)	€/a	7.640	8.273	9.062	10.068
Electricity cost	€/a	5.573	5.904	6.284	6.819
Heating cost	€/a	87	327	669	1.060
Cooling cost (with moisture recovery)	€/a	1.979	2.042	2.109	2.188
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		8.333	18.721	31.965
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.501	5.956	6.524	7.249

LISBON		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	18.408	19.502	20.765	22.567
Heating energy (heating coil)	kWh/a	0	74	535	1.483
Cooling energy (cooling coil) with moisture rec.	kWh/a	16.257	16.768	17.355	18.033
Annual energy cost, total (w/ MR)	€/a	7.473	7.874	8.392	9.157
Electricity cost	€/a	5.522	5.851	6.320	6.770
Heating cost	€/a	0	11	80	222
Cooling cost (with moisture recovery)	€/a	1.951	2.012	2.083	2.164
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		5.275	12.102	22.163
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.381	5.669	6.043	6.593

MADRID		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	17.610	18.723	19.973	21.740
Heating energy (heating coil)	kWh/a	509	2.113	4.473	7.142
Cooling energy (cooling coil) with moisture rec.	kWh/a	17.642	18.338	19.045	19.856
Annual energy cost, total (w/ MR)	€/a	7.476	8.135	8.948	9.976
Electricity cost	€/a	5.283	5.617	5.992	6.522
Heating cost	€/a	76	317	671	1.071
Cooling cost (with moisture recovery)	€/a	2.117	2.201	2.285	2.383
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		8.665	19.377	32.911
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.383	5.857	6.443	7.183

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 2

RESTAURANT, EATING PLACE

Operating time: Monday–Sunday, 06:00–24:00h
Reference airflow rate: 5.000 m³/h

SUMMER LABEL



MARSEILLE		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.015	20.108	21.373	23.174
Heating energy (heating coil)	kWh/a	294	1.367	3.114	5.256
Cooling energy (cooling coil) with moisture rec.	kWh/a	16.977	17.461	17.995	18.703
Annual energy cost, total (w/ MR)	€/a	7.786	8.333	9.038	9.985
Electricity cost	€/a	5.705	6.032	6.412	6.952
Heating cost	€/a	44	205	467	788
Cooling cost (with moisture recovery)	€/a	2.037	2.095	2.159	2.244
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		7.200	16.491	28.952
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.606	6.000	6.508	7.189

MILAN		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.191	20.272	21.537	23.338
Heating energy (heating coil)	kWh/a	1.658	4.485	7.969	11.724
Cooling energy (cooling coil) with moisture rec.	kWh/a	13.730	14.096	14.517	15.028
Annual energy cost, total (w/ MR)	€/a	7.654	8.446	9.399	10.563
Electricity cost	€/a	5.757	6.081	6.461	7.001
Heating cost	€/a	249	673	1.195	1.759
Cooling cost (with moisture recovery)	€/a	1.648	1.692	1.742	1.803
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		10.431	22.976	38.310
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.511	6.081	6.767	7.606

NAPOLI		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.139	20.223	21.491	23.283
Heating energy (heating coil)	kWh/a	84	655	1.791	3.299
Cooling energy (cooling coil) with moisture rec.	kWh/a	23.188	23.923	24.862	26.109
Annual energy cost, total (w/ MR)	€/a	8.537	9.036	9.699	10.613
Electricity cost	€/a	5.742	6.067	6.447	6.985
Heating cost	€/a	13	98	269	495
Cooling cost (with moisture recovery)	€/a	2.783	2.871	2.983	3.133
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		6.566	15.304	27.332
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.147	6.506	6.984	7.641

SUMMER LABEL



PORTO		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.166	20.260	21.518	23.317
Heating energy (heating coil)	kWh/a	40	391	1.271	2.571
Cooling energy (cooling coil) with moisture rec.	kWh/a	6.025	6.202	6.418	6.679
Annual energy cost, total (w/ MR)	€/a	6.479	6.881	7.416	8.182
Electricity cost	€/a	5.750	6.078	6.455	6.995
Heating cost	€/a	6	59	191	386
Cooling cost (with moisture recovery)	€/a	723	744	770	802
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		5.300	12.346	22.429
Annual energy cost per 1 m ³ /s	€/m ³ /s	4.665	4.954	5.340	5.891

ROME		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	18.950	20.043	21.302	23.104
Heating energy (heating coil)	kWh/a	112	737	1.967	3.553
Cooling energy (cooling coil) with moisture rec.	kWh/a	22.981	23.720	24.619	25.814
Annual energy cost, total (w/ MR)	€/a	8.460	8.970	9.640	10.562
Electricity cost	€/a	5.685	6.013	6.391	6.931
Heating cost	€/a	17	110	295	533
Cooling cost (with moisture recovery)	€/a	2.758	2.846	2.954	3.098
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		6.715	15.541	27.678
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.091	6.458	6.941	7.605

VENICE		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	19.401	20.478	21.734	23.525
Heating energy (heating coil)	kWh/a	758	2.984	5.981	9.210
Cooling energy (cooling coil) with moisture rec.	kWh/a	15.743	16.262	16.864	17.659
Annual energy cost, total (w/ MR)	€/a	7.823	8.542	9.441	10.558
Electricity cost	€/a	5.820	6.143	6.520	7.058
Heating cost	€/a	114	448	897	1.381
Cooling cost (with moisture recovery)	€/a	1.889	1.951	2.024	2.119
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		9.471	21.302	36.010
Annual energy cost per 1 m ³ /s	€/m ³ /s	5.633	6.151	6.797	7.602

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 3

MULTIFAMILY RESIDENTIAL BUILDING

Operating time: 24/7
Reference airflow rate: 5.000 m³/h

WINTER LABEL



AMSTERDAM		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	1.335	5.370	11.177	17.487
Cooling energy (cooling coil)	kWh/a	2.964	3.043	3.123	3.232
Annual energy cost. total (w/o MR)	€/a	8.598	9.528	10.750	12.235
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	200	805	1.676	2.623
Cooling cost	€/a	356	365	375	388
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		12.246	28.339	47.893
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.190	6.860	7.740	8.809

BERLIN		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	28.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	2.677	7.968	14.427	21.217
Cooling energy (cooling coil)	kWh/a	6.323	6.488	6.653	6.867
Annual energy cost. total (w/o MR)	€/a	9.202	10.331	11.661	13.231
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	402	1.195	2.164	3.183
Cooling cost	€/a	759	779	798	824
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		14.861	32.376	53.045
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.625	7.438	8.396	9.526

BRUSSELS		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	1.677	5.683	11.249	17.397
Cooling energy (cooling coil)	kWh/a	4.759	4.880	5.002	5.166
Annual energy cost. total (w/o MR)	€/a	8.864	9.795	10.986	12.454
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	252	852	1.687	2.610
Cooling cost	€/a	571	586	600	620
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		12.255	27.983	47.259
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.382	7.052	7.910	8.967

WINTER LABEL



COPENHAGEN		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	2.898	8.762	15.870	23.467
Cooling energy (cooling coil)	kWh/a	1.599	1.639	1.679	1.737
Annual energy cost. total (w/o MR)	€/a	8.668	9.868	11.281	12.953
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	435	1.314	2.380	3.520
Cooling cost	€/a	192	197	201	208
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		15.797	34.394	56.410
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.241	7.105	8.122	9.326

FRANKFURT		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	2.317	7.465	13.805	20.470
Cooling energy (cooling coil)	kWh/a	6.546	6.705	6.865	7.079
Annual energy cost. total (w/o MR)	€/a	9.175	10.281	11.593	13.144
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	348	1.120	2.071	3.070
Cooling cost	€/a	785	805	824	849
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		14.571	31.843	52.262
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.606	7.403	8.347	9.464

HELSINKI		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	13.374	20.648	29.350	38.644
Cooling energy (cooling coil)	kWh/a	2.199	2.248	2.297	2.367
Annual energy cost. total (w/o MR)	€/a	10.312	11.724	13.377	15.305
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	2.006	3.097	4.403	5.797
Cooling cost	€/a	264	270	276	284
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		18.594	40.356	65.741
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	7.424	8.441	9.631	11.020

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 3

MULTIFAMILY RESIDENTIAL BUILDING

Operating time: 24/7
Reference airflow rate: 5.000 m³/h

WINTER LABEL



LONDON		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	1.267	4.818	10.098	16.147
Cooling energy (cooling coil)	kWh/a	3.346	3.422	3.498	3.605
Annual energy cost. total (w/o MR)	€/a	8.633	9.490	10.633	12.079
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	190	723	1.515	2.422
Cooling cost	€/a	402	411	420	433
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		11.285	26.330	45.366
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.216	6.833	7.656	8.697

MUNICH		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	28.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	6.168	12.317	19.764	27.758
Cooling energy (cooling coil)	kWh/a	4.924	5.044	5.165	5.324
Annual energy cost. total (w/o MR)	€/a	9.558	10.810	12.283	14.027
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	925	1.848	2.965	4.164
Cooling cost	€/a	591	605	620	639
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		16.487	35.882	58.840
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.882	7.783	8.844	10.099

OSLO		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	8.534	15.217	23.311	31.987
Cooling energy (cooling coil)	kWh/a	2.150	2.204	2.259	2.340
Annual energy cost. total (w/o MR)	€/a	9.580	10.904	12.466	14.303
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	1.280	2.283	3.497	4.798
Cooling cost	€/a	258	265	271	281
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		17.438	38.007	62.191
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.897	7.851	8.976	10.298

WINTER LABEL



PARIS		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	1.233	4.892	10.063	15.751
Cooling energy (cooling coil)	kWh/a	6.665	6.821	6.977	7.189
Annual energy cost. total (w/o MR)	€/a	9.026	9.909	11.045	12.450
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	185	734	1.510	2.363
Cooling cost	€/a	800	818	837	863
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		11.624	26.582	45.070
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.499	7.135	7.953	8.964

STOCKHOLM		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	8.480	15.170	23.452	32.449
Cooling energy (cooling coil)	kWh/a	2.415	2.472	2.530	2.613
Annual energy cost. total (w/o MR)	€/a	9.603	10.929	12.520	14.405
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	1.272	2.276	3.518	4.867
Cooling cost	€/a	290	297	304	314
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		17.456	38.400	63.220
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.914	7.869	9.014	10.372

WARSAW		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	26.806	27.857	28.996	30.748
Heating energy (heating coil)	kWh/a	5.875	11.579	18.747	26.439
Cooling energy (cooling coil)	kWh/a	5.169	5.290	5.411	5.576
Annual energy cost. total (w/o MR)	€/a	9.543	10.731	12.160	13.859
Electricity cost	€/a	8.042	8.357	8.699	9.224
Heating cost	€/a	881	1.740	2.812	3.966
Cooling cost	€/a	620	635	649	669
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Only heat (sensible) recovery	€		15.643	34.453	56.825
Annual energy cost per 1 m ³ /s (w/o MR)	€/m ³ /s	6.871	7.727	8.755	9.979

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 3

MULTIFAMILY RESIDENTIAL BUILDING

Operating time: 24/7
Reference airflow rate: 5.000 m³/h

SUMMER LABEL



ATHENS		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	24.546	26.005	27.700	30.073
Heating energy (heating coil)	kWh/a	28	512	1.779	3.634
Cooling energy (cooling coil) with moisture rec.	kWh/a	30.557	31.505	32.560	33.764
Annual energy cost, total (w/ MR)	€/a	11.035	11.659	12.484	13.619
Electricity cost	€/a	7.364	7.801	8.310	9.022
Heating cost	€/a	4	77	267	545
Cooling cost (with moisture recovery)	€/a	3.667	3.781	3.970	4.052
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		8.215	19.082	34.021
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.945	8.394	8.989	9.806

BARCELONA		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.960	27.387	29.055	31.451
Heating energy (heating coil)	kWh/a	131	1.085	3.060	5.660
Cooling energy (cooling coil) with moisture rec.	kWh/a	20.917	21.497	22.251	23.233
Annual energy cost, total (w/ MR)	€/a	10.318	10.958	11.846	13.072
Electricity cost	€/a	7.788	8.216	8.716	9.435
Heating cost	€/a	20	163	459	849
Cooling cost (with moisture recovery)	€/a	2.510	2.580	2.670	2.788
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		8.434	20.114	36.264
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.429	7.890	8.529	9.412

CATANIA		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.405	26.483	28.536	30.932
Heating energy (heating coil)	kWh/a	131	838	2.234	4.131
Cooling energy (cooling coil) with moisture rec.	kWh/a	25.683	26.621	27.760	29.113
Annual energy cost, total (w/ MR)	€/a	10.723	11.373	12.227	13.393
Electricity cost	€/a	7.621	8.053	8.561	9.280
Heating cost	€/a	20	126	335	620
Cooling cost (with moisture recovery)	€/a	3.082	3.194	3.331	3.494
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		8.560	19.803	35.154
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.720	8.189	8.803	9.643

SUMMER LABEL



FLORENCE		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	24.769	26.240	27.927	30.307
Heating energy (heating coil)	kWh/a	1.035	3.572	7.081	11.019
Cooling energy (cooling coil) with moisture rec.	kWh/a	17.113	17.663	18.250	18.957
Annual energy cost, total (w/ MR)	€/a	9.639	10.527	11.630	13.020
Electricity cost	€/a	7.431	7.872	8.378	9.092
Heating cost	€/a	155	536	1.062	1.653
Cooling cost (with moisture recovery)	€/a	2.054	2.120	2.190	2.275
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		11.690	26.212	44.508
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.940	7.580	8.374	9.374

LISBON		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	24.544	26.003	27.687	30.090
Heating energy (heating coil)	kWh/a	0	160	1.087	2.791
Cooling energy (cooling coil) with moisture rec.	kWh/a	16.543	17.071	17.680	18.387
Annual energy cost, total (w/ MR)	€/a	9.348	9.873	10.591	11.652
Electricity cost	€/a	7.363	7.801	8.306	9.027
Heating cost	€/a	0	24	163	419
Cooling cost (with moisture recovery)	€/a	1.985	2.049	2.122	2.206
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		6.914	16.358	30.330
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.731	7.109	7.625	8.389

MADRID		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	23.480	24.964	26.630	29.987
Heating energy (heating coil)	kWh/a	1.017	3.760	7.552	11.741
Cooling energy (cooling coil) with moisture rec.	kWh/a	18.249	18.966	19.693	20.532
Annual energy cost, total (w/ MR)	€/a	9.386	10.329	11.485	12.921
Electricity cost	€/a	7.044	7.489	7.989	8.696
Heating cost	€/a	153	564	1.133	1.761
Cooling cost (with moisture recovery)	€/a	2.190	2.276	2.363	2.464
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		12.411	27.632	46.538
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.758	7.437	8.269	9.303

ANNEX – DETAILED OUTCOMES

APPLICATION GROUP 3

MULTIFAMILY RESIDENTIAL BUILDING

Operating time: 24/7
Reference airflow rate: 5.000 m³/h

SUMMER LABEL



MARSEILLE		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.353	26.810	28.497	30.898
Heating energy (heating coil)	kWh/a	553	2.321	5.123	8.477
Cooling energy (cooling coil) with moisture rec.	kWh/a	18.605	19.143	19.743	20.546
Annual energy cost, total (w/ MR)	€/a	9.922	10.688	11.687	13.007
Electricity cost	€/a	7.606	8.043	8.549	9.269
Heating cost	€/a	83	348	768	1.272
Cooling cost (with moisture recovery)	€/a	2.233	2.297	2.369	2.465
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		10.096	23.240	40.616
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.144	7.696	8.414	9.365

MILAN		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.588	27.029	28.717	31.117
Heating energy (heating coil)	kWh/a	3.070	7.322	12.571	18.228
Cooling energy (cooling coil) with moisture rec.	kWh/a	14.519	14.921	15.386	15.958
Annual energy cost, total (w/ MR)	€/a	9.878	10.997	12.347	13.984
Electricity cost	€/a	7.676	8.109	8.615	9.335
Heating cost	€/a	461	1.098	1.886	2.734
Cooling cost (with moisture recovery)	€/a	1.742	1.791	1.846	1.915
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		14.724	32.492	54.049
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.113	7.918	8.890	10.069

NAPOLI		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.519	26.963	28.654	31.045
Heating energy (heating coil)	kWh/a	182	1.199	3.096	5.527
Cooling energy (cooling coil) with moisture rec.	kWh/a	27.021	27.874	28.953	30.398
Annual energy cost, total (w/ MR)	€/a	10.925	11.614	12.535	13.790
Electricity cost	€/a	7.656	8.089	8.596	9.313
Heating cost	€/a	27	180	464	829
Cooling cost (with moisture recovery)	€/a	3.243	3.345	3.474	3.648
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		9.063	21.193	37.717
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.866	8.362	9.025	9.929

SUMMER LABEL



PORTO		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.554	27.014	28.691	31.089
Heating energy (heating coil)	kWh/a	89	823	2.443	4.684
Cooling energy (cooling coil) with moisture rec.	kWh/a	6.178	6.364	6.591	6.866
Annual energy cost, total (w/ MR)	€/a	8.421	8.991	9.765	10.853
Electricity cost	€/a	7.666	8.104	8.607	9.327
Heating cost	€/a	13	124	366	703
Cooling cost (with moisture recovery)	€/a	741	764	791	824
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		7.510	17.690	32.023
Annual energy cost per 1 m ³ /s	€/m ³ /s	6.063	6.474	7.030	7.814

ROME		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.267	26.724	28.403	30.805
Heating energy (heating coil)	kWh/a	271	1.509	3.657	6.262
Cooling energy (cooling coil) with moisture rec.	kWh/a	25.616	26.464	27.478	28.835
Annual energy cost, total (w/ MR)	€/a	10.695	11.419	12.367	13.641
Electricity cost	€/a	7.580	8.017	8.521	9.242
Heating cost	€/a	41	226	594	939
Cooling cost (with moisture recovery)	€/a	3.074	3.176	3.297	3.460
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		9.539	22.015	38.793
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.700	8.222	8.904	9.822

VENICE		5.000 m ³ /h			
Item	UoM	A+	A	B	C
		value	value	value	value
Electric energy (fans)	kWh/a	25.868	27.304	28.978	31.367
Heating energy (heating coil)	kWh/a	1.286	4.619	8.986	13.665
Cooling energy (cooling coil) with moisture rec.	kWh/a	17.755	18.355	19.049	19.980
Annual energy cost, total (w/ MR)	€/a	10.084	11.087	12.327	13.858
Electricity cost	€/a	7.760	8.191	8.693	9.410
Heating cost	€/a	193	693	1.348	2.050
Cooling cost (with moisture recovery)	€/a	2.131	2.203	2.286	2.398
Energy cost savings compared to class A+ after 17 years and 3% interest rate					
Heat and moisture recovery	€		13.204	29.538	49.685
Annual energy cost per 1 m ³ /s	€/m ³ /s	7.260	7.982	8.876	9.977



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