CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Malta

Status in 2020

AUTHORS
Matthew Degiorgio and Samuel Farrugia on behalf of the *Building Regulation Office within the Building and Construction Authority*

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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 of 13-14°C in January and February, 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 of 2006-2018. The statutory instrument transposing the EPBD has been revised and the Building Regulation Act has been issued in 2018, taking into account the latest EPBD provisions.

The Building and Construction Authority (BCA) has been set up in 2021 following the establishment of the transitory Building and Construction Agency in 2019 to incorporate the various aspects of the entities within the construction industry. The Authority is intended to be able to better fulfil its regulatory role in the construction industry including the requirements emanating from the EPBD.

BUILDING & CONSTRUCTION AUTHORITY

Figure 1. The BCA was set up with the intention of improving regulation and knowledge within the construction industry.

Following the issue of the minimum energy performance requirements reflecting cost-optimal levels which came into force as of January 2016, the second set of cost-optimal studies were carried out over a vast array of building typologies. The results from the cost-optimal studies are informing proposed new minimum energy performance requirements.

In recent years, focus has shifted towards the renovation of the existing building stock. In this regard, initial measures included the renovation of public buildings with the intention of increasing skills and experience in the sector such that renovation projects may be replicated in the private sector.

Implementing the EPBD was further supported by training and registering new EPC assessors as well as developing a framework to improve and better document the skills of tradesmen, craftsmen and workers within the construction industry.
As of 2021, the responsibilities for implementing the EPBD lie with the Building and Construction Authority.

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; these came into force in January 2016 with the ratification of Legal Notice 434 of 2015[1].

The second set of cost-optimal studies were carried out on a vast array of residential and non-residential buildings to provide a wide spectrum of building typologies which can represent the building stock in an effective way. As shown by the cost-optimal studies, cost-optimal levels depend to a large extent on the level of exposure of the property and on the ability to install renewable energy sources and efficient building systems.

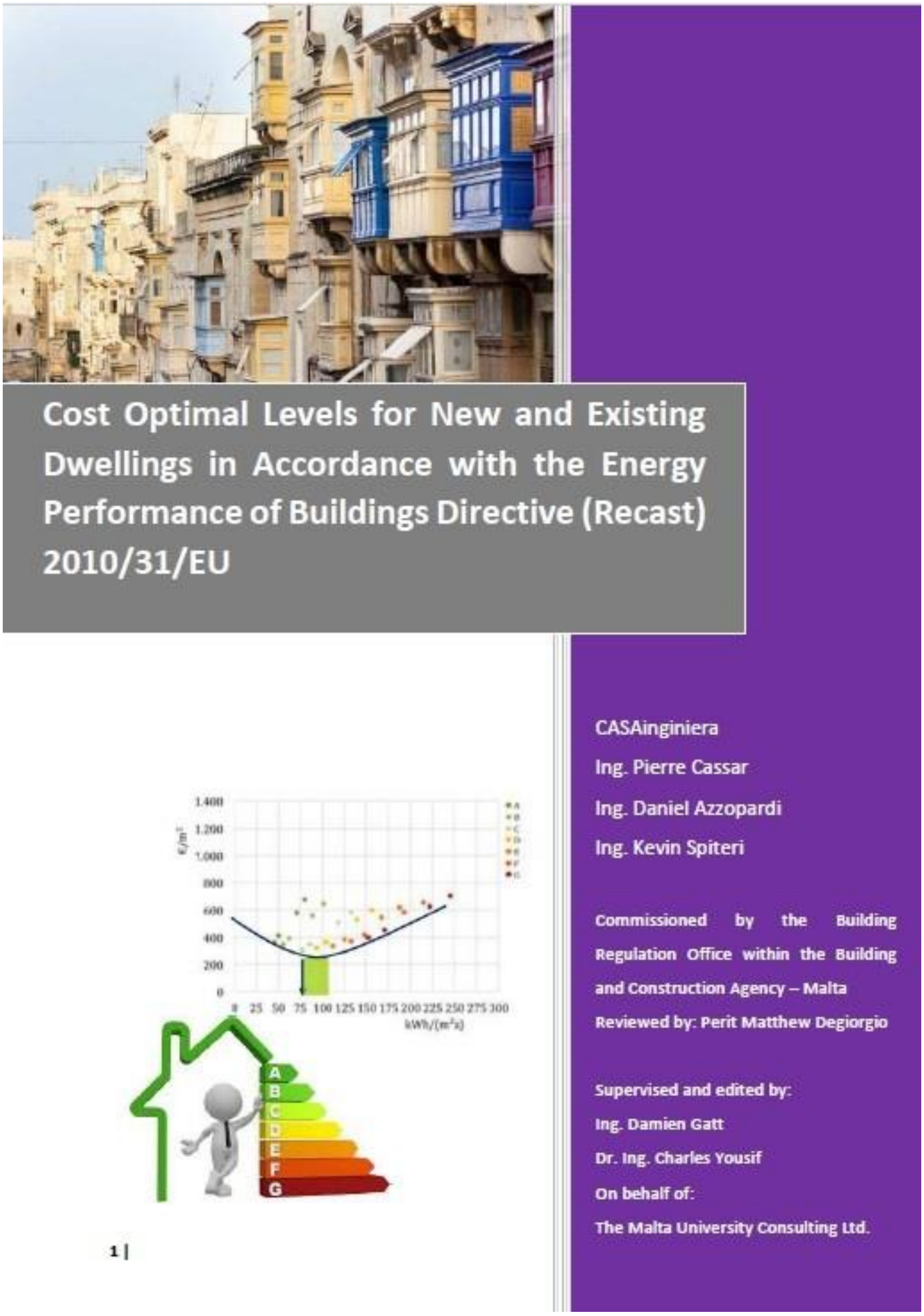

Figure 2. Cost-optimal study for new and existing dwellings carried out on a vast array of reference buildings.

2.I.i. Progress and current status of new buildings (regulation overall performance)

The minimum energy performance requirements in place, which came into force in 2016, were based on the cost-optimal studies carried out in 2013-2014. They set an overall energy performance level as guided by the cost-optimal studies. The requirements also introduced minimum levels of performance for technical building systems, together with requirements for controls of such systems. The first set of cost-optimal studies determined that the cost-optimal level varies considerably with both the building use and building typology. This is reflected in the overall energy performance for different building uses and building typologies.

The second set of cost-optimal studies was carried out on an array of reference buildings to reflect various building typologies with particular emphasis on buildings which are disproportionately highly representative in the local building stock and therefore contribute significantly to the use of energy. The reference buildings included sport complexes, restaurants, hotels, homes for the elderly, shops, existing offices, new offices, existing residences and proposed residences. A number of buildings were chosen for each of the building typologies such that the cost-optimal level could be assessed over a representative sample of the building stock.

The difference between the minimum requirements and the determined cost-optimal level varies according to building typology. The installation of renewable energy sources was found to be cost-optimal for all building typologies. The development of new minimum requirements that address the results from cost-optimal studies and advances in technology are under way. These are expected to deliver new possibilities in the design and construction of buildings to satisfy NZEB requirements.

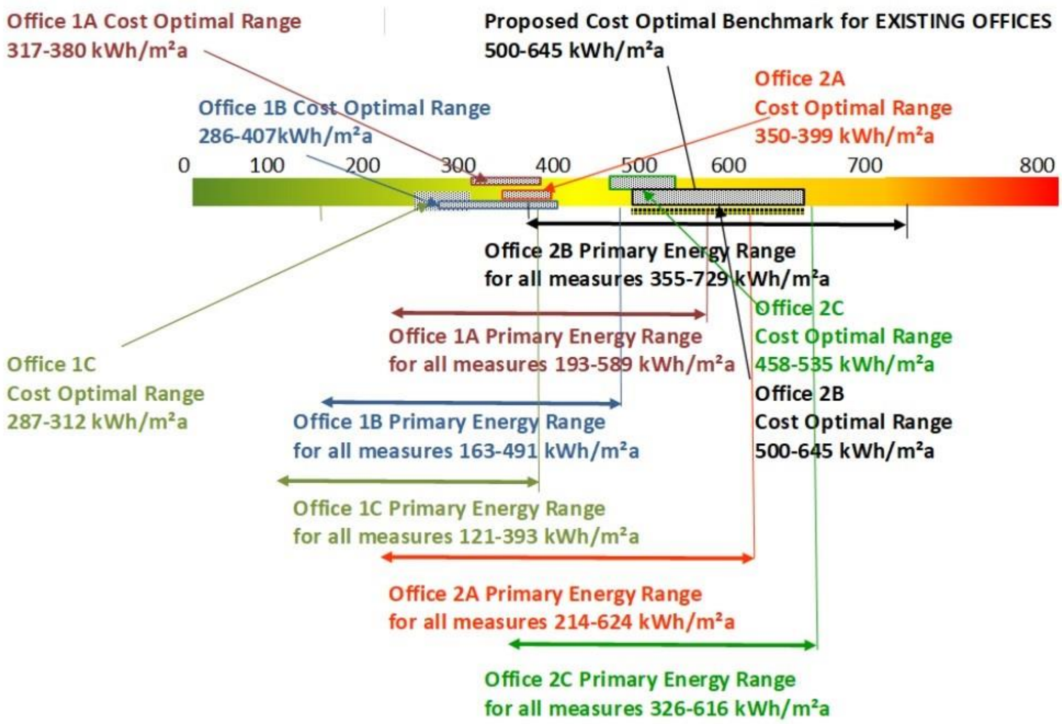

Figure 3. Extract from studies for offices showing energy performance levels over a spectrum depending on size and configuration of buildings.

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

The current minimum energy performance requirements came into force in 2016 and are laid out in 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. Requirements were also tightened for specific elements such as glazing and roofs, while those parts designed to avoid overheating were retained.

The overall energy demand for buildings is set according to building typology. To maximise the potential for energy efficiency for buildings which have the potential of achieving low energy demand with the installation of solar renewables or other effective technologies, the maximum energy demand requirements are low. 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. The contribution of RES is factored in according to the actual benefit obtained. The second set of cost-optimal studies have given further insight, and the development of a new set of minimum requirements has been initiated.

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

Steps towards implementing the NZEB were undertaken by an inter-ministerial working group, which followed the development of the definition for NZEB[1] (Figure 4). The working group developed an action plan for achieving 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.

The second set of cost-optimal studies has been developed, taking into consideration the measures to be implemented and the most effective investments that enable reaching NZEB level at the lowest cost. With the conclusion of the cost-optimal studies, the energy performance for future definitions of NZEB is being discussed.

REQUIREMENTS FOR NEARLY ZERO ENERGY RESIDENTIAL BUILDINGS

Building Category	Flatted Dwellings	Terraced Houses	Semi-detached Housing	Fully detached Housing	Mean Energy Requirement
nZEB Overall energy demand requirement	115kWh/m2yr	75kWh/m2yr	55kWh/m2yr	55kWh/m2yr	75kWh/m2yr
Renewable contribution requirement	yes	yes	yes	yes	

Figure 4. NZEB primary energy levels for dwellings in Malta showing energy performance levels according to building typology.

2.I.iv. Requirements for 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.

Elements forming part of the building envelope are required to conform to provisions for the conservation of heat during winter as well as requirements to prevent overheating in summer. The requirements for thermal transmittance were tightened with the introduction of the latest minimum energy performance requirements referred to above.

Requirements to prevent overheating include limitations to the maximum allowed glazing area, stipulated according to the orientation of the façades. An alternative compliance system is present that gives the designer a certain degree of flexibility. This involves the calculation of overheating within the space by means of dynamic simulations together with the ability to factor in shading and other measures to prevent overheating.

2.I.v. Enforcement systems new buildings

Following a process where changes to the construction industry were planned and evaluated with particular reference to regulatory functions, the Building and Construction Agency was set up in 2019. The agency incorporated the functions of developing and enforcing building regulations as well as licencing contractors into one entity. The transitory Building Regulation Agency was succeeded by the Building and Construction Authority.

The Building and Construction Authority has recruited several new officers to reinforce the enforcement of regulations, with the number of officers actually carrying out duties on-site having doubled over the period of 2019-2020. Enforcement has further been strengthened through the provision of training.

Enforcement of the Building Regulations is based on a system where the Authority has the ability to oversee the correct implementation of building regulations, including energy. Responsibility for the correct implementation of buildings’ energy performance is delegated to building professionals.

2.II. Energy performance requirements: EXISTING BUILDINGS

2.II.i. Progress and current status of existing buildings (regulation overall performance)

The updated minimum requirements, which came into force in 2016, 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.

Regulations for buildings undergoing major renovations have also been updated, while requirements were introduced for the first time for minor renovations. Together with the requirements for individual building elements already in place, an overall energy performance requirement was 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, as well as 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.

To support the assessment of opportunities for the renovation of existing buildings, cost-optimal studies were carried out on both new and renovated buildings and for both residential and non-residential buildings. The studies gave valuable insight into the most cost-effective methods to reap the benefits of investment in energy efficiency for existing buildings beyond the cost-optimal level, with a view to reaching NZEB levels. These studies are being used to further develop the provisions regulating buildings undergoing all levels of renovation.

2.II.ii. Regulation on individual parts, distinct from whole building performance

Minimum energy performance requirements for elements of the building envelope first came into force in 2007 and were amended when the updated minimum requirements came into force in 2016. The levels of performance in the updated requirements were shifted from being based on a traditional building trade system to being based on the results of the cost-optimal studies.

The second set of cost-optimal studies includes a detailed analysis of each building element to give guidance for the update of minimum requirements if these are required.

Requirements for building elements include those for the passage of heat for all building elements in all parts of the building envelope as well as elements dividing an internal area from an unconditioned space, such as the stairwell of an apartment building. For façades subject to solar gain, detailed provisions are also in place to prevent overheating.

The second set of cost-optimal studies have explored the cost-optimal U-value of building elements for the vast array of reference buildings. Gaps between the current minimum requirements and the cost-optimal level were identified in a number of reference buildings. Interestingly, the results varied according to building use and typology.

This exercise has been carried out to reflect any changes within the cost-optimal levels due to changes in parameters such as cost, energy price and development of new technologies since the first studies. Studies have also been useful to give insight into which are the most cost-effective systems to be used for reaching NZEB levels and beyond.

2.II.iii. Initiatives/plans to improve the existing building stock

Studies have shown that in existing buildings and 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 supporting current building owners and generated considerable participation. Over the period of 2016-2020, 55 million € was invested in the installation of solar renewables, heat pump water heaters, solar water heaters and the improvement of the thermal envelope. The housing building stock in Malta consists of a large number of single-family units with a substantial potential for the installation of RES in the form of solar systems. 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 semi-detached and detached housing units is equivalent to 55kWh/m² (NZEB plan for Buildings in Malta, 2015; *https://epc.gov.mt/legislation*).

Public buildings in Malta significantly vary in size, building characteristics and age as well as energy use A process has been initiated whereby the building stock occupied by the government is being renovated at an accelerated pace. This process is intended to improve the capacity of the workforce and industry in general to deliver the scope of the Long-Term Renovation Strategy.

2.II.iv. Long Term Renovation Strategies, status

The development of a Long-Term Renovation Strategy has been given increased priority over recent years to guide actions to be undertaken in the forthcoming period. The new LTRS has been concluded in spring 2020 and is now in the first phases of implementation.

A list of actions that the government of Malta is considering to further drive renovation of the building stock has been identified, in particular to align energy use and carbon emissions from buildings with the new, more ambitious reduction trajectories being considered as part of the Green Deal. The proposed policy mix is underpinned by:

- stronger regulation, in cases where current minimum standards are substantially below recent technical developments and below what is economically efficient;
- financial incentives, where the cost of implementing energy efficiency measures would not be economical for the building owner; incentives will instead primarily support renovation of the dwelling stock, with focus on the worst performing parts, and energy generation from renewable sources;
- exemplary role of government buildings, by increased investment in the public building stock.

The Long-Term Renovation Strategy provides an overview of the expected impacts of implementing these measures. While it remains difficult to quantify the long-term impacts of such measures, the strategy is expected to require substantial investments and thereby halve energy use compared to the counterfactual. Overall, the policies introduced are expected to lead to savings in the range of 15,080 GWh in buildings by 2050 (evenly spread across residential and non-residential buildings), leading to an estimated emissions reductions of around 2.7 million tonnes CO_2. The strategy is expected to require investments of around 4.5 billion € over a period of 30 years (undiscounted), with the Maltese government covering around 40% and the private sector 60%. For the next 10 years, the government plans to invest over 800 million € in the residential, non-residential and publicly owned building stock. This may stimulate an additional 1 billion € worth of investments from households and business.

Financial incentives and other government costs

In the short term, the main financial commitment of the government concerns the following incentives schemes:

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
PV schemes for residential buildings											
Cost (€million)	5	5	5	4	3	2	2	1	1	-	28
Buildings affected	2,200	2,200	2,200	1,800	1,300	800	800	400	400		12,100
Deep Renovations											
Cost (€million)	7.0	7.9	7.9	7.9	21.1	21.1	21.1	21.1	21.1	21.1	158
Buildings affected	400	450	450	450	1,200	1,200	1,200	1,200	1,200	1,200	8,950
Energy efficiency package											
Cost (€million)	5.0	5.1	5.1	15.0	15.1	15.2	15.2	15.2	15.3	15.3	121
Buildings affected	1,700	1,800	1,800	5,200	5,300	5,300	5,300	5,400	5,400	5,400	42,600
Total (€million)	17	18	18	27	39	38	38	37	37	37	308

Table 43: Budget forecast and expected number of residential buildings affected[151]

Figure 5. Long-Term Renovation Strategy for Malta including the extract for proposed 2030 milestones for dwellings.

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

Given the extensive building stock and the lack of energy-efficient buildings during the post-war period, the potential for improvement of the energy performance in existing buildings is rather high. 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 investments in this sector.

Investments in the integration of Renewable Energy Sources within the residential sector and the commercial sector continued with solar renewables being installed on a large scale and reaching 9% of the final energy consumption in 2019.

In addition, a scheme has been developed to promote the deep renovation of residential properties. Households eligible for this scheme must undergo works which reduce energy use to become 20% better than the NZEB level. Eligibility will also require a maximum heating energy demand of 15kWh/m^2.year, similar to passive house levels.

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. Financial incentives planned as part of the LTRS are expected to be crucial in enabling investment on a large scale in this sector.

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 renovations, 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:

- disseminating the NZEB Plan for Malta1 to both the general public and all building professionals via local printed newspapers;
- distributing brochures that detail EPC requirements and contain information regarding energy efficiency in general to all households in Malta;
- publishing articles in local printed media to promote energy efficiency and outline requirements of the EPBD;
- participating 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 information on EPC requirements for selling and advertising a property in local printed national newspapers;
- delivering a series of in-service courses regarding climate change and energy efficiency to teachers;
- delivering public lectures regarding the EPBD and energy efficiency to events organised by local councils;
- providing the latest information about various aspects of the EPBD and energy efficiency through official websites.

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.

2.III. Energy performance certificate requirements

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

EPCs were first introduced in Malta with the ratification of Legal Notice 261 of 2008[2] and 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 1 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, administrative processes to ensure that EPC requirements are adhered to have been intensified. This has led to an increase in the ratio of the number of EPCs to existing households from an estimated 2% in 2014 to 23% by the end of 2019.

This process has been further enhanced through close collaboration with the Department of Inland Revenue by actions enabling access to private contracts related to public and private buildings so that the requirement for building owners to submit an EPC is effectively adhered to.

The new obligation to register all long-term and short-term housing rentals has further supported efforts to enforce EPC requirement for rentals. All private and public rental contracts are registered with the Housing Authority and thereby the availability of an EPC is checked simultaneously.

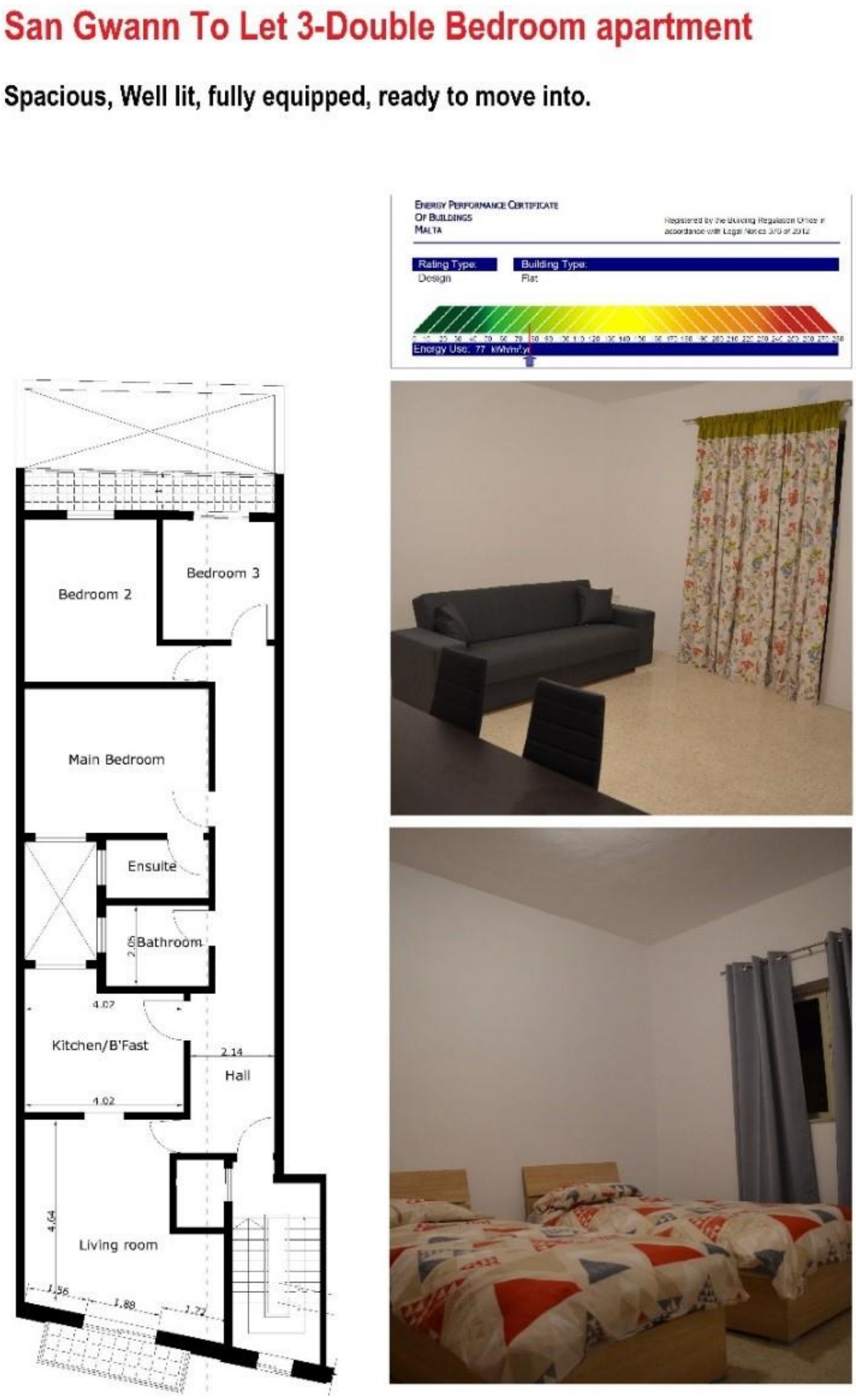

Figure 7: Extract from advertisement showing the uptake of the energy rating.

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) by means of a contract of service, following a memorandum of understanding. The verification system devised in conjunction with MCCAA. The control system 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. Control is carried out on a yearly basis guided by Schedule II of the EPBD.

The main findings of the verification exercises indicated typical shortcomings in issued EPCs. The lack of information on the exact characteristics of the building fabric was the most common deficiency encountered. The root for this has been identified and training may be provided to assist and train assessors to be able to assess the existing building fabric more precisely.

Another shortcoming relates to the fact that the input of building characteristics and system data is mostly based on assumptions. Significant improvements to the provided training are needed in order to enhance the quality of EPCs.

Following the audit report, a notification letter highlighting all errors identified is sent to all assessors so that these may be avoided in the future. Whenever large discrepancies in EPCs are apparent, the assessor in question is asked to resubmit a new certificate addressing the identified issues, and pay the relevant 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 a useful opportunity to disseminate information regarding EPCs and energy savings in general. In light of this, action is taken to ensure that all buildings larger than 250 m^2 which are occupied by a public authority and frequently visited by the public have a valid EPC that is clearly displayed to the public. A list of all buildings owned and/or used by the various government ministries is created and includes information on useful floor area and whether or not it frequently visited by the public. There is a planning in place for most of the buildings which satisfy the requirement for issuing an EPC. The plan is currently being assessed to verify if all EPCs that have been issued are on display. The rate of compliance for EPCs in public and private schools and central government buildings is very high. Since the EPCs of such buildings are frequently viewed by the public, the contents and calculations of related EPCs on display are verified for qualitative purposes. This verification process is additional to the independent control system in place, and involves on-site verification of the data. The improvement of the EPCs on display would be beneficial to the reputation of EPCs overall.

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

As of 2020, a new requirement for licensing estate agents has come into force. This has improved the quality of the services provided by estate agencies, making the requirement for the presentation of EPCs at the property advertising stage easier to enforce.

Provisions regulating the advertising of EPCs are contained within Legal Notice (47 of 2018), placing obligations on each and every party involved in the sale of property. Requirements are detailed and include advertisements on websites where users are able to create advertisements themselves. Following the resolution of anomalies previously present within the existing legal instruments, progress on this EPBD provision has continued.

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

Advertising media and estate agents have been informed of legal provisions in place such that these can take the required action. Advertisement of EPCs within online and printed media has been initiated.

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Figure 8. Extract from advertisement requirement guidelines issued for all advertising media (https://epc.gov.mt/legislation).

2.IV. Smart buildings and building systems

2.IV.i. Status and plans on smart buildings

The possibility of data gathering on energy consumption in buildings equipped with building automation and control is being assessed by the Building Regulation Office and the Building and Construction Authority. Sufficient data would allow for the determination of the benefits and pitfalls of devising systems that would increase the use of smart technologies in particular building typologies.

Developments in the establishment of the smart readiness indicator at a European level have been followed closely by the Building Regulation Office and the Building and Construction Authority. Possibilities for the introduction of a smart readiness indicator and its implications in relation to improvements in energy performance have been explored.

Discussions have also been ongoing regarding the changes that would be warranted if the smart readiness indicator was to be implemented in conjunction with the EPC framework, and how the construction industry would integrate this requirement if the smart readiness indicator would be implemented as a separate feature. In the current state, no final decisions have been taken with regards to the implementation of the smart readiness indicator. Decisions in this field are at an early stage

2.IV.ii. Regulation of system performance

Cost-optimal studies identified the energy saving potential which lies within technical building systems. These studies led to the establishment of the minimum requirements set in Technical Document F Part 2 which set minimum efficiencies for boilers used for space heating, domestic hot water systems, heat pumps, comfort cooling systems, ventilation and lighting. Moreover, minimum adjustment and controls for such systems were stipulated to ensure the optimal performance under varying conditions.

The inspections for heating and AC systems have been implemented to deal with system performance, among other aspects. Inspections evaluate the instalment and maintenance of such systems, the operational aspect to achieve maximum energy savings as well as system sizing to match building cooling/heating needs.

A new set of cost-optimal studies, published in 2018, led to the drafting of new minimum requirements for technical building systems which will be addressed further in the regulation of system performance.

Control systems enabling building automation and electronic monitoring of technical building systems are very much in use for large buildings such as schools, hotels, hospitals, care homes and large office buildings. Building owners are very much aware of the benefits and potential for energy savings of such control systems. In large HVAC installations in particular, centralised control systems are installed to control and monitor energy use. Occupancy sensors for lighting are also utilised to a large extent. More work needs to be done to collect datasets and process this data, with the aim of utilising monitoring to become an effective replacement for inspections.

2.IV.iii. Building Automation and Controls (BACs)

Mild climatic conditions in Malta do not create a need for the development of building automation systems, since the use of free cooling during mid-seasons is predominant. Until the proliferation of AC use in the last decade of the 20th century, energy waste due to lack of automated control was practically non-existent.

For non-dwellings, with particular focus on tourist accommodations, the development of building automation and control was more prevalent, since the benefits of energy savings were more pronounced and technologies for these kinds of applications were readily available.

The first minimum energy performance requirements which came into force in 2007 included the first provisions for control of lighting and other building services. The updated minimum requirements for building services in Malta (2015), Technical Document F Part 2, stipulated the minimum controls package required for various technical building systems.

Each package sets the control measures to be applied to a particular type of equipment and its rated output. Figure 9 is a typical example taken from Technical Document F Part 2.

Table 5 Minimum controls package for heat pump systems		
Heat source / sink	**Technology**	**Minimum controls package**
All types	All technologies	**Controls package A** a. On/off zone control; if the unit serves a single zone, and for buildings with a floor area of 150m2 or less, the minimum requirement is achieved by default b. Time control
Air-to-air	Single package Split system Multi-split system Variable refrigerant flow system	a. Controls package A above b. Heat pump unit controls for: i. control of room air temperature (if not provided externally) ii. control of outdoor fan operation iii. defrost control of external airside heat exchanger iv. control for secondary heating (if fitted) c. External room thermostat (if not provided in the heat pump unit) to regulate the space temperature and interlocked with the heat pump unit operation
Water-to-air Ground-to-air	Single package energy transfer systems (matching heating/cooling demand in buildings)	a. Controls package A above b. Heat pump unit controls for: i. control of room air temperature (if not provided externally) ii. control of outdoor fan operation for cooling tower or dry cooler (energy transfer systems) iii. control for secondary heating (if fitted) on air-to-air systems iv. control of external water pump operation c. External room thermostat (if not provided in the heat pump unit) to regulate the space temperature and interlocked with the heat pump unit operation
Air-to-water Water-to-water Ground-to-water	Single package Split package	a. Controls package A above b. Heat pump unit controls for: i. control of water pump operation (internal and external as appropriate) ii. control of water temperature for the distribution system iii. control of outdoor fan operation for air-to-water units iv. defrost control of external air side heat exchanger for air-to-water systems c. External room thermostat (if not provided in the heat pump unit) to regulate the space temperature and interlocked with the heat pump unit operation
Gas-engine-driven heat pumps are currently available only as variable refrigerant flow warm air systems.	Multi-split Variable refrigerant flow	a. Controls package A above. b. Heat pump unit controls for: i. control of room air temperature (if not provided externally) ii. control of outdoor fan operation iii. defrost control of external airside heat exchanger iv. control for secondary heating (if fitted) c. External room thermostat (if not provided in the heat pump unit) to regulate the space temperature and interlocked with the heat pump unit operation

Figure 9. Minimum controls package for heat pump systems as defined in Table 5 of Technical Document F Part 2.

Currently, Tech Doc F (2015) is being revised following the conclusion of the second set of cost-optimal studies, which have provided new insight with regards to technical building systems. Current requirements are expected to be superseded by new requirements which are currently being developed and which reflect developments in technology and the results of the cost-optimal studies. Provisions relating to BACS are planned to be introduced in these revised minimum requirements for each technical building system.

2.IV.iv. Status and 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 eight years in most buildings. This has enabled real-time monitoring of energy use and further plans are prepared for additional developments in this area.

Smart metering is supplemented by the development of online portals enabling consumers to monitor their daily consumption. This measure has enabled the identification of leaks and associated reduction in the energy intensive water production by desalination. The ability to view daily consumption has increased awareness, enabling consumers to monitor usage.

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.IV.v. Progress and current status on heating systems (Inspection / Equivalence)

Malta has adopted the inspection of heating and AC systems. Inspection procedures are set up and a register of inspectors and inspection reports is maintained. The register of heating and AC inspectors is available on the official 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 about possible measures to be undertaken.

The register for inspection reports and inspectors of heating systems is maintained centrally. 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 main aspects included in an inspection are a documentation review, a visual inspection of the heating system equipment, including generation, distribution, emission and controls, and a mandatory analysis of combustion efficiency. 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 inspections, a new legal notice has been issued which defines, in clearer terms, the responsibilities of heating systems' owners and relevant inspectors. The legal provisions refer to the issue of a '*Guide for Owners of Heating and Air-conditioning Systems' (GOHAS)* to provide guidance to inspectors in the carrying out of inspections.

2.IV.vi. Progress and current status on AC systems (Inspection / Equivalence)

The methodology being used for AC inspections is 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.

A list with details of accredited AC inspectors is available in the official website. Strict entry requirements are in place 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 authorised and have experience in the design and/or maintenance of AC systems.

Owners of AC systems shall commission a registered AC inspector to carry out the inspection. The inspection includes compilation of system documentation, maintenance, verification of the systems 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 Building and Construction Agency. The report must be handed over to the client, while the Building and Construction Agency retains a copy for the national database.

Similar to what has been described for heating system inspections, a new Legal Notice has come into force and contributes to improving the existing inspection system. The notice provides clearer definitions and describes responsibilities for both the inspectors and the owners of AC systems.

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

Enforcement and penalties

The new legal notice, 47 of 2018, addresses issues which were not addressed before. It provides clearer definitions and describes responsibilities for both the inspectors and the owners of AC systems, which will enable the Building and Construction Authority to step up the enforcement of inspections and better administer penalties.

Quality control of inspection reports

The quality of heating and AC system inspection reports to date is very good, since the competence level of registered inspectors is very high. The inspection reports submitted for registration have all been reviewed, and any identified deficiencies in reporting were referred back to the respective inspectors to be addressed and resolved, thereby contributing to an improved quality standard of inspection reports.

The Building and Construction Authority has secured the services of Malta Competition and Consumer Affairs Authority for the quality control of inspection reports.

Impact assessment, costs and benefits

The Building and Construction Authority has collected feedback from heating and AC inspectors on the current situation regarding inspections. It appears that the most crucial and demanding element of the first inspection is the gathering of documentation of the systems installed within a building. It also appears 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

The building stock in Malta mainly consists of either vernacular buildings with traditionally good passive energy design or modern buildings built after the second half of the 20th century which typically perform less efficiently. Due to mild climate conditions, the benefits reaped from the renovation of buildings are limited, and consequently the mobilisation of investments in energy efficiency from renovation is low. The task of mobilising investment in the sector was very limited for a long period.

The Maltese government decided at an early stage that, to reduce the energy use within buildings, the most effective ways for achieving energy efficiency should be targeted first and on a large scale. Opportunities were seen in the introduction of domestic hot water heating to satisfy the significant portion of energy used for this purpose, and offsetting the electrical demand for space cooling and other loads by means of on-site PV. Sustained efforts in this field led to a significant increase in on-site generation, with 9% of the annual demand being covered by on-site PV by 2020 (excluding solar water heating).

The renovation of the building stock was initiated on a large scale in recent years, with the government leading by example with the renovation of large office buildings occupied by the government. This is expected to continue, so that by 2030 all buildings occupied by the government which have a high specific energy consumption will have been targeted.

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 taken into consideration that this relates only to new builds, which annually represent around 1% of the existing stock, the improvement may in fact be relatively small. Renovation will therefore be needed for a larger proportion of the building stock for energy efficiency benefits to be obtained.

Studies including those carried out within the cost-optimal framework have concentrated on the best practices for renovation. Plans for a financial and fiscal policy are being developed to guide efforts for the renovation of the existing building stock.

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

Annexes -Key Indicators & Decisions

Key Indicators & Decisions - General Background

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.01	Definition of public buildings (according to article 9 b)	Buildings that are both owned by the government of Malta and occupied by authorities forming part of central or local government.	
01.02	Definition of public buildings used by the public (according to article 13)	A definition backed by legislation is not in place. Public buildings used by the public are defined by the public authorities (responsible for the implementation of the EPBD) as those buildings which are occupied by authorities forming part of the central or regional governments, which are intended to receive members of the public (not government workers) and which are visited by such persons on a daily basis.	
01.03	Number of residential buildings	Circa 153,000	This number relates to the number of houses used on a permanent basis. An additional number of dwellings are used on a temporary basis mainly as summer residences. This, together with the number of vacant properties, has been estimated at 72,000.
01.04	Number of non-residential buildings	203 hotels + 4,732 collective or individual accommodation 294 schools 7 hospitals with a bed capacity of 1,905 3,711 restaurants 18,000 m^2 of sport facilities	
01.05	If possible, share of public buildings included in the number given in 01.04	Exact number is not known. The total floor area is estimated at 518,500 m^2.	
01.06	If possible, share of commercial buildings included in the number given in 01.04	7,800 dwellings, 1,100 manufacturing, warehouse, retail, hotels and office buildings (development permits issued for construction or renovation)	
01.07	Number of buildings constructed per year (estimate)	Circa 9,000-10,000	
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	80-85%	
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	15-20%	

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	Not Known; data not divided between completely new, extensions of existing, renovation of existing and structural alterations to existing or change of use of existing or any combination of these	

Key Indicators & Decisions - New Buildings

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.01	Are building codes set as overall value, primary energy, environment (CO_2), reference building or other		
02.02	Requirements for energy performance of residential buildings in current building code	Mean primary energy balance of 85 kWh/m^2 year.	The requirement varies according to building typology with mean having been set at the cost-optimal level
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	Primary energy balance ranging from 290-350 kWh/m^2 year according to building typology.	This has been set according to cost-optimal levels
02.04	Requirements for energy performance of non-residential public buildings in current building code		
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	The performance level is within a regulation supported by legislation, but legislation does not specify primary energy balance directly.	
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	Mean requirement for primary energy balance is 75 kWh/m^2 year.	The requirement varies according to building typology
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	2018 public buildings 2020 all other buildings	No difference between commercial and residential, but differentiation only by public or private as in directive
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Requirement for primary energy balance of 220 kWh/m^2 year	The only exception concerns dwellings
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)		
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	No, the primary energy use is the main indicator. However, a carbon emission indicator is calculated in the methodology used to verify if the building is NZEB.	Given that practically all energy used in buildings in Malta has the same carbon generation (intensity), this value is not particularly relevant
02.11	Is renewable energy a part of the overall or an additional requirement?	Renewable energy contributes to reducing the primary energy balance. However, all buildings are required to have a portion of the demand satisfied by renewable energy sources.	Buildings will benefit by having a larger contribution from RES, since they can satisfy the requirements more easily. Designers are given flexibility to invest in the most cost-effective measures
02.12	If renewable energy is an additional requirement to NZEB, please indicate level	Level of renewable energy is not set as a percentage in the current requirements.	

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	Overheating requirements with maximum glazing areas according to orientation and ability to factor in the effect of shading; water conservation requirements for all buildings; thermal transmittance requirements for all elements forming part of the building envelope	

Key Implementation Decision - Existing Buildings

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment
03.01	Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation?	No. This level is set within documents forming part of regulations which are supported by legislation.	The levels are set in documents which have been issued and the issue has been made public by means of a government notice.
03.02	Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?	Existing buildings need to abide by minimum energy performance requirements, but there is no requirement for abiding to NZEB level at present.	The level set in minimum energy performance requirements are different from that for NZEB except for 2 building typologies.
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	NZEB levels have not been defined for existing buildings.	
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	NZEB level has not been set for existing levels	When buildings undergo renovations of a range that the renovated building may be considered a new building, NZEB requirements apply.
03.05	Overall minimum requirements in case of major-renovation	Buildings which have elements being replaced need to adhere to minimum energy performance requirements even if the renovation is not considered a major renovation.	E.g., all elements have a maximum U-value; glazing is limited according to orientation to limit overheating.
03.06	Minimum requirements for individual building parts in case of renovation	For Offices and mixed-use buildings where use includes Offices this is 350 kWh/m^2 year. All dwellings 140 kWh/m^2 year	Renovations which affect a building by 25% or more of its volume before such an intervention, or where renovation of 25% or more of windows or roofs or external walls is made, or where renovation of 25% or more of any energy consuming installations for artificial lighting, or heating or cooling of air or water or space ventilation is made, or where a change-of-use permit is submitted to the Malta Environment and Planning Authority.
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	Renovation rate to reach 3.3% per annum during period 2025-2030	
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Reduction of 74% in energy use in the residential sector and reduction of 78% of energy demand in the non-residential sector	

Key Implementation Decision - Energy Performance Certificates

no	Key Implementation Decision – Energy Performance Certificates	Description / value / response	Comment
04.01	Number of energy performance certificates per year (for instance average or values for of 3-5 years)	9,700 for 2016 11,000 in 2017 17,600 issued in 2018 13,700 issued in 2019	Around 93% relate to dwellings & 7% relate to non-dwellings.
04.02	Number of EPCs since start of scheme	33,000 Same number of buildings since EPC is issued for building unit not whole building.	Approximately 31,000 for dwellings, rest are non-dwellings.
04.03	Number of EPCs for different building types	Approximately 6,000 dwellings 55,000 non-dwellings	Values are approximate due to mixed-use buildings.
04.04	Number of assessors	522 dwellings 173 other buildings	Some assessors are both for dwellings and non-dwellings.
04.05	Basic education requirements for assessors	Degree in architecture & civil, mechanical or electrical engineering	
04.06	Additional training demands for assessors	Training course for assessors with examinations; the course has a total duration of 3 weeks, including the examination.	
04.07	Quality assurance system	Quality assurance entrusted to Malta Competition and Consumer Affairs Authority, which carries out audits on a statistically significant sample on three levels	Quality assurance is carried out by taking a statistically significant sample from all EPCs issued on an annual basis. Three levels of quality control are carried out with the third level involving site visits, while the other levels involve data analysis on two different levels.
04.08	National database for EPCs	One central national database	
04.09	Link to national information on EPCs / Database	https://epc.gov.mt/information-assessors?l=1	

Key Indicators & Decisions - Smart Buildings and Building Systems

no	Key Implementation Decision – Smart Buildings and Building Systems	Description / value / response	Comment
05.01	Is there a national definition of smart buildings?	No national definition in place at present	
05.02	Are there current support systems for smart buildings?	No national definition in place at present	
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Technical Document F part 2	Requirements for all technical building systems including space, heating, space heating, domestic hot water, ventilation and lighting
05.04	Are there current requirements for automatics (for instance in building codes)?	Technical Document F part 2	Requirements for control systems of technical building systems
05.05	Chosen option A or B for heating systems (inspection or other measures)	A, inspections	A inspections only
05.06	Number of heating inspections; reports per year (if option A)	4 inspections, covering 4 systems	
05.07	Chosen option A or B for cooling systems (inspection or other measures)		
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	67 inspections, covering 247 systems	
05.09	Is there a national database for heating inspections?	One central national database	The database is maintained by the central government
05.10	Is there a national database for cooling / air-conditioning inspections?	One central national database	The database is maintained by the central government
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	No, separate databases but controlled by same central government authority	
05.12	Link to national information on Inspection / Database		Detailed information not available to the public

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement № 820497.