

National plan for increasing the number of nearly zero- energy buildings in Cyprus



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1 Starting point

Please give a short overview of your national building stock. Describe the most important characteristics and emerging needs. Additionally, illustrate the chronological development of national requirements on the energy performance of buildings (for an example, see guidance document)

The total dwelling stock in Cyprus was in 2011, 433.212 of which, 299.275 are permanent residences and 133.937 are empty or of seasonal or temporary use. Of the 433.212 residences, 172.944 are detached houses, 59.050 are semi-detached houses, 32.893 are terraced houses and 123.557 are apartments. 32.530 are conventional dwellings in partly residential buildings.

The recorded year of completion of these buildings is as follows:

3.968 were completed before 1919,
9.129 were completed between 1919 and 1945,
20.343 were completed between 1946 and 1960,
24.255 were completed between 1961 and 1970,
61.247 were completed between 1971 and 1980,
85.503 were completed between 1981 and 1990,
70.094 were completed between 1991 and 2000,
54.897 were completed between 2001 and 2005,
and
74.203 were completed between 2006 and 2011.

When it comes to the size of the residential buildings in Cyprus, the mean area per dwelling there has been a decreasing trend from 184m² in 1998 to 153m² in 2005. Since 2005 the mean area per dwelling has remained approximately in the same level. The total building stock in the tertiary sector was approximately 81.000.

Out of the 81.000 there is information for the following categories of buildings

1073 are buildings used by public authorities, mainly offices
1035 are schools (nursing kindergarten, primary schools, gymnasiums, lyceum and universities)
395 are hotels and tourist apartments.
and
60 are hospitals and medical centers.

The first attempt to introduce energy conservation in buildings was the preparation of a voluntary CYS98:1999 Standard for the Insulation and Rational Use of Energy in Dwellings.

The Standard was suggesting that the thermal transmission (U-value) of the elements of the envelope of the building (except doors and windows) should be less than 1W/m² K. Furthermore the mean U value of the building surface with regards to the volume of the building should be between 1.22-1.55 W/m² K. The compliance with this Standard was set as a requirement when applying for a grant for insulation of existing buildings under the Grant Scheme for the Promotion of Energy Conservation and Renewable Energy Sources until 2008. The Grant Scheme for the insulation of existing buildings was in force from the middle of 2004 to September 2009 and 22.861 applications were received during that time. The estimated energy conservation by this measure is 6.746 toe per year.

For the transposition of the 2002/91 EPBD in Cyprus, the following legal documents have been approved by the House of Representatives and published in the Government Official Gazette:

- The Law for the Regulation of the Energy Performance of Buildings of 2006, N.142(I)/2006;
- The Amendment of the Law for the Regulation of Roads and Buildings of 2006, N.101(I)/2006;
- The Amendment of the Law for the Regulation of the Energy Performance of the Buildings of 2009, N.30(I)/2009;
- The Energy Performance of Buildings Notification in Accordance to Article 22 of 2007, K.Δ.Π. 437/2007

- The Energy Performance of Buildings Notification in Accordance to Article 22 of 2009, K.Δ.Π.275/2009
- The Roads and Buildings (Energy Performance of Buildings) Regulations of 2006, K.Δ.Π. 429/2006;
- The Energy Performance of Buildings (Inspection of Air-conditioning Systems) Regulations of 2009, K.Δ.Π. 163/2009;
- The Energy Performance of Buildings (Energy Certification for Buildings) Regulations of 2009, K.Δ.Π. 164/2009;
- The Energy Performance of Buildings (Methodology for calculating the Energy Performance of Buildings) Ministerial Order of 2009 K.Δ.Π. 414/2009;
- The Energy Performance of Buildings (Minimum requirements for the Energy Performance of Buildings) Ministerial Order of 2009, K.Δ.Π. 446/2009;
- The Energy Performance of Buildings (Authorized Inspectors) Ministerial Order of 2009, K.Δ.Π. 40/2009;
- The Energy Performance of Buildings (Examination material examination fees for Qualified Experts) Ministerial Order of 2009, K.Δ.Π. 260/2009;
- The Amendment of the Law for the Regulation of the Energy Performance of the Buildings of 2012, N.210(I)/2012;
- The Energy Performance of Buildings (Minimum requirements for the Energy Performance of Buildings) Ministerial Order of 2013, K.Δ.Π. 432/2013;

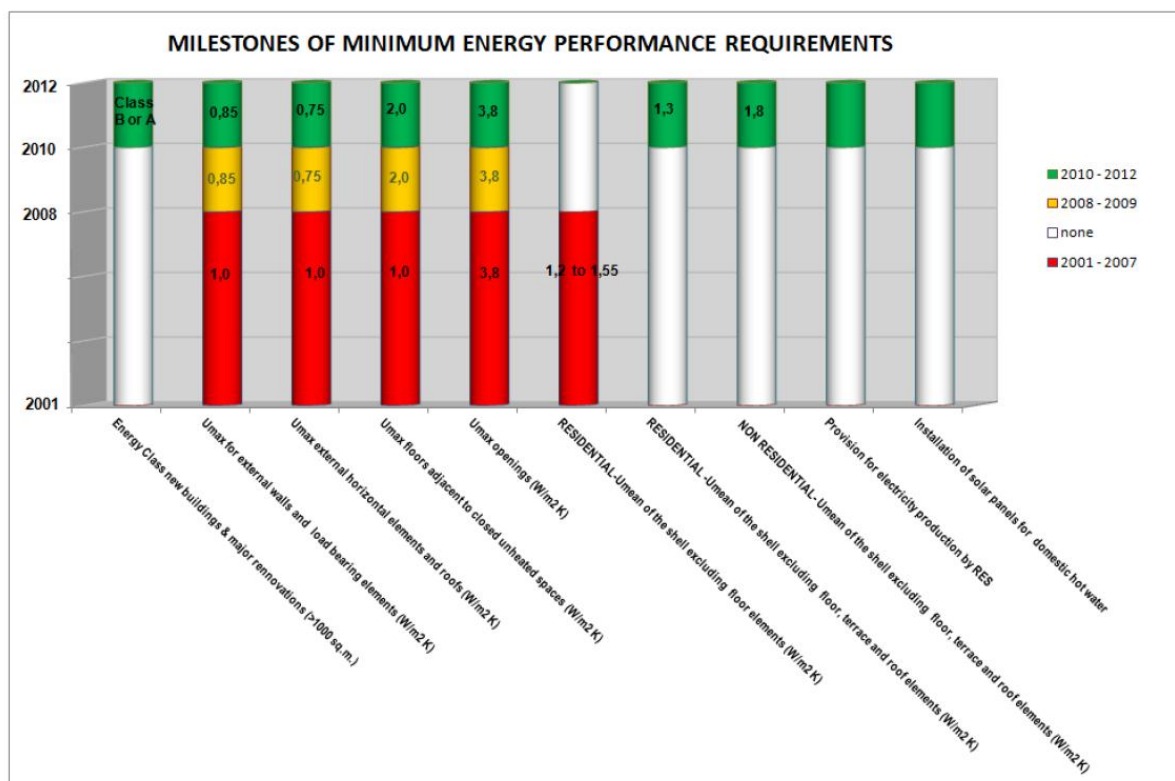
The law and regulations, determine the minimum demand of the Energy Performance Requirements of a Building, the prerequisites for the issue of a Certificate for the Energy Performance of a Building, the exceptions of the obligation of the existence of a Certificate, the maintenance procedure and the inspection of the energy consuming units of the building, the methodology for the calculation of the Energy Performance of a Building, the commendation of Advisory Committees, the authorities for inspection and auditing, the administration fines, the issuing of regulations, the offences, the lawsuit for the violation of law, the ability and the validity of the registration of Accredited Experts, the establishment and operation of the Register, the regulations and the fees.

The Law N.142(I)/2006 took effect as of 21/12/2007 by enacting the legislation concerning the minimum requirements set for the energy performance of buildings, (ΚΔΠ568/2007) which at that time were restricted to thermal insulation of the envelope for all new buildings and existing buildings exceeding 1000m² of effective floor area undergoing major renovation. The issue of Certificates for the Energy Performance for Buildings has taken effect as of 1st of January 2010 for residential buildings where as for non residential buildings has commenced in September 2010.

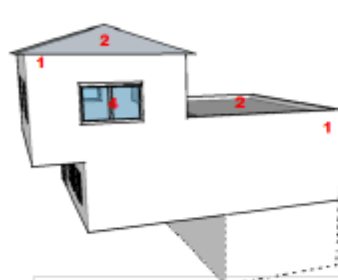
From January 2010, (K.Δ.Π.449/2009), the minimum requirements for the energy performance of buildings, besides the restrictions on the thermal performance of the different elements of the envelope of the building (maximum U-values), include; a mean u-value for the whole envelope excluding roof and floor, compulsory use of the domestic hot water solar systems, provision for electrical infrastructure for renewable system producing electricity. The category of the Energy Performance Certificate must be at least B (approximately 200kWh/m²/yr on average, for residential buildings and 260 kWh/m² /yr on average, for non residential) for all new buildings, and all existing buildings exceeding 1000m² of effective floor area undergoing major renovation.

The Amendment of the Law for the Regulation of the Energy Performance of the Buildings of 2012, N.210(I)/2012 took effect in 28/12/2012 and the latest revision of the minimum requirements for the energy performance of buildings took effect in 13/12/2013.

The chart below shows the milestones of the minimum requirements up until November 2013

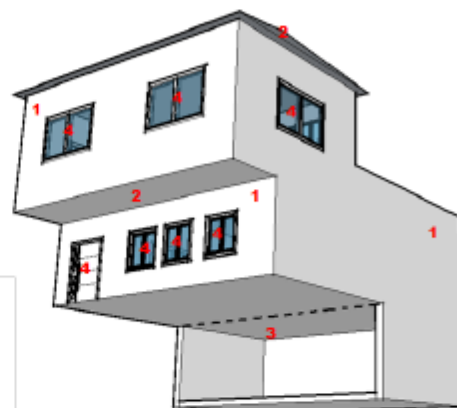


Minimum Energy Performance Requirements according to CYS98, Κ.Δ.Π.568/2007 and Κ.Δ.Π.446/2009.



Building Shell Elements

- 1: Walls and bearing construction elements
- 2: Horizontal shell elements and roofs in direct contact with the external environment
- 3: Floors over closed non heated spaces
- 4: Openings



Building Shell

- 1: $U_{max} = 1,0 \text{ W/m}^2\text{K}$
- 2: $U_{max} = 1,0 \text{ W/m}^2\text{K}$
- 3: $U_{max} = 1,0 \text{ W/m}^2\text{K}$
- 4: $U_{max} = 3,8 \text{ W/m}^2\text{K}$
- U_{mean} of the building shell elements excluding floors = 1,2 to 1,55 $\text{W/m}^2\text{K}$

Building Shell

- 1: $U_{max} = 0,85 \text{ W/m}^2\text{K}$
- 2: $U_{max} = 0,75 \text{ W/m}^2\text{K}$
- 3: $U_{max} = 2,0 \text{ W/m}^2\text{K}$
- 4: $U_{max} = 3,8 \text{ W/m}^2\text{K}$
- U_{mean} N/A

Building Shell

- 1: $U_{max} = 0,85 \text{ W/m}^2\text{K}$
- 2: $U_{max} = 0,75 \text{ W/m}^2\text{K}$
- 3: $U_{max} = 2,0 \text{ W/m}^2\text{K}$
- 4: $U_{max} = 3,8 \text{ W/m}^2\text{K}$
- U_{mean} of building shell elements excluding floors, terraces and roofs is 1,8 $\text{W/m}^2\text{K}$ for non residential and 1,3 $\text{W/m}^2\text{K}$ for residential buildings

Other Measures

- All new buildings are at least Energy Class B

- Installation of solar panels for covering hot water consumption

- Provision for future use of systems of electricity production

2 Application of the definition of nearly zero-energy buildings

Please indicate how a nearly zero-energy building is defined within national context and explain underlying assumptions and factors that provide the rationale for the chosen definition.

For reporting the detailed application in practice of the definition of nearly zero-energy buildings, the table presented in the Annex is to be used.

If a national definition of nearly zero-energy buildings does not exist yet in your country, please indicate here whether precise plans are already under development and if so, please describe these plans. Please also describe if any currently used non-governmental definitions will be considered in these plans and/or a future directive.

For the purpose of setting the definition of the NZEB in Cyprus the Energy Service of the Ministry of Commerce, Industry and Tourism (ES) had structured the in depth study of the potential of energy saving in the identified as most commonly used 3 categories of residential buildings,

- i) Detached 2 storey house
- ii) terraced houses
- iii) apartments on building blocks,

in the 4 climatic zones: Coastal areas, lowlands, low mountainous areas (from 300m up to 600m from sea level) and high mountainous area; of the country as defined in the national methodology for the energy performance of buildings.

The parameters identified to be analyzed in order to characterize the NZEB were:

- a. Architectural Design: orientation, compactness and summer comfort control of the country as defined in the national methodology for the energy performance of buildings.
- b. Insulation of opaque surfaces: walls, roof, floor (in contact with the ground, the air and closed environment)
- c. Shading strategies and applications (fins, overhangs, shutters, etc)
- d. Windows and other transparent surfaces: Thermal characteristics, U-value, shading ,Tsolar, Lsolar .
- e. Air permeability of the building for detached buildings and apartment buildings (high and low rising)
- f. Ventilation, natural and mechanical, in order to achieve good air quality to control air humidity and to ensure the durability of the building while reducing the energy consumptions of the heating, cooling and the use of ventilators.

g. Heat recovery systems when applicable

h. Heating systems, use of conventional hybrid or only renewable heating systems (the heating system should be analysed according to the following parameters: adaptation to the building characteristics (including its use), their energy efficiency, their environmental impact (especially of the carbon footprint) and the long term availability of the resource.

i. Optimization of the solar hot water production

j. Investigation of the gains from programming that would manage the absence of the occupants

k. Natural cooling methods

l. Cooling systems, use of conventional, or hybrid and renewable systems should be analysed according to the following parameters: adaptation to the building characteristics (including its use), their energy efficiency, their environmental impact (especially of the carbon footprint) and the long term availability of the resource.

m. Strategies for passive heating and cooling

The results of the in depth analysis of the ES, the outcomes of the contract for the consulting services and the evaluation of the measures through the cost optimal methodology are setting the definition of the NZEB for Cyprus (see also Chapter 9 Additional Information).

The proposed NZEB in Cyprus definition is under public consultation and when it is concluded the design parameters of NZEB are to be finalized.

For Residential Buildings:

Primary Energy Use: ?kWh/m²/yr

The numerical indication above includes primary energy use for heating, cooling, lighting and domestic hot water.

At least 25% of the ?kWh/m²/yr of the Primary Energy must be covered by RES

The NZEB for residential buildings in climatic zones Coastal areas, Lowlands, Low mountainous areas uses a reference building with the following technical characteristics:

ΠΙΝΑΚΑΣ 1: ΚΑΤΟΙΚΙΑ ΣΤΙΣ ΚΛΙΜΑΤΙΚΕΣ ΖΩΝΕΣ 1, 2 ΚΑΙ 3*

A/A	ΠΑΡΑΜΕΤΡΟΣ ΣΧΕΔΙΑΣΜΟΥ	ΠΡΟΤΕΙΝΟΜΕΝΗ ΤΙΜΗ
	Δομικά Στοιχεία του Κελύφους Κτιρίου	
1	Θερμολερατότητα εξωτερικής τοιχοποιίας	$\leq 0,489 \text{ W/m}^2\text{K}$
2	Θερμολερατότητα οροφής	$\leq 0,407 \text{ W/m}^2\text{K}$
3	Θερμολερατότητα δαπέδου σε επαφή με το έδαφος	$\leq 1,6 \text{ W/m}^2\text{K}$
4	Θερμολερατότητα δαπέδου πάνω από plotis	$\leq 0,41 \text{ W/m}^2\text{K}$
5	Θερμολερατότητα κορυφωμάτων	$\leq 28 \text{ W/m}^2\text{K}$
6	Εξωτερική θερμοχωρητικότητα κατοικίας	Μέτρια ή βαριά κατασκευή (medium or heavyweight) $\leq 132 \text{ kWh/K ανά m}^2$ της συνολικής επιφάνειας του δαπέδου.
	Εξωτερική Σκίαση	
7	Συντελεστής σκίασης συστήματος σκέπας και υαλοπίνακα κατά τους θερινούς μήνες	Gvalue $\leq 0,5$ ***
8	Θερμολερατότητα συστήματος σκίασης με πλαισιούρια	$\leq 1,1 \text{ W/m}^2\text{K}$
	Άλλες Παράμετροι	
9	Αεροστεγανότητα κελύφους (Δείκτης αέρα)	$\leq 10 \text{ m}^3/(\text{h m}^2)$ στα 50Pa
10	Νυχτερινός δροσισμός για το καλοκαίρι	Υπνοδωμάτια $\geq 730 \text{ m}^3/\text{h}$ Άλλοι χώροι $\geq 1300 \text{ m}^3/\text{h}$
11	Ετήσια κατακόλωση σε πρωτογενή ενέργεια (θέρμανση, ψύξη, φωτισμό, ζεστό νερό χρήσης και εξαερισμό)	? kWh/m ² ανά έτος (η τιμή θα καθοριστεί ανάλογα με το λογισμικό που θα χρησιμοποιηθεί για το σκοπό αυτό)
12	Συνεισφορά των Ανανεώσιμων Πηγών Ενέργειας στην ετήσια κατακόλωση σε πρωτογενή ενέργεια	$\geq 25\%$

The NZEB for residential buildings in climatic zone 4⁶ (high mountainous area) uses a reference building with the following technical characteristics:

ΠΙΝΑΚΑΣ 2: ΚΑΤΟΙΚΙΑ ΣΤΗΝ ΚΛΙΜΑΤΙΚΗ ΖΩΝΗ 4*

A/A	ΠΑΡΑΜΕΤΡΟΣ ΣΧΕΔΙΑΣΜΟΥ	ΠΡΟΤΕΙΝΟΜΕΝΗ ΤΙΜΗ
	Δομικά στοιχεία του Κελύφους Κτιρίου	
1	Θερμοπερατότητα εξωτερικής τοιχοποιίας	$\leq 0,303 \text{ W/m}^2\text{K}$
2	Θερμοπερατότητα οροφής	$\leq 0,338 \text{ W/m}^2\text{K}$
3	Θερμοπερατότητα δαπέδου σε επαφή με το έδαφος	$\leq 0,28 \text{ W/m}^2\text{K}$
4	Θερμοπερατότητα δαπέδου πάνω από pilotis	$\leq 0,34 \text{ W/m}^2\text{K}$
5	Θερμοπερατότητα κορυφωμάτων	$\leq 2,8 \text{ W/m}^2\text{K}$
6	Εξωτερική θερμοχωρητικότητα κατοικίας	Μέτρια ή βαριά κατασκευή (medium or heavy weight)** $\geq 132 \text{ kWh/K ανά m}^2$ της συνολικής επιφάνειας του δαπέδου.
	Εξωτερική Σκίαση	
7	Συντελεστής σκίασης συστήματος σκίαστρου και υαλοπίνακα κατά τους θερινούς μήνες	-
8	Θερμοπερατότητα συστήματος σκίασης με παντζούρια	$\leq 1,1 \text{ W/m}^2\text{K}$
	Άλλες Παράμετροι	
9	Αεροστεγανότητα κελύφους (Δεσμός αέρα)	$\leq 10 \text{ m}^3/(\text{h m}^2) \text{ στα } 50 \text{ Pa}$
10	Νυχτερινός δροσισμός για το κατοικαίρι	Υπνοδωμάτια $\geq 730 \text{ m}^3/\text{h}$ Άλλοι χώροι $\geq 1300 \text{ m}^3/\text{h}$
11	Ετήσια κατανάλωση σε πρωτογενή ενέργεια (θέρμανση, ψύξη, φωτισμό, ζεστό νερό χρήσης και εξοπλισμό)	? kWh/m ² ανά έτος (η τιμή θα καθοριστεί ανάλογα με το λογισμικό που θα χρησιμοποιηθεί για το σκοπό αυτό)
12	Συνεισφορά των Ανανεώσιμων Πηγών Ενέργειας στην ετήσια κατανάλωση σε πρωτογενή ενέργεια	$\geq 25\%$

For non Residential Buildings (mainly offices):

Primary Energy Use: ?kWh/m²/yr

The numerical indication above includes primary energy use for heating, cooling, lighting and domestic hot water.

At least 25% of the ?kWh/m²/yr of the Primary Energy must be covered by RES

3 Intermediate targets for improving the energy performance of new buildings in order to ensure that by 31 December 2020 all new buildings are nearly zero-energy buildings

Please report the 2015 targets ensuring that by 31 December 2020 all new buildings are nearly zero-energy buildings. Also explain how they relate to and help to ensure that all new buildings are nearly zero-energy buildings by 31 December 2020.

What are the qualitative and quantitative 2015 targets for all new buildings?

The proposed NZEB in Cyprus is under public consultation and when it is concluded the design parameters of NZEB are to be finalized.

3.1.1 Qualitative 2015 targets: Interim energy related requirements for new residential and non-residential buildings

Requirements on fraction of renewable energies:

Requirements on useful energy demand:

Requirements on primary energy demand:

The qualitative target is to be estimated when the proposed NZEB in Cyprus design parameters, which are under public consultation at the moment, are finalized.

3.1.2 Quantitative 2015 targets: Share of nZEB according to official nZEB definition on all newly constructed buildings (define reference parameter e.g. number of buildings, floor area, volume etc.):

The quantitative target is not estimated because the proposed NZEB design parameters in Cyprus are under public consultation and to be finalized.

Miscellaneous:

From your point of view, how close is your country at the moment in achieving this target? In case there is no target defined yet, please indicate when it is expected to have such a target.

The target 2015 should be expected after the NZEB design parameters are finalized.

4 Intermediate targets for improving the energy performance of new buildings in order to ensure that by 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings

Please report here the 2015 targets ensuring that by 31 December 2018 all new public buildings are nearly zero-energy buildings. Also explain how they relate to and help to achieve that by 31 December 2018, all new public buildings are nearly zero-energy buildings

What are the qualitative and quantitative 2015 targets for all new buildings occupied and owned by public authorities?

The proposed NZEB in Cyprus is under public consultation and when it is concluded the design parameters of NZEB are to be finalized

4.1.1 Qualitative 2015 targets: Interim energy related requirements for new public buildings

Requirements on fraction of renewable energies:

Requirements on useful energy demand:

Requirements on primary energy demand:

The qualitative target is to be estimated when the proposed NZEB in Cyprus design parameters, which are under public consultation at the moment, are finalized.

4.1.2 Quantitative 2015 targets: Share of public nZEB according to official nZEB definition on all newly constructed public buildings (define reference parameter e.g. number of buildings, floor area, volume etc.):

The quantitative target is not estimated because the proposed NZEB design parameters in Cyprus are under public consultation and to be finalized.

Miscellaneous:

From your point of view, how close is your country at the moment in achieving this target? In case there is no target defined yet, please indicate when it is expected to have such a target.

The target 2015 should be expected after the NZEB design parameters are finalized.

5 Policies and measures for the promotion of all new buildings being nearly zero-energy buildings after 31 December 2020

5.1 Residential buildings

5.1.1 Relevant regulations

Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 NZEB. (1st Stage 2012-2015)

In order to achieve a smooth transition from the today's minimum energy performance requirements to the NZEB energy performance requirements the ES will design and announce a linear tightening of the minimum energy performance requirements.

Second and third revision of the minimum energy performance requirements. (2nd Stage 2015-2018)

The minimum energy performance requirements, as mentioned before, have been set for the first time in 2007 and have been revised in 2009 and are included in Ministerial Orders issued by the Ministry of Commerce, Industry and Tourism. It is planned that at least 2 more revisions will take place between 2015 and 2018 named as the Second Revision and Third Revision respectively. On the second revision the minimum energy performance requirements will be tightened further, reflecting the trend leading to the NZEB and in the third revision the minimum energy performance requirements for NZEB will be issued.

Implementation of the Third Revision of the Minimum Energy Performance Requirements. (3rd Stage 2018-2020)

The Ministerial Order containing the Third Revision of the Minimum Energy Performance Requirements will be enforced and it will apply to all new building occupied and owned by the public authorities- from the 31st of December 2018 and to all new buildings- from the 31st of December 2020.

5.1.2 Relevant economic incentives and financing instruments

5.1.3 Energy performance certificates' use and layout in relation to nZEB standard

Methodology and software for the Energy Performance Certification of the NZEB (1st Stage 2012-2015)

Comparing the existing national methodology of the certification of the Energy Performance of Buildings, with the certification of NZEB, further parameters are to be accounted for in the latter, thus the existing methodology should be further developed in order to include the NZEB category. Once this is done, the software now in use for the certification of buildings will have to be improved, or replaced in order to reflect the new methodology for the certification of NZEB. It should be noted that the software in use now is developed by the ES and is free for all users. There are at the moment several private initiatives to develop software conforming to the national methodology, which will undergo evaluation and approval by ES in order to be used for Energy Performance Certification of Buildings.

Further upgrading of the software for the Certification of the NZEB. (2nd Stage 2015-2018)

The software developed during the first stage will continuously be upgraded /improved according to the remarks of the users and the changes made by the ES.

Identified final software for the Certification of the NZEB. (3rd Stage 2018-2020)

The Ministerial Order prescribing the Final version of the official (free) software for the Certification of NZEB will be enforced. At the same time other software developed by the private sector will be evaluated and be approved for use for the certification of NZEB.

5.1.4 Supervision (energy advice and audits)

5.1.5 Information (tools)

Preparation of Technical Guide (1st Stage 2012-2015)

ES will prepare a Technical Guide based on the results of the in depth study of the energy saving potentials and the outcomes of the consulting services contract. The Technical Guide shall include the minimum requirements of the NZEB in Cyprus and technical and **construction guidance in order to facilitate the**

design and construction of the building. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually. It will remain in use even after the enforcement by law application of NZEB.

Raising the awareness of the public (1st Stage 2012-2015)

The correct user-behaviour of the occupant will enhance the design and construction of NZEB whereas the foul use will negatively affect their performance. Thus it is important that the characteristics and advantages of the NZEB as well of the renewable energy systems and energy conservation systems be presented through a well planned campaign to the public, with special interest in the rational and correct use of these buildings and technical systems.

Successful practices used in the past will be planned such as publication of informative flyers, articles and interviews in newspapers, participation of energy officers in television and radio shows. Further more the upgrading of the website of the ES with a special link to the NZEB has already been planned.

Further upgrading the NZEB web platform (2nd Stage 2015-2018)

Information will be periodically updated and enriched to include: a) the Technical Guide, b) the presentation of NZEB that have been certified as such including description of construction and planning data, as well as visual presentation (photos and videos) and c) information on the construction companies, or land development organization responsible for the building.

Raising the awareness of the public- continued. (2nd Stage 2015-2018)

The information campaign that has started during the first stage will be evaluated and according to the results, adjusted to reach further and further the public. Furthermore Open Day houses visits to the NZEB constructed during the first stage, either by the pilot projects supported by ES, or by private initiative will be planned.

5.1.6 Demonstration

5.1.7 Education and training

Informing the Qualified Experts and the Engineers of the building industry (1st Stage 2012-2015)

The Qualified Experts and Architects and all Engineers involved in the design and construction of building will need to be informed of the changes of the legal framework and the minimum energy performance requirements of NZEB. Qualified Experts should be also further educated in the new parameters of the methodology for the certification of the NZEB and the use of the new software.

Training the construction companies personnel and the on site technicians. (1st Stage 2012-2015)

Under the **European initiative "Build Up Skills"** which is part of the European programme "Intelligent Energy for Europe" and is co-funded by the European Executive Agency for Competitiveness and Innovation (EACI), Cyprus has identified the numbers, the specialities, the necessary knowledge, skills and way of thinking needed to be acquired by the on site personnel, in order to render both the Construction sector, as well as other related sectors, making achievable the relevant targets of "Europe 2020" strategy, including NZEB.

The examination of the current **Vocational Education and Training System** in technical occupations concludes that the structure of the System is sufficiently concise and flexible, in order to meet any challenges that may arise. However, the continuous review and upgrade of the existing programmes is thought to be an absolute necessity, as well as the addition of new targeted programmes in emerging critical technologies, the training of instructors in order to renew and enrich their knowledge, and the provision of incentives and measures to increase the flow of Cypriot young people in technical occupations.

The total employment needs in certain technical occupations related to the "Build Up Skills" project for the period 2010-2020 are expected to increase significantly in comparison to the respective ones for the period 2005-2010.

Through the analysis of the status quo and the comparison with national targets and actions, the needs for technological skills are identified, which will play a key role in the achievement of the targets for 2020, like the installation and maintenance of photovoltaic systems, heat pumps and shallow geothermal systems, solar protection and automation systems, electronic monitoring and control of central heating, cooling and air-conditioning systems. Additionally, the minimum annual number of people per discipline who must receive training for new skills by 2020 has been estimated.

The results of this report will lay the foundation for the preparation of a **Roadmap** with a time horizon for completion by 2020, which will include all main policies and actions that are required for the promotion of the necessary vocational education and training of the people employed in technical occupations of the Construction sector and other related sectors, so that they acquire the necessary skills for the achievement of the national targets regarding the energy in the building sector.

Informing the Qualified Experts and the Engineers of the building industry continued. (2nd Stage 2015-2018)

The education of the Qualified Experts and Engineers of the building industry will continue through the second stage in order to cover all new interested parties and to continuously update their knowledge on the different aspects of NZEB, as well as the legal requirements, i.e. the second and third revision of the minimum energy performance requirements.

Training the construction companies personnel and the on site technicians. (2nd Stage 2015-2018)

The Roadmap to be prepared on the second stage of **Build up Skills Project** will set the pace and needs of the training of the construction companies personnel and the on site technicians and will run through to the second stage.

5.2 Non-residential buildings

5.2.1 Relevant regulations

Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 NZEB. (1st Stage 2012-2015)

In order to achieve a smooth transition from the today's minimum energy performance requirements to the

NZEB energy performance requirements the ES will design and announce a linear tightening of the minimum energy performance requirements.

Second and third revision of the minimum energy performance requirements. (2nd Stage 2015-2018)

The minimum energy performance requirements, as mentioned before, have been set for the first time in 2007 and have been revised in 2009 and are included in Ministerial Orders issued by the Ministry of Commerce, Industry and Tourism. It is planned that at least 2 more revisions will take place between 2015 and 2018 named as the Second Revision and Third Revision respectively. On the second revision the minimum energy performance requirements will be tightened further, reflecting the trend leading to the NZEB and in the third revision the minimum energy performance requirements for NZEB will be issued.

Implementation of the Third Revision of the Minimum Energy Performance Requirements. (3rd Stage 2018-2020)

The Ministerial Order containing the Third Revision of the Minimum Energy Performance Requirements will be enforced and it will apply to all new building occupied and owned by the public authorities- from the 31st of December 2018 and to all new buildings- from the 31st of December 2020.

5.2.2 Relevant economic incentives and financing instruments

5.2.3 Energy performance certificates' use and layout in relation to nZEB standard

Methodology and software for the Energy Performance Certification of the NZEB (1st Stage 2012-2015)

Comparing the existing national methodology of the certification of the Energy Performance of Buildings, with the certification of NZEB, further parameters are to be accounted for in the latter, thus the existing methodology should be further developed in order to include the NZEB category. Once this is done, the software now in use for the certification of buildings will have to be improved, or replaced in order to reflect the new methodology for the certification of NZEB. It should be noted that the software in use now is developed by the ES and is free for all users. There are at the moment several private initiatives to develop software conforming to the national methodology, which will undergo evaluation and approval by ES in order to be used for Energy Performance Certification of Buildings.

Further upgrading of the software for the Certification of the NZEB. (2nd Stage 2015-2018)

The software developed during the first stage will continuously be upgraded /improved according to the remarks of the users and the changes made by the ES.

Identified final software for the Certification of the NZEB. (3rd Stage 2018-2020)

The Ministerial Order prescribing the Final version of the official (free) software for the Certification of NZEB will be enforced. At the same time other software developed by the private sector will be evaluated and be approved for use for the certification of NZEB.

5.2.4 Supervision (energy advice and audits)

5.2.5 Information (tools)

Preparation of Technical Guide (1st Stage 2012-2015)

ES will prepare a Technical Guide based on the results of the in depth study of the energy saving potentials and the outcomes of the consulting services contract. The Technical Guide shall include the minimum requirements of the NZEB in Cyprus and technical and **construction guidance in order to facilitate the design and construction of the building**. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually. It will remain in use even after the enforcement by law application of NZEB.

Raising the awareness of the public (1st Stage 2012-2015)

The correct user-behaviour of the occupant will enhance the design and construction of NZEB whereas the foul use will negatively affect their performance. Thus it is important that the characteristics and advantages of the NZEB as well of the renewable energy systems and energy conservation systems be presented through a well planned campaign to the public, with special interest in the rational and correct use of these buildings and technical systems.

Successful practices used in the past will be planned such as publication of informative flyers, articles and interviews in newspapers, participation of energy officers in television and radio shows. Further more the upgrading of the website of the ES with a special link to the NZEB has already been planned.

Further upgrading the NZEB web platform (2nd Stage 2015-2018)

Information will be periodically updated and enriched to include: a) the Technical Guide, b) the presentation of NZEB that have been certified as such including description of construction and planning data, as well as visual presentation (photos and videos) and c) information on the construction companies, or land development organization responsible for the building.

Raising the awareness of the public- continued. (2nd Stage 2015-2018)

The information campaign that has started during the first stage will be evaluated and according to the results, adjusted to reach further and further the public. Furthermore Open Day houses visits to the NZEB constructed during the first stage, either by the pilot projects supported by ES, or by private initiative will be planned.

5.2.6 Demonstration

5.2.7 Education and training

Informing the Qualified Experts and the Engineers of the building industry (1st Stage 2012-2015)

The Qualified Experts and Architects and all Engineers involved in the design and construction of building will need to be informed of the changes of the legal framework and the minimum energy performance requirements of NZEB. Qualified Experts should be also further educated in the new parameters of the methodology for the certification of the NZEB and the use of the new software.

Training the construction companies personnel and the on site technicians. (1st Stage 2012-2015)

Under the **European initiative "Build Up Skills"** which is part of the European programme "Intelligent Energy for Europe" and is co-funded by the European Executive Agency for Competitiveness and Innovation (EACI), Cyprus has identified the numbers, the specialities, the necessary knowledge, skills and way of thinking needed to be acquired by the on site personnel, in order to render both the Construction sector, as well as other related sectors, making achievable the relevant targets of "Europe 2020" strategy, including NZEB.

The examination of the current **Vocational Education and Training System** in technical occupations concludes that the structure of the System is sufficiently concise and flexible, in order to meet any challenges that may arise. However, the continuous review and upgrade of the existing programmes is thought to be an absolute necessity, as well as the addition of new targeted programmes in emerging critical technologies, the training of instructors in order to renew and enrich their knowledge, and the provision of incentives and measures to increase the flow of Cypriot young people in technical occupations.

The total employment needs in certain technical occupations related to the "Build Up Skills" project for the period 2010-2020 are expected to increase significantly in comparison to the respective ones for the period 2005-2010.

Through the analysis of the status quo and the comparison with national targets and actions, the needs for technological skills are identified, which will play a key role in the achievement of the targets for 2020, like the installation and maintenance of photovoltaic systems, heat pumps and shallow geothermal systems, solar protection and automation systems, electronic monitoring and control of central heating, cooling and air-conditioning systems. Additionally, the minimum annual number of people per discipline who must receive training for new skills by 2020 has been estimated.

The results of this report will lay the foundation for the preparation of a **Roadmap** with a time horizon for completion by 2020, which will include all main policies and actions that are required for the promotion of the necessary vocational education and training of the people employed in technical occupations of the Construction sector and other related sectors, so that they acquire the necessary skills for the achievement of the national targets regarding the energy in the building sector.

Informing the Qualified Experts and the Engineers of the building industry continued. (2nd Stage 2015-2018)

The education of the Qualified Experts and Engineers of the building industry will continue through the second stage in order to cover all new interested parties and to continuously update their knowledge on the different aspects of NZEB, as well as the legal requirements, i.e. the second and third revision of the minimum energy performance requirements.

Training the construction companies personnel and the on site technicians. (2nd Stage 2015-2018)

The Roadmap to be prepared on the second stage of **Build up Skills Project** will set the pace and needs of the training of the construction companies personnel and the on site technicians and will run through to the second stage.

5.3 From your point of view, how would you evaluate the current measures that are in force?

Please also try to describe the existing gap between what is in force and what should be in force in order to ensure that after 31 December 2020, all new buildings are nearly zero-energy buildings. Are there precise measures planned for the future?

Existing Insulation requirements for new buildings are approaching the limits of cost efficiency. Some further improvements will be delivered due to the reduction of cost of the necessary material and technology. The bulk of the improvements towards the NZEB will be achieved by increasing RES on buildings, primarily

photovoltaics. The proposed NZEB in Cyprus will be finalized after a public consultation process.

6 Policies and measures for the promotion of all new buildings occupied and owned by public authorities being nearly zero-energy buildings after 31 December 2018

6.1 All new buildings occupied and owned by public authorities

6.1.1 Relevant regulations

Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 NZEB. (1st Stage 2012-2015)

In order to achieve a smooth transition from the today's minimum energy performance requirements to the NZEB energy performance requirements the ES will design and announce a linear tightening of the minimum energy performance requirements.

Second and third revision of the minimum energy performance requirements. (2nd Stage 2015-2018)

The minimum energy performance requirements, as mentioned before, have been set for the first time in 2007 and have been revised in 2009 and are included in Ministerial Orders issued by the Ministry of Commerce, Industry and Tourism. It is planned that at least 2 more revisions will take place between 2015 and 2018 named as the Second Revision and Third Revision respectively. On the second revision the minimum energy performance requirements will be tightened further, reflecting the trend leading to the NZEB and in the third revision the minimum energy performance requirements for NZEB will be issued.

Implementation of the Third Revision of the Minimum Energy Performance Requirements. (3rd Stage 2018-2020)

The Ministerial Order containing the Third Revision of the Minimum Energy Performance Requirements will be enforced and it will apply to all new building occupied and owned by the public authorities- from the 31st of December 2018 and to all new buildings- from the 31st of December 2020.

6.1.2 Relevant economic incentives and financing instruments

6.1.3 Energy performance certificates' use and layout in relation to nZEB standard

Methodology and software for the Energy Performance Certification of the NZEB (1st Stage 2012-2015)

Comparing the existing national methodology of the certification of the Energy Performance of Buildings, with the certification of NZEB, further parameters are to be accounted for in the latter, thus the existing methodology should be further developed in order to include the NZEB category. Once this is done, the software now in use for the certification of buildings will have to be improved, or replaced in order to reflect the new methodology for the certification of NZEB. It should be noted that the software in use now is developed by the ES and is free for all users. There are at the moment several private initiatives to develop software conforming to the national methodology, which will undergo evaluation and approval by ES in order to be used for Energy Performance Certification of Buildings.

Further upgrading of the software for the Certification of the NZEB. (2nd Stage 2015-2018)

The software developed during the first stage will continuously be upgraded /improved according to the remarks of the users and the changes made by the ES.

Identified final software for the Certification of the NZEB. (3rd Stage 2018-2020)

The Ministerial Order prescribing the Final version of the official (free) software for the Certification of NZEB will be enforced. At the same time other software developed by the private sector will be evaluated and be approved for use for the certification of NZEB.

6.1.4 Supervision (energy advice and audits)

6.1.5 Information (tools)

Preparation of Technical Guide (1st Stage 2012-2015)

ES will prepare a Technical Guide based on the results of the in depth study of the energy saving potentials and the outcomes of the consulting services contract. The Technical Guide shall include the minimum requirements of the NZEB in Cyprus and technical and **construction guidance in order to facilitate the design and construction of the building**. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually. It will remain in use even after the enforcement by law application of NZEB.

Raising the awareness of the public (1st Stage 2012-2015)

The correct user-behaviour of the occupant will enhance the design and construction of NZEB whereas the foul use will negatively affect their performance. Thus it is important that the characteristics and advantages of the NZEB as well of the renewable energy systems and energy conservation systems be presented through a well planned campaign to the public, with special interest in the rational and correct use of these buildings and technical systems.

Successful practices used in the past will be planned such as publication of informative flyers, articles and interviews in newspapers, participation of energy officers in television and radio shows. Further more the upgrading of the website of the ES with a special link to the NZEB has already been planned.

Further upgrading the NZEB web platform (2nd Stage 2015-2018)

Information will be periodically updated and enriched to include: a) the Technical Guide, b) the presentation of NZEB that have been certified as such including description of construction and planning data, as well as visual presentation (photos and videos) and c) information on the construction companies, or land development organization responsible for the building.

Raising the awareness of the public- continued. (2nd Stage 2015-2018)

The information campaign that has started during the first stage will be evaluated and according to the results, adjusted to reach further and further the public. Furthermore Open Day houses visits to the NZEB constructed during the first stage, either by the pilot projects supported by ES, or by private initiative will be planned.

6.1.6 Demonstration

6.1.7 Education and training

Informing the Qualified Experts and the Engineers of the building industry (1st Stage 2012-2015)

The Qualified Experts and Architects and all Engineers involved in the design and construction of building will need to be informed of the changes of the legal framework and the minimum energy performance requirements of NZEB. Qualified Experts should be also further educated in the new parameters of the methodology for the certification of the NZEB and the use of the new software.

Training the construction companies personnel and the on site technicians. (1st Stage 2012-2015)

Under the **European initiative "Build Up Skills"** which is part of the European programme "Intelligent Energy for Europe" and is co-funded by the European Executive Agency for Competitiveness and Innovation (EACI), Cyprus has identified the numbers, the specialities, the necessary knowledge, skills and way of thinking needed to be acquired by the on site personnel, in order to render both the Construction sector, as well as other related sectors, making achievable the relevant targets of "Europe 2020" strategy, including NZEB.

The examination of the current **Vocational Education and Training System** in technical occupations concludes that the structure of the System is sufficiently concise and flexible, in order to meet any challenges that may arise. However, the continuous review and upgrade of the existing programmes is thought to be an absolute necessity, as well as the addition of new targeted programmes in emerging critical technologies, the training of instructors in order to renew and enrich their knowledge, and the provision of incentives and measures to increase the flow of Cypriot young people in technical occupations.

The total employment needs in certain technical occupations related to the "Build Up Skills" project for the period 2010-2020 are expected to increase significantly in comparison to the respective ones for the period 2005-2010.

Through the analysis of the status quo and the comparison with national targets and actions, the needs for technological skills are identified, which will play a key role in the achievement of the targets for 2020, like the installation and maintenance of photovoltaic systems, heat pumps and shallow geothermal systems, solar protection and automation systems, electronic monitoring and control of central heating, cooling and air-conditioning systems. Additionally, the minimum annual number of people per discipline who must receive training for new skills by 2020 has been estimated.

The results of this report will lay the foundation for the preparation of a **Roadmap** with a time horizon for completion by 2020, which will include all main policies and actions that are required for the promotion of the necessary vocational education and training of the people employed in technical occupations of the Construction sector and other related sectors, so that they acquire the necessary skills for the achievement of the national targets regarding the energy in the building sector.

Informing the Qualified Experts and the Engineers of the building industry continued. (2nd Stage 2015-2018)

The education of the Qualified Experts and Engineers of the building industry will continue through the second stage in order to cover all new interested parties and to continuously update their knowledge on the different aspects of NZEB, as well as the legal requirements, i.e. the second and third revision of the minimum energy performance requirements.

Training the construction companies personnel and the on site technicians. (2nd Stage 2015-2018)

The Roadmap to be prepared on the second stage of **Build up Skills Project** will set the pace and needs of the training of the construction companies personnel and the on site technicians and will run through to the second stage.

6.2 From your point of view, how would you evaluate the current measures that are in force? Please also describe the existing gap between what is in force and what should be in force in order to ensure that after 31 December 2018, all new public buildings are nearly zero-energy buildings. Are there precise measures planned for the future?

Existing Insulation requirements for new buildings are approaching the limits of cost efficiency. Some further improvements will be delivered due to the reduction of cost of the necessary material and technology. The bulk

of the improvements towards the NZEB will be achieved by increasing RES on buildings, primarily photovoltaics. The proposed NZEB in Cyprus will be finalized after a public consultation process.

7 Policies and measures for the promotion of existing buildings undergoing major renovation being transformed to nearly zero-energy buildings

7.1 Residential buildings

7.1.1 Relevant regulations

Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 NZEB. (1st Stage 2012-2015)

In order to achieve a smooth transition from the today's minimum energy performance requirements to the NZEB energy performance requirements the ES will design and announce a linear tightening of the minimum energy performance requirements.

Second and third revision of the minimum energy performance requirements. (2nd Stage 2015-2018)

The minimum energy performance requirements, as mentioned before, have been set for the first time in 2007 and have been revised in 2009 and are included in Ministerial Orders issued by the Ministry of Commerce, Industry and Tourism. It is planned that at least 2 more revisions will take place between 2015 and 2018 named as the Second Revision and Third Revision respectively. On the second revision the minimum energy performance requirements will be tightened further, reflecting the trend leading to the NZEB and in the third revision the minimum energy performance requirements for NZEB will be issued.

Implementation of the Third Revision of the Minimum Energy Performance Requirements. (3rd Stage 2018-2020)

The Ministerial Order containing the Third Revision of the Minimum Energy Performance Requirements will be enforced and it will apply to all new building occupied and owned by the public authorities- from the 31st of December 2018 and to all new buildings- from the 31st of December 2020.

7.1.2 Relevant economic incentives and financing instruments

Proposed Support Scheme title: «εξοικονομώ – αναβαθμίζω», timeframe:2014-2020

- **Category A**-Financial incentive plan for energy performance upgrade of residential buildings for which the building permit was granted prior to the 21st December2007.
Total budget:5.000.000 euros.
- **Category D** Financial incentive plan for energy performance upgrade of individual building elements and for which the building permit was granted as. residential.
Total budget:1.000.000 euros

7.1.3 Energy performance certificates' use and layout in relation to nZEB standard

Methodology and software for the Energy Performance Certification of the NZEB (1st Stage 2012-2015)

Comparing the existing national methodology of the certification of the Energy Performance of Buildings, with the certification of NZEB, further parameters are to be accounted for in the latter, thus the existing methodology should be further developed in order to include the NZEB category. Once this is done, the software now in use for the certification of buildings will have to be improved, or replaced in order to reflect the new methodology for the certification of NZEB. It should be noted that the software in use now is developed by the ES and is free for all users. There are at the moment several private initiatives to develop software conforming to the national methodology, which will undergo evaluation and approval by ES in order to be used for Energy Performance Certification of Buildings.

Further upgrading of the software for the Certification of the NZEB. (2nd Stage 2015-2018)

The software developed during the first stage will continuously be upgraded /improved according to the remarks of the users and the changes made by the ES.

Identified final software for the Certification of the NZEB. (3rd Stage 2018-2020)

The Ministerial Order prescribing the Final version of the official (free) software for the Certification of NZEB will be enforced. At the same time other software developed by the private sector will be evaluated and be approved for use for the certification of NZEB.

7.1.4 Supervision (energy advice and audits)

7.1.5 Information (tools)

Preparation of Technical Guide (1st Stage 2012-2015)

ES will prepare a Technical Guide based on the results of the in depth study of the energy saving potentials and the outcomes of the consulting services contract. The Technical Guide shall include the minimum requirements of the NZEB in Cyprus and technical and **construction guidance in order to facilitate the design and construction of the building**. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually. It will remain in use even after the enforcement by law application of NZEB.

Raising the awareness of the public (1st Stage 2012-2015)

The correct user-behaviour of the occupant will enhance the design and construction of NZEB whereas the foul use will negatively affect their performance. Thus it is important that the characteristics and advantages of the NZEB as well of the renewable energy systems and energy conservation systems be presented through a well planned campaign to the public, with special interest in the rational and correct use of these buildings and technical systems.

Successful practices used in the past will be planned such as publication of informative flyers, articles and interviews in newspapers, participation of energy officers in television and radio shows. Further more the upgrading of the website of the ES with a special link to the NZEB has already been planned.

Further upgrading the NZEB web platform (2nd Stage 2015-2018)

Information will be periodically updated and enriched to include: a) the Technical Guide, b) the presentation of NZEB that have been certified as such including description of construction and planning data, as well as visual presentation (photos and videos) and c) information on the construction companies, or land development organization responsible for the building.

Raising the awareness of the public- continued. (2nd Stage 2015-2018)

The information campaign that has started during the first stage will be evaluated and according to the results, adjusted to reach further and further the public. Furthermore Open Day houses visits to the NZEB constructed during the first stage, either by the pilot projects supported by ES, or by private initiative will be planned.

7.1.6 Demonstration

7.1.7 Education and training

Informing the Qualified Experts and the Engineers of the building industry (1st Stage 2012-2015)

The Qualified Experts and Architects and all Engineers involved in the design and construction of building will need to be informed of the changes of the legal framework and the minimum energy performance requirements of NZEB. Qualified Experts should be also further educated in the new parameters of the methodology for the certification of the NZEB and the use of the new software.

Training the construction companies personnel and the on site technicians. (1st Stage 2012-2015)

Under the **European initiative "Build Up Skills"** which is part of the European programme "Intelligent Energy for Europe" and is co-funded by the European Executive Agency for Competitiveness and Innovation (EACI), Cyprus has identified the numbers, the specialities, the necessary knowledge, skills and way of thinking needed to be acquired by the on site personnel, in order to render both the Construction sector, as well as other related sectors, making achievable the relevant targets of "Europe 2020" strategy, including NZEB.

The examination of the current **Vocational Education and Training System** in technical occupations concludes that the structure of the System is sufficiently concise and flexible, in order to meet any challenges that may arise. However, the continuous review and upgrade of the existing programmes is thought to be an absolute necessity, as well as the addition of new targeted programmes in emerging critical technologies, the training of instructors in order to renew and enrich their knowledge, and the provision of incentives and measures to increase the flow of Cypriot young people in technical occupations.

The total employment needs in certain technical occupations related to the "Build Up Skills" project for the period 2010-2020 are expected to increase significantly in comparison to the respective ones for the period 2005-2010.

Through the analysis of the status quo and the comparison with national targets and actions, the needs for technological skills are identified, which will play a key role in the achievement of the targets for 2020, like the installation and maintenance of photovoltaic systems, heat pumps and shallow geothermal systems, solar protection and automation systems, electronic monitoring and control of central heating, cooling and air-conditioning systems. Additionally, the minimum annual number of people per discipline who must receive training for new skills by 2020 has been estimated.

The results of this report will lay the foundation for the preparation of a **Roadmap** with a time horizon for completion by 2020, which will include all main policies and actions that are required for the promotion of the necessary vocational education and training of the people employed in technical occupations of the Construction sector and other related sectors, so that they acquire the necessary skills for the achievement of the national targets regarding the energy in the building sector.

Informing the Qualified Experts and the Engineers of the building industry continued. (2nd Stage 2015-2018)

The education of the Qualified Experts and Engineers of the building industry will continue through the second stage in order to cover all new interested parties and to continuously update their knowledge on the different aspects of NZEB, as well as the legal requirements, i.e. the second and third revision of the minimum energy performance requirements.

Training the construction companies personnel and the on site technicians. (2nd Stage 2015-2018)

The Roadmap to be prepared on the second stage of **Build up Skills Project** will set the pace and needs of the training of the construction companies personnel and the on site technicians and will run through to the second stage.

7.2 Non-residential buildings

7.2.1 Relevant regulations

Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 NZEB. (1st Stage 2012-2015)

In order to achieve a smooth transition from the today's minimum energy performance requirements to the NZEB energy performance requirements the ES will design and announce a linear tightening of the minimum energy performance requirements.

Second and third revision of the minimum energy performance requirements. (2nd Stage 2015-2018)

The minimum energy performance requirements, as mentioned before, have been set for the first time in 2007 and have been revised in 2009 and are included in Ministerial Orders issued by the Ministry of Commerce, Industry and Tourism. It is planned that at least 2 more revisions will take place between 2015 and 2018 named as the Second Revision and Third Revision respectively. On the second revision the minimum energy performance requirements will be tightened further, reflecting the trend leading to the NZEB and in the third revision the minimum energy performance requirements for NZEB will be issued.

Implementation of the Third Revision of the Minimum Energy Performance Requirements. (3rd Stage 2018-2020)

The Ministerial Order containing the Third Revision of the Minimum Energy Performance Requirements will be enforced and it will apply to all new building occupied and owned by the public authorities- from the 31st of December 2018 and to all new buildings- from the 31st of December 2020.

7.2.2 Relevant economic incentives and financing instruments

Proposed Support Scheme title: «εξοικονομώ – αναβαθμίζω», timeframe:2014-2020

- **Category B** Financial incentive plan for energy performance upgrade of non residential buildings owned by a business for which the building permit was granted prior to the 21st December 2007. Total budget: 5.000.000 euros
- **Category C** Financial incentive plan for the energy performance upgrade of public sector buildings with useful floor area over 250 sq. meters and which were built prior to 2008. Total budget: 5.000.000 euros

7.2.3 Energy performance certificates' use and layout in relation to nZEB standard

Methodology and software for the Energy Performance Certification of the NZEB (1st Stage 2012-2015)

Comparing the existing national methodology of the certification of the Energy Performance of Buildings, with the certification of NZEB, further parameters are to be accounted for in the latter, thus the existing methodology should be further developed in order to include the NZEB category. Once this is done, the software now in use for the certification of buildings will have to be improved, or replaced in order to reflect the new methodology for the certification of NZEB. It should be noted that the software in use now is developed by the ES and is free for all users. There are at the moment several private initiatives to develop software conforming to the national methodology, which will undergo evaluation and approval by ES in order to be used for Energy Performance Certification of Buildings.

Further upgrading of the software for the Certification of the NZEB. (2nd Stage 2015-2018)

The software developed during the first stage will continuously be upgraded /improved according to the remarks of the users and the changes made by the ES.

Identified final software for the Certification of the NZEB. (3rd Stage 2018-2020)

The Ministerial Order prescribing the Final version of the official (free) software for the Certification of NZEB will be enforced. At the same time other software developed by the private sector will be evaluated and be approved for use for the certification of NZEB

7.2.4 Supervision (energy advice and audits)

7.2.5 Information (tools)

Preparation of Technical Guide (1st Stage 2012-2015)

ES will prepare a Technical Guide based on the results of the in depth study of the energy saving potentials and the outcomes of the consulting services contract. The Technical Guide shall include the minimum requirements of the NZEB in Cyprus and technical and **construction guidance in order to facilitate the design and construction of the building**. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually. It will remain in use even after the enforcement by law application of NZEB.

Raising the awareness of the public (1st Stage 2012-2015)

The correct user-behaviour of the occupant will enhance the design and construction of NZEB whereas the foul use will negatively affect their performance. Thus it is important that the characteristics and advantages of the NZEB as well of the renewable energy systems and energy conservation systems be presented through a well planned campaign to the public, with special interest in the rational and correct use of these buildings and technical systems.

Successful practices used in the past will be planned such as publication of informative flyers, articles and interviews in newspapers, participation of energy officers in television and radio shows. Further more the upgrading of the website of the ES with a special link to the NZEB has already been planned.

Further upgrading the NZEB web platform (2nd Stage 2015-2018)

Information will be periodically updated and enriched to include: a) the Technical Guide, b) the presentation of NZEB that have been certified as such including description of construction and planning data, as well as visual presentation (photos and videos) and c) information on the construction companies, or land development organization responsible for the building.

Raising the awareness of the public- continued. (2nd Stage 2015-2018)

The information campaign that has started during the first stage will be evaluated and according to the results, adjusted to reach further and further the public. Furthermore Open Day houses visits to the NZEB constructed during the first stage, either by the pilot projects supported by ES, or by private initiative will be planned.

7.2.6 Demonstration

7.2.7 Education and training

Informing the Qualified Experts and the Engineers of the building industry (1st Stage 2012-2015)

The Qualified Experts and Architects and all Engineers involved in the design and construction of building will need to be informed of the changes of the legal framework and the minimum energy performance requirements of NZEB. Qualified Experts should be also further educated in the new parameters of the methodology for the certification of the NZEB and the use of the new software.

Training the construction companies personnel and the on site technicians. (1st Stage 2012-2015)

Under the **European initiative "Build Up Skills"** which is part of the European programme "Intelligent Energy for Europe" and is co-funded by the European Executive Agency for Competitiveness and Innovation (EACI), Cyprus has identified the numbers, the specialities, the necessary knowledge, skills and way of thinking needed to be acquired by the on site personnel, in order to render both the Construction sector, as well as other related sectors, making achievable the relevant targets of "Europe 2020" strategy, including NZEB.

The examination of the current **Vocational Education and Training System** in technical occupations concludes that the structure of the System is sufficiently concise and flexible, in order to meet any challenges that may arise. However, the continuous review and upgrade of the existing programmes is thought to be an absolute necessity, as well as the addition of new targeted programmes in emerging critical technologies, the training of instructors in order to renew and enrich their knowledge, and the provision of incentives and measures to increase the flow of Cypriot young people in technical occupations.

The total employment needs in certain technical occupations related to the "Build Up Skills" project for the period 2010-2020 are expected to increase significantly in comparison to the respective ones for the period 2005-2010.

Through the analysis of the status quo and the comparison with national targets and actions, the needs for

technological skills are identified, which will play a key role in the achievement of the targets for 2020, like the installation and maintenance of photovoltaic systems, heat pumps and shallow geothermal systems, solar protection and automation systems, electronic monitoring and control of central heating, cooling and air-conditioning systems. Additionally, the minimum annual number of people per discipline who must receive training for new skills by 2020 has been estimated.

The results of this report will lay the foundation for the preparation of a **Roadmap** with a time horizon for completion by 2020, which will include all main policies and actions that are required for the promotion of the necessary vocational education and training of the people employed in technical occupations of the Construction sector and other related sectors, so that they acquire the necessary skills for the achievement of the national targets regarding the energy in the building sector.

Informing the Qualified Experts and the Engineers of the building industry continued. (2nd Stage 2015-2018)

The education of the Qualified Experts and Engineers of the building industry will continue through the second stage in order to cover all new interested parties and to continuously update their knowledge on the different aspects of NZEB, as well as the legal requirements, i.e. the second and third revision of the minimum energy performance requirements.

Training the construction companies personnel and the on site technicians. (2nd Stage 2015-2018)

The Roadmap to be prepared on the second stage of **Build up Skills Project** will set the pace and needs of the training of the construction companies personnel and the on site technicians and will run through to the second stage.

7.3 From your point of view, how would you evaluate the current measures that are in force? Please also try to describe the existing gap between what is in force and what should be in force in order to stimulate the transformation of buildings that are refurbished into nZEB. Are there precise measures planned for the future?

8 Additional Information

Please fill in any additional information on actions taken to increase the number of nearly zero-energy buildings in your country.

Consulting Services

Through an open tender procedure, the Energy Service of the Ministry of Commerce, Industry and Tourism (ES) had engaged the consulting services of EXERGIA S.A. The scope of the contract was the in depth analysis of the different aspects of the design, materials and technical systems in the 4 climatic zones of Cyprus (*Coastal areas, Lowlands, Low mountainous areas, high mountainous areas*) applicable to residential buildings, and in order to advice the Competent authority on the best possible applications in terms of energy efficiency, towards achieving nearly zero energy residential buildings and an indication of the primary energy in kWh/m²/yr. The contract had a duration of approximately one year and was completed in July 2012 and the results of the contract have been presented to all the interested parties in June 2012.

Calculation of Cost Optimal Levels

At the same time the ES is calculating the minimum energy performance requirements at the cost optimal levels. The method is based on the comparative methodology framework as it is defined in the Regulation No 244/2012 and the guidelines accompanying the regulation. For the purpose of the calculation reference buildings were defined for the following types of buildings:

- Single family buildings
- Apartment buildings
- Office buildings
- Educational buildings
- Hospitals
- Hotels
- Sports facilities
- Small retail buildings
- Large retail buildings

In all cases more than one reference building corresponds to each type of building, since the main purpose of a reference building is to represent the average and typical building stock. For the establishment of reference buildings, real and virtual buildings were used. The energy performance of the reference buildings is calculated in kWh/m²/year of delivered and primary energy using the national methodology. The national methodology defines the pattern of use and the conversion factors of primary energy. So far they have been calculated the cost optimal levels of the energy performance requirements for single family buildings and office buildings. The calculation will be completed and submitted to European Commission by March 2013.

The results of the in depth analysis of the ES, the outcomes of the contract for the consulting services and the evaluation of the measures through the cost optimal methodology are setting the definition of the NZEB for Cyprus.

National Plan to increase the number of NZEB

In the present chapter the proposed plan of action for increasing of NZEB in Cyprus is presented.

Objective

The plan of action presents the essential measurements that will enable Cyprus to harmonise with the Directive 2010/31/EU and enforce the NZEB on new public buildings by 2018 and all new buildings by 2020.

The national plan includes short term and medium term measures as follows:

Short term measures

1. Information of the public and education of selected groups of the industry.
2. Pilot project applications and encouragement of volunteer application of the NZEB in private buildings.

3. Guidance for preparation of the industry and construction companies.
4. Gradual advancement of legal requirements (strengthening of the minimum energy performance requirements for new buildings).

Medium term measures

5. Certification of NZEB.
6. Compliance monitoring.

Identified population groups

The identified population groups affected and thus needing tailored actions are:

General Public	All the potential owners and users of NZEB
Land Developing Companies	Companies that plan ahead for future construction developments
Professionals	Professionals that design and control the construction of buildings such as Architects, Civil Engineers, Electrical Engineers, Mechanical Engineers, etc
Qualified Experts	Engineers, specially trained and registered by the ES as qualified to issue Energy Performance of Buildings Certificates according to the national methodology for the energy performance of buildings.
Industry	All the industrial and commercial enterprises that supply construction and building materials, energy saving products, solar systems, building technical systems, etc.
Public Authorities	Ministry of Commerce, Industry and Tourism, Ministry of Interior, District Authorities, and Municipalities, ie all the competent

	authorities involved in the legal framework .
Consulting Companies	Companies and organizations that will consult stakeholders about the oncoming changes in the construction industry.

Suggested Actions:

The following actions have been included in order to implement the measures of the national plan. The execution of the national plan is divided in three stages according to the progressive reviews of the legal framework in Cyprus.

The three stages are the following:

1st Stage 2012-2015: Application on a volunteer basis of the NZEB.

a) Preparation of a Technical Guide

see Chapter **Error! Reference source not found..**

b) Pilot Project Applications of NZEB in Cyprus

Residential and non residential pilot applications of NZEB are planned to be constructed. Since last year the ES is assisting the Cyprus Land Development Cooperation into designing and setting the

specifications for new developments of semi-detached, terraced and apartments in order to be NZEBs. This action is subject to land development construction demand. Also ES is working closely with the Technical Services of the Ministry of Education and Culture in order to design and construct the first NZEB schools.

c) Supporting Research Programs for the development, improvement or advancement of construction techniques.

It is important that research programmes in the industrial field are supported in order to develop or advance further the available construction products and techniques and thus make available improved solutions in the construction industry.

9 Possible improvements

Where do you see most room for improvement in order to increase the number of nearly zero-energy buildings in your country? Please also try to give examples for appropriate measures.

Annex- Definition of nZEB

1. General Information		
Country		
Name of regulation ,directive, certification scheme		
Editor of regulation, directive, certification scheme		
Year of introduction of current version	Click and choose.	
benchmark of current version (Select one)	<input type="radio"/> Energy Autonomous building <input type="radio"/> Efficient buildings <input type="radio"/> Net zero energy buildings <input type="radio"/> Plus energy buildings <input type="radio"/> Nearly zero energy buildings <input type="radio"/> Zero energy buildigns <input type="radio"/> Other	
Integration and consideration in national directive	Please add explanation/ comment/ source Click and choose.	
2. Field of Application		
2.1 Building category Select one and describe right is this typology included in the directive? Are special requirements or exceptions defined for this typology? If more than one definition exists, you can duplicate this appendix for each of them.		
<i>Member States shall ensure that all new buildings are nearly zero- energy buildings by 31 December 2020 respectively after 31 December 2018 (occupied and owned by public authorities). For the purpose of the calculation buildings should be adequately classified into the [...] categories. References: EPBD article 9.1a/b, EPBD Annex I.</i>		
Category <input type="radio"/> Residential <input type="radio"/> Non-residential <input type="radio"/> Residential and Non-residential	Please add explanation/ comment/ source	
single family houses	Click and choose.	Please add explanation/ comment/ source
apartment blocks	Click and choose.	Please add explanation/ comment/ source
Offices	Click and choose.	Please add explanation/ comment/ source
educational buildings	Click and choose.	Please add explanation/ comment/ source
hospitals	Click and choose.	Please add explanation/ comment/ source
hotels and restaurants	Click and choose.	Please add explanation/ comment/ source
sports facilities	Click and choose.	Please add explanation/ comment/ source
wholesale and retail trade service buildings	Click and choose.	Please add explanation/ comment/ source
other types of energy-consuming buildings	Click and choose.	Please add explanation/ comment/ source
2.2 New/retrofit buildings		
Select one and describe right. If more than one definition exists, you can duplicate this appendix for each of them.		
<i>New, and existing buildings that are subject to major renovation, should meet minimum energy performance requirements adapted to the local climate.</i>		
<i>Member States shall furthermore [...] stimulate the transformation of buildings that are refurbished into nearly zero-energy buildings. Reference: EPBD preamble recital 15, EPBD article 9.2.</i>		

<input type="radio"/> New buildings <input type="radio"/> Retrofit <input type="radio"/> New and retrofit	Please add explanation/ comment/ source
2.3 Private/public buildings Select one and describe right. If more than one definition exists, you can duplicate this appendix for each of them. <i>Member States shall ensure that by 31 December 2020, all new buildings are nearly zero- energy buildings and after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings. Reference: EPBD article 9.1a/b</i>	
<input type="radio"/> Private <input type="radio"/> Public <input type="radio"/> Public and private	Please add explanation/ comment/ source
3. Energy Balance and calculation 3.1 Balance Type Describe how renewable energy is calculated / included in the energy balance (e.g. renewable heat from solar thermal collectors reduces energy use for heat and DHW; renewable electricity reduces/compensates delivered electricity). <i>[...] The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources</i> <i>Energy performance of a building means the calculated or measured amount of energy needed to meet the energy demand [...]. Reference: EPBD article 2.2, EPBD article 2.4</i>	
<input type="radio"/> energy demand vs energy generation <input type="radio"/> energy import vs energy export <input type="radio"/> virtual balance between demand and generation <input type="radio"/> not specified <input type="radio"/> other	Please add explanation/ comment/ source
3.2 Physical boundary Select the widest possible boundary and describe right if/which further subdivisions are possible <i>This directive lays down requirements as regards the common general framework for [...] buildings and building units. [...] building' means a roofed construction having walls, for which energy is used to condition the indoor climate. Reference: EPBD article 1.2, EPBD article 2.1</i>	
<input type="radio"/> single building <input type="radio"/> building unit <input type="radio"/> building unit	Please add explanation/ comment/ source

<input type="radio"/> building site <input type="radio"/> cluster of buildings <input type="radio"/> quarter or city <input type="radio"/> other	
3.3 System boundary demand / energy uses included Define if this load sector is included in the energy balance calculation (other requirements like maximum consumption values can be described below under item 5, further requirements).	
<i>[...] energy performance of a building means the calculated or measured amount of energy needed to meet the energy demand associated with a typical use of the building, which includes, inter alia, energy used for heating, cooling, ventilation, hot water and lighting. Reference: EPBD article 2.4</i>	
space heating, domestic hot water	Click and choose. <small>Please add explanation/ comment/ source</small>
ventilation, cooling, air conditioning	Click and choose. <small>Please add explanation/ comment/ source</small>
auxiliary energy	Click and choose. <small>Please add explanation/ comment/ source</small>
lighting	Click and choose. <small>Please add explanation/ comment/ source</small>
plug loads, appliances, IT	Click and choose. <small>Please add explanation/ comment/ source</small>
central services	Click and choose. <small>Please add explanation/ comment/ source</small>
electric vehicles	Click and choose. <small>Please add explanation/ comment/ source</small>
embodied energy	Click and choose. <small>Please add explanation/ comment/ source</small>
3.4 System boundary generation / renewable energy sources included Select and explain right (e.g. only in building's physical footprint, on-site, on-site incl. import of off-site renewables like pellets, wood chips, rape oil etc.). How is CHP (based on non-renewable energy carriers like natural gas or oil) included?	
<i>[...] The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. [...] energy from renewable sources means energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. [...] minimum levels of energy from renewable sources [...] to be fulfilled, inter alia, through district heating and cooling [...]. Reference: EPBD article 2.2, EPBD article 2.6, EPBD article 13.4</i>	
generation on-site	Click and choose. <small>Please add explanation/ comment/ source</small>
generation near by	Click and choose. <small>Please add explanation/ comment/ source</small>
generation external	Click and choose. <small>Please add explanation/ comment/ source</small>
crediting	Click and choose. <small>Please add explanation/ comment/ source</small>
3.5 Balance period / calculation step What is the defined period of time over which the balance is calculated? Is the calculation period divided into calculation steps (e.g. one hour, one month or one heating and/or cooling season)?	
<i>[...] The methodology for calculating energy performance should be based not only on the season in which heating is required, but should cover the annual energy performance of a building [...]. Reference: EPBD preamble recital 9 [...] requirements should be set with a view to [...] the cost-optimal balance between the investments involved and the energy costs saved throughout the lifecycle of the building [...]Reference: EPBD preamble recital 10.</i>	
<input type="radio"/> Life cycle balance <input type="radio"/> Yearly <input type="radio"/> Seasonal <input type="radio"/> Other	<small>Please add explanation/ comment/ source</small>

3.6 Monthly accounting limitation Is a monthly accounting limit defined? Is it based on end energy (e.g. monthly electricity generation compensates monthly electricity loads) or on primary energy (any monthly generation compensates any loads)? Are surpluses transferred to an annual balance?	
<input type="radio"/> monthly source based end energy crediting <input type="radio"/> monthly primary energy crediting <input type="radio"/> nothing defined <input type="radio"/> other	Please add explanation/ comment/ source
4. Accounting system	
4.1 Normalization	
<i>[...] including a numerical indicator of primary energy use expressed in kWh/m² per year. Reference: EPBD article 9.3a</i>	
<input type="radio"/> person <input type="radio"/> gross floor area <input type="radio"/> net floor area <input type="radio"/> gross volume <input type="radio"/> net volume <input type="radio"/> usable floor area <input type="radio"/> treated floor area <input type="radio"/> conditioned area <input type="radio"/> other	Please add explanation/ comment/ source
4.2 Primary metric Indicate which metric is used for the energy performance calculation / energy balance and give input on (the source of) the conversion factors on the right. Possible sources are e.g. EN 15603 or national and regional codes. <i>The energy performance of a building shall be expressed in a transparent manner and shall include an energy performance indicator and a numeric indicator of primary energy use, based on primary energy factors per energy carrier, which may be based on national or regional annual weighted averages or a specific value for on- site production. Reference: EPBD Annex 1.</i> <i>[...] including a numerical indicator of primary energy use expressed in kWh/m² per year. Reference: EPBD 9.3a</i> <i>[...] primary energy' means energy from renewable and non- renewable sources which has not undergone any conversion or transformation process. Reference : EPBD article 2.5</i>	
<input type="radio"/> energy need <input type="radio"/> energy use <input type="radio"/> delivered/site energy <input type="radio"/> primary / source energy (renewable part included) <input type="radio"/> primary / source energy (renewable part not included)	Please add explanation/ comment/ source

40

Dynamic: weighting factors based on shorter time periods /hourly basis (according to energy offer and demand in the grid)	
<i>Primary energy factors [...] may be based on national or regional yearly average values and may take into account [...] European standards. Reference: EPBD 9.3a</i>	
<input type="radio"/> static conversion factors <input type="radio"/> quasi static conversion factors <input type="radio"/> dynamic conversion factors	Please add explanation/ comment/ source
5. Further requirements	
5.1 Fraction of renewables Select and describe right if guidelines are given for any fraction of renewable energy and indicate how/at which level a certain fraction is calculated (e.g. solar thermal heat might be a fraction of energy use, electricity from PV a fraction of delivered energy.)	
<i>Member States shall introduce [...] appropriate measures [...] to increase the share of all kinds of energy from renewable sources in the building sector [...]. By 31 December 2014, Member States shall [...] require the use of minimum levels of energy from renewable sources in new buildings and in existing buildings [...] Reference: RED article 13.4</i> <i>[...] The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources [...]Reference : EPBD article 2.2</i>	
<input type="radio"/> defined <input type="radio"/> not defined <input type="radio"/> defined in other regulation	Please add explanation/ comment/ source
5.2 Temporal performance	
Describe if any requirements are given for a temporal match between on-site energy load and on-site energy generation (load match) and which calculation procedures are applied.	
<u>Load match</u> <input type="radio"/> defined <input type="radio"/> not defined	Please add explanation/ comment/ source
<u>Grid interaction</u> <input type="radio"/> defined <input type="radio"/> not defined	Please add explanation/ comment/ source
5.3 Energy performance or rating requirements	
Are limitations given for a standard energy rating, an energy indicator or maximum demands for heating, cooling, embodied energy, demand of appliances, etc.? If yes, type the values and give explanations on the right	
<i>nearly zero-energy building means a building that has a very high energy performance [...]. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources [...]</i>	

<p><i>The energy performance [...] shall [...] include an energy performance indicator and a numeric indicator of primary energy use [...]. Reference : EPBD article 2.2, EPBD Annex 1.</i></p>	
<p>Performance or rating</p> <p><input type="radio"/> defined</p> <p><input type="radio"/> not defined</p> <p><input type="radio"/> defined in other regulation</p>	<p>Please add explanation/ comment/ source</p>
<p>Energy Performance indicator</p> <p>Is an energy performance indicator defined? If yes, type the values and the according unit.</p>	<p>Give further explanation</p>
<p>Numeric indicator of primary energy use</p> <p>Is a numeric indicator of primary energy use defined? If yes, type the values and the according unit.</p>	<p>Give further explanation</p>
<p>5.4 General framework / prescriptive requirements</p> <p>Describe which guidelines are given for:</p> <p>Thermal characteristics (insulation, thermal bridges, thermal capacity, passive heating, internal loads, solar protection)</p> <p>Efficiency of installations (hot water supply, air-conditioning, lighting fan power)</p> <p><i>The methodology shall [...] take into consideration: thermal characteristics (thermal capacity, insulation, passive heating, cooling elements, and thermal bridges), heating installation and hot water supply, air-conditioning installations, natural and mechanical ventilation, built-in lighting, the design, positioning and orientation of the building, outdoor climate, passive solar systems and solar protection, [...], internal loads. Reference: EPBD Annex 1</i></p>	
<p><input type="radio"/> defined</p> <p><input type="radio"/> not defined</p> <p><input type="radio"/> defined in other regulation</p>	<p>Please add explanation/ comment/ source</p>
<p>5.5 Definition of comfort level & IAQ requirements (for winter and summer season, beside other national directives)</p> <p>Describe which guidelines are given for indoor climatic conditions, minimum or maximum indoor temperature, minimum lighting levels/ daylight availability, minimum ventilation rates/ natural ventilation, indoor air quality, max. CO2 levels, etc.</p> <p><i>This Directive [...] takes into account [...] indoor climate requirements [...] Reference: EPBD article 1.1</i></p> <p><i>The methodology shall [...] take into consideration: [...] indoor climatic conditions [...]Reference: EPBD Annex 1</i></p> <p><i>That includes [...] indoor air-quality, adequate natural light [...].Reference:</i></p> <p><i>EPBD preamble recital 9</i></p>	
<p><input type="radio"/> defined</p> <p><input type="radio"/> not defined</p>	<p>Please add explanation/ comment/ source</p>

<input type="radio"/> defined in other regulation	
<p>5.6 Monitoring procedure Describe if and how a monitoring mandatory is formulated; calculated or measured values are used; an evaluation of the indoor environmental quality is considered; which calculation step is used. [...] energy performance of a building means the calculated or measured amount of energy needed [...] Reference: EPBD article 2.4 Member States shall encourage the introduction of intelligent metering systems [...] and the installation of automation, control and monitoring systems [...]. Reference: EPBD article 8.2</p>	
<input type="radio"/> defined <input type="radio"/> not defined	Please add explanation/ comment/ source



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