CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

EPBD implementation in Malta

Status in December 2016

AUTHORS

Matthew Degiorgio & Carmelo Barbara, *Building Regulation Office*

NATIONAL WEBSITES

www.bro.gov.mt

1. Introduction

Malta has a long tradition regarding building regulations, with requirements ranging from prescriptive-based to performance-based. With regards to energy efficiency, the development of regulations has historically been hindered by the absence of severe weather conditions, with mean temperatures for January and February of 13-14°C, resulting in inherently low energy demands in buildings. The main challenge in climatic building design has been to employ various strategies to avoid overheating in summer; achieving high thermal mass, limiting solar gains through glazing by utilising various external shading devices, implementing stack-effect ventilation and achieving air stratification through the use of high ceilings. It was not until the implementation of Directive 2002/91/EC that the first building regulations exclusively related to energy efficiency were developed.

The EPBD was transposed through a number of acts and legal notices over the period 2006-2015. The statutory instrument transposing the EPBD has been revised by the Building Regulation Office (BRO) and is awaiting government approval. Revisions are intended to address the improved implementation of the EPBD.

Over the last three years, the minimum requirements have been revised to reflect cost-optimal levels and are now contained in two documents: Document F, part 1 and Document F, part 2[1]. These minimum requirements came into force as of January 2016 with the ratification of Legal Notice 434/2015[1].

In recent years, new developments include a definition of NZEB in Malta and a plan to achieve the targets to attain NZEB levels in the timeframe transposed by the relevant statutory instruments; furthermore, the first steps have been taken to shift the building energy demand in a positive direction. Action was also taken to address the advertisement of EPCs in all media and, to this end, guidelines were developed relating to advertising requirements.

Implementing the EPBD was further supported by training and the registration of new EPC assessors as well as inspectors of technical building systems. Guides were developed relating to inspection systems and methodologies in order to provide assistance to inspectors.

As of 2016, the responsibilities for implementing the EPBD lie with the BRO and the Building Regulation Board (BRB) of the government of Malta.

2. Current Status of Implementation of the EPBD

2.I. Energy Performance requirements: NEW BUILDINGS

Traditionally, building regulations in Malta were embedded within national legislation, with the requirements ranging from a prescriptive approach to best-practice guidance. Such legislation tended to cover various aspects of building design and performance, including energy efficiency. With the introduction of the EPBD, a progressive overhaul of the energy performance of buildings was initiated. The Building Regulation Act, Legal Notice 261 of 2008, and the first version of Technical Guidance Document F came into force, which established requirements specifically designed to improve energy performance. Following the issuance of the EPBD, a process was initiated whereby building regulations were updated to cost-optimal levels, and these came into force in January 2016 with the ratification of Legal Notice 434 of 2015[1]. Malta is now in the early stages of evaluating the regulations in force to establish whether amendments or adjustments are warranted.

Figure 1. New updated minimum requirements for buildings (left) and building services (right), which came into force in January 2016.

2.I.i. Progress and current status of new buildings

Studies to establish cost-optimal levels of energy performance in the period of 2013-2014 determined that there was a gap between the minimum requirements in force and the actual cost-optimal levels, although in some cases this difference was not particularly significant. An inter-ministerial working group was set up to address these issues, and this working group formulated proposals for new minimum requirements, including a change in approach whereby all buildings were bound by a maximum overall energy balance. The proposals were taken up and a new updated set of regulations was drawn up, coming into force as of January 2016 with the ratification of Legal Notice 434 of 2015 titled *Minimum Requirements on the Energy Performance of Buildings Regulations*[1].

Analysis of the cost-optimality reports and other available data showed that the energy performance could possibly be improved in specific building typologies if minimum energy performance requirements specifically addressed these buildings. To this end, a study was initiated to analyse the energy use within a number of reference buildings in these typologies in order to assess if the minimum requirements should be updated.

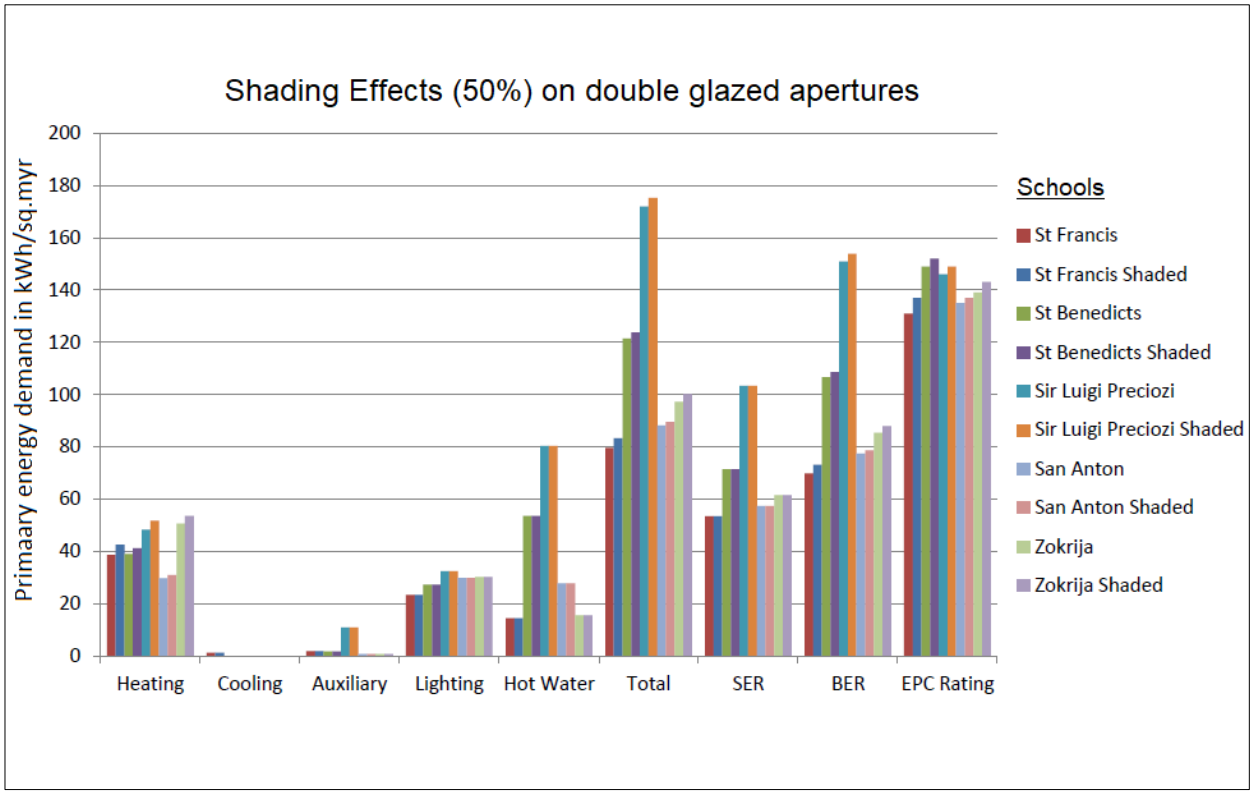

Figure 2. Extract from studies commissioned to enhance minimum requirements, showing results divided by energy use for simulations carried out for shading effects in schools.

2.I.ii. Format of national transposition and implementation of existing regulations

The minimum requirements which came into force in 2016 include a technical guidance document with two parts[1]; Part 1 relates to the building envelope and overall energy performance, while Part 2 covers building services. For the first time, requirements for the overall energy performance were introduced, taking into account the specific building types so that buildings with the potential to achieve high-energy performance (e.g., single-family detached and semi-detached houses) are required to do so. The updated documents also tighten requirements for specific elements such as glazing and roofs, while those parts designed to avoid overheating were retained. Regulations for buildings undergoing major renovations have also been

updated, while requirements were introduced for the first time for minor renovations. Buildings undergoing major renovations are now required to have a maximum overall energy demand together with the elemental requirements already in force.

The national calculation methodology for the calculation of energy performance is the same as that for issuing EPCs so that both systems may be used to enable the effective enforcement and verification of requirements. Primary energy factors are based on actual values so that building designs are able to favour systems with a higher energy performance. The contributions of RES are factored in according to the actual benefit obtained. The introduction of EPCs and the overall energy balance has enabled data to be collected for all buildings and verification may now be carried out effectively. The proposed building characteristics may now be analysed in greater detail prior to the construction phase, since there is a requirement that an EPC has to be submitted to the planning authorities at the design stage.

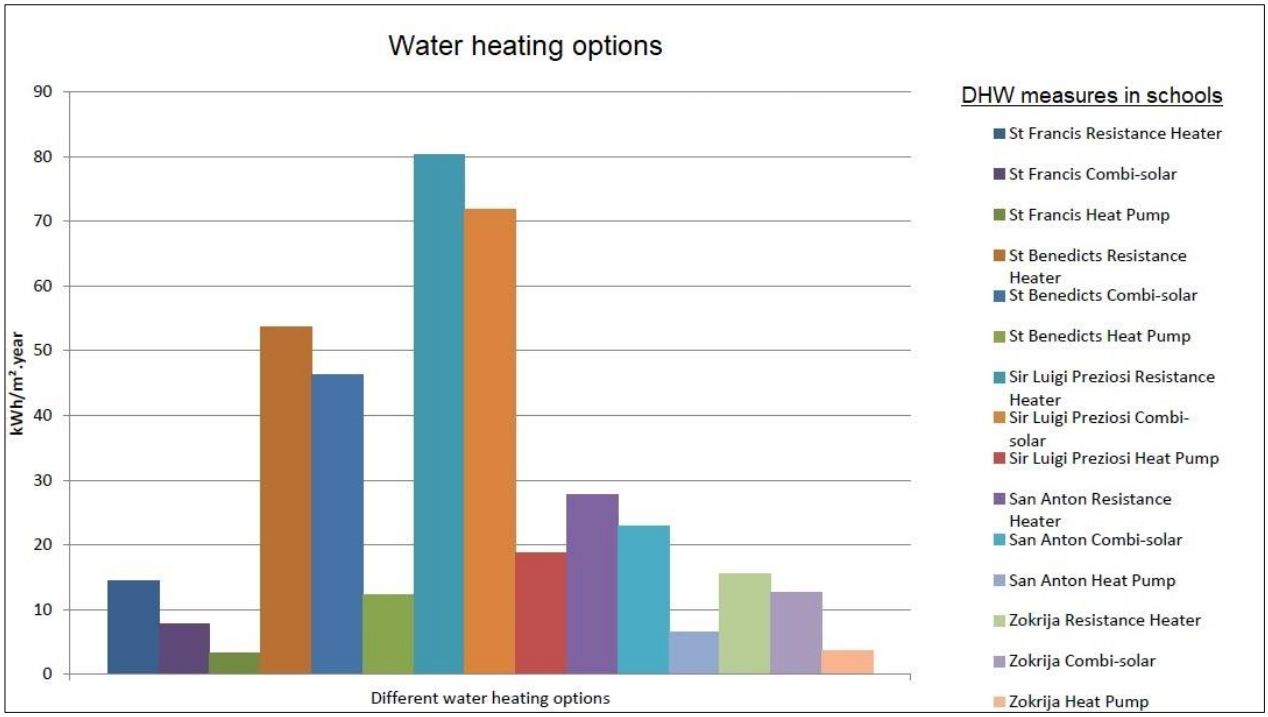

Figure 3. Extract from studies on specific aspects of minimum requirements for non-residential buildings.

2.I.iii. Action plan for progression to NZEB for new buildings

In recent years, steps towards implementing the NZEB were undertaken by an inter-ministerial working group, which follow the development of the definition for NZEB[1] (Figure 4). The working group developed an action plan for the achievement of NZEB. Barriers were identified, including those related to the skills within the construction industry at various levels in the workforce currently employed in the sector. Quantitative targets were set for the progression towards NZEB, while the qualitative progression of the newly built stock towards NZEB was monitored.

A number of studies were carried out on buildings which were known to have inherently high energy use. These were carried out by the BRO specifically in connection with the NZEB commitments. The buildings studied include hotels, restaurants and shops as well as nursing homes, sporting facilities and educational buildings. These studies will be crucial for directing investments so that the results can be achieved. The studies have shown that the investment in RES is particularly cost-effective in the local context, and this is particularly true for buildings with intensive domestic hot water use such as hotels and nursing homes.

Figure 4. The NZEB plan published in 2015 by the Building Regulation Office within the Ministry for Transport and Infrastructure. The plan includes a detailed definition for NZEB https://epc.gov.mt/legislation?l=1

2.I.iv. Requirements for systems and / or building components for new buildings

A set of minimum energy performance requirements for buildings and building services entered into force on 1 January 2016 with the ratification of Legal Notice 434 of 2015. These requirements are officially referred to as Technical Document F, Part 1: Minimum Energy Performance Requirements for Buildings in Malta, and Technical Document F, Part 2: Minimum Energy Performance Requirements for Building Services in Malta (Figure 1 and 5).

Table 9 Maximum heat losses from DHW storage vessels

Nominal volume (litres)	Heat loss (kWh/24h)	Nominal volume (litres)	Heat loss (kWh/24h)
200	2.1	900	4.5
300	2.6	1000	4.7
400	3.1	1100	4.8
500	3.5	1200	4.9
600	3.8	1300	5.0
700	4.1	1500	5.1
800	4.3	2000	5.2

Notes

a. For guidance on maximum heat losses from DHW storage vessels with a storage volume less than 200 litres, see MSA EN 15450:2007[a].

b. The heat loss from electrically-heated cylinders (volume V litres) should not exceed $1.28 \times (0.2 + 0.051V^{2/3})$ if point-of-use or $1.28 \times (0.051V^{2/3})$ if local.

a MSA EN 15450:2007 *Heating systems in buildings. Design of heat pump heating systems.*

Figure 5. Extract from Technical Document, Part 2: Minimum Energy Performance Requirements for Building Services in Malta showing requirements for domestic hot water, which has been identified as a component with high energy demands in Malta when compared to other Member States.

2.II. Energy performance requirements: EXISTING BUILDINGS

2.II.i. Progress and current status of existing buildings

The first minimum energy performance requirements, introduced in 2006 following the issuance of Directive 2002/91/EC, attempted to address the energy performance of existing buildings by ensuring that all buildings undergoing major renovations were subject to the elemental values as well as system and overheating requirements applicable for new buildings. To enable effective enforcement, major renovations were defined in Legal Notice 376 of 2012[1], to relate specifically to the building's physical characteristics. The updated minimum requirements[1], which came into force in 2016, further address minor renovations, staged renovations, and the replacement of building components. When a building component is replaced in an existing building, the requirements for the replaced component are the same as for a new building. An overall energy performance requirement was also introduced for buildings undergoing major renovations so that the maximum energy demand of the newly renovated building has been limited. A common methodology applies for the calculation of the overall energy balance required for minimum energy performance and the calculation of the energy performance indicator for EPCs. This simplifies calculation, comparison between buildings and enforcement of the requirements. When assessors issue EPCs, they are required to report the date of any renovations carried out. This simplifies the enforcement of energy performance requirements for both minor and major renovations.

2.II.ii. Plans to improve the existing building stock

Studies have shown that in existing buildings, housing in particular, significant energy performance improvements are possible through the installation of RES and the replacement of technical building systems. With this in mind, a number of financial incentives and favourable feed-in tariffs were introduced in order to specifically target existing buildings. Such incentives were aimed at enabling current building owners, and these incentive schemes generated considerable participation. As of 2015, a total of 77,000 applications for grants were made in relation to the installation of photovoltaic systems and feed-in tariffs, solar water heaters, micro-wind turbines and other measures. The housing building stock in Malta consists of a large number of single-family units with a substantial potential for the installation of solar RES. A sample of existing housing units which have undergone major renovations showed that it is not only possible to achieve the minimum requirements for overall energy performance of new housing units with the introduction of such RES technologies, but in most cases it is also possible to achieve NZEB level, which for some semi-detached and detached housing units is equivalent to 55kWh/m²(NZEB plan for Buildings in Malta, 2015; https://epc.gov.mt/legislation?l=1).

Public buildings in Malta range in size, building characteristics and age as well as energy use. As a part of central government efforts to play an exemplary role in energy efficiency and renovation, a detailed inventory of all public buildings was compiled by the Maltese Energy Agency and the BRB. As part of the renovation strategy, detailed data has been gathered as to the actual energy use. The energy use and building characteristics were assessed by these agencies to identify which buildings have the greater potential for improvement. The process for renovations on a number of these public buildings has now been initiated with the intent of reducing the energy use in these buildings, gathering information for future renovations in public and private buildings and enabling the central government to contribute to energy efficiency targets.

2.II.iii. Regulation of system performance, distinct from whole building performance

Technical Document F, Part 2: Minimum Energy Performance Requirements for Building Services in Malta sets out mandatory requirements regarding technical buildings systems as laid out in Article 8 of the EPBD, transposed by Legal Notice 47 of 2018, Energy Performance of Buildings Regulations[1]. The requirements addressed in this document apply to fixed building systems which are being designed and/or installed in both new and existing buildings. The document is available for download on the BRO website (www.bro.gov.mt). This document sets mandatory minimum energy performance requirements for cooling, heating, ventilation and lighting systems together with their relevant controls. Among various requirements, these regulations have introduced a framework for the overall performance of systems, including minimum efficiency levels for system typologies.

2.II.iv. Encouragement of intelligent metering

In the Maltese energy context, the energy generation and distribution sector is dominated by a single corporation which has invested considerably in the transition to intelligent metering in recent years. Intelligent metering has been introduced in the vast majority of buildings and intelligent meters have been in use for more than five years in most buildings.

Minimum standards for the metering of general and display lighting are referred to in Technical Document F, Part 2. The same document also specifies the minimum requirements for control and minimum efficiency for systems in various building services, including lighting, domestic hot water and space heating services.

2.II.v. Financial instruments and incentives for existing buildings

The potential for improved energy performance in existing buildings has been recognised at an early stage given the extensive building stock and the lack of energy-efficient buildings in the post-war period. The prevalence of a mild climate, which consequently results in little incentive among owners to renovate given the low financial benefits of doing so, has been a contributor to the low level of investment in this sector. Most housing units are owner-occupied, single-family homes and apartments; due to the already low amount of energy used as well as the moderate energy costs, there is not much to gain financially by achieving further energy savings. Around 4% of the total energy generation in Malta is from solar RES, the majority of which comes from the widespread installation of solar domestic hot water and photovoltaic panels on existing buildings.

2.II.vi. Information campaigns / complementary policies

While the energy performance of buildings is adhered to by means of regulation and enforcement, it has been acknowledged that the installation of RES in private residences and other buildings as well as the shift towards NZEB may be greatly aided by an increase in public demand for such buildings, even though these may not pay off in the short term. Central government authorities responsible for energy efficiency have therefore attempted to promote the benefits of energy efficiency in property values. An example where this strategy has worked is in glazing, where, due to high consumer demand, most new buildings are now being fitted with glazing systems which go beyond the newly updated minimum requirements set according to cost-optimal levels.

Information campaigns targeting energy efficiency over recent years have included:

- distributing the NZEB Plan for Malta[1] to the general public via local printed newspapers and to all building professionals to make the general public aware of the shift towards NZEB;
- distributing brochures that detail the requirements for EPC and with information regarding energy efficiency in general to all households in Malta;
- having articles published in local printed media to promote energy efficiency and outline requirements of the EPBD (Figure 6);
- having members of the BRO participate in radio and television broadcasts, including live phone-ins from the public, to promote various aspects of the EPBD such as the value of EPCs for energy efficiency;
- distributing brochures with regards to requirements for EPCs when selling a property and publishing advertisements in local printed national newspapers to encourage persons to advertise a sale of a property by providing the EPC to estate agents, in order to improve compliance with requirements to display EPCs when advertising a property;
- delivering a series of in-service courses for teachers regarding climate change and energy efficiency where teachers may then impart knowledge to students later in science lessons, creating a multiplier effect;
- delivering lectures regarding the EPBD and energy efficiency to the public in events organised by local councils;
- updating the BRO's website (www.bro.gov.mt) to provide the latest information about various aspects of the EPBD and energy efficiency.

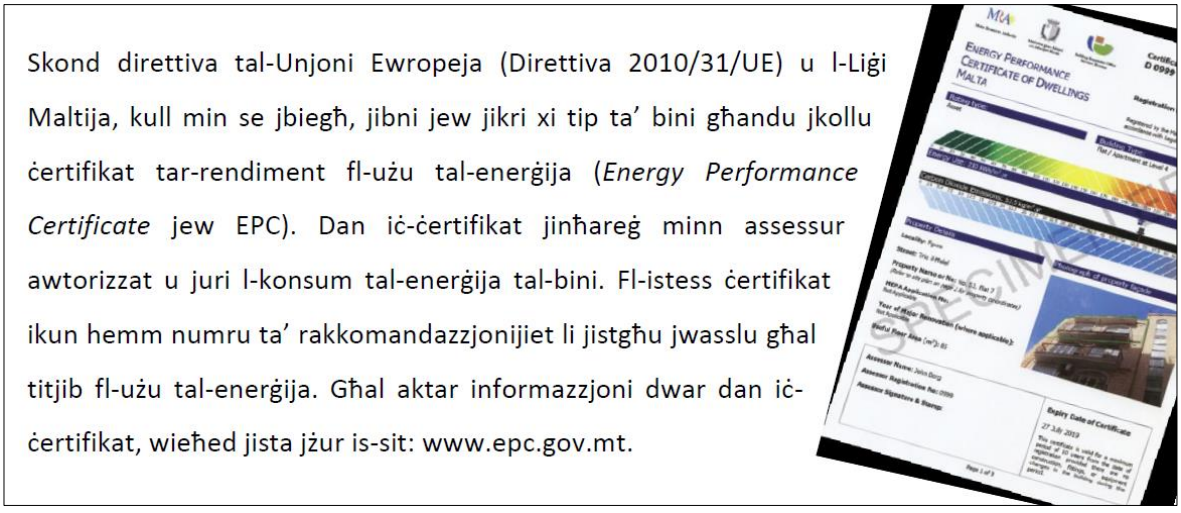
Skond direttiva tal-Unjoni Ewropeja (Direttiva 2010/31/UE) u l-Liġi Maltija, kull min se jbiegħ, jibni jew jikri xi tip ta' bini għandu jkollu ċertifikat tar-rendiment fl-użu tal-enerġija (*Energy Performance Certificate* jew EPC). Dan iċ-ċertifikat jinħareġ minn assessur awtorizzat u juri l-konsum tal-enerġija tal-bini. Fl-istess ċertifikat ikun hemm numru ta' rakkomandazzjonijiet li jistgħu jwasslu għal titjib fl-użu tal-enerġija. Għal aktar informazzjoni dwar dan iċ-ċertifikat, wieħed jista jżur is-sit: www.epc.gov.mt.

Figure 6. An article in local printed media to promote energy efficiency and outline requirements of the EPBD.

Figure 7. Billboards as part of an information campaign regarding EPCs.

2.III. Energy performance certificate requirements

2.III.i. Progress and current status on sale or rental of buildings and EPCs

EPCS were first introduced in Malta with the ratification of Legal Notice 261 of 2008[2], and were made mandatory for housing units when built, sold or rented after 2 January 2009. For all other buildings, energy performance certification was made mandatory as of 1st of June 2009.

The EPC methodologies *Energy Performance of Residential Dwellings in Malta (EPRDM)*, and *Simplified Building Energy Model for Malta (iSBEMmt)* for residential and non-residential buildings, respectively, have become the approved national methodologies for certification purposes by means of government Notices 1025 and 1035 of 2015 issued in October of the same year.

Where a building is not yet constructed, the certificate is based on a *design rating*, while certificates for completed buildings are based on an *asset rating*. In either case, the certificate is valid for 10 years and is stored in a central national database.

In recent years, the BRO has initiated administrative processes to ensure that the requirements for EPCs are adhered to in order to increase the issuance of EPCs, with a total of 8,482 certificates issued in 2015 and 9,726 issued in 2016. Consequently, the ratio of the number of EPCs to the number of existing households increased from an estimated 2% in 2014 to 12% by the end of 2016.

The BRO has in recent years collaborated closely with the Department of Inland Revenue to be able to access private contracts related to public and private buildings so that the requirement for building owners to submit an EPC is effectively adhered to.

2.III.ii. Quality Assessment of EPCs

To ensure a high quality of EPCs and to achieve a level of independence in the auditing process, the Independent Control System has been entrusted to the Malta Competition and Consumer Affairs Authority (MCCAA). The verification system devised by the BRO and MCCAA consists of a number of checks on a statistically significant sample of certificates. During the sampling process, at least one certificate from each active registered assessor is verified. This is carried out on a yearly basis guided by Schedule II of the EPBD. Over the last three years, over 1,000 EPCs were scrutinised during this verification process.

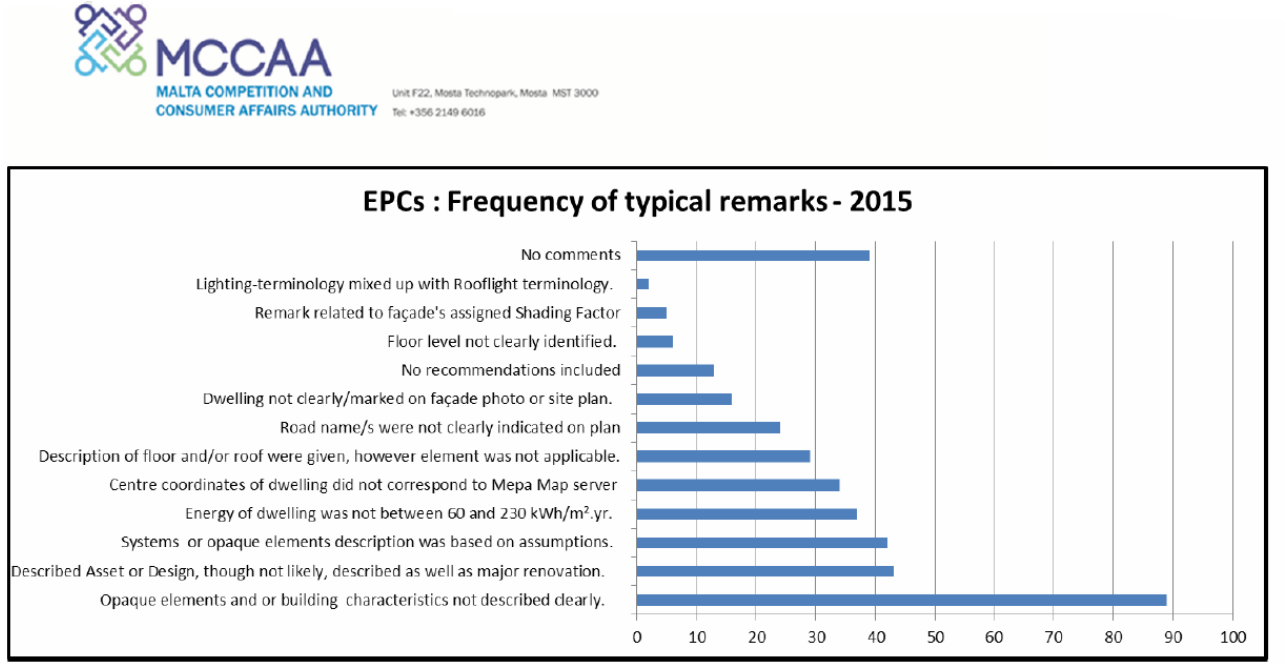

Figure 8. Results from audits carried out on a sample of EPCs by the independent authority.

Following the audit report, notifications are given to all assessors on minor errors being highlighted in the verification report so that these may be avoided in the future. Wherever quality was seen to be lacking, the assessor was asked to resubmit a new certificate addressing the issues, along with a resubmission fee.

2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public

Buildings visited by the public are considered an opportunity to disseminate information regarding EPCs and energy savings in general. In light of this, an exercise is being carried out with the specific intent to ensure that all buildings larger than 250 m^2 occupied by a public authority and frequently visited by the public are covered by an EPC clearly displayed to the public. The various government ministries have been contacted and a list of all the buildings owned and/or used by each was submitted together with information on useful floor area and whether or not these are frequently visited by the public. The buildings which satisfied the requirement for an EPC were identified and a programme for the submission of the various EPCs has been prepared by most of the building coordinators. The programmes are currently being followed up to ensure that EPCs are indeed displayed. The BRO has ensured in this way that all EPCs that have been issued are on display. The issuance of EPCs in public and private schools and central government buildings is very high. Since these EPCs are frequently viewed by the public, the BRO has undertaken a process whereby the contents and calculations of these EPCs are verified for quality purposes. This verification process is in addition to the independent control system in place and involves

on-site verification of the data. It is believed that the improvement of the EPCs on display is beneficial to the overall reputation of energy performance certification.

2.III.iv. Implementation of mandatory advertising requirement status

Legislation has recently come into force regarding the implementation of mandatory advertising requirements which had addressed previous anomalies hindering the implementation of this requirement. The new Legal Notice (47 of 2018) clearly sets out obligations of each and every party involved in the sale of a property. The party responsible for ensuring the EPCs are present in the advertisement has been defined in all cases, including in the case of websites where users are able to create advertisements themselves. A way forward has thus been set for the enforcement of this obligation.

A document titled "*Advertisement requirement guidelines*" has also been issued to serve both as a guide and a "minimum requirement" for the integration of EPCs within advertising media, including inter-alia newspapers, magazines, internet media, brochures, billboards, radio, television, direct mail, apps and estate agent listings (Figure 9).

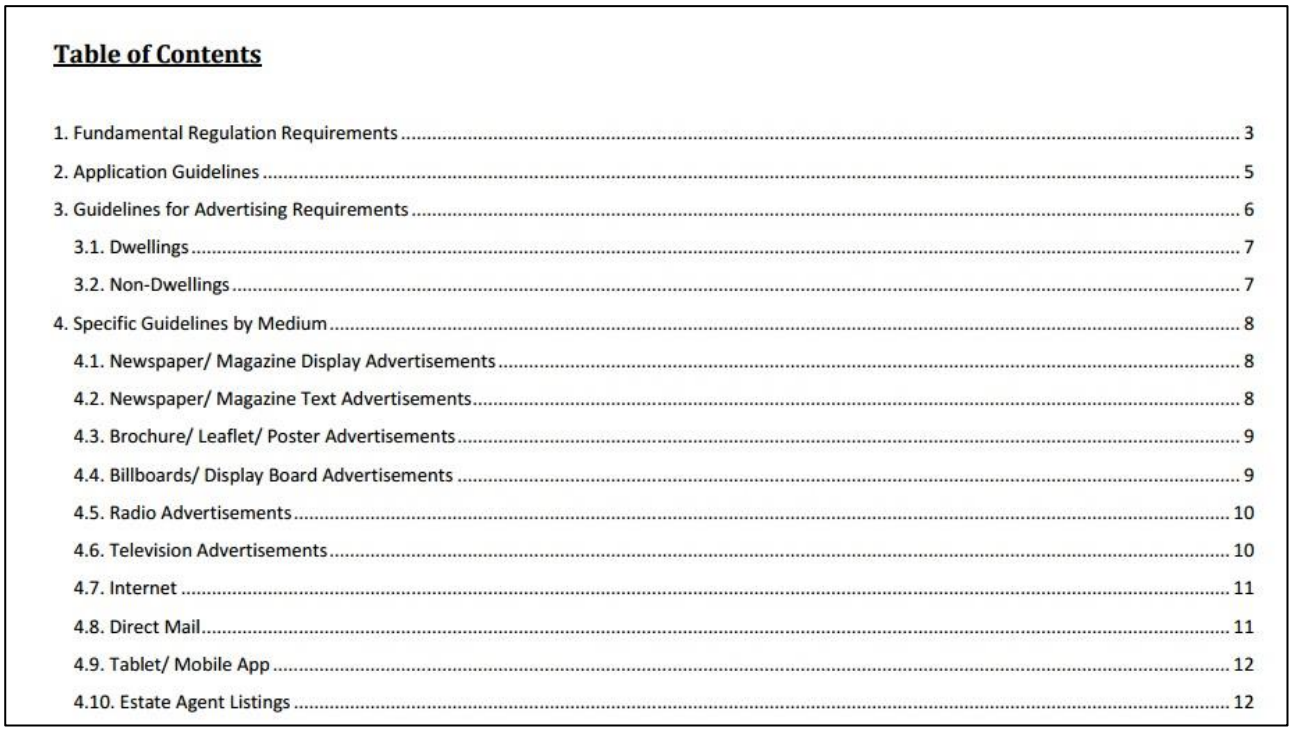

Table of Contents

Figure 9. Extract from advertisement requirement guidelines issued for all advertising media (https://epc.gov.mt/legislation?l=1).

2.IV. Inspection requirements - heating systems, air conditioning

Malta has adopted the inspection of heating and AC systems. The BRO has set up inspection procedures and maintains the register of inspectors and inspection reports. The register of heating and AC inspectors is available on the BRO website, including contacts for the public to be able to commission an inspector[3]. The public has been informed about the requirements and information sessions have been carried out so that professionals, building managers and other persons within the industry are informed regarding procedures to be undertaken.

2.IV.i. Progress and current status on heating systems

The BRO maintains the register for inspection reports and inspectors of heating systems. Inspections are carried out on the accessible parts of systems used for the space heating of buildings with boilers of an effective rated output of 20 kW or greater. The inspection frequencies of heating systems are shown in Figure 10.

Effective rated output of boiler	Type of boiler fuel	Inspection frequency of heating system
>100 kW	All types except gas	2 years
>100 kW	Gas	4 years
>20 kW up to 100 kW	All types	4 years

Figure 10. Inspection frequency of heating systems.

The essential aspects of an inspection include a documentation review, a visual inspection of the heating system equipment, including generation, distribution, emission and controls, and a mandatory combustion efficiency analysis. Inspectors of heating systems make an assessment of the boiler efficiency and sizing. Inspectors are also required to draw up recommendations for the cost-effective improvement of the energy performance of the inspected system(s).

In order to improve the inspection system, a new legal notice has been issued. This new legal notice defines the responsibilities of heating systems' owners and relevant inspectors in clearer terms. A "*Guide for Owners of Heating and Air-conditioning Systems" (GOHAS)* has also been prepared for publishing, along with the aforementioned Legal Notice.

This guidance document indicates which systems qualify for inspection with reference to particular system setups. It also provides additional details on the responsibilities of heating systems' owners and inspectors. The document preparation required by owners is also listed in this guide for ease of reference.

2.IV.ii. Progress and current status on AC systems

The methodology being used for AC inspections is largely based on "Technical Memorandum 44: Inspection of Air-conditioning systems, 2012", issued by the Chartered Institute of Building Services Engineers, UK (CIBSE). Inspections are carried out on AC systems which have an effective rated output of more than 12 kW. Inspection frequencies are shown in Figure 11.

Effective rated output	Inspection Frequency
12-100 kW	10 years
>100 kW	5 years

Figure 11. Inspection frequencies for AC systems according to effective rated output.

AC inspectors who have undergone a training course and assessment are registered with the BRO and their list with contact details is available on the BRO website (https://epc.gov.mt/information-assessors?l=1). The BRO has placed strict entry requirements for AC inspectors in order to ensure the necessary

competency. The AC inspectors must have a degree in mechanical and/or building services engineering, be warranted and have experience in the design and/or maintenance of AC systems. This ensures that the inspection reports are of good quality.

Owners of AC systems shall commission a registered AC inspector to carry out an inspection. The inspection requires the compilation of system documentation, the maintenance of the system, its energy efficient operation and recommendations for cost-effective improvements to the system. An assessment is also carried out on the efficiency and sizing of the AC system in comparison with the cooling requirements of the building. The AC inspection report drawn up by the inspector is then submitted for registration with the BRO. The report is handed to the client and the BRO retains a copy for the national database.

Similar to what has been described in heating system inspections, a new Legal Notice awaiting publishing is expected to contribute to improvements on the existing inspection system. This Legal Notice provides clearer definitions and responsibilities on both the inspectors and owners of AC systems.

2.IV.iii. Enforcement and impact assessment of inspections

Enforcement and penalties

The new legal notice, 47 of 2018, addresses deficiencies which are lacking in the present legal instrument. The new legal notice provides clearer obligations on the owners of AC systems, which will enable the BRO to step up the enforcement of inspections and administration of penalties.

Quality control of inspection reports

The quality of the inspection reports to date is very good, since there is a very high level of competence in the registered heating and AC systems inspectors.

The inspection reports submitted for registration were all reviewed by the BRO personnel and any deficiencies in reporting were referred back to the respective inspector to improve upon these deficiencies in order to set up a good quality standard of inspection reports.

The BRO has also a provision for the quality control of inspection reports to be carried out by the MCCAA[4], in a similar manner to that carried out on the EPCs.

Impact assessment, costs and benefits

The BRO has received feedback from the heating and AC inspectors on the current situation when carrying out inspections. The most crucial and demanding aspect of the first inspection is the gathering of documentation of the systems installed within a building. It also seems that building users are usually not aware of the systems installed in their buildings and lack information on how to best operate such systems. Therefore, the most cost-effective recommendations to achieve energy efficiency are mostly related to the proper upkeep and maintenance of systems usually requiring minimal interventions on the installed equipment.

3. A success story in EPBD implementation

Architecture and structural engineering in Malta have particularly strong ties. The engineering and architectural professions have worked together for most of their existence, and most professionals practise both. In many cases, particularly in small projects, such professionals are involved from the very early stages of the project all the way to the end, assuming responsibilities for design, planning permits, structural design and finishing. Professionals are bound by a long period of professional responsibility, which in practical terms translates into professionals being crucial in ensuring that the finished building is built according to the intended design and is structurally sound.

With the introduction of the EPBD, and with national legislation related to energy performance coming into force, architecture and engineering professionals were then tasked with new responsibilities. Establishing responsibilities applicable to minimum requirements and EPCs as well as NZEB within the current system was viewed as a golden opportunity. Architects and civil engineers would now be responsible for drawing up recommendations to improve the building's energy efficiency, since these professionals were deemed the most competent persons within the construction industry due to their experience in construction and renovations. Similarly, heating and AC inspections were entrusted to experienced building service engineers, as these are the professionals with the best available knowledge as to how to improve the efficiency of installed systems and may therefore advise building owners accordingly.

It was understood from the very beginning that training building professionals in energy efficiency aspects will have a multiplier effect in the sense that the training they undergo for energy performance certification and system inspection may then be put to good use when these same professionals are carrying out unrelated design work. Similarly, the same professionals are then able to impart the knowledge gained from EPC and inspection training onto associated professionals, trade persons within the construction industry, building users and owners.

4. Conclusions, future plans

In Malta, the EPBD is part of a wider movement towards energy efficiency in general, plug-in-loads, behavioural patterns in energy use and building energy efficiency. The actual impact of the EPBD on energy efficiency in the Maltese context has yet to be quantified, and when this is done it will be very difficult to qualify which increased efficiencies are due to the EPBD, which are attributable to other EU directives and which are attributable to other measures taken by private individuals or the Maltese authorities. For new buildings, introducing minimum EPBD requirements has effectuated improvements estimated at somewhere between 15-25%. This might be viewed as a big step forward, but when one takes into consideration that this relates only to new builds, which annually represent around 1% of the existing stock, the improvement may in fact be small overall.

An analysis by the BRO of a sample of EPCs for housing units over the period 2011-2015 shows that the energy performance of new housing units has indicated a slight improvement in energy performance over this period. Across all sectors of energy use, a reduction of carbon dioxide emissions was attained, where according to Eurostat in 2013, values were 6.8% lower than in the previous year.

Statistics show that housing units were built over various periods. The energy use for residential buildings has been shown to be low overall, and therefore the reduction in carbon dioxide emissions from this sector is expected to be low. During the past few years, it has been shown that in many cases cost-effective

energy efficiency in this sector may only be achieved when RES, particularly those related to solar energy, are integrated in the renovation or new build. These small-scale solar RES constitute the majority of the country's added share of renewable energy in the last five years.

Offices and commercial buildings are being constructed at a quick pace, due to development in the services industry. These buildings have been shown to use energy much more intensively in Malta. The requirements of the EPBD for this sector were implemented at a later stage, and as a result its effects cannot be quantified as of yet. This sector is expected to contribute to a greater effect towards energy efficiency.

Introducing the new cost-optimal minimum requirements, which include an overall energy balance limit for buildings undergoing major renovations and requirements for renovated parts, is expected to improve the overall energy demand for building stock renovations already taking place.

Endnotes

1. https://epc.gov.mt/legislation?l=1
2. http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=15928&l=1
3. https://epc.gov.mt/EPC/information-assessors?l=1
4. https://mccaa.org.mt

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 692447.