Innovációs és Technológiai Minisztérium

Long Renewal Strategy on the basis of Directive (EU) 2018/844 with a view to fulfilling the eligibility conditions for the payment of cohesion funds for the period 2021-2027

ITM

FELADATUNK A JÖVŐ

Contents

Executive summary

Objective of the strategy:

Buildings are a priority in the European Union's energy and climate policy, as they account for around 40 % of final energy consumption and CO emissions. The 2015 Paris Agreement on climate change also promotes the EU's efforts to decarbonise buildings. The European Commission attaches particular importance to energy efficiency and the role of the construction sector in achieving the EU's energy and climate policy goals. By 2050, the EU has set the objective of renovating a "climate-neutral" built environment and existing buildings in need of renovation, while promoting the use of innovations that help EU citizens to maintain and operate buildings. In 2018, the European Parliament and the Council amended the Directive on the energy performance of buildings, and in 2019 the European Commission issued a recommendation to Member States with the aim of **speeding up the process of renovation of buildings**. Each Member State of the European Union was required to bring into force the laws, regulations and other administrative provisions of the relevant directive in 2020 and to prepare the so-called 'Long Távú Building Renovation Strategy', which is one of the conditions for access to resources in the next EU development policy cycle.

In addition to the **obligation, the Hungarian Government** is committed to protecting the natural environment and the sustainability of the built environment, as it **protects the living space of families and future generations**. Our built environment is diverse and therefore our responsibilities are multifaceted. We face a wide range of challenges, including the modernisation and more liveability of buildings that are "inherited" from socialism, to which the government intends to help families. In addition to supporting the construction of new homes, it is particularly important to renovate and upgrade buildings the maintenance of which places a heavy burden on Hungarians.

The government's aim is to **preserve the built heritage that enriches our national values, to contribute to the modernisation of existing buildings, while at the same time helping Hungarian families to live in more liveable and cheaper buildings**.

In addition, the government sets out the objective of supporting the **development of the Hungarian economy, construction companies and families through programmes supporting the protection and renewal of the built environment.**

The collective protection of the created and built environment is our shared responsibility arising from our Christian culture. The government pursues a realistic and responsible policy in the field of climate protection, but at the same **time implements measures aimed at facilitating and improving the living conditions of the people living in** Hungary.

With regard to our built environment**,** the Hungarian Government sets out the following **vision (2050)**:

1. **It is viable** because it provides families living in Hungarian towns and villages with a living space that contributes to a higher quality of life. Another objective is to increase the housing stock by rehabilitating brownfield sites.

2. It**is affordable** because the construction or renovation of a building is of high quality and in a way that takes into account sustainability, uses energy-efficient, renewable energy and works with a minimum network, with further support for residential constructions.
3. **Clean because it** is environmentally aware of the natural environment, materials and energy sources used and waste generated by households. This also gives direction to the green transformation of the construction sector.
4. It is**barrier-free** because, thanks to its design and technical solutions, its use is convenient and safe for all, including those who need special equipment or technical solutions to do so.
5. **Modern because it** provides innovative and smart technologies for building users' everyday lives and for the management of buildings.

Article 2a of Directive 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency (Furthermore: Directive), requires EU Member States to draw up a strategy for long-term renewal. Its implementation in Hungary was adopted by the Hungarian Government on 8 January 2020 (hereinafter: NEKT) as well. This document has been drawn up in accordance with the technical, substantive and formal requirements laid down in the Directive and approved by the European Commission, in accordance with its provisions. As a result of the above, the document entitled'*Long Tavous Renewal Strategy under Directive (EU) 2018/844 with a view to fulfilling the eligibility conditions for the payment of cohesion funds for the period 2021-2027*'(hereinafter: HTFS or Strategy). One of the main objectives of the Strategy is to enable the national stock of residential and non-residential buildings, both private and public, to become a highly energy efficient and decarbonised building stock through renovation by 2050.

In addition to compliance with the legislation and the obligation of the Member States, particular attention was given to the implementation of **Hungary's strategic objectives of basing the renewal of the Hungarian building stock on deep renovations enabling sustainable, energy and cost-effective operation, the reduction of energy imports and the use of intelligent systems, while maintaining the reduction of the final consumer price of public services to the extent required by law (hereinafter: Reduction of charges)**.

Hungary also attaches particular importance to the Energy Efficiency Obligation Scheme (hereinafter: The EQF) shall be implemented and operated to a high professional standard. With the introduction of the ERF, a number of measures to encourage energy efficiency renovation can be implemented, which are described in detail in this Strategy.

An important aspect in designing the measures is a significant reduction in the number of households to be supported, the achievement of which would contribute directly and indirectly to the improvement of energy efficiency, environmental, health, economic and socio-demographic indicators.

Starting point and situational picture

Buildings are among the largest$_{domestic}$CO2 emitters and energy consumers. Around 27 % oftotal final energy consumption in residential buildings, cca. 6 % takes place in public buildings. The industrial sector accounts for almost a quarter of consumption and the services sector (trade, public services, other services) accounts for 12 %, while agriculture accounts for 4 % and transport for 27 %. 40 % of domestic energy use is for cooling and heating purposes. The potential for saving this type of energy is particularly high, as Hungary is among the ten most consumers in the EU in terms of the amount of energy used per dwelling. **Natural gas is the primary fuel currently used for the energy supply of more than 3.7 million residential homes in Hungary, which is used by nearly 76 % of households for heating purposes. At the same time, almost 80 % of the natural gas used is imported, which can be significantly reduced by implementing the measures set out in this Strategy and by operating the ERF.**

The renovation rate of the building stock, although showing an increasing trend, is still low, as **the renovation rate for residential buildings is only around 1 % per year.**

Primary energy consumption in residential buildings is on average^{between}215 kWh/m²/year and public buildings approximately 214 kWh/m²/year. Compared to other EU Member States, Croatia, the Czech Republic and Poland have nearly similar values, i.e. primary energy consumption exceeds 200 kWh/m²⁻However, Germany and Austria have buildings with^{average} primary energy consumption below 200 kWh/m².

Target system

The **overall objective of the Strategy is to lay the groundwork for achieving a sustainable, energy-efficient and cost-effective domestic building stock by 2050** through energy efficiency, value, comfort and health improvement measures, renewable energy utilisation and smart technologies, reducing national primary energy use and carbon dioxide emissions. This contributes significantly to the objective of significantly reducing the Hungarian energy import dependency and indirectly reinforces the long-term sustainability of the household cuts. Hungary sets as a horizontal objective that the **principle of energy efficiency** should be a mandatory aspect in all interventions, investments and awareness-raising in the construction sector.

Operational objectives and objectives

1. 20 % savings in the energy use of the domestic housing stock by 2030,
2. A60 % reduction in CO emissions related to the energy use of buildings by 2040 from the average level in 2018-2020,
3. By 2050, the percentage of nearly zero-energy buildings should reach 90 %.

Renovation targets

By implementing the measures set out in the Strategy, the objective of achieving the renovation rate of 3 % per year for the total residential stock by 2030 can be achieved. This means total energy use in residential buildings and $CO2_{emissions}$ cca. It can decrease by 20 %.

During the same period, the aim is to strengthen the annual renovation rate of the public buildings stock of 5 %. If this is achieved gradually, the overall energy consumption of public buildings, as well as $CO2_{emissions}$, can decrease by 18 %.

Areas of intervention, measures required

The long-term achievement of the above objectives for the existing building stock can only be achieved through deep renovation. As this involves a significant cost of ownership, it is necessary to provide for the **possibility of staged renovations**. In order to promote the highest possible proportion of renovations reaching the required level of deep renovation as a **priority,** the Strategy shall examine the scope of financial incentives, measures and eligible activities, as well as their relevance, with a view to developing appropriate schemes.

For the 2021-2027 programming period, a combination of non-reimbursable and repayable assistance **is justified in order to ensure the efficient use of EU funds.** Possible financing programmes are planned by Hungary in such a way that the aid does not crowd out but mobilises market financing and is better adapted to the specific characteristics and needs of the segment. Households and vulnerable groups in difficulty and vulnerable groups, as well as residential and residential users, will receive special attention, for which specific programmes will be developed and implemented.

Developments in recent years indicate the need to rethink the energy efficiency measures applied so far, to create new incentives, to introduce an energy efficiency obligation scheme, including the introduction of programmes and the implementation of measures leading to certified energy savings on the end-user side. On this basis, Hungary shall introduce an Energy Efficiency Obligation Scheme as of 2021.

In addition to deep renovation, the smart building indicator system (hereinafter: Sri) is also an important objective. The establishment of the SRI and the introduction of an experimental period are required by Article 8(10) and (11) and Annex 1 of the Directive. The introduction of the SRI system is a Community policy pilot measure managed directly by the Commission.

Hungary shall also pay particular attention to the role of training and awareness-raising, in particular with regard to building users. The range of training courses available in secondary and higher education on energy efficiency will be extended.

Vision

The achievement of the objectives of the Strategy and the implementation of the measures have a significant impact on economic development and employment. The milestones and the effectiveness of the Strategy are decisive for the sustainability of both the built environment and the construction economy.

The Strategy sets out 35 measures. The implementation of the measures will be monitored by the **establishment of the so-called building renovation monitoring system (ÉMOR)**. This will enable the continuous processing of feedback loops and, if necessary, the establishment of new intervention points.

The implementation of the Strategy will have the following positive effects:

- Long— **term** maintenance of the reduction of charges,
- **decrease in the use of natural gas,**
- **Decrease in energy imports (natural gas, electricity),**
- **Strengthening energy independence, increasing** energy autonomy and self-determination,
- a renewable, sustainable, **intelligent public building stock,**
- Significant **job creation** effects of energy efficient modernisations, interventions and measures,
- **increase in value of upgraded buildings,**
- **the development of attractive and viable settlements (rural),**
- **an increase in the life expectancy of buildings,**
- **Creating a competitive alternative for repatriated construction workers due to** the job creation effect of energy efficiency renovations;
- **significant reductions in households to be supported.**

The actions of the Strategy shall also contribute to the following Sustainable Development Goals (hereinafter referred to as "the Sustainable Development Goals") of the United Nations for 2030 (hereinafter: SDG) for national implementation:

- Affordable and clean energy,
- Doubling the rate of energy efficiency improvement in the world;
- Sustainable cities and communities,
- Responsible consumption and production,
- Taking action against climate change,
- Promoting sustainable, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- Ensuring healthy life and well-being for all members of all generations.

The Strategy thus underpins and further strengthens Hungary's commitment to responsible and sustainable development.

Socialisation and professional consultation

The socialisation and professional consultation of the Strategy shall be carried out by the Ministry of Innovation and Technology (hereinafter: ITM). On 4 August 2020, a technical consultation of the HTFS took place with the active participation of relevant government stakeholders, professional organisations, academic institutions, market participants and banks. The comments, comments and needs received in the course of socialisation were taken into account in the finalisation of the Strategy.

Brief overview of the recently published key strategy papers on energy and climate policy on the relevance of HTFS

The objectives, principles and orientations set out in*the document entitled 'Long-term Renewal Strategy for the purpose of fulfilling the enabling conditions for the payment of cohesion funds for the period 2021-2027 under Directive (EU) 2018/844'*are closely linked to the objectives and orientations set out in the following domestic strategies. The summary of these documents, presented with a brief HTFS relevance, can be found below:

1. **Hungary's National Energy and Climate Plan and National Energy Strategy 2030, with a view to 2040**[1]

The **main objectives** of the documents **are** to **strengthen energy sovereignty** and energy security, **to maintain the results** of the reduction and to **decarbonise energy production**, which can be combined with nuclear energy and renewable energy. For countries lacking in conventional energy sources, such as Hungary, energy **sovereignty is a matter of prosperity, economics and national security**. **It is in Hungary's clear interest to reduce its demand for energy imports.**

The cleanest energy is the unused fossil energy. This can be achieved in particular through the use of heating and cooling solutions based on renewable resources, the implementation of the Green Heat Programme and the reduction of energy use in public institutions, industry and transport. Due to the high efficiency of electric motors, clear end-user energy savings are achieved through the expansion of electromobility.

The energy independence of families **can be promoted by supporting home-based self-generation of renewable energy and by promoting the deployment of smart meters**. The Government of Hungary is determined to protect our natural heritage and the natural conditions of the way of life we, Hungarians, have developed together in this country.

The Government shall pursue a realistic and responsible policy in the field of climate protection. It should be realistic, on the one hand, in terms of the assessment of world policy processes, and in terms of the expected results and cost implications of the interventions that could be implemented with current technologies.

Hungary has a clear interest in reducing its demand for energy imports and, at the same time, ensuring its wider connection to the regional electricity and gas networks, which is also a guarantee of security of supply and effective import competition.

[1]Hungary's National Energy and Climate Plan; National Energy Strategy 2030, with an outlook to 2040 (January 2020)

According to the documents, the future of domestic energy supply is as follows:

1 Clean becauseit increases the weight of low- or zero-emission technologies in domestic energy use, **encourages more energy efficiency and thus strengthens our energy independence. Supports energy-saving solutions at all levels of the value chain in order to minimise the negative impact on the environment, the climate and consumers' energy bills**.

2 It is smart because it builds on the latest technological developments in order to ensure ahigh level of energy services at the lowest possible cost. The transformation of the energy sector aims to create new market opportunities and strengthen research and development activities in the sector.

3 It is affordable because a **diversified supply portfolio and a regulatory environment will be developed** in which the development of domestic energy prices supports the improvement of the competitiveness of the Hungarian economy and the improvement of consumer welfare in a sustainable way.

The two main pillars of strengthening our energy independence at national level are the reduction of our high exposure to energy imports, as well as multiple positions (diversification) ensuring security of supply and effective import competition in the case of remaining energy imports. Reducing energy imports goes hand in hand with the decarbonisation of our energy sector. The use of innovative technological and business solutions contributes to achieving our goals of strengthening energy independence at national and local level, increasing consumer choice and greening the energy sector in a cost-effective way, also supporting industrial development efforts. The National Energy Strategy is structured along four main sub-measures with an outlook until 2040:

- Focus on the Hungarian consumer in the strategy.
- Strengthen the security of our energy supply.
- Implement the climate-friendly transformation of the energy sector.
- Exploit the potential of energy innovation for economic development.

2. National Clean Development Strategy[2]

In response to the call of the Paris Agreement and given that **Hungary is one of the few countries in the world that have managed to reduce their greenhouse gas emissions by increasing their economic performance (GDP), the strategy aims to ensure that this "clean growth" continues. Along these lines, Hungary may gradually become a climate neutral country by 2050, without jeopardising economic growth and social well-being.**

With a view to achieving climate neutrality by 2050, greenhouse gases in Hungary (hereinafter: GHG) should be reduced by around 95 % compared to 1990. According to our current knowledge, the remaining emissions can be neutralised by domestic sinks (land use sector, in particular forests). Although there are research into artificial sinks, their possible future applicability is very uncertain. In order to achieve this objective, it is necessary to intervene in all emission sectors (energy use, industry, agriculture, waste) and to take steps to maintain sinking capacities. **It is important for**

[2] National Clean Development Strategy (January 2020)

Hungary that the innovations and energy efficiency measures necessary for the transition to a low-emission economy are realised as soon as possible, as these are a significant contribution to achieving the targets.

The estimated cost of achieving climate neutrality in 2050 is in the order of HUF 50 thousand billion, which assumes that resources amounting to 2.5 % of GDP per year by 2050 will be raised.

3. National Climate Change Strategy[3]

During the development of the second National Climate Change Strategy (NÉS-2) for the period 2017-2030, which also covers the period up to 2050**, the public policy objective was to establish a national climate strategy that sets the objectives to address the impacts of climate change in the long term. This can be achieved in two ways. In line with international efforts, we need to reduce greenhouse gas emissions and increase our carbon sink capacities, in the interests of our country. If these steps are successfully implemented, the concentration of greenhouse gases in the atmosphere can be reduced in the long term, leading to a further reduction in the rate of global atmospheric temperature rise. In addition to reducing $CO2_{emissions}$and increasing absorption capacity, an objective assessment of the impacts on the national territory is also necessary. The long-term preservation of our livelihoods in the Carpathian Basin – our rich water resources, lands, forests and diverse living resources – is of national strategic importance.**

4. First Climate Action Plan[4]

Climate change and preparedness is **one of the most important challenges of today's country. A number of international agreements, policy documents and strategies worldwide address the problem, but concrete interventions are needed to take effective action**. The second National Climate Change Strategy (NÉS-2) adopted in October 2018 sets long, medium and short-term targets and action lines for Hungary. **However, defining the actual response is the responsibility of the action plans linked to the strategy**, the first of which is the **Action Plan on Climate Change I covering the period until the end of 2020** (Furthermore: I. ÉCsT). During the planning of SST I, thematic concentration was an explicit objective to avoid fragmentation of resources and tasks. The document focuses on the tasks that can be carried out over a defined period of time and on those aimed at preparing these longer-term developments, thus laying the foundations for the latter.

Both emission reduction (mitigation), adaptation and awareness-raising have played a prominent role in the definition of SDG I measures. The mitigation measures shall focus primarily on renewable energy, the greening of transport and the strengthening of sinking capacities (forest areas). **The national strategic objectives of the measures** shall be to maintain industrial competitiveness, **to preserve the result of the reduction in the price and to strengthen the security of energy supply in Hungary**. **The key priority areas for adaptation are human health**, energy infrastructure, water management, agriculture, as well as disaster management, tourism and forestry. **Awareness-raising measures include in situ responses**, local planning and other **interventions in support of mitigation and adaptation purposes** in the public administration, the media, the education system and the civil

[3] National Climate Change Strategy (2017)
[4] First Climate Action Plan (January 2020)

sector. **Since 2010, the GHG intensity of the Hungarian economy (gas emissions per unit of GDP) has improved by 22 %, indicating that economic development and climate protection are mutually reinforcing targets**. **Hungary is located in the 21 countries in the world that have reduced GHG emissions while increasing its GDP since 2000. A key strategic objective is to strengthen this trend, i.e. to reduce further the energy and GHG intensity of our national income while maintaining high-quality economic growth**. The first major thematic element of SMR I is the Decarbonisation Programme (DP), which, as the main action tool of the NÉS-2 Homeland Decarbonisation Roadmap (HDÚ), details actions from a mitigation perspective for the period 2018-2020 in 7 action groups.

Main actions related to HTFS:

- **The development of an efficient, renewable-based, affordable, environmentally friendly district heating policy programme under the EED, ensuring a high level of security of supply,**
- **Preparation of the ESCO programme for improving energy efficiency in public and residential buildings,**
- **Long-term operation of a sector-neutral energy efficiency obligation scheme,**
- **The development of a background material examining the possibilities for renewable energy production,**
- **Displaying climate protection in education,**
- **Establish a comprehensive monitoring and evaluation framework for measuring and evaluating the results of energy and climate policy measures.**

List of abbreviations and units of measurement

LIST OF ABBREVIATIONS

ÁEEK	State Health Care Centre
VAT	Value Added Tax
BASKETS	System for collecting energy status characteristics and monthly energy use of the buildings of public institutions (cadastre)
BIM	Building Information Modelling
BM	Interior Ministry
BME (TECHNICAL UNIVERSITY OF BUDAPEST)	Technical University, Budapest
CMU	Capital Markets Union (Capital Market Union)
CSOK	Family home creation allowance
DB	Pieces
DNA	Avoidance of effects contrary to environmental objectives (Do No Significant Harm)
DSM	Consumer Side Management
EBRD	European Bank for Reconstruction and Development
EEEEF	European Energy Efficiency Fund
FDI	Annual Development Framework
EIB	European Investment Bank
ECR	Energy efficiency obligation scheme
ELENA	European Local Energy Assistance
////////	ÉMI Non-Profit Company for Quality Control and Innovation in Building
MHC	Ministry of Human Resources
EPBD	Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency
EPC	Energy Performance Contract
ESCO	Energy Service Company
ESG	Environmental, social and corporate governance characteristics (Environmental, social, governance)
EU	European Union
EVOSZ	National Federation of Construction Entrepreneurs
GINOP	Economic Development and Innovation Operational Programme
HMY	Domestic hot water
HTFS	Long Renewal Strategy on the basis of Directive (EU) 2018/844 with a view to fulfilling the eligibility conditions for the payment of cohesion funds for the period 2021-2027
IM	Ministry of Justice

MINISTRY OF INNOVATION AND TECHNOLOGY (MIT)	Ministry of Innovation and Technology
KÁBER	Central State Investment Control System
SME	Small and medium-sized enterprises
KÖFOP	Public administration and public service development operational programme
HCSO	Central Statistical Office
ME	Prime Minister's Office
MEKH	Hungarian Energy and Public Utility Regulatory Authority
MÉP	Modern Construction Economic Platform
MFB	Hungarian Development Bank
MFK	Hungarian Development Centre
MMK	Hungarian Chamber of Engineers
HNB	Hungarian National Bank
NHS	National Waste Management Strategy
NEG Zrt.	NEG National Energy Management Zártkörűen Működő Részvénytársaság
NÉeR2	National Building Energy System 2
NEKT	National Energy and Climate Plan
NAS	National Energy Strategy 2030 with Outlook to 2040
NÉeS	National Building Energy Strategy (2015)
NZEB	Nearly Zero Energy Buildings
IM	Ministry of Finance
SSEP	Sustainable Energy Action Plan
SECAP	Sustainable Energy- and Climate Action Plan
SEA	National Energy Strategy Strategic Environmental Assessment with proposals for Hungary's National Energy and Climate Plan
//TAO	Tax relief for companies
GHG	Greenhouse gas
KEHOP Plus	Environmental and Energy Efficiency Operational Programme Plus

LIST OF UNITS OF MEASUREMENT

M2	square metre – unit of area
CO2	carbon dioxide
KWh/m²/year	annual energy consumption per unit area
PJ	Energy unit 1015^{Joule}
PJ	Unit of energy 2,777 778 x 108 kWh
TJ	Unit of energy 2,777 778 x 105 kWh
U-value	Heat transmittance factor of a building structure, expressed in W/m2K
KT	Kilotonnes of $_{CO2\ emissions}$

kton/y	kilotonnes per year – often a measure of carbon dioxide depletion
T	tons – unit of mass
M3	cubic metres – unit of volume
Mg/m^3	micrograms per cubic metre – unit used for, inter alia, the concentration of air particulate matter

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I. Overview of the national building stock (based on statistical sampling and the expected share of renovated buildings in 2020)

Content of the Chapter: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings – Overview of the national building stock pursuant to Article 2a(1)(a).

I.1. Presentation of the national building stock on the basis of statistical sampling

There are currently more than 3.7 million residential dwellings in Hungary, with a total floor area of almost 274 million m². Most of the public buildings are owned by the Hungarian State and the local governments and managed by the Magyar Nemzeti Vagyonkezelő Zrt., as well as ecclesiastical or privately owned. The total number of public buildings with a floor area of more than 250 m² is[5] around 24 000 ccas. With a heated floor area of 50 million m².

For residential buildings, energy performance certificates, analysis of the various operational programmes and surveys show that the renovation rate is approximately 1 % per year.

Final energy consumption in residential buildings is on average between 205 and 225 kWh/m²/year, and public buildings approximately 214 kWh/m²/year. In particular, there are very large differences based on the year of construction and the renovations that have taken place since then. The most widespread fuel is natural gas, which supplies 76 % of the population of residential buildings and 80 % of the public building stock. The total final energy consumption of residential buildings in 2018 was 205 000 TJ, while that of public buildings was approximately 39 000 TJ.

I.1.1. Building typology and the multiplicity of buildings

Building typology

The building typology used has been defined[6] on the basis of, and in addition to, NÉeR2. The energy calculations of the sample buildings were based on the calculations of the National Building Energy Strategy of 2015 and the NÉeR2.

[5] Buildings of less than 250 m² are excluded from the analysis as the register of smaller buildings is seriously incomplete and, according to municipal building statistics, 90 % of the useful floor area is made up of over 250 m² buildings.

[6] National Building Energy System 2 (NÉeR2) 2015 – ÉMI Nonprofit Kft. (on behalf of Pro Regio Nonprofit Közhasznú Kft.)

Residential buildings

Compared to the previous National Building Energy Strategy, the typology of building categories has been revised[7] on the basis of the revised EPBD in 2018. The types of residential buildings are summarised in the following table:

Épülettípus	Építési év	Alapterület	Falazat típusa	Épületek, 2011 (db)	lakott lakások, 2020 (db)	Lakott alapterület, 2020 (m2)
családi vagy sorház (1-3 lakás)	0	-	vályog, alapozással	486 192	385 772	25 460 952
családi vagy sorház (1-3 lakás)	0	-	vályog. alapozás nélkül	189 074	150 023	9 901 518
családi vagy sorház (1-3 lakás)	-1944	-	tégla, kő, kézi falazóelem	233 982	213 256	15 780 944
családi vagy sorház (1-3 lakás)	1945-1959	-	tégla, kő, kézi falazóelem	221 376	190 106	14 257 950
családi vagy sorház (1-3 lakás)	1960-1979	119 m^2 alatt	tégla, kő, kézi falazóelem	590 656	532 069	39 905 175
családi vagy sorház (1-3 lakás)	1960-1979	120 m^2 felett	tégla, kő, kézi falazóelem	96 362	87 245	12 912 260
családi vagy sorház (1-3 lakás)	1980-1989	119 m^2 alatt	tégla, kő, kézi falazóelem	271 372	247 816	18 338 384
családi vagy sorház (1-3 lakás)	1980-1989	120 m^2 felett	tégla, kő, kézi falazóelem	100 760	91 987	14 074 011
családi vagy sorház (1-3 lakás)	1990-2005	119 m^2 alatt	tégla, kő, kézi falazóelem	218 320	198 028	14 852 100
családi vagy sorház (1-3 lakás)	1990-2005	120 m^2 felett	tégla, kő, kézi falazóelem	113 624	102 110	16 950 260
családi vagy sorház (1-3 lakás)	2006-2020	119 m^2 alatt	tégla, kő, kézi falazóelem	59 236	44 464,00	3 557 120
családi vagy sorház (1-3 lakás)	2006-2020	120 m^2 felett	tégla, kő, kézi falazóelem	29 903	90 576,00	14 582 736
családi vagy sorház (1-3 lakás)	2020 után	119 m^2 alatt	tégla, kő, kézi falazóelem	-	-	-
családi vagy sorház (1-3 lakás)	2020 után	120 m^2 felett	tégla, kő, kézi falazóelem	-	-	-
Társasház (4-9 lakással)	-1945	-	tégla, kő, kézi falazóelem	15 889	72 027	3 961 485
Társasház (4-9 lakással)	-	-	tégla, kő, kézi falazóelem	19 178	100 247	5 714 079
Társasház (4-9 lakással)	1990-2005	-	tégla, kő, kézi falazóelem	8 625	41 607	2 704 455
Társasház (4-9 lakással)	2006-2020	-	tégla, kő, kézi falazóelem	4 390	24 150	1 545 600
Társasház (4-9 lakással)	2020 után		tégla, kő, kézi falazóelem	-	-	-
Társasház (10 vagy több lakással)	-1944	-	tégla, kő, kézi falazóelem	9 417	179 424	10 406 592
Társasház (10 vagy több lakással)	1945-1989	-	tégla, kő, kézi falazóelem	30 841	547 778	26 841 122
Társasház (10 vagy több lakással)	-	-	közép-vagy nagyblokk, öntött beton	1 481	14 810	784 930
Társasház (10 vagy több lakással)	-1979	-	panel	8 224	177 102	9 032 202
Társasház (10 vagy több lakással)	1980-1989	-	panel	7 203	120 311	6 376 483
Társasház (10 vagy több lakással)	1990-2005	-	tégla, kő, kézi falazóelem	4 343	68 772	3 644 916
Társasház (10 vagy több lakással)	2006-2020	-	tégla, kő, kézi falazóelem	2 040	47 484	2 564 136
Társasház (10 vagy több lakással)	2020 után		tégla, kő, kézi falazóelem	-	-	-
ÖSSZESEN				**2 772 488**	**3 727 164**	**274 149 410**

1Table: Residential typology (Source: Expert findings of MultiContact Consulting Kft., based on KSH data)[8]

The above statistics are based on the national census of 2011 and 2016 and have been corrected on the basis of demographic projections for 2020.

Public buildings

[7] Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency

[8] Microcensus issued by HCSO 2016, 7. According to the document, the number of dwellings occupied is 3 854 000

The typology of public buildings was also based on NÉeS and NÉeR2 typology methodologies, reviewed and modified in line with the new regulatory environment and the years of construction. On this basis, the types are:

Building function	Year of construction	Number of buildings, 2020 (number)	Floor area, 2020 (m^2)
Health, social and accommodation buildings	Before 1900	478	603 714
Health, social and accommodation buildings	1901-1945	1 068	1 348 884
Health, social and accommodation buildings	1946-1959	588	742 644
Health, social and accommodation buildings	1960-1979	1 774	2 240 562
Health, social and accommodation buildings	1980-1989	473	597 399
Health, social and accommodation buildings	1990-2006	384	484 992
Health, social and accommodation buildings	2006 —	235	296 805
Buildings of an administrative and office nature	1900	832	881 920
Buildings of an administrative and office nature	1901-1945	1 835	1 945 100
Buildings of an administrative and office nature	1946-1959	747	791 820
Buildings of an administrative and office nature	1960-1979	1 448	1 534 880
Buildings of an administrative and office nature	1980-1989	420	445 200
Buildings of an administrative and office nature	1990-2006	335	355 100
Buildings of an administrative and office nature	2006 —	204	216 240
Commercial (e.g.: Store, store, warehouse)	—1990	529	580 313
Commercial (e.g.: Store, store, warehouse)	1990-2006	69	75 693
Commercial (e.g.: Store, store, warehouse)	2006 —	42	46 074
Cultural (e.g.: Museum, theatre, library, cultural house)	1900	208	228 176
Cultural (e.g.: Museum, theatre, library, cultural house)	1901-1945	254	278 638
Cultural (e.g.: Museum, theatre, library, cultural house)	1946-1959	88	96 536
Cultural (e.g.: Museum, theatre, library, cultural house)	1960-1979	216	236 952
Cultural (e.g.: Museum, theatre, library, cultural house)	1980-1989	60	65 820
Cultural (e.g.: Museum, theatre, library, cultural house)	1990-2006	60	65 820
Cultural (e.g.: Museum, theatre, library, cultural house)	2006 —	37	113 442
Educational buildings (e.g.: Kindergarten, school, college, university)	Before 1900	1 113	3 412 458
Educational buildings (e.g.: Kindergarten, school, college, university)	1901-1945	2 203	6 754 398
Educational buildings (e.g.: Kindergarten, school, college, university)	1946-1959	1 082	3 317 412
Educational buildings (e.g.: Kindergarten, school, college, university)	1960-1979	3 462	10 614 492
Educational buildings (e.g.: Kindergarten, school, college, university)	1980-1989	1 290	3 955 140
Educational buildings (e.g.: Kindergarten, school, college, university)	1990-2006	592	1 815 072
Educational buildings (e.g.: Kindergarten, school, college, university)	2006 —	362	1 834 616
Hospitals	1900	89	451 052
Hospitals	1901-1945	186	942 648
Hospitals	1946-1959	91	461 188
Hospitals	1960-1979	269	1 363 292
Hospitals	1980-1989	90	456 120
Hospitals	1990-2006	51	258 468

Building function	Year of construction	Number of buildings, 2020 (number)	Floor area, 2020 (m^2)
Hospitals	2006 —	31	23 777
Sport facilities	1900	307	235 469
Sport facilities	1901-1945	135	103 545
Sport facilities	1900	82	62 894
Sport facilities	1990-2006	478	603 714
Sport facilities	2006 —	1 068	1 348 884
TOTAL		**23 819**	**50 334 765**

2Table: Public building typology (Source: MultiContact Consulting Kft.)

The table above shows the number of public buildings[above] 250 m² and their estimated floor area.[9]

New construction and demolition

In the period from 2011 to 2018, an average of 10 122 dwellings were built per year, while an average of 2 007 dwellings were dismantled. The main reason for the demolition of dwellings is that the buildings to be demolished have reached the end of their life. Compared to 3.7 million dwellings, the average number of newly constructed dwellings is less than 0.3 % per year.

Új építésű lakások átlagos száma	2011 – 2018 átlagos érték (db)
Új lakások száma (1-3 lakásos épületben)	6 269
Új lakások száma (4-10 lakásos épületben)	1 117
Új lakások száma (10 lakás feletti épületben)	2 726
Összesen	10 122

Lebontott lakások száma	2011 – 2018 átlagos érték (db)
Lebontott lakások száma (1-2 lakásos épületben)	1 711
Lebontott lakások száma (3 lakás feletti épületben)	296
Összesen	2 007

3Table: Number of dwellings newly constructed and demolished (Source: MultiContact Consulting Kft.)

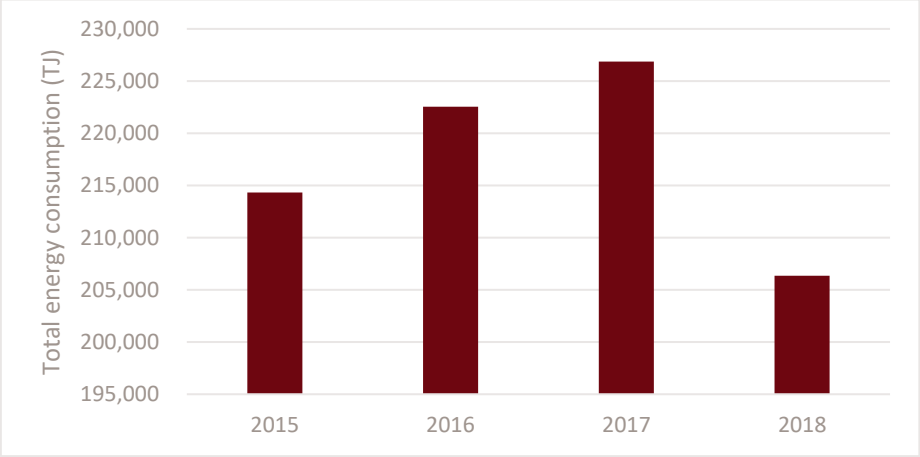
According to the energy efficiency database on the construction and demolition of public buildings, 780 new properties were built between 2011 and 2019. The largest category is office house (237 real estate), while the second largest group is commercial buildings (177 real estate).

[9]While waiting buildings have not been included in the typology as a separate type of building, they shall be considered as public buildings for the purposes of grants and tenders.

I.1.2. Energy performance indicators for buildings

Residential buildings

The figure below shows the total residential energy consumption per year:

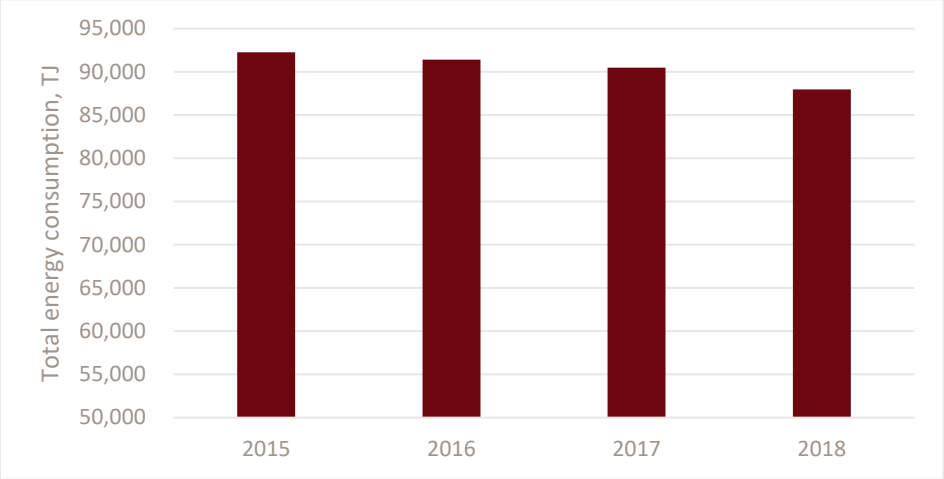


1Figure: Residential final energy consumption, (heating, cooling, domestic hot water) TJ (Source: MultiContact Consulting Kft.)

According to MEKH statistics, final energy consumption in the residential sector increased slightly between 2015 and 2017, before declining significantly in 2018, due to unusually warm weather conditions. On the basis of forecasts of international and domestic weather research, this trend will not change significantly in the future, and we can expect, in principle, more milder winters and summers with large and more lasting heat peaks over time. In 2018, according to the statistical data of MEKH, the consumption of natural gas for heating decreased by almost 20 000 TJ, while the consumption of cooling energy increased by a few percentage points and the use of HMV energy from year to year is almost constant.

Public buildings

The graph below shows the total final energy consumption in the service sector, within which public buildings are a subset of this sector. Statistics show a decrease in consumption over the years.



2Figure: Final energy consumption of the service sector, TJ (Source: MultiContact Consulting Kft.)

Of the consumption of 90 000 TJ, 39 000 TJ is the consumption of technical building systems in heated public buildings of more than 250 m². The average m² consumption is above 200 kWh/m²/year, similarly to residential buildings.

I.2. Determination and characterisation of the proportion of renovated buildings (applicable to renovations completed by 2020)

Residential buildings

To determine the refurbishment rate of residential buildings[10], a survey was carried out in[11] 2012 and 2020, respectively. The comparison was made in four categories: Family homes, panel buildings, small multi-family houses (4-10 apartments) and large multi-family houses (with more than 10 apartments). The results of the survey are shown below:

[10] ÉMI Nonprofit Kft., 2012
[11] MultiContact Consulting Kft., 2020

Hőszigeteltség	Családiházak	Panel	Nagy társasházak	Kis társasházak
2020				
Hőszigetelt	33%	44%	26%	16%
Nem hőszigetelt	63%	52%	63%	77%
Részlegesen hőszigetelt	1%	4%	7%	6%
Nem megállapítható	4%	0%	4%	1%
2012				
Hőszigetelt	23%	37%	19%	16%
Nem hőszigetelt	76%	58%	80%	82%
Részlegesen hőszigetelt	1%	5%	1%	1%
Nem megállapítható	1%	0%	0%	1%

4Table: Share of insulated residential buildings in 2020 and 2012 (Source: MultiContact Consulting Kft.)

The above data show that the proportion of fully or partially insulated buildings has increased, with varying proportions depending on the type of building.

The proportion of windows replaced shows a similar trend to insulation. The percentage of windows replaced increased in all categories, except for panel buildings. The increase is higher, ranging from 5 % to 13 %, and in some categories even partial window replacements of more than 20 %.

Given that external façade thermal insulation is the most representative indicator of the renovation of the building, this can be considered as the basis for determining the annual renovation rate. On this basis, the annual renovation rate is approximately 1 %.

Public buildings

The rate of renovation of public buildings can be estimated on the basis of renovation projects financed by EU funds. In the period between 2015 and the first quarter of 2020, according to publicly available data, the number of relevant projects financed by the grant was 1 721.

I.2.1. Building stock forecast

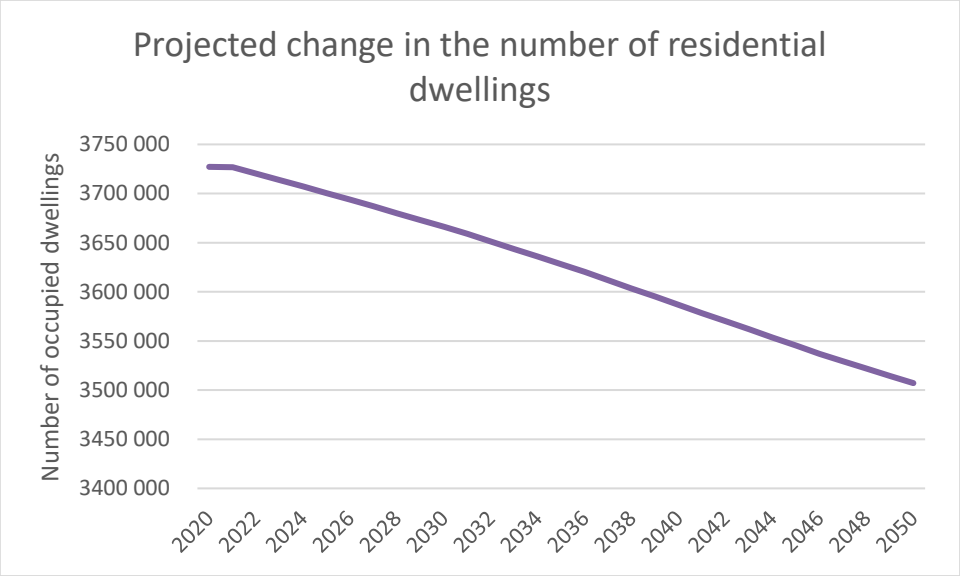
The situation of the housing market depends to the greatest extent on the state of the economy. During the economic crisis, the construction of new dwellings decreased steadily between 2006 and 2012, with fewer than 5000 dwellings built annually in the worst period. In recent years, the number of new housing constructions has also increased in line with economic growth, reaching over 20 000 a year. At the same time, the rate of renewal of the residential building stock remains low. The average number of new dwellings over the last 10 years is between 9 and 10 000 new dwellings per year, which is close to 0.3 % of the total number of dwellings used.

The following can be estimated for the evolution of the number of residential buildings in use until 2030:

- The number of new dwellings is expected to evolve annually in line with the trend for the period 2011-2018;
- Population is expected to decline by 2030;
- The number of residential real estate in the panel buildings is likely to remain unchanged until 2030;
- Buildings built after 1990 are also assumed to remain stable;

- It is assumed that newly built apartments up to 2030 will reduce the occupancy rate of residential properties built before 1990 and located in less fracked areas.

The following chart shows the forecast of the number of residential dwellings in the period under review:



3Figure: Projected number of dwellings up to 2050 (Source: ÉMI Nonprofit Kft. according to the projections of the Regional Research Centre for Energy Economics)

For public buildings, no projections have been made for construction, demolition and demographic change. This is due to the lack of reliable data on both the actual floor area and the construction/demolishment rates.

I.3. Monitoring system and indicators (selection, methodological bases, responsible persons)

Establishment and up-to-date registration of public buildings

System for collecting the energy status characteristics and monthly energy use of the buildings of the State public institutions under the KÖFOP project '3D-based data infrastructure'(cadastre; Hereinafter: ÁKÉK), an application providing a single user interface, capable, among other things, of displaying descriptive data stored in various databases (e.g. country inventory, National Building Energy System, real estate register, central address register, etc.) on state public buildings with different functions in a uniform environment. In addition, the single user interface will be able to query, according to different search criteria, the operational data of public buildings, as well as the spatial location, energy characteristics and energy consumption parameters of state public buildings.

The Hungarian Energy and Public Utility Regulatory Authority shall establish and operate the Public Building Register by uploading and keeping the data up to date of the ÁKÉK application. In this

database, strong emphasis is placed on building, building energy, facility management and other ancillary data, thus supporting the cost-effective operation of the institutions, the preparation of decisions on building renovation and maintenance investments. The application shall provide a breakdown of the operating costs of the installations up to the smallest possible territorial unit. During the design phase of works, it shall assist in the preparation of situational and ex-post impact assessments, as well as in the analysis of statistical data.

Building Renovation Monitoring System (ÉMOR)

Hungary shall establish a monitoring system related to the indicators specified in the development of the Strategy, the purpose of which shall be to verify the achievement of the strategic objectives. This will enable the continuous processing of feedback loops and, if necessary, the establishment of new intervention points. The final form of this is the so-called building renovation monitoring system. The online interface shall be established in accordance with the indicators set out in the Strategy. The programme will also be suitable for interconnection with, inter alia, the State Public Building cadastre, the electronic applications of the National Construction Register, in particular the e-certification system, and, for public buildings, the municipal property register and the Central State Investment Control System (KÁBER). The operation and maintenance of the building renovation monitoring system, as well as the performance of tasks related to the provision of data, will be carried out by professionals. As a result of complex data collection, the building renovation monitoring system will be suitable for measuring five main indicators and for recording:

1. Renovated number of buildings per type of building (number/type);
2. Floor area of renovated public buildings ($^{m^2/type)}$;
3. Energy savings and$_{CO2\ emission}$ savings (kWh; Tco2$_{)}$;
4. Financial resources spent on building renovations (HUF; HUF/kWh);
5. Which policy measure results (in relation to the results of points 1, 2 and 3) (HUF/kWh).

In addition to the outputs listed above, the system will be able to set the user's complex filtering conditions, as well as to prepare complex reports that can be consulted immediately on the basis of various criteria. In this way, the progress of the milestones set out in the Strategy can be measured accurately and the reports can also provide statistical data for the construction economic forecasts.

Act CXXV of 1995 on national security services (hereinafter: Section 51 (1) a) of the Nbtv.) with *the* **consent of** *the minister or the Directors-General, in addition to classified information, data relating to the objects and staff* **of** *national security services may be disclosed*. In view **of this, data on the building stock of national security services in the registers are set out in the Nbtv. They may be included with the consent specified in section 51 (1).**

Measures

1) **Establishment and up-to-date registration of public buildings**

Scope of the measure: Public buildings
Duration**of the measure: Continuous from**2023
Brief description of the measure: In order to establish the Public Building Register, the ÁKÉK shall be uploaded with up-to-date data on public buildings. Several institutions are not

technically well prepared to provide accurate data, so the involvement of those who carried out the survey is necessary.

Expected impact of the measure: The GRCM will have a sufficiently precise, high-quality start-up database for further monitoring.

Person responsible for action: Hungarian Energy and Public Utility Regulatory Authority (MEKH)

2) **Establishment of a building renovation monitoring system (ÉMOR)**

Scope of the measure: Buildings and measures covered by the Strategy

Duration**of the measure: Continuous from**2023

Brief description of the measure: Establish the building renovation monitoring system described**above (including the methodology and the related IT system), operate and maintain it, and perform the tasks related to the provision** of data.

Expected impact of the measure: Effective and up-to-date monitoring of the measures set out in the Strategy.

Person responsible for action: Minister for Energy Policy

Indicators related to this chapter:

- Number of buildings/number of dwellings (by type of building) – m²,
- Annual energy consumption (by type of building and end-use) – TJ,
- Annual percentage of renovated buildings (by type of renovation and residential/non-residential distribution) – %,
- Number of EPCs (by type of building, energy efficiency class) – db,
- Number/size of NZEBs (by residential/non-residential distribution) – db, m².

I.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

It has been confirmed that accurate monitoring and monitoring of the public building stock and related investments, as well as access to the database of stakeholders (e.g. municipalities) are necessary for the implementation of a well-designed and effective strategy. The alignment with existing databases, preferably with automatic data transfer procedures, shall be a priority both at the time when the data are uploaded and at the time of the establishment of the ACM.

II. Identify cost-effective renovation approaches appropriate to the building type and climatic zone, taking into account, where appropriate, relevant points within the life cycle of buildings when intervention becomes necessary

Hungary is located in the temperate zone according to the solar climate division. Its climate is very

Content of the Chapter: Description and analysis of cost-effective renovation modalities pursuant to Article 2a(1)(b) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

volatile, the annual temperature of heat is high, the mean monthly temperature of the coldest month (January) is 1.3 °C as an average over the last ten years, while the average monthly temperature of the warmest month (July) is 23.7 °C, as an average over the last ten years. This implies that both heat insulation and efficient heating solutions, as well as protection against overheating, as well as passive and active cooling, need great care.

In order to determine cost-effective approaches to renovation according to the type of building and the climate zone, the buildings have been typified according to their technical characteristics and their function. The definition of the types of buildings is explained in Chapter II.1.2 of the strategy. By merging the division described therein from a technical point of view, the following categories have been established:

Public building	Residential buildings
Buildings for cultural purposes	Family house, twin house, sorthouse (1-3 apartments)
Educational building	Small condominium (3-10 apartments)
Sports building	Large condominium (more than 10 apartments)
Health and social building	Industrialised building (panels, tunnels, etc.)
Commercial building	
Administrative and office buildings	
Hospital	

5Table: Technical building typing applied to renovation patterns

II.1. Detailed development of renovation patterns per type of building

Typical renovation elements that can cost-effectively reduce the energy use of buildings in Hungary are summarised below.

II.1.1. Typical refurbishment elements

Improvement of thermal transmittance parameters for building boundaries

An effective way of reducing the energy demand for heating and cooling is to improve the thermal transmittance parameters of building boundaries. In terms of expected energy savings, $CO2_{emission}$ reductions and returns[12], solutions that meet cost-optimal requirements and those with a lower heat transfer factor have been analysed[13]. This showed that additional savings are minimal for better performing structures, so that meeting cost-optimal requirements is sufficient for borderlines.

These requirements are:

Building boundary structure	Requirement value of the heat transmission factor U W/m2K
Façade wall	0,24
//Fixers	0,17
Structures delimiting a heated roof space	0,17
Floor bed beneath bed and swivel space	0,17
Ditch and transverse floor	0,17
Lower end floor above unheated spaces	0,26
Glazing	1
Special glazing	1,2
Window glazing with a façade with a framework structure of wood or PVC (>0.5 m²)	1,15
Glassed window windows of the façade with a metal frame structure	1,4
Façade glass wall, curtain wall	1,4
Glass roof	1,45
Rooflight and smoke extraction curvature	1,7
Roof plane window	1,25
Industrial and fire-retarding doors and gates (heated space for storage)	2
Door between façade or heated and unheated spaces	1,45
Façade or gate between heated and unheated spaces	1,8
Wall between heated and unheated spaces	0,26
Wall between adjacent heated buildings and parts of buildings	1,5
Foot wall, wall in contact with the ground from terrain to a depth of 1 m (below ground level only for new buildings)	0,3

[12]DOC. 7/2006. (V. 24.) TNM Decree on the determination of the energy characteristics of buildings – Annex 5 Table 1

[13]Hungary: Prepared by Modernisation of Public and Residential Buildings – Identification and Elaboration of Support Programmes Muticontact Consulting Kft., 2020)

Ground floor (for new buildings)	0,3
Conventional energy collection walls (e.g. mass wall, Trombe wall)	1

6Table: Cost Optimum Requirement Level – Requirement Value of Heat Transmission Factors

Modernisation of heating systems

The modernisation of existing heating systems offers multi-level intervention possibilities, ranging from improved controllability to the replacement of the whole system:

- Creating and improving the possibility of regulation: The way in which it can be designed depends on the heating system.
  In the case of home centre and district heating, it is recommended that local housing regulatory units, meters (including smart meters) be installed per dwelling, as well as the possibility of individual regulation and the payment of heating charges on the basis of actual consumption. Otherwise, the user of the building will be less motivated to operate an energy-efficient building.
  In the case of central heating per dwelling, it is recommended that weather-tracking regulation and room-to-room temperature control be developed.
  In the case of individual heating, thermostats may be installed. If individual heat generator-heat take-off devices (e.g. electrical conv.) are provided, it is possible to link the heat take-offs to a system with smart controls, so that the temperature control is more accurate.
- Modernisation of heating system components: The modernisation of the various non-heat generating or heat take-off elements of the systems, e.g. circulating pumps and grid regulation, can often lead to tangible savings through small investments.
- Modernisation of heat emitters: The state-of-the-art heat emitters also ensure adequate thermal comfort in the case of heating medium at lower temperatures and provide the possibility to control the amount of heat.
- Modernisation or replacement of heat producers: Modern heat producers (boilers, heat pumps, convectors) have a significantly higher efficiency than outdated equipment and their operational safety is higher.
- Building a new, more efficient system: If the entire heating system of the building is replaced, it is possible to choose the most optimal equipment for that building. This may include the installation of a new condensing gas boiler and the associated heat take-off system or heat pump. Connection to the district heating system may also result in energy savings in a dense urban environment. Specific solid-fired solutions (e.g. tiles, fireplace) are not recommended due to increasing concentrations of particulate matter due to solid combustion, as well as inefficiencies. For family houses, state-of-the-art biomass or wood gasifier and wood chip boilers may be used.

Modernisation of cooling and ventilation systems

When establishing a ventilation system, account shall be taken of Decree No 7/2006 (V.24.) of the TNM and of the European Union (hereinafter: (EU) Nos[14] 1253/2014 and[15]1254/2014 on energy-

[14] Commission Regulation (EU) No 1253/2014 of 7 July 2014 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for ventilation units

saving ventilation systems. State-of-the-art ventilation systems are equipped with regulations according to the user's needs.

PURSUANT TO DECREE NO 7/2006 OF APRIL According to Annex 3 to Decree No/of 24 May of the Minister for Transport and Transport, residential premises shall be provided with a minimum of 0.5 times the air exchange per hour. This was usually ensured by windows with older designs, with the proviso that they were not perfectly closed. Thus, during a heating season, fresh air at an external ambient temperature corresponding to half of the internal airspace was provided to the internal rooms every hour, thereby increasing the heat loss.
The current air-closed windows do not release almost no extraneous air into the inner space. There are several threats to this.

- The level of oxygen in the room's air decreases – the well-being of the occupants deteriorates.
- The level of carbon dioxide in the inner air is increasing – the well-being of the inhabitant deteriorates.
- Pollutants (from furniture, carpets, etc.) are enriched in the inner air.
- In the inner air, the humidity (from indoor, cooking, etc.) is enriched – this in turn can cause mould on heat bridges and cold surfaces.

Of course, this can be treated by intermittent ventilation, but the heat loss is increased again.
The solution may consist of the installation of ventilation facilities for dwellings equipped with heat recovery. This device filters the intake fresh air and then passes through a heat recovery and blows into the premises of the apartment. The exhaust fan installed in the same appliance drains the used air from the rooms, transmits its heat in the heat recovery to fresh air and leaves the outside space. The thermal efficiency of these appliances shall be between 80 % and 95 %. Thus, the loss can be between 5 % and 20 %. The fans naturally have an energy consumption, but this energy absorption plus thermal losses is less than it would be possible to enter the outside cold air directly by ventilation. Losses are also reduced by the smart regulator of these devices. In buildings with a 'nearly zero' energy level, these installations are indispensable.

Heat pump systems can provide cooling, heating, hot water for domestic use in buildings, as well as providing thermal energy for the operation of ventilation systems.
Specific new Split – multisplit systems are heat pumped and can provide space heating and cooling, and the latest systems are highly efficient.
It is important that equipment is regularly cleaned and maintained, as otherwise their efficiency is reduced and, if not cleaned, they may be harmful to health.

[15] Commission Delegated Regulation (EU) No 1254/2014 of 11 July 2014 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of residential ventilation units

Passive heat protection

Protection against overheating in the summer is also increasing in our country. However, not only mechanical cooling, but also the thermal insulation of building structures and passive and natural heat protection solutions are important for a more pleasant indoor climate in summer. The simplest solution for this in the case of renovations is the installation of external shading structures. Automatic sensor-based smart regulation of shadowing systems improves efficiency and, in the case of existing blinds, such a system may be established ex-post.

Modernisation of lighting

The replacement of light sources and luminaires for state-of-the-art LED-system elements results in perceived energy savings with relatively low investments. For public buildings, the energy demand for lighting is significant and can represent between 25 % and 40 % of the total energy demand. On this basis, the replacement of luminaires – light bulbs could save up to 20 % to 35 % of the total electricity consumption. However, it is important to highlight that in many cases the modernisation of lighting has to take place in conjunction with the refurbishment of the electrical network, which is in itself a renovation element with high investment needs, but does not result in significant energy savings.

The presence-sensing control of lighting and the use of smart systems can further reduce energy use.

Modernisation of domestic hot water production system

If electric boilers are used, their efficiency is greatly impaired by their deposition, so their efficiency is improved by regular periodic maintenance. At the same time, the devices currently on the market are more efficient and the replacement of old, obsolete equipment may be recommended. If the hot water is produced by the boiler providing heating, the upgrading can accordingly take place together with the heating system. In multi-family houses, a regulatory centre per apartment can be more efficient in heating and producing domestic hot water. In this unit, the heat meter, the heating regulator and the domestic hot water are also produced locally. In this case, there is no need for a central storage, pipeline network and circulating line.

Installation of an electrical power generation system

The installation of solar panels on the roof surfaces of buildings is widespread and should be supported. In the case of a family house and a small condominium, as well as in the case of public institutions, it is typically possible to install a number of solar panels that are close to or reach the electricity demand of the building. In particular, it is recommended in cases where the heating system is powered by electricity (electric heating or heat pump) or where a high-capacity cooling – ventilation unit is located (e.g. offices, hospitals).

Intelligent building management, "smart building"

The use of various smart building management solutions, which may cover all technical and household electronics, could result in significant energy savings due to accurate regulation. Systems can often be installed per element (smart thermostat, automatic shielding treatment, etc.) and can also be used in the case of cascading refurbishment.

II.1.2. Refurbishment packages for types of buildings

On the basis of the16 examination of more than 400 renovation packages for the different types of buildings, the proposed packages for energy savings have been identified. According to a detailed analysis of the packages, the following general findings can be made:

- In terms of expected energy savings, $CO2_{emission}$ reductions and cost-optimal requirements, compliance with cost-optimal requirements is optimal, extra savings are minimal compared to better performing structures, but investment costs are higher.
- In the case of family houses, the reduction of CO2 emissions from the $development_{package}$containing electric heating and solar panels is close to the reduction of $CO2_{emissions\ from}$the development package containing heat pumps and solar panels. Their investment costs are practically the same, so the proposals do not provide for this solution separately.
- For public buildings, the biomass boiler development package results in a reduction of $CO2_{emissions}$ similar to the heat pump development package, but increases particulate matter emissions and is therefore not recommended in urban environments.

It is important to underline that the renovation of each building should be designed according to its specific characteristics, as various factors, such as the starting state, the condition of the building structures, the orientation and location of the building, etc., have a significant influence on the applicable and applicable solutions.

Residential buildings

Family house, twin house, sorthouse (1-3 apartments)	
Thermal insulation	*Cost-optimal requirement level*
Replacement of windows	*Cost-optimal requirement level*
Heating system	*Individual condensing boiler or heat pump (supplemented with solar cells)*
Refrigeration systems	*If yes, it is proposed to refurbish it, new construction is not supported* *Heat pump heating system is recommended and suitable for cooling*
Ventilation systems	*Installation of heat-recovery ventilation equipment*
Passive heat protection	*Installation of glazed windows with a shade*
Modernisation of lighting	*Replacement of luminaires with LED systems*
Modernisation of domestic hot water production system	*Regular maintenance of boilers, replacement or replacement of boilers in the event of deterioration*
Installation of an electrical power generation system	*Recommended depending on the location of the building, measured for the electricity consumption of the building*
Intelligent building management, "smart building"	*Recommended, whether per element (smart thermostat, shielding control)*
Small condominium (3-10 apartments)	
Thermal insulation	*Cost-optimal requirement level*
Replacement of windows	*Cost-optimal requirement level*
Heating system	*Individual condensing boiler or heat pump* *Home centre heating with boiler or heat pump (supplemented by solar cells), with the possibility to control individual heat quantities*

[16]Hungary: Prepared by Modernisation of Public and Residential Buildings – Identification and Elaboration of Support Programmes Muticontact Consulting Kft., 2020)

Refrigeration systems	*If yes, it is proposed to refurbish it, new construction is not supported* *Heat pump heating system is recommended and suitable for cooling*
Ventilation systems	*If a ventilation system exists, modernisation of the system, use of heat recovery ventilation* *If not available, installation of a heat-recovery ventilation unit per dwelling or design of the heat-recovery ventilation system of the entire building*
Passive heat protection	*Installation of glazed windows with a shade*
Modernisation of lighting	*Replacement of luminaires with LED systems in apartments and common rooms*
Modernisation of domestic hot water production system	*Regular maintenance of boilers, replacement or replacement of boilers in the event of deterioration*
Installation of an electrical power generation system	*Recommended depending on the location of the building, measured for the electricity consumption of the building*
Intelligent building management, "smart building"	*Recommended, whether per element (smart thermostat, shielding control)* *Control of common spaces, heating, alarm system*
Large condominium (more than 10 apartments), traditional construction method	
Thermal insulation	*Cost-optimal requirement level*
Replacement of windows	*Cost-optimal requirement level*
Heating system	*Refurbishment of heat take-off, control and related systems of the existing heating system* *Making it possible to regulate individual quantities of heat* *Home centre heating with boiler or heat pump (supplemented by solar cells),* *Where chimney is available, individual condensing boiler* *Connection to district heating, refurbishment of heat take-off, control and related systems in the case of district heating buildings*
Refrigeration systems	*If yes, it is proposed to refurbish it, new construction is not supported* *Heat pump heating system is recommended and suitable for cooling*
Ventilation systems	*If a ventilation system exists, modernisation of the system, use of heat recovery ventilation* *If not available, installation of a heat-recovery ventilation unit per dwelling or design of the heat-recovery ventilation system of the entire building*
Passive heat protection	*Installation of glazed windows with a shade*
Modernisation of lighting	*Replacement of luminaires with LED systems in apartments and common rooms*
Modernisation of domestic hot water production system	*Regular maintenance of boilers or replacement in the event of wear, or, if a heating system provides hot water, refurbishment of the heating system*
Installation of an electrical power generation system	*Recommended depending on the location of the building, measured for the electricity consumption of the building*
Intelligent building management, "smart building"	*Recommended, whether per element (smart thermostat, shielding control)* *Control of common spaces, heating, alarm system*
Industrialised building (panels, tunnels, etc.)	
Thermal insulation	*Cost-optimal requirement level*
Replacement of windows	*Cost-optimal requirement level*
Heating system	*Refurbishment and regulation of the heat take-off, control and related systems of the existing heating system* *Making it possible to regulate individual quantities of heat* *Replacement of boilers in the case of home-centre heating*
Refrigeration systems	*If yes, it is proposed to refurbish it, new construction is not supported*
Ventilation systems	*Modernisation of the system, use of heat-recovery ventilation* *Replacement of old exhaust roof fans with energy saving*
Passive heat protection	*Installation of glazed windows with a shade*
Modernisation of lighting	*Replacement of luminaires with LED systems in apartments and common rooms*
Modernisation of domestic hot water production system	*Refurbishment of the heating system in the event of regular maintenance of boilers or, in the event of deterioration, replacement or, if a heating system provides hot water, the refurbishment of the heating system. If the district heating service provider supports the solution, switching to a*

	specific hot water production method (during the summer period, it is not always economically viable for the supplier to maintain capacity solely due to the production of hot water)
Installation of an electrical power generation system	*Recommended depending on the location of the building, measured for the electricity consumption of the building*
Intelligent building management, "smart building"	*Recommended, whether per element (smart heat meter, shielding control) Control of common spaces, heating, alarm system*

7Table: Residential refurbishment packages

Public building

Generally proposed interventions depending on the technical condition of the building[17]	
Thermal insulation	*Cost-optimal requirement level*
Replacement of windows	*Cost-optimal requirement level*
Heating system	*Upgrading the heating system or installing a new heating system, adjusting the system (depending on the type of heating system)*
Passive heat protection	*Installation of glazed windows with a shade*
Modernisation of lighting	*Modernisation of lighting, installation of presence sensor lighting control*
Installation of an electrical power generation system	*Recommended depending on the location of the building, measured for the electricity consumption of the building*
Intelligent building management, "smart building"	*Development of a regulatory system, even by element – in the event of the refurbishment of mechanical systems, it is recommended that the widest possible smart control be installed*
Proposed interventions depending on function	
Buildings for cultural purposes	
Cooling and ventilation systems	*Refurbishment of existing cooling system* *Construction of a new cooling system (possibly with solar panel system)* *Refurbishment of existing ventilation system, development of heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Educational building	
Cooling and ventilation systems	*Refurbishment of the existing cooling system and design of a shading system* *Construction of a new cooling system (possibly with solar panel system)* *Refurbishment of existing ventilation system, development of heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Sports building	
Cooling and ventilation systems	*Refurbishment of existing cooling system* *Construction of a new cooling system (possibly with solar panel system)* *Refurbishment of existing ventilation system, development of heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Modernisation of domestic hot water production system	*Regular maintenance of boilers or replacement in the event of wear, or, if a heating system provides hot water, refurbishment of the heating system*
Health and social building	
Cooling and ventilation systems	*Refurbishment of existing cooling system* *Construction of a new cooling system (possibly with solar panel system)* *Refurbishment of existing ventilation system, development of heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Modernisation of domestic hot water production system	*Regular maintenance of boilers or replacement in the event of wear, or, if a heating system provides hot water, refurbishment of the heating system*

[17]In the case of public buildings, the technical characteristics of buildings vary widely, which determine some of the proposed renovation elements. The general description shall include the elements of refurbishment proposed independently of the function, on the basis of a consideration of technical characteristics.

Commercial building	
Cooling and ventilation systems	*Refurbishment of existing cooling system* *Construction of a new cooling system (possibly with solar panel system)* *Refurbishment of existing ventilation system, development of heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Administrative and office buildings	
Cooling and ventilation systems	*Refurbishment of existing cooling system* *Construction of a new cooling system (possibly with solar panel system)* *In the event of refurbishment of an existing ventilation system, installation of a heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Hospital	
Cooling and ventilation systems	*Refurbishment of existing cooling system* *Construction of a new cooling system (possibly with solar panel system)* *In the event of refurbishment of an existing ventilation system, installation of a heat-recovery ventilation system* *Depending on the size of the building, the installation of an air handling system may be recommended*
Modernisation of domestic hot water production system	*Maintenance and replacement of the hot water production system in the event of deterioration*

8Table: Refurbishment packages for public buildings

It is important to underline that the above proposals are universal and aimed at improving the energy efficiency of buildings. However, there are other aspects of deep renovation (suitability, comfort, aesthetic needs, etc.) which cannot be ignored in the investment planning process.

In order to preserve and maintain the value of renovated buildings, it is essential that planned maintenance also takes place during use.

II.2. Evaluation: Proposals for deep renovation targets (nearly zero level)

In the case of deep renovation of existing buildings, steel is to make buildings undergoing deep renovation a viable alternative to new buildings in terms of their use and energy efficiency. In a life-cycle approach, renovation may in many cases be more advantageous than demolition and construction of a new building, therefore it is essential that the owners, operators and users of the buildings become interested.

For the above reasons, the level of deep renovation is defined in such a way that the requirements for a building that has undergone such intervention (or a series of interventions in the case of cascading renovation) are identical in all respects, or approach, within reasonable limits, those applicable to new buildings.

The following criteria define deep renovation:

Aspect	Requirement
Energy efficiency	*The building must comply with the provisions laid down in Decree 7/2006. The requirement level for nearly zero-energy buildings as defined in Annex 6 to Decree No/of the Minister for Transport and Transport of 24 May (176/2008. (VI. 30.) pursuant to Annex 3 to Government Decree No/, classification according to 'BB' energy quality).*
Comfort degree, use	*In the case of residential buildings, the building shall comply with the requirements laid down in Section 91/A of Act LXXVIII of 1993 for a building that is* ***comfortable or*** *at least a comfortable building, i.e. it shall have at least one residential room, cooking room, bathroom and toilet area exceeding 12 m², public utility, hot water supply and centralised or individual heating mode.* *The building shall comply with the requirements of the relevant legislation that apply to new buildings.* *In the case of a public building, in accordance with the applicable law, the building shall be accessible.*
Condition of structures and systems	*Building structures shall not have problems of stability and their water insulation shall be resolved. The expected useful life of the primary support structures after the refurbishment shall be at least 25 years.* *None of the technical building equipment or building structures shall be in the last 25 % of its planned useful life (unless the expected useful life after renovation is at least another 25 years).*

Measures

The certification system currently in place is in the process of being revised in order to ensure more accurate building energy calculations.

The development objectives and principles related to Decree No 7/2006 (V.24.) of the TNM on the definition of the energy characteristics of buildings and Government Decree 176/2008 (VI.30.) on the certification of the energy characteristics of buildings can be summarised as follows:

- Establishing a more flexible set of requirements encouraging solutions to reduce the use of non-renewable energy. This should be done by phasing out the mandatory share of renewable energy, which would be replaced by a requirement for carbon dioxide emissions.
- Determine the $CO2_{emission}$ factors required for the calculation and review primary energy factors.
- Comprehensive review of regulations to correct technical and formal errors in practical applications.
- Extend the calculation procedure to ensure that the commonly used technical solutions that have been used in practice in recent years can be calculated using a simplified method (e.g. calculation of solar panels, collectors). In justified cases, more precise calculation methods and basic data shall be developed.

- Transform the energy performance certificate database so that a significant part of the technical data contained in the certificate and its mandatory annex is available in a searchable, filterable way for statistical evaluations.
- Develop a more effective set of conditions for carrying out the verification of certificates required for reasons of quality assurance, including both substantive and formal checks (including the registration of the current owner of the certified building and the necessary increase of the powers of the inspectors).
- Improving the interpretation and understanding of the certification methodology.
- Review of the contents of the certificate: The aim is to better inform the consumer, to increase the range of data required for statistics to be included in the certificate, to increase the usefulness of renovation proposals, and to promote incentives for deep renovations.
- Take into account the relevant points of the 2018 SBD amendment for these provisions.

II.3. Definition of intervention points adapted to the life-cycle of a building

Intervention points within the life-cycle of the building may result from technical reasons, from transactions involving use or ownership, or from potential opportunities. According to the latter, a distinction should be made between the category of residential and public buildings due to the different financing possibilities.

The intervention points shall take into account that renovation, in particular deep renovation, creates organisational difficulties when the building is used continuously. Furthermore, the expected length of time should also be taken into account.

The following intervention points for technical reasons:

Planned maintenance

Maintenance carried out as part of the intended use may also provide for the possibility of performing refurbishment elements, but the process of deep refurbishment may be less attached to these events.

Obsolescence of systems and structures

Within the life-cycle of the building, there are points where renovation becomes absolutely necessary for the usability of the building (e.g. heating and cooling system refurbishment or replacement, electrical grid upgrade, façade insulation). As these typically result in major renovations, they can be a good starting point for incentivising deep renovation, but since the way in which the building is used often remains unchanged, the cascading refurbishment approach is a realistic option.

Damage to systems and structures

During external exposure, a system or structure suffers mild or severe damage (e.g. storm damage on the roof, fracture of pipes). It is typical that the damage does not affect only a system or structure, so

that it can be the starting point for deep renovation and, as in the previous point, the cascading approach is a realistic option.

Enlargement and rebuild

Building extensions and rebuilds are typically large-scale interventions, so that they can easily be connected to the goal of deep renovation. As use is often suspended, it is more likely to achieve full renovation at a single stage.

Residential buildings

Transactions involving use or ownership

- Change of ownership (sale, inheritance): Both the period before and immediately after the change of ownership is suitable for carrying out or starting deep renovation (in the event of cascading implementation), since the building is vacated, its use is suspended for at least a short period, so that the organisational barriers to the renovation are reduced.
- Change in building user (e.g. rental): In the same way as the change of ownership, the suspension of use in this case creates a suitable possibility of intervention.
- In the case of residential buildings, at the time of sale or lease in accordance with the provisions laid down in Decree No 176/2008 of April on residential buildings. (VI. Pursuant to Government Decree No. 30.)18 an energy certificate shall be issued for the building. If the system of refurbishment passports is introduced, this may be accompanied by a draft proposal for deep renovation, which means a clear plan to be known to the buyer/tenant.

Potential opportunities

If a new financial incentive that is favourable to the owner is available, it may facilitate the start of the previously planned renovations or a deeper, broader renovation than originally planned. It is therefore important to increase the awareness of owners about the possibilities available.

Public buildings

Since owners and users of public buildings have fewer resources allocated for renovation, the renovation of public buildings can take place almost without exception in cases where grants, other public incentives or financial products for public buildings are available, making them much more important in this sector.

In the case of public buildings, the most likely intervention point is the change of user, the change of function of the building or, in rare cases, the change of ownership (change of ownership in this sector is less frequent).

At the same time, a large share of the sector can be mobilised through newly emerging targeted programmes.

[18]DOC. 176/2008. (VI. 30.) Government Decree on the certification of the energy characteristics of buildings

II.4. Monitoring system and indicators

Indicators related to building renovation shall be recorded in the building renovation monitoring system. The data can be consulted in a structured way, on the basis of which a report on the effectiveness of the measures is produced every two years. The following indicators shall be recorded in relation to renovation approaches:

- total energy saving potential (by type of building) – TJ,
- Renovated area (by type of building, regional breakdown) – $m^{2,}$
- cost-effectiveness of renovations (by type of building, regional breakdown) – payback time – (year),
- energy savings due to renovations (by type of building, regional breakdown) – TJ,
- Reduction of $CO2_{equivalent}$emissions from renovations (by type of building, regional breakdown) – kt.

II.5. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

A large majority of those present saw the achievement of the deep renovation level as the most suitable energy saving option for Hungary to reach its 2030 and 2050 energy targets.

A number of contributions were received highlighting the importance of cascading renovations in several stages and of providing technical and professional support for their effective implementation

The above is also supported by the vote that took place during the consultation, with the active participation of professional organisations:

Which renovation concept do you consider to be optimal and cost-effective within the residential building segment?

1. **Implementation of simultaneous deep renovation – 45 %**
2. Implementation of cascading renovation, with the obligation to achieve a deep renovation level – 39 %
3. Cascading renovation, without the obligation to achieve a deep renovation level – 10 %
4. Cascading renovation with time limit – 3 %

Demolition of old buildings and construction of new buildings as opposed to renovations – 3 %

III. Policies and measures to stimulate cost-effective deep renovations, including staged deep renovations, and to support targeted, cost-effective measures and renovations

Content of the Chapter: Policies and incentive measures to stimulate cost-effective deep renovations of buildings, including staged deep renovations, and to support targeted, cost-effective interventions and renovations. Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings pursuant to Article 2a(1)(c).

The objective of achieving the highest possible share of the building stock is to reach or approach the level of nearly zero-energy buildings (BB). This can be achieved by deep renovation of the existing building stock. However, account should be taken of the fact that the one-off investment costs of deep renovations are significant (may exceed the market value of the real estate in residential buildings) and have a long payback period. To address this, various measures have been developed to encourage and support in-depth renovations that can be implemented in several stages.

III.1. Development of incentive measures to encourage cost-effective deep renovations of buildings, including staged deep renovations:

In the following, incentives are presented that do not encourage smaller part-investments that increase energy efficiency, but specifically encourage the achievement of deep renovation levels.

Measures

3) **Home Renovation Programme**

Scope of the measure: Families with at least one child
Duration**of the measure: Continuous from**2021
Brief description of the measure: Home Renovation Assistance is a support to extend their existing homes and modernises those who already have at least one child. The aid may be granted for both materials and labour costs, as well as for outdoor and indoor works. The maximum amount of aid shall be HUF 3 million in total. Half or half of the cost of materials and labour may be claimed. Each family shall only be entitled to the support once. The implementation of the renovations will be monitored by the capital and county government offices and their district (capital district) offices.
Expected impact of the measure: The number of value-adding renovations is increasing significantly.
Person responsible for action: Minister responsible for families without portfolio

4) **Examination of the possibility of extending the scope of eligible activities**

Scope of the measure: Financial incentives and subsidies to improve the energy efficiency of buildings

Duration**of the measure: Continuous from**2023

Brief description of the measure: The scope of activities eligible for financial incentives shall be reviewed in order to promote the highest possible proportion of renovations reaching deep renovation levels. Deep renovations may result in more additional costs that do not result in energy savings per se, but at the same time the refurbishment process attracts these needs (e.g. refurbishment of the electrical grid, replacement of internal enclosures, accessibility). Not all financial engineering instruments allow them to be accounted for and, in the absence of own resources, this may hinder the implementation of renovation in both the residential and public buildings sectors.

The possibility of including these activities, at least in part, as eligible elements in financial incentive schemes, whether as a combined package combining several financial products, will be examined.

Expected impact of the measure: A higher proportion of renovations reach the deep renovation target (based on II.2Chapter).

Person responsible for action: Minister for Energy Policy

III.2. Development of incentive measures to support targeted, cost-effective measures and renovations

Measures to improve information have been developed to support renovations. On the one hand, awareness-raising programmes improve the understanding of businesses and the general public of the benefits of deep renovation. (XIII.1chapter 33) point)

Operation of the National Energy Network (XIII.1chapter) supporting the acquisition of information on the technical aspects of the implementation.

The search for a Green Financial Product facilitates the discovery of financial opportunities (XIII.1 chapter,34) point).

III.3. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- Use of public incentives for deep renovation, broken down by incentive and regional breakdown – HUF,
- Total and annual share of buildings undergoing deep renovation and conversion into NZEBs, by type of building, regional breakdown – %

III.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

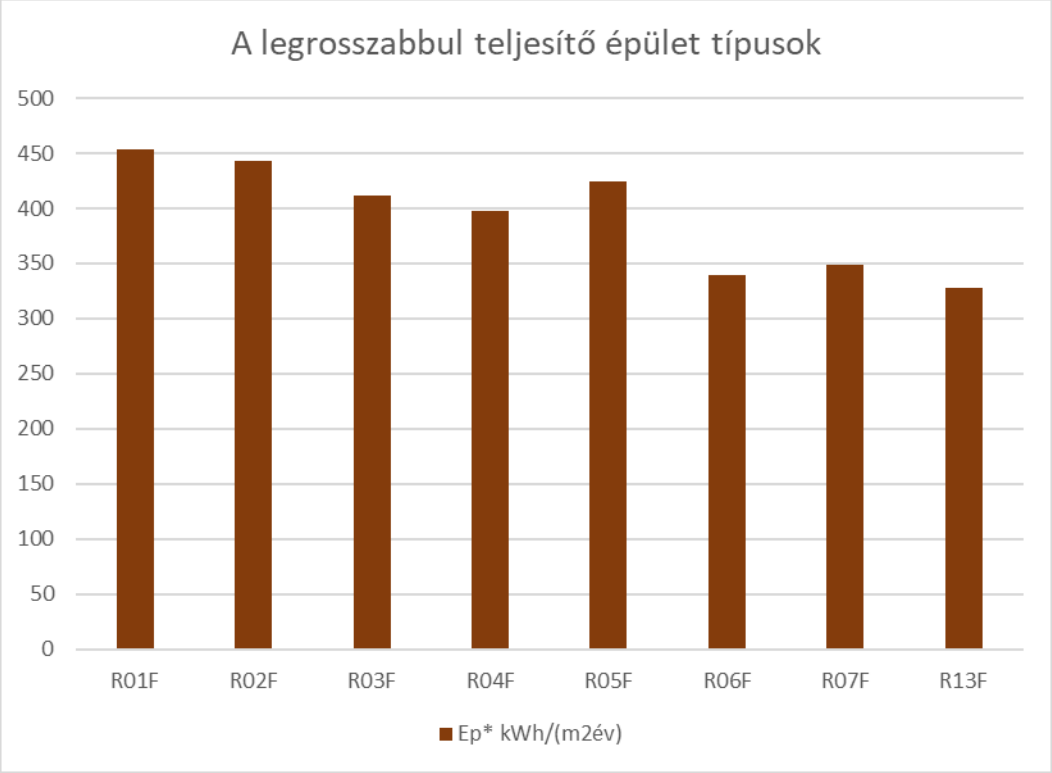
It has been confirmed by those present that, among the measures encouraging and supporting the achievement of deep renovation levels, not only financial incentives, but also more information opportunities, as well as technical professional support (predictable renovation plan through renovation passports) can contribute effectively to achieving the objectives of the HTFS.

IV. Policies and measures targeting the worst performing segments of the building stock, conflicts of interest between owner and tenant, market failure and households to be supported

IV.1. Definition of the worst performing segments of the building stock from the technical point of view

Content of the Chapter: Pursuant to Article 2a(1)(d) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

The types of buildings with the worst performance in terms of energy efficiency are defined on the basis of the typology of Chapter I, as shown in the table below. The boundary of buildings with worst performing energy consumption, based on the overall primary energy indicator, is the types of buildings with an average value greater than 300 kWh/m^{2}^{years}.



4Figure: Average values for total energy characteristics determined from the survey of 2000 buildings based on NÉeR2 expert documentation on residential buildings (Source: Own editing based on NéeR 2 data)

The combined energy characteristics of R01F (1-3 apartments, unrealised loam houses with unknown construction time, annual energy consumption 453 kWh/m²/year in original condition)are highest in^{buildings}of the type R02F(1 to 3 apartments, loam houses with unknown construction time, annualenergy consumption 443 kWh/m²/year in their original condition). Their number is significant, but it is presumably since the inspection of NÉeR2 that many of them have been abandoned and are not resident. This is due to poor living conditions or an ageing population. The buildings in these two

segments were not recommended to be renovated because their value (often due to their location) is so low that the refurbishment is not remunerated at market value. The examples often found in the building renovation literature, according to which these houses should not be renovated in a normal way because the renovation technologies common to other buildings cause damage to structures, also contribute to this. There are efforts to buy these buildings for weekends or leisure houses. They shall be refurbished with special technology, but this shall not be taken into account in this chapter.

In the case of buildings in this segment, high energy use is often accompanied by structural problems and lower residential comfort, so energy renovation may not be recouped. In this case, their dismantling could be a solution. Therefore, it is not appropriate to launch a targeted support programme for their renewal. However, buildings are not only a technological but also a social issue due to the livelihood of the people and families living in it.

The Government of Hungary shall maintain the following measures for the benefit of households to be supported:

- keeping energy prices under public regulation (reduction of bills),
- a social fuel scheme,
- schoolchildren development of household-scale electricity,
- Development of housing conditions in “countries of catching up”.

These are further explained in ChapterIV.4.

The combination of social-focused programmes and interventions by owners (renovation or demolition) contributes to the progressive disappearance of buildings with an overall energy feature above 300 kWh/(m² year)from the national building stock, whether through renovation or demolition. This is part of the achievement of the decarbonised building stock set in the Strategy.

Less performing building segments:

These are buildings that should not be demolished but refurbished due to the large number of inhabitants. Furthermore, these types of buildings are characterised by the fact that they are still in a state that is technically suitable for refurbishment.

The number of buildings of the types R03F and R04F (1-3 dwellings, family houses or cartridges built between 1945 and 1960 (dimensions^{below} or above 80 m²), their annual energy consumption in their original condition being 412 kWh/m²/year,^{and}398 kWh/m²/year)^{is}significant. Some of these have started to be partially renovated in recent years, depending on the financial background of their inhabitants. In this segment, special emphasis will be placed on the assistance and educational work of local energy professionals.

The number of R05F and R06F buildings (1-3 dwellings, family homes or cartridges built between 1961 and 1979) is the largest in the family home segment (annual energy consumption of 424 kWh/m²/year in its original condition^{and}340 kWh/m²/year). These buildings give Hungarian cities and villages a distinctive appearance. Their energy renovation is relatively simple due to their external simple shape and the smaller size of windows. A small part of these buildings is likely to have been renovated at some level by the owners of their own resources.

The number of R07F buildings (1-3 dwellings, family homes or household houses built between 1980 and 1989) is not negligible (annual energy consumption of 349 kWh/m²/year in its original state). Their energy renovation is relatively simple due to their external simple shape and the smaller size of windows. A small part of these buildings is likely to have been renovated at some level by the owners of their own resources.

The type of R13F building generally performs better in terms of energy than the previous eight. This type is characterised either by closed-line urban installation or by individual installation. In a number of cases, there are also problems with the construction of buildings. Another problem is the fact that most of its inhabitants do not have the financial resources they need to renovate. This is due to partly known problems in co-ownership.

In general terms, for the types of buildings described above, the so-called cascading renovation is the most optimal solution to achieve a complex level of renovation, as well as to encourage the launch of smaller energy investments. At the same time, this will ensure that a large number of small renovation interventions can be taken by building owners, which also means energy savings and a higher comfort for the achievement of the domestic$_{CO2\ savings}$ targets.

IV.2. Development of incentive measures for the worst performing segments of the national building stock: Concern conflicts of interest between the owner and the lessee

IV.2.1. Overview of rented dwellings in Hungary

The 2018 statistics on the rental of private dwellings developed by the HCSO show the proportion of private rentals and residential dwellings distributed by type of building in Hungary. On the basis of this statistical statement, the level of the building stock in need of renovation in which there is a conflict of interests between the tenant and the owner can be identified.[19]

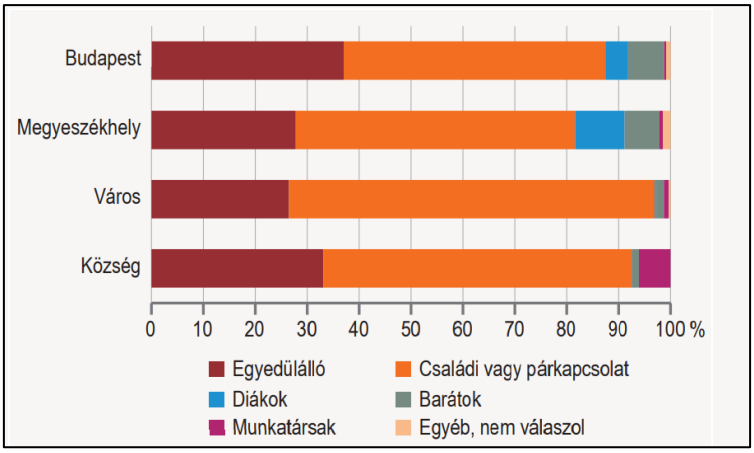
39 % of all rented dwellings are located in Budapest, a further 30 % in county headquarters and less than one third in other towns or villages in the country. In Budapest, 41 % of rental homes are located in urban rental houses, 20 % in residential estates and 35 % in other, mainly non-green, multi-dwelling buildings. In county headquarters, most rental homes are available in residential estate buildings (59 %).

In particular, the rental of smaller dwellings is observed, the average size of which is 56 m². This size is two thirds of the national average size of residential dwellings. Only the size of rented dwellings in villages, usually in family homes, varies significantly, reaching 70 m²; the quality of the rental dwellings is generally lower than that prevailing in the category of settlements. In Budapest, only two thirds of rented dwellings are comfortable, compared with the share of total comfort homes in the capital, amounting to an average of three-quarters. Very low-comfort rental homes only occur in smaller settlements in large numbers: In villages, one in five rental dwellings is semi-comfort or

[19] Central Statistical Office (KSH): Private rentals, rents – main results of the 2018 rent survey, Statistics Vegetables, 25 June 2019 https://www.ksh.hu/docs/hun/xftp/stattukor/lakber18.pdf

uncomfortable. At the same time, 12 % of rental homes do not have bathrooms, but this proportion is twice as high as for residential residential dwellings.

Most tenants (57 %) live in the dwelling with their family or partner, while the share of other related cohabitants, such as friends, students and staff, together accounts for 11 %. In 32 % of rented dwellings, the tenant lives alone, and in Budapest this share is higher (37 %) and lower in smaller settlements. In the capital and county seats, the sharing of housing by students and friends is more common, while in smaller settlements, co-ownership is more common (5Figure).



5Figure: Distribution of people living in private rentals by tenant's relationship, by category of settlement (Source: KSH)

Current measures to resolve the tenant-owner's conflicts

The current policy measures aim to ensure that, if the intention to renovate is expressed, the status of tenant should not be an obstacle to benefiting from the benefits provided by the policy. In particular, in the case of grants provided through operational programmes, tenants had the possibility to join the applicants in the call for proposals for energy.

Measures

5) **Verification of the existence of an energy performance certificate**

Scope of the measure: Pursuant to Decree No 176/2008 of April (VI. 30.) Leasers of real estate falling within the scope of government decrees
Duration**of the measure: Continuous from**2023
Brief description of the measure: PURSUANT TO DECREE NO 176/2008 OF APRIL (VI. 30.) The energy characteristics of real estate falling under the scope of government decree shall be certified in accordance with the same Government Decree, but the absence of such certification has not been sanctioned at present. A system of penalties for the absence of certificates and the necessary legal environment will be developed. Undertakings engaged in letting advertising of real estate are required to advertise only rental items for which the energy performance certificate or its main energy elements are also included in the advertisement.
Expected impact of the measure: The tenant's higher level of awareness of the energy state of the rental. Supporting the tenant's decision support.

Person responsible for action: Minister for Energy Policy

IV.3. Development of incentive measures for the worst performing segments of the national building stock: Address market failures

Legislation promoting domestic highly efficient building transformations has been almost fully harmonised, in line with the regulatory frameworks of the EU.

The simplification of the authorisation of energy-efficient renovation investments has significantly reduced the administrative burden of investments, while placing greater emphasis on facilitating controls and making the relevant information available in electronic form.

As construction activities require considerable financial and human resources, further simplification would probably not be effective, as the possibility and effectiveness of controls can only be reduced if subsequent administrative obligations are removed. In this case, the possibility of subsequent checks that are sufficiently detailed and effective shall be lost.

The following measures shall address market failures:

Measures

6) **Introduction of EPC contracts for renovations and involvement of ESCO companies in projects**

Scope of the measure: Owners of buildings and ESCO service providers
Duration**of the measure: Continuous from**2023
Brief description of the measure: It is important to develop contractual elements related to financial and technical risk sharing and compensation. It is necessary to develop a regulation specific to ESCO services in order to enable the development of the regulated market, including one or more contract templates, which may also simplify such negotiations. More detailed information on ESCO solutions can be found in Chapters V.1 and XII.1.
Task: Prepare and upload EPC and ESCO model contracts to a dedicated website and change the legal framework enabling such contracts to be concluded.
Expected impact of the measure: The legal possibility of concluding EPC contracts, as well as the involvement of ESCO service providers, increases market mobility and allows energy savings to finance renovation.
Person responsible for action: Minister for Justice, Minister for Energy Policy

IV.4. Outline national measures that contribute to improving the situation of households to be supported

Three main factors have been identified that can be traced back to the situation of households in need: 1. income problems, (2) high energy prices, (3) low energy efficiency.

Two types of households are particularly concerned: Large families living together in a family home in a small settlement and pensioners remaining alone in a condominium or in a family home. In regional terms, the regions of Northern Hungary and South Transdanubia. On the basis of technological differentiation, the focus is placed on solid fuel users with individual space heating.

The policy measures currently in place to address the difficulties faced by households in need will continue to work.
In order to address difficulties arising from high energy prices, the so-called "zust reduction" programme, which reduces regulated household energy costs from 2013 onwards, ensures affordable energy supply and financial predictability. The programme has significantly reduced the utility burden of households, making district heating, natural gas and electricity significantly cheaper than in 2013. The effectiveness of the policy aimed at further reducing heating difficulties is measured, among other things, by monitoring the development of households spending at least 25 % of their income on their energy costs, with a share of 9.8 % in 2016.
Solid fuel types, which are used in a higher proportion than the average by those belonging to the lower income deciles, shall not be covered by the vibration reduction. Hungary can thus reach the households most in need of support through the social fuel scheme launched in 2011, under which the firewood is often distributed free of charge. The co-benefit of this is a reduction in the level of pollution caused by emissions from the use of polluting heating fuels that are harmful to health.
In addition to the above, Hungary shall maintain or implement the following measures aimed at reducing the number of households to be supported in connection with the renovation of buildings.

Measures

7) **Education, consumer awareness**

Scope of the measure: Retail sector

Duration**of the measure: Continuous from**2023

Brief description of the measure: Hungary will put more emphasis on programmes targeted at households to be supported in the course of awareness-raising, information and advisory campaigns aimed at increasing the willingness to invest in energy efficiency by increasing the awareness and influencing the behaviour of the population.
Expected impact of the measure: Awareness-raising campaigns contribute to an increase in energy efficiency investments, as a significant proportion of households, although strongly motivated to invest in energy efficiency, did not happen in the past in the past, and there are, in addition to financial reasons, information barriers that could increase investor activity.
Person responsible for action: Minister for Energy Policy

Further measures are still ongoing. These include the development of household-scale electricity for schoolchildren, starting in 2017.

The purpose of a call financed from domestic sources is to improve the infrastructural supply of farms, and to support the construction of a combined electricity system for which the electricity system is outdated or has not been built. The maximum amount of the grant that may be claimed is HUF 6.2 million and its intensity is 95 %.

Another ongoing measure is the development of housing conditions in the 'Closing settlements'[20], which has been in progress since 2019. The aim of the measure is to support the 300 most disadvantaged municipalities in the country through a targeted programme. A complex housing programme may be developed. This is the basis for housing interventions. In complex housing interventions, the programme places particular emphasis on both infrastructure and human development. First, the conditions of trust and cooperation are established, as well as the settlement of ownership relationships, followed by the application of renovation, comfort repair or new construction procedures with the involvement of local capacities. In the course of interventions, the development of the urban landscape and the settlement of unused or rocky real estates shall be a priority. Thus, housing investments – new construction, renovation, utilities and energy developments – will be carried out along strategic urban landscape development.

In order to ensure the effective implementation of the measure, the Ministry of the Interior, together with the Lechner Knowledge Centre, developed a web-based geospatial system, which is easy to manage and displays real estate registration data.

In order to provide adequate housing conditions, safe and healthy energy use should also be established, as these settlements are characterised by unsafe and/or legal electricity and heating practices that are outdated and harmful to health. To this end, the real estates shall be prepared for the establishment of a secure connection point within the building.

IV.5. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- public investments in policies addressing these issues (conflicts of interest, households to be supported, etc.) – HUF,
- Number of buildings in the worst performing segment from a technical point of view, share per subtype of the total building stock – bb,$^{m^2,}$ %,
- public investment in policies addressing households to be supported – HUF,
- share of rented houses in the worst technically performing segment with an energy performance certificate per total rented dwelling – %,
- percentage of vulnerable users in terms of energy costs, with a regional breakdown – %,
- late settlement of utility bills (number of consumers, extent of delay, amount) – main, day, HUF
- population living in inadequate housing conditions or with inadequate heating and cooling, with regional breakdown – persons,
- share of household disposable income spent on energy – %,
- share of households using solid fuels to a large extent, by regional breakdown – household,
- rate of change of average ressiteher – HUF.

[20]Government Decree 1404/2019. (VII. 5.) Government Decision on the basis of the long-term programme of "Counting localities"

IV.6. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

The participants commented that since the users of the technically worst performing buildings often belong to the category of households to be supported on the basis of their income situation, the two areas could be treated as one.

V. Policies, measures, financial mechanisms and incentives for all public buildings

Content of the Chapter: Measures to support energy efficiency investments in public buildings. Pursuant to Article 2a(1)(e) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

V.1. Financial mechanisms for all public buildings

ESCO[21] constructions

In the case of energy efficiency investments by the central budget and local governments, ESCO-based services minimise, or even render redundant, the use of budgetary resources and EU grants. As a result, Hungary intends to rely heavily on this scheme in the future, thus contributing to a more rational use of the shrinking funds in the 2021-2027 programming period.

The combined service that can be used by ESCO companies makes it possible to increase the sources of financing available for energy efficiency modernisation and to make higher-risk investments. ESCOs have a strong multiplier effect and are able to multiply the scarce resources available through their re-use.

As the expertise and resources required in the state and local government sectors for the implementation of complex energy efficiency improvement projects are often lacking, and there is no company capable of providing complex services on the market, which does not focus solely on one technology or sector, the Hungarian State established in 2017 the National Energy Management Zártkörűen Működő Részvénytársaság (NEG Zrt.), which is 100 per cent owned by the Hungarian State. NEG Zrt. provides complex deficit-replacing services that together ensure the successful implementation of energy efficiency investments, their long-term operation and the realisation of planned savings, as well as the refurbishment and reduction of energy use of budgetary institutions with a lack of resources. Its primary activity is the full implementation of energy efficiency investments in the ESCO investment scheme, where the investment is financed from the realised savings.

The aim of the planned ESCO investments is to implement projects leading to large primary energy and operational cost savings. NEG Zrt. intends to implement the energy modernisation of the institutions with the most innovative technical solutions based on the use of renewable energy, paying particular attention to minimising pollution and reducing$_{CO2\ emissions}$. Depending on the technique used and the size of the investment, the duration of the works may range from 6 months to one and a half years.

The establishment of NEG Zrt. is also intended to support the implementation of the “National Building Energy Strategy” and its related objectives at EU level, as well as to strengthen the

[21] Energy Service Company

exemplary role of the state in the ESCO market through its mission and complex services, thus helping ESCO companies to thrive in our country.

ESCO programmes and projects

LED street lighting project

Currently NEG Zrt. It has 41 signed contracts. In 2018, it delivered state-of-the-art LED street lighting in 19 settlements under Phase I. In stages II and III, public lighting was delivered in a further 6 settlements, and 16 settlements are under preparation for construction in stage IV.
The investment managed by NEG Zrt. with a value of at least HUF 40 billion shall be implemented by 2025, in particular in the following segments: Modernisation of health care, penitentiary enforcement, public lighting and interior lighting.

Bright Okos Schools Programme and Shining Okos Institutions Programme

The 'Small Okos School Programme', launched in 2019, will modernise the lighting system for the buildings of the member institutions of the vocational training centres. The programme is financed by ESCO, the implementation of which is carried out by NEG Zrt. with the assistance of ÉMI Nonprofit Kft. The programme is expected to modernise the lighting systems of 300 institutions.
As a follow-up to the project, the programme will be extended to several types of public buildings called "Small Okos Institutions". NEG Zrt. plans to generate energy efficiency projects in 2500 public institutions by 2022.

The following projects are currently under preparation:

- NEG Zrt. In 2017-2018 with the National Health Care Centre (10 health institutions produced expert documentation on energy modernisation – "Energy loss assessment study"),
- and a cooperation agreement with the National Command of the Penalty Implementation (5 institutions' heating systems were screened, loss detection and feasibility documentation prepared).
- The contract concluded with BKV Railway Járműtő Kft. for the heat supply of NEG Zrt. for the heating modernisation work of its Budapest plant has already been carried out.

Future focus for action

- Looking at the market from the technological side, the most popular and fastest profitable investments (5-12 years) include lighting, heating and cooling modernisation, and solar electricity production. Taking this into account, NEG Zrt. places special emphasis on these investments in the development of energy efficiency.
- In order to develop the ESCO market:
    - the application of strict professional qualification criteria towards subcontractors;
    - implementing at least one communication campaign per year to disseminate successful projects and results.

Technical requirements of projects

- The objective of the ESCO project is to achieve energy cost savings of at least 5 % to 10 % over the lifetime of the ESCO project for the user of the service, through the implementation of energy production systems based primarily on the use of renewable energy. It is expected that significantly higher energy cost savings can be realised after the expiry of the term.
- Achieving an internal rate of return of at least 5 % on the own resources spent.

Grants

While the planning processes for the 2021-2027 planning cycle are ongoing, non-reimbursable funds for the energy development of public institutions will continue to be available on the basis of the plans.

EU direct grants

After 2020, particular emphasis should be placed on attracting funding opportunities directly available to EU financial and project support institutes.

EEEF: European Energy Efficiency Fund[22]

As the fund is intended to support, directly or indirectly (through a financial intermediary), local government energy efficiency and renewable energy projects on a smaller scale, Hungary intends to make use of the financial possibility provided by the EEEF for the continuation of municipal public lighting programmes. This is confirmed by the successful use of EEEF funds for this purpose in a number of EU countries (e.g. Spain, the Netherlands).

Hungary also favours the Fund because it is relatively simple to apply for funding: I.e., there is no application form, the eligibility criteria have to be met, which can be checked on the Fund's website for each project plan. There is no time limit for submission, applications are evaluated on a first-come, first-served basis, with a period of approximately 6 months from submission to payment. This simple business is particularly important, as municipalities often suffer from a lack of human resources, especially in the field of energy expertise.

ELENA: **European Local Energy Assistance** [23]

Any Hungarian government that has a Sustainable Energy Action Plan (SEAP) or a Sustainable Energy and Climate Action Plan (SECAP) as an operational tool of the long-term building renovation strategy and that commits to a CO2 emission of at least 20 % of $CO2_{emissions}$ may apply for the European Commission Support Facility.
As one of the main objectives of the ELENA programme is to support the preparation of planned renewable energy and energy efficiency investments, this will provide local and county authorities and public authorities with coverage for the preparation of non-refundable EU funds feasibility

[22]https://www.eeef.eu/home.html
[23] ELENA is a joint initiative of the EIB (European Investment Bank) and the European Commission under the Horizon 2020 programme

documentation, business plans, energy audits, technical design documentation and public procurement procedures. The grant shall cover 90 % of the technical preparatory costs. Implementation costs may be covered by ESCO-type financing,[24] by the European Investment Bank or by domestic preferential bank financing.
Hungary has set up an institutional system in order to help local governments to make more extensive use of the support. The Hungarian Development Centre has operated the ELENA Pont division as of 1[25] May 2019. The aim of the division is to carry out, in the coming years, the identification of projects complying with the ELENA requirements, toconsult those wishing to apply already during the preparatory phase, to coordinate and supervise the processes and to provide technical assistance toHungarian applicants**,** thereby facilitating the implementation of ELENA projects in Hungary on behalf of the Hungarian State.

VAT refund

The preparation of the extension of the VATrefund to public buildings is under preparation. Maintenances and owners may be entitled to do so if they finance energy-efficient building conversions and improvements from their own resources.

Support for market-based fundraising in public buildings

Green bond issuances can be an efficient market-based source of finance for building modernisation investments (see section IX for details), complementing bank lending. The advantage of green bonds over bank financing is that, due to their tradability, they can be reached by a wide range of investors (whether international) potentially or at lower yields, although the lower cost of funding compared to ordinary bonds only occurs in some cases. The issuer may be the state or even the municipalities themselves. The Hungarian financial system also had significant past experience with the form of municipal bond-type financing, prior to the municipal debt consolidation between 2011 and 2014, the stock of (non-green) bonds issued by municipalities exceeded HUF 600 billion.
The Hungarian legislation should be reviewed in order to explore the way in which a dedicated “window” could be opened to support municipalities financing green investments and to issue bonds, in which the refurbishment of municipal-owned buildings may also play a prominent role.

Measures

8) **Energy modernisation of health institutions under ESCO-type energy service contracts**

Scope of the measure: Healthcare providers
Duration of the measure: 2020-2022 (first two sample projects)

[24]European Investment Bank (EIB): Https://www.eib.org/en/index.htm
[25]The Hungarian Development Centre (abbreviation: MFK) by a decision of the Hungarian Government of 2014 (1856/2014. (XII. 30.) Government Decision on the coordination of the efficient use of funds paid in Brussels at the Carpathian Basin level, the establishment of the Hungarian Development Centre and the performance of tasks related to the sub-programme for Climate Action and Environment (LIFE) was established with the aim of helping to secure direct EU funds, i.e. available outside the indirect resources that can be drawn from the European Structural and Investment Funds. To this end, the Hungarian Development Centre shall perform information, coordination and for profit operational tasks. https://mfk.gov.hu/

Brief description of the measure: Continuous improvement of the healthcare system is essential to increase patient safety. On the basis of the technical expert documentation on energy upgrades prepared for the 10 health institutions, NEG Zrt. plans to carry out renewable energy upgrades that, with the same technical content as at present, result in large-scale primary energy savings and cost savings supported by its long-term operation under ESCO-type energy service contracts. The cost savings shall be borne partly by the energy service provider and partly by the customer.

The first two sample projects are: Borsod-Abaúj-Zemplén County Central Hospital and University Training Hospital, Borsod-Abaúj-Zemplén County Central Hospital and University Training Hospital, field stones rehabilitation hospital.

Planned cost of the measure: The source of energy modernisation, partly NEG Zrt.'s equity capital: HUF 1 518 150 000, partly investment loan: HUF 3 542 350 000.

Total: HUF 5 060 500 000 (two sample projects).

Planned source of action: NEG Zrt's equity, investment loan and Annual Development Framework.

Expected impact of the measure: The energy use of the public bodies concerned is decreasing. As modern, renewable-based energy supply systems are implemented, they result in maximum primary energy savings, thus ensuring that the functioning of institutions is less vulnerable to the volatility of primary energy prices after modernisation.

Person responsible for action: Minister for Human Resources, State Health Care Centre

V.2. Incentive measures for all public buildings

It is of utmost importance that public institutions play an exemplary role in terms of energy efficiency, in line[26] with Article 5 of the EU Energy Efficiency Directive. In order to achieve this, it is necessary to lay down more stringent legal obligations for the operators and owners of public buildings and to make them interested in both energy efficiency renovations and energy efficient building management.

In order to achieve the above objective, Hungary shall take the following measures:

Measures

9) **Introduction of mandatory energy efficiency audits in public institutions**

Scope of the measure: Operators of public buildings (for all categories of public buildings)

Duration**of the measure: Continuous from**2023

Brief description of the measure: An energy audit obligation shall be introduced for operators of buildings larger than 250 m² that[are]heated or cooled in public institutional ownership or use.

[26] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

The purpose of the audit is to know the energy characteristics associated with the use of the building and to provide advice on energy efficiency. The audit shall be repeated every four years. The details of the regulation shall be drawn up by the Ministry of Innovation and Technology.

Expected impact of the measure: Public sector operators shall receive guidance on cost-effective renovation orientations and partly on energy-efficient building management methods. This is expected to improve the energy efficiency of public institutions.

Person responsible for action: Minister for Energy Policy

V.3. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- Size of renovated public buildings (by type of building: Central government, local government and other public buildings) – m²,
- Number of municipalities benefiting from ELENA aid, with a regional breakdown —
- Number of municipalities using the EEEF financial facility, broken down by regional level —
- Non-refundable aid for energy renovation of public buildings – HUF/year,
- Repayable aid for energy renovation of public buildings – HUF/year,
- Investment costs of public buildings renovated with ESCO-type financing – HUF/year,
- Number of ESCO contracts – number,
- Generated ESCO companies – db,
- Investment costs of public buildings renovated with supranational institutional (e.g. EIB) financing – HUF/year,
- Investment costs of public buildings renovated with green bond type financing – HUF/year,
- Share of non-budget resources in financing the renovation of public buildings – %.

The Nbtv. Section 51 (1) a), with *the consent* **of the minister or the Directors-General, may disclose**, in addition to classified data, data relating to the **objects** and staff of national security services. In view **of this, data on the building stock of national security services in the registers are set out in the Nbtv. They may be included with the consent specified in section 51 (1).**

V.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

On the basis of the feedback received, both the prominent role of the ESCO scheme in implementing energy efficiency investments in public buildings and the need to develop the ESCO market have been confirmed by professional organisations.

VI. Comprehensive national initiatives and measures to promote smart technologies and well-connected buildings and communities, as well as an overview of skills and education available in the construction and energy efficiency sectors

Content of the Chapter: Pursuant to Article 2a(1)(f) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

VI.1. National initiatives and measures aimed at smart technologies and the promotion of well-connected buildings and communities.

Digitalisation is one of the elements of economic growth that affects all sectors. Preparing for digital transformation in the economy is one of the keys to competitiveness. However, new technological tools and data available in increasing quantities do not in themselves address the development and maintenance issues of the built environment. The economic and ecological balance, the attractive living environment offering a high quality of life and the active participation of the inhabitants in the life of their settlements are tasks that require a strategic approach and a lasting partnership between a wide range of actors. Hungary aims to support the process of digitalisation also in the construction sector through appropriate measures.

In terms of energy savings, the uptake of building automation systems is an important step in the digitalisation process. “Smart metering” is a technologically mature solution to implement remotely read settlement measurement for low-power users. In addition to applying flexible, multi-zonal tariffs, smart metering can technically provide the possibility to collect time series metering data and remotely implement end-month and annual readings, thereby encouraging changes in consumer habits leading to energy savings.

Measures

10) **Preparing for the integration of standards related to smart technology**

Scope of the measure: Actors in the construction sector
Duration**of the measure: Continuous from**2023
Brief description of the measure: Hungary shall launch the development of a standard environment related to smart technologies and its integration into the domestic legal order. As a first step, the relevant international standards will be mapped, a situation analysis will be carried out, resulting in a list of standards proposed for implementation in the domestic legal order and, if necessary, a proposal for the development of new standards.
Expected impact of the measure: Facilitating digitalisation in construction processes.
Person responsible for action: Minister for Energy Policy

11) **Increase policy coherence on the development of district heating services**

Scope of the measure: District heating suppliers, parties involved in the operation of buildings
Duration**of the measure: Continuous from**2023
Brief description of the measure: Policy systems, decision-making mechanisms and responsibilities for the development of systems on the primary side of district heating and those related to secondary building modernisation shall be examined in order to ensure the coordination of the two sides of the decision. Following thereview, Hungary shall make the necessary modifications to the processes put in place so far in order to ensure that building modernisation investments (secondary side) and district heating (primary) developments are carried out in a coordinated manner. In the review of the system, particular attention shall be paid to the alignment of primary and secondary technical needs related to the applicability of smart technologies. A system shall be established where, during the preparation of developments, the effects on the other side (primary/secondary) will be assessed and analysed.
Expected impact of the measure: Making more effective development orientations and policy decisions. Support the rational, prudent introduction of technical implementations related to smart technologies. Avoidance of counter-productive solutions.
Person responsible for action: Minister for Energy Policy

12) **Policy support for the development of demand-side regulation for utilities using smart meters**

Scope of the measure: Universal service providers, commercial and distribution licensees
Duration**of the measure:** 2022-2023
Brief description of the measure: Hungary shall review the current regulatory environment related to the uptake of smart technologies, paying particular attention to facilitating the uptake of smart meters. One element of this is the development of flexible utility consumption and multi-zonal long-term tariff systems that can be achieved through the use of smart meters, as well as the necessary legislative framework for its introduction. In this way, universal service providers, commercial and distribution licensees will be obliged to establish flexible tariffs.
Expected impact of the measure: Achieve the in-house dissemination of smart measurements among those interested in building operation.
Person responsible for action: Minister for Energy Policy

13) **Obligation to install smart meters**

Scope of the measure: Universal service providers, commercial and distribution licensees involved in theelectricity sector
Duration**of the measure:** 2022-2023
Brief description of the measure: A regulatory environment shall be established which provides that, if certain conditions are met, traditional meters may only be replaced by smart meters when their validity expires. The cost of replacement shall be borne by utility service providers operating in the electricity sector.

Expected impact of the measure: By significantly increasing the share of smart meters and switching to flexible tariffs, to achieve a significant amount of energy consumption in order to reach the objectives of becoming active customers and achieving cost reduction potentials.
Person responsible for action: Minister for Energy Policy

14) **Policy support for the establishment of decentralised community heating plants**

Scope of the measure: Municipalities, energy service companies, end-users
Duration**of the measure:** From2023 onwards
Brief description of the measure: On the basis ofair pollution data, a set of measures will be developed on the basis of the development of an appropriate policy system for the cost-optimal development of small district heating systems based on decentralised biomass in the most polluted areas. A system of measures for establishing and encouraging connections to decentralised heating plants will be developed. One of the criteria for the design shall be that the connecting consumer shall bear a maximum cost equal to the annual maintenance and maintenance fees to be established in general before the connection.
Expected impact of the measure: Reducing air pollution, significantly improving air quality and creating more efficient and environmentally sound operating conditions.
Person responsible for action: Minister for Energy Policy

VI.2. National initiatives and measures to improve skills and education in the construction and energy efficiency sectors

The development of NZEBs and the design, construction and renovation of energy-efficient and sustainable buildings increasingly highlight the importance of the relevant skills and knowledge of building actors. However, vocational training in the construction sector currently does not meet the needs of the modern construction sector, due to the lack of sufficient specialised staff.

VI.2.1. Courses available as part of initial and further education

Among the training programmes available in higher education in Hungary, the following courses have a specific focus on energy efficiency:

- **Training in energy engineering**

  Comprehensive domestic and international issues in the fields of heat and electricity, district heating and renewable energy.

- **Installation-energetic engineer training**

  Knowledge of the factors affecting the energy use of buildings and the related simulation programmes and procedures.

- **Energy loss detection auditor training**
  Knowledge of conducting diagnostic/loss analysis tests in the field of expertise, in-depth detection, analysis and prevention of the causes of unjustified and unnecessary overconsumption.

- **Master's degree in facility engineer**

  The training of engineers able to accompany the entire facility construction process, to fully operate existing communal, industrial or agricultural buildings, to carry out management, management and development tasks, to audit buildings, to diagnose buildings and their sub-systems, and to carry out research and development tasks.

Construction organisations, firms, professional associations and chambers also regularly organise small information sessions for various construction actors.

VI.2.2. Other domestic initiatives include:

The **Modern Model Plant provides**a programme opportunity to visit demonstrators where advanced industrial solutions can be consulted in an operational environment by familiarising themselves with the relevant theoretical background and showing intelligent energy use. In **the context of the Digital Success Programme**, an educational programme **entitled 'Digital** Spatial Development specialist' is available, aiming at training professionals with the appropriate knowledge of urban and regional development in the smart city.

In the framework of the **Technical Directive Programme**, draft technical directives on construction have been drawn up and have been the subject of an expert opinion. Within the framework of the programme, the Technical Data Repository for Construction under development shall serve to improve the transparency of the regulatory environment and raise awareness, while supporting the work of industry actors.

VI.2.3. Domestic implementation of international initiatives:

Under a number of support programmes, the European Union has set itself the objective of improving the skills of those working in the construction sector. These programmes are available and applicable to the development of their own national education programmes in both international and domestic consortia:

A project carried out in a national consortium in the framework of the Build UP Skills initiative, aimed at improving the energy efficiency skills of technicians in buildings.

The aim of the Hungarian projectunder the Construction**Skills** initiative is to train construction professionals needed to build and renovate nearly zero-energy buildings.

One of the domestic projects under the **ERASMUS+** (Strategic Partnership) programme aims to develop a new training material, methodology and opportunities for sustainable building design,

construction and renovation, targeting the BIM (Building Information Modelling) and NZEB (Nearly Zero Energy Buildings) areas.

Measures

15) **Support for specialised education in the energy sector**

Scope of the measure: Energy efficiency education
Duration**of the measure: Continuous from**2023
Brief description of the measure: Following theassessment of the situation, a detailed action plan setting out the intervention points will be drawn up. Increasing the knowledge base on life-cycle thinking, digitalisation and advanced technical solutions will be a priority in the system's modification. As a result, new learning materials will be developed and integrated into the elements of the revised education system. On the basis of the relevant vocational training laws in force, the vocational training content in the VET cooperation system shall be developed and renewed in cooperation with the Sectoral Skills Councils coordinated by the Hungarian Chamber of Commerce and Industry.
Expected impact of the measure: A higher level of energy efficiency can be achieved by more qualified professionals in the long term.
Person responsible for action: Hungarian Energy and Public Utility Regulatory Authority

16) **Increasing the robustness of energy efficiency investments**

Scope of the measure: Real estate owners, investors, energy certifications
Duration**of the measure:** 2020-2023
Brief description of the measure: The energy performance certificate is an essential document for a number of energy efficiency-related measures and decisions. Hungary is reviewing the energy certification system and a system of strict professional records and prior studies has been developed. Hungary shall review and strengthen its system of comprehensive professional checks and sanctions of energy performance certificates. And the mandatory review of existing energy certifications by re-examination, as well as a quality review of the certificates carried out. The qualifications required for issuing the energy performance certificate shall be reviewed.
Expected impact of the measure: By increasing the quality of the energy certification system, the soundness of energy efficiency measures becomes more reliable, thus achieving significant energy savings.
Person responsible for action: Minister for Energy Policy

VI.3. National initiatives and measures to integrate recharging points and e-mobility related to building renovation

On the basis of current trends in economically developed countries around the world, it can be predicted that the share of electric vehicles in the car market is expected to be between 20 % and 30 % by 2030, making it essential to build recharging infrastructure of the right quality and quantity. In 2019 the Jedlik Ányos Plan was published to update the Jedlik Ányos Plan 2.0 – Homeland Electronic Mobility Strategy, the Jedlik Ányos Plan of 2015 and the subsequent regulatory framework. In this strategy paper, a number of objectives have been set out to facilitate the construction of recharging points and increasing their density.

On the basis of the Jedlik Ányos Action Plan, e-mobility in the built environment is set out in Decree 10/2016. (II. 9.) Government Decree No 253/1997 on national urban planning and construction requirements (XII. 20.) by amending Government Decree No/(OTÉK), it ensured that it was mandatory to take into account aspects that facilitate the spread of electric mobility in residential environments.

For the establishment of a new requirement, Decree No 7/2006 of December on the determination of the energy characteristics of buildings (V. 24.) TNM Decree/is also amended. The scope of the requirement shall cover non-residential buildings with more than ten parking spaces, newly constructed and undergoing major renovation.

Measures

17) **Introduction of a recharging point in residential car parks**

Scope of the measure: Residential buildings with at least 20 own parking spaces
Duration of the measure: 2025-2030
Brief description of the measure: Hungary shall, by amending the necessary legislative environment, make the installation of 1 recharging points for residential buildings mandatory for every 20 existing car parks and for each 20 new car parks.
Expected impact of the measure: Increasing the infrastructure of the charging network for electromobility, increasing the take-up of electric cars.
Person responsible for action: Minister for Energy Policy

18) **Extension of the possibilities for replacing mandatory parking spaces prescribed by municipalities**

Scope of the measure: New buildings or new parking spaces in the course of building extensions
Duration**of the measure:** 2025-2030
Brief description of the measure: The establishment of a legislative environment that makes it possible to replace the obligation to install parking spaces under the OTÉK by establishing an electric recharging point in public areas or by contributing to the financing of its construction shall be examined.
Expected impact of the measure: Increasing the infrastructure of the charging network for electromobility, increasing the take-up of electric cars.
Person responsible for action: Minister for Energy Policy

VI.4. National initiatives and measures targeting DSM solutions and smart communities

DSM (Demand Side Management) is an instrument influencing the consumer side through incentives, other measures and technical means to reduce consumption demand. DSM measures shall include energy efficiency/demand-side management measures, instruments for combating climate change and security of supply, the provision of adequate economic incentives and, where appropriate, all existing national and Community instruments necessary to maintain and establish the necessary network infrastructure. Most European countries use some kind of DSM system. Part of this is to encourage the influence of consumption through tariffs, while the other part is to support a technology, including a direct-led intervention.

Energy savings and energy efficiency are supported by several programmes, in particular by financing technological developments and the development of smart solutions or energy-conscious communities:

- The OTTHON warm programme, with a subsidy of 50 %, allowed for the modernisation of heating and cooling systems.
- The 2020-3.1.4-ZFR-EKM programme is a model project supporting the development and operation of energy communities.
- In total, non-refundable resources of HUF 15 million may be awarded to residential communities in the course of the OTP Business Cosasházi Tender.27
- The Hungarian Energy and Public Utility Regulatory Authority shall support talented young people through a competition.
- Under call No 2020-3-1.4-ZrF-EKM-A-2019/944 model projects for the development of energy communities may be implemented.

Measures

19) **Supporting the establishment of renewable energy communities**

Scope of the measure: Natural persons, municipalities, SME sector
Duration**of the measure: Continuous from**2023
Brief description of the measure: Hungary shall develop the possibility of establishing so-called renewable energy communities. As a result, natural persons, municipalities and SMEs can cooperate in legal form for the production of renewable energy by establishing the right legal environment.
Expected impact of the measure: The establishment of energy communities in order to achieve energy independence.
Person responsible for action: Minister for Energy Policy

[27]Https://profitline.hu/Meg-tobb-vissza-nem-teritendo-forras-a-tarsashazaknak-402794; 21 January 2020

VI.5. National initiatives and measures to inspect heating and cooling systems (compliance with Articles 14 to 15 of the Directive)

Government Decree No 264/2008 of June on the energy inspection of heating installations and air-conditioning systems (XI. 6.) Government Decree requires periodic review, but does not penalise failure to do so. For this reason, the reviews were not carried out and the register was not established. The adequate review and maintenance of heat-generating equipment and cooling systems, as well as their connection to building automation and control systems, have a high energy saving potential.

Measures

20) **Compliance with the inspection obligation scheme for heating and cooling systems**

Scope of the measure: Operators and owners of heating and cooling systems with an effective rated output of over 70 kW

Duration**of the measure: Continuous from**2021

Brief description of the measure: The accessible parts of heating and cooling systems and combined heating/cooling and ventilation systems with an effective rated output of over 70 kW shall be subject to regular inspections. The inspection shall include an assessment of the efficiency of the system and its sizing in relation to the heating and cooling requirements of the building and, where appropriate, the extent to which the performance of the system can be optimised under typical or average operating conditions. Inspections of heating and cooling systems subject to inspection and owned or used by the public shall be financed from central sources. The public is thus exempted from the technical inspection costs required under the Directive, but both for the operation and maintenance of the technical building systems, as well as for the development of small amounts and higher costs, the population receives clear and well-founded professional proposals. Hungary shall establish, through the extension and development of the database operated by the National Climate Protection Authority, a database storing and processing the inspection and its results, including inspectors with the appropriate training and authorisation to carry out on-site inspections. For nearly 50 thousand residential buildings (25 thousand co-ownership or cooperative buildings with 10 or more apartments, 15 thousand apartments in co-ownerships with 4 to 9 dwellings, and 10.000 family homes$^{\text{below}}$ 100 m²), the policy objective of the Government is to ensure that the heating system can be made subject to 100 % state funding. According to the calculation of the Chamber of Engineers, the costs per scheme are expected to be HUF 75 000, and this, together with the buildings used by the state and local government concerned (estimated 10 to 12 thousand pieces), represents a gross budgetary resource requirement of HUF 4.65 billion.

Planned cost of the measure: Carryingout inspections of the population and of the buildings occupied by the state or local government concerned: HUF4 650 000 000, development of a database: HUF 100 000 000.

Planned source of action: Environmental and Energy Efficiency Operational Programme Plus (completion of inspections), Energy and Climate Modernisation System (establishment of a database).

Expected impact of the measure: Achievingsignificant energy savings in accordance with the provisions laid down in Directive 264/2008. (XI. 6.) in the case of equipment and systems falling within the scope of government decrees.
Person responsible for action: Minister for Energy Policy

VI.6. National initiatives and measures aimed at designer ownership and other quality assurance elements

In order to ensure that renovation interventions, like new works, are carried out in high quality, it is necessary to review the legislative environment, both from a design and construction point of view, in order to ensure the responsibility and quality guarantees of specialist professionals.

Measures

21) **Development of occupational guidance programmes and training in the field of energy technology**

Scope of the measure: Energy technology workers
Duration**of the measure: Continuous from**2023
Brief description of the measure: A progress report will be prepared with the involvement of stakeholders in the energy sector in order to identify accurately the areas of shortage of professionals that the sector is currently facing. As a result, Hungary shall set up the training system for filling the deficit areas by reforming the current training structure in the identified deficit areas. For professions that may not be trained in higher education institutions, free secondary education courses shall be launched with the support of the education institutions.
Expected impact of the measure: Promote the creation of50 000 new jobs in the field of energy technology.
Person responsible for action: Minister for Energy Policy

VI.7. Monitoring system and indicators

- Number of dwellings with energy management systems or similar intelligent systems broken down by region —
- the scale of public and private investment in smart technologies, including smart grids,
- number of citizens participating in energy communities – main,
- number of smart electricity meters in households – db,
- number of freely accessible recharging points – db,
- number of smart parking places, broken down by county,
- number of inspections of heat generators and heaters – db,
- number of special construction supervision and consumer protection inspections for renovations -,
- university courses focusing on energy efficiency and related smart technologies, the number of persons passing the exams in the training courses – number of persons,
- number of professional/technical training courses in the field of energy efficiency, number of persons having passed the examinations – number, persons,

- Number of specialists experienced in new technologies and working methods;
- Budget of national research programmes in the field of energy efficiency of buildings — HUF,
- participationof national universities in international scientific research projects on the energy efficiency of buildings (e.g. Horizon 2020) — main.

VI.8. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

It has been confirmed by the participants that the measures taken for a more efficient operation of utilities (smart meter installation, installation of smart building control systems)are expected to facilitate more efficient building management and increase user awareness.

VII. Evidence-based estimation of wider benefits: Assessment of impacts on health, safety and air quality

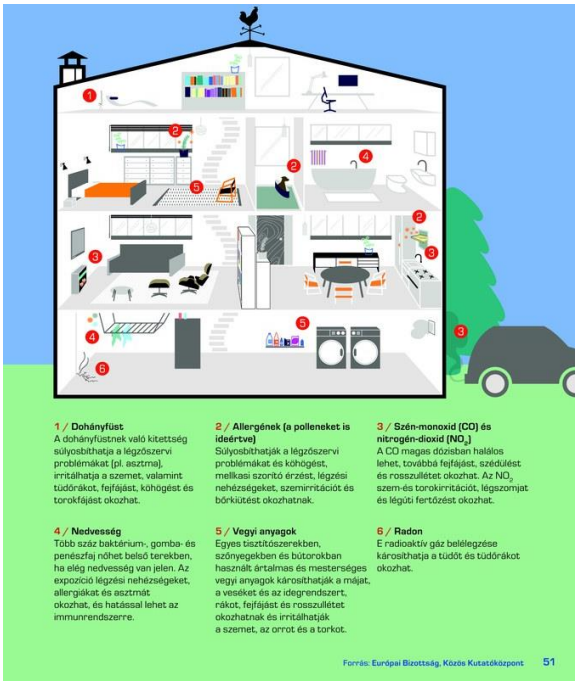
Content of the Chapter: Pursuant to Article 2a(1)(g) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

In the course of the renovation of buildings, positive effects are realised in a number of themes that are not closely related to energy savings. Methodologies will be developed to estimate these benefits on the basis of facts and to measure the benefits.

VII.1. Assessment of estimation methodology and benefits (developing or naturalising through the adoption of an international methodology) to determine the wider evidence-based impact of energy efficiency measures on health

VII.1.1. Indoor air conditions and service comfort

The energy condition of buildings and the way and quality of domestic heating, cooling and ventilation can have a serious impact on the health of those living both in buildings and in their surroundings. Across Europe, people spend an average of 90 % of their time indoors. Temperature, lighting, humidity, draught and noise are fundamental determinants of physical and mental well-being. More efficient buildings create pleasant temperatures with lower energy use and emissions, as well as better internal and external air quality. Indoor building materials, insulation materials, furniture and paints are a source of pollutants that can accumulate in our buildings with poor or too few ventilation and can cause serious long-term health damage.



6Figure: Indoor air pollution (Source: EEA 2019)

Adequate windows, insulation and heating systems shall allow internal rooms to be ventilated at an appropriate level without significantly reducing comfort levels. Homes and houses with inadequate insulation, windows or even poorly renovated (e.g. thermal bridges) may unfortunately have high humidity and mould, which also poses a serious health risk.

[28]According to a recent report by the Buildings Performance Institute of Europe in 2019, deep energy renovations provide special benefits for all types of buildings. Some examples include:

Hospitals: The energy efficiency of hospitals and the quality of the internal environment are of paramount importance for health. Good ventilation systems reduce the possibility of cross-contamination, while natural light, thermal comfort and sound insulation accelerate patients' cure. Research found that an improved internal environment could reduce the mortality rate of children's hospitals by 10 % and energy modernisations could reduce the duration of stay in hospital by 11 % in general, leading to a 20 % reduction in supply costs and labour migration.

Public and private workplaces: Around 36 % of the European Union's workforce – 81 million people – spends 8 hours or more per day in offices. Comfortable, healthy, well-informed and well-designed workplaces that can be achieved through refurbishment improve work-mortised workplaces and reduce staff turnover. Workers' performance may increase by up to 12 % after a refurbishment. Overall, healthier workplaces can deliver shocking savings of EUR500 billion per year in the European Union.

[28]Buildings Performance Institute of Europe (REC-BPIE (2020)): Building Renovation: A kick-starter for the EU Recovery.
https://www.renovate-europe.eu/2020/06/10/building-renovation-a-kick-starter-for-the-eu-economy/

Schools: Students' health, presence, concentration and learning performance are all damaged if school buildings are poorly designed or outdated systems are used. Based on the BPIE's[29] models, she estimated that the educational performance of children improved by 3-8 % thanks to school renovations.[30]

Residential buildings: Several research has shown that young children living in cold humid dwellings are more likely to experience breathing, chest or bronch problems and have a 40 % higher chance of obtaining asthma. In the case of older people, poor living conditions account for a 40 % increase in winter deaths in the European Union. According to thereport, around 250 000 additional deaths are recorded in the European Union in every winter (compared to the summer period), of which around one third, i.e. 80 deaths, are related to poor living conditions and the inability of residents to keep their homes warm.

It appears from the above that the state budget can benefit significantly from falling health costs.

VII.1.2. Lead water supply pipes and fittings

Lead is one of the oldest known metals, which has also been used for the production of aqueducts from ancient times to the mid-20th century. However, the use of lead has been banned in Europe since the 1970s. However, in the case of apartments built before the 1970s, but in the case of houses, the internal water network of the property may still consist of lead pipelines accepted a few decades ago. Lead is a toxic element that, if introduced into the human body, can cause neurological and developmental disturbances. In particular, exposure to significant amounts of lead can endanger health in foetuses and young children. PURSUANT TO DECREE NO 201/2001 OF APRIL Pursuant to Government Decree (X. 25.) Korm., as of 25 December 2013, the limit value for lead in drinking water is 10 µg/l in Hungary. In view of the possible accumulation of lead in drinking water above the limit value, it is recommended that these pipes be replaced by more modern solutions in order to protect health. In the design of aid schemes for technical building energy renovation, the eligibility of these items will also be an important aspect in the future.

The above benefits shall be measured in a dual way. On the one hand, by directly monitoring the effects and, on the other hand, by registering the elements of the renovations carried out, which also serve to protect health.

In relation to the latter, it may be appropriate to apply a complex rating system, such as the internationally known WELL rating[31], which specifically focuses on the development and evaluation of healthy and more liveable indoor spaces.

[29] Buildings Performance Institute Europe
https://www.bpie.eu/
[30] Hungarian Institute for Energy Efficiency (MEHI): Energy renovation of buildings: Reaping the intact benefits to date. https://mehi.hu/hir/epuletek-energetikai-felujitasa-az-eddig-erintetlen-elonyok-kiaknazasa
[31]https://www.wellcertified.com

The comparison of directly measured impacts with data from renovated buildings is suitable for assessing and estimating the wide-ranging health-related benefits. A report on the cross-checking shall be drawn up every two years.

The indicators used to measure the direct effects are set out in point (aVII.5) of this chapter: Monitoring system and indicators'.'.

VII.2. Assessment of estimation methodology and benefits (developing or naturalising through the adoption of an international methodology) to determine wider evidence-based impacts of energy efficiency measures in relation to "security"

VII.2.1. Obsolete electrical systems

According to data from the National Directorate-General for Disaster Management of the Ministry of the Interior, among the causes of the fire discovered by fire inspection procedures, the outdated electrical network and systems show an increasing trend in recent years. According to the investigations, the fire caused by the outdated electrical network and systems can be traced back to three main causes: Overload of cables, cables, high transient resistance, short circuits or electric arcs. The interconnections of old electricity grids and the cross-section of its power lines are often no longer capable of supplying the newly procured high-capacity electrical equipment with electrical energy in an operational and safe manner. The joints and wiring may overheat, causing plastic insulation to melt and ignite, thus causing fire and life-threatening to its surroundings.

The aluminium pipeline system used in the 60s and 70s, but has continued to cause a number of problems, is critical from the point of view of fire risk. Partly because aluminium is capable of reacting chemically and physically with materials used in other household electrical systems that cause aluminium oxidation, deterioration, overheating and fire. In most cases, these old and technically outdated systems do not have a secure electrical earthing system. This means, in addition to fire risks, that there is no earthing for the protection of appliances and sensitive electronics, so that the operation of these high-cost equipment may often be more risky than high-voltage damage and may therefore pose a risk to life and property safety.

Since, according to the current standards, copper ducts are in any event installed upon renewal, the fire risks arising from the material of the pipeline network will be eliminated, and the current legislation requires the establishment of appropriate earthing.

In the event of a refurbishment affecting the lighting system, the safety lighting required by law may be installed.

VII.2.2. Gas equipment and appliances

Hungary accrues to Government Decree No 65/2011 of (IV. 15.) Government Decree No 276/2015, as well as the amendment thereof, (IX. 21) by means of a government decree, the ECO design directive incorporated into the Hungarian legal order the rules on heat emitters. As a result, only boilers of sufficient efficiency could be placed on the market as of 26 September 2015 (the grace period lasted

until 01 July 2016). This means that only condensing boilers can meet these requirements. The same apparatus has changed generationally in the markets for convectors and gas water heaters.

At the same time, there is a need for Directive 264/2008. (XI. 6.) Government Decree on the revision of the decree on the energy inspection of heat-producing plants and air-conditioning systems, as the general public calls upon a professional to the combustion plant only if it deteriorates. However, it is necessary to ensure the correct and intended operation, regular maintenance and adjustment of these devices in order to operate under optimal conditions.

Maintenance of equipment is particularly important also in order to avoid carbon monoxide poisoning. In Hungary, in general, 12 people die from carbon monoxide poisoning each year, and approximately 350 to 400 people suffer mild or moderate poisoning.[32] The majority of cases can be avoided by scheduled maintenance, proper operation and the use of carbon monoxide detectors.

The possibility of setting up a central portal where, as in the case of refrigeration and heat pump systems, information on the condition and necessary maintenance could be collected on heat-generating equipment has been explored.

In the case of refurbishment of residential heating, the refurbishment of gas pipelines outside the dwelling, which in many cases leaks, is often missed. This could result in a loss for gas suppliers and a life-threatening effect on the other. Therefore, in the case of energy renovations, it is appropriate to include not only internal but also external lines in the review. When expanding the scope of eligible activities, the inclusion, at least in part, of these activities as eligible elements in financial incentive schemes shall be examined, whether as a combined package bringing together more than one financial product.

VII.2.3. Seismic security

In the case of energy renovation of existing buildings, there is no requirement to review and, if necessary, correct the resistance of the building to earthquakes, although this would essentially be necessary for all multi-level buildings over 20 years of age. Major deep renovations (including restraining structures) provide an opportunity to review seismic safety and, if necessary, intervene.

VII.2.4. Fire protection

During the renovation of buildings, it is possible to develop a comprehensive fire protection concept, so that existing fire safety deficiencies in the building can be reduced or repaired.

The necessary refurbishment of the lightning protection system, the replacement of obsolete mechanical systems (with the installation of more modern and new products and structures instead of obsolete, ageing appliances, wiring or chimneys), retro-installed combustion product evacuations reduce the number of fires caused by these systems and reduce the effects of fires.

[32] National Directorate-General for Disaster Management (OKF), 2020

It is positive that, in parallel with energy renovation, the requirements on the use of buildings (e.g. storage rules) can be reviewed and verified. The dismantling of irregularly established security grates and seals effectively improves the conditions for escape and rescue. In addition, major renovations allow for the development of means of escape in accordance with the legislation in force.

In parallel to energy renovations, it is advisable to carry out automatically non-energy interventions (e.g. separating mines by level, installing fire-retardant home doors, installing CO and smoke detectors, etc.) but which effectively increase the safety of the building or counteract the impact of less favourable fire protection solutions.

Certain energy refurbishment elements may impair the fire safety of buildings (e.g. use of combustible thermal insulation). In order to mitigate this, the possibility of making mandatory the involvement of a fire safety expert in the event of large-scale interventions or particularly risky fire-fighting interventions, even if the investment itself is not subject to authorisation or notification, shall be examined.

With regard to safety, the benefits under the above four criteria (electrical systems, gas equipment and appliances, seismic safety and fire protection) are measured in a dual way. On the one hand, by directly monitoring the effects and, on the other hand, by registering the elements of the renovations carried out to promote safer use.

The comparison of directly measured impacts with data from renovated buildings is suitable for assessing and estimating the wide-ranging health-related benefits. A report on the cross-checking shall be drawn up every two years.

The indicators used to measure the direct effects are set out in point (aVII.5) of this chapter: Monitoring system and indicators‘.’.

VII.3. Assessment of estimation methodology and benefits (developing or naturalising through the adoption of an international methodology) to determine wider evidence-based impacts of energy efficiency measures in terms of air quality impacts

In 2013, long-term exposure to air pollution caused around 436, premature deaths across Europe. The main source of pollution is solid fuels burned by households. Direct air pollution costs, including missed working days and higher healthcare costs, in particular for the elderly and children, amount to around EUR 23 billion per year.[33]

Hungary is also significantly affected by this problem. The 2020 EU Country Report on Hungary highlights[34] this issue in particular: “In 2017, emissions of nitrogen dioxide and particulate matter (PM10) exceeded EU air quality standards in several air quality zones. The persistent breaches of air

[33] Hungarian Institute for Energy Efficiency (MEHI): Energy renovation of buildings: Reaping the intact benefits to date. https://mehi.hu/hir/epuletek-energetikai-felujitasa-az-eddig-erintetlen-elonyok-kiaknazasa
[34] European Commission: Country Report Hungary 2020;

quality standards have severe health and environmental repercussions. In 2016, there were more than 13000 premature deaths in Hungary due to poor air quality, mainly particulate matter."

Combustion of fuel wood of inadequate quality (or treated with chemicals), in a low-efficiency, unaged heater, results in significant air pollution (increased sulphur dioxide (SO_2), nitrogen oxides (NOx),soot, dust and other pollutant emissions).35

This impact is significantly reduced by the renovation of buildings, partly due to lower thermal energy demand due to thermal insulation, partly to more modern heaters and energy sources with lower or zero local emissions.

Moreover, awareness-raising and information programmes can help reduce the incineration of household and garden waste.

Together, they have a positive impact on air quality.

Air quality is measured and evaluated by the National Air Pollution Measurement Network (OLM). The data-based inventory, compared to measures aimed at reducing air pollution, makes it possible to monitor the effectiveness of the measures. A report shall be drawn up every two years.

Air quality indicators under point) of VII.5this chapter: Monitoring system and indicators'.'.

VII.4. Assessment of the expected benefits of measures developed (as per points III to VI and VIII)

The broader positive effects of the planned measures are set out below:

Effects of measures to encourage deep renovations

Some of the benefits are realised due to the achievement of a deep renovation level, and the extension of eligible activities allows for renovation elements that are not directly aimed at energy efficiency (e.g. replacement of electrical lines, involvement of fire protection planners). Expected impacts:

Health: Unhealthy indoor air conditions, insufficient lighting, reduced noise impact due to the operation of outdated systems, improved thermal comfort and unhindered accessibility are expected to disappear.

Security: Reducing the risk of fires, safer operation of gas appliances.

Air quality: Reducing air pollution due to emissions from inefficient combustion plants.

Effects of measures to reduce households to be supported

Among households to be supported, heating with inadequate solid fuels is the highest, so measures targeting this layer will help reduce air pollution from heating. Expected impacts:

[35]National Energy Strategy Strategic Environmental Assessment with proposals for Hungary's National Energy and Climate Plan (hereinafter: SEA), p. 76.

Health: Housing conditions may become healthier among households to be supported.

Security: More informed consumer behaviour facilitates the safer operation of buildings.

Air quality: Reducing the use of non-compliant solid fuels reduces air pollution.

Impact of measures targeting public buildings

In addition to energy efficiency, refurbishment of the public building stock, as well as encouraging more energy-efficient operation, will help to realise wider benefits. Expected impacts:

Health: Healthier environments (indoor air quality, lighting, noise, thermal comfort) for both workers and users in public buildings, as well as accessibility.

*Security: The refurbishment*of obsolete systems reduces the risk of accidents due to electrical failure or gas appliances, as well as better informed consumer behaviour in order to facilitate the safe operation of buildings.

Air quality: Reducing air pollution due to emissions from inefficient combustion plants.

Impact of comprehensive national initiatives and measures

Smart technologies and DSM solutions make energy use lower and more adaptable to user needs, increasing user comfort. The development of education in the sector facilitates the presence of well-informed professionals in the construction sector. The review of heating and cooling systems facilitates efficient and safe operation.

Health: Developing healthy living and working conditions and serving users' needs more accurately, through smart technologies, education and awareness-raising.

*Security: The review*of heating and cooling systems reduces the chances of accidents and failures due to malfunctioning.

*Air quality: Making*heating systems more efficient reduces local air pollution.

Impact of measures to strengthen an integrated approach

By strengthening an integrated approach, the co-benefits of renovations can be maximised.

Health: Unhealthy indoor air conditions, insufficient lighting, reduced noise impact due to the operation of outdated systems, improved thermal comfort, accessibility, comfort, and health risks arising from asbestos dismantling are expected to disappear.

Security: Reducing the risk of fires, safer operation of gas appliances.

Air quality: Reducing air pollution due to emissions from inefficient combustion plants.

VII.5. Monitoring system and indicators

The indicators shall only be measured in relation to buildings undergoing renovation.

Health-related indicators:

- average time spent in hospital, per hospital stay – day,
- number of illnesses related to living or working conditions – number,
- number of days incapacitated due to illness linked to working conditions – days,
- change in the average study rate of pupils and students – %,
- change in labour efficiency – %,
- number and qualification of buildings with a building rating (e.g. WELL) resembling healthy building use – assessment according to the rating system,
- number of apartments where lead-containing pipelines and fittings have been replaced during the renovation – db.

Safety related indicators:

- change in the amount of fires resulting from a mains electrical failure – %,
- change in the volume of accidents resulting from a mains electrical failure, personal injury or damage to property – %,
- change in the number of cases of carbon monoxide poisoning – %,
- number of maintenance of registered gas appliances required and carried out – db,
- number of refurbishment-related reinforcements on support structures -,
- number of refurbishment planning involving a fire safety expert – db.

Air quality indicators:

- Air quality – particulate matter, nitrogen oxides and sulphur dioxide concentration, by area distribution – $\mu g/m^3$.

VII.6. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

According to the comments of several participants, the co-benefits of energy saving measures have a motivating effect on the willingness to renovate, so it may be useful to emphasise them in awareness-raising.

VIII. Measures to strengthen an integrated approach

Content of the Chapter: Pursuant to Article 2a(1)(g) of Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

An integrated approach should be an important element in the planning of renovations, since deep renovation does not only result in energy savings.

In order to ensure that the related non-energy-saving benefits can be realised, the conditions for applying for support schemes shall be reviewed in order to ensure that renovation approaches with wider benefits are positively reflected in the evaluation system.

A significant proportion of the measures presented in this chapter do not have a direct energy efficiency focus, but contribute to the development of a healthy and energy-efficient building stock based on an integrated approach.

VIII.1. Integrated measures for asbestos removal

In Hungary, in the 20th century, flat and wave slate roofing materials, as well as wrapping and insulation panels, were produced in large quantities of cheap asbestos cement. The use of asbestos is set out in Decree No 41/2000 of April on the use (XII.20.) EüM-KöM Decree No/prohibited as of 1 January 2001 due to severe respiratory damage (asbestosis). As of 1 January 2005, the prohibition on the marketing and use of asbestos-containing products in Hungary became complete.

Slate roofs containing asbestos have a lifespan of around 20 to 40 years, and slate containing asbestos has been used for roofing until the 1980s. It is estimated that 150 million $m^{2\,roofing}$ materials could result in 1.2 million$^{m^3\ demolition\ materials}$ by 2030.

During renovations, the replacement of roofing materials containing asbestos often takes place, thus approaching the objective of removing construction materials that cause serious damage to health from the domestic building stock.

VIII.2. Integrated measures to improve working conditions

The disappearance of unhealthy indoor air conditions (e.g. moulding, excessive humidity, outdated, contaminated ventilation and refrigeration equipment) reduces the health risks associated with the respiratory system.

The possibility of individual temperature control in both residential and working environments is beneficial, not only in terms of energy use but also in terms of thermal comfort. In addition, building automation systems may have a number of comfort functions aimed at the user.

The deep renovation of public buildings is typically for energy purposes, but, as it is a major renovation, the accessibility of the building, which is mandatory by law, often takes place at the same time, thus speeding up the accessibility of all public institutions to users of buildings with special needs.

Outdated, inadequate lighting has numerous nuisances and, in some cases, harmful effects on health. Gliding, vibrating luminaires and insufficient or uneven distribution of light may cause concentration disturbances and headache. Modernising lighting will eliminate these problems, thus improving work efficiency and reducing the risk of visual deterioration.

Measures

22) **Review of criteria for the evaluation of aid schemes**

Scope of the measure: Aid schemesfor buildings serving as workplaces
Duration**of the measure: Continuous from**2023
Brief description of the measure: The criteria for evaluating the aid schemes available for buildings serving the workplace will be reviewed in order to ensure that a rating system for the evaluation of the indoor spaces of the buildings is carried out (e.g.: Well) shall be a condition or a positive assessment criterion in the assessment of the aid.
Expected impact of the measure: In order to obtain certification, building operators shall put more emphasis on the development of healthy indoor conditions.
Person responsible for action: Minister for Energy Policy

VIII.3. Integrated measures to increase comfort

In determining the level of deep renovation, it was laid down as a condition that the residential buildings undergoing intervention comply with the requirements of a fully conspicuous or at least a comfortable building within the meaning of Section 91/A of Act LXXVIII of 1993 (i.e. having at least one residential room, cooking room, bathroom and toilet, public utility, hot water supply and a central or individual heating mode of more than 12 square metres). This shall ensure that for any subsequent aid scheme linked to the achievement of the deep renovation target, an adequate level of comfort is ensured.

The family home creation concession (CSOK), if a specific condition is met (the real estate is located in a small commune specified in the law), it is possible to use the aid for modernisation, as well as for increasing comfort levels.

The planned New Home Programme aims to enable most people to live in their own homes. Until 31 December 2026, the 5 % housing VAT to be introduced for the purchase of new dwellings shall apply to dwellings^{below} 150 m² and to^{family} homes of less than 300 m² for which a building permit or a simple declaration of construction is made by the end of 2022. The tax rate applicable to transactions carried out in 2020 shall still be determined on the basis of the transitional rule relating to the phase-out of the 5 % flat VAT on 31 December 2019.

As part of a package, the new family support proposal has been extended and supplemented by the CSOK. All persons applying for CSOK support for at least two children shall be eligible. Families who use CSOK may also claim back the 5 % VAT when purchasing their new home. The maximum amount of the CSOK loan depends solely on the number of existing or committed children, with HUF 10 million for 2 children and HUF 15 million for 3 children for a fixed loan with a maximum interest rate of 3 %.

A non-refundable grant of HUF 10 million for the construction of multi-generation homes resulting from the installation of the roof space of family homes may also apply for grants of HUF 10 million to those who are about to have children or who are already raising children. In the case of the undertaking of one child, the amount of the aid shall be HUF 600 and HUF 2.6 million for two children. The condition of payment for real estate is that the new home must have separate entrances, kitchens, bathrooms and accommodation. Again, the size of the real estate is regulated, so that one child[shall] have a minimum of 40 m³, 50 m³ for[two] children[and] at least 60 m³ for three or more children.

Persons who purchase new or second-hand real estate with CSOK shall be exempted from transfer duty, so that it is not a subsequent refund but an effective exemption. The amount of the fee corresponding to the tax advantage shall not be payable if, for medical reasons, the conditions for having a child are not met. In the case of a contract of sale dated after 1 January 2021, the new tax exemption measures shall apply to asset acquisitions relating to immovable property, while the provision in force at that time shall continue to apply to contracts concluded previously after its expiry.

Half of the refurbishment costs of families with at least one child shall be assumed and reimbursed by the state up to a maximum of HUF 3 million. The allowance may be applied for until the child is 18 years old, but those entitled to the child's home care fee may benefit from the allowance without the age limit.

The new home creation programme has an indirect impact on the construction sector:

- The notified scheme is practically a bail-out for negative effects and for a stable recovery from the adverse market situation. In the week following the first announcements of the scheme, demand for real estate has already increased to a noticeable extent. Although interest in housing has decreased compared to 2019, family homes have already exceeded the 2019 figures.

- The availability of real estate may improve significantly in the short term due to VAT reductions, favourable loans and duty exemptions. The extent of the advantage provided by the scheme is such that, according to the analysts, it can also be directed towards aid to those who have not yet anticipated this possibility.

- Although the availability of real estate is improving, owners may increase the price of the real estate, which is borne by the buyers' additional resources. In the case of medium or bad condition properties, it may even be worthwhile for the owner to use the resources for renovation, carry out the renovation and sell the property as renovated at a higher price.

- Thanks to the programme, the acquisition of real estate for investment purposes will be made more accessible. Due to the incentive to buy owner-occupied dwellings and the potential oversupply in the sub-lease market, real estate-based investment is expected to be less attractive. Due to the COVID outbreak, small or private investors are moving towards lower-risk investments due to the volatile financial situation and market, which is expected to have a stimulative effect on real estate investments.

- According to the trend observed in 2020, demand is mainly generated by newly built houses, thus affecting the construction, construction, construction micro and small business segments that would be most important to develop. The impact of the announced programme and the reorientation of purchasing habits (agglomeration relocation) is expected, especially during the COVID outbreak, to improve significantly, especially in the field of micro-entrepreneurs.

- Thanks to a grant of up to HUF 3 million to the renovators, it is expected that the innovators will use the support for building materials and request invoices. As regards labour costs, market forecasts are still not fully clear, and the number of owner-occupied refurbishments, such as family refurbishment, is likely to be high.

- CSOK, interest-subsidised loans, duty exemption and multigeneration home construction are all aimed at encouraging the purchase of owner-occupied real estate. Based on the preliminary calculations, the discounts are expected to result in the amount of repayment instalments being lower than the sub-lease prices.

- The increase in prices in the agglomeration exceeded 25 % in 2019 compared to the previous year. According to the data of the HCSO, with the exception of the municipalities of Budakeszi, Budaörs, Vác and Pomáz, the largest price increase is located in the eastern and south-eastern regions. This can also include the strongest demand, as real estate at a more favourable price than the other areas of the agglomeration is located. The impact is such that the real estate demand in 2020 is mostly generated by newly constructed houses. The positive financial benefits of the notified scheme are expected to further reinforce the relocation trend.

Measures

23) **Encourage the development of accessibility for large multi-family homes**

Scope of the measure: Multi-family houses with more than 10 dwellings
Duration**of the measure: Continuous from**2023
Brief description of the measure: Financial incentives and constructions for the energy renovation ofapartment blocks will be reviewed and the implementation of accessibility for multi-family homes with more than 10 dwellings will be an important aspect of the design of new ones. The best design of this conditionality, technical and financial criteria, eligibility criteria and eligibility criteria will be examined.
Expected impact of the measure: The share of accessible multi-family homes can increase.
Person responsible for action: Ministry of Human Resources

VIII.4. Integrated measures to ensure a circular approach

With regardto waste management in Hungary, the basic regulatory framework is laid down in the European Union legislation. The Hungarian legislation in force takes into account both EU requirements, international conventions and national strategic concepts and objectives. The

fundamental strategic objective of both the European Union and the domestic sector is to prevent the generation of wasteand increase its material recovery for all waste streams.

As part of the preparation of the legislative tasks necessary for the transposition of EU legislation, two expert forums were organised in the course of 2019, with the participation of professional organisations and certain relevant economic organisations in the waste management sector.

In the case of waste management, waste prevention sets out sectoral measures as a basic principle. To this end, it is necessary to ensure adequate collection of waste, to ensure improvements for preparation for re-use and recycling, and to promote sustainable production and consumption patterns. In this context, it is necessary to increase the effectiveness of measures for the collection and recycling of waste, both in the construction sector and in the case of waste generated by the general public.

In order to implement the principles, in 2020 the Ministry of Innovation and Technology developed the National Waste Management Strategy and the National Waste Management Plan (2021-2027), which contains the tools and measures to promote circularity. It presents the state of play of Hungary's waste management, presents the current situation per waste stream, the results achieved, identifies gaps and outlines the action lines for a given waste stream. It sets out the legislative background for Hungary's waste management, and then identifies, for each waste stream, the method of its management, the shortcomings observed, the objectives to be achieved, the means and measures required. In the spirit of sustainability and the circular economy, the implementation of waste management infrastructure will ensure the efficient use of public and EU funds and increase the competitiveness of the waste management sector. Increasing the competitiveness of the waste management sector can benefit all actors in the sector, which is expected to have a positive impact on investments in the sector.

VIII.5. Integrated measures to reduce cooling demand

There are more options for reducing the energy demand for cooling in buildings. We can achieve both by improving the passive heat protection properties of the building (i.e. not requiring energy input when operating) and by improving the microclimate of the immediate or wider environment.

One of the most important elements of passive heat protection in buildings is the shielding of glazed windows. The heat entering the building by radiation can be greatly reduced, so that the temperature of the indoor space remains lower. Shading devices may also be built in the course of minor renovations. At present, the effect of external shielding devices may be taken into account when determining the energy characteristics of buildings, in the calculation of protection against overheating in the summer on the basis of Decree No 7/2006 of the TNM.

An option going beyond individual renovation, improving the microclimate of the external environment. This can be achieved in the immediate environment by creating green surfaces and open water surfaces, or even on a municipal scale, by establishing deciduous, climate-tolerant tree lines, shrub strips, and even shrub strips that shield the heat island effect of the urban climate. Such solutions may, among other things, be included in the Sustainable Energy and Climate Action Plans (SECAP) prepared by the municipalities.

VIII.6. Integrated action to improve air quality (internal, external)

The most significant negative determinants of external air quality in buildings are the increase in particulate matter, nitrogen oxides and sulphur dioxide concentrations resulting from solid combustion.

In order to reduce pollution from heating, Hungary supports the use of lower-emission heating solutions by means of incentive measures and awareness-raising.

Energy production is an industry having a significant impact on air quality. With a view to reducing energy dependency and increasing the share of renewables, Hungary shall launch projects that encourage self-generation based on renewable energy that strengthens the energy independence of consumers and consumer communities.

The related measures[36] are specified in the National Energy and[37]Climate Plan and in the National Energy Strategy.

For indoor air quality, residential buildings, deep renovations are likely to improve, as well as measures to help households to be supported, the poor air quality resulting from unhealthy heating in this area can be improved.

Measures

24) **Green Disther Heat Programme**

Scope of the measure: District heating suppliers
Duration**of the measure: Continuous from**2023
Brief description of the measure: Under theprogramme, greening of the district heating sector is mainly achieved by increasing the use of geothermal waste for heating and cooling that meets the requirements of the geothermal, cost-effectiveness and waste management hierarchy, as well as the use of biomass produced on the basis of sustainability criteria for heating and cooling. Another objective is to increase the use of energy from wastewater treatment, depot gas and the utilisation of biogas of agricultural origin. The incentive scheme for the use of these resources shall be designed for each of the larger district heating areas on the basis of a detailed analysis carried out taking into account local circumstances.
Expected impact of the measure: The share of renewable energy production for heating is increasing and the country's dependence on natural gas is decreasing. The beneficial effect of district heating developments is that they cause well-defined in situ pollution, and emissions are generated in a point-by-point and well-controlled manner, most of which do not deteriorate the air pollution data of a given settlement.
Person responsible for action: Minister for Energy Policy

[36]National Energy Strategy 2030 with Outlook to 2040
[37] Hungary's National Energy and Climate Plan

25) **Expansion and integration of renewable energy production, including the resources of the Recovery and Resilient Capability Instrument**

Scope of the measure: Retail sector
Duration**of the measure: Continuous from**2023
Brief description of the measure: Restoration and Resilient Capability Instrument for the Green and Digital Transitions (Further: (rrf) one of the planned priority areas of intervention is the transformation of domestic energy production to 90 per cent climate-neutral by 2030. The key to this is to promote production from renewable sources while maintaining nuclear capacity. In the context of renewable production, weather-dependent capacities, in particular solar cells, are becoming increasingly important. The reform package on the expansion and integration of renewable energy production included in the design of the RRF will include the following elements to be supported:

- the launch of a new programme to support investments in solar cells by households with large families in rural areas;
- encouraging renewable energy production in the Community;
- development of electricity grids and flexibilities of producers, storage and consumers in order to facilitate the system integration of renewable energy production (digitalisation, including the installation of smart meters).

Expected impact of the measure: In themedium term, at least 150 to 200 thousand households will have roof-mounted solar panels with an average power of 4 kW. Furthermore, the number and installed capacity of residential heat pumps can increase significantly.
Person responsible for action: Minister for Energy Policy

26) **Examination of the possibility of aid for the construction of biomass heating**

Scope of the measure: SME sector
Duration**of the measure: Continuous from**2023
Brief description of the measure: The impact of the introduction of the following system on energy efficiency and the national economy shall be examined and, following an assessment, its feasibility shall be considered:
In the case of the modernisation of a newly installed biomass-based heating system or an existing system in a building belonging to or used by SMEs falling within the scope of the exceptions listed in section 1 (2) of the Government Decree on the certification of the energy characteristics of buildings, a grant of up to 50 % of the cost of the investment, but not exceeding HUF 1 000 000 may be requested. The aid scheme shall be established[38]through the GINOP and may be applied up to the specified financial amount.
Expected impact of the measure: The better price results in a faster return on the investment, thus encouraging consumers to realise even as an investment element in their own right.
Person responsible for action: Minister for Finance

[38]Economic Development and Innovation Operational Programme

27) **Development of smart and hygienic building technologies in educational, health and social buildings**

Scope of the measure: Educational, health and social institutions
Duration**of the measure: Continuous from**2023
Brief description of the measure: The programme shall include the development of educational buildings, health-related buildings and social buildings. The non-refundable grant part, which may reach the aid intensity of 100 %, shall only support technical improvements aimed at reducing the risk of infection, in particular upgrades to ensure the virus and bacterial decontamination of the technical building systems, the development of non-contact technical solutions, and the development of antimicrobial surfaces and spaces. In the course of the development of each building, it is necessary to supplement the defence improvements with the[39] improvements of the Indicator Okos Building. The technical systems that may be developed are the following: 1. heating; 2.cooling; 3. domestic hot water production; 4. controlled heat-recovery ventilation (without remixing); 5. lighting; 6. dynamic building envelopes; 7. electrical system; 8. electric car charging; 9. monitoring and control systems.
Expected impact of the measure: In buildings covered by the programme, health risks and infection risks are reduced due to improvements in in-house air quality.
Person responsible for action: Minister for Human Resources, Minister for Energy Policy

VIII.7. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- quantities of slate waste removed and treated, produced by the general public and containing asbestos – tonnes,
- labour productivity growth due to improved working environment and living conditions – %,
- removing/preventing accessibility barriers during renovations
- the quantity of construction and demolition waste and the rate of re-use of construction and demolition waste – t, %,
- Air quality – particulate matter, nitrogen oxides and sulphur dioxide concentration- µg/m^{3,}
- amount of energy produced by residential energy producers – kWh,
- Number, output, regional breakdown of biomass heating systems newly installed or refurbished by SMEs – db, kW,
- Development of smart and hygienic building technologies: number, area and regional breakdown of institutions involved in the programme – mb, m$^{2.}$

[39]SMART Readiness Indicator

VIII.8. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

It was confirmed by the participants that the coordination of the related strategies and large-scale programmes (National Waste Management Strategy, National Waste Management Plan, Green Disther Heat Programme) is of particular importance to the objectives of the HTFS (e.g.: Reduction of $CO2_{emissions}$).

IX. Public guarantees for the creation of investment platforms, groups and energy efficiency cooperation in small and medium-sized enterprises

Content of the Chapter: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings – Article 2a (3a).

IX.1. "Certification of Article 2a (3a) of the EPBD: Ensuring that, inter alia, investment platforms or groups and consortia of small and medium-sized enterprises can merge projects, allowing investor access"

According to the provisions of Article 2a(3)(a) of the Directive, the aggregation of investment projects is one of the keys to investor access. This is confirmed by international experience, i.e. refurbishments of a small amount by themselves, or even municipal refurbishments, do not reach the scale required by investors, and therefore potential economies of scale cannot be realised. On the other hand, aggregation of projects has a risk-reducing effect due to diversification benefits.

In order to address the above challenges, Hungary plans the following measures:

As a first step, a large, standardised refurbishment investment needs to be packaged so that it can be bonded and the projects can be sold directly to investors in this form. The latter, combined with a public incentive, has the potential to reduce the cost of resources, which can channel the return on investment decisions into a larger positive range. As renovations entail a relatively high capital requirement, with relatively low annual overhead savings, especially in the retail segment, alongside domestic retail tariffs, this also underpins the relative advantages of long-term bond-based financing.

Several forms of bonding are possible, including securitisation and green bond issuance in-the most relevant Hungarian context.

Securitisation

Banks lend to retail, municipal and corporate customers, and may supplement this form of financing and increase the amount of funds that can be deployed, securitisation. Indeed, bank loans, typically long-term, 'burden' bank balance sheets, enter into equity, worsen maturity mismatches between assets and liabilities, and may be subject to limits (industrial lending, indebtedness, regulatory, etc.) after a certain volume. Securitisation can benefit from financial techniques in the field of bank refurbishment lending:

- the balance sheets may be partially released, allowing banks to issue new loans;
- risk-sharing may occur as securitisation results in sharing the same risks among investors purchasing the securities;
- it is also suitable for using targeted state incentives and subsidies, as the state itself can support the process at several points (investor, guarantor, etc.).

In order to implement these financial techniques and operations, the European Union40 created the possibility of a sufficiently structured and supervised securitisation market in the wake of the global financial crisis of 2007 and 2008, with the Securitisation Regulation adopted in 2017. The Securitisation Regulation, applicable in all Member States of the European Union, directly applicable as of 1 January 2019, established, among other things, a framework for simple, transparent and standardised (STS[41]) securitisation, which prioritised simple and transparent instruments over complex structures that greatly contribute to the emergence of the crisis.

The aggregation of bank refurbishment loans can make them suitable for "bonds" by means of STS securitisation, thus attracting domestic or even foreign investors' resources while enhancing the bank's (re)credit capacity.

Issuance of green bonds

In Hungary, apart from green government bonds and a corporate green bond issue, no green bonds have been issued so far, although international examples show that green bonds are suitable to refinance energy efficiency renovations. In this case, the issuer may be an ESCO-type company, a municipality or a bank.

In the case of green bonds issued by companies or municipalities, bond repayments may be calculated or settled from energy efficiency savings. In the case of bank issuance, based primarily on the relatively well-developed domestic mortgage bond market, the form of green mortgage bill is the most appropriate form of the bond (in this case, there is no direct link between the refurbishment loan and the cash flows of the mortgage bond). In the case of green government debt, the State may finance the renovation of state-owned properties from the bonds itself.

The EU Green Bond Standard under construction 42 explicitly contains provisions on building renovations:

[40]Regulation (EU) 2017/2402 of the European Parliament and of the Council of 12 December 2017 laying down a general framework for securitisation, establishing a specific framework for simple, transparent and standardised securitisation and amending Directives 2009/65/EC, 2009/138/EC and 2011/61/EU and Regulations (EC) No 1060/2009 and (EU) No 648/2012

[41] Simple, transparent and consolidated

[42]EU Technical Expert Group on Sustainable Finance: Usability Guide – TEG proposal for an EU Green Bond Standard, March 2020

Use	Activity	Metric	Threshold	DNSH* criterion
Green buildings	Renovation of existing buildings	Number of renovations Energy savings (kWh/m$^{2)}$	According to national legislation, or At least 30 % savings in primary energy consumption	Recovery of construction and demolition waste
Green buildings	Specific refurbishment measures, Installation of renewable energy production capacity, Professional aid	According to national legislation	By national or EU legislation	Recovery of construction and demolition waste, avoidance of hazardous materials and water wastage, prioritisation of recycled materials

**DNSH: Do No Significant Harm, i.e. avoidance of effects contrary to environmental objectives*

9Table: Building renovations in the standards of the EU Green Bond under construction (Source: MNB)

Measures

28) **Public incentives for the issuance of green bonds – design of a programme**

Scope of the measure: Retail sector, corporates, municipalities
Duration of the measure: 2022 onwards
Brief description of the measure: The aim of the measure is to ensure that the domestic green bonds that finance renovations are to be promoted in accordance with the standard of the future EU Green Bond, and may therefore be suitable for reaching foreign investors, as the EU standard will demonstrate a uniform quality guarantee.
The launch of green bond issuances to be issued by private operators financing renovations primarily requires public incentives, i.e., where appropriate, a guarantee (see paragraph of this chapterIX.2), interest rate subsidies or other targeted support.
In theframework of the European Commission's Structural Reform Support Service, a comprehensive programme for public incentives for the issuance of green bonds will be developed as part of the "Designing recommendations for a sustainable capital markets strategy and action plan" 2020-2021.
In the case of green government debt, the measure will be developed in accordance with the Green State Bond Programme of the Climate and Nature Action Plan, i.e. the person purchasing a green bond to finance budgetary expenditure for the planned climate protection supports the issue of climate protection, as the Hungarian Government commits to dedicate the money from it only to climate-friendly programmes. In the case of corporate, municipal or banking issues, the financing of green bonds would involve investments according to the EU taxonomy or other green standards, which would therefore also be in line with the Government's Climate and Nature Action Plan and the Clean Development Strategy.
Expected impact of the measure: Green bonds can act as catalysts for the launch of the entire green financial segment, by 'placing' the country on the map for international markets, ESG[43]

[43]ESG is an acronym for environmental, social and governance characteristics.

investors, while the issuer itself, by definition, obtains a significant reputational benefit compared to its competitors. At present, green investment funds managed by Hungarian operators hold foreign green assets (since there are no green bonds issued in Hungary). Thus, in the context of market development, the launch of the domestic green bond issuance is of particular importance, which would also allow investors' assets managed by domestic fund managers and asset managers to finance domestic green investments.
Person responsible for action: Minister for Finance

IX.2. Amending or supplementing policy decisions where necessary

The lack of large-scale building renovations, including market barriers such as high implicit discount rates on the part of owners, lack of information, uncertainties about returns, long payback periods, the ability of bonds to manage only part of them (primarily the provision of long, ideally cheaper and additional sources) can manage them. Therefore, the launch of green bond issuances to be issued by private operators financing renovations primarily requires public incentives.

IX.2.1. Development of the concept of a green finance guarantee organisation

In the financing practices of commercial banks, environmentally more sustainable investments do not benefit from other investments when making credit risk decisions.

At the same time, investments that also support environmental sustainability, such as real estate renovations, have positive externalities compared to other investments (mainly by reducing greenhouse gas emissions related to energy use). As these positive externalities are not taken into account by market participants, without public incentives there will be less investment than socially optimal. The supply of resources can be shifted by a state guarantee or interest rate subsidy to a level that already achieves an appropriate market balance.

Due to its multiplicative nature, the size of a unit of support (according to the thumb rule) allows the provision of up to ten to twenty units of guaranteed loans, while increasing the growth rate of green investments to multiples. Furthermore, due to its counter-cyclical operation, the guarantee organisation is well suited to fulfilling its role as a green stimulus for the economy, to counter the more risk-averse strategy of banks, and to finance green investments by customers without substantial collateralisation.

There are several examples of the effective functioning of a green guarantee organisation, a green fund, in Europe: Denmark, Bulgaria, Estonia. Energy efficiency renovations are one of the main focal points of their activities, i.e. they can play a strong role in the implementation of a national long-term renovation strategy. In their service range, direct lending sometimes appears alongside different forms of guarantees (see Green Bank below).

In Hungary, the guarantee can also be applied to loans financing the modernisation of non-residential properties, as well as to the financing of investments in solar collectors and solar panels of household size.

Possible activities and benefits of a Green Finance Guarantee Organisation:

- allows for the promotion of traditional lending by commercial banks, whether ESCO-type financing or the issuance of green corporate bonds, whether privately or publicly owned;
- one of the pillars of encouragement is the concentration of high-level green industry know-how and expertise in the guarantee organisation, including in areas where a commercial bank has no or very limited historical experience and therefore has low or no risk appetite;
- it may also encourage participation-type placements (e.g. support to green venture capital funds;
- it may ensure an increase in the supply of financing by reducing financial risks.

The setting up of a dedicated Green Guarantee Organisation in Hungary could make a significant contribution to expanding commercial bank lending for renovations and the launch of green bond issuances financing renovations.

Furthermore, by the end of June 2021, the minister responsible for innovation and technology, with the assistance of the Minister of Finance and with the involvement of the Hungarian National Bank, shall develop the financing products ensuring the implementation of energy efficiency measures and the detailed financing rules to support investments within the energy efficiency obligation scheme, possibly including the development of the concept of such a guarantee organisation.

IX.2.2. Establishment of a green bank

In the long term, Hungary plans to set up a Green Bank, as banks may provide insufficient or priced financing in certain segments even if the guarantee organisation is guaranteed.

The Green Bank can do more than the Green Guarantee Organisation in its capacity to catalyse the financing of other actors (through risk reduction) rather than being able to catalyse a wider range of activities:

- co-financing alongside commercial banks;
- lending on a stand-alone basis;
- acquisition of shares in projects;
- administering securitisations.

IX.3. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- Number of integrated/consolidated projects – number,
- Annual issuance of green bonds financing energy efficiency investments -,
- EU green bond refurbishment indicators according to standard
    a. number of refurbishments – number,
    b. energy savings – TJ.

IX.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

It has been confirmed by professional organisations and banks that green bonds are highly suitable to refinance energy efficiency renovations and that they can act as catalysts for launching the whole green financial segment.

X. Measures to reduce perceived risks in energy efficiency related activities for investors and the private sector

X.1. Justification of Article 2a (3b) of the EPBD: Ensure that adequate measures are in place for investors and the private sector to reduce the perceived risks in energy efficiency related activities

Content of the Chapter: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings pursuant to Article 2a (3b).

Mobilising investments to increase energy efficiency is supported by the introduction of public guarantee schemes, specifically linked to 'green' loans for energy efficiency or even green bonds. The assumption of some or all of the credit risk encourages banks to increase their "green" energy efficiency loans and, ideally, to provide them at a better price through well-calibrated regulation. Such guarantee schemes implemented in some countries of the European Union demonstrate that this can be an effective measure for investors and the private sector to reduce the risks associated with energy efficiency activities.

The above measure would not only strengthen the Hungarian National Bank (hereinafter: MNB) – the central bank of Hungary – together with the incentive effect of the recent introduction of capital relief on loans financing energy efficiency, but also the initiative of the MNB to encourage the issuance of green bonds and mortgage debentures, can be an effective tool for leveraging the resources of investors in the domestic and international markets.

Measures

29) **Green Capital Requirements for Housing Scheme**

Scope of the measure: Credit institutions, retail sector
Duration of the measure: 2021 — 2030 (first step 2021-2025)
Brief description of the measure: With a view to supporting the uptake of green financial products and improving the energy efficiency of the domestic real estate stock, the MNB announced a capital reduction in December 2019 for loans granted to Hungarian credit institutions for green residential purposes between 1 January 2020 and 31 December 2023, fulfilling the conditions.
The methodological basis for the application of the capital requirement relief is the "green hypothesis" that establishes a lower credit risk of loans for energy-efficient homes. That, due to lower overhead costs, people living in green real estates have higher income available for repayment, which reduces the probability of default of loans. As well as changes in the regulatory environment and consumer attitude, green properties are expected to be more value-proof in the long term, so that their enforceability as collateral may be more advantageous.

The measure can simultaneously support an increase in green risk awareness, the development of a green financial market, and support a lower credit risk hypothesis on a large sample.

Credit institutions shall transfer the savings from the lower cost of capital to their clients in the form of an interest rebate of at least 0.3 percentage points (green interest rebate). This constitutes a noticeable discount for customers.

The Discount shall be available for energy-efficient loans aimed at:

- The sale or construction of a residential building corresponding to the energy quality rating 'BB' or better,
- the implementation of one or more of the following refurbishment measures carried out in a residential building (even with a lower rating than BB):
    - installation of solar panels or solar collectors; Geothermal, air-to-water, air-to-air heat pump installation; Installation of wind turbines; Installation of heat and electrical storage units; Thermal insulation of building boundaries; Replacement of the façade window with an energy-saving window; Installation of shadowing techniques; Installation, replacement or refurbishment of heating, cooling or ventilation systems, including connection to a district heating system; Developing energy-efficient lighting; Supporting the development of power generation (biomass, sun) of the Energy Community to replace its own consumption; installation of low—water kitchen, toilet or bathroom sanitary systems; Installation of generation 3 smart metering systems to monitor the use of electricity; Installation of zonal thermostat systems, smart thermostats and sensors; Installation of building automation (Building Management System) systems.

Planned cost of the measure: None, the MNB shall grant the capital allowance to credit institutions. At the same time, State involvement, such as targeted state aid or the linking of public interest rates, tax relief, state guarantees, could help to increase the spread of these types of loans, and would provide a wider positive incentive scheme. In this case, the budgetary claim depends on the level of the tax or interest reduction to be granted, or on the level of the state guarantee.

Expected impact of the measure: The measure is expected to boost residential modernisation investments and improve the energy efficiency of the domestic building stock, as well as to contribute to achieving or approaching nearly zero-energy buildings (BB) of the domestic building stock.

Person responsible for action: Hungarian National Bank

30) **Extension of development tax benefit in the framework of an economic protection action plan**

Scope of the measure: SME sector

Duration**of the measure: Continuous from**2020

Brief description of the measure: In the framework of the economic protection action plan, Hungary shall gradually reduce the threshold for qualifying investments by small and medium-sized enterprises from 2020 to 2022. Accordingly, the value of investments above HUF 500 million, which are currently in force and are eligible for development tax relief for small and medium-sized enterprises, changes in the following way:

- 300 for small enterprises and HUF 400 million for medium-sized enterprises from 2020,
- 200 for small enterprises and HUF 300 million for medium-sized enterprises from 2021,
- From 2022 tax relief is available for small companies at HUF 50 and for medium-sized companies at HUF 100 million.

Expected impact of the measure: The lowering of the investment threshold will make the discount available to some 7 companies.

As investments of at least HUF 100 million in present value installed and operated in the[44] territory of the Free Enterprise Zone can also be used, Hungary is particularly important for the recovery of investments in these areas for renovation purposes.

Person responsible for action: Minister for Finance

31) **'Falusi CSOK' — Extension of the family home creation allowance (CSOK)**

Scope of the measure: Retail sector

Duration**of the measure:** Examination of continuous extension of CSOK: From 2023 onwards

Brief description of the measure: Non —refundable state aid for residential purposes up to HUF 10 million (up to HUF 600 million for one child, HUF 2 million for two children, HUF 10 million for three or more children) and the related interest-subsidised loan facility (interest subsidy for home-building for families with several children) up to HUF 15 million (up to HUF 10 million for eachchildand up to HUF 15 million for three or more children).

In the case of CSOK, state aid may be used for construction, purchase and extension. If a specific condition is met (the real estate is located in a preferred small commune defined by law – "Falusi CSOK"), support may also be used for modernisation.[45] In the course of the modernisation, support may be granted, inter alia, to: Insulation of residential buildings, replacement of windows and use of renewable energy sources.

The energy efficiency and national economic impact of the grant and the extension of the use of the interest-subsidised loan for the modernisation of loans throughout the country will be examined, and its feasibility will be considered from 2023 onwards.

Expected impact of the measure: The measure shall contribute to achieving the highest possible share of the domestic building stock or reaching the level of nearly zero-energy buildings (BB).

Person responsible for action: Minister for Finance

32) **Improving the development position of regions and counties**

Scope of the measure: Primarily local governments and their institutions and local government-owned economic organisations

Duration**of the measure:** Continuous**from**2023

[44] The various socially/economically detached areas of the country, namely:
DOC. 27/2013. (II. 12.) Government Decree on the rules on the establishment and operation of free enterprise zones and the use of discounts, Annex 1 to Decree No 27/2013 (II. 12.) Government Decree No/: Municipalities of free enterprise zones

[45] DOC. 17/2016. (II. 10.) Government Decree on family home creation allowances for the purchase or extension of a second-hand dwelling

Brief description of the measure: The territorial development of the least developed counties and disadvantaged areas, including regional and local development, with a view to economic recovery, job preservation and job creation, as well as population retention, family protection and quality of life. Investments in the energy modernisation of majority local government-owned buildings, including thermal insulation and depension exchange, cooling – heating and domestic hot water systems, modernisation of building lighting systems (e.g. use of intelligent lighting systems).
Expected impact of the measure: The measure contributes to reaching or approaching nearly zero-energy buildings (BB) levels of the domestic municipal building stock, thus strengthening the exemplary behaviour of the public sector and the local government sector.
Person responsible for action: OP Managing Authority

X.2. Amending or supplementing policy decisions where necessary

These policy orientations, such as tax incentives and targeted grants, also support the objectives set out in this chapter in the long term. In order to ensure efficient use, it is necessary to simplify the administrative procedures for their use and use.

The policy orientations described in IX.2Chapter (Establishing a Green Finance Guarantee Organisation and the establishment of a Green Bank) can also effectively mitigate the perceived risks for energy efficiency related activities.

X.3. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- amount of guarantees for refurbishment loans – HUF,
- how many people made use of the option of refunding VAT – HUF,
- number of undertakings using the TAO after energy efficiency investments and renovations —
- how many families used CSOK, in what value – HUF and HUF.

X.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

The following additional proposal has been made to this chapter:

It would be useful to promote that, with regard to the corporate tax relief available under Section 22/E of Act LXXXI of 1996, during the implementation of an investment or renovation for energy efficiency purposes, up to 65 % of the eligible costs may be enforced in the form of tax relief. Many companies are not aware of this possibility.

The above addition will be taken into account when designing awareness-raising measures.

The popularity of tax advantages is also indicated by the vote in the course of the consultation, with the active participation of professional organisations. The extension of tax advantages, as an optimal public incentive, received the second highest number of votes:

What State incentive do you consider to be the most optimal with which the market can be moved to the largest volume?

1. State promotion of ESCO schemes – 16 %
2. Encouraging the take-up of EU financial instruments – 16 %
3. Increase in state aid – 11 %
4. **Continuation of preferential Energy Efficiency Loan Scheme – 26 %**
5. Extension of tax breaks – 21 %
6. Promotion of green finance through commercial bank credit facilities – 11 %

XI. Measures to attract additional private investors in addition to public funding or to address market failures

Content of the Chapter: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings pursuant to Article 2a (3c).

XI.1. Justification of Article 2a (3c) of the EPBD: Ensure that adequate measures are in place to attract private investors or address market failures

In order to raise the capital necessary for the transformation of the domestic energy sector, it is essential to raise private resources. In particular, the use of instruments with low aid intensity and repayable funds should be prioritised, avoiding oversubsidisation of investments. Private funds also act as a multiplicative channel of available development resources, providing additional room for manoeuvre to finance transformations. The available development resources, combined with the encouragement of the involvement of private funds, can be used most effectively to improve the energy efficiency of buildings. The emergence of public programmes in the energy efficiency investment market has a significant impact on stimulating private investment and is able to move the market to a large extent. International experience shows that private investment of up to ten times the amount of aid granted can be mobilised using carefully designed forms of support.

Products of commercial banks

Commercial banks offer additional retail loans that can be used, inter alia, for the purchase and installation of solar panels. Furthermore, there are currently credit institutions whose mortgage or personal loans support energy efficiency improvements by the energy efficiency of the funded real estate being a discount on interest rates for the customer.

One third of the personal loans are estimated to be spent on housing renovation projects.[46] Residential loans and personal loans for refurbishment could reach up to HUF 40 billion in 2019.

[46]MNB Housing Market Report, November 2019

Measures

A loan programme aimed at increasing the energy efficiency and renewable energy use of residential buildings available since 2017 is one of the related measures currently in place. Among the non—market-based banking products for energy efficiency purposes, the reimbursable European Union grant-based retail energy efficiency loan scheme, which is subject to reimbursement by the Hungarian Development Bank (hereinafter: MFB) through its commercial banking partners.

The objective of the measure is a soft loan of 0 % with a fixed interest rate. The duration of the loan shall not exceed 20 years, the maximum amount shall be HUF 10 million for natural personsand a maximum of HUF 7 million per dwelling in the case of co-ownership and housing cooperatives. The amount of own resources required shall be at least 10 % of the eligible costs of the project.
The following activities shall be eligible for funding under the Loan Programme:

- Activities to improve energy efficiency:
  - thermal insulation of devices separating heated and unheated space;
  - replacement of windows;
  - installation of shielding and shading devices (supported together with other individually eligible activities);
  - modernisation of heating or domestic hot water systems (the completion of chimney engineering improvements may only be supported with the modernisation and replacement of the heat-producing plant);
  - modernisation of heat recovery equipment;
  - energy-saving transformation of existing indoor and outdoor lighting systems (supported together with other eligible activities on their own).
- Activities related to the use of renewable energy:
  - installation of solar collector systems (use hot water);
  - construction of briquettes, pellets, wood chips, wood gasification boiler systems;
  - installation of a solar panel system (only self-supply);
  - heat pump systems for use (heating/cooling/use hot water production, heating assistance).

Hungary's objective is to ensure that the reinvestment of the interest-free loan package MFB introduced for residential energy-efficient building modernisation is allocated exclusively to the renovation of residential buildings (deep renovations among households to be supported). As such, this is a "revolving fund", i.e. regressive amounts are already considered as domestic budgetary resources.
The measure will increase the energy efficiency of residential buildings and the use of renewable energy sources related to residential buildings inthe residential sector, thusreducing greenhouse gas emissions.

XI.2. Amending or supplementing policy decisions where necessary

Future action/intervention plans

The banks' market-based loans and the programmes of the MFB and the MNB shall only help creditworthy customers with adequate income and own shares to finance deep renovations. The most efficient use of public resources can be achieved if grants target a group of beneficiaries that would be excluded from market lending based on income or other credit risk considerations.

Extending loan guarantee schemes to deep renovation investments may represent the most effective form of use of state resources, since in this case only a part of the loan amount disbursed by commercial banks is actually "realised" by the State. In combination with the different credit options, a partial or full assumption of credit risk will allow customers to obtain bank financing under more favourable conditions.

Community financing

Decentralised forms of energy production and the development of local energy communities require high resources. New alternative methods of raising capital may be used on the basis of internationally known models. Such an innovative business model, popular crowdfunding.

The construction of small household power plants is also included in the broader concept of renovation. On the basis of the relevant EU Directive, the possibility of establishing "renewable energy communities" will soon be opened in Hungary too: Natural persons, municipalities or SMEs may "consort" to cooperate in a legal form for the production of renewable energy. The community, as a legal person, will be able to finance the investment (in addition to its own resources) from external sources.

Hungary shall establish in its national law the institution of renewable energy communities by 30 June 2021. It is important that the legislation also takes due account of the eligibility of funds, since the legal form will be one of the determining factors for raising funds on the market. In its consultation on banks launched in April 2020, the MNB, with the involvement of credit institutions, examines whether retail bank lending can be one of the funding bases for renewable energy communities.

XI.3. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

- public energy efficiency investments as a percentage of total energy efficiency investments – %,
- public-private partnership initiatives —
- annual lending for green (for energy efficiency or renewable energy production) – HUF/year,
- annual green lending (for energy efficiency or renewable energy production) in proportion to the state aid (reimbursable and non-reimbursable grant, guarantee) – %,

- Greenhouse gas savings per unit of public support – CO2eq,
- number of renewable energy communities, annual amount of energy they produce – kWh.

XI.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

In the case of the loan programme "Loan to increase the energy efficiency and use of renewable energy in residential buildings" (VEKOP-5.2,1-17) published in the framework of Széchenyi 2020, the funding needs of the loans received exceeded the available amount, so the reception of applications was suspended on 17 October 2019. In other words, it is not possible at present to make use of this possibility in the region of Central Hungary due to the exhaustion of resources. As the programme is very successful, there was also a need for the technical consultation to continue the programme. The possibility of doing so is under consideration.

The above request is confirmed by the vote in the consultation, with the active participation of professional organisations, the outcome of which also confirms the need to continue the Loan Programme:

What State incentive do you consider to be the most optimal with which the market can be moved to the largest volume?

1. Public promotion of ESCO schemes – 16 %,
2. Encouraging the take-up of EU financial instruments – 16 %,
3. Increase in state aid – 11 %,
4. **Continuation of preferential Energy Efficiency Loan Scheme – 26 %,**
5. Extension of tax advantages – 21 %,
6. Promotion of green finance through commercial bank credit facilities – 11 %.

XII. Measures to enforce guidance on investment in an energy-efficient public building stock in line with Eurostat guidelines

XII.1. Justification of Article 2a (3d) of the EPBD: Ensure that appropriate measures are in place to enforce guidance on investments

Content of the Chapter: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings – pursuant to Article 2a(3)(d).

in an energy-efficient public building stock in line with Eurostat guidelines

In line[47] with Eurostat guidelines, Hungary is examining the introduction of energy performance contracts (hereinafter: EPC), in order to contribute to the promotion of investments in energy efficiency improvements in public buildings.

To this end, the national legal framework for the ESCO service is being reviewed and the recommendations of the European Commission are being transposed.

Overview of the national legal framework for ESCO funding and transposition of the Commission's recommendations:

In autumn 2017, the European Commission together with the European Statistical Office (Eurostat) resolved a serious obstacle to the popular and popular guaranteed EPC contracts in the Member States, in particular among public actors, and related energy investments: It amended the guidelines previously issued by Eurostat on the accounting of EPC-type agreements in the general government. In the following, the new Eurostat guidance simplifies and facilitates the rules on accounting between the contracting parties, the beneficiary and the provider of the energy efficiency improvement measure (ESCO).

Domestic market barriers

In recent years, ESCO investments have been hampered by the following market trends.

- The low global price of energy prices, which has led to a significant increase in payback times. The turnaround already occurred in 2019.
- The high volume of EU non-refundable funds did not favour the use of ESCO solutions.
- The costs of refurbishment of the public building are high. The shortest payback periods are also generally longer than 10 years. In the case of ESCO investments so far, service providers generally concluded contracts with a maximum duration of 15 years, which could still benefit from energy savings. In the case of contracts with a maturity of 15 years, the

[47] Eurostat, European Investment Bank: A Guide to the Statistical Treatment of Energy Performance Contracts, May 2018

owner shall contribute his own contribution to the investment, which is a public debt-increasing factor.

XII.2. Amending or supplementing policy decisions where necessary

Regulatory barriers

Under the current rules, an ESCO company cannot be involved in a project where EU funds are used, since all EU funds are subject to the condition that a given asset/investment is owned by the applicant or is activated by the applicant and must ensure its maintenance/operation for a given period of time. This is contrary to the fact that an ESCO investment is recorded in the accounts of the ESCO company.

Necessary intervention

Hungary addresses this issue by[48] transposing the 2017 European Commission-Eurostat recommendations into Hungarian law. If an ESCO provider providing an EPC contract bears the financial and economic risk and the benefit of the investment materialises through its better operation, the investor will also be the "economic owner" of the investment. The cost of the investment would thus be reflected in the accounts of the ESCO service provider, which is also in line with market practice.

In order to strengthen confidence in ESCO investments, the following changes shall be made by 2030:

- Requiring measurement-based accounting, assessing the state and consumption patterns prior to the investment, and monitoring savings on a continuous or regular basis, as well as feedback from the ESCO service provider to the project promoter.
- Ex ante settlement of the effects of the energy price change in the contract.
- The definition of base operating costs and associated operating conditions, against which savings can be undertaken.
- It is worth sharing the savings with the project promoter, so that he/she will also be interested in making savings as much as possible, thus making it easier to avoid faulty consumer behaviour.

Against this background, Hungary looks forward to the introduction of EPC contracts. It is particularly important to develop contractual elements related to financial and technical risk sharing and compensation.

XII.3. Monitoring system and indicators

In order to assess the effectiveness, an evaluation report on the effectiveness of each measure shall be prepared in an annual cycle based on the following indicators:

[48]European Commission, Eurostat: Eurostat Guidance Note, the recording of energy performance contracts in government accounts, September 2017.

- Number and trend monitoring of EPC contracts concluded annually — HUF, kWh, %,
- Monitoring the number of EPC contracts in each public building sector (by ownership, size of building, function — HUF, DB,
- Monitoring the payback period of EPC contracts – year,
- Predict energy savings expected by EPC contracts for the duration of the contracts – kWh,
- Comparison of forecasts with real savings — %,
- monitoring of over-maturity savings projections in a central system, thus facilitating savings planning – PJ.

XII.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

On the basis of the feedback received, the importance of the introduction of EPC contracts by professional organisations for ESCO schemes has been confirmed.

XIII. Measures to improve information on relevant energy efficiency renovations and financing instruments

XIII.1. Justification of Article 2a (3e) of the EPBD: "Ensure that appropriate measures are in place to put in place accessible and transparent tools to provide advice on relevant energy efficiency renovations and financing instruments: Providing a one-stop shop for consumers and for enforcing the provision of energy advisory services"

Content of the Chapter: Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings pursuant to Article 2a (3e).

Improving information on relevant energy efficiency renovations

National Network of Energy Engineers

According to[49] Article 7 of the Energy Efficiency Directive, each EU Member State shall achieve annual final energy savings of 1.5 % for energy end-users. This obligation is consistent with the objectives of the New National Energy Strategy. The Energy Efficiency Directive[50] was transposed by Act LVII of 2015, which is of great importance in the national energy legislation. Section 9/A of the Act[51] ordered the establishment of the National Energy Network, and the implementing instructions for the Act – 122/2015 Government[52] decree —determined the tasks of the National Energy Network.

Against this background, the National Energy Network was set up in 2017 to promote the efficient operation of public institutions, including municipalities.

The tasks of the National Energy Network shall be performed by the Hungarian Energy and Public Utility Regulatory Authority pursuant to Section 21/D(3) of Act LVII of 2015 on energy efficiency.

Within the scope of the Network's tasks related to buildings owned and used by public institutions and used for the fulfilment of a public service mission:

- provide free energy advice to public institutions,
- maintain continuous contact with local governments,
- encourages public institutions to set up an energy management system, including energy audits, at regional and local level;

[49] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

[50] Act LVII of 2015 on energy efficiency

[51] Act LVII of 2015 on energy efficiency, 9/A Energy efficiency tasks related to buildings owned and occupied by public institutions, Section 11/A,

[52] DOC. 122/2015. Government Decree No/of 26 May on the implementation of the Act on energy efficiency

- provide technical assistance for the preparation of the energy saving action plan for buildings owned and occupied by public institutions and intended for the fulfilment of a public service mission,
- provide professional assistance to the person responsible for operating a building owned and used by public institutions and serving a public service mission in connection with the reporting of the energy consumption data of the building,
- contribute to the development of the county spatial development programme,
- and, upon request, participates in the conclusion of energy contracts,
- furthermore, upon request, it shall provide advice on the control of energy procurement contracts and energy bills in the interest of the public institution,
- it shall also provide technical support in the case of energy procurement upon request.[53]

In addition to the above, Hungary plans further awareness-raising programmes to improve information on energy efficiency in the residential and business sectors.

Measures

33) **Raising awareness and improving information in the residential and business sectors**

Scope of the measure: Retail sector and business sector
Duration**of the measure: Continuous as of**2023.
Brief description of the measure: Hungary to improve the information of businesses and citizens on energy efficiency renovations and financing instruments

- set up an online information portal to showcase good practices in energy renovations and industrial energy saving opportunities,
- organise awareness-raising campaigns for business leaders, with the involvement of chambers, on the scope and energy saving potential of corporate tax benefits,
- organise a presentation for professionally interested university students and secondary education groups to showcase the completed energy saving and renewable energy projects;
- encourages higher education institutions to tender for students to develop energy saving innovations (on real buildings);
- support professional organisations in organising energy conferences,
- launch artistic and cultural competitions in the field of energy-conscious use of buildings.

Expected impact of the measure: Up-to-date, easily accessible relevant information improves the willingness of citizens and businesses to undertake energy renovations and a greater commitment to energy efficiency is expected.
Person responsible for action: Minister for Energy Policy

Measures to increase information on green financial products

34) **Find a green Financial Product**

Scope of the measure: Retail sector

[53] Section 7/D (1) of Government Decree No 122/2015 of 26 May

Duration**of the measure: Continuous from**2023

Brief description of the measure: Hungary the Hungarian National Bank (hereinafter "Hungarian National Bank") The MNB), with the involvement of the MNB, intends to introduce campaign-like and permanently available measures to ensure that the largest possible proportion of the population can receive information on the available green financial products, in particular on green loans that can be used for renovations. One of the tools for this is the management of the MNB, which is expected to be launched in 2021.

Expected impact of the measure: The construction and operation of the green product seeker will allow only credit, savings, investment, or even insurance products that meet professional standards to be certified by the MNB. On the one hand, this will increase customer confidence and obtain more quickly and fully information on the availability of green products.

Person responsible for action: Hungarian National Bank

Conferences, information days, training sessions

The Government also relies heavily on the central bank to develop education and knowledge on climate-friendly finance. Following the successful eventheld in November 2019, the MNB, in[54] cooperation with the European Bank for Reconstruction and Development (EBRD)[55] and the International Organisation of Green Central Banks (NGFS), organised an international green finance conference entitled "Green Finance Conference for the Environmentally Sustainable Recovery of Economic Growth" in Budapest on 12 October 2020. The conference focused on financial challenges and opportunities related to curbing climate change, with a particular focus on the "greening" of the energy sector. The main target audiences of the conference are financial institutions, regulatory authorities, green NGOs, researchers, students, both domestic and medium-east Europe. The event is a permanent, annual forum with a recurring theme on energy efficiency.

In cooperation with the European Commission and the MNB, the Sustainable Energy Investment Forum (Seif) took place in Budapest on 13 October 2020 entitled "National Roundtable on Financing Energy Efficiency in Hungary", which also addressed energy efficiency renovations in detail.

In order to involve stakeholders, the Ministry of Innovation and Technology, which is responsible for the field, organises workshops and seeks to gather the views of the relevant stakeholders on the current situation and future plans during interviews.

Interviews were conducted on the performance of the construction industry on behalf of the ITM. In addition, two workshops were organised in November 2019 ("Building Renovation Concepts, How beyond 2020") and in March 2020 ("Renovation concepts 2020-2030") on the topics of building statistics and planned modelling methodology, as well as possible renovation scenarios.

For the second phase of the project, more than 15 interviews are planned with various stakeholders, including representatives of banks, ESCOs and utilities.

XIII.2. Amending or supplementing policy decisions where necessary

[54]The Network of Central Banks and Supervisors for Greening the Financial System: Https://www.ngfs.net/en
[55]European Bank for Reconstruction and Development: Https://www.ebrd.com/home

The measures taken to improve professional and financial information, to be implemented in the 2021-2030 period, will be coordinated in order to achieve a one-stop shop for users.

Measures

35) **One-stop shop for users**

Scope of the measure: Retail sector, micro-enterprise and SME sector
Duration**of the measure: Continuous from**2023
Brief description of the measure: Awareness-raising programmes shall assist the public and the business sector in obtaining technical information on energy-efficient renovations and the use of buildings. Awareness-raising programmes shall be gradually increased by providing advice on financial possibilities. The MNB shall provide the professional support for financial advice.
The possibility of online processing has been established, so that the user can participate in counselling, even by using an online video chat application, in order to facilitate the wide availability of the service.
Expected impact of the measure: It is easier for users to access a wide range of information, thus encouraging investment in energy-efficient renovations.
Person responsible for action: Minister for Energy Policy

XIII.3. Monitoring system and indicators

- Awareness-raising initiatives – number, target audience reached, target audience involved in actions)
- Number of large-scale events and participants on energy efficiency – number of participants
- International initiatives in which Hungary participates – db
- Awareness-raising campaigns to promote and educate energy – businesses and population, number of participants
- Use of advice from the National Energy Network, broken down by regional level – occasion
- Number of conferences, events, participants related to energy efficiency renovations and financing instruments – number of participants

XIII.4. Public technical consultation and evaluation

On 4 August 2020, the social consultation and technical consultation of the HTFS took place with the active participation of professional organisations, banks and stakeholders.

We agree with the suggestion made at the Forum that local authorities should be more closely involved in the information and awareness-raising work, as they are well aware of local conditions and are therefore able to communicate effectively to the public and local businesses.

XIV. Milestones (2030, 2040 and 2050)

In order to monitor the achievement of the objectives set by the Strategy, Hungary shall set the following indicative milestones:

Indicative milestones related to the energy efficiency of buildings:

1. Reduction of carbon dioxide emissions achieved by reducing primary (primary) fossil energy needs for energy purposes in buildings (heating, cooling, domestic hot water production, cooking, lighting, ventilation, building recharging, intelligent building energy energy systems) compared to the 2018-2020 average, (%)

YEAR	Reducing CO emissions related to the energy use of buildings from the 2018-2020 average level
2030	20 % (residential) + 18 % (public building)
2040	60 %
2050	90 %

2. The percentage of nearly zero-energy buildings (without taking into account buildings within the meaning of Article 4(2) of Directive 2010/31/EU); (%)

YEAR	Percentage of nearly zero-energy buildings
2030	20 %
2040	60 %
2050	90 %

3. Decrease in the number of households eligible for support compared to the 2021 baseline, (%)

YEAR	Reduction of households to be supported from base level 2021
2030	50 %
2040	80 %
2050	100 %

4. Decrease in final energy consumption of public buildings compared to the 2018-2020 average, (%)

YEAR	Decrease in final energy consumption of public buildings compared to 2018-2020 average
2030	18 %
2040	40 %
2050	60 %

5. Guaranteed minimum number of recipients of energy efficiency advice at engineering level in the framework of the National Energy Network

YEAR	Guaranteed minimum number of SMEs receiving engineering energy efficiency advice in the framework of the National Energy Network	Guaranteed minimum number of natural persons receiving engineering energy efficiency advice in the framework of the National Energy Network
Total 2021-2030	6 000 items	8 000 persons/year
Total 2031-2040	15 000 items	30 000 persons/year
Total 2041-2050	10 000 items	15 000 persons/year

XV. Conclusion

XV.1. Summary of legislative tasks set out in the strategy

Legislation to be amended	Modification Description
DOC. 7/2006. Decree No/of 24 May of the Minister for Transport and Transport on determining the energy characteristics of buildings	review and amendment on several themes
DOC. 176/2008. (VI. 30.) Government Decree on the certification of the energy characteristics of buildings	review and amendment on several themes
DOC. 264/2008. (XI. 6.) Government Decree on the energy inspection of heating installations and air-conditioning systems	review and amendment to introduce sanctions under the obligation
DOC. 16/2016. (II. 10.) Government Decree on housing support related to the construction and purchase of new dwellings	amendment of the conditions of use of the CSOK

XV.2. The measures set out in the Strategy and their estimated resource requirements

		Measure title	Start and status of action		Organisation or Ministry responsible for coordination	Indicative financial needs planned
I./3	1)	Establishment and up-to-date registration of public buildings	2023	2027	MEKH	HUF 200 000 000
	2)	Establishment of a building renovation monitoring system (ÉMOR)	2023	2027	Minister for Energy Policy	HUF 50 000 000 per year
III./1	3)	Home Renovation Programme	2021	2027	Minister responsible for families without portfolio	—
	4)	Examination of the possibility of extending the scope of eligible activities	2023	2027	Minister for Energy Policy	HUF 5 000 000
IV./2	5)	Verification of the existence of an energy performance certificate	2023	2027	Minister for Energy Policy	HUF 10 000 000
IV./3	6)	Introduction of EPC contracts for renovations and involvement of ESCO companies in projects	2023	2027	Minister for Justice, Minister for Energy Policy	HUF 5 000 000
IV./4	7)	Education, consumer awareness	2023	2027	Minister for Energy Policy	HUF 150 000 000 per year
V./1	8)	Energy modernisation of health institutions under ESCO-type energy service contracts	2020	2022	Minister for Human Resources, State Health Care Centre	NEG Zrt. own resource, investment loan, NFK
V./2	9)	Introduction of mandatory energy efficiency audits in public institutions	2023	2027	Minister for Energy Policy	HUF 500000 000 per year
VI./1	10)	Preparing for the integration of standards related to smart technology	2023	2027	Minister for Energy Policy	HUF 10 000 000

		Measure title	Start and status of action		Organisation or Ministry responsible for coordination	Indicative financial needs planned
	11)	Increase policy coherence on the development of district heating services	2023	2027	Minister for Energy Policy	HUF 15 000 000 per year
	12)	Policy support for the development of demand-side regulation for utilities using smart meters	2022	2023	Minister for Energy Policy	HUF 50 000 000
	13)	Obligation to install smart meters	2022	2023	Minister for Energy Policy	HUF 5 000 000
	14)	Policy support for the establishment of decentralised community heating plants	2023	2027	Minister for Energy Policy	HUF 50 000 000
VI./2	15)	Support for specialised education in the energy sector	2023	2027	Hungarian Energy and Public Utility Regulatory Authority	HUF 200 000 000
	16)	Increasing the robustness of energy efficiency investments	2020	2023	Minister for Energy Policy	HUF 80 000 000
VI./3	17)	Introduction of a recharging point in residential car parks	2025	2030	Minister for Energy Policy	HUF 5 000 000
	18)	Extension of the possibilities for replacing mandatory parking spaces prescribed by municipalities	2025	2030	Minister for Energy Policy	HUF 5 000 000
VI./4	19)	Supporting the establishment of renewable energy communities	2023	2027	Minister for Energy Policy	HUF 10 000 000
VI./5	20)	Compliance with the inspection obligation scheme for heating and cooling systems	2021	2027	Minister for Energy Policy	HUF 5 000 000 000
VI./6	21)	Development of occupational guidance programmes and training in the field of energy technology	2023	2027	Minister for Energy Policy	HUF 100 000 000
VIII./2	22)	Review of criteria for the evaluation of aid schemes	2023	2027	Minister for Energy Policy	HUF 5 000 000

		Measure title	Start and status of action		Organisation or Ministry responsible for coordination	Indicative financial needs planned
VIII 3	23)	Encourage the development of accessibility for large multi-family homes	2023	2030	Ministry of Human Resources	HUF 5 000 000
VIII./6	24)	Green Disther Heat Programme	2023	2027	Minister for Energy Policy	—
	25)	Expansion and integration of renewable energy production, including the resources of the Recovery and Resilient Capability Instrument	2023	2027	Minister for Energy Policy	—
	26)	Examination of the possibility of aid for the construction of biomass heating	2023	2027	Minister for Finance	HUF 5 000 000
	27)	Development of smart and hygienic building technologies in educational, health and social buildings	2023	2027	Minister for Human Resources, Minister for Energy Policy	HUF 5 000 000 000
IX./1	28)	Public promotion of green bond issuance – design of a programme	2022	2027	Minister for Finance	HUF 50 000 000
X./1	29)	Green Capital Requirements for Housing Scheme	2021	2025 (2030)	Hungarian National Bank	—
	30)	Extension of development tax benefit in the framework of an economic protection action plan	2020	2027	Minister for Finance	HUF 10 000 000
	31)	'Falusi CSOK' – Extension of the family home creation allowance (CSOK)	2023	2027	Minister for Finance	—
	32)	Improving the development position of regions and counties	2023	2027	OP Managing Authority	As laid down in an operational programme
XIII./1	33)	Raising awareness and improving information in the residential and business sectors	2023	2027	Minister for Energy Policy	HUF 100 000 000 per year
	34)	Find a green Financial Product	2023	2027	Hungarian National Bank	HUF 150 000 000 per year

		Measure title	Start and status of action	Organisation or Ministry responsible for coordination	Indicative financial needs planned
XIII./2	35)	One-stop shop for users	2023 2027	Minister for Energy Policy	HUF 150 000 000 per year

XV.3. Description of planned financing arrangements

Energy efficiency obligation scheme (EED)

Developments in recent years indicate the need to rethink the energy efficiency measures applied so far, to create new incentives, to introduce an energy efficiency obligation scheme, including the introduction of programmes and the implementation of measures leading to certified energy savings on the end-user side.

On this basis, Hungary shall introduce an obligation system under the Energy Efficiency Directive. The scope of the energy efficiency obligation scheme shall cover commercial and universal service licensees of electricity and natural gas under the Vet. and Get., as well as entities selling transport fuels (motor gasoline, diesel gas oil, E85, biodiesel, LPG, CNG, LNG) to final customers.

Obligors

- 0.05 % of the amount of energy sold by it to final customers in the year 2021,
- 0.1 % of the amount of energy sold by it to final customers in the year 2022,
- 0.3 % of the amount of energy sold by it to final customers in the year 2023,
- 0,5 % of the volume of energy sold by it to final customers in the fourth, third and second years preceding each year in the years 2024 to 2027,
- **0.35 %**of the amount of energy sold by it to final customers in the year 2028,
- **0.15 %**of the amount of energy sold by it to final customers in the year 2029,
- **0.05 %**of the amount of energy sold by it to final customers in the year 2030,

they shall achieve sufficient annual energy savings among domestic final customers. Energy savings of 2 PJ per year are expected to be achieved with the introduction of the obligation scheme.

The obligors may choose to pay an energy efficiency contribution as an alternative to performance. The revenue from the contribution shall primarily be used to finance alternative policy measures aimed at improving the energy efficiency of the households to be supported. And compliance with the contribution and the obligation in principle may be combined.

In addition, obligated parties may obtain savings made by a certifying body instead of making direct investments or paying contributions. An investment certified by a third party is a right of limited marketable asset value; the seller may be any person who made the investment in question, but the buyer may only be obliged to do so.

It is up to the companies concerned to find the most cost-effective way to ensure that the implementation of the system leads to the optimal achievement of the energy efficiency targets from an economic point of view. The obligation system also gives suppliers and/or distributors the freedom to determine in which customer circle the investments are made: Industrial, residential, public institutions or services sectors. Therefore, household modernisation will take place on a market-based basis, within the framework of the planned energy efficiency obligation scheme, so that its costs will not in principle be borne by households and the state budget. The purpose of the support structure is to ensure that, among the obligated parties, universal service providers cannot pass on the burden of energy savings to household customers using electricity and natural gas.

According to the preliminary calculations, the support structure would be based on non-reimbursable funds in the first years of the obligation system and subsequently reimbursable funds.

The revenues would be earmarked for a dedicated allocation for the Energy and Climate Modernisation Scheme, also operating as the National Energy Efficiency Fund, the possibility of which is provided for in Article 20(6) of the EED.

Hungary will facilitate the financing of the energy efficiency obligation scheme by improving the conditions for ESCO-type solutions, creating opportunities for mitigating the uncertainties and risks inherent in the scheme.

Expected benefits of the energy efficiency obligation scheme:

- Part of energy and climate policy decisions:
  - the cost of climate protection is paid by the polluters/large companies,
  - today, most of the funds are EU and budget support, which would be complemented by a significant share of private financing (budgetary discharge + VAT revenue).
- A tool for relaunching the economy, strengthening energy sovereignty:
  - the planned energy savings of 2 PJ in the scheme will generate an investment volume of 100 billions per year,
  - 70 % of the return/financing comes from energy savings, i.e. final customers' energy bills and Hungary's energy import needs decrease sustainably due to annual investment volumes.

Hungary introduced the Energy Efficiency Obligation Scheme in January 2021, under which a number of energy efficiency improvement measures will be implemented, ranging from the residential sector to the level of large consumers.

The Hungarian Energy and Public Utility Regulatory Authority shall be the authority designated for the implementation of the energy efficiency obligation scheme.

ESCOs

For energy efficiency investments in the central budget and local governments, ESCO-based services shall minimise the use of budgetary resources and EU grants. The combined service that can be used by ESCO companies makes it possible to increase the sources of financing available for energy efficiency modernisation and to make higher-risk investments. ESCOs have a strong multiplier effect and are able to multiply the scarce resources available through their re-use.

As the expertise and resources required in the state and local government sectors to implement complex energy efficiency improvement projects are often lacking, as well as a company capable of providing complex services on the market, the Hungarian State established the National Energy Management Zártkörűen Működő Részvénytársaság (NEG National Energy Management Zártkörűen Működő Részvénytársaság), which is 100 % owned by the Hungarian State, in 2017. NEG Zrt. provides complex deficit-replacing services that together ensure the successful implementation of energy efficiency investments, their long-term operation and the realisation of planned savings, as well as the refurbishment and reduction of energy use of budgetary institutions with a lack of resources. (See details in Chapter V)

Hungary is also launching the extension of ESCO services towards residential buildings. The introduction of the ERF is of particular importance to the MVM Group, which is the leader in the gas and electricity markets, and to its millions of household and organisational customers. The MVM Group plans to implement energy efficiency investments under the ERF primarily through ESCO-type investments. MVM ESCO Zrt., dedicated to the task, may therefore be given a prominent role in fulfilling the obligations arising from the ERF, as it is able to carry out its investments in such a way as to:

— may rely on the substantial and diverse professional experience of the member companies of the MVM Group;
— the MVM Group can use its financial stability to leverage external market resources in a dynamic manner;
— have the capacity to leverage and make efficient use of sources of support;
—in the meantime, it does not increase the indebtedness of the MVM Group or the government debt ratio;
— provides a practical solution to the financing tasks of increased investments in the public sector.

Part of the non-reimbursable resources of the relevant operational programmes available in the 2021-2027 financial cycle should be placed behind the schemes as grants in order to achieve this objective. The scheme shall be developed by the Ministry of Innovation and Technology by 2021.

European Union supranational financial instruments

- EEEF: European Energy Efficiency Fund

As the fund is intended to support, directly or indirectly (through a financial intermediary), local government energy efficiency and renewable energy projects on a smaller scale, Hungary intends to make use of the financial possibility provided by the EEEF for the continuation of municipal public lighting programmes.

- ELENA: European Local Energy Assistance

One of the main objectives of the ELENA programme is to support the preparation of planned renewable energy and energy efficiency investments. The grant shall cover 90 % of the technical preparatory costs. In May 2019, Hungary set up its institutional system – the Hungarian Development Centre ELENA Pont Division – in order to help local authorities to make wider use of the support. (See details in Chapter V)

Quota revenues for green economic development purposes

For the period after 2020, HUF 35 billion is available under the scheme heading for the modernisation of energy and climatepolicy, of which state aid may be granted:

- an investment or measure leading to a reduction of GHG emissions;
- The development of other technologies contributing to the$_{transition}$to a low-CO2 emission economy; And;
- providing financial support to improve energy efficiency to address the social aspects of low and middle income households.

Recipients of payments: Hungarian branches of international organisations, natural persons, companies having their seat in Hungary, sole proprietorships, sole proprietorships, non-

governmental organisations, public bodies, budgetary bodies, ecclesiastical legal persons, co-ownerships, housing cooperatives and foreign-based undertakings.

From the source of the system of modernisation of energy and climatepolicy, the popular "Otthon Melege Programme", under which programmes are launched on the following themes, continues:

- Dissemination of smart cost sharing, Radator exchange sub-programme II:
  Apartment blocks with home centre heating may apply for the exchange of radiators and the installation of cost allocation, together with the modification of the necessary mechanical elements. Non-repayable grant.
- Boiler replacement programme:
  Replacement of a conventional gas boiler for central heating and HMV supply to a condensing gas boiler with the relevant chimney casing. Multi-family homes, residential homes and apartments with home centre heating and HMV supplies may apply. Non-repayable grant.
- Bojler Exchange Programme:
  Replacement of boilers (determined by type) older than 20 years with electrical storage for the purpose of supplying full domestic hot water to new, more modern boilers. Family homes and apartments may apply. Non-repayable grant.
- Indoor indoor light exchange program:
  Multi-family homes or housing cooperatives with more than 50 apartments in jointly owned premises may apply for the replacement of conventional bulbs with the same luminous flux by LED bulbs with the lowest capacity. Non-repayable grant.
- Installation of a recharging point for electric cars:
  Apartment blocks or housing cooperatives with their own car parks may apply for the development of recharging points in their car parks. Or co-ownerships and housing cooperatives without their own car parks may apply, together with the municipalities, for the development of a recharging point in a public area suitable for parking in front of the co-ownership building. Interest-subsidised loan.
- Applications for solar panels in co-ownerships:
  Apartment blocks and housing cooperatives may apply for the installation of solar panels. Interest-subsidised loan.

Modernisation Fund[56]

The 50 per cent of the total amount of quota revenues for the development of the green economy shall be supplemented by the resources of the Modernisation Fund, provided by the sale of a certain amount of allowances, to which Hungary will be entitled to exceed the amounts used under the general rules of the current quota revenues. The Modernisation Fund, to be set up by 2021, aims at modernising energy systems and increasing energy efficiency. The aid intensity may be up to 100 % for projects included in the priority list, such as improving the energy efficiency of buildings, provided that the State aid rules allow this for a given project. Hungary shall be entitled to call up 7,12 % of the Fund's resources.

[56]Financing mechanism under Article 10d of Directive 2003/87/EC of the European Parliament and of the Council

“Building energy tender programme” (target)

The HUF 0.4 billion per year may be used, inter alia, to support the construction of low-energy buildings or to increase the use of renewable energy.

EU package to relaunch the economy

Given the current situation, the European Union plans to support the measures needed to relaunch the economy in its member countries with substantial amounts to address it. In the first round, in line with the potential for use, Hungary intends to support energy efficiency improvements in public buildings with a specific focus on schools, health institutions, buildings and housing in the worst performing segments.

Community financing

New alternative method of raising capital, new business model.
On the basis of the relevant EU Directive, the possibility of establishing so-called renewable energy communities in Hungary will soon be opened: Natural persons, municipalities or SMEs may “consort” to cooperate in a legal form for the production of renewable energy. The community, as a legal person, will be able to finance the investment (in addition to its own resources) from external sources. Hungary shall establish the institution of renewable energy communities in national law by 30 June 2021.

(See details in Chapter XI)

XVI. Annexes

1. Annex: Evaluation of the measures of the National Building Energy Strategy 2015

1. Annex: Evaluation of the measures of the National Building Energy Strategy 2015

In order to achieve the national energy strategy, the NÉeS, developed by the Ministry of National Development, with the involvement of the group of experts established in the coordination of ÉMI Construction Quality Control Innovation Nonprofit Kft, shall set out the objectives and main directions that will enable the Hungarian building stock to be modernised and its energy use significantly reduced by 2030 in the period up to 2020 and looking ahead. The document had a significant impact on the energy renovation of the entire building stock, in addition to providing an overall view of the state of the building stock. A developed building typing system enabled the energy performance of each type of building to be established. On this basis, the energy level of the entire building stock was determined, from which it was possible to deduce the necessary measures to contribute to the achievement of Hungary's energy targets. This, given that 40 % of domestic primary energy consumption is used for the supply of energy to buildings, can radically improve the income situation of both the population and businesses, as well as reduce the costs of owners of public buildings.

1. Description of the legislative environment conducive to increasing energy savings in buildings and reducing carbon dioxide emissions

From the beginning of the 2000s to date, a legislative environment defining the development of an energy-efficient construction environment has been established through the adoption of a decree and law relating to the use of energy in buildings that have been decisive to date. This has significantly tightened the construction, renovation and operation of buildings from an energy efficiency point of view, the most significant of which are:

- *DOC. 7/2006. Decree No/of 24 May of the Minister for the Environment – determining the energy characteristics of buildings*
- *DOC. 176/2008. (VI. 30.) Government Decree on the certification of the energy characteristics of buildings*
- *DOC. 264/2008. (XI. 6.) Government Decree on the energy inspection of heat-producing plants and air-conditioning systems*
- *DOC. 65/2011. (IV. 15.) Government Decree on the imposition of ecodesign obligations for energy-related products and on the general conditions for placing on the market and assessing conformity*
- *DOC. 40/2012. (VIII. 13.) Decree No 7/2006 of the Minister for the Interior on the determination of the energy characteristics of buildings Decree No/of 24 May of the Minister for Transport and Transport*
- *DOC. 20/2014. (III. 7.) Decree No 7/2006 of the Minister for the Interior on the determination of the energy characteristics of buildings Decree No/of 24 May of the Minister for Transport and Transport*

1.1 Regulations and laws relating to the energy efficiency of buildings adopted after the National Building Energy Strategy

- *Act LVII of 2015 on energy efficiency*
- *DOC. 122/2015. Government Decree No/of 26 May on the implementation of the Act on energy efficiency*

- *DOC. 39/2015. (IX. 14.) MvM Decree No 7/2006 on the determination of the energy characteristics of buildings Decree No/of 24 May of the Minister for Transport and Transport*
- *DOC. 261/2015. (IX. 14.) Government Decree No 176/2008 on the certification of the energy characteristics of buildings (VI. 30.) amending Government Decree No/.*
- *DOC. 393/2016. (XII. 5.) Government Decree on energy efficiency and amending certain government decrees on operating support for electricity from renewable energy sources*
- *Act CXXXVIII of 2016 amending certain Acts on climate and green economy development*
- *Act XCIX of 2018 amending Acts on energy and certain acts on climate and taxation*
- *DOC. 210/2018. (XI. 20.) Government Decree on the energy labelling and the provision of product information to energy-related products.*
- *DOC. 38/2019. Decree No 7/2006 of 15 October of the Minister for the Interior on the determination of the energy characteristics of buildings Decree No/of 24 May of the Minister for Transport and Transport*
- *DOC. 41/2019. (XI. 14.) Decree No 7/2006 of the Minister for the Interior on the determination of the energy characteristics of buildings Decree No/of 24 May of the Minister for Transport and Transport*

2. Support schemes for the period 2014 to 2020 as a result of the measures undertaken in the NÉeS

For the period under review, the table below shows the range of beneficiaries and the modalities of support in each operational programme.

Energetikai célú fejéesztési prioritások a 2014-2020 közötti operatív programokban		
Prioritás	Kedvezményezetti kör	Támogatási forma
KEHOP - 5: Energiahatékonyság növelése, megújuló energiaforrások alkalmazása	Központi költségveztési szervek, KMR önkormányzatok, vállalkozások, állami és egyházi intézmények	Vissza nem térítendő támogatások
TOP-3: Alacsony széndioxid kibocsájtású gazdaságra való áttérés, kiemelten városi területeken	önkormányzatok	Vissza nem térítendő támogatások
TOP-6: Fenntartható városfejlesztés megyei jogú városokban	megyei jogú városok önkormányzatai	Vissza nem térítendő támogatások
VEKOP-5: Az energia hatéklonyság, az intelligens energiahasználatés a megújuló energiákfelhasználásának támogatása	KMR vállalkozások, KMR lakosság	vállalkozásoknak, kombinált VNT+VT), lakosságnak visszatérítendő
GINOP-4: Energia	Vállalkozások	vállalkozásoknak, kombinált VNT+VT)
GINOP-8: Pénzügyi eszközök	Vállalkozások és lakosság	visszatérítendő

1. táblázat: Energy development priorities 2014-2020 (Source: Evaluation of building energy developments and measures related to the production of renewable energy, Trenecon Kft, February 2020)

2.1. Applications from the general public

As of 2015, non-refundable tenders aimed at saving energy for the population continued. These were targeted at different types of buildings and segments, and the applicant had to have a share in accordance with the requirements of the relevant tender for the energy investment.

The following table shows that, between 2014 and 2019, the public tender subsidies concerned approximately 315 000 apartments, representing almost 7 % to 8 % of the total number of dwellings.

The public tenders targeted different types of buildings and building segments, and the applicant had to have a share in line with the requirements of the relevant call for energy investment. The own contribution was between 40 % and 80 %, depending, where applicable, on the total investment costs.

During the period examined, the following tenders were published, with the attached data. The data on tenders in the lower segment of the table are incomplete due to the fact that they have not yet been closed during the period under review, so their data cannot be finalised yet:

Pályázati kiírás	Meghirdetés éve	Támogatási intenzitás	Szerződött pályázatok darabszáma	Érintett lakások darabszáma	Folyósított Támogatás összege (Ft)	Elérhető CO2 megtakarítás (t/év)	Elérhető energia megtakarítás (kWh/év)
Otthon Melege Program - Háztartási nagygépek energiamegtakarítást eredményező cseréje alprogram	2014	50%	22 461	22 461	781 959 379	8 796,95	9 559 689,11
Otthon Melege Program - Homlokzati Nyílászárócsere Alprogram	2014	40%	2 026	2 026	820 558 449	1 766,57	9 168 518,06
Otthon Melege Program - Fűtéskorszerűsítés (Kazáncsere)	2014	40% vagy max. 650.000,- Ft	2 093	2 093	1 074 448 050	4 091,12	19 228 089,99
Otthon Melege Program - Háztartási nagygépek (mosógép) energia megtakarítás eredményező cseréje alprogram	2015	50% vagy meghatározott max. limit	40 987	40 987	1 777 901 996	2 922,83	3 151 152,00
Otthon Melege Program - Társasházak energiamegtakarítást eredményező korszerűsítésének, felújításának támogatására kiírt alprogram	2015	50% vagy meghatározott max. limit CO_2 megtakarításhoz kötött	430	13 975	11 225 125 134	19 773,00	89 299 812,00
Otthon Melege Program - Háztartási nagygépek (hűtő és fagyasztó készülék) energia megtakarítás eredményező cseréje alprogram	2016	50% vagy meghatározott max. limit	41 207	41 207	1 355 797 054	17 803,23	19 142 306,96
Otthon Melege Program - Családi házak energia-megtakarítást eredményező korszerűsítésének, felújításának támogatása alprogram	2016	költségek 40-55%-ára vissza nem térítendő támogatás, max limit CO_2 kg/év egységre 900 Ft	2 803	2 803	3 902 755 147	7 056,81	7 587 976,41
Otthon Melege Program - Fűtési rendszerkorszerűsítésének támogatása alprogram	2017	40% vagy max. 700.000,- Ft	5 476	5 476	2 679 258 427	11 191,47	46 101 411,56
Otthon Melege Program - Háztartási nagygépek (hűtő vagy fagyasztó készülék, mosógépek illetve mosó-szárítógépek) energia megtakarítás eredményező cseréje alprogram	2017	50% vagy meghatározott max. limit	58 244	58 244	2 365 581 272	10 805,21	12 001 205,00
Otthon Melege Program - Földgázüzemű konvektorok cseréjére irányuló alprogram	2017	80% vagy max. 500.000,- Ft	4 202	4 202	1 548 160 234	5 125,61	25 379 359,39
Otthon Melege Program - Háztartási nagygépek (hűtő vagy fagyasztó készülék, mosógépek illetve mosó-szárítógépek) energia megtakarítás eredményező cseréje alprogram	2018	50% vagy meghatározott max. limit	115 196	115 196	4 499 245 897		
Otthon Melege Program - Földgázüzemű konvektorok cseréjére irányuló alprogram	2019	80% vagy max. 500.000,- Ft	3 032	3 032			
Otthon Melege Program - Okos költségmegosztás alkalmazásának elterjesztése, radiátor csere alprogram	2019	Elszámolható bruttó költségek 50 %-a, a támogatás maximális mértéke lakásonként max. 350.000,- Ft	105	3 108		1 548,12	6 790 046,66

2. táblázat: Retail energy tenders 2014-2019 (Source: ÉMI, citizens' applications database)

The design of the support schemes logically followed the need to improve the energy efficiency of residential buildings, covering all intervention segments, ranging from the replacement of large household appliances to the more modern type of household appliances, the replacement of heat generators requiring major intervention and renovation, to complex, more freely defined deep renovations.

In 2014, the Otthon Melege Program for the replacement of large household appliances, launched by the State aid for the exchange of old refrigerators and freezers, was launched (hereinafter: "HGCS"), which was a washing machine in 2015, resumed in 2016 with the replacement of refrigerators and freezers. In 2017 and as an extension of the programme, subsidised exchanges of both refrigerators-freezers and washing machines took place in the programme launched. The table below shows, on the basis of the aggregated results of tenders between 2015 and 2019, the proportion of obsolete appliances that were replaced from tendering sources of nearly HUF 11 billion, and the overall annual savings of over 56 tonnes of carbon dioxide were achieved. Converted to energy savings, this is 153 thousand MWh per year.

Design		Appliances	Number of items exchanged	$CO2_{savings}$ /year (tonne)	Energy savings/year (in kWh)	Call for proposals
HGCS	2015	washing machine	40 522	2 907	7 964 366	HUF 2 000 000 000
HGCS	2016	refrigerators and freezers	41 196	17 803	48 775 235	HUF 2 000 000 000
HGCS	2017	refrigerators and freezers	28 074	9 651	26 440 895	HUF 2 000 000 000
HGCS	2017	washing machine	30 032	2 723	7 460 737	
HGCS	2018-2019	refrigerators and freezers	56 639	18 364	50 312 218	HUF 5 000 000 000
HGCS	2018-2019	washing machine	52 554	4 644	12 723 260	
Total			**249 017**	**56 092**	**153 676 711**	**HUF 11 000 000 000**

3. táblázat: Results of the Sub-programme for the replacement of large household appliances 2015-2019 (source: APPLiA Hungary Merger – Study based on 13 May 2020)

However, the proportion and quantity of the schemes put in place require further, similar calls for tenders in order to meet the objectives set out in the Strategy.

2.2. Loans to increase energy efficiency and use of renewable energy in residential buildings[1]

The tender scheme GINOP-8.4.1/A-17 was published in 2017. The objective of the loan programme is to provide the necessary resources for the residential sector's energy investments in buildings with a view to increasing the energy efficiency of residential buildings and the use of renewable energy sources related to residential buildings. The loan could also be taken up by a private person, a condominium or a housing association.

Between 2017 and 2019, the preferential loan is 10.630 private individuals and 60 co-ownership houses and housing cooperatives. Among the winning co-ownerships and housing cooperatives are 4 apartments and 80 apartments.

[1]Source: GINOP loan indicator report 2017-2020.01.13

The following will be eligible:

- thermal insulation of external building structures,
- replacement of external windows,
- modernisation of heating and/or domestic hot water systems,
- modernisation of heat recovery equipment,
- energy-saving transformation of existing indoor and outdoor lighting systems,
- installation of a solar collector system,
- construction of briquettes, pellets, wood chips, wood gasification boiler systems,
- installation of solar systems,
- use of ground-to-water, water-to-water, air-to-water heat pump systems.

The borrower shall set targets to be achieved at project level in relation to indicators relevant to the project and shall report them to the lender. The indicators were defined in the tender.

2.3. Energy subsidies granted to municipalities.

Under another aid scheme, tenders aimed at the local government sector were launched in the Territorial and Settlement Development Operational Programme (TOP) during this period.

It was important to increase the energy efficiency of local governments and the share of renewable energy use. The aim of the proposals is to facilitate the transition to a low-carbon economy, in particular in urban areas. Calls for proposals, summarised in the table below, have been launched with an aid intensity of 100 % for the above objectives, which are still in the process of being implemented.

Design	Title of the proposal
TOP-3.2.1-15	Development of the energy performance of local government buildings
TOP-3.2.1-16	Development of the energy performance of local government buildings
TOP-3.2.2-15	Comprehensive development programmes controlled by local governments for the implementation of energy supply aimed at the exploitation of renewable energy sources in a way which fits into the local environment
TOP-6.5.1-15	Development of the energy performance of local government buildings
TOP-6.5.1-16	Development of the energy performance of local government buildings

4. táblázat: Energy Operational Programmes (TOPs) targeting local governments (Source: Slatezat.gov.hu)

In the case of TOP energy tenders, a total of 1596 winning tenders had been published by 2020, with a grant value of HUF 171 036 738 479.

In the case of local government institutions, infrastructure and municipal-owned buildings stock, the utilisation of renewable energy sources was possible in all TOP tenders, but the primary objective was for sub-programmes 3.2.2-15. In this framework, 46 successful tenders were supported with a total grant amount of HUF 11 968 949 574.

2.4. Subsidies for public buildings:[2]

[2] Source: Evaluation of building energy developments and measures related to the production of renewable energy, Trenecon Kft., February 2020

Support for the development of public buildings for building energy and renewable energy production took place in four operational programmes during the period under review.

- Environmental and Energy Efficiency Operational Programme (KEHOP),
- Area and settlement development operational programme (TOP),
- Competitive Central Hungary Operational Programme (VEKOP),
- Economic Development and Innovation Operational Programme (GINOP)

In the programmes and priorities, the targets for energy improvements were expressed as follows:

Priority 5 of the KEHOP mainly supports building energy improvements in public buildings, as well as the increase in the production of renewable energy sources and the production of green electricity. The aid intensity ranged between 10 % and 100 %, depending on the type of development or the aid applicant, as follows.

Application code	Design name	Aid intensity
KEHOP-5.1.1-17	Promoting green electricity generation from renewable sources by installing electricity generation systems with an installed capacity exceeding 4 MW	10-45 %
KEHOP-5.1.2-17	Promoting green electricity generation from renewable sources by installing electricity generation systems with an installed capacity not exceeding 0.5 MW	10-45 %
KEHOP-5.1.3-17	Promoting green electricity generation from renewable sources by installing electricity generation systems prepared as part of the KEOP-7.9.0 scheme	10-45 %
KEHOP-5.2.1-15	Building energy development of church-run hospitals and of the Hungarian Defence Forces Health Centre	100 %
KEHOP-5.2.10-16	Calls for proposals concerning the improvement of the energy performance of buildings for budgetary authorities	100 %
KEHOP-5.2.11-16	Establishment of photovoltaic systems for central budgetary authorities	100 %
KEHOP-5.2.12-17	Energy development of state-owned sports facilities	100 %
KEHOP-5.2.2-16	Priority development of the energy performance of public buildings	100 %
KEHOP-5.2.3-16	Development of the energy performance of ecclesiastical buildings with the option of using renewable energy sources	100 %
KEHOP-5.2.4-15	Investment in energy efficiency by central budgetary bodies	100 %
KEHOP-5.2.5-16	Construction of nearly zero energy buildings as pilot projects	100 %
KEHOP-5.2.8-17	Improvement of the energy performance of buildings in accordance with State aid rules	30-80 %
KEHOP-5.2.9-16	Call for proposals concerning the energy performance of buildings for municipal governments in the Central Hungary Region	100 %
KEHOP-5.3.1-17	Energy modernisation of the district heating sector	10-50 %
KEHOP-5.3.2-17	Meeting local heat and cooling needs with renewables	45-60 %

5. táblázat: Aid intensities for energy-related KEHOP applications
(source: Slatezat.gov.hu)

Out of the above energy-related programmes, 715 successful tenderers received a total amount of HUF 309 408 183 178 by 2020.

Priority 3 of the TOP targets the "Transition of urban areas towards a low-carbon economy". Under the priority, local authorities may receive support for their investments in energy efficiency and the increased use of renewable energy sources (solar collectors, photovoltaic and heat pump systems). In addition, priority 6 supports the achievement of energy goals through the development of sustainable cities. The energy tender schemes of the TOP were described in the previous point.

VEKOP's priorities 5 aim to support the investments of enterprises in the Central Hungary region in energy saving and the use of renewable energy, and to increase the number of such investments in the case of residential buildings by providing credit.

Application code	Design name	Aid intensity
VEKOP-5.1.1-5-1-2-16	Support for the energy development of enterprises using renewable energy with a combined loan product in the Central Hungary region	45 %
VEKOP-5.2.1-17	Credit aimed at improving the energy efficiency of residential buildings and increasing the use of renewable energy	—

6. táblázat: Aid intensities for VEKOP energy applications (Source: Slatezat.gov.hu)

Tender VEKOP-5.1.1-5-1-2-16 supported the energy development of enterprises using renewable energy in the Central Hungary region. The planned amount available for the aid scheme at the time of the launch of the call is HUF 7.808 billion.

- of which the amount of the grant is: HUF 4.704 billion,
- loan amount: HUF 3.104 billion.

In the period 2019-2020.01.28, 45 candidates won HUF 1.113,505. Given that this is a running tender, we are not aware of the savings data.[3]

The EDIOP shall support the energy modernisation of buildings and production processes and the use of renewable energy sources in the business sector under priorities 4 and 8, both in the form of non-reimbursable and reimbursable funds. Priority 8 ("Development of financial instruments and services") aims to provide SMEs and citizens with financial instruments (loans) for building energy improvements, energy efficiency and renewable energy investments. Private individuals and associations of co-ownerships may take out loans of up to HUF 500 thousand to HUF 50 million and up to 0 % for a period of up to 20 years. Only HUF 5 million are expected to be covered.

Application code	**Design name**	**Aid intensity**
GINOP-4.1.3-19	Support for the installation of solar systems for micro, small and medium-sized enterprises	100 %
GINOP-4.1.1-8-4-4-16	Support for the improvement of the energy performance of buildings with the use of renewable energy through combined loan products	45 %
GINOP-4.1.2-18	Support for the improvement of the energy performance of buildings with the use of renewable energy	50 %

[3]Source: Indicator data on OP. MINISTRY OF INNOVATION AND TECHNOLOGY (MIT)

GINOP-8.4.1/A-17	Energy efficiency in residential buildings and renewable energy loan to increase its use	—
GINOP-8.3.5-18	Loan programme for the technological modernisation of micro, small and medium-sized enterprises	—
GINOP-8.4.1/B-16	SME energy loan	—
GINOP-8.3.1-16	Loan programme aimed at enhancing the competitiveness of micro, small and medium-sized enterprises	—

7. táblázat: Aid intensities for EDIOP energy applications (Source: Slatezat.gov.hu)

The above calls included grants, repayable grants and subsidised preferential loans.

Number of proposals launched as a result of the calls: There were 12 962. In particular, the reason for the high number of applications received in response to the EINOP-8 calls (10 429) was a loan facility available to the general public and used for a smaller amount per tender. Typically, more projects of lower value were implemented within these calls than in the calls of the other OPs.

A significant amount of renewable energy systems were built in the implemented tenders. A significant proportion of energy renovation tenders are complex implementations.

In line with the Vocational Training 4.0 Strategy, a comprehensive, complex national programme for infrastructure development was launched in 2019 entitled “21st century vocational training institutions programme”. One of the principles of the medium-term programme planned and implemented on the basis of a single professional strategy is the promotion of energy efficiency, the reduction of greenhouse gas emissions and the use of renewable energies, which can provide significant added value in the energy development of public buildings.

3. Industrial energy saving schemes

The GINOP and VEKOP tenders described in point 2 have greatly helped to reduce the use of energy by micro, small and medium-sized enterprises.

Act LVII of 2015 on energy efficiency required large companies to appoint external energy policy officers. Policy officers examine the energy condition of the company, propose energy saving measures, and prepare a monthly report to the company’s senior management, and an annual report to the MEKH. An exception to the use of a policy officer is the large company that has put in place the ISO 50001 corporate energy management system.

4. Public and residential energy saving programmes

4.1. The National Energy Network was set up in 2017 to promote the efficient operation of public institutions, including municipalities. Public institutions shall prepare an annual Energy Saving Action Plan with the help of the NEH and upload it to a central website.

4.2. As an amendment to the Act on Energy Efficiency, Section 90 of Act CX of 2019 designated the Hungarian Chamber of Engineers to provide energy advice to businesses and the general public.

Advisors shall provide free energy advice to businesses and the general public and shall monitor the amount of energy savings achieved as a result of the advice and shall also provide information on available energy efficiency tenders.

5. Energy awareness campaigns.

In the period 2015 to 2019, several energy awareness-raising campaigns were carried out in Hungary. In this context, a number of publications were distributed on the internet and printed. In 2015, the Ministry of National Development prepared Hungary's Energy and Climate awareness-raising action plan.

Energiahatékonyságot, energiamegtakarítást támogató kiegészítő (szoft) eszközök	
Felhívás szám, pályázói kör	Projektek várható száma
KEHOP-1.2.0-15 Szeml.form.: Módszertan, Megyei Önkormányzatok	21
KEHOP-1.2.1-18 Szeml.form: Figyelemfelhívás | Helyi Önkormányzatok	180
KEHOP-5.4.1-16 Szeml.form: Figyelemfelhívás | Civil szervezetek	1000
KEHOP-5.4.2-15 Szeml.form: Tanulm. versenyek | ITM	1

8. táblázat: Number of relevant applications in the EUPR database within software calls for the themes (Source: TRECON)

On the basis of the number of applications stored in the EUPR for calls under the theme and the expected number of items estimated at the time of publication of the call, the awareness-raising scheme for local authorities "KEHOP-1.2.1-18" and the call "KEHOP-5.4.1-16" for civil society organisations, which are also aimed at raising awareness, show significantly lower utilisation rates compared to the expected number of applications. Local governments had an occupancy rate of 9 %, while no applications were submitted in the case of civil society organisations. The framework for the "KEHOP-1.2.0-15" scheme for local governments (also related to climate strategies) was covered up to 100 % by tenders. For the large-scale student awareness-raising programme, the KEHOP-5.4.2-15 scheme "Green Caric Games", 1 applications were submitted, which is not the case.[4]

For the purpose of energy awareness-raising, the KEHOP 5.4.1 tender was launched, under which 178 awareness-raising projects were supported. Projects aimed at increasing public awareness of energy saving, energy efficiency, renewable and alternative energy solutions and opportunities and changing the related consumer and social habits of the population were eligible for grants between HUF 1 and 5 million. Through information and awareness-raising programmes, campaigns, training and community cooperation, the call contributed to the spread of competent and responsible behaviour, the wide dissemination of the values and tools of energy-conscious lifestyles, thereby increasing the use of renewable energy and reducing the use of energy. Projects such as:

- "Account reduction" – workshop of social assistants,
- workshop for pre-school teachers and teachers,
- climate officer workshop,

[4] Source: Evaluation of building energy developments and measures related to the production of renewable energy, Trenecon Kft., February 2020

- workshop on green public procurement,
- workshop accompanying local government energy developments,
- co-ownership workshop,
- public awareness campaign.

In addition to the support option announced as an operational programme, it should be pointed out that, in the interests of energy efficiency, MEKH operates an awareness-raising website. You can find up-to-date information useful to the general public on the website.

Another significant example of awareness-raising programmes is the campaign “Going for tomorrow” produced and published by MEKH, which was directed towards the general public.

These publications address the following topics:

- Breath with lighting,
- Optimalise the temperature of the room,
- Useful tips on the efficient use of energy.

6. Energy data collection systems

MEKH

The Hungarian Energy and Public Utility Regulatory Authority shall perform the tasks related to the uniform national energy statistics and, as an official statistical body, shall comply with the obligations to provide data to domestic and international organisations and to other organisations.

Within the framework of the National Statistical Data Recruitment Programme (OSAP), the Office shall collect and manage energy-related data specified in separate legislation, shall establish and maintain a national energy and utility statistical information system for the provision of information to the public, and shall provide data to the European Union, international organisations and bodies belonging to the official statistical service on the basis of Act LXXXVI of 2007 on electricity, Act CLV of 2016 on official statistics and other relevant laws.

- The Energy Information Data Repository to authorised persons authorised to provide data by public authorities (as required by the Data Decision). (https://sia.mekh.hu access to the website, only users approved by the Office).
- The Statistical Information System is the provision of data for statistical purposes in the framework of the National Statistical Data Recruitment Programme (OSAP).
- Data shall also be provided by water utility service providers as well as by public waste management service providers.
- As a body within the official statistical service, the MEKH shall perform the tasks related to the uniform national energy statistics, fulfilling its obligations under domestic and international law[5].

Accessible information system for energy at Lechner Knowledge Centre

The Lechner Knowledge Centre is the professional institution of the Prime Minister’s Office for architectural, construction, real estate and spatial information, and its mission is the digitalisation

[5] Source: Www.mekh.hu

and socialisation of its wide-ranging public services related to the built environment and spatial data. Its activities include remote sensing, regional planning, smart urban services, surveying, earth observation and mapping, and its priority tasks include the operation of the Documentation Centre and the operation of IT services supporting e-administration. It acts as an intermediary between architectural and co-professional areas and the wider public, and its services reach both professional and residential users.

The Lechner Knowledge Centre collects energy certificates for buildings in Hungary, which are regularly checked by the Hungarian Chamber of Engineers on the basis of their selection.[6]

7. Energy rating of buildings and certification system

The processing of the energy rating of buildings and the experience of the certification system, and the further development of the system where necessary, appeared as one of the measures of the NÉeS. In line with the requirements of the European Union and the domestic aspects in recent years, government Decree No. 7/2006., which serves as the basis for energy certification, Decree No/of 24 May of the Minister for the Interior and Decree 176/2008 (VI. Government Decree No. 30.) has been amended several times.

The Budapest and Pest County Chamber of Engineers carries out the verification of the energy performance certificates of buildings as a statutory task. In the course of the quality control of the certificates issued in the second half of 2019, 2175 cases, including a total of 26408 certificates since the existence of the control system, have been examined so far. Examples of common certifier errors are the incorrect establishment of the intended use of the building, the ignorance of point and lineside heat bridges, the inappropriate choice of the air exchange number, the incorrect use of the value of the batch plant correction, or the incorrect consideration of solar collectors, heat pumps, multi-heat systems.

Due to the above, compulsory training was extended to energy certifiers, with effect from 1 January 2020 to Decree No 266/2013. Pursuant to the amendment of Government Decree/(VII.11).

8. Preparation of national action plans:

According to the commitments made in the NÉeS, Hungary adopted the National Energy Action Plan in November 2017.

9. Executive summary

Overall, it can be said that the National Building Energy Strategy, completed in 2015, achieved its objectives. In some cases, the importance aspects have been reformulated during this period. As we have seen, the support of individual OPs has been used by a large number of people, with the result that the use of renewable energy equipment is also spreading in Hungary. The investment cost of such equipment is significant and therefore many would not be able to buy such equipment without subsidies or preferential loans.

[6] Source: Www.lechnerkozpont.hu