iBRoad

Individual Building Renovation Roadmaps

Factsheet: Greece

Current use of EPCs and potential links to iBRoad

Residential buildings account for most of the Greek building stock with 69% of the buildings built before 1990. About half of the Greek residences lack thermal insulation, as they were constructed before the introduction of the national thermal regulation, and the renovation rate is very low. An Energy Performance Certificate (EPC) is mandatory when selling or renting out a house, but no publicly available registry of EPC data exists. Approximately 16% of the Greek residences hold an EPC. Beyond this, there is a small market for energy audits in residential buildings, which is currently not working effectively.

Overview of the building stock

Total building floor area:
650 Mm² (2013)

Share of residential floor area:
89%

Number of single-family houses:
3.7 million
(55% of total residential buildings) (2014)

Percentage of buildings built before 1990:
69%

Average residential energy consumption:
112.04 kWh/m² (2014)

Average residential envelope performance:
2.15 W/m²ºC (2014)

Major renovation rate:
0.4% [1]

All data comes from the EU Building Stock Observatory

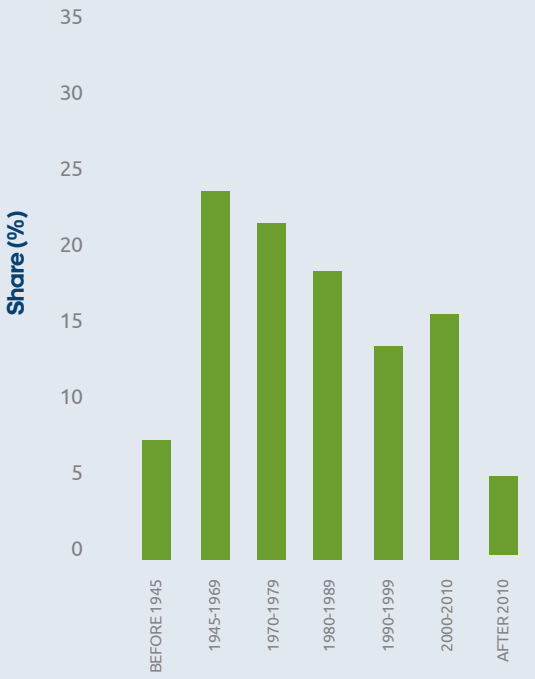

Figure 1: Greek building stock per construction year (Source: EU Building Stock Observatory)

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Greece has among Europe's biggest share of private tenants (around 25%) [2]. 55% of the country's 6.9 million residential buildings are single-family houses [3]. About half of the Greek residential buildings lack any thermal insulation since they were built before 1980 (see Figure 1), when the national thermal regulation entered into force. Between 1981 and 2000, the application of the new thermal insulation regulation was problematic and resulted in about 30% of buildings being partially or insufficiently insulated. Only buildings built after 2000 can be considered sufficiently insulated [4].

Residential buildings in Greece are one of the most important energy-consuming sectors. As main sources for heating, households use oil (60%), followed by wood (24%) and natural gas (7%) (2011-2012) [5].

Overview of existing policies and financial schemes

The Greek Regulation for the Energy Performance of Buildings (KENAK) and the technical guidelines issued by the Technical Chamber of Greece [6] form the regulatory framework for the energy performance calculations. KENAK follows standards such as ISO 13790:2008 and has been recently revised (July 2017) to comply with the Energy Performance of Buildings Directive (EPBD) guidelines. The major revision is related to increased thermal insulation requirements [7]. The EU Cohesion Policy Funds constitute a considerable source of funding for energy efficiency in Greece. For the current programming period (2014-2020), Greece allocates about 3% of the funds (more than €422 million), to building renovation (both public and residential buildings). The main scheme for the renovation of residential buildings will be a new (2nd) version of 'Saving at Home', which is expected to be re-launched in 2018. The 1st version of 'Saving at Home' is described hereby:

Saving at Home:
This scheme (1st version) was announced in 2011 with an EU co-financed budget of €396 million. The support consists of a grant covering up to 70% of the cost (depending on the applicant's income) for energy upgrades on the building's envelope, windows, heating and hot water supply systems [8]. The remaining 30% must be covered by a loan. The interest on this loan is fully subsidised [9] [10] [11] [12]. The scheme is available for buildings with an EPC score of D or lower, located in socially-vulnerable areas [13]. After the renovation, the building should achieve a higher EPC class or at least 30% energy savings [8]. The scheme was extended with an increased budget, resulting in additional applications being approved in 2017. A total of 52,249 homes have benefitted from the scheme from its launch until November 2017.

The implementation status of the EPC

EPCs are mandatory for almost all building types when sold or rented and are not mandatory in case of a rental renewal with the same building owner. Before 2016, EPCs were mandatory only for buildings bigger than 50 m^2 [14]. According to the Ministry of Environment, Energy and Climate Change, 663,625 EPCs were issued in Greece between 2011 and 2016, of which 83% for multi-family buildings and 17% for single-family houses [15].

The energy classification of buildings is divided in nine energy classes (Annex). The minimum acceptable class for new buildings and for those undergoing major renovations is 'B'. The distribution of existing EPCs for residential buildings shows that most are highly inefficient: 65% are between the classes E-G (corresponding Greek scale: E-H), 32% between C-D (Γ-Δ) and only 3% are above B [16].

The underlying assumptions, calculations, climatic data files and thermal characteristics of building material were included in technical guides published by the Technical Chamber of Greece in July 2010 and updated in March 2012 and in November 2017 [7] [17].

Even though there is an accessible registry of energy inspectors and an available tool for building owners to check the validity of their EPC, there is no publicly accessible registry for the EPCs.

The energy inspector electronically submits the EPC data (including all relevant information e.g. building drawings, calculation method owner's contact details, etc.) to the Ministry of Environment and Energy, before issuing the EPC [18]. Annual reports on EPC statistics are published by the Ministry of Environment and Energy.

For buildings undergoing major renovations requiring a building permit (and also for new buildings), energy checks are performed upon completion to assure that the building is in line with the initial assessment (Concerted Action, 2016). The building must be compliant with class B or higher. In case this is not achieved, the owner is given a year to upgrade the energy performance of the building according to the recommendations provided by the energy inspector. After the upgrade is complete, a second check takes place. In case of non-compliance, the building owner receives a penalty. Only when the building meets the minimum energy requirements, it is connected to utility networks (e.g. electricity, water) [17].

According to Article 15 of KENAK, an energy check/inspection includes the following stages [18]: (i) the building owner assigns the check to an energy expert/inspector; (ii) the energy inspector registers the building online; (iii) before the inspection, the inspector collects the building shell and installations (architectural drawings, electrical and mechanical building installations, electricity consumptions etc.) relevant information; (iv) during the inspection, the energy auditor visits the site, collects information about the building and double checks information that was provided by the owner; (v) calculations and analysis of the results are performed and an energy classification based on the results is provided; (vi) the energy inspector electronically submits the data (in XML) to the Special Secretariat for the Environment and Energy Inspectorate of the Greek Ministry of Environment and Energy.

The TEE KENAK software, provided by the Technical Chamber of Greece [21], is used by the energy inspectors to issue the Energy Performance Certificates. It is also used for buildings' energy efficiency studies either for issuing a licence permits for new buildings or for major renovation works. TEE KENAK was developed by the Institute for Environmental Research and

Sustainable Development of the National Observatory of Athens.

Several commercial software tools (4MKENAK, Buildingsoft GoEnergy CAD-PRO, Civiltech Energy Certificate CAD, etc.), using the calculation engine of TEE KENAK, are used to reduce the workload for energy inspectors by integrating shading calculations and building drawings.

FACT BOX
EPCs in Greece

Responsible authority:
Ministry of Environment and Energy

Availability of a central registry of EPCs:
No freely-accessible registry of EPC information. Annual reports on EPCs are published by the Ministry of Environment and Energy

Number of EPCs issued:
941,793 (between 2011-2016) [16] [15]

Percentage of buildings with EPCs:
16% [16]

Period of validity of an EPC:
10 years

Recommendations included in the EPC:
The EPC does not include a predefined list of recommendations, the energy inspector is responsible for this and advises openly. The most common recommendations are related to the replacement of windows, installation of solar panels, installation of thermal insulation and maintenance of heating and cooling systems.

Energy label/continuous scale:
Energy label A-G (A+,A,B+, B, Γ, Δ, E, Z, H)

Price range for an EPC:
€50-€150

Body responsible for performing quality checks:
Hellenic Energy Inspectorate

Penalties for qualified experts for poor quality EPCs
Penalties including fines and temporary suspension or permanent exclusion of the expert depending on the level of violation are foreseen (Concerted Action, 2016)

Number of certified energy experts:
About 15,859 (2014), of which 7,011 were experts in heating systems and 6,532 were experts for AC systems (Concerted Action, 2016)

Requirements to become a certified energy expert:
Members of the Technical Chamber of Greece, engineers with a technical education or engineers with recognised professional qualifications can become energy experts/inspectors (law 4409/2016). Energy inspectors are certified for three different classes depending on their qualification level and experience [19]. Since July 2016, training is no longer mandatory to become a member of the energy expert registry [20].

Indicative cost of training for energy experts:
Not available

The experts' opinion*

- **Limited awareness about the benefits of renovation and the cost of renovation are the main barriers to renovation, especially for low-to-medium income households.**
- **The bureaucracy linked to deep renovation (owners must submit a plan to the local urban planning authority and get a building permit) has a negative impact on deep renovations, since it raises both costs and administrative burden.**
- **The access to financial incentives and programmes is essential to increase the depth and rate of renovation. Experts noted that the bureaucratic nature of "Saving at Home" and the mandatory private contribution via bank loan restrict the access of low-income households to the programme. The simplification of all procedures (establishment of a complete electronic system for the applications, documents, etc.), the provision of financing instruments for low-income families and the use of Energy Efficiency Contracts and ESCOs could help address these barriers [22].**
- **EPCs are considered as an administrative burden rather than a helpful tool for building owners and tenants.**
- **The EPC certification is disconnected from the renting/sale market and, except for buildings labelled A/A+, it doesn't seem to have an impact on transaction prices.**

* based on interviews and feedbacks received from national experts

Current status of energy audits and potential market for iBRoad

This section is about energy audits and tools, which are not included in the EPC framework. The audit described here is not identical to the energy check needed to produce an EPC.

The procedure for energy audits is different than the EPC inspections. Energy audits are voluntary and are designed and regulated under Article 9 of the Energy Efficiency Directive (2012/27/EU). Currently, there is a limited market for energy audits in the residential building sector and no data is available on performed energy audits.

Home-owners, however, have access to user-friendly tools and applications, like the 'Energy Inspection Home Edition', to estimate the energy performance of their building and its potential energy savings (Annex) [23] [24].

The individual building renovation roadmap (iBRoad) could provide the building owner with a better understanding of his/her building and opportunities for deep renovation in the long term. The renovation roadmap could also contribute to reduce the application time for financial support. While data gathered from the EPCs would feed iBRoad, an on-site visit will be a necessary step towards the creation of a customised renovation roadmap.

The limited energy audit market in residential buildings and the cost of the audits are two of the main barriers that need to be addressed, to fully develop iBRoad in Greece. A building renovation roadmap could drive the market forward while public and private funding could help tackle the cost barrier.

The experts' opinion

- The roadmap of possible interventions and their estimated benefits should be presented in a simple and understandable way for building owners.
- To drive renovations, owners should have access to a larger amount of information and advice covering possible interventions, the costs of proposed measures, alternative technologies and solutions, available financial support and incentive for implementation, a list of trusted installers and technical companies as well as legal and administrative requirements to proceed with renovation (e.g. special permit, etc.).
- A targeted communication towards citizens on the value of EPCs and iBRoad is required to boost the interest.

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Main author: **Buildings Performance Institute Europe**
Contributing national partner: **Institute of Zero Energy Buildings (INZEB)**
Review: **Sympraxis Team**

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All of iBRoad's reports, analysis and evidence can be accessed from **ibroad-project.eu**.

iBRoad project partners

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Annex
Greek Energy Performance Certificate

ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΕΝΕΡΓΕΙΑΚΗΣ ΑΠΟΔΟΣΗΣ (ΠΕΑ)
Δνση κτηρίου/κτηριακής μονάδας

Αρ. Πρωτοκόλλου:	00000/0000	Αρ. Ασφαλείας:	0000-0000-0000-0000
Ημερομηνία έκδοσης:	00/00/0000	Ισχύς έως	00/00/0000

- Ελέγξτε την εγκυρότητα του ΠΕΑ: https://www.buildingcert.gr/checkCert.view

Τίτλος κτηριακής μονάδας: «.....»	
Χρήση:	
Κλιματική ζώνη:	
Συνολική επιφάνεια:	
Ωφέλιμη επιφάνεια:	

ΦΩΤΟΓΡΑΦΙΑ ΚΤΗΡΙΟΥ/ΚΤΗΡΙΑΚΗΣ ΜΟΝΑΔΑΣ

Ενεργειακή κατηγορία:	Υφιστάμενη	Δυνητική*
Μηδενικής Ενεργειακής Κατανάλωσης		
EP ≤ 0,33 R_R (A+)		
0,33 R_R < EP ≤ 0,50 R_R (A)		
0,50 R_R < EP ≤ 0,75 R_R (B+)		B+
0,75 R_R < EP ≤1,00 R_R (B)	B	
1,00 R_R < EP ≤ 1,41 R_R (Γ)		
1,41 R_R < EP ≤ 1,82 R_R (Δ)		
1,82 R_R < EP ≤ 2,27 R_R (E)		
2,27 R_R < EP ≤ 2,73 R_R (Z)		
2,73 R_R < EP (H)		

- Μετά την εφαρμογή των παρεμβάσεων ενεργειακής αναβάθμισης σύμφωνα με τη βέλτιστη (1η) σύσταση.

Υπολογιζόμενη ετήσια κατανάλωση πρωτογενούς ενέργειας*	
Κτηρίου αναφοράς [kWh/m^2]:	999999999,99
Επιθεωρούμενου κτηρίου [kWh/m^2]:	999999999,99
Πραγματική ετήσια κατανάλωση επιθεωρούμενου κτηρίου	
Ηλεκτρικής ενέργειας [kWh/m^2]:	999999999,99
Θερμικής ενέργειας (καύσιμα) [kWh/m^2]:	999999999,99
Συνολική ετήσια κατανάλωση πρωτογενούς ενέργειας [kWh/m^2]:	999999999,99
Ετήσιες εκπομπές CO_2 επιθεωρούμενου κτηρίου	
Υπολογιζόμενες ετήσιες εκπομπές CO_2 [kg /m^2]:	999999999,99
Πραγματικές ετήσιες εκπομπές CO_2 [kg /m^2]::	999999999,99

Συνθήκες άνεσης και ποιότητας εσωτερικού περιβάλλοντος			
Θερμική άνεση ☐	Οπτική άνεση ☐	Ακουστική άνεση ☐	Ποιότητα εσωτερικού αέρα ☐

- Η ενεργειακή απόδοση ενός κτηρίου προσδιορίζεται βάσει της υπολογιζόμενης ετήσιας κατανάλωσης ενέργειας για την κάλυψη των αναγκών που συνδέονται με τη χρήση του ώστε να επιτυγχάνονται συνθήκες θερμικής και οπτικής άνεσης.

ΠΙΣΤΟΠΟΙΗΤΙΚΟ ΕΝΕΡΓΕΙΑΚΗΣ ΑΠΟΔΟΣΗΣ (ΠΕΑ)

Αρ. Πρωτοκόλλου:	00000/0000	Αρ. Ασφαλείας:	0000-0000-0000-0000

Υπολογιζόμενη ετήσια ενεργειακή απαίτηση ανά τελική χρήση [kWh/m^2]				
	Θέρμανση	Ψύξη	ΖΝΧ	Φωτισμός
Κτήριο αναφοράς				
Επιθεωρούμενο κτήριο				

Υπολογιζόμενη ετήσια κατανάλωση τελικής ενέργειας ανά πηγή ενέργειας & τελική χρήση [kWh/m^2]						
Πηγή ενέργειας	Θέρμανση	Ψύξη	ΖΝΧ	Φωτισμός	Συνολική	Συνεισφορά στο ενεργειακό ισοζύγιο του κτηρίου [%]
Ηλεκτρική						
Πετρέλαιο						
Φυσικό αέριο						
Άλλα ορυκτά καύσιμα						
Ηλιακή						
Βιομάζα						
Γεωθερμία						
Άλλη ΑΠΕ						
Σύνολο						

Χρησιμοποιήστε το ΠΕΑ για να:

- συγκρίνετε την ενεργειακή απόδοση κτηρίων ίδιας χρήσης βάσει της κατάταξής τους σε ενεργειακή κατηγορία,
- πληροφορηθείτε για εξοικονόμηση ενέργειας και χρημάτων μέσω παρεμβάσεων βελτίωσης της ενεργειακής απόδοσης.

ΣΥΣΤΑΣΕΙΣ ΓΙΑ ΤΗ ΒΕΛΤΙΩΣΗ ΤΗΣ ΕΝΕΡΓΕΙΑΚΗΣ ΑΠΟΔΟΣΗΣ

1.

2.

3.

Σύσταση	Εκτιμώμενο αρχικό κόστος επένδυσης [€]	Εκτιμώμενη ετήσια εξοικονόμηση πρωτογενούς ενέργειας & τιμή μονάδας			Εκτιμώμενη απλή περίοδος αποπληρωμής*	Εκτιμώμενη ετήσια μείωση εκπομπών CO_2	Ενεργειακή κατηγορία
		[kWh/m^2]	[%]	[€/kWh]	[έτη]	[kg/m^2]	-
1.							
2.							
3.							

Οι συστάσεις είναι ιεραρχημένες σε σχέση με το κόστος – ενεργειακό όφελος που προκύπτει. Η εξοικονόμηση ενέργειας και τιμή μονάδας αφορά την κάθε επί μέρους σύσταση και τα ποσά δεν αθροίζονται. Ομοίως για την ετήσια μείωση εκπομπών CO2 και την περίοδο αποπληρωμής.

- Η απλή περίοδος αποπληρωμής υπολογίζεται με βάση την τελική ενεργειακή κατανάλωση και όχι την κατανάλωση πρωτογενούς ενέργειας.

Ονοματεπώνυμο Ενεργειακού Επιθεωρητή Α.Μ. Ενεργειακού Επιθεωρητή: 00000	Σφραγίδα Υπογραφή

Energy Inspection Home Edition

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