

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



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**Please note:** The English translation of the report on the national plan for increasing the number of nearly zero energy buildings in Germany, submitted on 21 January 2013, is partly inaccurate. In order to avoid false statements or misleading information, the quotations inserted by Ecofys have therefore been partly deleted or modified.

## 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 [European] nearly zero-energy building standard corresponds essentially to the nearly carbon-neutral new construction, which is to be introduced by 2020 in line with the Federal Government's energy plan of 28 September 2010. without replacing the prevailing cost-effectiveness requirements.

1. In 2011, there were close to 40.5 million apartments in residential and non-residential buildings in Germany. The official building statistics show a stock of approx. 18.2 million residential buildings in 2011. Reliable statistical information on the number of heated or cooled non-residential buildings is not available. Estimates indicate a stock of approx. 1.7 million non-residential buildings. Nearly 70 % of all residential buildings and almost three quarters of all apartments were constructed before 1978. The share of new residential buildings constructed after the introduction of the first insulation regulation in 1978 accounts for just under 7 % of the total stock of buildings. The share of apartments included in this percentage is close to 5 % of the total stock. Approximately 54 % of all occupied apartments are rented, approximately 80 % of which are located in residential buildings with three and more residential units.

Current research on the energy performance of existing residential buildings in Germany comes to the conclusion that by the end of 2009, about 42 % of all residential buildings had an insulation of the exterior wall. In nearly 50 % of the cases, this insulation was added as part of modernisation measures. In about 76 % of all residential buildings the roof or the ceilings of the top floors, and in about 37 % the cellar roof is insulated; in about 53 % (roof or top floor ceilings) and 26 % (cellar roof) respectively, the insulation was applied retrospectively. The vast majority of all residential buildings (about 94 %) have double-glazing, and nearly 4 % of the buildings are equipped with triple-glazed windows. According to these findings, the exterior wall insulation of buildings constructed prior to 1978 was modernised at the rate of 1% per year in the period from 2000 to 2009. The annual modernisation rate for thermal insulations of roofs or top floor ceilings in this period ranged from 1.4 to 2.2 %; in the case of cellar ceilings, the rate ranged from 0.3 to 0.5 %. The renewal rate of the main heat generator for existing residential building is at nearly 3 % per year.

The progress in the improvement of the energy performance of buildings is reflected in the observed energy consumption of private households for space heating and warm water. Corrected for temperature, energy consumption declined in the period from 2000 to 2010 by approximately 18 %, while the residential floor area increased by nearly 8 %. This means that the final energy consumption declined by about 24 % within a period of 10 years per square metre. In non-residential buildings, the trend in energy consumption is comparable: the renewal rate of components is often higher in commercial buildings than in residential buildings. In view of the highly diverse building and owner structure, more detailed data are currently being collected.

In existing buildings, the incidence of systems for using renewable energies is still at a very low level. In 2010, renewable energies (e.g. by the use of solar heating systems) were used exclusively in about 6 % of the existing building, and in part in one-eighth of the buildings (13 %). Data from 2008 show that the use of heating from renewable energies is already much more widespread in single-family and two-family homes. For example, this type of building accounts for 75 % of all currently used energy from renewable energies, as opposed to apartment buildings — about 12 % — and non-residential buildings — about 10 %.

2. On 1 November 1978, the first thermal insulation regulation entered into force and on 1 February 2002 the first Energy Saving Ordinance (EnEV). On 28 September 2010 the Federal Government adopted the energy plan and the related bill on the 'Energy and Climate Fund' special fund. Key elements are the reduction of energy consumption, the increase of energy efficiency and the development of renewable energies, thereby putting the focus on economic incentives. The aim is:

- to reduce greenhouse gas emissions by 40% by 2020, and by at least 80% by 2050 (compared to 1990).
- energetic refurbishment of buildings plays a key role
- to reach a nearly carbon-neutral building stock by 2050.

- primary energy consumption of existing buildings is to be reduced by approx. 80%.  
Cost-effectiveness and affordability are the key considerations in achieving these aims. Incentives are provided, without imposing mandatory refurbishments. This approach aims at avoiding an excessive financial burden for owners and tenants without creating disincentives for sensible investment in energy efficient buildings.

The Federal Government has opted for a differentiated strategy in regard to measures enhancing energy efficiency. In the building sector, the approach focuses on *'Require, support, inform — strengthen market forces'*

## 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.

### **Residential:**

The specific definition of the nearly zero-energy building standard will be developed by the Federal Government with scientific support and having regard to economic considerations. In this regard, the focus is on the 'KfW efficiency houses'. This is the standard developed in the context of the Federal Government's funding scheme for energy efficient buildings. This funding scheme is administered by the KfW-Bank. Currently, funding is available for the following categories of buildings:

- new buildings: KfW Efficiency House 40, 55 and 70
- refurbishments: KfW Efficiency House 55, 70, 85, 100 and 115

The number indicates the amount of annual primary energy consumption (QP) in relation (%) to a comparable new building (reference building) according to the requirements of the Energy Saving Ordinance 2009. An Efficiency House 40, for example, does not use more than 40 % of the annual primary energy consumption (QP) of the corresponding reference building.

It should be noted that this label does not prejudice future regulatory requirements.

The gradual tightening of EnEV-requirements is related to the gradual improvement of the cost effectiveness of investments into innovative energy saving technologies with their increasing market maturity. On the contrary, in the view of the Federal Government premature definition of the nZEB standards, in force from 2019 and 2021 respectively, could result in rather more conservative levels of ambition with regard to implementation and cost optimality if based on of today's technology and cost levels.

Against this background the Federal Government is legally obliged by the Energy Saving Act of 2013 to present the named requirements via an amendment of the Energy Saving Ordinance within the deadlines specified by this law, namely before 2017 for all publicly used and before 2019 for all other buildings. The following time schedule is currently envisaged:

- first draft of the amendment to be completed by the first quarter of 2016,
- decision by Federal Government in summer 2016
- assent by Bundesrat (Federal States) by autumn 2016.

The legal basis for this amendment of the Energy Saving Ordinance is § 2a of the Energy Saving Act which authorises the Federal Government to define specific requirements for the energy performance

of nearly zero-energy buildings by regulation. § 2a of the Energy Saving Act further obliges the Federal Government to enact the ordinance before 1<sup>st</sup> January 2017 for buildings owned and used by public authorities and before 1<sup>st</sup> January 2019 for all other buildings.

For the highly diverse group **of non-residential buildings** no energetic standard has been researched yet, which might serve as guidance for the nearly zero-energy building standard.

### 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?*

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

The Federal Government believes that it is neither possible nor necessary to establish binding numerical guidelines for intermediate targets as far [as] the number of nearly zero-energy buildings to be achieved in future is concerned.

#### **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.):**

#### **Miscellaneous:**

The latest revision of the Energy Saving Ordinance(EnEV) aims at increasing the energetic minimum requirements for new buildings (residential and non-residential) on average by 25% p.a. as of January 2016. In this way, the energetic minimum standards are gradually brought in line with the nearly zero-energy standard (i.e. having the effect of an intermediate target).

*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.*

Pursuant to the energy plan, the primary aim of the Federal Government is to reach the nearly zero-energy standard for new buildings by 2020. In the light of the uncertain price trends for energy and construction materials and services, the Federal Government focuses on flexible tools to maximise the number of nearly zero-energy buildings in new and existing buildings. In particular, the Federal funding scheme is embedded in a broader overall concept and consists of various funding levels with increasing funding amounts. This funding scheme is continuously developed based on the development of the relevant regulatory requirements and technical specifications,, as well as the transfer of the results from research and pilot projects. This system motivates investors to construct already now buildings with an ambitious level of energy efficiency. This is also in line with the approach of the Federal Government in its energy plan, which focuses on economic incentives and voluntary compliance.



#### 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?*

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

The Federal Government believes that it is neither possible nor necessary to establish binding numerical guidelines for intermediate targets as far the number of nearly zero-energy buildings to be achieved in future is concerned.

##### **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.):**

###### **Miscellaneous:**

The latest revision of the Energy Saving Ordinance (EnEV) aims at increasing the energetic minimum requirements for new buildings (residential and non-residential) on average by 25% p.a. in 2016. In this way, the energetic minimum standards are gradually brought in line with the nearly zero-energy standard (i.e. having the effect of an intermediate target).

*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.*

Pursuant to the energy plan, the primary aim of the Federal Government is to reach the nearly zero-energy standard for new buildings by 2020. In the light of the uncertain price trends for energy and construction materials and services, the Federal Government focuses on flexible tools to maximise the number of nearly zero-energy buildings in new and existing buildings. In particular, the Federal funding scheme is embedded in a broader overall concept and consists of various funding levels with increasing funding amounts. This funding scheme is continuously developed based on the development of the relevant regulatory requirements and technical specifications,, as well as the transfer of the results from research and pilot projects. This system motivates investors to construct already now buildings with an ambitious level of energy efficiency,. This is also in line with the approach of the Federal Government in its energy plan, which focuses on economic incentives and voluntary compliance.

## 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

The Federal Government has opted for a differentiated strategy in regard to measures enhancing energy efficiency. In the building sector, the approach focuses on *'Require, support, inform – strengthen market forces'*.

*'Require'* by mandatory regulatory requirements, in particular the Energy Saving Ordinance (**EnEV**) and the Renewable Energies Heat Act (**EEWärmeG**). These regulatory provisions define the minimum requirements for the energy efficiency of buildings, subject to the constitutional mandate of proportionality. The EnEV transposes the EPBD with minimum requirements for the annual primary energy consumption as well as certain requirements related to the building envelope. The legal requirements are defined on a technology neutral basis in order to promote competition for system technology.

The **Renewable Energies Heat Act** obliges building owners since 2009 to meet the thermal energy requirements of new buildings in part with renewable energies. This established for the first time a regulatory instrument in the form of the mandatory use of renewable energies for the construction of new private and public buildings.

The mandatory use may be met either by the use of solar heating (a minimum share of heating energy need of 15 %), biomass (solid and liquid: at least 50 %, gaseous: at least 30 %), geothermal energy and environmental heat (at least 50 %), but failing that, also by the use of waste heat, combined heat and power generation and energy conservation measures (15 % better than the EnEV standard). Combinations of renewable energies and with substitute measures are permitted.

#### 5.1.2 Relevant economic incentives and financing instruments

##### Energy efficient construction (KfW)

The KfW-programmes for energy efficient refurbishment and construction are part of the "CO<sub>2</sub>-Gebäudesanierungsprogramm" that is funded by federal budget. In the context of energy efficient construction promotion is provided by low-interest-loans. Additionally redemption grants are allowed for buildings which annual primary energy demands do not exceed 40% or 50% of the requirements set out by Energy Saving Ordinance 2009.

Since 2006 until December 2013 more than € 3.4 million dwellings with a total investment of € 155 bn. triggered had been supported by the promotion programme "energy efficient refurbishment or construction"

- In the period from 2006 to 2011 EUR 7.8 bn. were made available. In 2012 by means of the "Energy and Climate Fund" EUR 1.5 bn. had been allocated.
- Since 2013 until 2020 there are means in the amount of € 1.5 bn. yearly for subsidized loans and further € 300 mio. for grants from the "Energy and Climate Fund"

With the adaptation of the EnEV 2009 to the reference building method, the KfW Efficiency House standard with the KfW Efficiency House 55 (including passive house), 70 and 85 levels were introduced in the programme 'Energy-efficient Construction' in April 2009. The figure reflects the maximum applicable primary energy consumption in % in relation to the maximum value under the applicable EnEV 2009.

KfW support is structured in general in such a way that the financial funding increases with the energetic level achieved.

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

#### 5.1.4 Supervision (energy advice and audits)

#### 5.1.5 Information (tools)

5.1.6 Demonstration

5.1.7 Education and training

## 5.2 Non-residential buildings

5.2.1 Relevant regulations

The Federal Government has opted for a differentiated strategy in regard to measures enhancing energy efficiency. In the building sector, the approach focuses on *'Require, support, inform — strengthen market forces'*.

*'Require'* by mandatory regulatory requirements, in particular the Energy Saving Ordinance (**EnEV**) and the Renewable Energies Heat Act (**EEWärmeG**). These regulatory provisions define the minimum requirements for the energy efficiency of buildings, subject to the constitutional mandate of proportionality. The EnEV transposes the EPBD with minimum requirements for the annual primary energy consumption as well as certain requirements related to the building envelope. The legal requirements are defined on a technology neutral basis in order to promote competition for system technology.

The **Renewable Energies Heat Act** obliges building owners since 2009 to meet the thermal energy requirements of new buildings in part with renewable energies. This established for the first time a regulatory instrument in the form of the mandatory use of renewable energies for the construction of new private and public buildings.

The mandatory use may be met either by the use of solar heating (a minimum share of heating energy need of 15 %), biomass (solid and liquid: at least 50 %, gaseous: at least 30 %), geothermal energy and environmental heat (at least 50 %), but failing that, also by the use of waste heat, combined heat and power generation and energy conservation measures (15 % better than the EnEV standard). Combinations of renewable energies and with substitute measures are permitted

5.2.2 Relevant economic incentives and financing instruments

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

5.2.4 Supervision (energy advice and audits)

5.2.5 Information (tools)

5.2.6 Demonstration

5.2.7 Education and training

**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?

### Following Energy Saving Act (EnEG):

Building owners will be obliged, as of 31 December 2020, to construct new buildings in the form of nearly-zero buildings. For newly constructed buildings that are to be used by public administrations and owned by the public administrations, the obligation commences already two years earlier. In this regard, the minimum requirements of the statutory definition in Article 2(2) EPBD have been adopted.

This same is also true of the requirement 'very low amount of energy required'. Even though it might be desirable to render this requirement more specific by reference to a specific, uniform energy parameter already in the pending revision, this aim is opposed by the need to consider the principle of economic reasonableness in determining the threshold in the short term.

The future regulatory requirements will be set by an amendment of the Energy Saving Ordinance which is intended to enter into force before 2017 for buildings owned and used by public

authorities and before 2019 for all other buildings. The following time schedule is currently envisaged:

- first draft of the amendment to be completed by the first quarter of 2016,
- decision by Federal Government in summer 2016
- assent by Bundesrat (Federal States) by autumn 2016.

The legal basis for this amendment of the Energy Saving Ordinance is § 2a of the Energy Saving Act which authorises the Federal Government to define specific requirements for the energy performance of nearly zero-energy buildings by regulation. § 2a of the Energy Saving Act further obliges the Federal Government to enact the ordinance before 1<sup>st</sup> January 2017 for buildings owned and used by public authorities and before 1<sup>st</sup> January 2019 for all other buildings.

## 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

The Federal Government has opted for a differentiated strategy in regard to measures enhancing energy efficiency. In the building sector, the approach focuses on *'Require, support, inform — strengthen market forces'*.

*'Require'* by mandatory regulatory requirements, in particular the Energy Saving Ordinance (**EnEV**) and the Renewable Energies Heat Act (**EEWärmeG**). These regulatory provisions define the minimum requirements for the energy efficiency of buildings, subject to the constitutional mandate of proportionality. The EnEV transposes the EPBD with minimum requirements for the annual primary energy consumption as well as certain requirements related to the building envelope. The legal requirements are defined on a technology neutral basis in order to promote competition for system technology.

The **Renewable Energies Heat Act** obliges building owners since 2009 to meet the thermal energy requirements of new buildings in part with renewable energies. This established for the first time a regulatory instrument in the form of the mandatory use of renewable energies for the construction of new private and public buildings.

The mandatory use may be met either by the use of solar heating (a minimum share of heating energy need of 15 %), biomass (solid and liquid: at least 50 %, gaseous: at least 30 %), geothermal energy and environmental heat (at least 50 %), but failing that, also by the use of waste heat, combined heat and power generation and energy conservation measures (15 % better than the EnEV standard). Combinations of renewable energies and with substitute measures are permitted.

As part of the **turnaround in energy policy** adopted in June 2011, the Federal Government decided that federal buildings should set an example in the reduction of energy consumption.

The decision provides that all new buildings of the Federal Government as of 2012 are to be constructed in line with the nearly zero-energy standard.

#### 6.1.2 Relevant economic incentives and financing instruments

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

#### 6.1.4 Supervision (energy advice and audits)

#### 6.1.5 Information (tools)

#### 6.1.6 Demonstration

#### 6.1.7 Education and training

### 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?

The Federal funding scheme is embedded in a broader overall concept and consists of various funding levels with increasing funding amounts. This funding scheme is continuously developed based on the development of the relevant regulatory requirements and technical specifications,, as well as the transfer of the results from research and pilot projects. This system motivate investors to construct already now buildings with an ambitious level of energy efficiency,. This is also in line with the approach of the Federal Government in its energy plan, which focuses on economic incentives and voluntary compliance.

The future regulatory requirements will be set by an amendment of the Energy Saving Ordinance which is intended to enter into force before 2017 for buildings owned and used by public authorities and before 2019 for all other buildings. The following time schedule is currently envisaged:

- first draft of the amendment to be completed by the first quarter of 2016,
- decision by Federal Government in summer 2016
- assent by Bundesrat (Federal States) by autumn 2016.

The legal basis for this amendment of the Energy Saving Ordinance is § 2a of the Energy Saving Act which authorises the Federal Government to define specific requirements for the energy performance of nearly zero-energy buildings by regulation. § 2a of the Energy Saving Act further obliges the Federal Government to enact the ordinance before 1<sup>st</sup> January 2017 for buildings owned and used by public authorities and before 1<sup>st</sup> January 2019 for all other buildings.

## 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

**Energy Saving Ordinance (Section (§) 9 EnEV):** Under national law, owners of existing buildings are already now obliged in principle to observe demanding requirements for the component or building element (i. a. walls, windows, doors, roofs) that is to undergo major renovation, refurbishment or replacement as well as the extension of building units. The energy-related minimum requirements will continue to be further developed in future in an economically feasible (cost efficient) way as part of a balanced overall assessment, having regard to the burdens imposed on owners and tenants.

The recast version of **the Renewable Energies Heat Act**, which entered into force on 1 May 2011, also introduced a 'role model' function of existing public buildings. There is an obligation to cover part of the heating or cooling requirements of public non-residential buildings with renewable energies as soon as the buildings are refurbished.

Section 3(2) of the **Renewable Energies Heat Act (EEWärmeG)** provides an escape clause for the federal states to adopt own provisions for existing buildings. With the 'Renewable Heat Act' (EWärmeG), adopted on 7 November 2007 by the **Baden-Württemberg State Parliament**, it is the first federal state to adopt a heat act. Since January 2010, 10 % of the heating consumption must be covered by renewable energies when replacing a heating system in an existing residential building. Alternatively, energy can be saved by improved thermal insulation of façades or roofs.

#### 7.1.2 Relevant economic incentives and financing instruments

##### Energy efficient refurbishment (KfW)

The KfW-programmes for energy efficient refurbishment and construction are part of the "CO<sub>2</sub>-Gebäudesanierungsprogramm" that is funded by federal budget. The programme energy efficient refurbishment financially supports extensive refurbishment to "KfW-Effizienzhaus" (EH 55 - 115) and high efficient individual measures e.g. insulation of the building envelope, replacement of windows, renewing heating systems).

Since 2006 until December 2013 more than € 3.4 million dwellings with a total investment of € 155 bn. triggered had been supported by the promotion programme "energy efficient refurbishment or construction"

- In the period from 2006 to 2011 EUR 7.8 bn. were made available. In 2012 by means of the "Energy and Climate Fund" EUR 1.5 bn. had been allocated.
- Since 2013 until 2020 there are means in the amount of € 1.5 bn. yearly for subsidized loans and further € 300 mio. for grants from the "Energy and Climate Fund"

Since April 2012, there are special funding provisions for listed buildings and buildings that are particularly worthy of conservation (residential and non-residential buildings). Funding is provided for refurbishments toward the KfW Efficiency House Monument standard in listed buildings or buildings that are classified municipalities as particularly worthy of conservation. In this way, it is possible to improve the quality of the buildings from an energy point of view, while preserving their historical nature at the same time.

Since 2007, the Federal Government also supports municipalities, social organisations and municipal companies in the energy-efficient refurbishment of their buildings (schools, day care facilities, swimming pools, museums and administrative buildings) with the funds of the CO<sub>2</sub> building refurbishment programme. Funding is provided for high-efficiency individual measures and comprehensive refurbishments towards a KfW Efficiency House 55, 70, 85 and 100.

### **Market incentive programme (MAP)**

The Market Incentive Programme (MAP) is another key funding instrument of the Federal Government. It contributes towards meeting the target of a share of 14 % of renewable energies in the heating and cooling supply in the heating sector by 2020 (as of 2011: 10.4 %). Funding is provided for solar heating systems, biomass systems and heat pumps. The programme section on investment grants provides for increased funding by means of a bonus system.

### **Combined Heat and Power Generation Act (CHP Act)**

The most recent revision of the Combined Heat and Power Generation Act (CHP Act) seeks in particular to achieve a CHP share in power energy of 25 % by 2020. The revision entered into force on 19 July 2012.

### **Energetic urban renewal**

The 'Energy-efficient Urban Renewal' programme seeks to initiate comprehensive measures in the field of the energy-efficiency of neighbourhood buildings and infrastructure in order to offer, i.a., a broader spectrum for the use of renewable energies and to involve additional investor groups in the refurbishment process. Grants for integrated neighbourhood concepts and refurbishment managers are provided by the programme. Said refurbishment managers are to supervise in particular the investive implementation of the concepts, coordinate the investors, organise the participation of citizens, etc. Moreover, loans reduced in price through federal funds serve to promote investments in the infrastructure (heating, heat stores, water supply and sanitation, street lighting, etc.).



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

As part of the latest revision of the Energy Saving Ordinance (EnEV, entered into force the 1 May 2014), an obligation to provide energy-related key indicators in real-estate advertisements and to hand over the energy performance certificate to buyers and new tenants has been introduced. The obligation, introduced in 2007, to display the energy certification in buildings used by public administrations with a high incidence of public access is being extended to smaller public buildings as well as to large private buildings with a high incidence of public access. The energy performance certificates provide transparency about the essential energy-related properties of the buildings. In addition to the extended requirements for energy performance certificates, stipulated by the EPBD, the EnEV seeks to enhance the informative value of the energy certifications by adapting, i.a., the colour shading of the number ray in the energy performance certificate and the information on the use of renewable energies.

#### 7.1.4 Supervision (energy advice and audits)

Local energy consulting services in residential buildings with detailed proposals for measures for energy-related refurbishment are funded with 50 % of the costs that are eligible for funding, with up to EUR 400 per individual counselling.

Energy consulting services for private consumers and energy checks for households are organised via the consumer protection agencies of the Federal Government and the federal states

Energy consulting services for private consumers are currently being offered in 200 consumer protection agencies and in 460 municipal consulting points by approx. 380 energy consultants. In both 2010 and 2011, approx. 100,00 private consumers benefited from individual energy counselling. This offer was recently extended by phone and email services. Accordingly, the number of consulting services is expected to increase.

An energy check for households is available, which is also organised by the consumer protection agencies.

#### 7.1.5 Information (tools)

The **national list of energy efficiency experts** for the support programmes of the Federal Government in the field of energy efficiency aims to improve the quality of local energy consulting services (see Energy consulting services), of the construction supervision funded by the KfW as well as the expert energy-related planning of particularly efficient residential buildings by means of uniform qualification criteria, proof of regular advanced training and random checks of the results.

The '**Energy Efficiency**' initiative and energy-related information offered by dena aim to inform consumers, professional audiences and multipliers about a variety of energy efficiency potentials. For example, practical information and specific tips show users how to use energy efficiently, to save energy and to avoid unnecessary energy consumption.

#### 7.1.6 Demonstration

#### 7.1.7 Education and training

### 7.2 Non-residential buildings

#### 7.2.1 Relevant regulations

The revision of the **Renewable Energies Heat Act**, which entered into force on 1 May 2011, provides that existing public buildings should set an example. The exemplary role of public buildings

includes the obligation to cover part of the heating and cooling consumption of public non-residential buildings with renewable energies as soon as the buildings have been refurbished fundamentally (use obligation). The obligation of the public sector to comply with this role model function applies to existing buildings owned by the public administration as well as to buildings owned by third parties that are rented or leased not merely temporarily for public purposes. In the latter case, the public administration must ensure that the landlord takes the necessary measures to comply with this use obligation.

The obligation for existing buildings owned by a public administration does not apply if, in a specific instance and due to special circumstances, compliance with the obligation or substitute measure would cause disproportionately high costs or an unreasonable hardship in any other way, especially if the measure is shown to be economically infeasible by the result of an economic feasibility study, having regard to the life cycle costs. The obligation also does not extend to public buildings that are owned or possessed by a municipality or an association of municipalities, if the latter is overindebted at the start of the fundamental refurbishment (or would become overindebted as a result of the refurbishment), or if the measure would entail additional costs.

For existing federal buildings, an energy-efficiency refurbishment roadmap is to be developed. The aim is to create a nearly carbon-neutral stock of existing buildings by 2050. Already by 2020, a reduction of the final energy consumption for heating by 20 % is to be achieved.

#### 7.2.2 Relevant economic incentives and financing instruments

##### **Energy efficient refurbishing (KfW)**

Since April 2012, there are special funding provisions for listed buildings and buildings that are particularly worthy of conservation (residential and non-residential buildings). Funding is provided for refurbishments toward the KfW Efficiency House Monument standard in listed buildings or buildings that are classified municipalities as particularly worthy of conservation. In this way, it is possible to improve the quality of the buildings from an energy point of view, while preserving their historical nature at the same time.

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

#### 7.2.4 Supervision (energy advice and audits)

#### 7.2.5 Information (tools)

#### 7.2.6 Demonstration

#### 7.2.7 Education and training

**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?

The rehabilitation of existing buildings is one of the central tasks in the context of energy saving and climate protection. Because about 70 % of the buildings (approximately 75 % of apartments) were constructed before the entry into force of the first thermal insulation regulation (1 November 1977), and hence, from a contemporary perspective, with relatively poor thermal insulation. For this reason, the Federal Government, by creating a suitable general framework, provides incentives for owners to refurbish their existing homes from an energy point of view.

In addition to the regulatory requirements of the Energy Saving Ordinance (EnEV), the KfW funding programmes for energy-efficient refurbishment are a central focus of the energy savings policy of the Federal Government. A staggered range of incentives offers owner-occupiers and investors

incentives for through a tiered support offered incentives for the most effective refurbishment from an energy point of view. The KfW programmes are supplemented by additional programmes and measures, in particular for the introduction of technical solutions of heating and cooling supply and storage, in particular the market incentive programme for renewable energies (MAP). To ensure the quality of the planning and implementation of refurbishment projects, support is provided for local energy consulting as a first measure. Moreover, planning and supervision of the construction phase of refurbishment measures by a qualified expert are funded through the KfW programmes, in addition to the investment measures. These measures are supplemented by measures for the qualification of planners and craftsmen as well as information measures for home owners.

Owing to the mandatory principle of economic feasibility of the Energy Saving Act (EnEG), it is currently not possible to impose regulatory requirements for increasing the number of existing nearly zero-energy buildings. Moreover, such measures would not be cost-efficient in the sense of the EPBD. The requirements of Article 9 EPBD are rather implemented by other instruments of a non-regulatory nature. This is achieved in particular by financial incentives.

## 8 Additional Information

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

### **The strategy of the government in the building sector**

The Federal Government has opted for a differentiated strategy in regard to measures enhancing energy efficiency. In the building sector, the approach focuses on *'Require, support, inform — strengthen market forces'*.

*'Require'* by regulatory law, in particular the Energy Saving Ordinance (EnEV) and the Renewable Energies Heat Act (EEWärmeG); *'Support'* by means of financial incentives and *'Inform — strengthen market forces'* in particular by means of professional energy consulting, continued expansion and qualification of the energy certifications, pilot projects and awareness raising activities, including competitions.

Regulatory law lays down the minimum requirements, subject to the constitutional mandate of proportionality. The Energy Saving Ordinance (EnEV) transposes the EPBD with minimum requirements for energy performance (annual primary energy consumption) of buildings. This is done without reference to a specific technology, since a better quality of the building envelope and 'better' systems technology are complementary aspects.

The key instruments in regard to *'Support'* are the KfW support programmes for energyefficient construction and refurbishment (CO<sub>2</sub> building refurbishment programme), the KfW programme 'Energetic urban renewal' as well as the market incentive programme for the promotion of systems for the use of renewable energies. In regard to *'Require'* and *'Support'*, there is a constant on-going development in order to adapt to technical standards subject to economic considerations. The stringent requirements for the investment aid programme 'better than the Renewable Energies Heat Act (*Erneuerbare Energien Wärme Gesetz - EEWärmeG*)', expedite the development of new products and technologies and assist the transfer of advanced technologies and products as well as know-how to a broader market. The investment aid programme 'Energetic urban renewal' supplements the building-related programmes by providing promotional funds for measures in urban neighbourhoods. Funding is made available especially for the creation of integrated neighbourhood concepts for renovating and upgrading the energy efficiency of the municipal infrastructure, such as neighbourhood-based heating systems.

Energy advisory programmes assist individual owners when making deciding on specific and individual refurbishment measures.

### **National plan for increasing the number of nearly zero-energy buildings**

Already since many years, Germany pursues the aim to increase energy efficiency and to enhance climate protection in the building sector (new buildings and existing buildings). This has led already now to an increase of the number of nearly zero-energy buildings (see also Section 4 on KfW Efficiency Houses). In this regard, the voluntary and cost efficient nature of the measures in connection with the mix of instruments referred to in Section 2 (*'Compel, Support, Inform — strengthen market forces'*) is a key aspect. The instruments are described below in detail both for new buildings and for refurbishment measures on existing buildings.

### **Research**

#### **Research initiative "Future Building"**

Germany supports the development of new materials and processes with the aim to improve the energy efficiency of buildings as part of the "Future Building" initiative. Since the start of the initiative in 2006, approximately 500 research projects with an overall volume of approx. EUR 51 million have been funded. Among other things, about 40 projects of the 'New materials and techniques' cluster were funded. Because new materials and processes, such as vacuum insulation panels, integrative energy generating systems in the building envelope as well as the improvement of thermal insulation properties of already existing materials, will play a key role for the energy efficiency of buildings in

future. In addition, a funding policy for education infrastructure buildings in EfficiencyPlus standard is being developed as part of the initiative.

### **Research grants for solar heating with high solar fractions**

Under the 6th Energy research programme of the Federal Government, funding is provided for solar heating as part low-temperature solar heating for buildings with a high solar fraction ranging between 50 and 100 %, including measuring programmes, planning tools and accompanying monitoring. This relates to next generation 'solar buildings' as well as to 'self-sufficient solar buildings', which rely fully on solar heating and power supply for the building by a combination of solar heating, photovoltaic and/or photovoltaic/heating and new solutions for efficient heat storage in the building.

### **Pilot projects and expert reports**

#### **Pilot projects for the development of methods and ways of practical implementation in the construction process to assist the formation of local networks**

In a next step, new materials and technologies are tested in pilot projects on a broader practical scale. Such pilot projects aim to identify and eliminate existing barriers in order to make investments into energy-efficient building technology, including renewable energies, in future more economical.

The projects pursue the following specific aims for the:

- development of the significant energy and CO<sub>2</sub> saving potentials in existing buildings;
- development of innovative energetic standards for new buildings and refurbishments;
- know-how transfer and qualification of specialist stakeholders;
- generation of imitation effects through knowledge transfer and public relations;
- support and expansion of the regional competence networks and
- the present introduction of energy saving technologies that are on the brink of economic viability in particular for refurbishment measures to the market to make such measures economically feasible in the medium term.

These findings also contribute, among other things, to the development and advancement of funding programmes.

#### **a - Pilot projects 'Existing nearly zero-energy buildings'**

Supported by funds from the CO<sub>2</sub> building rehabilitation programme, the German Energy Agency (dena) carries out approx. 450 pilot projects across Germany for highly energyefficient refurbishment of residential and non-residential buildings (municipal infrastructure buildings, especially schools). The refurbished buildings remain below the requirements of the EnEV for a comparable new building on average by approx. 50 %. In addition, dena makes its findings and experience available to planners and craftsmen engaged in the rehabilitation sector via information platforms.

#### **b - Pilot projects 'Roadmap to the EnergyEfficiencyPlus Building'**

The 'Roadmap to the EnergyEfficiencyPlus Building' pilot projects for future standards for carbon-neutral new buildings and refurbishments undertaken since early 2011 are additional cornerstones. On the basis of 42 innovative construction projects (new buildings and refurbishments) selected by an expert jury, the pilot project develops and tests future new building and refurbishment standards for residential buildings that are to be nearly carbonneutral (building standards for 2050). The construction projects are closely monitored in the planning and execution stages by the engineering consultants commissioned by dena.

#### **c - EfficiencyBuildingPlus with electromobility**

The Federal Government takes a further step in the form of the new generation of EfficiencyBuildingsPlus buildings. Currently, an inhabited pilot project of the Technical University Stuttgart in Berlin aims to show that the building generates with renewable energies more energy than it consumes for the thermal conditioning of the house and the charging of the electric vehicles with a reach of up to 30 000 km on an annual average. Moreover, the building is also subjected to a sustainability audit (rating system for sustainable building) in accordance with the German certification system, and sets an excellent example in the field of sustainable building. For example, the environmental impact of the building was also observed during the planning stage. The predecessors of this building were the Plus-Energy houses of the Technical University Darmstadt constructed in 2007 and 2009, which became solar world champions at the solar decathlon competition by using innovative technologies and architecture. In addition to these model buildings, a

Germany-wide network of additional EfficiencyBuildingPlus is being developed with the EfficiencyBuildingPlus with electromobility. Here, the focus is on the continuous exchange of information and the financial support for a broader application of this new generation of buildings. Multiple building types are examined, ranging from single-family homes to apartment buildings, both in the form of newly constructed buildings and in the form of refurbishing of existing buildings to the EfficiencyBuilding Plus. For example, currently the refurbishment of old buildings into an EfficiencyBuildingPlus building is examined in the scope of two apartment buildings in Neu-Ulm.

#### **d - Pilot projects 'Construction of new non-residential buildings as part of the municipal and social infrastructure'**

Compared with the extensive experience in the residential sector, there is currently still need for research into highly-efficient non-residential buildings — both in terms of the construction and the exploitation phase.

As part of the pilot project, the new construction of schools, childcare facilities and administrative buildings, hospitals and other municipal facilities with an improvement of 60 to a minimum of 45 % on the EnEV 2009 standards (KfW Efficiency House 40, respectively 55) is being funded and scientifically monitored. In doing so, the exemplary planning, their structural implementation and the exploitation phase are being examined, i.a. in regard to their economic feasibility and transferability. As part of the 'Future Building' initiative, a funding policy for educational buildings in the EfficiencyPlus standard is being developed.

#### **e - Pilot project 'Zero-energy building for the Federal Environmental Agency (Umweltbundesamt) in Berlin-Marienfelde'**

The 'Zero-energy building for the Federal Environmental Agency (Umweltbundesamt) in Berlin-Marienfelde' pilot project tests compliance with the future energetic requirements for a nearly zero-energy building on a public building model already today.

### **Energy efficient construction (KfW)**

The number of applications filed (AZ) as well as the number of residential units (WE) of the Energy Saving House 40 and 60 in the period from 2003 up to the end of 2008 is shown in the following Table 1.

**Table 1: Development of the funding figures from 2003 to 2008**

Energy Saving House 40

Energy Saving House 60

	AZ	WE	AZ	WE
2003				
2004	1,384	1,744	-	-
2005	1,927	2,428	-	-
2006	2,830	3,584	7,447	9,582
2007	7,785	17,022	24,769	40,430
2008	5,532	17,158	20,950	33,843
Total	10,462	26,400	17,147	28,066
	<b>29,920</b>	<b>68,336</b>	<b>70,313</b>	<b>111,921</b>

The funding figures for the Energy Saving Houses 40 and 60 from January up to the end of March 2009, as well as the funded KfW Efficiency Houses (EH) 85, 70, 55 and 40 for the period from April 2009 until June 2012 are shown in the following Table 2. The Energy Saving House 40 corresponds more or less to the KfW Efficiency House 70, while the Energy Saving House 60 corresponds to the KfW Efficiency House 85.

**Table 2: Development of the funding figures from January 2009 until June 2012**

	Efficiency House 85		Efficiency House 70		Efficiency House 55		Efficiency House 40	
	AZ	WE	AZ	WE	AZ	WE	AZ	WE
2009 <sup>1</sup>	10,903	19,159	23,556	50,585				
2010	2,999	5,038	35,648	66,471	3,401	11,132	693	1,624
2011	-	-	34,039	53,938	8,873	18,803	2,384	8,418
2012	-	-	21,967	34,232	4,622	9,205	1,378	4,429
Total	13,902	24,197	115,210	205,226	16,896	39,140	4,455	14,471

The energy-efficient construction of approx. new 463,000 apartments has been assisted since 2003 as part of the support.

### **KfW development programme 'Energy efficient refurbishing'**

Since 2005, high quality individual refurbishment measures in residential buildings are funded in addition to the funding of comprehensive refurbishments by low-interest loans and grants. By 2010, a total of 230,078 applications were approved and hence measures in 586,293 apartments were supported financially. The requirements for these individual measures are streamlined since 2011 to such an extent that by implementing all measures, the elevated energy standard of KfW Efficiency House 55 is achieved. By the end of June 2012, 45,349 applications for 145,415 apartments have been approved. The number of existing buildings meeting KfW Efficiency House standard is to be increased through refurbishments carried out gradually by individual measures as well as through comprehensive refurbishments. Especially the gradual implementation of individual measures facilitates the refurbishment of buildings by private owners.

The trend in the numbers of applications (AZ), as well as in the number of funded residential units (WE) as part of the CO<sub>2</sub> building refurbishment programmes using federal funds of the KfW in the period from 2001 to 2008 is shown in Table 3. It is not possible to provide a breakdown to individual funding standards for this period. Comprehensive energy-related refurbishments of residential buildings were funded in these years by means of the CO<sub>2</sub> building refurbishment programme. Packages of measures (three combined measures) as well as more ambitious refurbishments at the level of a comparable new building in accordance with EnEV then in force or at a level that undercuts the requirements of the EnEV by 30 % were funded.



**Table 3: Development of the funding figures in refurbishments from 2001 to 2008**

	AZ	WE
2001	9.862	31.513
2002	14.146	43.218
2003	20.631	69.010
2004	22.599	90.259
2005	24.079	70.237
2006	43.610	154.888
2007	20.582	83.345
2008	28.376	122.016
<b>Total</b>	<b>183.885</b>	<b>664.486</b>

In the course of the revision of the EnEV 2009, the programme requirements (primary energy consumption and transmission heat loss) were tightened by approximately 30 % in April 2009. At the same time, the currently applicable KfW Efficiency House standard described above was introduced. The funding of energetic refurbishment was concentrated in July 2010 to even more efficient standards by ceasing the KfW Efficiency House 130 and by introducing new demanding standards by way of the KfW Efficiency Houses 70 and 55. The trend in approval figures as well as the funded residential units since 2009 implementing the various funding standards is shown in Table 4. It reflects an increasing willingness to carry out highly energy efficient refurbishments. The demand for funding for the Efficiency Houses 55 and 70 in existing buildings, also comprising buildings on a passive house standard, has increased significantly. This trend continued in the first half of 2012.

In other words, a total of approximately 1,090,00 apartments were refurbished from an energy point of view in the period from 2001 to the end of June 2012. The number of apartments receiving funding for energy-efficient individual measures is not included in this figure. Moreover, planning and the supervision of the construction phase of refurbishment measures by a qualified expert is funded through the KfW programme, 'Energy-efficient Refurbishment — Construction Supervision', in addition to the investment measures.

Since 2007, the Federal Government also supports municipalities, social organisations and municipal companies in the energy-efficient refurbishment of their buildings with the funds of the CO<sub>2</sub> building refurbishment programme. While the funding was at first only limited to measures in schools, day care centres for children and facilities for child and youth care, it was extended in April 2011 to all categories of buildings, such as swimming pools, museums and administrative buildings. Funding is provided for high-efficiency individual measures and comprehensive refurbishments towards a KfW Efficiency House 55, 70, 85 and 100. The system and intensity of the funding correspond to those for residential buildings. In the period from 2007 up to the end of June 2012, funding was provided for energy-efficient refurbishment of approx. 1,350 buildings of the municipal and social infrastructure.



**Table 4: Development of the funding figures in refurbishments from 2009 until the end of June 2012**

		EH 130	EH 115	EH 100	EH 85	EH 70	EH 55
2009 <sup>1</sup>	AZ	17.560	95	11.720	364		
	WE	78.355	425	52.297	1.622		
2010	AZ	4.480	2.658	6.111	4.862	411	103
	WE	35.048	12.261	41.205	19.031	2.741	290
2011	AZ	-	3.062	3.398	2.633	1.737	431
	WE	-	12.001	20.217	10.279	5.833	1.584
2012	AZ	-	1.635	1.793	1.394	966	232
	WE	-	7.803	10.427	6.002	3.245	525
<b>Total</b>	<b>AZ</b>	<b>22.040</b>	<b>7.450</b>	<b>23.022</b>	<b>9.253</b>	<b>3.114</b>	<b>766</b>
	<b>WE</b>	<b>113.403</b>	<b>32.490</b>	<b>124.146</b>	<b>36.934</b>	<b>11.581</b>	<b>2.399</b>

<sup>1</sup> Number of residential units determined on the basis of the approved volume. The Efficiency House standards relate to the EnEV 2009.

## 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.**

For the on-going development of regulatory law, e.g. by means of a revision of the EnEV, research contracts are regularly awarded on issues of potential, economically reasonable amendments of the energetic standards. Though the results do not bind the authority adopting the regulation, they are used as an aid in the decision-making process.

Even the KfW support programmes for energy-efficient construction and refurbishment issued as part of the CO<sub>2</sub> building refurbishment programme are comprehensively reviewed on an annual basis within the scope of flanking scientific research. On this basis, the programmes are regularly updated and improved to adapt them to the current state of the art and the actual conditions of the market and to enhance the promotional incentives. If fundamental modifications of the technical requirements have become necessary as the result of e.g. a revision of the EnEV, supplementary expert reports are commissioned as a rule. In addition, the findings form the research development and the pilot projects contribute to the further development of the KfW programmes, which serve to initially prepare the market for new technologies and methods.

To bring the energetic aims in line with the demographic developments and real estate industry trends, the Federal Government is currently developing a rehabilitation roadmap. As part of this roadmap, a programme monitoring energy consumption (primary energy, final energy) of the existing buildings is to be established, which will also offer findings on the number of nearly zero-energy buildings.

This mix of instruments serves to significantly increase the number of nearly zero-energy buildings by 2020. Given the highly diverse owner and building structures, with a very high proportion of private ownership, the Federal Government has opted for voluntary measures, financial incentives and the provision of information subject to the constitutional mandates of subsidiarity and proportionality of State action.

## Annex- Definition of nZEB

1. General Information		
Country	Germany	
Name of regulation ,directive, certification scheme	EnEG, EnEV, EEWärmeG	
Editor of regulation, directive, certification scheme	Germany	
Year of introduction of current version	Click and choose. EnEG 2013, EnEV 2014, EEWärmeG 2011	
benchmark of current version (Select one)	<input type="radio"/> Energy Autonomous building <input checked="" 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 buildings <input type="radio"/> Other	
Integration and consideration in national directive	<p>Please add explanation/ comment/ source</p> <p>otherother The legal requirements for the nZEB will be defined numerically before 2017 for publicly used and before 2019 for all other buildings (§ 2a Abs. 3 EnEG).</p> <p>All information enclosed in the tables below follow present calculation methodologies. It is envisaged that future calculations for the nZEB could be performed accordingly.</p>	
2. Field of Application		
<b>2.1 Building category</b> 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>		
<b>Category</b> <input type="radio"/> Residential <input type="radio"/> Non-residential <input checked="" type="radio"/> Residential and Non-residential	Please add explanation/ comment/ source	
single family houses	Click and choose.	applies to all: classification is not mandatory ("should", not "shall")
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
<b>2.2 New/retrofit buildings</b> <b>Select one and describe right. If more than one definition exists, you can duplicate this appendix for each of them.</b>		
<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 checked="" type="radio"/> New buildings <input type="radio"/> Retrofit <input type="radio"/> New and retrofit	Please add explanation/ comment/ source New buildings “NZEB is defined to be a building of very high energy performance. A very low energy demand shall be covered to a very significant extent by renewable energy sources.” (§ 2a Abs. 1 EnEG)	
<b>2.3 Private/public buildings</b> <b>Select one and describe right. If more than one definition exists, you can duplicate this appendix for each of them.</b>		
<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 checked="" type="radio"/> Public and private	Please add explanation/ comment/ source §2a Abs. 1 EnEG	
<b>3. Energy Balance and calculation</b>		
<b>3.1 Balance Type</b> 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 checked="" 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 According to the present regulations, which at the same time are also the primary calculation rules for the funding schemes for the mentioned new buildings with improved performance, renewable Energies are accounted as follows: <ul style="list-style-type: none"> <li>• wood: accounted via Primary Energy Factor (PEF)</li> <li>• liquid and gaseous fuels generated in close connection to the building (i. e. not delivered through a grid or a by a merchant): accounted via PEF</li> <li>• no accounting of other liquid or gaseous fuels from renewable sources</li> <li>• renewable energies as input in district heating systems: accounted via PEF calculated for the district heating grid (locally) or via default assumption for the grid if applicable</li> <li>• solar heat, ambient heat generated on-site, waste heat from (industrial) processes: accounted via PEF</li> <li>• electricity generated on-site or nearby from renewable</li> </ul>	

	<p>energy sources (i. e. photovoltaic, wind power): direct subtraction from the electric energy demand of the building, monthly balance, no further accounting if the calculated monthly demand is exceeded by the generation, no bonus for electricity delivered to the grid</p> <ul style="list-style-type: none"> <li>other electricity generated from renewable energies: accounted in the global PEF of the national grid, no further accounting in the building's balance</li> </ul> <p><b>All provisions concerning renewable energies are under consideration since the relevant legislation is due for amendment</b></p>	
<b>3.2 Physical boundary</b> 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 checked="" type="radio"/> single building <input type="radio"/> building unit <input type="radio"/> building unit <input type="radio"/> building site <input type="radio"/> cluster of buildings <input type="radio"/> quarter or city <input type="radio"/> other	Please add explanation/ comment/ source	
<b>3.3 System boundary demand / energy uses included</b> 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	consideredconsidered	Please add explanation/ comment/ source
ventilation, cooling, air conditioning	consideredconsidered	Please add explanation/ comment/ source
auxiliary energy	consideredconsidered	Please add explanation/ comment/ source
lighting	consideredconsidered	non-residential only
plug loads, appliances, IT	not considerednot considered	Please add explanation/ comment/ source
central services	not considerednot considered	no accounting of energy demand that exceeds Annex I of the EPBD
electric vehicles	not considerednot considered	Please add explanation/ comment/ source
embodied energy	not considerednot considered	no accounting of energy embodied in the building material
<b>3.4 System boundary generation / renewable energy sources included</b> 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</i>		

article 2.2, EPBD article 2.6, EPBD article 13.4		
generation on-site	consideredconsidered	see answer to question 3.1
generation near by	consideredconsidered	see answer to question 3.1
generation external	consideredconsidered	see answer to question 3.1
crediting	not considerednot considered	if this refers to bonuses for energy delivered from the building to a grid or other buildings: no accounting, see answer to question 3.1
<b>3.5 Balance period / calculation step</b> 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 checked="" type="radio"/> Yearly <input type="radio"/> Seasonal <input type="radio"/> Other	yearly using monthly calculation steps	
<b>3.6 Monthly accounting limitation</b> 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 checked="" type="radio"/> monthly source based end energy crediting <input type="radio"/> monthly primary energy crediting <input type="radio"/> nothing defined <input type="radio"/> other	see answer to question 3.1	
<b>4. Accounting system</b>		
<b>4.1 Normalization</b>		
<i>[...] including a numerical indicator of primary energy use expressed in kWh/m<sup>2</sup> per year. Reference: EPBD article 9.3a</i>		
<input type="radio"/> person <input type="radio"/> gross floor area <input checked="" 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	For residential buildings: virtual reference area calculated from gross heated volume For non-residential buildings: net floor area, but limited to ?	
<b>4.2 Primary metric</b> 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</i>		

<p>production. Reference: EPBD Annex 1.</p> <p>[...] including a numerical indicator of primary energy use expressed in kWh/m<sup>2</sup> per year. Reference: EPBD 9.3a</p> <p>[...] primary energy' means energy from renewable and non- renewable sources which has not undergone any conversion or transformation process. Reference : EPBD article 2.5</p>	
<p><input checked="" type="radio"/> energy need</p> <p><input type="radio"/> energy use</p> <p><input type="radio"/> delivered/site energy</p> <p><input type="radio"/> primary / source energy (renewable part included)</p> <p><input type="radio"/> primary / source energy (renewable part not included)</p> <p><input type="radio"/> (equivalent) carbon emissions</p> <p><input type="radio"/> exergy</p> <p><input type="radio"/> energy costs</p> <p><input type="radio"/> environmental credits</p> <p><input type="radio"/> points (labeling system)</p> <p><input type="radio"/> other</p>	<p>Calculation methods result in “energy demand”, i. e. the energy needed by the building for the purposes given in Annex I EPBD considering standard conditions of use and climate</p>
<p><b>4.3 Secondary metric</b></p>	
<p><input type="radio"/> energy use</p> <p><input type="radio"/> energy need</p> <p><input checked="" type="radio"/> delivered/site energy</p> <p><input type="radio"/> primary / source energy (renewable part included)</p> <p><input type="radio"/> primary / source energy (renewable part not included)</p> <p><input type="radio"/> (equivalent) carbon emissions</p> <p><input type="radio"/> exergy</p> <p><input type="radio"/> energy costs</p> <p><input type="radio"/> environmental credits</p> <p><input type="radio"/> points (labeling system)</p> <p><input type="radio"/> other</p>	<p><b>present regulations (EnEV)</b> set a second requirement for the buildings:</p> <ul style="list-style-type: none"> <li>• maximum value of specific heat transmission (residential buildings) or</li> <li>• maximum value of average u-values for transparent as well as for opaque fabric elements (non-residential buildings)</li> </ul> <p><b>present energy certificates</b> display the delivered energy as secondary indicator to use as information in advertisements</p>
<p><b>4.4 Symmetric or asymmetric weighting</b></p>	
<p><input type="radio"/> symmetrical weighting</p> <p><input type="radio"/> asymmetrical weighting</p>	<p>Question is not comprehensible!</p>
<p><b>4.5 Time dependent weighting</b></p> <p>Static: no time dependent weighting (annual constant weighting/factors)</p> <p>Quasi-static: seasonal/monthly average weighting factors</p>	

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	Question is not comprehensible! PEFs in Germany are fixed by standards on yearly average and are updated with any amendment of the relevant standards (if needed). No weighting with respect of summer/winter differences or things like that.
<b>5. Further requirements</b>	
<b>5.1 Fraction of renewables</b>	
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 checked="" type="radio"/> defined in other regulation	The present Renewable Energies Heat Act sets requirements for a quota of renewable energies to use in new buildings for the purpose of heating and cooling. The annex to the Law gives values depending on the type of renewable energies. The law is foreseen for an amendment, so no detailed information for the future application is possible.
<b>5.2 Temporal performance</b>	
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 checked="" type="radio"/> not defined	
<u>Grid interaction</u> <input type="radio"/> defined <input type="radio"/> not defined	see answers to question 3.1
<b>5.3 Energy performance or rating requirements</b>	
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> <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>	
<u>Performance or rating</u> <input type="radio"/> defined <input checked="" type="radio"/> not defined	for nZEB: to be defined in future



<input type="radio"/> defined in other regulation	
<b>Energy Performance indicator</b> Is an energy performance indicator defined? If yes, type the values and the according unit.	for nZEB: to be defined in future
<b>Numeric indicator of primary energy use</b> Is a numeric indicator of primary energy use defined? If yes, type the values and the according unit.	for nZEB: to be defined in future
<b>5.4 General framework / prescriptive requirements</b> Describe which guidelines are given for: Thermal characteristics (insulation, thermal bridges, thermal capacity, passive heating, internal loads, solar protection) Efficiency of installations (hot water supply, air-conditioning, lighting fan power)	
<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>	
<input checked="" type="radio"/> defined <input type="radio"/> not defined <input type="radio"/> defined in other regulation	Present regulations: calculation rules DIN V 18599 and DIN V 4701-10/DIN V 4108-6 are mandatory for calculation of all mentioned issues.
<b>5.5 Definition of comfort level &amp; IAQ requirements (for winter and summer season, beside other national directives)</b> 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.	
<i>This Directive [...] takes into account [...] indoor climate requirements [...] Reference: EPBD article 1.1</i> <i>The methodology shall [...] take into consideration: [...] indoor climatic conditions [...] Reference: EPBD Annex 1</i> <i>That includes [...] indoor air-quality, adequate natural light [...]. Reference:</i> <i>EPBD preamble recital 9</i>	
<input checked="" type="radio"/> defined <input type="radio"/> not defined <input type="radio"/> defined in other regulation	Present regulations: calculation rules DIN V 18599 and DIN V 4701-10/DIN V 4108-6 are mandatory for calculation of all mentioned issues
<b>5.6 Monitoring procedure</b> 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.	
<i>[...] energy performance of a building means the calculated or measured amount of energy needed [...] Reference: EPBD article 2.4</i> <i>Member States shall encourage the introduction of intelligent metering systems [...] and the installation of automation, control and monitoring systems [...]. Reference: EPBD article 8.2</i>	
<input type="radio"/> defined <input checked="" type="radio"/> not defined	The introduction of the mentioned metering system is not related to the calculation of the energy demand of a building.

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