



HI-SMART: HIGHER EDUCATION PACKAGE FOR NEARLY ZERO  
ENERGY AND SMART BUILDING DESIGN

# MODULE #1

## CHAPTER 5: STRATEGIES AND ACTION PLANS

Co-funded by the  
Erasmus+ Programme  
of the European Union



SLOVAK UNIVERSITY OF  
TECHNOLOGY IN BRATISLAVA



## 1.5.1 EU STRATEGIES AND GOALS

### **EU climate action and the European Green Deal**

Climate action is at the centre of the European Green Deal – an ambitious package of measures ranging from ambitiously cutting greenhouse gas emissions to investing in cutting-edge research and innovation.

First climate action initiatives under the Green Deal include:

- European Climate Law to enshrine the 2050 climate-neutrality objective into EU law
- European Climate Pact to engage citizens and all parts of society in climate action
- 2030 Climate Target Plan to further reduce net greenhouse gas emissions by at least 55% by 2030
- New EU Strategy on Climate Adaptation to make Europe a climate-resilient society by 2050, fully adapted to the unavoidable impacts of climate change.

### **2030 climate & energy framework**

The 2030 climate and energy framework includes EU-wide targets and policy objectives for the period from 2021 to 2030.

Key targets for 2030:

- At least 40% cuts in greenhouse gas emissions from 1990 levels, (55% is under discussion<sup>1</sup>)
- At least 32% share for renewable energy
- At least 32.5% improvement in energy efficiency

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<sup>1</sup> By July 2021, the Commission will review and, where necessary, propose to revise all relevant policy instruments to deliver additional greenhouse gas emissions reductions.



The joined-up approach for the period up to 2030 helps ensure regulatory certainty for investors and coordinate EU countries' efforts.

The framework helps drive progress towards a low-carbon economy and build an energy system, that:

- ensures affordable energy for all consumers,
- increases the security of the EU's energy supplies,
- reduces our dependence on energy imports,
- creates new opportunities for growth and jobs and
- brings environmental and health benefits – e.g. through reduced air pollution.

### ***Greenhouse gas emissions – a cut of at least 40%***

There is a binding target to cut emissions in the EU by at least 40% below 1990 levels by 2030. This will enable the EU to move towards a climate-neutral economy and implement its commitments under the Paris Agreement.

To achieve the target:

- EU emissions trading system (ETS<sup>2</sup>) sectors will have to cut emissions by 43% (compared to 2005) – the ETS has been revised for the period after 2020
- non-ETS sectors will need to cut emissions by 30% (compared to 2005) – this has been translated into individual binding targets for Member States.

### ***Renewables – increasing to at least a 32% share***

There is a binding renewable energy target for the EU for 2030 of at least 32% of final energy consumption, including a review clause by 2023 for an upward revision of the EU level target. It is quite probable that the EU will increase the target.

The 2030 goal of Member States can be much higher or lower than the EU average, based on their economic potential and political background.

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<sup>2</sup> ETS: emissions trading system. A cap is set on the total amount of certain greenhouse gases that can be emitted by installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, companies receive or buy emission allowances, which they can trade with one another as needed.



### ***Energy efficiency – increasing by at least 32.5%***

There is a headline target of at least 32.5% for energy efficiency to be achieved collectively by the EU in 2030, with an upward revision clause by 2023.

### ***Governance system***

A transparent and dynamic governance process will help deliver on the 2030 climate and energy targets in an efficient and coherent manner. The EU has adopted integrated monitoring and reporting rules to ensure progress towards its 2030 climate and energy targets and its international commitments under the Paris Agreement. Based on the better regulation principles, the governance process involves consultations with citizens and stakeholders.

### **Nearly Zero-Energy Building Strategy 2020 (ZEBRA2020)**

***The EU committed to limit global warming well below 2 degrees Celsius and the related climate targets clearly indicate that CO<sub>2</sub>-reductions of 80-95% will be required in the building sector by 2050.***

Sustainability of the European society and economy is planned to be based on renewable energy and resource efficiency. For the building sector, this implies the large-scale deployment of nearly Zero-Energy Buildings (nZEBs). The technology is available and proven, however, the large-scale uptake of nZEB construction and renovation is still a challenge for all market actors and stakeholders involved. A substantial gap in reliable data on current market activities made it difficult for policy-makers to evaluate the success of their policies.

In the ZEBRA2020 program the market uptake of nZEBs was monitored across Europe; also data and recommendations were provided on how to reach the nZEB standard. The program covered 17 European countries and almost 90% of the EU building stock and population. Recommendations have been derived on national and EU level based on scenarios until 2050. The ZEBRA2020 scenarios reach CO<sub>2</sub>-reduction levels of around 80% only in the ambitious cases. An achievement of the 2050 energy and climate goals require policy ambitions, going beyond the assumed actions of the ambitious policy



scenarios, which were developed together with policy makers. Immediate action and radical policy innovations are required to reach the energy and climate targets.

A considerable part of the heating systems installed in the next 10 years will still be in place in 2050. Thus, an absolute phase out of new fossil heating systems would be required within the next 5-10 years to reach strong decarbonisation levels in 2050.

The online data tools ([www.zebra-monitoring.enerdata.eu](http://www.zebra-monitoring.enerdata.eu)) provide unique information regarding nZEB market development and nZEB characteristics. New approaches have been developed in order to allow for a better comparability of national data, for instance the major renovation equivalent and the nZEB radar.

The online nZEB tracker<sup>3</sup>, based on a set of criteria, assesses the nZEB market maturity and visualises the national nZEB markets dynamically. Results on national and EU level can be aggregated. Though market conditions appear to improve throughout the EU, nZEBs are still rare in most EU Member States.

ZEBRA2020 defines a methodology on how nZEB can be defined for nZEB market tracking, with the nZEB radar graph. This nZEB radar combines a qualitative and quantitative analysis of building standards and clusters new buildings in 4 different energy efficiency categories that have been defined at national level by experts:

1. Net zero energy buildings / Plus energy buildings
2. nZEB buildings according to national definitions
3. Buildings with an energy performance better than the national requirements in 2012
4. Buildings constructed/renovated according to national minimum requirements in 2012.

### **Covenant of Mayors – Sustainable Energy and Climate Action Plans**

The EU Covenant of Mayors for Climate & Energy brings together thousands of local governments voluntarily committed to implementing EU climate and energy objectives. Signatories endorse a shared vision for 2050: accelerating the decarbonisation of their territories, strengthening their capacity to adapt to unavoidable climate change impacts, and allowing their citizens to access secure, sustainable and affordable energy.

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<sup>3</sup> <http://zebra2020.ecofys.com>



The initiative now gathers more than 10000 local and regional authorities across 57 countries drawing on the strengths of a worldwide multi-stakeholder movement and the technical and methodological support offered by dedicated offices.

Signatory cities pledge action to support implementation of the EU 40% greenhouse gas-reduction target by 2030 (\*55% target for new signatories from 2021) and the adoption of a joint approach to tackling mitigation and adaptation to climate change.

In order to translate their political commitment into practical measures and projects, Covenant signatories commit to submitting, within two years following the date of the local council decision, a **Sustainable Energy and Climate Action Plan (SECAP)** outlining the key actions they plan to undertake. The plan will feature a Baseline Emission Inventory to track mitigation actions and a Climate Risks and Vulnerability Assessment.

As the building sector is responsible for the largest share of greenhouse gas emissions, mitigation actions focusing on reducing the energy consumption of buildings and supplying them with renewable energy will be a priority in most of the SECAPs.

## 1.5.2 NATIONAL STRATEGIES AND GOALS

### **National energy and climate plans**

Under the governance system, Member States were required to adopt integrated national energy and climate plans (NECPs) for the period 2021-2030. This chapter provides an overview of the NECP of Hungary, Germany and Slovakia.

#### ***National Energy and Climate Plan of Hungary***

In accordance with the obligations set by the European Union, Hungary has prepared its National Energy and Climate Plan for the next 10 years. The document sets out comprehensive goals and measures through which Hungary intends to reduce its carbon dioxide emissions by 2030 by 40%, as well as increase the role of energy efficiency and the share of renewable energy sources (21%).

The key objectives identified in the document are: a) energy sovereignty; (b) energy security; (c) maintaining the results of the utility cost reduction programme; (d) decarbonisation of the energy production.



In terms of specific indicators, the plan sets ambitious targets in some areas, but the ideas outlined are certainly insufficient in several segments. A key issue is the projected growth in primary domestic energy consumption, which is projected to increase from 1117 PJ in 2017 to 1284 PJ by 2030, which is an increase of 15%. This does not meet the expectations of environmental and climate protection, nor the declining consumption trends of developed economies.

The NECP outlines only a little progress regarding CO<sub>2</sub> emission reduction compared to the commitments made by other EU Member States. A significant part of the 40% emission reduction has been already achieved (compared to the base year of 1990), so in the next decade only a 12% reduction (from 63.8 million tons in 2017 to 56.2 million tons) should be outlined. At the same time, this pace is insufficient to achieve long-term climate protection goals and to mitigate climate change, as Hungary will still have annual carbon emissions of over 43 million tons by 2050 if the track of the NECP is followed:

- 1) Energy efficiency is rather lightly discussed in the NECP. The planned measures do not consider energy efficiency as a primary target area.
- 2) Energy awareness, as another means of reducing consumption and integrating renewable energy sources, is one of the rather neglected topics of the NECP. The document presents it only as a sketched idea, which will have to be run up somehow in the future, but only faint references can be read in the material.
- 3) The third key element of the energy revolution in Europe is the use of renewable energy sources. The target of the 21% RES share (in gross final energy consumption) is significantly below the EU average. EU Member States have already set an average target of 32% by 2030, thus promoting their energy independence, increasing the number of jobs and reducing the burden on the environment.

Regarding the role of renewable energy sources, the planned expansion of solar PV systems is the most ambitious part of the NECP. According to the goals, 6500 MW PV capacity will be set in place in Hungary by 2030, adding up the larger (industrial-scale) systems and the household systems (*Figure 1*).

A large increase is expected in the number of household PV systems in the next decade. The NECP's goal is to install an average capacity of 4 kW for 200,000 households by 2030. Thus, 5% of Hungarian households could be connected to the electricity system as a prosumer.

In the field of heating the document has a firewood-based concept for the household level, despite the local air pollution problems and its overconsumption. Access heat and other ambient heat utilisation, as air source and ground source heat pumps, should have



been mentioned as important development areas. Some of the relevant figures of the NECP do not indicate these possibilities, the geothermal energy is the only one, which is mentioned frequently.

All in all, a radical change is needed compared to the current status. A much greater emphasis on training should be placed at all possible levels especially regarding expert knowledge and consumer awareness in order to catch up with the forefront in Europe.



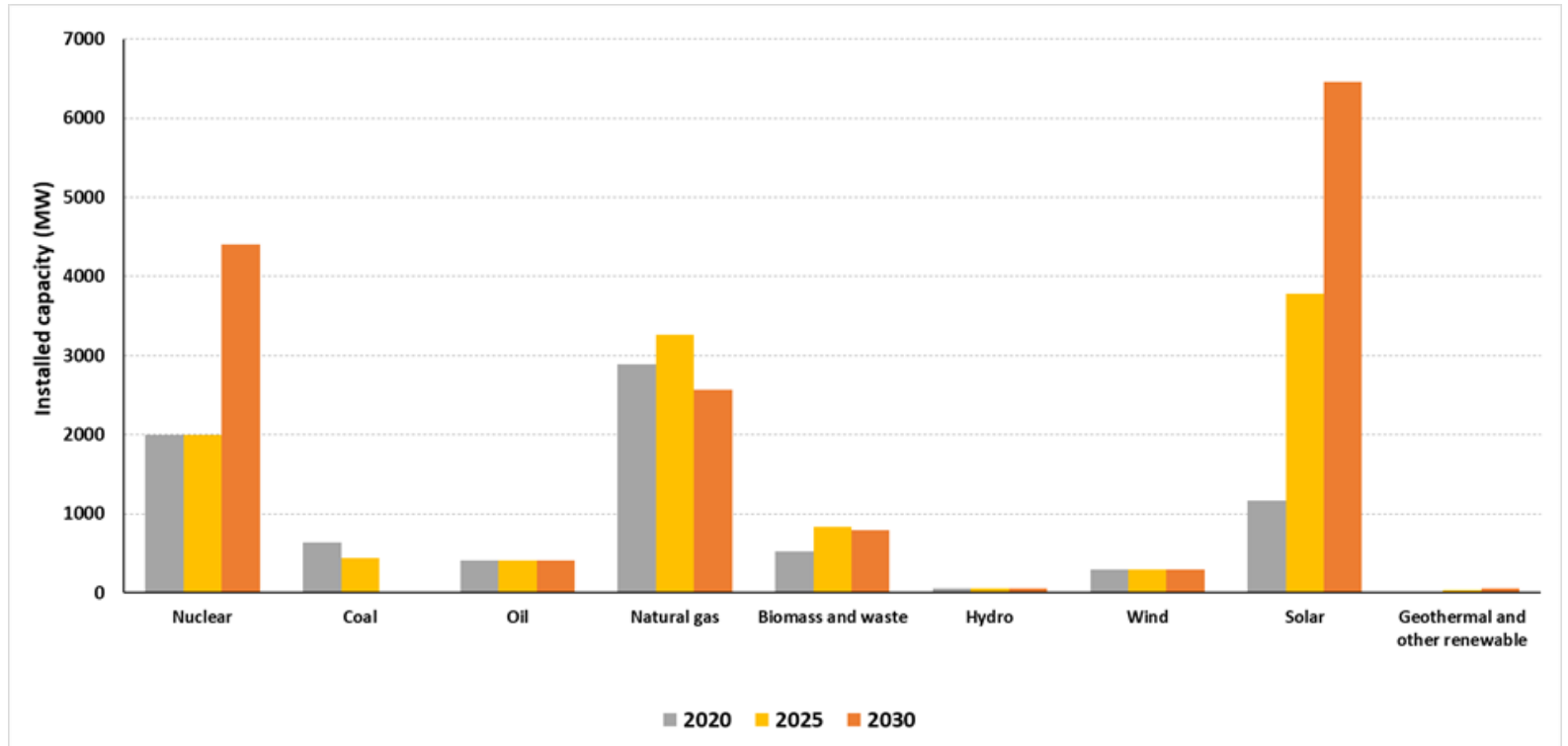


Figure 1.5.1: Planned evolution of installed power generation capacity in Hungary (NECP)



### ***National Energy and Climate Plan of Germany***

Germany's draft integrated national energy and climate plan (NECP) addresses the country's energy transition (Energiewende), based on a 'triangle' of three policy objectives: affordability, security of supply and environmental soundness. The energy transition has a strong focus, so far, on electricity, and on emission reductions, but also relates closely to other policies.

Germany's 2030 target for greenhouse gas (GHG) emissions is -38% compared to 2005. While the national and sector-wide greenhouse gas emission reduction targets for 2030 are in line with the German long-term strategy (National Climate Plan 2050), these are not always reflected in sector-specific national contributions (e.g. to the EU energy efficiency target) and policies and measures (e.g. in the transport, building and agriculture sector).

Germany's proposed share of 30% of energy from renewable sources in gross final consumption of energy in 2030 as national contribution to the EU 2030 target for renewable energy is in line with the results of the formula under the Governance Regulation on which the Commissions bases its assessment of Member States' renewable energy contributions. Moreover, Germany plans for the years 2022, 2025 and 2027 a more ambitious delivery of its national contribution for renewables than the required reference levels.

While Germany has a 2050 objective for energy efficiency, the draft plan lacks clarity on Germany's energy efficiency contribution to the EU target of 32.5% in 2030. Therefore, no conclusion can be drawn on the level of ambition of Germany's contribution to the Union's 2030 headline targets on energy efficiency ([https://ec.europa.eu/energy/sites/default/files/documents/necp\\_factsheet\\_de\\_final.pdf](https://ec.europa.eu/energy/sites/default/files/documents/necp_factsheet_de_final.pdf)).

### ***National Energy and Climate Plan of Slovakia***

The Energy Policy of Slovakia featured four basic pillars: energy security, energy efficiency, competitiveness and sustainable energy. There is a focus on science, research and innovation too. The priorities are:

- an optimal energy mix;
- increase energy supply security;
- develop the energy infrastructure;
- diversify energy sources and distribution routes;
- maximum use of transmission networks and transit systems passing through the SR;
- application of the primacy of energy efficiency principle;
- reduce energy intensity;
- a functioning energy market in a competitive environment;
- high-quality energy supply at affordable prices;
- protect vulnerable customers;



- address energy poverty;
- a reasonable pro-export balance in the electricity system;
- promote high-efficiency cogeneration;
- promote the use of efficient district heating systems (DHS);
- promote the use of RES to produce electricity, hydrogen, heat and cold;
- use nuclear energy as a low-carbon electricity source;
- improve the safety and reliability of nuclear power plants.

The main quantified NECP targets for Slovakia by 2030 are to reduce greenhouse gas emissions for sectors not involved in emissions trading (non-ETS) by 20%. The RES share in final energy consumption has been set at 19.2% for 2030, together with meeting the required target of 14% of RES in transport.

The elaborated measures to achieve the national contribution of Slovakia in energy efficiency show slightly lower values (30.3%) than the European target of 32.5%. Industry and buildings will be key to achieving the targets.

### **National long-term climate strategies**

Under the governance system, EU Member States were required to develop national long-term strategies and ensure consistency between these strategies and their NECPs.

### ***National long-term climate strategy of Hungary***

In order to achieve climate neutrality by 2050, greenhouse gas emissions in Hungary are expected to decrease by approx. 95% compared to 1990. To achieve this goal, intervention is needed in all emission sectors and steps must be taken to maintain absorption capacities. Currently – at the end of the 2010s – the rate of reduction is about 32% compared to 1990.

Aspects related to the energy consumption of buildings:

- According to the Strategy, energy efficiency investments can be made most cost-effectively by introducing a commitment system.
- In the heating and cooling sector, there is a great potential for the utilization of biomass in both individual heating installations and district heating, as well as in the use of ambient heat through heat pumps. In view of the geological conditions of Hungary, the aim is to exploit the potential of geothermal energy, both in district heat production and in agricultural utilization. In addition, the involvement of the biodegradable part of municipal waste in useful heat production should be exploited.

The strategy mentions the importance of smart-systems and smart-metering. It outlines that the energy independence of families can be promoted by supporting renewable energy



production of households, by promoting the spread of smart meters, and by investing in energy efficiency that sustains the results of overhead reductions.

### ***National long-term climate strategy of Germany***

Germany's long-term climate goal is to become largely greenhouse gas-neutral by 2050. This means a 80-95% cut in emissions based on 1990 levels. The target also reflects the country's particular responsibility as a leading industrialised nation and the EU's strongest economy.

The Climate Action Plan 2050 outlines a modernisation strategy for the necessary transformation towards a low-carbon economy in Germany on three levels:

- It contains specific guiding principles for the individual areas of action for 2050, leaving scope for innovations and striving to maximise sustainability.
- It outlines robust transformation pathways for all areas of action, highlights critical path dependencies and describes interdependencies.
- It underpins goals, in particular the interim GHG target for 2030 of at least a 55 percent reduction in GHG emissions compared to 1990, with emission targets for all sectors, concrete milestones and strategic measures, also taking impact and cost analyses into account.

Aspects related to the energy consumption of buildings:

For the buildings sector, a roadmap has been drawn up for achieving a virtually climate-neutral building stock. As buildings have a very long service life, the foundations for 2050 need to be laid early. The goal is a reduction of 66 to 67 percent by 2030 compared to 1990. Achieving a virtually climate-neutral building stock by 2050 depends on ambitious standards for new buildings, long-term strategies for upgrading existing buildings and gradually phasing out fossil-fuel heating systems. As a result, the zero-energy building standard for new buildings, which will apply from 2021 onwards, will be progressively developed in order to achieve a medium-term standard for new buildings that is virtually climate-neutral. This will make installing new heating systems that use renewable energy sources efficiently a far more attractive option than those that run on fossil fuels. To support this goal, appropriate incentives for using and constructing buildings that generate more energy than they use will be reviewed. By 2050 existing buildings are also due to be upgraded through energy efficiency measures and greater use of renewable energy so that they meet the standards of virtually climate-neutral buildings. The energy requirements for existing buildings will therefore be developed gradually until 2030, also with a view to economic aspects.

### ***National long-term climate strategy of Slovakia***



The goal of the National long-term strategy of Slovakia is to achieve climate neutrality by 2050, which accounts for an 80% emissions reduction compared to 1990.

Aspects related to the energy consumption of buildings:

Increase the energy savings achieved in building renovation from 30% to 60% and promote the improvement of buildings' energy performance with measures implemented in the heating and cooling sector aimed at decarbonizing the supply of heat to buildings from district heating and cooling systems.

### **National Building Energy Performance Strategies**

The EPBD is a cornerstone in EU legislation, and was developed to realise the saving potential in buildings, as they account for almost 40% of the consumption of energy in the EU. Full and efficient transposition of this directive is therefore central in achieving EU energy saving and carbon emission targets. National Building Energy Performance Strategies are based on the EPBD standards, and the legal transposition is in progress.

***National Building Energy Performance Strategy of Hungary (Ref. Ares(2015)1092845 - 12/03/2015 )<sup>4</sup>***

The Hungarian National Building Energy Performance Strategy put the task of improving building energy performance into a wider energy policy, economic and social context.

First of all, the document mentions that buildings account for approx. 40% of total national primary energy consumption, which outlines the importance of improving the state of our homes, public and other buildings to decrease energy consumption and emissions. In Hungary, more than 50 % of the energy used by buildings comes from natural gas.

Since a major part of the energy consumed by buildings is used for heating, energy use shows a highly seasonal pattern. This is a circumstance of central importance for both the storage of natural gas and capacity management.

In Hungary - compared to developed Member States – the domestic energy consumption of households per capita is low. Still, many Hungarian households struggle with paying their energy bills. Therefore, the government set the goal to curb utility costs. The utility cost reduction program launched in 2013.

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[https://ec.europa.eu/energy/sites/ener/files/documents/2014\\_article4\\_hungary\\_en%20translation.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/2014_article4_hungary_en%20translation.pdf)



In the Hungarian National Energy Performance Strategy, a number of objectives had been set:

- Harmonisation with the energy and environmental objectives of the EU
- Modernisation of buildings as a means to reduce the utility costs of the population
- Cutting back on budgetary expenses
- Reducing energy poverty
- Creating jobs
- Reducing greenhouse gas ('GHG') emissions.

In the Strategy, specific objectives were also set:

- The energy savings to be achieved by 2030 should be in line with the relevant energy efficiency requirements set in the National Energy Strategy 2030.
- 2020 targets for energy savings from improved building energy performance should be defined on the basis of calculations made with the current condition of the building stock, the requirements applicable to the different building types, the technical modernisation tasks needed to meet these requirements as well as the costs this involves and the available Government and other resources taken into account.
- Having regard to Directive of the European Parliament and of the Council on the energy performance of buildings, from 1 January 2015, the values corresponding to cost-optimal energy efficiency levels are applicable in the case of support granted under domestic or EU tenders or from the central budget for the improvement of the energy performance of buildings falling within the scope of the Energy Performance Characteristics Decree.
- Pursuant to the Energy Performance of Buildings Directive, it will be binding upon the Member States to meet nearly zero-energy building ('NZEB') standards for new buildings as from 1 January 2021 and for new public buildings as from 1 January 2019. This means that NZEB requirements will apply whenever a new building is constructed instead of renovating existing buildings. However, the introduction date has been postponed to June 2022 by the Hungarian government.
- For public buildings, 3 % of the total useful floor area of heated and/or cooled buildings over 500 m<sup>2</sup> owned and occupied by the central government of Member States should be renovated each year, and must also be observed.

### ***National Building Energy Performance Strategy of Germany***

A holistic approach to energy efficiency in buildings was first introduced by Germany in 2002 with the Energy Saving Ordinance. It replaced the legislations on thermal insulation of buildings and system requirements for central heating, which had been in place for 25 years.



The main energy performance requirements for new buildings are defined in the Energy Saving Ordinance (EnEV) comprising:

- a maximum non-renewable primary energy demand, which is determined individually for each building using a reference building with similar building geometry, orientation and use, but with a certain quality of all energy-relevant systems and components;
- a minimum requirement for the energy performance of the building's thermal envelope;
- a minimum percentage of RES used for heating, domestic hot water and cooling; the percentage is different for the various technologies.

As a first step towards NZEB, the requirements for new buildings were tightened in January 2016. The maximum primary energy demand now equals 75% of the 2014 value, whereas the requirements addressing the thermal envelope were strengthened by 20%.

The government decided to use the aforementioned amendment not only to specify the NZEB-level, but also for a significant simplification of the existing regulations, mainly by combining the legislation of the RES use percentage with the energy efficiency regulations.

### ***National Building Energy Performance Strategy of Slovakia***

The EPBD has been incorporated into Slovakian legal documents (act and ministerial decree). RES and heat recovery are now mandatory in new buildings. Requirements for thermal protection of the envelope components and buildings are presented in national standard. The revised standard, which came into force on 1 August 2016, respects cost-optimality calculations.

The implementation of the EPBD has led to a phased tightening of the minimum requirements for the energy performance of buildings. This tightening is based on the rate of construction of high energy performance buildings. These will be followed by NZEB requirements for all new buildings starting in 2021. Renovated existing buildings must meet the requirements for new buildings when technically, functionally and economically feasible.

## 1.5.3 REFERENCES

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The views and opinions expressed in this publication are the sole responsibility of the author(s) and do not necessarily reflect the views of the European Commission.

Co-funded by the  
Erasmus+ Programme  
of the European Union



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