CONCERTED ACTION
ENERGY PERFORMANCE
OF BUILDINGS

Implementation of the EPBD in Malta

STATUS IN DECEMBER **2015**

1. Introduction

In Malta, legislation and regulation relating to energy efficiency in buildings imposed limited extra measures due to the prevalent mild climate and relatively low energy use in buildings. The Energy Performance of Buildings Directive (Directive 2002/91/EC and its recast, Directive 2010/31/EU - EPBD) was transposed through a number of statutory instruments over the period 2006-2015.

Legal Notice 238 of 2006 set out minimum requirements on the energy performance of buildings. These were the first ever legally binding regulations relating to overall energy performance of buildings in Malta. Requirements for energy performance certification were set out under Legal Notice 261 of 2008. This legal notice, which transposed the Directive 2002/91/EC into national legislation through the provisions of the 'Malta Resources Authority Act (CAP 423)', also set out requirements for the inspection of heating and Air-Conditioning (AC) systems. Following the Directive 2010/31/EU, Legal Notice 376 of 2012, titled 'Energy Performance of Buildings Regulations 2012' was issued in October 2012 through the provisions of the 'Building Regulation Act (CAP 513)' and the 'Malta Resources Authority Act'. This transposed Directive 2010/31/EU into law and superseded all previous legal notices. This legal notice has been instrumental in implementing energy performance requirements in Malta.

This report illustrates the process by which Malta implemented the EPBD. It also gives a detailed picture of the status of implementation of the EPBD up until late 2015. The aspects described in this report include the systems for energy performance certification of buildings, training of energy performance assessors, current energy performance minimum requirements, cost-optimal studies carried out and emanating proposals, steps taken towards upgrading minimum requirements, inspection of heating and AC systems, training of inspectors, quality control and auditing, information campaigns, incentives and subsidies.

Since October 2012, the responsibilities for the EPBD implementation lay with the Building Regulation Office (BRO) and the Building Regulation Board (BRB), within the Ministry of Transport and Infrastructure.

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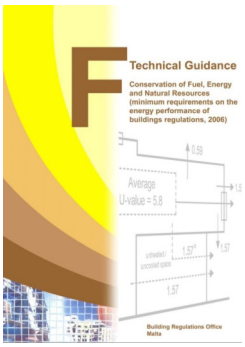
2. Current status of Implementation of the EPBD

I. ENERGY PERFORMANCE REQUIREMENTS

Prior to the first steps towards the implementation of the EPBD, no particular legislation treated energy efficiency in buildings in Malta. This was partially due to the mild climate and the traditional vernacular buildings, which due to their high thermal mass and other design features are not particularly avid energy users. Legal Notice 238 of 2006 introduced

minimum requirements for all buildings (Figure 1). These minimum requirements tackled various aspects ranging from construction of the building envelope to lighting systems and other technical components. In view of Malta's warm climate, these minimum requirements introduced limits for the size and positioning of glazing to reduce overheating (Table 1). Requirements to limit thermal losses through the building fabric included maximum thermal transmittance values for all building elements. The adopted requirements for walls reflected the local practice of constructing external cavity walls with two 150 mm thick stone leafs. This practice was at the time being replaced by a system of a single hollow concrete block wall and therefore was reducing the thermal performance of the building envelope.

Figure 1: National requirements for all new buildings.



Due to the lack of freshwater available on the island and the dependency on groundwater and desalinated water, the requirements also included mandatory rainwater conservation through the compulsory construction of water cisterns and use of the rainwater for flushing and irrigation purposes in all new buildings.

Figure 2: Maximum thermal transmittance factors for all buildings.

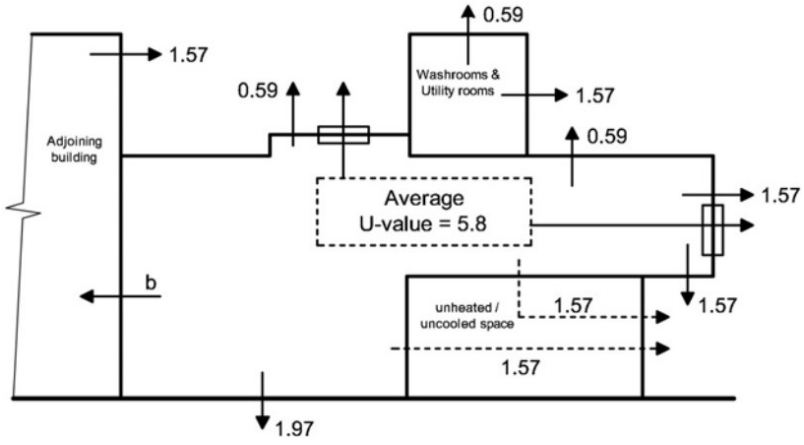


Table 1: Provisions on minimum requirements for the limiting of overheating enable compliance by limiting glazing areas according to orientation (table F.4 of the building regulations).

Maximum allowable area of glazing	Table F.4
Orientation of opening	**Maximum allowable area of opening (%) using a minimal correction factor of 0.95 for glazing/blind combination**
N	25
S	20
NE	17
E/SE/SW/NW	12
W	9
Horizontal (rooflights)	7
Note: The maximum allowable area of glazing for windows with an orientation falling in between the compass directions indicated in the table may be calculated by interpolating the values shown above.	

I.i. Progress and current status

The minimum energy performance requirements that were introduced in 2006 for all new residential and non-residential buildings, were in the form of technical guidance documents. These minimum requirements take a broadly elemental approach to energy performance and are identical for both residential and non-residential buildings. The minimum requirements are also applicable to existing buildings where these are subject to major renovations. The latter was clearly defined in the "Energy Performance of Buildings Regulations LN 376" of 2012 which superseded previous legislation. Where existing buildings undergo such renovation, the minimum energy performance requirements for the renovated parts of the building are the same as those for new buildings.

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

Legal Notice 376 of 2012 issued by the Ministry of Resources and Rural Affairs kept the same provisions for energy performance in buildings requirements adopted in 2006, and transposed other provisions of the Directive 2010/31/EU, including cost-optimal framework and development of plans for Nearly Zero-Energy Buildings (NZEBs).

The minimum requirements are applicable to all new buildings, as well as those undergoing major renovations.

The minimum requirements include provisions on the following aspects:

- maximum thermal transmittance factors for all elements to prevent the passage of heat through the building fabric (Figure 2);
- requirements to calculate the effect of thermal bridges and limits to prevent excessive heat loss through such thermal bridges;

Table 2: Provisions for the controls of heating and cooling systems (table F.5 of building regulations).

Size of plant for which separate metering would be reasonable	Table F.5
Plant item	**Rated input power (kW)**
Boiler installations comprising one or more boilers or CHP plant feeding a common distribution circuit	50
Chiller installation comprising one or more chiller units feeding a common distribution circuit	20
Electric humidifiers	10
Motor control centres providing power to fans and pumps	10
Final electrical distribution boards	50

- indoor air quality is ensured by minimum background ventilation rates, which are usually provided in the form of trickle vents, however no separate provisions for building infiltration rates are present;
- limits on the glazed areas to limit the passage of heat, while providing flexibility for designers to increase these glazed areas by further improving thermal performance of individual items of the building envelope;
- overheating mitigation from solar gains by limiting glazed areas according to orientation (Table 2), while retaining flexibility by allowing designers to use alternative methods of calculation to take into consideration elements such as shading devices. With regards to the latter, the designer is permitted to increase maximum glazing areas if such areas are shaded and only the limits for thermal transmittance apply;
- controls on artificial lighting systems;
- conservation and use of rainwater collected on the roofs and sites;
- controls and insulation of heating and cooling systems.

Since Malta adopted, at that time (2006), an elemental approach towards building envelope energy performance and not an overall energy demand approach, compliance to the minimum energy performance requirements does not consist of calculations with set thermal comfort parameters. After 1 January 2016, the different overall performance benchmarks for different categories of residential units and other building types enter into force through new legislation issued at the end of 2015.

The BRO is responsible for setting Quality Assurance (QA) procedures and strategy. The Malta Environment and Planning Authority has been involved in the strategy and procedures for QA. These strategies have been designed to tackle any issues identified at very early stages in building design. As such, the BRO is in some cases consulted by the Malta Environment and Planning Authority during early stages of design of new buildings.

I.iii. Cost-optimal procedure for setting energy performance requirements

Malta has carried out cost-optimal studies for residential and non-residential buildings. The studies for residential buildings identified 7 reference typologies for new buildings and 14 for existing ones, taking into consideration a wide spectrum of building typologies and construction systems. Existing reference buildings included a variety of constructions built over the last century, thus mirroring practically all parts of the current building stock.

Energy efficiency measures applied to the reference buildings included measures related to heating, cooling, Domestic Hot Water (DHW) and lighting, together with contribution from Renewable Energy Sources (RES). Cost-optimality studies included the application of 225 permutations of energy efficient packages for each residential reference building.

An elemental analysis was carried out to determine the cost-optimal level of building elements (e.g., parts of the building fabric), or systems in major renovations or replacement.

Results showed that the then current minimum requirements were cost-optimal for some elements (e.g., roofs), while lower than cost-optimal level for other elements (e.g., glazing). Where it is possible to install solar RES, these are cost-optimal in all situations affecting overall energy demand considerably.

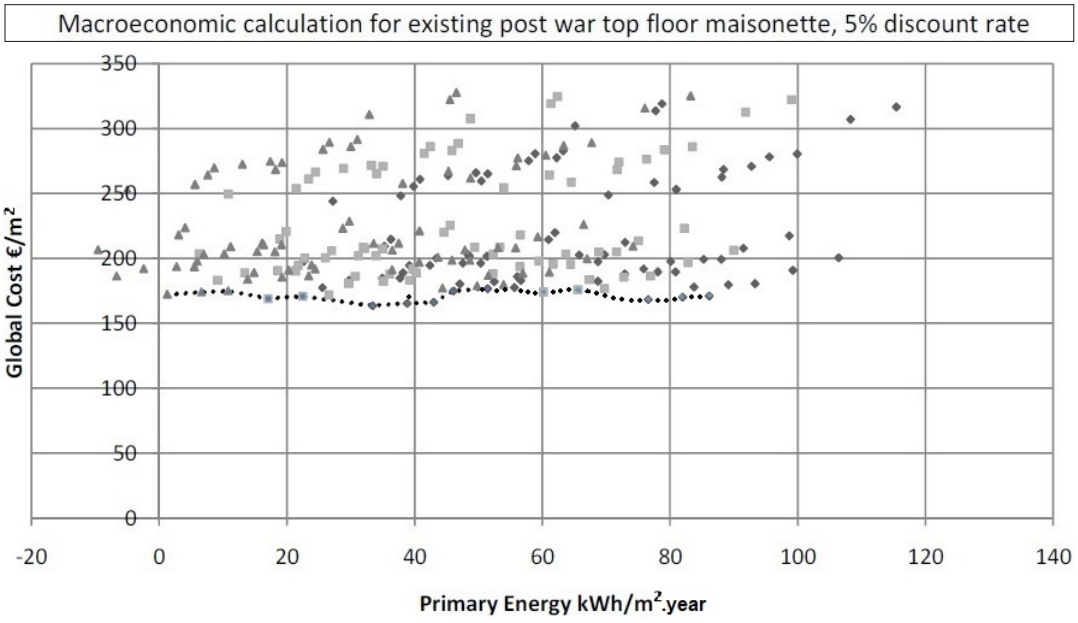


Figure 3: Graph showing primary energy against global cost for a reference house.

For the vast majority of cases, the new residential reference buildings with cost-optimal overall energy demand in kWh/m^2.year was found to be lower than that for the reference buildings built according to then current minimum requirements. The gap between current minimum requirements and cost-optimal levels due to the building fabric and building systems was found to be slightly above the 15% threshold. Amendments to current minimum requirements were being prepared, which include a total building energy performance indicator together with limits for elements. By means of statutory instruments introduced in late 2015, these new revised minimum requirements enter into force as of 1 January 2016.

For non-residential buildings, studies have also shown that the new reference buildings with cost-optimal overall energy demand in kWh/m^2.year are more energy efficient than the reference buildings built according to current minimum requirements. The overall gap between current minimum requirements and cost-optimal levels due to the improved fabric and systems varies between 20% and 45%, according to the building typology. Proposals for the improvement of current minimum energy performance requirements were formulated.

I.iv. Action plan for progression towards Nearly Zero-Energy Buildings (NZEBs)

Legal notice 376 of 2012 requires a shift towards NZEBs by 2018 for new buildings occupied and owned by public authorities, and 2020 for all new buildings. Studies to develop a NZEB plan for Malta, undertaken recently, where carried out in close coordination with the studies carried out for cost-optimality. A number of energy efficiency measures were applied in packages to reference buildings in such a way to achieve nearly zero energy levels. Such packages were analysed from a financial point of view to determine which measures are capable of achieving these two energy levels at the lowest cost over the building life-cycle. NZEB levels were shown to be tighter than cost-optimal levels.

Over the past few years, the Malta Resources Authority in collaboration with the BRB and the BRO have been responsible for drawing up the National Energy Efficiency Action Plan (NEEAP), together with other national plans in order to ensure an increase in the number of NZEBs, and to increase the integration of RES in new buildings and buildings undergoing major renovation. The latter is considered essential in reaching NZEB levels locally.

A NZEB plan has been developed and approved with input from all authorities concerned. The plan defines and sets parameters for NZEBs in Malta. The NZEB definition is based on requirements for the overall primary energy balance. For residential buildings, this varies from 55 kWh/m^2.year to 115 kWh/m^2.year. The overall energy demand is calculated according to the national calculation methodologies, thus creating a level of correlation between minimum requirements and energy performance certification methodologies. The NZEB plan includes requirements for the integration of RES for all buildings (Figure 5).

The plan outlines existing incentives and schemes and those that are shown to be able to create the best possible environment to achieve NZEB levels.

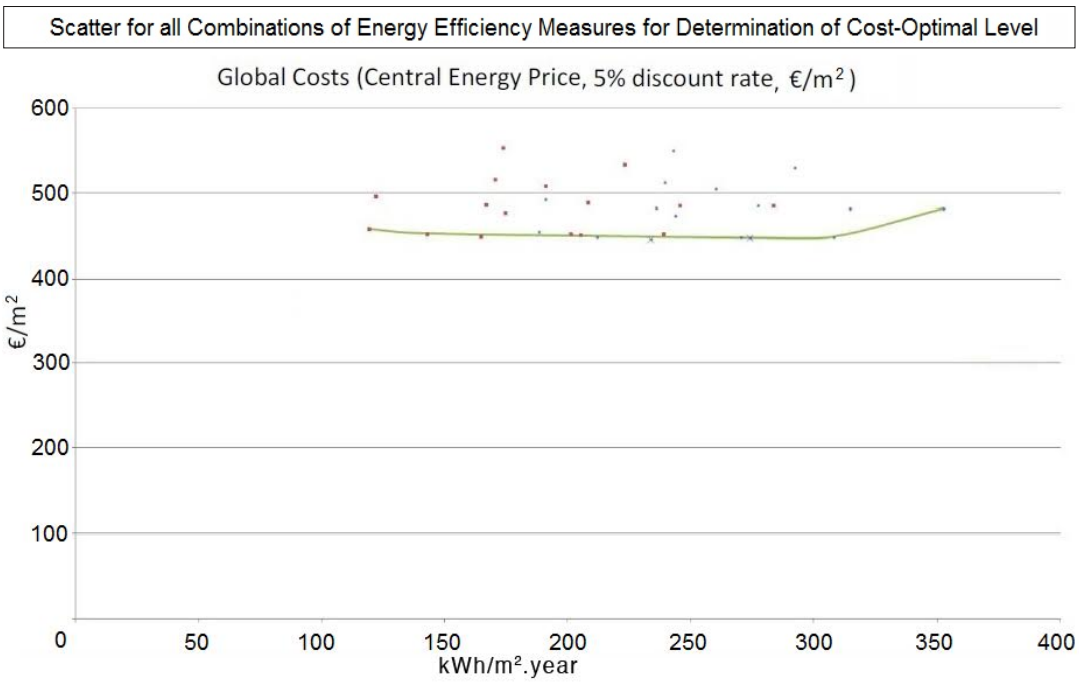


Figure 4: Graph showing the cost-optimal range for an office (central energy price, 5% discount rate).

The role of the central government in setting an example for the construction of NZEB has been particularly concentrated in the construction of low-energy schools and educational buildings. This sector has traditionally set an example in Malta where, in the post-war period, the use of natural light and ventilation in schools was shown to be capable of reducing energy use drastically. A number of schools on the island have shown that it is possible to create positive energy buildings, particularly with the integration of solar RES within the building, or nearby. Non-state schools have also shown a capability to attain low energy levels, where 13 church schools have undergone renovations and integrated RES, reducing delivered energy demand by 647 MWh annually.

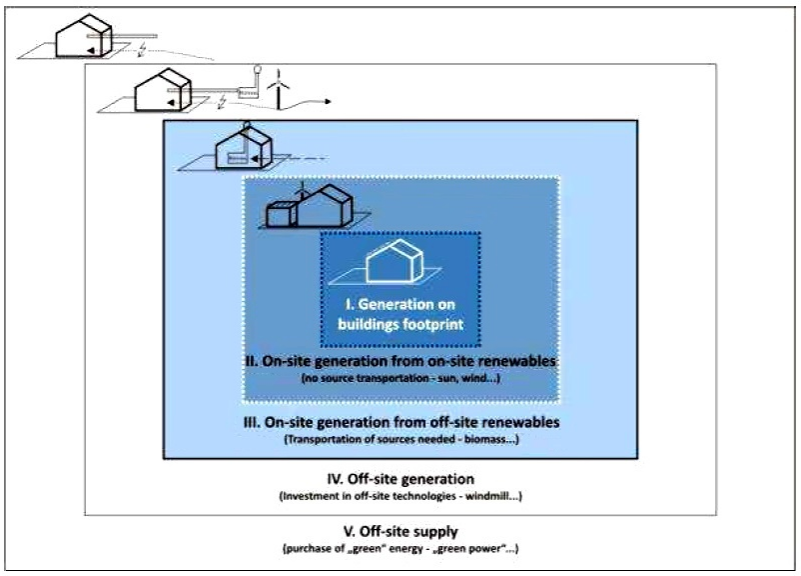
In the private residential sector, 27% of new houses in 2012 have a primary energy demand of less than 60 kWh/m^2.year.

Financial incentives in the form of grants and feed-in tariffs have been adopted over the last few years and have been targeted at those measures capable of achieving NZEB levels. A scheme is being implemented to create financial incentives for achieving NZEB levels. Positive fiscal measures and advantageous bank loans for retrofitting energy efficient buildings have also been available over the past few years.

I.v. Implementation of the Energy Efficiency Directive (EED) regarding building renovation and the exemplary role of public buildings

In line with Article 4 of the Energy Efficiency Directive (Directive 2012/27/EU - EED), data has been collected and compiled about buildings occupied by the central government. This included on-site surveys, such that the latest available information about energy characteristics was collected. Energy audits have been carried out on most of the buildings occupied by the central government, making information about energy use and intensities available. Analysis of this data has shown that 77% of buildings have an actual delivered energy use of less than 107 kWh/m^2, which is considered as good practice. Buildings with higher energy use will be prioritised for renovation, which will achieve minimum savings of 555 MWh of delivered energy.

Figure 5:
Possibilities for the defining inclusion of renewable technologies in proposed NZEB plan.

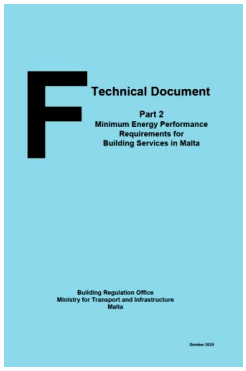


II. REQUIREMENTS FOR TECHNICAL BUILDING SYSTEMS (TBS)

Energy efficiency requirements for Technical Building Systems (TBS) were introduced along with the first issue of minimum energy performance requirements. These included requirements for the control of heating systems, the control of cooling systems, conventional hot water storage systems, artificial lighting systems, display lighting in buildings and conservation of rain water.

A new set of minimum energy performance requirements for TBS have been drawn-up and will come into force from January 2016 (Figure 6). These are based on the UK building services compliance guides (both residential and non-residential buildings). The BRO has commissioned this new document to address in a better way the EPBD requirements, namely the requirement for proper installations, adjustments and controls of the TBS. This document will be part of the new minimum energy performance requirements in Malta.

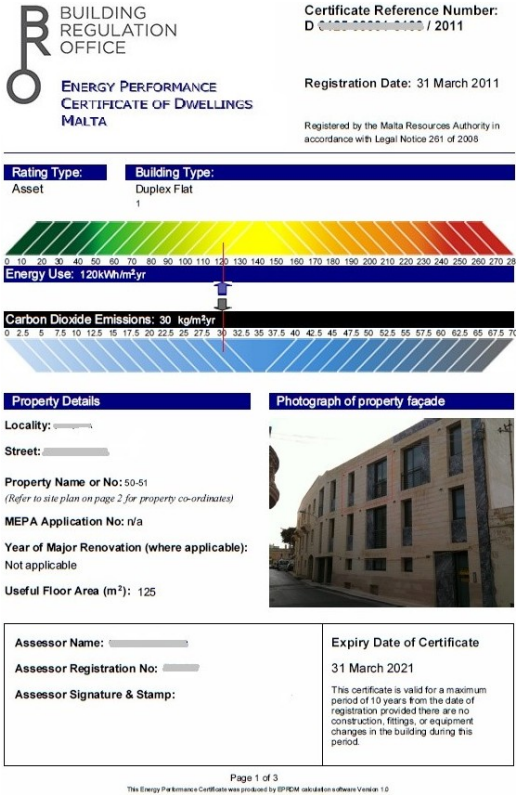
Figure 6:
Technical Document F - part 2 - Minimum requirements for building services.



III. ENERGY PERFORMANCE CERTIFICATES (EPCs) REQUIREMENTS

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

Energy Performance Certificates (EPCs) were first introduced in Malta by means of Legal Notice 261 of 2008, and were made mandatory for houses when built, sold or



BUILDING REGULATION OFFICE

ENERGY PERFORMANCE CERTIFICATE OF DWELLINGS MALTA

Certificate Reference Number: D [redacted] / 2011

Registration Date: 31 March 2011

Registered by the Malta Resources Authority in accordance with Legal Notice 261 of 2008

Rating Type: Asset

Building Type: Duplex Flat

Energy Use: 120kWh/m²yr

Carbon Dioxide Emissions: 30 kg/m²yr

Property Details

Locality: [redacted]

Street: [redacted]

Property Name or No: 50-51

(Refer to site plan on page 2 for property co-ordinates)

MEPA Application No: n/a

Year of Major Renovation (where applicable): Not applicable

Useful Floor Area (m²): 125

Photograph of property façade

Assessor Name: [redacted]

Assessor Registration No: [redacted]

Assessor Signature & Stamp:

Expiry Date of Certificate

31 March 2021

This certificate is valid for a maximum period of 10 years from the date of registration provided there are no construction, fittings, or equipment changes in the building during this period.

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Figure 7: 'Asset' energy performance certificate for houses.

rented after 2 January 2009. For all other buildings, an EPC was made mandatory as from 1 June 2009. A seller or landlord is required to produce an EPC (Figure 7), and to hand it over to the prospective buyer or new tenant at the date of entering the contract of promise of sale or rent agreement at the latest.

A methodology called 'Energy Performance of Residential Dwellings in Malta (EPRDM)' has been developed and is the only approved methodology for the issue of EPCs for housing.

Where a building is not yet constructed, the EPC is based on a 'design rating', while EPCs for completed buildings are based on an 'asset rating' (Figure 8). In either case, the EPC is valid for 10 years from the date of issue. All EPCs are stored in a single central database, with 10,580 certificates issued up to the end of 2015. In the case of multi-family buildings, a certificate is issued for each residential unit as an individual entity.

An EPC is accompanied by recommendations applicable specifically to the building in question. These recommendations are not generated automatically, but drawn up individually by the assessors, who are all building or engineering professionals, or accredited assessors in other EU countries. Such recommendations provide the actual benefit in improving the overall energy performance of the building stock in the long term.

In case of houses, a schedule of specifications and building characteristics is included within the EPC. When a building under construction is certified, the assessor is involved at design stage, giving valuable advice regarding energy efficiency, which in small projects would otherwise not be available.

The owner of a residential unit (single-family house or apartment) being sold typically pays from 225 €, in case of an apartment, to 450 €, in case of more complicated houses, for the issue of an EPC. This fee includes the registration charge levied by the BRO, which covers part of the expenses used to run and update the EPC web portal and certificate auditing systems.

An owner who fails to produce the certificate to the authorities within 60 days from when requested to do so, can incur a fine of between 500 € and 1,500 €. No fines have been issued to date as strategy is aimed towards compliance.

In Malta, prospective assessors have to successfully undertake a period of training on the assessment of the energy performance of buildings constructed in Malta and the methodology adopted for certification of buildings. The training

Figure 8: Extract from data reflection report submitted by assessors and received by BRO. This document gives detailed information about the building which is useful for quality assurance purposes.

SBEMmt Data Reflection Report — Actual Building

Date: Tue Mar 11 13:07:14 2014

Project name: Example building | **Building type:** Offices and Workshop businesses | **Building area [m2]:** 2900

General

Building address	Triq Francesco Buonamici Floriana FRN 1700
Building area [m2]	2900
Weather	MAL
Building rotation [degrees]	0
Project complexity	-

Energy assessor / Certifier

Name	javier zanetti
Telephone number	25252525
Address	river plate buenos aires inter
Assessor number	N1234
Qualification	-
Accreditation scheme	-
Employer name	-
Employer address	-

Owner

Name	John Jones
Telephone number	+356 2295 2000
Address	Triq Francesco Buonamici Floriana FRN 1700

Analysis

Compliance checked with	None
Asset rating	EPC Malta
Stage	As built
Shell & core building	NO

Software

SBEMmt version	v4.2.a.0
Interface to SBEMmt	ISBEMmt
Interface version	v4.2.b

Summary of objects

Object type	Total number	Total related area [m2]
Envelope/Door constructions	6	-

Envelope/Door constructions

Name	U-value [W/m2K]	Adjusted U-value	Km [kJ/m2K]	Metal clad
External wall	1.22	NO	127.05	NO
Ground floor	0.412	NO	150	NO
External door	2	NO	20	NO
Internal floors and ceilings	1.07	NO	76.635	NO
Internal wall	1.69	NO	127.05	NO
Roof for the example building	0.45	NO	3.75	NO

Window/Rooflight constructions

Name	U-value [W/m2K]	Solar transmittance	Light transmittance
Double	1.1	0.42	0.66

course and course content is subject to approval by the BRB. Successful participants have to obtain an overall pass mark of at least 80% after having attended at least 80% of the course lectures. Most of the course participants have qualified and registered to become assessors. Assessors for building energy performance registered in other EU Member States (MSs) can register directly with the BRO. Most of the assessors for non-residential building certification are also assessors for the residential buildings, with just over 180 assessors in total. Training is currently underway with 150 new assessors expected to be registered by the end of 2015.

Enforcement of the system has been carried out since the system was launched. To better enable enforcement, a joint action has been initiated by the BRO and the Authority responsible for the issue of building permits, whereby planning applications may be viewed in the very early stages, to ensure that all EPC requirements have been met. Statistics for compliance by sector are not available.

Auditing of the EPCs has been entrusted to the Malta Competition and Consumer Affairs Authority (MCCAA). A statistically significant sample of certificates is routinely audited on a yearly basis. For 2014, a sample of just over 300 EPCs was audited. A smaller sample is audited to a higher detail and may include location visits. EPCs may also be audited if values are out of range, if issued on the same address as other certificates, or if they are the first certificates issued by a specific assessor, or following complaints from clients. Policy has been targeting at the re-issue of certificates if these are found to be lacking, with levy of re-issue fee.

III.ii. Progress and current status on public and large buildings visited by the public

Information sessions and seminars have been delivered regarding the requirements for the issue of EPCs for buildings larger than 500 m^2 occupied by a public authority and frequently visited by the public. Up to 2014, 52 EPCs have been issued for central government buildings. A number of other entities are in the process of commissioning an EPC during 2015. A list of all buildings occupied by the government has been compiled. Available data includes floor areas of the buildings and the actual energy use. Enforcement of the display of the EPCs in public buildings is being carried out according to this data, and QA is carried out as part of the overall auditing system.

III.iii. Implementation of mandatory advertising requirement

As from 2012, legislation requires the owner or agent of a building offered for sale or rent to display the energy performance indicator of the EPC in commercial media. Information sessions and day conferences have been carried out with the association of real estate agents, to inform estate agents of these requirements. The BRO is in the process of intensifying operations to increase uptake of energy performance indicators in commercial media.

III.iv. Information campaigns

The implementation of the EPBD in Malta is part of a greater picture where energy efficiency is promoted at all levels and across all sectors of energy use. The authorities acknowledge that informing the public about energy efficiency facilitates the implementation of the EPBD by promoting public awareness leading to a demand for energy efficient buildings. The BRO, in some cases in conjunction with other government authorities, has organised and participated in several events in relation to the implementation of the EPBD including:

- prominent roadside advertisements (Figure 9) encouraging persons to advertise a sale of property by providing the EPC to estate agents;
- articles in local printed media to promote energy efficiency and outlining requirements of the EPBD (Figure 10);

Figure 9: Roadside advertisements were installed throughout Malta as part of promotion campaigns.

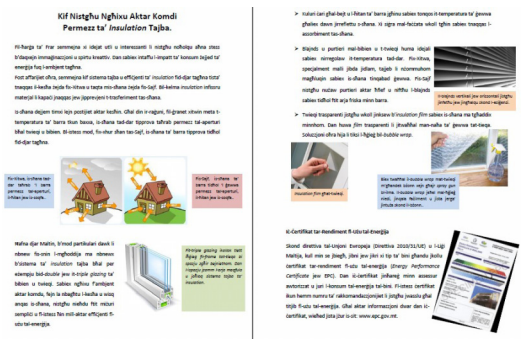
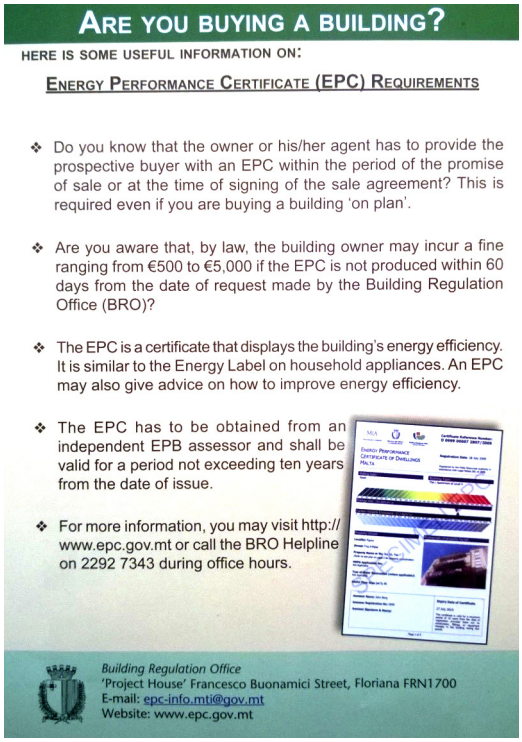


Figure 10: Article in local magazine showing principles of energy efficiency and simple energy efficiency techniques, and informing the public on how these relate to EPCs.

> participation in radio and television broadcasts by members of the BRO with live phone-ins from the public to promote various aspects of the EPBD, e.g., the contribution of EPCs to energy efficiency;
> advertisements in local printed national newspapers encouraging persons to advertise a sale of property by providing the EPC to estate agents;
> 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 at local level in events organised by the local councils;
> promoting energy efficiency themes via brochures and videos during various events, through a supporting campaign called the Switch campaign;
> distributing brochures informing about the requirements for EPCs when selling and advertising a property (Figure 11);
> updating the BRO's website to provide the latest information about various aspects of the EPBD and energy efficiency.

III.v. Coverage of the national building stock

For the 152,000 households in Malta, about 9,400 EPCs have been issued till the end of November 2015, translated into around 6% of all households. With approximately 500 EPCs issued each month, this is expected to increase at a rate of around 1% per year. The system for the non-residential sector was initiated later, and the coverage at the end of 2013 was less than 1%.


ARE YOU BUYING A BUILDING?

HERE IS SOME USEFUL INFORMATION ON:

ENERGY PERFORMANCE CERTIFICATE (EPC) REQUIREMENTS

- Do you know that the owner or his/her agent has to provide the prospective buyer with an EPC within the period of the promise of sale or at the time of signing of the sale agreement? This is required even if you are buying a building 'on plan'.
- Are you aware that, by law, the building owner may incur a fine ranging from €500 to €5,000 if the EPC is not produced within 60 days from the date of request made by the Building Regulation Office (BRO)?
- The EPC is a certificate that displays the building's energy efficiency. It is similar to the Energy Label on household appliances. An EPC may also give advice on how to improve energy efficiency.
- The EPC has to be obtained from an independent EPB assessor and shall be valid for a period not exceeding ten years from the date of issue.
- For more information, you may visit http://www.epc.gov.mt or call the BRO Helpline on 2292 7343 during office hours.

Building Regulation Office
'Project House' Francesco Buonamici Street, Floriana FRN1700
E-mail: epc-info.mti@gov.mt
Website: www.epc.gov.mt

Figure 11: Advert distributed to prospective property buyers and all persons entering promise of sale.

III.vi. Other relevant plans

The government has taken an active approach, where implementation is facilitated by a number of incentives. One of such incentives was the provision of a number of energy efficient lamps to every family in Malta. This increased the take-up of energy efficient lamps, and latest data shows 95% of households are powered by energy efficient lighting.

Financial incentives include rebates on an array of measures and systems including:

> solar water heaters;
> roof or wall insulation;
> double glazing;
> energy efficient appliances (A rated);
> AC with minimum energy efficiency class A and an output equal to or less than 12 kW.

The installation of photovoltaic panels and micro wind turbines are promoted by a generous feed-in tariff together with a grant of 50% of the initial cost of the system.

IV. INSPECTION REQUIREMENTS – HEATING AND AIR-CONDITIONING (AC) SYSTEMS

Requirements for mandatory inspections were first established in Malta by Legal Notice 238 of 2006, followed by Legal Notice 261 of 2008. These requirements were superseded by Legal Notice 376 of 2012, issued after Directive 2010/31/EU came into effect, where mandatory inspections have been adopted again. The BRO has been entrusted with establishing and maintaining a system for the registration of EPCs. The BRB has approved the guidance documents outlining methodologies proposed by the BRO and established the respective inspection frequencies.

IV.i. Progress and current status on heating systems

Inspections of heating systems are carried out on the accessible parts of systems used for space heating of buildings with boilers of an effective rated output of 20 kW or greater (Figure 12). Inspections follow the methodology issued by the BRO, which has been based on MSA EN 15378:2007, and adopted to meet the requirements of Directive 2010/31/EU. The inspection frequencies for boilers exceeding 100 kW

are set according to the type of fuel used. For boilers with an effective rated output of 20 - 100 kW, the maximum inspection interval is set at 4 years (Table 3). Inspection frequencies remain unchanged in the case where an electronic monitoring and control system is in place.

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. The heating systems inspectors make an assessment of the boiler efficiency and sizing. Inspectors are also required to draw up recommendations for cost-effective improvement of the energy performance of the inspected system(s).

The BRO has established training of inspectors for heating systems in line with the methodology developed. Courses were delivered in collaboration with the Malta Chamber of Engineers. Candidates for the inspector training course are required to possess a degree in mechanical and/or building services engineering, be warranted as engineers, and show experience in design and/or maintenance of heating systems. Candidates who successfully sit for the course assessment may register with the BRO to become registered heating systems inspectors. Such registration is valid for 5 years. To date, there are eleven registered heating systems inspectors. This list is kept updated and published on the BRO website.

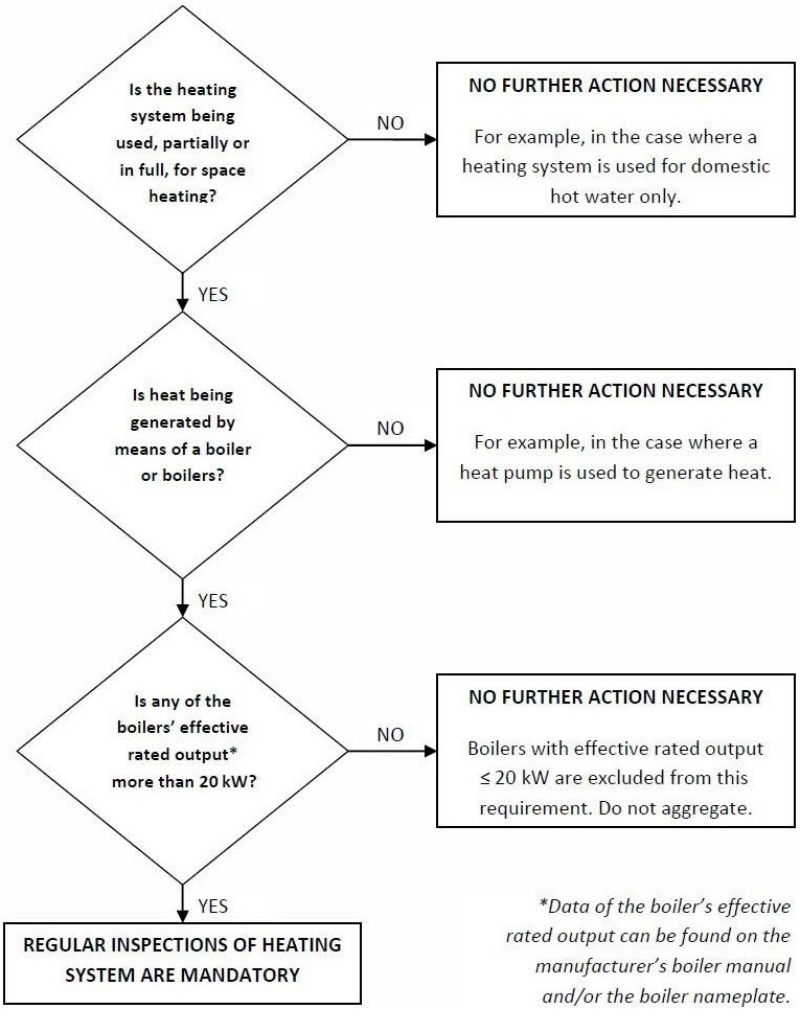
The inspection reports must be submitted to the BRO for registration and quality control checks. Monitoring and QA of inspection reports received are delegated to the Malta Competition and Consumer Affairs Authority which is an independent authority, and can ensure that an adequate level of quality is maintained.

IV.ii. Progress and current status on AC systems

Inspections of AC systems are carried out on the accessible parts of AC systems with an effective rated output of more than 12 KW. Inspections follow the methodology issued by the BRO which has been based on "TM 44: Inspection of Air-conditioning systems", 2012, issued by the Chartered Institute of Building Services Engineers, UK (CIBSE).

Inspection frequencies remain unchanged in the case where an electronic monitoring and control system is in place. The frequency of inspections for AC systems having an effective rated output of more than 12 kW have been approved by the BRB, and are shown in Table 4.

Figure 12:
Process adopted for determining if inspection for heating system is warranted.



**Data of the boiler's effective rated output can be found on the manufacturer's boiler manual and/or the boiler nameplate.*

Table 3:
Required frequency of inspections for heating systems.

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

Table 4:
Required frequency of inspections for AC systems.

Effective rated output of AC system	Inspection frequency
12 kW - 100 kW	10 years
More than 100 kW	5 years

The inspections of AC systems address collection of data and compiling of all necessary system documentation, appropriate maintenance of the systems, energy efficient operation of the system, recommendations for the cost-effective improvements to the system. Inspections also include an assessment of the AC efficiency and sizing, compared to the cooling requirements of the building.

The BRO has been organising training courses for AC inspectors. Entry requirements for the AC inspectors course are a degree in mechanical and/or building service engineering, a warrant to practice as engineers, and experience in design and/or maintenance of AC systems. Training courses were entrusted to the Chamber of Engineers, and were delivered in collaboration with the Chartered Institute of Building Services Engineers, UK (CIBSE).

Candidates who are successful in the final assessment, may then proceed to register with the BRO as AC system inspectors for a period of 5 years. A list of registered AC system inspectors is kept updated and published on the BRO website.

The BRO receives the submitted AC inspection reports which are then registered and validated. The Malta Competition and Consumer Affairs Authority has been entrusted with the setting up of an independent quality control system for monitoring and QA of the AC inspection reports.

3. A success story in EPBD implementation

The EPBD was introduced in Malta within a context where energy performance regulation was scarce and resources, human or otherwise, were very limited. The authorities responsible for the implementation of most of the aspects of the directive initially encountered various problems including lack of awareness, resistance from the industry to new systems, lack of resources to ensure that private industry was adhering to requirements of the EPBD. Eventually, a process was initiated were various authorities started to collaborate in such a way that information and some resources could be shared. This improved the level of implementation considerably.

4. Conclusions, future plans

The introduction of the EPBD in Malta was implemented together with a general shift towards energy efficiency. The impact of the implementation of the EPBD has yet to be quantified, and when this is done it is very difficult to qualify which increased efficiencies are due to the EPBD. For new buildings, the improvement due to the introduction of minimum requirements according to the EPBD has been estimated at somewhere between 15 and 25%. However, with a very large existing building stock compared to new buildings being built, the improvement may be small overall.

An analysis of a sample of EPCs for houses shows that the energy performance of new houses has shown a slight improvement over the last few years. Across all sectors of energy use, a reduction of CO_2 emissions was attained where, according to Eurostat, 2013 values were 6.8% lower than in the previous year.

Statistics show that houses were built over various periods, with only just about 1% of the current stock being added every year. The energy use for residential buildings has been shown to be low overall, and therefore the reduction in CO_2 emissions from this sector is expected to be low.

On the other hand, offices and commercial buildings are being constructed at a higher rate, due to the 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 yet. This sector is expected to contribute to a greater effect towards energy efficiency.

Large energy savings are expected to accrue from renovation of existing buildings, since a large fraction of the existing houses have been built during a period when energy efficiency was not considered important and relied heavily on fossil fuels to obtain comfort levels.

Following the completion of cost-optimality studies, it is expected that the minimum requirements will be revised in the near future. If an overall energy demand is included in the revised minimum requirements as planned, this will improve correlation between minimum requirements and EPCs, making the latter much more useful.

The NZEB plan has been approved and has defined NZEBs in Malta to act as a catalyst for the improvement of the building stock in the mid-term future. The NZEB plan is expected to provide a clearer picture of the way forward from the present date to 2020 and beyond.

Co-funded by the Intelligent Energy Europe
Programme of the European Union

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The content of this report is included in the book “2016 – Implementing the Energy Performance of Buildings Directive (EPBD) Featuring Country Reports”,
ISBN 978-972-8646-32-5, © ADENE 2015

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