



MINISTRY OF ENVIRONMENT & ENERGY GENERAL DIRECTORATE OF ENVIRONMENT, CONSTRUCTION, ENERGY AND MINERAL INSPECTORATE



NORTHERN AND SOUTHERN HELLENIC DIRECTORATE

ENERGY PERFORMANCE OF BUILDINGS CERTIFICATES:

STATISTICAL ANALYSIS FOR THE YEAR 2015

NORTHERN AND SOUTHERN GREECE

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Energy Performance of Buildings Certificates STATISTICAL ANALYSIS FOR THE YEAR 2015

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1 INTRODUCTION

According to the Regulation on the Energy Performance of Buildings approved by $\Delta 6 / B / oik.5825 / 30-03-2010$ Joint Decision of the Finance and Environment, Energy Climatic Change Ministers (Government Gazette B 407) and article 11 of law 4122/2013 (Government Gazette 42), the Energy Performance Certificate (EPC) includes:

- The energy performance of the building or building unit and reference values such as minimum energy
 performance requirements in order to make it possible for owners or tenants of the building or building unit to
 compare and assess its energy performance. The quotient of the calculated primary energy consumption
 (kWh/m²) of the building to the calculated primary energy consumption of the reference building (kWh/m²) is the
 criterion for the classification of the building to the corresponding energy class (A+, A, B+, B, C H).
- Additional information, such as the general data, the estimated annual primary energy consumption and the
 actual energy consumption of the building or building unit, the estimated annual primary energy consumption of
 the reference building, the percentage of energy from renewable sources in the total energy consumption, the
 estimated and actual annual carbon dioxide emissions (kg/m²), the assessment of the energy auditor on the
 evaluation of indoor environmental quality.
- Cost effective recommendations for improving the energy performance of the building or building unit, unless there is no reasonable potential for such improvement compared to the current requirements for energy performance.

The issue of EPC is mandatory, according to the paragraph 1 of article 12 of Hellenic law 4122/2013 (A' 42):

- a) after the completion of newly constructed building or building unit, subject to paragraph 4 of the referenced law,
- b) after completion of "major renovation" of a building or building unit,
- c) when selling a building or building unit,
- d) during renting out to a new tenant building or building unit,

e) where a total useful floor area over 500 square meters (500 m²) is occupied by a public authority and frequently visited by the public. Since, July 9, 2015 this threshold of five hundred square meters was lowered to two hundred and fifty square meters (250 m²).

On 01.01.2016, in accordance with paragraph 7 of Article 12 of this law, the issue of EPC is mandatory for "*building units with a total useful floor area of less than fifty square meters* (50*m*²)."

According to the Article 11 (par.2g) of Presidential Decree 100/2014 (A' 167), as it was amended and is in force, the Departments of Energy Inspection of General Directorate of Environment, Construction, Energy and Mineral Inspectorate (Σ .E. Π . Δ .E.M.) performed statistical analysis of the results for the energy performance of residential buildings, the tertiary sector and public buildings, after evaluation of the electronic data of EPC files lodged on the electronic Archive Audit of Buildings www.buildingcert.gr by the Energy Auditors.





The statistical results are presented annual and quarterly every year for buildings of all Hellenic Territory, and for each its region, regional unit and municipality, in the link of Ministry of Environment and Energy <u>www.ypeka.gr</u> selecting $E\pi\iota\theta\epsilon\omega\rho\eta\sigma\eta - Ev\epsilon\rho\gamma\epsilon\iota\alpha\kappa\eta E\pi\iota\theta\epsilon\omega\rho\eta\sigma\eta - \Sigma\tau\alpha\tau\iota\sigma\tau\kappa\alpha A\pi\sigma\tau\epsilon\lambda\epsilon\sigma\mu\alpha\tau\alpha$) or in the link: <u>http://www.ypeka.gr/Default.aspx?tabid=907&language=el-GR</u>.

Finally, the Energy Inspection Departments considering the immediate value to interested citizens and research stakeholders in energy performance of Hellenic buildings present this statistical release after evaluation of EPCs issued for dwellings and non-domestic buildings in year 2015 in comparison with those of previous years.





Energy Performance of Buildings Certificates

2. Energy Performance of Buildings Certificates: Statistics Release 2015

All Properties

A total of **53.689 Energy Performance Certificates** (EPCs) of buildings issued in 2015, which decreased by 56% compared to 2014. The largest percentage was issued for rent (45,54%) and sale purposes (36,28%). They, also, covered a total floor area of **7.922.883,86 m**² (**4.992.330,29 m**² in Southern Greece and **2.930.553.57 m**² in Northern Greece) –a decrease of 48,19% compared to the year 2014

(total floor area $15.292.623,85 \text{ m}^2$).

Concerning the energy class of buildings, the highest percentage (**57,79%**) of those were awarded an Energy Performance Rating **E**, **F** or **G**. A further 37,21% were awarded a Rating of **C** or **D** and the remaining 5% were awarded a Rating of **A** or **B** (the highest). This amounts to an increase of 8,38% buildings ranking to the higher energy class **A-B** and **C-D** compared to the same in 2014.



2.1. Residential buildings

Residential buildings accounted for **82,5%** of Energy Performance Certificates lodged on the Archive Audit of Buildings in 2015, a total of **44.298** EPCs (**28.286 EPCs** in Southern Greece and **16.012 EPCs** in Northern Greece). This category includes dwellings, such as houses (**20%** of EPCs lodged, **8.884 EPCs**) and building blocks/units of building blocks (**80%** of EPCs lodged, **35.414 EPCs**). They, also, covered a total floor area of **4.439.939,88 m²** - a decrease of 58,14% compared to the year 2014.

Concerning the energy class of residential buildings, the highest percentage (64,07%) of those were awarded an Energy Performance Rating E, F or G. A further 31,17% were awarded a Rating of C or D and the remaining 4,76% were awarded a Rating of A or B (the highest). This amounts to an increase of 6,15% residential buildings ranking to the higher energy class A-B and C-D compared to the same in 2014.





Of particular interest is the fact of the dwellings participated in the national program "energy saving at home", where after refurbishment of heating and cooling systems, as well as building envelopes and domestic hot water (DHW) systems, 56,92% of them were ranked to energy class C-D and 14,01% to energy class A-B respectively. It is noted that, in 2014, 53,81% of dwellings which participated in the same program, were ranked to energy class C-D and 7.42% of them to the energy class A-B.



Finally, in 2015, **the houses were the most energy consuming residential buildings**, as the average annual primary energy consumption was 337,62 kWh/m² in houses and 228,59 kWh/m² in building blocks. In dwellings, <u>most of the energy was consumed for heating demands</u> (the average annual primary energy consumption was 171,18 kWh/m² for heating).

2.2. Buildings of the tertiary sector

Buildings of tertiary sector accounted for **17,5%** of Energy Performance Certificates lodged on the Archive Audit of Buildings in 2015, a total of **9.391 EPCs** (**6.307 EPCs** in Southern Greece and **3.084 EPCs** in Northern Greece). Of the total number of these EPCs, **51,25%** were issued for shops (**4.813 EPCs**) and **20,4%** for offices (**1.915 EPCs**). They, also, covered a total floor area of **3.482.943,98 m²** - a decrease of 25,65% compared to the year 2014.

Concerning the energy class of tertiary sector buildings, the highest percentage (65,69%) of those achieved an Energy Performance Rating C or D. A further 28,15% were awarded a Rating of E, F or G and the remaining 6,15% were awarded a Rating of A or B (the highest). This amounts to <u>an increase of 83,6% tertiary sector buildings ranking to the higher energy class</u> A-B compared to the same in 2014.



Finally, **the most energy consuming tertiary sector buildings** for the year 2015 were the nursing homes (the average annual primary energy consumption was 1.157,20 kWh/m²), hospitals (the average annual primary energy consumption was 886,07 kWh/m²) and indoor gyms (the average annual primary energy consumption is 867,56 kWh/m²). In the tertiary sector buildings, most of the <u>energy was consumed for lighting demands</u> (the average annual primary energy consumption was 168,94 kWh/m² for lighting).



2.3. New/radically renovated buildings

New / radically renovated buildings accounted for **1,79%** of Energy Performance Certificates lodged on the Archive Audit of Buildings in 2015, a total of **959 EPCs** (**550 EPCs** in Southern Greece and **409 EPCs** in Northern Greece) which covered a total floor area of **304.074,2 m²** - an increase of 63,7% compared to the year 2014 (**185.717,04 m²**). Of the total number of these EPCs, **47,86%** were issued for residential buildings (**459 EPCs**) and **25,13%** for tertiary sector buildings.

Concerning the energy class of tertiary sector buildings, the highest percentage (93,01%) of those achieved an Energy Performance Rating A or B and only 5,94% were awarded a Rating of C or D. This amounts to <u>an increase of 3,43%</u> <u>new/radically renovated buildings ranking to the higher energy class</u> A-B compared to the same in 2014.

The buildings ranked to lower energy class **E**, **F** or **G** (1,04%) are those whose construction was completed after 2010, but their building permission was issued prior to the commencement of the Hellenic Regulation on the Energy Performance of Buildings (KENAK).



In the new/radically renovated buildings, most of <u>the energy was consumed for heating</u> (the average annual primary energy consumption was 56,98 kWh/m² for heating) <u>and cooling demands</u> (the average annual primary energy consumption was 32,66 kWh/m² for cooling).

2.4. Public buildings

Public buildings accounted for **1,23%** of Energy Performance Certificates lodged on the Archive Audit of Buildings in 2015, a total of **665 EPCs** (**327 EPCs** in Southern Greece and **338 EPCs** in Northern Greece), which covered a total

floor area of **1.115.503** m^2 - an increase of 7,10% compared to the year 2014.

Concerning the energy class of public buildings, the highest percentage (52,33%) of those achieved an Energy Performance Rating C or D. A further 33,53% were awarded a Rating of E, F or G and the remaining 14,14% were awarded a Rating of A or B. This amounts to <u>an increase of 64,04%</u> <u>public buildings ranking to the higher energy class</u> A-B compared to the same in 2014.







Of particular interest is the fact for public school buildings which participated in the national program "Saving II" financially supported from National Strategic Reference Framework, after specific interventions, ranked an amount of them 65,38% to energy class **C**, 23,08% to energy class **B** and 11,54% to energy class **E**, respectively.

Similarly, the public buildings of Hellenic municipalities which joined correspondent financial supporting program, after specific interventions ranked an amount of them 85,71% to energy class **C-D** and 14,29% to energy class **A-B**.



Finally, the most **energy consuming public buildings** for the year 2015 were **the indoor gyms** (the average annual primary energy consumption was 898,16 kWh/m²), **hospitals** (the average annual primary energy consumption was 759,10 kWh/m²) and **indoor swimming pools** (the average annual primary energy consumption was 752,02 kWh/m²). In public buildings, most of the <u>energy was consumed for heating demands</u> (the average annual primary energy consumption was 109,46 kWh/m² for heating).





3. Energy Performance of Buildings Certificates: Statistics Release 2011 -2015

The time period 2011 till 2015, a total of 663.625 **Energy Performance Certificates** (EPCs) lodged on the Archive Audit of Buildings (Table 1), of which 14,78% issued for tertiary sector buildings and 85,21% for residential buildings.

Year	Amount of EPCs	Total Floor Area (m ²)
2015	53.689	7.922.883,86
2014	122.429	15.292.528,85
2013	222.354	25.632.172,72
2012	211.192	23.990.266,40
2011	53.961	7.036.561,53
Total	663.625	79.874.413,36

Table 1. Data for buildings for the period 2011-2015

The majority of EPCs have mainly being issued for the buildings constructed by the year 2009 and especially, the period 1970-1980. This is due to the fact, that many EPCs issued as necessary document for the participation of dwelling buildings in the program "Saving at home", the first phase of which involved only buildings that were built up since 1980.

During the period of implementation of Hellenic Regulation on the Energy Performance of Buildings (KENAK), a small amount of EPCs being issued reflecting the plunge of the construction industry over the last years in Greece, as a result of economic crisis.





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The classification of buildings constructed prior to 2010 in energy classes A⁺ to C, is explained by the fact that in these buildings were made major renovation or interventions through various funding programs (eg "energy saving at home", etc.).

In addition, most of the issued EPCs concerns buildings (mostly apartments) that were to be rented out. However, the number of EPCs issued for "Renting" has drastically decreased in 2015 compared to previous years.



At the time period **2011-2015**, the highest percentage (**60%**) of buildings were awarded an Energy Performance Rating **E**, **F** or **G**.





The amount of buildings per energy performance class (A⁺, A, B⁺, B, C - H) and by Hellenic region is presented in detail below.



					ENERGY (CLASS of	BUILDING	S		
REGION	A+	A	B+	В	с	D	E	F	G	TOTAL
Eastern Macedonia and Thrace		7	65	593	4174	7608	4939	3284	9522	30192
Attica	11	129	949	8479	46985	52075	38987	47363	74266	269244
Northern Aegean		1	25	150	1235	2255	2274	1847	5039	12826
Western Greece		18	99	682	3903	6855	6602	5278	9806	33243
West Macedonia	2	2	36	294	1971	3193	2565	2066	5511	15640
Ipeiros	1	13	107	536	2966	4955	4213	3096	7603	23490
Thessalia	2	17	98	1090	6431	9441	8361	6543	16899	48882
Ionian Islands		23	41	225	1945	2717	2447	1709	3769	12876
Central Macedonia	4	16	465	3345	21576	29947	21179	13909	27349	117790
Crete	3	5	116	942	3746	5580	4829	4142	6435	25798
Southern Aegean	7	17	120	869	4107	4510	3593	2568	4046	19837
Peloponese		6	107	735	4156	6546	4966	4027	8758	29301
Sterea Ellada	2	1	49	426	2795	5090	4102	3454	8587	24506
TOTAL	32	255	2277	18366	105990	140772	109057	99286	187529	663625





3.1. Residential Buildings



During the period 2011-2015, a high percentage of residential buildings were given an Energy Performance Asset Rating of E, F or G and most of their energy was consumed for heating demands. The following table compares average values of primary energy consumption over a range of indicators for residential buildings for which EPCs were lodged on the electronic Archive Audit of Buildings.

Year	Number of	Total Floor	Average annual	Average annual	Average	Average	Average	Average
	EPCs	area (m²)	consumption	primary energy	annual	annual	annual	annual
			kg CO ₂ /m ²	in heating	primary	primary	primary	primary
				(kWh/m²)	energy in	energy in	energy in	energy
					cooling	DHW	RR	(kWh/m²)
					(kWh/m²)	(kWh/m²)	(kWh/m²)	
2015	44.298	4.439.939,88	66,06	171,18	31,04	47,36	0,02	250,46
2014	106.207	10.607.916,00	70,11	193,32	31,83	47,01	0,04	272,73
2013	184.759	17.813.541,65	67,68	177,84	30,88	47,77	0,04	257,38
2012	178.988	17.200.727,67	69,11	161,16	34,38	55,94	0,07	252,67
2011	51.256	5.656.533,80	78,18	186,95	43,84	60,83	0,11	291,96

In addition, the energy upgrade to the higher energy class E-B of dwellings which participated in national subsidized development programs during 2011-2015, as shown below, is quite remarkable.







3.2. Buildings of the tertiary sector



During the period 2011-2015, a high percentage of tertiary sector buildings were given an Energy Performance Asset Rating of C or D and most of their energy was consumed for cooling and lighting demands. The following table compares average values of primary energy consumption over a range of indicators for tertiary sector buildings for which EPCs were lodged on the electronic Archive Audit of Buildings.

Year	Number of EPCs	Total floor area (m²)	Average annual consumption kg CO ₂ /m ²	Average annual primary energy in heating (kWh/m²)	Average annual primary energy in cooling (kWh/m²)	Average annual primary energy in HW (kWh/m²)	Average annual primary energy in lighting (kWh/m ²)	Average annual primary energy in RR (kWh/m²)	Average annual primary energy (kWh/m ²)
2015	9.391	3.482.943,98	139,09	108,41	137,17	15,33	168,94	0,10	429,77
2014	16.222	4.684.612,85	148,87	113,15	146,32	18,24	181,18	0,02	458,87
2013	37.595	7.818.631,07	151,89	118,77	148,97	21,26	180,50	0,02	469,49
2012	32.204	6.789.538,73	146,05	132,60	152,80	26,92	159,18	0,03	471,46
2011	2.705	1.380.027,73	112,21	111,92	124,36	32,88	110,91	0,09	380,02



3.3. New/radically renovated buildings



During the period 2011-2015, the new / radically renovated buildings were awarded an Energy Performance Asset Rating of either A (the highest) or B. Remarkably, the energy consumption in heating and hot water demands in new/renovated residential buildings as well as the energy consumption in cooling demands in new/renovated tertiary sector buildings have significantly been reduced. The classification of some new/ buildings to lower energy class E, F or G is owed to the fact that although they were completely constructed in the period (2011-2015), their building permission had been issued prior to the commencement of the Hellenic Regulation on the Energy Performance of Buildings (KENAK).

Year	Number of EPCs	Total floor area (m2)	Average annual consumption kg CO ₂ /m ²	Average annual primary energy in heating	Average annual primary energy in cooling	Average annual primary energy in HW	Average annual primary energy in lighting	Average annual primary energy in RR	Average annual primary energy (kWh/m ²)	
				(kWh/m²)	(kWh/m²)	(kWh/m²)	(kWh/m²)	(kWh/m²)	(
Buildings of Tertiary Section										
2015	259	162.758,89	74,90	45,05	64,87	12,69	104,54	1,07	226,41	
2014	116	82.356,37	76,80	44,24	78,19	8,05	100,62	0,46	230,64	
2013	64	32.462,64	106,07	77,23	109,64	18,03	112,30	0,13	317,07	
2012	39	44.833,54	71,95	48,74	60,62	11,16	104,92	0,00	225,45	
2011	30	11.937,29	118,21	129,90	119,27	61,49	98,51	0,00	409,17	
				Residential	Buildings					
2015	700	141.315,33	27,69	61,39	20,75	15,90	0,00	0,29	97,90	
2014	549	103.360,67	28,89	70,46	18,93	16,26	0,00	0,15	105,87	
2013	360	91.477,91	33,81	78,74	21,37	20,40	0,00	0,32	120,19	
2012	303	47.226,42	34,62	80,86	27,56	26,09	0,00	0,00	135,17	
2011	393	62.452,19	55,01	114,66	36,07	48,63	0,00	0,00	199,36	



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3.4. Public Buildings



During the period 2011-2015, a high percentage of public buildings were given an Energy Performance Asset Rating of C or D and most of their energy was consumed for heating demands. The following table compares average values of primary energy consumption over a range of indicators for public buildings for which EPCs were lodged on the electronic Archive Audit of Buildings.

Year	Number of EPCs	Total floor area (m2)	Average annual consumption kg CO ₂ /m ²	Average annual primary energy in heating (kWh/m ²)	Average annual primary energy in cooling (kWh/m ²)	Average annual primary energy in HW (kWh/m ²)	Average annual primary energy in lighting (kWh/m ²)	Average annual primary energy in RR (kWh/m ²)	Average annual primary energy (kWh/m ²)
2015	665	1.115.502,73	88,69	109,46	72,04	13,67	95,59	0,23	290,56
2014	325	1.041.547,86	99,18	124,82	76,23	10,56	109,93	0,22	321,31
2013	307	372.224,43	127,25	115,67	133,44	20,01	129,36	0,00	398,48
2012	469	518.699,96	116,69	137,53	109,42	24,23	109,75	0,01	380,93
2011	385	494.774,86	60,09	74,84	38,88	42,34	53,24	0,14	209,20





The upgrade to higher energy class E-B of school buildings as well as of various public buildings in municipalities which participated in national subsidized development programs during 2011-2015, as shown below, should be noted as well.







4 CONCLUSIONS

According to the previously statistical release for the energy performance of the building stock, the estimated average annual energy consumption is 265,04 kWh/m² in residential buildings, 441,92 kWh/m² in tertiary buildings and 320,10 kWh/m² in public buildings.

If these buildings were constructed with requirements of the Hellenic Regulation on the Energy Performance of Buildings (KENAK) (energy class B), then residential buildings would consume annually average primary energy 108,76 kWh/m², the tertiary sector buildings 272,73 kWh/m² and the public buildings 194,78 kWh/m².

Then, the total annual estimated energy consumption is 14,77 TWh in residential buildings, 10,68 TWh in tertiary sector buildings, 1,13 TWh in public buildings. Then, if these buildings were constructed in accordance to KENAK requirements, then the total annual estimated energy consumption would be 6,06 TWh in residential buildings, 6,58 TWh in tertiary sector buildings, and 1,13 TWh in public buildings.

Thus, the estimated amount of energy saving target would be 59% for the residential buildings, 38% for the tertiary sector buildings and 39% for the public buildings.







5. MORE INFORMATION

In accordance with the Article 11 of the Presidential Decree 100/2014 (A' 167), Northern and Southern Hellenic Departments of Energy Inspection, which constitute administrative units of the General Directorate of Environment, Construction, Energy and Mineral Inspectorate (Σ .E. Π . Δ .E.M.), are responsible for:

- (a) the inspection of the issue procedure for energy performance of building certificates (EPS), auditing reports for heating and air conditioning systems, inspection of Energy Auditors, inspection of academic institutions and certified vocational centers which offer educational programs to Energy Auditors,
- (b) imposing penalties to Energy Auditors as well as to academic institutions and certified vocational centers which offer educational programs to Energy Auditors,
- (c) administration of the (electronic) Register of Energy Auditors (buildings, heating systems and air conditioning systems) and (electronic) Archive Audit of Buildings,
- (d) the collection, evaluation and statistical analysis of the results from the energy performance of building certificates and auditing reports of heating and air-conditioning systems,
- (e) implementation and supervision of energy audits in industrial activities or facilities.

Information for the Register of Energy Auditors and the Archive Audit of Buildings

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Address: Kifisias 1-3, 11523 Athens, Greece. E-mail: <u>ene-ne@prv.ypeka.gr</u>

NORTHERN HELLENIC DIRECTORATE / Department of Energy Inspection

Address: Andrianoupoleos 24, 551 33 Thessalonica, Greece. E-mail : eyepen-ye@pry.ypeka.gr

Web-sites:

1.<u>http://www.ypeka.gr/Default.aspx?tabid=337&langua</u> ge=el-GR

- 2. http://bpes.ypeka.gr/
- 3. www.buildingcert.gr

Information on the legal framework for the energy performance of buildings:

Directorate of Energy Policy and Energy Performance/Department of Energy Performance E-mail : <u>depea@prv.ypeka.gr</u>

Technical support of the database <u>BuildingCert</u> (passwords, problems in the submission of files .xml, etc) Telephone (helpdesk) : 210 66 03 309 E-mail: buildingcert.gr@gmail.com (CRES)

Information on the implementation of TOTEE and Technical Support of the software TEE - KENAK: Hellenic Technical Chamber (TEE). E-mail: <u>teekenak@tee.gr</u>

