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SEPlaM-CC – Raising capacity of cross-border public institutions in sustainable energy planning and management and climate change mitigation

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Analysis of gathered strategic and planning documents regarding energy and climate with energy and climate planning and management modes in Hungary

Prepared by: Zala County Foundation for Enterprise Promotion

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Content

1. Summary

In the framework of the present study, we describe in detail the current regulatory environment of energy and climate policy in Hungary, as well as the medium- and long-term strategic goals of these two policy fields.

In order to better understand the Hungarian context, the study first compares the legislative and strategic environment of Hungary with that of the European Union, which makes it clear that Hungary can be defined as one of the key member states putting meaningful emphasize on environmental sustainability and implementing a conscious climate policy in the European Union. All this, i.e. the significant progress made in achieving the goals of the Paris Climate Agreement, significantly strengthens the international reputation of Hungary, therefore the national energy and climate policy can be considered as two interconnected success stories.

The following chapters of the present study describe in separate units the legal framework of the closely related Hungarian energy and climate policy, as well as the strategic documents that directly or indirectly determine the future development of the observed policies. From this detailed examination, we can get a comprehensive picture of the current operative conditions and future prospects of the Hungarian energy and climate policies, i.e. we can identify the results that Hungary has achieved in the field of clean energy production and climate protection.

Finally, the study formulates professional conclusions and recommendations for the development of renewable energy production, energy efficiency measures and climate protection initiatives to be implemented in Zala County and the neighbouring Croatian-Hungarian border region, thus supporting the policy-making of the region in the preparation and realisation of sectoral decisions.

Proposals formulated at the end of the present document are the following ones:

- In the 2021-2027 EU budget period, significant amounts will be available for the implementation of climate projects. In order to use it effectively, it is necessary to strengthen the absorption capacity of local governments in the region.
- In this respect, it would be important to prepare a municipal climate strategy or SECAP for as many municipalities in the region as possible.
- Municipalities need to learn about and use alternative financial sources to implement their energy or climate-related projects.
- The involvement of adequate professional support for the development of their projects will be essential for municipalities.
- In connection with the above, it must be noted that there is no organization (e.g. energy agency) on the Hungarian side of the program area that could provide full professional support to local governments. Therefore, it is important to look into the possibility of establishing and operating an Energy Agency in Zala County. The activities of the organization could be linked to the county-level Climate Change Platforms and the National Energy Network.

2. Introduction

The complex phenomenon of climate change accelerated by anthropogenic greenhouse gas emissions is one of the greatest challenges facing humanity in the 21st century. Although individual countries have not contributed equally to the development and maintenance of the problem and are not equally affected by adverse effects, in the Paris Agreement of global significance adopted in December 2015, members of the UN Framework Convention on Climate Change agreed that all countries following the principle of common but differentiated responsibilities and different capabilities and are equally involved in the fight against global climate change, given the different national circumstances. Article 4 (1) of the Paris Agreement states that the aim is to "ensure a balance between greenhouse gas emissions by sources and removals by sinks in the second half of this century on a fair basis, in the context of sustainable development and poverty eradication".

This balance (i.e. climate neutrality) needs to be achieved globally by 2050, according to the 1.5-degree warming report of the Intergovernmental Panel on Climate Change, in order to avoid the worst effects of climate change. Hungary, despite the fact that it is responsible only 0,1% of the global CO_2, is committed to the fight against climate change since the start of international climate negotiations. It has made binding emission reduction commitments during the first and second commitment periods of the Kyoto Protocol, which it has far exceeded, compared to the Kyoto base year. Therefore, emission of Hungarian greenhouse gases (GHG) is 42% lower, which is approximately represents a 32% reduction rate to the base year. Moreover, Hungary was the first in the European Union to ratify the Paris Agreement with full parliamentary unanimity, and undertook, together with the European Union and its member states, to reduce its emissions by at least 40% by 2030 compared to the 1990 base.

In this regard, through our daily lives and consumption habits, we have a significant impact on our environment, both in its resource-side and carrying capacity. Therefore, the responsibility of individuals and decision-makers is just as crucial as that of economic actors in mitigating the risks to energy supply due to climate change and the increasingly scarce resources available to us. With a change in consumer attitudes and the advancement of conscious consumer behaviour, all of these risks can be reduced. Aspects of sustainable development must become a social norm, a long-term goal of which is to create an economic and social system that consciously utilizes natural resources. In order to achieve the above, targeted awareness-raising measures affecting all actors in society must be implemented, from which civil society, economic and state actors alike must play their part.

In line with the call of the Paris Agreement, and given that Hungary is one of the few countries in the world that has been able to reduce its greenhouse gas emissions by increasing their economic performance (GDP), the present governmental policy – described in this document – intends to ensure a sound implementation of the agreed climate commitments. Along the strategic lines, Hungary can gradually become a climate-neutral country by 2050 without the transition jeopardizing economic growth and social welfare.

In order to achieve climate neutrality by 2050, Hungarian greenhouse gas emission is expected to be reduced by 95%. To the best of our knowledge, the remaining emissions can be neutralized by domestic sinks (land use sector, mainly forests). Although there is research into the design of artificial sinks, their potential future applicability is very uncertain. Achieving this goal requires intervention in all emission sectors (energy use, industry, agriculture, waste) and steps must be taken to maintain absorption capacities. It is important for Hungary

that the innovations and energy efficiency measures necessary for the transition to a low-emission economy be implemented as soon as possible, as these will significantly help to achieve the goals.

In order to reach the 95% overall emission reduction target, which will require technologies that are not yet known today, certain sectors (e.g. electricity and district heating, oil refining, coking, energy efficiency, agriculture, fisheries, and forestry, complete elimination of the use of fluorinated greenhouse gases and solvents in product use) it is necessary to reduce emissions to absolute zero. However, there will be sectors (agricultural emissions, industry, fugitive emissions, residual impact of old landfills) for which greenhouse gas emission is expected to persist at much lower levels than at present.

In line with the emission targets, Hungary intends to increase the share of renewable energy sources in gross final electricity consumption to at least 20% by 2030. Central to the "greening" of the electricity sector is the expansion of solar capacity, which will increase from less than 680 MW in 2016 to 6,500 MW in 2030. In 2030, the amount of wind power capacity will be close to the current level (330 MW). In addition to maintaining existing hydropower plants, the expansion of small hydropower capacity is also justified.

The transformation of the electricity sector requires the promotion of innovative and smart solutions that provide greater flexibility, generating significant market organization, distribution and transmission network development, human capacity and competence development, and regulatory challenges. Their implementation should prevent the integration of weather-dependent renewable producers into further large-scale systems in order to ensure system security and cost control. Therefore, after the insertion of 2000 MW of solar generation capacity into the system, it is necessary to examine from what source and when the financial and infrastructural conditions for further growth can be realistically ensured.

The new Hungarian support system for the promotion of electricity production from renewable energy sources (METÁR) started operating in January 2017. On September 2, 2019, the first METÁR tender was also announced. In order to ensure a cost-effective level of support, in the future support under METÁR can only be obtained through technology-neutral renewable capacity tenders, and in the traditional mandatory take-over system, only pilot technologies and demonstration projects can receive production support. We also want to encourage the installation of solar systems for the partial replacement of our own electricity consumption. The goal is for at least 200,000 households to have an average of 4 kW of roof-mounted solar panels by 2030.

With these strategic lines, measures, legislative acts and governmental engagements, Hungary is willing to ensure a safer and more competitive energy structure for future generations. In the present document, relevant legal documents and strategies are presented to help better understand the Hungarian strategical environment for energy policy and environmental reforms.

3. Comparison of European and Hungarian regulations in the field of energy and climate

European environmental policy began to take shape in the 1970s, on the one hand as a result of the 1972 UN Conference on the Human Environment in Stockholm during the then period of international climate mitigation, and on the other hand recognizing that economic cooperation as a common market is in direct relation with the natural environment and its condition. While in the case of coal, one of the most important fossil fuels in the energy sector, the need for cooperation was already evident to the founders of the European Coal and Steel Community, however the necessity of cooperation was later revealed due to long-range and 'acid rain' sulphur emissions from coal-fired power generation.

The risk of a global “climate problem” also arose in the international meetings of the 1970s, such as the already mentioned 1972 conference and the 1979 Geneva World Climate Summit. Through the proliferation of observational data and model results, scientific certainty about the possibility of contemporary climate change and the role of human activities in its induction has been strengthened since the mid-1980s. In parallel with the resulting climate policy, several sectoral areas, including some aspects of the energy sector, have become part of Community policies. However, the interconnected management of the two areas at Community level, with the setting of more specific objectives and standards, did not take place until the mid-1990s, as a result of significantly different international developments.

However, in connection with the slow development of cooperation in the field of energy, a major change in climate policy has only taken place since 1990, when a UN resolution already required the drafting of a climate agreement and the first Intergovernmental Panel on Climate Change report was published. As a consequence, in the UN Framework Convention on Climate Change, adopted in 1992, EU Member States undertook not to exceed 1990 emission levels in 2000. To this end, Community energy efficiency and renewable energy programs have been approved. For renewables, the 8% target has been set as an "indicative" target for 2005. Similarly, the new Environmental Program, completed in 1993, already emphasized the transition to sustainability in the spirit of the 1992 Global Plan of Action for Sustainable Development also in the field of energy or climate policy, indicating the future implementation of the UN program and the climate agreement in general. The changes in world politics that took place in the 1990s have also helped the EU to strengthen cooperation between its Member States with new treaties, to start association negotiations with many Central and Eastern European countries and for the EU to play a greater international role in general. This was reflected in stronger action in 1997 and 2002 to implement the World Sustainable Development Agenda, the creation of an international coalition committed to renewable energy sources, the 8% "Kyoto" emission reduction commitment to be solved by improving energy efficiency and promoting the use of renewable energies.

As a consequence of the commitments, Climate policy has already become one of the priorities of the EU's environment program, which has been in force since 2002. This program sets out in detail its sectoral tasks, particularly in the field of energy management: reviewing subsidies for sustainable energy use, achieving a 12% share of renewables by 2010, promoting energy efficiency, and so on. At the same time, the subject became so important that a special cooperation forum called the European Climate Change Program was launched in 2000, which has been running since 2005 in cooperation with the new Member States. In this forum, sectoral tasks (energy production and consumption, transport, etc.) and the integration of climate goals into them were discussed in more depth, while also contributing to the effective implementation of the environmental program. It became clear that the “Kyoto commitment” to reduce emissions, in which the energy sector had the largest share, would not be met “by itself”. The Environment Program 2014-2020 not only referred to

climate and energy policy as a general priority, but also projected and reinforced a high degree of "decarbonisation" by 2050 in the Europe 2020 program approved in 2010 and in the "Climate Energy Package". defined objectives.

In addition to policy programs, the first major regulatory instrument was the 2003 Directive introducing Community "emissions trading" (2003/87 / EC). The then Member States were still opposed to the inclusion of such a market instrument in the 1997 Kyoto Protocol, which was called for by the US and Russian parties. However, when, a few years later, the cost-effective implementation of the 8% joint emission reduction agreed by the 15 Member States in the Protocol was on the agenda, the sale and purchase of CO2 emission allowances, mainly from energy sources, was already considered an effective solution between the facilities in the Member States. The adoption of the Directive in 2003 "deliberately" preceded the large-scale enlargement of the Community, but the new Member States also had to transpose it into their own legal order for the "learning period" 2005-2007 and then for the commitment period of the Kyoto Protocol 2008-2012 comprehensive directive.

Nevertheless, the energy efficiency indicators in the acceding countries were much worse and could be achieved cheaper at their facilities, e.g., improving energy efficiency in coal-fired power plants, thereby reducing emissions beyond the required level, which could be sold in excess (up to a limited level) on the Community "quota market". Other CO2-emitting sectoral installations have been included in this scheme (e.g. district heating) and other instruments have emerged in addition to 'emissions trading' (e.g. in relation to building energy).

Following the introduction of the Kyoto Protocol, international negotiations could continue from 2007 with a view to reaching a new post-2012 agreement. EU Member States have decided to take more ambitious steps than before, embodied in a comprehensive "climate energy package". The main indicators for this are by 2020: a 20% renewable rate, a 20% energy efficiency improvement and the achievement of at least a 20% emission reduction (compared to 1990). The same targets have been included in the EU-2020 strategy adopted in 2010.

Due to the joint EU policy action, the climate policy area, which mainly affects greenhouse gas emissions, has become so intertwined in several organizations and countries that they are regularly examined together, even under joint organizational management, but at least there is close cooperation between their units. This is also the case at the United Nations Environment Program, the European Commission, the International Energy Agency, and in Hungary and in some countries at the level of government offices (e.g. Denmark, the United Kingdom, France, the Netherlands). The main reason for this is that fossil fuels account for an extremely large share of both energy consumption and climate-critical atmospheric emissions.

From the outset, we can conclude that the EU has been an active participant in climate policy cooperation and has done much to bring about the agreements referred to above. Together, the member states of the Union undertook to reduce emissions by 8%, 20%, and then at least 40% in connection with the Kyoto Protocol, the Doha Amendment, and the Paris Agreement. In addition, they acknowledged to a large extent the special situation of particularly vulnerable developing countries and undertook to provide support primarily to them (to prepare their climate policy plans, to prepare for change). EU instruments have also evolved in line with these commitments: a climate policy agenda; emission reduction, adaptation, climate finance targets have been taken into account in sectoral programs and legal instruments; from 1995 onwards, separate “climate-energy packages”, i.e. legislation, were developed. The latter included regulations on Community emissions trading, energy efficiency and the use of renewable energy sources. The current legislative package also serves to meet the EU's commitments under the Doha Amendment and includes an average reduction of at least 20% in emissions at EU level by 2020 (compared to 1990), a 20% improvement in energy efficiency and an average 20% reduction in renewables. to achieve

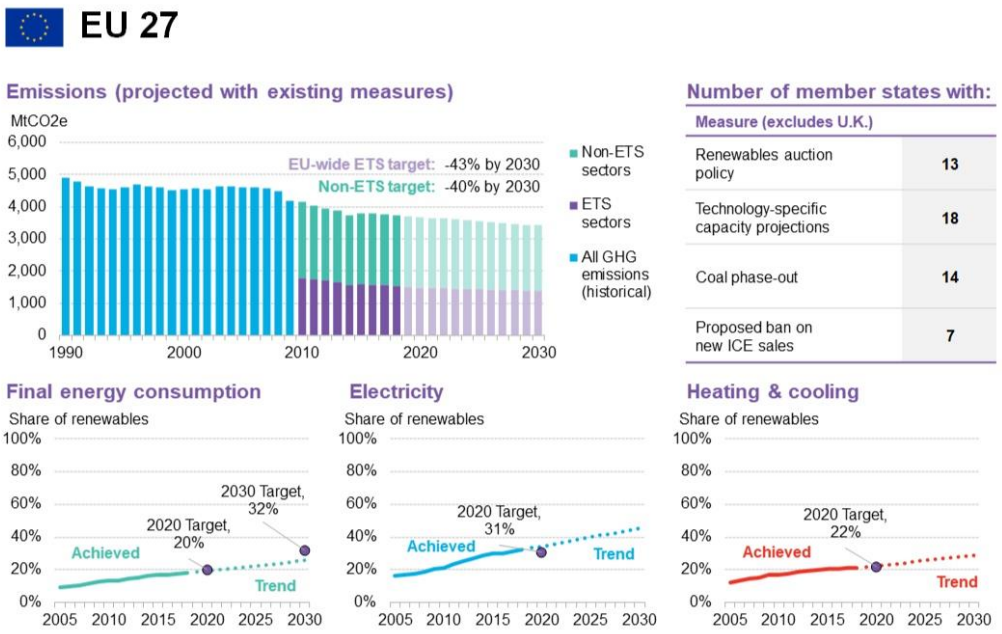
the rate. However, the next climate-energy package must already be in line with the Paris Agreement and the EU's Memorandum of Understanding to reduce emissions by at least 40% by 2030, and to achieve at least 27-27% energy efficiency and renewables.

CO2 reduction commitments of the European Union indicated in different agreements:

	greenhouse gas emission reduction	% of renewables	improvement of energy efficiency
UN Climate Agreement 1992	keeping the 1990 reduction level until 2000	8% until 2005	no relevant indicator
Kyoto Protocol 1997	8% until 2012 comparing to 1990	12% until 2010	no relevant indicator
Doha Agreement 2012	min. 20% reduction until 2020 comparing to 1990	20% until 2020	20% until 2020
Paris Agreement 2015	min. 40% until 2030 comparing to 1990	32% until 2030	32,5% until 2030

Since joining the EU, Hungary has been cooperating with other EU Member States both in the international negotiation process and in the development and implementation of related Community programs and legal instruments. Even before that, i.e. between 1991 and 2004, consultations took place between the then EU Member States and the Associated States; this was partly due to the fact that the latter, as countries with “transition economies”, became actively involved in the international conciliation process. Hungary has acceded to all four international climate policy agreements already mentioned. The comprehensive framework of domestic tasks is provided by the National Climate Change Strategy, special programs and strategies (that will be presented in next chapters) have been launched on the topic of adaptation tasks, the relevant EU-level regulatory tools have been adopted, and all sectoral areas have taken into account the relevant tasks in their professional programs and regulatory tools. As a matter of fact, the Hungarian legislation was among the first European legislative assemblies adopting the Paris Agreement and harmonised the national targets and strategies to the EU commitments. Consequently, Hungary can be considered a climate policy frontrunner within the European Union.

Reduction mechanism of the Paris Agreement within the European Union:



Source: Bloomberg, https://www.bloomberg.com/news/articles/2020-08-21/eu-member-states-finalize-2030-climate-plans-bnef-chart

4. Hungarian regulations, strategic and planning documents regarding energy with energy planning and management modes

4.1. Introduction to the chapter.

Basic measures related to climate change are interpreted both on the national and community level, providing tacit knowledge on the level of citizens and decision-makers, that results in action programs in individual circumstances and also in micro and macro communities.

Regarding the European and national targets, the reduction of CO_2 emission and other pollutants and the usage of potential and regionally specific renewable energy sources must be clearly measurable, while new regulatory frameworks shall be elaborated through incentive programs to increase energy efficiency.

In the energy sector, the role of governments is primary, as the governmental actors have control over legislation, standardization, environmental protection, economic governance, setting directions for development, taxation, and those assets that can influence energy production and utilisation. In the past 20-25 years, the Hungarian energy policy proclaimed its commitments upon energy management in national strategies in line with the EU energy policy targets.

The goal of the present period and the near future is that smaller communities (counties, districts, settlements) will intend to strive for their own planning system, regulation, action programs and their thematic implementation, thus recognizing the importance of planning and implementation on local and regional level.

4.2. General regulations

The European Union formally ratified the Paris Climate Convention on the 5th of October 2016. In November 2018, the European Commission published the EU long-term strategy, which states that the EU must achieve carbon neutrality by 2050. In this context, greenhouse gas emissions should currently be reduced by 40% by 2030 comparing to the 1990 basis. Following its resolution of March 2019, the European Parliament called for a much more ambitious emission reduction target to achieve carbon neutrality by 2050. At the same time, the Hungarian government undertook and formulated the **National Energy Strategy 2030**, with an outlook to 2040. The Hungarian strategy was published in January 2020 and one of its most important objectives is the decarbonisation of energy production.

As the Hungarian National Energy Strategy emphasizes, climate change is one of the major challenges of our time. Moreover, a wide range of institutions and stakeholders – from the global to the local level – consider as a primary task to address these issues as the “Cambrian explosion” of climate change has become more complex, fragmented and decentralized.

Based on the above, the regulations and strategies elaborated by the Hungarian government should be examined along the following key governmental principle enshrined in the National Energy Strategy 2030:

"With the creation of the National Energy Strategy 2030, the Government aims to harmonize energy and climate policy with economic development and environmental sustainability, to

determine acceptable energy demand and future directions of energy developments, and to develop a vision for Hungarian energy involving energy market participants."

In this regard, it must be mentioned that at the end of November 2016, the European Commission published the so-called "**Winter Energy Package**", which, in addition to several new climate and energy policy proposals, called on Member States to develop a **National Energy and Climate Plan** (**NECP**), using a common methodology and with a standardised content. According to the resolution of the European Commission, the national plans can rely on the existing climate and energy strategies and action plans of member states, if they are compatible with the EU 2030 climate and energy policy goals and the greenhouse gas emission reduction commitments arising from the Paris Agreement.

In this respect, during the preparation of the NECP, Hungary carried out extensive professional, civil and social consultations in order to implement the plan with the support of residents. Integrated design of the document involves decarbonisation, energy efficiency, energy security, internal energy market, research, innovation and competitiveness dimensions of the Energy Union.[1]

Based on the NECP, as next step, the new National Energy Strategy and related action plans published in January 2020 outlined the future of the domestic climate and energy sector until 2030, with a view to 2040. The Energy Strategy promises a "clean, smart and affordable" energy supply, with the main objectives of focusing on consumers, strengthening security of supply, climate-friendly transformation of the energy sector and exploiting the economic development potential of energy innovation. Regarding the forthcoming strategic targets, from 2020, the Hungarian government is intended to achieve strategic goals along four programs by focusing on consumers, strengthening the security of energy supply, transforming the energy sector in a climate-friendly way and supporting energy innovations. The implementation of the goals is supported by thematic programs through 40 sectoral projects.

The overall aim of the strategy is to provide direction and policy support to domestic energy industry actors and stimulate sectoral action plans in order to create, coordinate and stimulate investment and RDI activity in line with national energy commitments. It also aims to contribute to low energy prices, job creation, environmental and climate protection, reducing dependence on energy imports and maintaining a high level of security of supply at all times. Some of the proposed action plans are worth mentioning: "Energy Industry Development and RDI Action Plan 2030" or the **Strategic Environmental Assessment (SEA)** framework. Moreover, the National Energy Strategy also requires the elaboration of an action plan on energy industry development, R&D and innovation. Taking this into account, the Energy Industry Development and RDI Action Plan concerns, among other things, the organizational and financial conditions for the training of professionals required for the energy market, the continuation of research and development and education at a high level, and the implementation of the results of domestic R&D initiatives.

Regarding the SEA framework, its ultimate goal is to compile an environmental assessment that makes feasible proposals for improving the environmental performance of the Action Plan and for promoting sustainable development in the framework of energy industry development and RDI. In order to prevent and mitigate the adverse effects, SEA formulated a total of 36 proposals and recommendations. Methodologically, in this matter, the National Environmental Council (NEC) issues a resolution on the completed action plans and the SEA Environmental Report. Among other things, the NEC states: "The structure and content of the SEA reflect professional work, but it also inevitably reflects the shortcomings of the basic document, which it seeks to fill in some places. As a particular advantage, it examines in

[1] Magyarország Nemzeti Energia és Klíma terve 2018

detail the relationship and coherence (or possible lack thereof) with other national strategies and plans that could be linked to the action plans and also points out potential inconsistencies to be eliminated at a later stage. ".[2]

In connection with the NECP, the Hungarian government has authorized the **Ministry of Innovation and Technology** (ITM) to develop appropriate policy programs and visions for issues that determine the future of the energy sector and other sectors affected by decarbonisation, thus setting national energy and climate change targets and domestic commitments, in particular on emission reductions, energy efficiency and the share of renewable energy, in order to meet the objectives of the Energy Union and to comply with the Paris Agreement.

ITM presented (2019, 2020) the main elements of the main projects of the NECP, emission reduction and climate adaptation, which include decarbonized and flexible electricity generation, greening of transport, support for energy-conscious and modern Hungarian homes, climate-conscious water management, or the implementation of climate protection programs in the municipality.

In addition to these types of actions, the manner of policy coordination is also an essential point. Related decisions can be based on the principle of self-government, where local initiatives dominate the whole process, including planning, funding and implementation. The situation is different when reference is made to public-private partnership projects and awareness-raising campaigns.

During the establishment of the NECP, Hungary took into account the current national plans, measures and policies. It is closely linked to the content and process of the new National Energy Strategy being prepared at the same time as the NECP.

On behalf of government involvement, the current government is constantly positioning the place of the topic.

From 15 January 2021, the State Secretariat for Energy and Climate Policy and the State Secretariat for the Construction Economy, Infrastructure Environment and Sustainability will continue to operate in a single organization within the Ministry of Innovation and Technology. As a reason for this, the Ministry indicated in a statement that the strategic and regulatory foundations of the Climate and Nature Action Plan were laid by the Ministry last year. The challenge for the next period is to implement the prepared and already launched programs in a coordinated manner in line with international commitments and obligations. In accordance with the tasks that require primarily EU conciliation experience, the related state secretariat will be headed by newly appointed Mr. Attila Steiner, the former State Secretary for European Union Affairs of the Ministry of Justice.

4.3. Strategic and planning documents

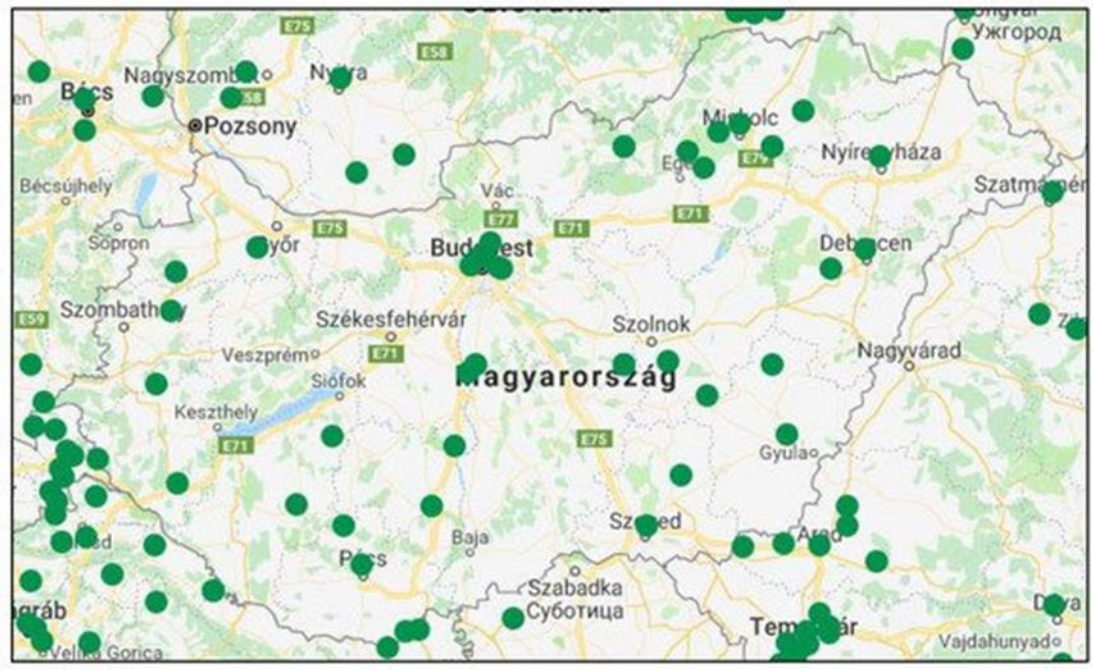
The three main types of climate change measures are adaptation, mitigation and awareness raising. The implementation of these measures can be very successful with a variety of planning tools such as adaptation strategies, mobility plans, greenhouse gas (GHG) reduction concepts, and municipal climate action plans. Strategies and activities can be extended to different sectors, such as energy, transport, water supply, waste management, etc.

[2] http://www.env-in-cent.hu/hu/n/a_kormany_elfogadta_az_energetikai_iparfejlesztesi_es_kfi_cselekvesi_tervet_az_skvt_az_envincent_kft_keszitette-104

In Hungary, climate-sensitive planning is quite rare at the level of villages or towns, and only larger cities have some kind of energy/climate action plans (SEAP – Sustainable Energy Action Plan, SECAP – Sustainable Energy and Climate Action Plan). These documents are largely public, but organizations such as the Covenant of Mayors, which have direct access to each municipality and are consciously disseminating the need to involve municipalities more actively in their work on climate change, are committed to ensuring accessibility.

One of their tasks is to support these activities of local governments: In the last 1-6 years, county-level climate planning was implemented, and municipalities had the opportunity to join this process. The majority of responding municipalities were aware of this county-level process, and many of them were actively involved. Unfortunately, the little ones haven't even heard of these initiatives.

With regard to climate change or energy planning, it can be seen that only the larger municipalities treat this issue as their own task. The map visualizes the Hungarian municipalities having joined the initiative of the **Covenant of Mayors**.



Membership of Hungarian municipalities in the Covenant of Mayors (2018) (source: https://www.covenantofmayors.eu)

The way to participate in climate change can be manifested in tangible projects and programs. One of the most popular projects is the energy-saving retrofitting of public buildings. This usually means replacing old windows with more efficient and up-to-date plastics insulating the exterior walls and roofs of buildings. Most municipalities have already implemented some projects in this field. The main benefit for them is to improve the energy efficiency of public buildings and decrease the municipal energy bill.

In order to achieve the energy efficiency objectives, the Hungarian legislation adopted **Act LVII/2015** on energy efficiency. The legal act not only imposes obligations on companies, but also encourages public institutions to operate more efficiently in an exemplary manner, albeit without the support of the necessary resources.

In this respect, in every five years, public institutions must prepare an energy saving action plan, which they must upload to the online interface operated by the National Energy Network by 31 March of the year of preparation, and after that an annual report on the fulfilment of the energy saving action plan to the same online interface. Moreover, they have to also report energy consumption data for the building, certify the building with an energy

efficiency certification, the results of which must also be reported, updated within the energy audit.

From the point of view of public administration and public institutions, stakeholders have to adhere to the measures of the following dimensions of energy policy:

Decarbonization dimension

Greenhouse gas emissions and removals

The EU Climate and Energy Policy Framework, adopted by the European Council in October 2014, envisages a reduction in greenhouse gas emissions of at least 40% at EU level by 2030 compared to 1990. In connection with this, Hungary aims to reduce its greenhouse gas emissions by at least 40% by 2030 compared to 1990, i.e. gross emissions in 2030 should not exceed 56.19 million tCO2eq.

Renewable energy

Hungary wants to achieve a share of renewable energy sources of at least 21% in gross final energy consumption by 2030.

The share of renewable energy in the heating and cooling sector, with additional measures, could approach 30% in 2030. There is great potential for the efficient utilization of biomass in both individual heating systems and district heating, as well as the possibilities of using thermal heat through heat pumps. The implementation of the Green District Heating Program and the placement of as many of the individually heated buildings as possible on a renewable basis will play a key role in replacing natural gas and increasing our use of renewable energy sources in the heat market.

In the field of transport, Hungary sets a renewable energy share of at least 14% by 2030. In order to achieve this goal, so-called food and feed crops the share of first-generation biofuels to almost 7%, while the so-called Hungary will increase the share of second-generation (or advanced) biofuels and biogas to 3.5% of final energy consumption in transport. The remaining part can be achieved through a significant increase in the use of electricity for transport.

Energy efficiency dimension

Our main energy efficiency goal is that the Hungarian final energy consumption in 2030 does not exceed the value of 2005 (785 PJ / 18750 ktoe). Naturally, reducing the amount of energy is a priority, but in case of economic growth, the energy consumption of neither industry nor transport can be limited, therefore after 2030 Hungary undertakes to increase only final carbon consumption from carbon-neutral energy sources after 2005.

Energy security dimension

The high share of imports in both the electricity market and the gas market is decisive in the Hungarian energy supply. High dependence on energy imports can pose serious security of supply and price risks. As Hungary sees security of supply as an element of its national sovereignty, one of the main tasks of the Hungarian Government is to strengthen energy independence. In reducing its dependence on energy imports and strengthening geopolitical independence, Hungary places emphasis on increasing energy efficiency.

Internal energy market dimension

The proper functioning of the internal energy market depends primarily on three main components: the degree of interconnectivity (interconnection) and the need to increase it; the

level of market interconnections and its effect on reducing prices and price volatility; and the liquidity of the Budapest Power and Gas Exchange.

Hungary already significantly exceeds the EU target for electricity interconnection, but the target figure can also be increased above 60% on the basis of a policy vision, due to significant energy coordination reasons.

Research, innovation and competitiveness dimension

Hungary strives to ensure that the domestic energy industry and the RDI sector are able to serve national and EU energy and climate policy goals as much as possible. That is why the priority for the country is to increase innovation performance and to make the most of the economic development opportunities inherent in energy innovation and climate change. As part of the new energy innovation strategy, the Hungarian government is intended to encourage the use of innovative solutions.

To support the development of an energy innovation strategy in line with these criteria, the Energy Innovation Council (EIT) was established by Hungarian energy and industrial companies, universities, research institutes, professional organizations, the Hungarian Energy and Public Utilities Regulatory Authority (MEKH), the Ministry of Technology and Innovations and the representatives on the Paks Nuclear Power Plant. The Council identified options for action in the following areas:

1. Innovative system balance (Flexibility storage and demand management, distribution system active operation);
2. Encouraging the market introduction of innovative energy supply methods;
3. Energy efficiency innovation program;
4. Promoting the utilization of domestic natural gas assets;
5. "Smart regulation" to encourage distributors and service providers to innovate;
6. Traffic greening;
7. Encouraging the use of renewable energy sources;
8. Supporting nuclear innovation;
9. Encourage innovative seasonal electricity and heat storage solutions.
1. The strategy is the and document system description and availability

The implementation of the energy policy provisions are primarily influenced by the following official documents elaborated by the Hungarian government:

National Renewable Energy Action Plan

The most important strategic goal of the Hungarian renewable energy policy is to optimize the joint implementation of security of supply, competitiveness and sustainability as the primary goals of the national economy, taking into account the long-term aspects as well. There can be several interactions between these three goals, in many cases their implementation can be in conflict with each other, but they can also strengthen each other. For this reason, the measures formulated to achieve the objectives must place particular emphasis on synergies, the resolution of contradictions and the greatest possible coherence. For this aim, the action plan identifies five main areas of intervention:

- safe and stable energy supply;
- climate protection, environmental sustainability;
- agriculture and rural development;
- green economy;
- adaptation to EU commitments.

National Energy Strategy 2030

As the strategy highlights, the national energy policy of the future must be shaped partly by the responses to the most important domestic and global challenges, and partly by the EU energy policy aspirations, taking into account the Hungarian geopolitical specifics. The focus is on achieving a rationalized energy demand and energy supply (both in infrastructure and services) that simultaneously serves the growth of the domestic economy, ensures the availability of services and affordable prices for a wide range of consumers. The challenges related to the forthcoming change in the energy structure can be turned to the benefit of Hungary, but for this the government has to exploit the opportunities inherent in employment and economic growth in energy developments.

During the energy restructuring, the following points must be implemented:

- energy efficiency measures covering the entire supply and consumption chain;
- increasing the share of low-carbon electricity generation, based primarily on renewable energy sources;
- the spread of renewable and alternative heat production;
- increasing the share of low-carbon modes of transport.

By implementing these four points, significant progress can be made towards the creation of sustainable and secure energy systems, which can also make a significant contribution to increasing economic competitiveness.

4.4. Other specific regulations

In order to satisfactorily interpret the completeness of the regulatory environment, in the following section an overview is given about the framework of construction regulation and qualification (quality assurance). What follows are excerpts from the current regulation as of early 2021.

Government Decree 666/2020. (XII. 28.) on the energy review

The regulation contains provisions about the obligation to register and record an energy audit, about the content requirements of an energy audit and the supervisory tasks of the audit process. Here is the full text of the decree:

Legislative changes after 2020:

1. **Decree Amendment of TNM Decree 7/2006** on the determination of the energy performance of buildings (V. 24.); and
2. **Amendment of Government Decree 176/2008** on the certification of the energy performance of buildings (VI. 30.)

A six-month postponement of the introduction of the nearly zero energy buildings provision has been included in the following regulation:

The amendment reads as follows: “By way of derogation from point (a) of 6/B. § A 6. § Section (2), if, on the basis of the architectural and technical documentation, the design of the building is not close to zero or below zero and the commissioning takes place after 31th of December 2020, 6. § Section (2) (a) shall apply in the case of putting into service after 30th of June 2021. "

3. **Modification of Government Decree 176/2008** on the certification of the energy performance of buildings (VI. 30.)

This is a minor amendment, in which one or two terms have been changed (e.g. “use of renewable energy” has been replaced by “use of renewable energy and the aggregated energy characteristics as defined by the Order”, and “building services” has been replaced by “building technologies”).

4. **Modification of Government Decree 122/2015** on the implementation of the Energy Efficiency Act. (V. 26.)

Here, some points have been amended or supplemented, including those on energy experts, energy audits and the liability regime. Several annexes have been modified also.

5. **Modification of Government Decree 7/2006** on the determination of the energy performance of buildings (V. 24.)

The regulation has been amended and supplemented on several points. Among other things, a section has been added to the section on the share of renewable energy in Annex 6 stating that "In the event that the technical and economic conditions for meeting the minimum share of renewable energy in accordance with point 1 are not met, the minimum renewable energy requirement may be met by increased energy efficiency. The minimum expected level of increased energy efficiency shall be ensured in accordance with Table IV.2." According to this, the 25% renewable share should only be met if "the technical and economic conditions are present, as outlined by the expert opinion included in Annex 4".

The following point is added to Annex 6 to the Regulation: „4.3. The amount of renewable heat used to cool the building can be taken into account during the cooling operation, but not exceeding the period of between 15th of April to 15 October. In case of a heat pump, the heat removed from the building towards the outside air cannot be considered as a renewable energy source."

Annex 1 of the Decree has also been amended/supplemented with regard to "Room temperature control", "Assessment of building services systems" and "Building supervision".

It has also been supplemented with Annex 8, which contains new points on electromobility.

Construction legislation has also been amended. This modification is the most important in relation to increasing efficiency. Thus, we can assume this will result in the reduction of industrial emissions and the improvement of the energy performance of the building sector. These can be read as follows:

1. **Government Decree 2033/2020. (XII. 29.)** on the support for increasing the productivity and efficiency of the construction sector

"The Government

1. supports the increase of domestic construction productivity and the provision of financial means resulting in better economic processes in the construction sector;

2. calls on the Minister of Finance to ensure the provision of HUF 12,000,000,000 to support the technological modernization and increase of productivity of domestic construction enterprises in accordance with Act LXXI of 2019 on the Central Budget of Hungary 2020; as described in Annex 1 Chapter XVII. for the Ministry of Innovation and Technology, Section 20. „Appropriations managed by chapter", Section 64. „Economic tasks", legal group „5. Aid for technological modernization and efficiency improvement in the construction sector„.

2. **Government Decree 700/2020. (XII. 29.)** on the amendment of certain government decrees on construction

It amended Decree 253/1997 on national urban planning and construction requirements (XII. 20.), the Government Decree 191/2009 on construction activities (IX. 15.), Government Decree 312/2012 on the procedures and inspections of the construction and construction supervision authorities, and on the services of the construction authorities (XI. 8.) and Decree 155/2016 on the simplified notification of the construction of a residential building (VI. 13.)

4.5. Conclusions

The implementation of a Community energy policy will be a long process, but we believe Europe is on the right track. However, it is feared that the crisis at the Member State level will somewhat set back efforts, as countries focus more on tackling public debt and budget deficits. We agree with the statements in the Annual Growth Survey that Member States need to stick to their targets, as energy efficiency measures and bioenergy investments will help reduce energy consumption and at the same time create new jobs. However, it is clear that energy policy does not stand alone and cannot be separated from other policies. Any investment or measure automatically has an impact on processes and areas that are fundamentally part of another Community policy. This is why strategies and objectives need to be coordinated across all policy fields, as this will maximize the overall efficiency and support specific policy activities.

Looking at the relevant sectors in turn, the issue of the use of nuclear energy divides Member States. Especially after the events in Fukushima its support has changed in some countries. The use of renewable energy sources must, of course, be encouraged, as there are still plenty of untapped resources to be exploited. Hungary is still at an early phase on its path towards more extensive exploitation of renewable energy sources. Regarding energy efficiency, several energy efficiency and waste management strategies exist in the country, and grants can be applied for the implementation of projects. The energy saving potential is mainly present in the corporate, household and public administration sectors. This potential can be harnessed by investments in heating modernization, building insulation and the installation of solar collectors. There are good conditions for using biomass power plants in Hungary, as it is an agricultural country. There is ample opportunity to include fallow land for growing energy crops; and waste from agriculture and animal husbandry can also be used in power plants. In this way, useful energy can be generated while one can get rid of harmful by-products.

There is still a lot to be done in Hungary to achieve the goals. This will also require a change in the attitude of the population to pursue a more environmentally friendly lifestyle. It is also important to increase corporate social responsibility. All in all, there is increased global awareness to change the structure and extent of energy use. The goals are set to ensure a

stable energy supply for Hungary, we just need to achieve them. This requires very close cooperation by all stakeholders. Everyone must take its share to achieve a sustainable economic structure that does not jeopardize fulfilling the needs of future generations.

5. Hungarian regulations, strategic and planning documents regarding climate with climate planning and management modes

5.1. Introduction to chapter

According to the report of the Intergovernmental Panel on Climate Change (IPCC), in order to keep the global temperature growth below 2 °C, thus avoiding a number of serious adverse effects on global warming, climate neutrality needs to be achieved by 2050. Reaching this goal requires immediate and profound action from all countries in the world. For this aim, after ratifying the Paris Agreement, negotiations began in November 2018 between the EU Member States coordinating their climate policy on the long-term strategy of the European Union, and in particular on the goal of climate neutrality.

In this respect, Hungary aims to achieve net zero greenhouse gas emissions, thus reaching climate neutrality, by 2050, by maintaining a balance between anthropogenic emissions and removals in accordance with the Paris Agreement. To better understand this governmental engagement, the present chapter describes the Hungarian legislative and strategic framework intended to foster climate-friendly action in the light of the international emission commitments.

5.2. General regulations

Regarding the actual regulatory framework, it can be highlighted that climate policy is regulated closely along with energy policy legal acts and strategies. Therefore, climate and energy policies – as two highly interrelated issues – are treated together on strategic level. In this regard, Hungarian climate policy is shaped by the following legislative acts:

1. **XLIV/2020 Act on Climate Protection**: Climate change and the increasing intensity of extreme weather events are among the most important sustainability challenges of our days, which pose many challenges for Hungary – where the extent of global warming is above the European average – and for the Hungarian government. Preventing them, reducing their effects and adapting to their consequences require effective and feasible interventions, which the Hungarian government considers to be a priority obligation with the adoption of the Paris Climate Agreement. Accordingly, in order to protect the environmental heritage, to preserve the results of the joint efforts of the Hungarian residents and next generations, and to ensure the survival of the Hungarian nation in the Carpathian Basin, the Hungarian Parliament enacted a Climate Protection Act in 2020. The main provisions of the legislation can be summarized as follows:

    - notes that climate change and the increase in the frequency of extreme weather events are clearly being identified around the world, and that the natural, economic and social effects are affecting more and more people;
    - ensures the commitment of the Hungarian government to protect the natural heritage and the natural conditions of the way of life that the Hungarian nation has created in the country;
    - reaffirms the importance of protecting the environment and combating the adverse effects of climate change;
    - Hungary will reduce its greenhouse gas emissions by at least 40% by 2030 compared to 1990;

- in the event of an increase in final energy consumption exceeding the level of 2005 after 2030, Hungary will provide the increase only from carbon-neutral energy sources;
- Hungary will achieve at least a 21% share of renewable energy sources in gross final energy consumption by 2030;
- Hungary will achieve full climate neutrality by 2050, i.e. the remaining domestic greenhouse gas emissions and removals will be in balance by 2050;
- In accordance with the previous points, the Hungarian government will:
  - measure to achieve a share of renewable energy in gross final consumption of at least 21% by 2030;
  - support the population and local communities to move from consumers to active energy producers;
  - launch the support program for the renewable energy and energy efficiency developments of domestic enterprises;
  - modify the related public policy regulations (mainly transport, energy and waste management policy, water, agriculture and forestry policy, land use, land and settlement development policy) on the basis of sustainability aspects, and;
  - initiate programs to encourage technological solutions for climate protection.
- The Hungarian government will ensure the issuance of a Green Government Bond in order to create a source of budget-funded developments for climate protection, and will run social awareness campaigns, especially for economic decision-makers.

2. **LIII/1995 Act on General Rules for the Protection of the Environment:** The purpose of the law is to establish a harmonious relationship between man and his environment, to ensure a high level of coordinated protection of the environment as a whole and its elements and processes, and to ensure sustainable development. According to the principles of predictability and fair burden-bearing, the law creates an appropriate framework for enforcing constitutional rights to a healthy environment and promotes the following measures:

   - reduction of the use and pollution of the environment, prevention of damage, repair and restoration of the damaged areas;
   - protection of human health, improvement of environmental conditions of quality of life;
   - the conservation and maintenance of natural resources, their management in a reasonable manner and ensuring the renewal of resources;
   - the compatibility of other tasks of the state with the requirements of environmental protection;
   - international environmental cooperation;
   - the initiative and participation of citizens in activities aimed at environmental protection, in particular in the exploration and knowledge of the state of the environment, in the performance of the tasks of state bodies and local governments related to environmental protection;
   - operative coordination of the economy, social and economic development with the environmental requirements;
   - the establishment and development of the institutional system of environmental protection;
   - the establishment and development of public administration for the protection and preservation of the environment.

3. **LIII/1996 Act on the Protection of Nature**: Natural areas are specific and irreplaceable parts of national wealth. Therefore, their maintenance, management,

improvement and preservation for present and future generations, in accordance with our international obligations is an essential condition for creating environmentally sustainable conditions. These measures require the establishment of effective legal and institutional background, and therefore constitutes the following law:

- the general protection, promotion and sustainable use of natural values and areas, landscapes and their natural systems, biodiversity, and meeting the requirements of social needs for a healthy, aesthetic nature;
- preservation of the traditions of nature conservation, further development of its results, priority protection, preservation, maintenance and development of natural values and areas.

4. **306/2010. (XII. 23.) Government Decree on air protection**: This legal act has a crucial importance as it enshrines general and specific rules for air protection, while the rules for odour pollution also appear in this decree. According to this measure:
   - It is forbidden to pollute the air and to pollute the air with odours that disturb the population. Compliance with air protection requirements must be ensured in the area affected by the air pollution source.
   - The law stipulates that in case of activities or facilities subject to an environmental impact assessment or a single environmental use permit involving an odour emission, the odour emitter must establish a protection zone. In the meanwhile, the territorial environmental authority shall determine the size of the protection zone in the environmental permit, with the highest power utilization and unfavourable propagation conditions (especially prevailing wind direction, weather conditions), topography, protection elements and protected areas taking into account structures in an area at least 300 meters from the boundary of the air pollution source and at a maximum distance of 1000 meters.
   - Health limit values, alert thresholds, information thresholds, tolerances, target values and critical levels must be set out in legislation on emission limit values for stationary point sources and are reviewed at least every three years.
   - For zones and agglomerations where the levels of sulphur dioxide, nitrogen dioxide, PM10, PM2,5, lead, benzene or carbon monoxide in the air exceed the limit value on the basis of the annual air quality assessment, an air quality plan shall be drawn up containing appropriate measures to compliance with the air pollution limit values must be ensured as soon as possible.
   - For zones and agglomerations where the concentration of ground-level ozone exceeds the target value or the long-term objective, the regional environmental authority shall determine the disproportionately high costs, taking into account the opinion of the transport authority or municipalities, involving the air pollutants concerned to ensure that the target values and the long-term objective are met.

5. **CCXVII/2012 Act on participation in the scheme for greenhouse gas emission allowance trading within the EU and implementation of the effort sharing decision**: By creating this law, the Hungarian legislation aimed to create the opportunity for Hungary to mitigate human-induced climate change by reducing greenhouse gases as deemed scientifically necessary by participating in the greenhouse gas trading system applied in the European Union. A consistent, transparent and accurate monitoring and reporting scheme of greenhouse gas emission in accordance with the harmonized requirements laid down in this Regulation is essential for the effective functioning of the greenhouse gas emission allowance trading scheme established in accordance with Directive 2003/87 / EC.

5.3. Strategic and planning documents

Beside the above mentioned legal acts, Hungarian climate policy is coordinated by the following sectorial strategies setting targets both for the coming years and decades:

- **National Energy Strategy and the (draft) National Energy & Climate Plan:** The main objectives of the newly adopted Energy Strategy and the still draft version National Energy & Climate Plan are to strengthen energy sovereignty and energy security, to maintain the results of overhead reductions and to decarbonise energy production, which can only be achieved through the combined use of nuclear and renewable energy. For countries poor in traditional energy sources, such as Hungary, energy sovereignty is a matter of prosperity, economy and national security. It is in clear national interest to reduce the domestic need for energy imports and, at the same time, to ensure wider connection to the regional electricity and gas networks, which is also a guarantee of security of supply and effective import competition. The cleanest energy is unused fossil energy. This can be achieved through the use of heating / cooling solutions based on renewable resources, the implementation of the Green District Heating Program, 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 with the spread of electromobility. As a result of the Green Bus Program for Greening Local Transport, environmentally friendly electric buses will run in major cities. The energy independence of families can be promoted by supporting renewable energy production in the backyard for one's own purposes and by promoting the spread of smart meters. In this regard, the governmental goal is for most of Hungarian electricity generation to come from two sources: nuclear energy and renewable energy, primarily solar power plants. These are not mutually exclusive technologies, but mutually supportive solutions, and both can be considered as clean energy sources.

  The National Energy Strategy 2030 adopted in 2020 identifies the following main points:
  - the central role of consumers,
  - strengthening security of energy supply,
  - climate-friendly transformation of the energy sector,
  - stimulating innovation opportunities important for economic development
  - They are important for increasing energy efficiency and expanding the use of renewable energy, which is also present in the city's climate strategy.

- **Second National Climate Change Strategy:** As a result of the legislative review of the first National Climate Change Strategy adopted by the Parliament in 2008, the draft of the Second National Climate Change Strategy for 2014-2025, with a view to 2050, was prepared in 2013 and submitted by the Government to the Parliament in June 2015. Meanwhile, in the framework of the 21st Conference of the Parties to the UN Framework Convention on Climate Change, in December 2015, Member States adopted the new global "Paris Agreement" and the "Paris Package" supporting decisions, which necessitated a re-examination and revision of the draft strategy. The related discussion and negotiation finally took place in October 2018, and after a few weeks of committee negotiations and the emergence and transfer of minimum modification requests, the actualised strategy (with a view to 2050) was adopted on the 30th of October 2018. The improved Strategy includes an assessment of the expected impacts of climate change in Hungary, the natural and socio-economic consequences, as well as the climate vulnerability of ecosystems and economic sectors, the Hungarian Decarbonisation Roadmap with targets, priorities and

directions for reducing greenhouse gas emissions by 2050, and the National Adaptation Strategy. The main objectives of the latter are to prevent risks related to climate change and climate security, to mitigate damage and to present a target framework for climate change prevention, preparedness and adaptation activities and to set sectoral policies for human health, agriculture and rural development, forestry, nature conservation, energy infrastructure, tourism, settlement, and disaster management.

Briefly, the strategy sets out four thematic specific objectives, which represent a more detailed, sectoral explanation of the overarching objectives:

- **Decarbonisation**: The aim is to reduce greenhouse gas emissions (CO2, CH4, N2O, F, etc.) and reduce natural gas emissions in the context of the fight against the drivers of climate change, taking into account the obligations arising from our international and EU membership through capacity building. Geological storage and storage of carbon dioxide (CLT) is considered by the European Union as a possible and recommended means of decarbonisation, and further studies on environmental and safety risks and cost-effectiveness are needed to minimize the potential use of the technology.
- **Geoinformatics (GIS) establishment for the territorial study of climate vulnerability**: The territorial and sectoral strategic integration of adaptation to climate change requires detailed information on social, economic and environmental vulnerability to change. The aim is the continuous operation of a multi-purpose GIS data system based on domestic research and the results of earth observation, which helps with flexible planning, decision-making adapted to changing circumstances with objective information.
- **Adaptation and preparation**: The aim of climate adaptation is to preserve the stock and quality of national (natural, human and economic) resources and to promote flexible natural, social, economic and policy responses to changing external conditions. The aim is to prepare for a coordinated response to the long-term challenges of climate, energy, food and water security, as well as critical infrastructure security.
- **Ensuring a climate partnership**: The aim is for Hungarian climate policy to be implemented within the framework of a broad partnership and socio-economic consensus. There is a need to increase awareness and public confidence on climate change, prevention and adaptation measures. The state must help to build this consensus by setting a lasting and continuous example, including in the field of energy saving and climate-friendly public procurement. The role of civic, charitable and ecclesiastical organizations, local governments, as well as the participation of economic interest groups and chambers in joint actions must be strengthened, as the involvement of non-public funds is also essential for the cost-effective fulfilment of climate policy goals.

- **National Clean Development Strategy** (draft version): This strategy reflects to the realisation of the reduction goals set by the Paris Agreement and reaching climate neutrality by 2050. According to cost estimations, achieving climate neutrality in 2050 requires approx. HUF 50,000 billion, which assumes the involvement of 2.5% of GDP per year until 2050.

  In order to achieve climate neutrality by 2050, Hungary's greenhouse gas (GHG) emissions should be reduced by 95%. To the best of our knowledge, the remaining emissions can be neutralized by domestic sinks (land use sector, mainly forests). Although there are research processes upon the design of artificial sinks, their potential future applicability is very uncertain. To achieve this goal, intervention is

needed in all emission sectors (energy use, industry, agriculture, waste) and steps must also be taken to maintain absorption capacities. It is important for Hungary that the innovations and energy efficiency measures necessary for the transition to a low-emission economy be implemented as soon as possible, as these will significantly help to achieve the agreed goals. In order to reach the 95% overall emission reduction target, which will require technologies that are not yet implemented today, certain sectors (e.g. electricity and district heating, oil refining, coking, energy efficiency, agriculture, fisheries and forestry, energy demand, complete elimination of the use of fluorinated greenhouse gases and solvents in product use) it is necessary to reduce emissions to absolute zero. However, there will be sectors (agricultural emissions, industry, fugitive emissions, residual impact of old landfills) where GHG emissions are expected to be much lower but still present. As a consequence, the vision set out in the National Clean Development Strategy relies heavily on technological developments over the next 30 years. The vision envisages the emergence of innovative technologies such as energy storage systems (e.g. power-to-gas or hydrogen), carbon capture and storage or use, use in high-emission industrial plants for hydrogen reduction from clean sources, or industrial combustion to heat high-temperature processes.

As Hungarian government agrees with the EU's climate goals, and the following four conditions must be met during the implementation of the present strategy:

- It is not the people who pay the price of climate protection, but the biggest emitters of climate change, i.e. large companies and large polluting countries, as they are the biggest beneficiaries of increasing CO2 emissions.
- The price of energy and food paid by families must not rise.
- The government also insists on keeping cohesion money and use for this purpose.
- Furthermore, the promotion of nuclear energy is of paramount importance, without which there will be no effective emission reductions.

- **Energy and Climate Awareness Action Plan**: In order to achieve the Hungarian energy policy goals, the National Energy Strategy recognizes the role of social behaviour patterns in many areas and, as a result of this, emphasizes the importance of the opportunities inherent in shaping citizens' attitudes. As a matter of fact, the National Energy Strategy assigns to the Government the task of developing an action plan for the formation and development of consumers' energy and environmental awareness. Pursuant to the decision, the Government should provide education on sustainable development and energy awareness and disseminate it through the media.

  In Hungary, there is significant potential for energy savings in the modernization of energy-wasting buildings (due to the lack of good maintenance of building structures) and heating and electricity systems that are no longer considered efficient, as well as in the replacement of energy-intensive electrical equipment. This potential is greater in case of Hungary than in the western member states of the European Union, where, in spite of all this, sensitisation programs are of much greater importance. Thanks to the EU support programs, an increasing number of building energy modernizations are being implemented in Hungary as well. However, in order to make better use of energy efficiency potentials and increase the efficiency of resource use, it is essential to arouse general interest and provide consumers with appropriate information.

  According to the latest statistics, residential energy consumption accounts for 27% of the EU's final energy consumption. However, this value can be set at 32% in

Hungary, which clearly shows that the population has an important role to play in achieving energy efficiency and savings targets, especially in the following issues:

- Estimating the potential for savings in household energy consumption is the subject of a number of studies and studies that consider significant savings of up to 20 percentage points to be achieved through a combination of asset and behavioural changes.
- The population as an important energy consumer should play an active role in implementing the energy strategy. In order to achieve the necessary motivation and independent action, it is necessary to provide credible and target group-specific knowledge to the population in a more intensive way than before, given that a significant part of society lacks energy and related environmental awareness. Climate change is the most significant environmental problem arising from energy consumption and should therefore, as the title of the Action Plan indicates, play a key role in achieving energy-related environmental awareness through the implementation of awareness-raising measures. This requires the transfer of detailed knowledge about it.

The Energy and Climate Awareness Action Plan encourages the implementation of awareness-raising activities in the following thematic areas:

- energy efficiency and energy saving;
- renewable energy use;
- transport energy savings and emission reductions;
- resource-efficient and low-carbon economic and social system;
- adaptation to changed climatic conditions.
- The ECSC makes the following suggestions on the types of attitudes:
- integration of climate protection into the legislative activities of county and local governments;
- partnership with county media;
- environmental sensibilisation in education;
- social and public campaigns;
- county climate protection networking;
- helping and presenting local pilot projects, good examples.

5.4. Other specific regulations

In line with the primary sectorial strategies, Hungarian climate policy must be also adjusted to the following secondary strategies influencing relevant issues of environmental protection and sustainability:

- **National Building Energy Strategy**: In Hungary, the share of building stock in the national primary energy consumption is approximately 40%, which includes heating, cooling and domestic hot water production. This is broadly in line with the proportion observed in the EU Member States with similar natural endowments. The technical and thermal condition of a significant part of Hungarian buildings is outdated, as a result of which there is a significant potential for energy savings in reducing the energy consumption of buildings. Within the building sector, the share of natural gas in energy consumption is more than 50%. As a result, building energy savings also have a significant impact on natural gas imports. The majority of the energy consumption of buildings is room/flat heating, so the seasonality of use is strong. This is of paramount importance for both natural gas storage and performance management. Accordingly, climate protection is one of the goals of the present strategy by reducing GHG emissions. Thus, the National Building Energy Strategy states that the greatest energy savings and GHG emission reductions can be achieved within the building sector by energy renovation of the existing building stock.

  The main, comprehensive goals of the National Building Energy Strategy adopted in 2015 are:
  - Alignment with EU energy and environmental objectives;
  - Building modernization as a means of reducing overhead costs for the population;
  - Reduction of budget expenditures;
  - Reducing energy poverty;
  - Reduction of GHG emissions.

- **National Transport Infrastructure Development Strategy**: The main goal of the National Transport Infrastructure Development Strategy adopted in 2014 is to ensure the conditions for mobility of the economy and prosperity. The strategy identifies 8 social goals to which it contributes with its own means, among which the reduction of the negative effects on the environment and the implementation of climate protection aspects are in the first place. In this spirit, the main transport objectives also include environmental aspects, in the form of strengthening "resource-efficient modes of transport" and "more socially beneficial passenger and freight transport". In this context, the strategy encourages the development and promotion of non-motorized (pedestrian and bicycle) transport, the expansion of rail transport in socially justified cases, and the preference and development of public transport in passenger transport by various methods.

- **National Rural Strategy**: Preservation of natural resources and values, responsible and sustainable management, development of agriculture and the countryside, protection of the built and natural environment and the preservation of natural values are strategic issues in the 21st century having direct national security significance. Therefore, ensuring good quality and safe food supply, landscape maintenance, protection of drinking water supplies, soils, biodiversity and good environmental status, creating sustainable conditions for rural communities and culture, and the maintenance of local public services must be treated across Europe as key government goals. In this regard, the overarching objective of the National Rural

Strategy – adopted in 2012 – is to improve the population retention capacity of our rural areas.

In this regard, the Rural Strategy identifies the following five target areas:

- Preservation of the natural values and resources of our landscapes;
- Diverse and viable agricultural production;
- Food and food security;
- Ensuring the livelihoods of the rural economy, increasing rural employment;
- Strengthening rural communities, improving the quality of life of the rural population;

- **National Forestry Strategy**: The National Forest Strategy adopted in 2016 identifies climate change as one of the challenges affecting forests and forestry, and states that the tasks of forest management are to adapt to the changing climate and to mitigate climate change due to the excellent carbon sequestration capacity of forests. To this end, according to the measures of the strategy, “methods and management methods that most effectively promote the adaptation of forests must be developed and introduced in the practice of forest management”. Moreover, climate change considerations also need to be gradually integrated into forest planning, including site designation and tree species selection.

- **Kvassay Jenő Plan – National Water Strategy:** One of the overarching long-term goals of the Water Strategy adopted in 2016 is to ensure that all water users have an equal chance of having access to sufficient healthy water by 2030, while measures to promote water use and combat water damage are in harmony with natural conditions. The quantity and quality of domestic usable water resources should be improved until good status is achieved. With regard to water damage, he emphasized that the prevention of water damage should take precedence over protection, and that the harmful transformation of water management systems and land use patterns should be based on reducing water scarcity.

  To this end, the SCI identifies the following priorities:

  - Water retention and distribution to make better use of our waters
  - Preventive water damage prevention
  - Gradual improvement of water status to achieve good status
  - Quality water utility service and rainwater management with tolerable consumer load bearing
  - Improving the relationship between society and water

5.5. Conclusions

Hungary belongs to the group of leading countries in fulfilling the climate policy commitments of the European Union. This engagement is well illustrated by the fact that GHG emissions in Hungary decreased by 32.7% by 2018 compared to the base year of 1990. This achievement is significantly higher than the EU average of 25.2%, which can be interpreted as a significant national success. In addition, the commitment of the Hungarian government and legislature to climate policy measures can be further demonstrated by the fact that Hungary was among the first countries ratifying the Paris Climate Agreement, together with its emission reduction targets.

In this regard, is worth mentioning that Hungary is one of the 21 countries in the world where gross domestic product has grown since 2000, while stakeholders could reduce CO_2 emissions (by 32%) and energy consumption (by 15%). Since 2010, the Hungarian economy has been able to produce GDP growth with 24 percent less greenhouse gas emissions. Thus, Hungary is not only at the forefront of economic growth in Europe, but also has an exemplary practice in the field of climate protection.

GHG emission in the EU member states between 1990-2018

	1990 (million tonnes)	2018 (million tonnes)	2017 - 2018 (million tonnes)	Change 2017 - 2018 (%)	Change 1990-2018 (%)
Austria	78.5	79.0	-3.1	-3.7%	0.6%
Belgium	146.4	118.5	0.5	0.4%	-19.1%
Bulgaria	101.8	57.8	-3.9	-6.3%	-43.2%
Croatia	31.9	23.8	-1.2	-5.0%	-25.4%
Cyprus	5.7	8.8	-0.2	-1.8%	55.0%
Czechia	199.1	128.1	-1.6	-1.3%	-35.6%
Denmark	70.8	48.2	-0.1	-0.3%	-31.9%
Estonia	40.3	20.0	-0.9	-4.5%	-50.4%
Finland	71.2	56.4	1.0	1.8%	-20.8%
France	548.3	444.8	-18.7	-4.0%	-18.9%
Germany	1249.5	858.4	-35.9	-4.0%	-31.3%
Greece	103.3	92.2	-3.4	-3.5%	-10.7%
Hungary	94.0	63.2	-0.6	-0.9%	-32.7%
Ireland	55.5	60.9	-0.1	-0.1%	9.9%
Italy	516.1	427.5	-3.8	-0.9%	-17.2%
Latvia	26.3	11.7	0.5	4.4%	-55.5%
Lithuania	48.0	20.3	-0.4	-1.7%	-57.8%
Luxembourg	12.7	10.5	0.3	3.0%	-17.2%
Malta	2.6	2.2	0.0	1.4%	-14.9%
Netherlands	221.7	188.2	-5.1	-2.7%	-15.1%
Poland	475.1	412.9	-1.8	-0.4%	-13.1%
Portugal	58.6	67.4	-3.2	-4.6%	15.0%
Romania	248.0	116.1	-0.8	-0.7%	-53.2%
Slovakia	73.5	43.3	-0.1	-0.3%	-41.0%
Slovenia	18.6	17.5	0.1	0.8%	-6.0%
Spain	289.4	334.3	-6.0	-1.8%	15.5%
Sweden	71.2	51.8	-0.9	-1.8%	-27.3%
United Kingdom	794.2	462.1	-9.4	-2.0%	-41.8%
EU-27+UK	**5652.2**	**4226.0**	**-98.8**	**-2.3%**	**-25.2%**
Iceland	3.7	4.9	0.0	0.4%	30.1%
United Kingdom (KP)	797.0	465.2	-9.3	-2.0%	-41.6%
EU-KP	**5658.7**	**4233.9**	**-98.7**	**-2.3%**	**-25.2%**

Source: https://www.eea.europa.eu//publications/european-union-greenhouse-gas-inventory-2020

Protecting the environment and adapting to climate change is a priority for Hungary to ensure clean water supply, cleaner air conditions and a more sustainable environment.

For this aim, the Hungarian government is consistently moving towards the goals set for 2030, and as such, electricity production in Hungary will be 90 percent carbon neutral for example. Moreover, by 2050, the goal is to achieve a climate-neutral emission framework, but the arising costs shall be paid by the biggest climate polluters on the European level according to the Hungarian governmental intentions. By the end of this year, the Ministry for Innovation and Technology will develop the long-term, comprehensive National Clean Development Strategy needed to achieve climate neutrality in 2050.

The Hungarian government agrees with the emission goals set by the European Union until 2030, as the Community has an action plan for reaching the targets, and the necessary resources are available to fulfil the commitments. Nevertheless, the governmental commitment to increase the share of carbon-free electricity production to 90 percent by 2030 is even more ambitious than the European efforts. In Hungary, this extra-commitment will be achieved by maintaining nuclear capacity, encouraging renewable electricity generation and a comprehensive transport greening program.

In the meanwhile, according to the cost predictions, it would take 50,000 billion HUF for Hungary to have carbon-neutral electricity generation, to replace natural gas consumption entirely, and to place transport entirely on an electric basis. Therefore, according to the Hungarian governmental position, **significant part of the expenditures of this transformation must be paid by the biggest polluting, climate-damaging countries and large companies, while energy and food costs should not increase, the expenses should not be covered by cohesion funds and nuclear energy should be part of the solution to handle climate problems**. This is the summary of the Hungary strategic vision in climate policy for the next 10 years.

6. Conclusions and recommendations

Climate change, mitigation, adaptation are common concerns of all residents, institutions, businesses and non-governmental organizations in the region. The local governments or any other institutions alone are obviously not able to implement the measures set out in the strategy, every previous day, because the planned tasks fall within the competence of different sectors, specialties and institutions. The key to the successful implementation of the climate and energy policy measures is to find the key players, to establish long-term partnerships and to operate them successfully.

Obviously, the basic requirements for the successful implementation of all measures are the appointment of a **regional coordinating body**, which fully monitors the assigned tasks in total, thus trying to provide the necessary human and material resources to achieve the goals. Therefore, it is expedient if the coordinating institution has – in addition to the appropriate expertise – other key competencies necessary for strategic implementation, above all the experience of fundraising, event organization and coordination.

The successful implementation of horizontal, multidisciplinary tasks is often hampered by the difficulty of building consensus or compromise. To eliminate this, regional decision-makers have to initiate the establishment and operation of various conciliation forums, which aims to resolve conflicts of interest between different stakeholders in the future by channelling professional discussions on climate change.

There is currently no organizational unit in Zala County and the Croatian-Hungarian cross-border area that would bring together all parts of the implementation of the climate strategy, the creation of a climate reference position or even a Climate Office that could be responsible for taking action. The task of such an organisation would be – in addition to the implementation of the goals of the given year – the preliminary assessment of local government proposals from a climate perspective, liaison with other institutions and non-governmental organizations, and monitoring of tenders. The staff of the office can include climate officers, energetics, communication and community development professionals, which provides an opportunity to coordinate mitigation, adaptation and attitude formation at the level of an organization.

The Local Government of Zala County is primarily responsible for the implementation of the elaborated Climate Strategy of the Zala County according to the provisions of the previously presented acts and strategies. However, at the same time, the implementation of the municipal climate strategy requires the cooperation of the entire population, as well as the institutional and entrepreneurial circle, as no sector alone can be able to fully achieve the set goals. To this end, it is also necessary to establish a partnership between the local governments, public institutions, non-governmental organizations and economic actors within the regional scope.

As a consequence, the Local Government of Zala County is the organization responsible for coordinating the implementation of the climate strategy. In this role, it shall carry out the following main activities:

- holding consultations and lectures on various topics related to climate change at regular intervals in the topics defined in the strategy, the participants of which include scientific life as well as representatives of various economic branches, social groups and institutions;
- having up-to-date knowledge on current financing opportunities for climate change-related developments and, if required, provides information on them to those interested;

- embracing initiatives related to climate change mitigation and adaptation, creates a forum to learn about them, seeks to find resources for their implementation;
- actively participating in climate change-related activities, primarily aimed at the population and local governments;
- collecting, calculating and systematising, as necessary, indicators for monitoring the implementation of the climate strategy, and prepare a progress and review report on the state of implementation of the climate strategy, as required, but at least every three years.

In this county-level engagement, Local Government of Zala County can establish active partnerships with the following actors as they are also responsible for the concrete implementation of the regional climate strategy, of which the following should be highlighted:

- Balaton Uplands National Park Directorate;
- E.ON Ltd.
- MÁV;
- Western Transdanubia Water Directorate;
- University of Pannonia;
- Zala County Territorial Organization of the National Hungarian Hunting Chamber;
- Soós Ernő Water Technology Research and Development Center;
- Volánbusz Ltd.
- Zalaerdő Ltd.;
- Zala County Disaster Management Directorate;
- Zala County Government Office;
- Largest industrial emitters;
- NGOs.

The county-level climate strategy encourages the development of long-term partnerships with business and non-governmental organizations, in the form of a cooperation agreement for well-defined, specific climate protection tasks. In case of larger companies, it is expedient to use the opportunities inherent in the community responsibility system and promotional needs, while in case of smaller companies, the cooperation can be based on their local embeddedness and their local community activity. Agreements with NGOs can, above all, contribute to the success of awareness-raising.

In connection with the establishment of partnership relations, the first task is to assess the range of potential partners, followed by the establishment of a cooperation agreement to be concluded with the Local Government.

As a consequence, we can formulate the following final conclusions and recommendations to be considered by regional stakeholders and decision-makers:

Final conclusions:

- Most of the energy and climate-oriented strategies at the national and sub-national levels have been completed (except for deep renovation strategy), but the missing ones are also being prepared. They ensure the harmonisation of the Hungarian legal and strategic environment with the relevant EU regulations.
- Climate strategies affecting county actors have been completed in each county, which set goals and proposed measures in relation to the three pillars (mitigation, adaptation, attitude formation).
- Some municipalities have prepared or are preparing their climate strategy or SECAP at the municipal level.
- As local authorities have a significant role to play in the fight against climate change (reducing CO_2 emissions, strengthening adaptability, setting a good example for the

population, etc.), it is important that they be able to implement as many projects as possible.

- Municipal financing capacity is generally low, as shown by the fact that their climate projects are implemented almost exclusively from EU funding sources.
- Expertise with the appropriate professional competence is also lacking in several municipalities as well.

Proposal:

- In the 2021-2027 EU budget period, significant amounts will be available for the implementation of climate projects. In order to use it effectively, it is necessary to strengthen the absorption capacity of local governments in the region.
- In this respect, it would be important to prepare a municipal climate strategy or SECAP for as many municipalities in the region as possible.
- Municipalities need to learn about and use alternative financial sources to implement their energy or climate-related projects.
- The involvement of adequate professional support for the development of their projects will be essential for municipalities.
- In connection with the above, it must be noted that there is no organization (e.g. energy agency) on the Hungarian side of the program area that could provide full professional support to local governments. Therefore, it is important to look into the possibility of establishing and operating an Energy Agency in Zala County. The activities of the organization could be linked to the county-level Climate Change Platforms and the National Energy Network.

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