# D5.2 | Case study report on governance barriers to energy transition.

# Country report for HUNGARY

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## Abbreviations

| | |
|---|---|
| BEV | Battery Electric Vehicle |
| BIONYOM | Biofuel and bioliquid traceability register |
| BKK | Centre for Budapest Transport |
| CBA | Cost-Benefit Analysis |
| CEDEC | Committee of Domestic Equipment Manufacturers |
| CHP | Combined heat and power |
| CPI | Consumer price index |
| DH | District Heating |
| DSO | Distribution system operator |
| E10 | E10 fuel is a blend of up to 10% bioethanol and 90% petrol. |
| E85 | Petrol containing at least 70% of bioethanol |
| EE | Energy efficiency |
| EEOS | Energy Efficiency Obligation Scheme |
| EREV | Extended Range Electric Vehicle |
| ETS | Emission Trading System |
| FEC | Final energy consumption |
| FIT | Feed in tariff |
| GCND | Governmental Committee of National Development |
| GCND | Governmental Commitee of National Development |
| GEFS | Green Economy Financing Scheme |
| GHG | Greenhouse gas |
| GIS | Green Investment Scheme |
| GNI | Gross National Income |
| HEPURA | Hungarian Energy and Public Utility Authority |
| ILUC | Indirect land use change |
| KÁT | Hungarian feed-in tariff system |
| KEF | Directorate General for Public Procurement and Supply |
| MAVIR | Hungarian Transmission System Operator |
| MEHI | Hungarian Energy Efficiency Institute |
| METÁR | Hungarian renewable energy support system |
| MND | Ministry of National Development |
| MNE | Ministry of National Economy |
| MOL | Hungarian Oil and Gas Plc. |
| NAV | National Tax and Customs Administration of Hungary |
| NBEPS | National Building Energy Performance Strategy |
| NDA | National Development Agency |
| NÉBIH | National Food Chain Safety Office |
| NEEAP | National Energy Efficiency Action Plan |
| NES | National Energy Strategy |



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| NFSI | National Strategic Institute for Development |
| NGO | Non-governmental organisation |
| NKM | National Utilities Ltd. |
| NREAP | National Renewable Action Plan |
| OP | Operational Programme |
| PEC | Primary energy consumption |
| PHEV | Plug-in Hybrid Electric Vehicle |
| PMO | Prime Minister's Office |
| PV | Photovoltaic electricity systems |
| R&D | Research and Development |
| RES | Renewable energy source |
| RES-E | Electricity from renewable energy sources |
| RES-H | Renewable energy use in heating and cooling |
| RES-T | Renewable energy use in transport |
| TSO | Transmission system operator |
| WTO | World Trade Organization |



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# The project in brief

The Energy Union Framework Strategy laid out on 25 February 2015 aims to foster a cost-efficient low carbon energy transition that delivers secure, sustainable and affordable energy to all European consumers. At its heart this is a citizen-oriented process involving new energy production and energy consumption choices shaped by particular economic conditions, value systems, gender-based preferences, efficiency of governance and the maturity of civil society.

The ENABLE.EU project attempts to understand the key drivers of individual and collective energy choices, especially the profile shift from traditional consumer to prosumer (when energy consumers become energy producers). The project will develop participant-driven energy choice scenarios until 2050 by incorporating the findings from comparative sociological research. ENABLE.EU will include a comparative section to explain the variations found between Member States.

The final aim of this project is to contribute to more enlightened, evidence-based policy decisions with the right mixture of incentives to develop the five dimensions of the Energy Union and Europe's transition towards a decarbonised energy system therein. ENABLE.EU seeks to provide a more in-depth and thorough understanding of the social and economic drivers for individual and collective energy choices and energy choice patterns. Results will be disseminated to relevant national and EU-level actors as well as to the research community and a wider public.



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# 1. Introduction

### The aim of the study

This country study was prepared in the frame of the ENABLE.EU project with the aim to explore national legislative, regulatory and financial bottlenecks to the implementation of low carbon energy systems, focusing on the areas of a) wind, solar and smart grid power networks, b) bioenergy and biofuels, c) energy efficiency and d) the electrification of vehicles. The report investigates the effectiveness of the related institutional framework in terms of political viability and organisational capacity, as well as an assessment of the effectiveness of policy implementation by looking at factors such as the credibility of policy, compatibility or conflicts between policy priorities, transparency and accountability. The study relies on desk research and the outcome of 9 in-depth interviews conducted with 12 stakeholders in the above-mentioned fields.

This introductory section of the paper gives a brief overview of the national institutional framework and presents the progress towards achieving the 2020 targets in the fields of renewable energy and energy efficiency. The second section presents the main findings related to the different areas investigated: a description of the relevant national institutional framework, the achievements in the design and implementation of national energy policies, and the governance bottlenecks and constraints identified. The last section gives a summary of the main findings regarding the institutional framework and the policy implementation of low-carbon energy policies, and provides recommendations.

### Progress in energy transition

Hungary's mandatory 2020 RES (Renewable Energy Sources) target was initially 13% in 2009 set by the EU Renewable Energy Directive (RED)[1] and raised to 14.65% in the National Renewable Action Plan (NREAP) in 2011. Hungary is close to reaching this higher share, with an overall RES share in 2016 of 14.2%. The largest RES share is in the heating and cooling sector, where more than 20% of the total energy consumed is based on renewable sources. However, in this sector more than 90% of the RES comes from solid biomass, mainly burned by households from lower income groups.

In the figure below, a sharp increase in renewable heat consumption is visible in 2010, a result of a retroactive statistical adjustment. In early 2017 the Hungarian Energy and Public Utility Authority – responsible for the energy statistics in Hungary – revised the firewood consumption of households for the period of 2010 – 2015. Before the revision, in 2010, the firewood consumption in this segment was 30.3 PJ, and then modified to 76.2 PJ. The actual RES share in the electricity and transport sector is around the target set by the Hungarian NREAP.

[1] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC



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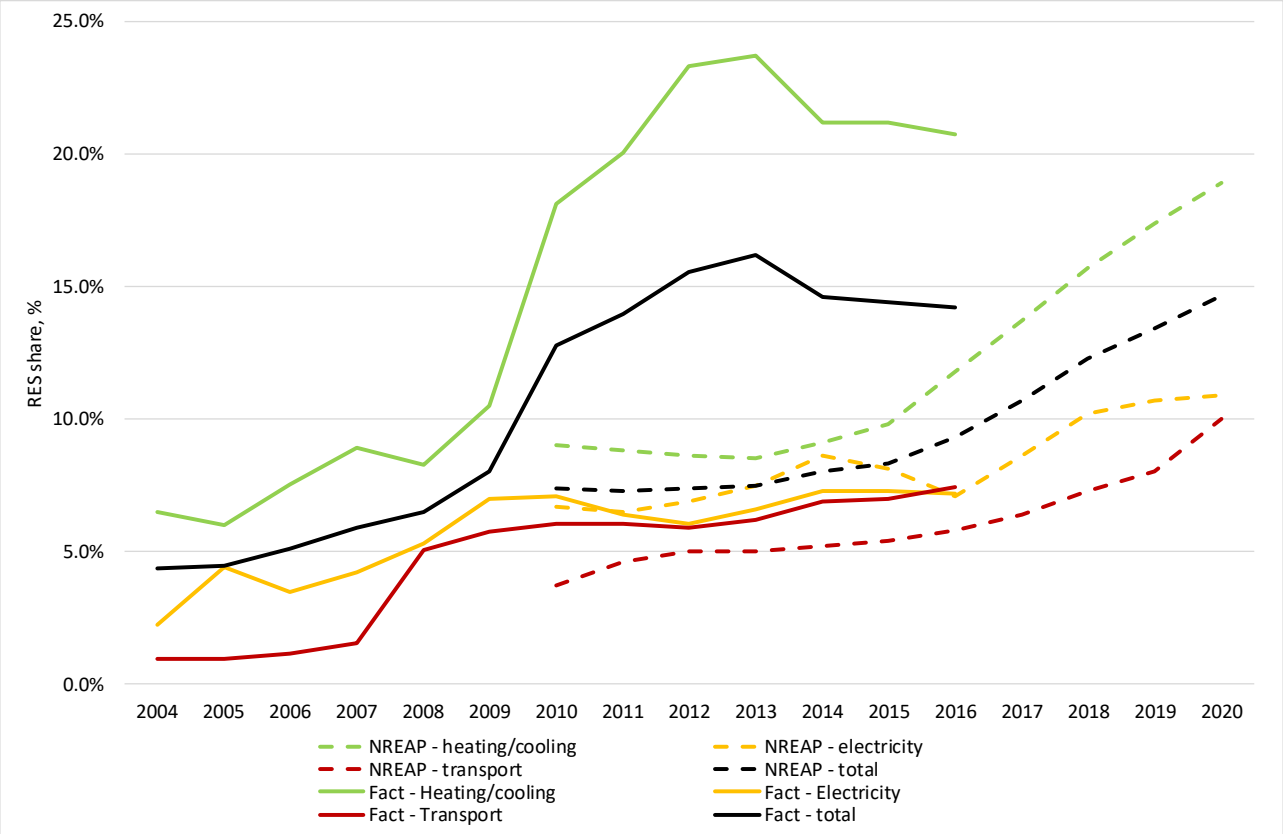
Figure 1: Share of renewable and targets set by the NREAP, %, 2004-2020




*Source: SHARES database and Hungarian NREAP*

Up to 2002, the use of renewable sources in the electricity sector was limited to hydro generation with a share of less than 1% in total electricity consumption. In the EU Accession process Hungary introduced a feed-in tariff regime for renewable electricity in 2003 to reach the 2010 goals mandated by the 2001 RES Directive. The government also implemented the Large Combustion Plants Directive and the National Emission Ceilings Directive.[2] These stricter emission limits forced the conversion of some old coal-fired power plants to biomass or co-fired biomass capitalising on incentives made available by the feed-in tariff. Consequently, biomass-based power generation increased by almost 1.5 TWh within three years reaching a 4% renewable share by 2005.

While biomass generation growth stagnated during the 2006-2016 period, giving way to more wind investments, the former still dominates renewable electricity (RES-E) production. In 2016 biomass accounted for 46% of total RES-E production. Wind now also has a significant share of RES-E in the sector (22%), but the produced quantity has not increased from 2012 due to suffocating regulation effectively prohibiting investments in the technology. PV penetration only began to grow in 2014, reaching a total installed capacity of some 300 MW by the end of 2017.

[2] 2001/80/EC and 2001/81/EC



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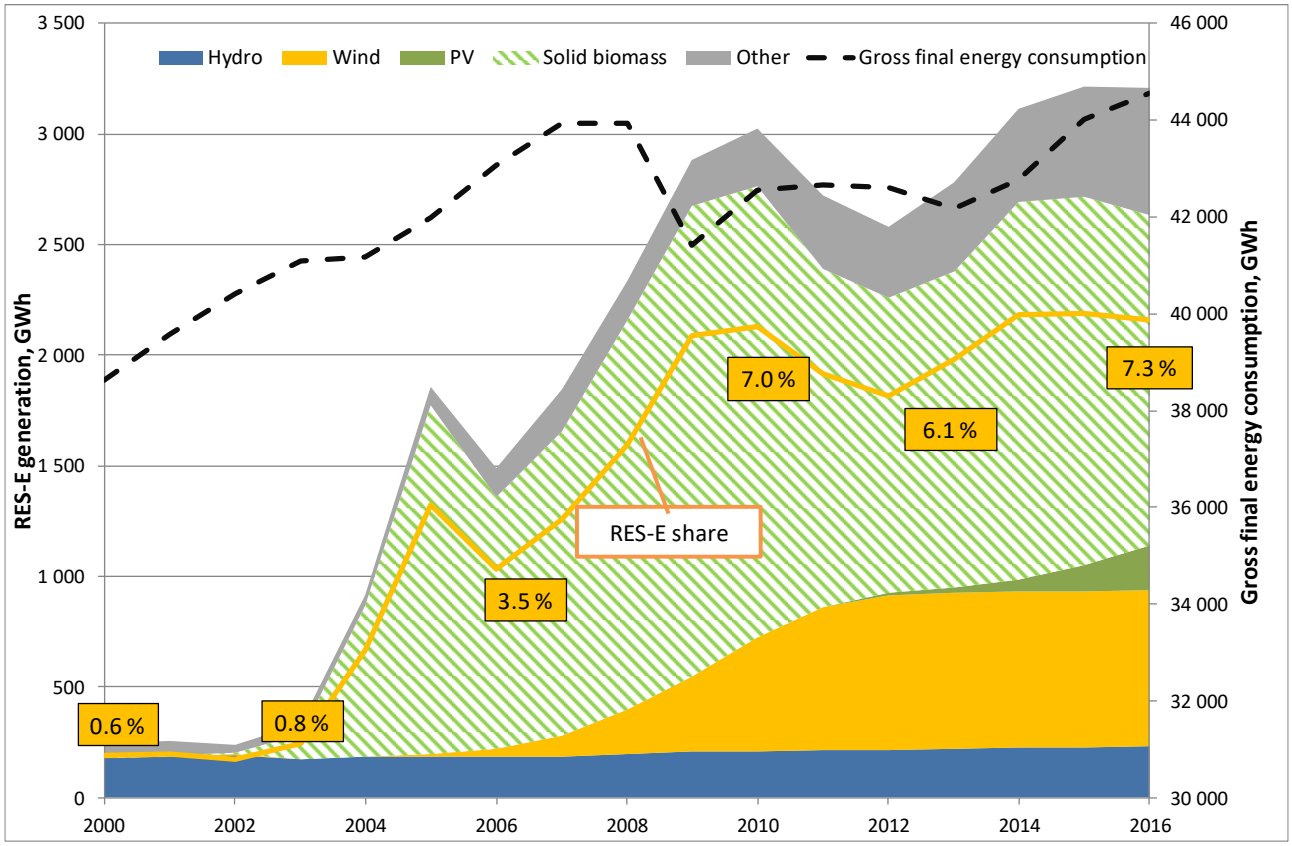
Figure 2: Renewable and gross final electricity consumption (2000-2016, GWh)




*Source: Eurostat, SHARES database*

Final heat consumption varied between 400 and 450 PJ in the last decade. The share of renewables is over 20%, far above the level reached in the electricity sector. The dominance of solid biomass is outstanding: about 90% of renewable heat production comes from biomass, mainly used in the residential sector for space heating. The revision of firewood statistics caused a jump in biomass consumption in 2010, but the upward trend began earlier and continued until 2014. The increase may be attributed to several gas price jumps between 2007 and 2013, encouraging households to switch from natural gas to fire-wood.


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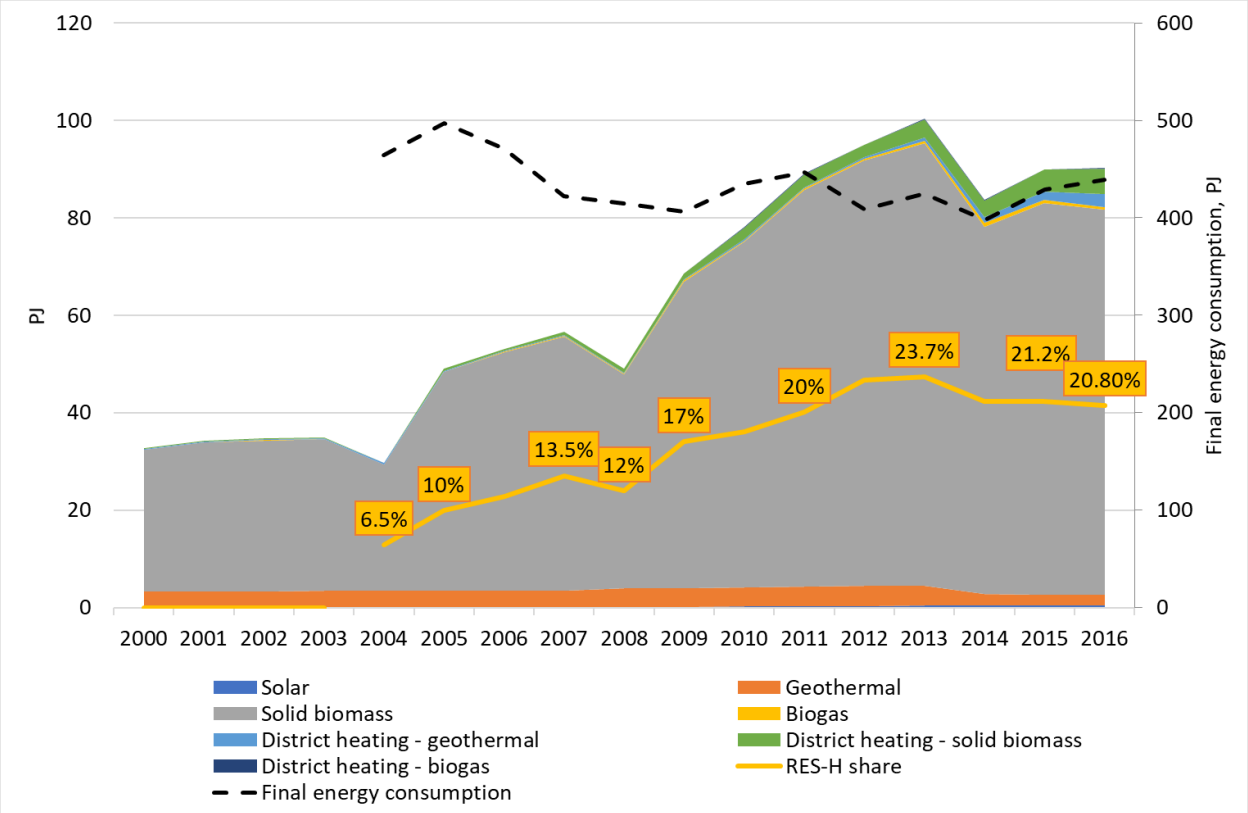
Figure 3: Renewable and gross final heat consumption (2000-2016, GWh)




*Source: Eurostat, SHARES database*

Hungary's transport sector consumed 190 PJ of energy in 2016, representing 25% of total final energy use, 92% of which is attributed to road transportation. The level of energy consumption has substantially increased since 1990, peaking in 2008 before the years of recession. Following five years of decline from 2009, the level of consumption has been on the rise again since 2013, reaching 144% of its 1990 level in 2016 (Eurostat). The role of alternative fuels is still rather small, in 2016 1% of energy use came from natural gas, 4.2% from biofuels, and only 2.2% from electricity (Eurostat). At the moment, the proportion of electricity in the fuel mix is mainly attributable to the railway sector as national incentives to increase the deployment of electric vehicles in road transport have just started to have some effect. Thus, the level of electricity consumption has remained stable over the last 10 years, still 2.9% during the lowest annualized gross final consumption in 2013 owing to the railway sector's relatively stable energy demand profile (around 4 PJ).


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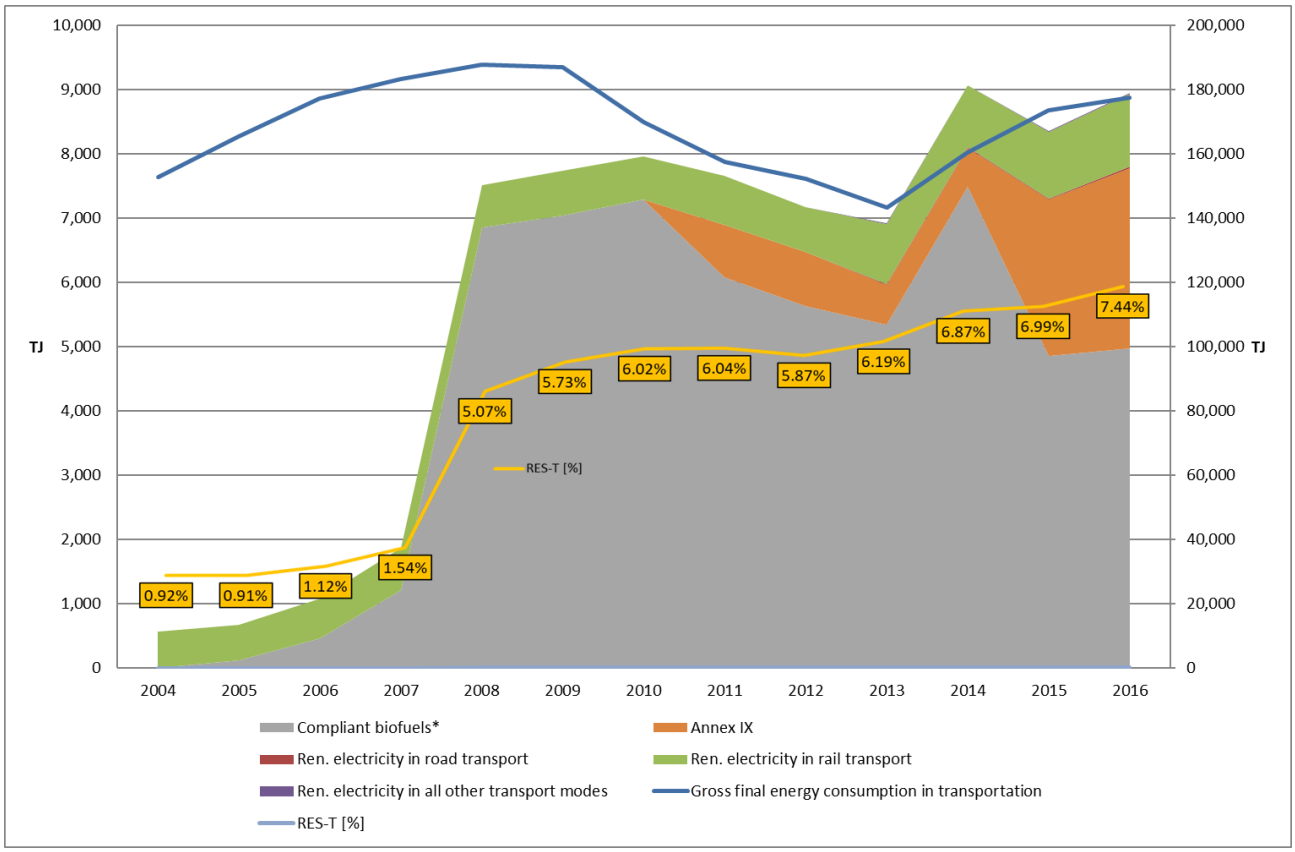
Figure 4: The evolution of renewable energy use in Hungary's transport sector (2004-2016, TJ)




*Source: Eurostat, SHARES database*

According to the accounting rules defined by the Renewable Energy Directive, the share of renewable energy in transport (RES-T) reached 7.4% of gross final consumption in 2016, led by biofuel (Eurostat). Retroactive changes to European legislation set a hard cap for biofuel production from food/feed crop in favour of promoting advanced and waste-based biofuels. This contributed directly to an increase in the share of biodiesel produced from waste cooking oil in Hungary (included in Annex IX category of the revised renewable energy directive)[3]. The amount of renewable electricity contributing to the RES-T target was 1.16 PJ in 2016.

The next figure shows the evolution of final energy consumption in the period 2005-2016. Despite modest economic growth, the primary and the final energy consumption (PEC/FEC) decreased by 15% and 12% respectively between 2005 and 2014, bringing Hungary closer to its energy saving target. However, after 2014 energy consumption shot up, and by 2016 the FEC was only 3.8% below its 2005 value. The averages conceal huge sectoral diversity: energy consumption of households and services fell by 12% and 35% respectively, and industrial consumption increased by 30%.[4]

[3] Directive 2015/1513/EU amending the Fuel Quality Directive (98/70/EC) and the RES Directive (2009/28/EC).
[4] Hungarian Statistical Office


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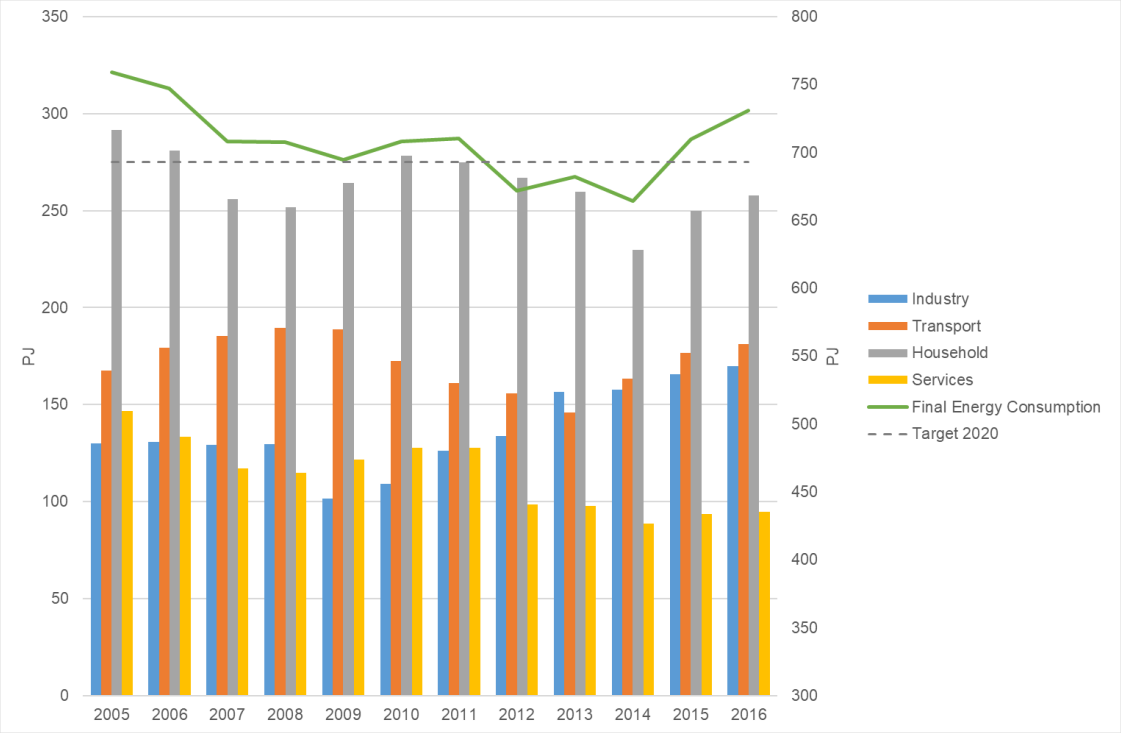
**Figure 5: The evolution of final energy consumption, 2005-2016**




*Source: Eurostat Note: (left axis: final energy consumption by sector; right axis: total final energy consumption and 2020 target)*

Energy consumption variation is driven by economic activity, lifestyle, weather, and energy efficiency improvements. Economic growth was the main driving force behind the large increase in industrial energy consumption. Industrial companies performed remarkably high energy efficiency improvement (3.8% per year), but the energy savings were not enough to compensate for the additional energy use resulted from increased production levels.[5] The service sector experienced similar energy efficiency improvement (3.5% per year), resulting in large fall in final energy consumption. Residential consumption was driven by increasing stock of electric appliances (reflecting a 'catching-up effect' experienced in several new member states), but behavioural changes (fuel switch after significant gas price increase between 2006 and 2010) and the limited energy efficiency improvement (1% per year) counterbalanced its effect. Overall energy efficiency improvement was 2%/year between 2000 and 2015, lagging behind the EU average.[6]

[5] Energy efficiency improvements are measured by the ODEX index and developed by the Odyssee-Mure project. ODEX is composed of sub-sectoral indexes, calculated from variations of unit energy consumption indicators, measured in physical units. See: Definition of ODEX indicators in ODYSSEE data base

[6] JRC calculations led to similar results. Primary energy intensity of the Hungarian economy reduced by 1.6% annually between 2005 and 2015 lagging behind EU average. See: Zangheri P. et al. (2017): Analysis of the annual reports 2017 under the Energy Efficiency Directive (JRC Technical Reports, Luxembourg)



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# 2. Mapping governance bottlenecks and constraints for the implementation of low-carbon energy policies

The main goal of the analysis is to describe the institutional framework for renewable energy and energy efficiency policies and explain the socio-political obstacles before the implementation of the low-carbon energy policies, highlighting the governance bottlenecks and constraints evident across various institutional and regulatory regimes. The design and outcomes of the most effective national and local low-carbon energy and climate policies will be highlighted therein.

### Institutional framework

From 2010 the former Ministry of National Development (MND) was responsible for the legal regulation of the transport, communication and energy sectors, including the management of state infrastructure assets. The former MND was the lead energy policy institution responsible for the management of conventional and renewable energy resources (crude oil, natural gas, coal and nuclear), the legislation related to the electricity, natural gas and district heat sectors (except for capacity expansion at the Paks nuclear power plant), climate policy and energy efficiency. Until 2018 energy-related responsibilities were split between two state secretariats within the MND: conventional energy sources and energy policy belonged to the Secretariat of Energy Affairs while climate policy, energy efficiency, and renewable support schemes were handled by the Secretariat of Development and Climate Policy and Key Public Services.

The Ministry of National Economy (MNE) merged the institutional functions of finance and industry/economy. Its core function was budget preparation and general planning of economic policy, but it was also responsible for the oversight of network industries, including electricity, gas, water, postal and transport services, consumer protection, and construction. MNE provided input for energy efficiency plans (concerning the building sector and the transport industry), electromobility, and managed greenhouse gas (GHG) emissions rights.

In 2018, the structure of the government and the tasks of ministries changed. The Ministry of National Development (MND) was dissolved and its functions merged into the newly established Ministry of Innovation and Technology (MIT). It is now the lead energy and climate policymaking ministry in Hungary, ending a chapter of shared responsibility between the two previous secretariats that was plagued by coordination setbacks. At the same time, the Ministry of National Economy (MNE) was transformed into a conventional finance ministry and it was renamed as Ministry of Finance (MF), ending another contentious relationship between ministries (MND and MNE) of shared and overlapping functions.

The Prime Minister's Office (PMO) was set up in 2010 and gained authority over several energy-related projects and policies of importance. The PMO is the project owner of the Russian financed capacity expansion at the Paks nuclear power plant, also known as the Paks 2 project. The First


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National Public Utility Holding Company supplying gas and electricity services to small customers was set up and operated under the supervision of the Prime Minister's Office. In 2013 the PMO gained authority over the National Development Agency (NDA) and took over responsibility for administration and coordination of Hungary's European Union developmental funding. In practice, the PMO had a say in numerous issues and its head was more powerful than any minister.

The Hungarian Energy and Public Utility Regulatory Authority (HEPURA) is an independent agency exercising regulatory oversight in electricity, natural gas, district heating, water utility and waste management. Its main functions are licensing and price regulation: it determines network usage and access charges and issues the relevant permits. HEPURA is heavily involved in preparing decrees and laws regulating the network industries falling under its authority, including the renewable support scheme. It is responsible for collecting data and reporting energy statistics related to electricity, natural gas, and district heating.

HEPURA's responsibilities increased significantly in the midst of governmental efforts to centralize and overtake municipality regulatory functions during the first half of the 2010s. HEPURA took control of the licencing and price regulation for district heating, water works and waste management. HEPURA staff increased from 104 in 2010 up to 321 in 2015, with its official status transforming from a governmental agency into an independent authority.[7]

The financing of the energy transition depends on two main sources, operating subsidies and investment support. Operating subsidies paid within the feed-in tariff system is the main tool for promoting renewable energy sources for electricity generation. The funding of the support scheme is paid by non-household electricity customers, amounting to HUF 50 billion per year (approximately EUR 162 million).[8] In the first decade of the FIT system (between 2003 and 2013) the financial burden of the operating subsidies was shared among all customers including the households, but after the first utility rate cut households were exempted from payment. The regulation is based on governmental and ministerial decrees prepared by the MND and the operation of the system is ensured by HEPURA and the Hungarian Transmission System Operator (MAVIR).

Investment support for the energy transition in the form of grants rely on two sources of revenues, a small part funded from sales of emission units under the Kyoto Protocol and the larger portion from EU allowance unit quotas under the ETS. EU financing is the primary source of investment related to the energy transition, predominantly through the EU Structural Funds and the Cohesion Fund, making up 4,2% of Hungary's Gross National Income (GNI) between 2010 and 2016, or 8-10% of the total governmental expenditures.

The National Development Agency (NDA) was the main body managing the allocation of EU funds for 2007-2013. It was responsible inter alia for planning national development programmes using EU financial support, negotiating the details of the Operational Programmes (OPs) stipulating the main areas of use, preparing calls for application, selecting the projects to be awarded support, and monitoring their implementation. During the whole process from the planning/programming until the selection of winning projects the relevant ministries were involved under the coordination of the NDA.

[7] Act XXII. of 2013

[8] Using the yearly average exchange rate for 2017 (309.21 HUF/EUR) published by the Hungarian Central Bank.



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NDA's position gradually eroded after the central government aspired to increase control over the allocation of EU funding. In 2012 a governmental body called the Governmental Committee of National Development (GCND) was established to act as a top decision-making body.[9] The GCND consisted of four members of the government: the prime minister, the minister of national development, the minister of economy, and the head of the Prime Minister's Office. It was responsible for determining projects of primary importance (coming under special procedure), selecting winners of projects over 1 billion HUF (around € 3 million).[10] The NDA was subsequently dissolved and its duties formally transferred directly to PMO in 2014.

## 2.1. Wind, solar and smart grid power networks

### Institutional framework

In the last 8 years the main actors involved in designing and implementing policies to support wind and solar based power generation and smart grid development were the Ministry of National Development, the Hungarian Energy and Public Utility Regulatory Authority, and the Hungarian Transmission System Operator. The MND was the main institution responsible for shaping Hungarian RES policy; it was in charge of preparing legislative acts and ministerial decrees for supporting RES development while HEPURA was responsible for enforcing the ministerial decrees. HEPURA also had licencing and monitoring tasks, and the Hungarian transmission system operator operated the financial scheme for the RES production compensation. The support level was set by a ministerial decree and HEPURA calculated the support period length for all producers to ensure sufficient return for investors. The institutional framework for allocating investment support financed by EU funds are described in the first part of chapter 2.

### Design, implementation and achievements in renewable electricity deployment

Up to 2016, the main support instruments for renewable electricity were feed-in tariffs (FIT) and investment grants. The Hungarian FIT scheme was introduced in 2003 to meet the 2010 RES-E target set by the 2001 RES Directive. Feed-in tariffs were differentiated by technologies and sizes with different fixed prices in peak, valley and deep-valley hours. FIT levels were adjusted yearly based on the consumer price index (CPI) published by the Hungarian Statistical Office. For plants commissioned after 2008 the value of CPI minus one percentage point was used to account for expected efficiency improvements. Until mid-2011, natural-gas based CHP plants were also supported by feed-in tariffs, causing a boom during the 2005-2011 period, which was subsequently rolled back in 2011.

In 2010, the Hungarian Government announced a new support scheme for RES-E expected to be

[9] Decree of the Government 140/2012. (VII. 2.) and Decision of the Government 1221/2012 (VII. 2.)
[10] Decree of the Government 4/2011 (I. 28.)


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adopted by 2011. However, after continuously postponed by a less than eager government, investors had to wait until the end of 2016. The old FIT regime remained until 2016, creating tremendous uncertainty for renewable investors in the intervening years which led to lower investment activity - investors expected increasing support levels under the new scheme. The previous support regime was not validated by the EU Commission but the new one complies with the EU guidelines related to state aid for environmental protection and energy. There are four main categories in the new regime, called METÁR:

- Renewable capacity below 500 kW and demonstration projects are eligible for feed-in tariffs. For solar installations the price is around 100 €/MWh (32 HUF/kWh), and for all other technologies the price is differentiated by peak, valley and deep-valley hours. Again, the price is set by Governmental decree[11] and the length of the support period by HEPURA, to fix the rate of return for the various projects at the targeted level.
- Renewable capacity between 500-1000 kW (except wind) is supported by a premium, where the reference price is set administratively by the above-mentioned Governmental decree. This is the same as the feed-in price for PV installations. RES producers receive two incomes under this scheme, selling their production on the market and receiving a floating premium that supplements the market price to guarantee the level of return for their production.
- The premium is allocated in a competitive tendering process for units above 1 MW installed capacity, where the premium level is determined in the competitive price setting procedure of the tenders. The Ministerial decree[12] provides for technology neutral one round pay-as-bid auctions, where the price is the only selection criteria, to be organised by HEPURA. However, since this regulation has been in force from the end of 2016 until mid-2018 no tenders are announced.
- The fourth element of the new support system is the brown-premium for which investments in biogas or biomass power plants already paid are eligible.

Besides feed-in tariff and premium, investment grants are also available for prospective investors from EU development funds co-financed through Operational Programs. Grants can be acquired by participating in specific tender calls, and successful applicants can receive about half of their investment costs as non-refundable subsidies. Available investment grants have significantly contributed to the financing of RES-E projects in Hungary by ensuring a significant portion of up-front capital costs. Many of the biogas and small PV installations are supported this way. In their case the support period is proportionally reduced to avoid the overcompensation of investors.

The last support element is net metering, in operation since 2008. Small plants entitled to operate under net-metering are categorized as 'household power plants' and are defined by the 2007 Electricity Act as electricity generating installations connected to the low voltage network with a maximum of 50 kVA grid connection capacity. On a few occasions, household power plants also received state investment support, but it was not available in the last three years.

Net-metering allows the operator to be charged only for the *net* amount of consumed electricity

[11] 299/2017 Governmental decree
[12] 62/2016 MND decree


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during the billing period (net of electricity off-takes and injections in the period measured by a bidirectional meter) or to be reimbursed for the *net* excess electricity in case injection exceeds off-take. The billing period for net metering can be monthly, biannual or annual, depending upon the agreement between the operator and its contracted electricity trader (or universal service provider)[13]. The electricity trader (or universal service provider) with whom the plant operator has a valid supply contract, is obliged to take over the excess electricity that is produced but not consumed instantaneously. This scheme characterized the bulk of the PV installations in Hungary up to 2016 (around 80%). If the household sized plants were supported by investment grants this did not affect conditions under the net metering scheme, even when the beneficiary is not a household.

## Governance bottlenecks to wind and solar power

Hungary's experience with wind quotas and the solar PV boom is representative of the governance bottlenecks that emerged during design and implementation of renewable energy policies. The following two short case studies help to understand the dynamics of conflicting developments and the interdependencies of different policy measures.

### *Wind power*

Wind power plants can be built in Hungary only if a tender call for new investments is initiated by the responsible ministry and special permits are issued by the regulatory authority (now HEPURA). This special quota system is regulated by the 2007 Electricity Act and in its implementing rules. Special permits were first allocated by the regulatory authority in 2006 for 330 MW capacity, albeit without organising a tender, and distributing permits in a non-transparent process. Setting a quota for wind generation was originally justified by ensuring system operability, but the resulting slow licensing process meant that construction could take 6 years. In 2010 a second allocation round was organized, in a transparent, market-based procedure, where licences for an additional 410 MW capacity were planned to be issued. But after the first administrative steps in the auction process the new Hungarian Government cancelled the auctions, and since then no new auction has been announced. In 2016 another very strict set of regulatory measures was introduced for the installations of new wind power plants. The Ministerial Decree (34/2016) on the Technical and Safety Requirements of Power Generators and the 277/2016 Government Decree on Wind Generators set technical limitations on the design of new wind power plants, limiting the height of the tower (max. 100 meter), the capacity size (max 2 MW per installation), the blade position (blade edge must be 50 meter above ground level) and the noise level as well (60 dB in the safety zone, and under 40 dB beyond the safety zone at 1.5 m height). The safety distance limits from settlements is perhaps the most restrictive provision for wind generators above 50 kW capacity, which must be at least 12 km away from any settlements, effectively limiting the area available for wind generators to zero. Due to these very strict regulations new wind capacity development is not expected in Hungary until new regulations come into force.

[13] 273/2007 Government Decree


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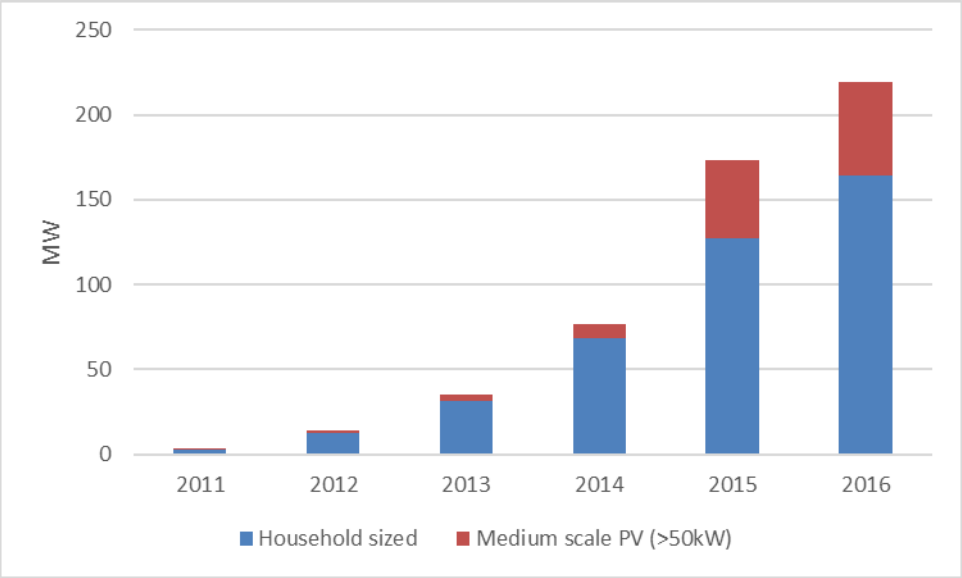
### *Solar power*

Hungary started to promote the development of renewable energy with a feed-in tariff scheme offering production support that remained constant over the 13-year period of its lifetime (2003: 18 Ft/KWh, 2005: HUF 23/KWh, since 2012: HUF 31.9/KWh ca. 10 €c/KWh). From 2012, the FIT level was not changed and only the length of the support period was adjusted by the regulator to keep the net present value of the investments within limits. Yet this level of support was not sufficient to attract significant investment into the Hungarian PV market for many years as shown in the following figure.

**Figure 6: PV capacity installations in Hungary**




*Source: HEPURA*

Most PV installations were a result of the household net metering scheme. These were small scale PV systems (under 50kW capacity) while larger sized installations supported under the KÁT regime only appeared after 2012 in small levels (55 MW in 2016).

The consistent (but low) level of FIT support was a kind of advantage compared to several other EU countries (Czech Republic, Bulgaria or Spain) because no retroactive modifications were needed in the Hungarian scheme. Nonetheless it did not manage to attract many investors to the PV segment until 2016 when the support became attractive offering a higher premium to investors than those in the other EU member states. After signalling that the scheme would be replaced by one far less generous at the end of 2016, investors rushed for licences before its expiration, resulting in the issuance of licences for more than 2000 MW (mostly units of 0.5 MW) capacity. It was not only the high level of FIT but other advantageous features of the support scheme (compulsory takeover of produced electricity; low penalty level if schedule is not met by the producers) that were expected to be modified significantly following new EU competitive regulation.

Licence owners were expected to build up the capacities and start operations by the end of 2018.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Licence conditions were quite relaxed, licences were marketable, and the location could be changed if the DSO (distribution system operator) gave consent to the new connection points. A very volatile market emerged, where licences were sold frequently but the realisation rate of new projects was low; the boom in licensing was not followed by a boom of PV installations up till now. Project promoters started to delay actual investments for many reasons. First, many of the licence applications were rather speculative, lacking the skills of project development. Second, there is a shortage of project developers (constructors) which resulted in a cost increase affecting the economies of project realisation. Third, information on the possible extension of the deadlines was conveyed early on so promoters were rather relaxed in project realisation. The expected deadline extension had come in the first half of 2018 and now promoters have an additional two years for realising their projects with some newly introduced constraints. From now on, changing the location and the connection point is not allowed anymore, and the length of the support period will likely be shortened for those commissioning the project after 2018.

The handling of the current 2000 MW of PV application shows some disfunction in the RES promotion policies in Hungary. The stability surrounding the regulated support level in the first period became a disadvantage since the regulator was not able to control the number of applications and the issued licenses once the offered FIT reached a financially attractive level. The more than 2500 individual applications with typical size of 0.5 MW and the lobbying power behind the applicants put continuous pressure on the responsible ministry to further extend the deadlines without changing the main support elements (e.g. offered prices, relaxed participation in the scheduling and balancing schemes), leading to slow uptake of PV capacities and high uncertainty as to the final realisation rate.

The high 'floating' number of issued (and valid) licences brings uncertainty to the whole RES promotion system in Hungary and estimates of the final realisation rate.[14] Under these conditions it is difficult to plan the future support schemes since the required budget could be very high if all applications are realised.

The new support scheme (METÁR) seems less appealing for investors who prefer to buy cheap licenses from the previous KÁT system. Although there are some applications for the new premium system (mid of 2018) there is no demand for tenders of capacities over the size of 1MW which have a budget allocated and many secondary supportive pieces of legislation already enacted. However, in the face of the 'floating' 2000 MW licenses, it could be rational for the government to delay the RES auctions.

This KÁT case highlights some features in the support system and the distribution of tasks between the responsible ministry and the regulator. Although the regulator conveyed to the ministry the potential for excessive licenses early on in the KÁT system, support level reductions (which is the task of the ministry) were not issued, and thus the number of applications reached an unprecedented level. Also, several license applications arrived in the last hour with several missing elements, causing delays in the licensing process and overburdening the regulator which had limited human resources to handle these issues. Because many of these applications represent 'preferable' investors, such as local governments and their institutions, the ministry is under pressure to not apply very stringent

[14] The Regulatory Office continuously monitor the realisation, even issued a questionnaire on the planned realization of PV investments. According to the results, over 95% of license owners wish to realise their projects.



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conditions and further extend the deadlines for project realisation. In spite of this, by the end of 2018 they could have prevented those applications unable to realise their projects and direct them to the new METÁR system (either premium or tendering). Without tendering procedures, the government and regulator cannot have reliable information on the true market costs for investors, so it is only an estimate that the promised 10 € cent/KWh support contains above market subsidies.

### Policies related to smart grid development

The 'smart grid' concept broadly includes several different features, such as renewable integration, network operation services (ancillary services, balancing), smart metering, demand side response and intelligent buildings. In Hungary, several organizations share some responsibility for the coordination and management of the country's smart grid development due to the complexity of these tasks, most prominent of which are the Ministry of Innovation and Technology and the Hungarian Energy and Public Utility Authority.

Hungary's National Energy Strategy was approved by Parliament in 2011, defining the main goals and strategic actions for the energy sector development.[15] The smart grid concept appears in several parts of the document: its importance in relation to the network and consumers, and the requirement of its deployment in case of positive cost-benefit analysis (CBA) results. The chapter dedicated to energy efficiency mentions metering, intelligent transmission and distribution systems, and demand side response as potential avenues for reducing losses in the electricity system. Another chapter of the Strategy declares that the state must be at the forefront in the field of energy efficiency, taking the lead in the reconstruction of public buildings and the implementation of smart grid solutions in the public sector.

In order to meet the provisions set out in EU legislation related to the implementation of intelligent metering systems, several pilot projects were carried out in Hungary in the period of 2012-2014 to provide input for the cost-benefit analysis required from each member state. DSOs installed smart metering devices in the dwellings of more than 10,000 households and collected data on their consumption. The conclusion was that the installation of smart meters is not economically justifiable in Hungary. However, according to DSO representatives and other experts, the main reason for the unresponsiveness of consumers to the information received on their energy use was the governments' utility bill cut policy that occurred over the same period.[16]

In the absence of real time consumption and electricity prices for consumers and only limited availability of time of use rates for households, public organizations and business consumers, the possibility of exploiting demand response opportunities is presently quite limited in Hungary. DSOs provide the opportunity for households to receive lower rates for appliances that can be operated

[15] The Hungarian National Energy Strategy, 2030, http://2010-2014.kormany.hu/download/7/d7/70000/Hungarian%20Energy%20Strategy%202030.pdf

[16] The utility cut, implemented by the Hungarian government in three steps between January 2013 and April 2014, resulted in a 20% decrease in utility bills of households for electricity, gas, heat and water supply as well as and municipal waste services. On the rate cuts implemented in the electricity and gas sectors see: 'Invoicing the future - REKK analysis of the 10% utility rate cut of January 2013' (REKK Hungarian Energy Market Report 2013 Q1), and 'The second utility bill cut' (REKK Hungarian Energy Market Report 2014 Q1)



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flexibly (e.g. electric heating systems with heat storage, freezers and electric-vehicles) through direct load control which supports intra-day scheduling of electric power demand.

The Hungarian transmission system operator MAVIR is responsible for managing ancillary services and balancing. This a stable market (cca. EUR 100 million /year) with strong competition mainly in the secondary and tertiary reserves. The development of storage technology seems to offer a competitive alternative to conventional technologies in some segments of the market with some private entities identifying business models for participating on the ancillary service market. In addition, state R&D funds are available for supporting the storage projects.[17] In Hungary, the following government bottlenecks to smart grid development can be identified:

- With program management and responsibilities shared between different state entities the government's vision for smart-grid related activities remains unclear.
- Regulation and insufficient incentives for DSOs together with the impact of utility bill cuts for households limits the economic case for new investments into smart solutions.
- The frequent regulatory changes and financial conditions can slow the deployment of new projects for smarter renewable electricity integration.
- Detailed regulation is still being drafted for energy storage and profitability will strongly depend on its quality.

## 2.2. Biomass and biogas

### Institutional framework

The institutional framework for designing and implementing biomass and biogas-based power generation correspond exactly with the one fully described in the previous chapter. The only difference is related to the regulation of selling the heat produced by biomass or biogas within the district heating market. Before 2011 only the household end-user price was regulated by the local authorities with the other prices determined by the companies. From 2011 both the producer and the end-user prices are regulated, except the end-user prices of non-households and non-governmental users. The prices are proposed by the HEPURA and determined by the minister of information and technology every year ex-ante. Another price regulation measure was introduced in 2012, whereby the yearly profit share cannot be higher than 2% for district heating supplier and non-RES heat producers and 4.5% for RES based heat generators and cogeneration plants. The yearly price regime and the limitation of the profit share results in a very uncertain cash-flow for the new heat producers meaning that very few heat producers have entered the market since 2012, only those either co-financed by EU grants or renewable co-generators supported through feed-in tariffs.

[17] Alteo Co. Ltd. won HUF 500 million non-refundable grant for a HUF 1.1 billion total R&D investment from the National Innovation Research Fund in 2017 to install storages and develop the integration of RES produced by the company.



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### Achievements in the design and implementation of biomass and biogas policies

Biomass and biogas power generation is supported by the same mechanism applied for PV and wind generators, up to 2016 with feed-in tariffs and later FIT or premium depending on the size. Investment grants are also available for these types of generators. However, there are two special features for solid biomass and biogas, one being a cap on individual installations (determined in GWh as well as a maximum years) supported by FIT and the other a brown premium for the existing power plants.

- Biomass quotas:

The HEPURA determines the total production quotas in GWh supported by a feed-in tariff for the given power plant on a case-by-case basis. The regulator calculates the rate-of-return of the power plant and allocates a quota under which the power plant reaches justified returns. These quotas are especially important in the case of the Mátra power plant co-firing biomass with lignite. This plant is the largest power plant in Hungary after the Paks nuclear plant[18], and can generate relatively high additional income from the support (accounting for about 15% of its revenues), while the non-subsidised part of its biomass-based production is sold in the market.

- Brown premium:

The brown premium was introduced with the new support system (METÁR). The aim of this is to subsidize high operating costs to maintain biogas or biomass power plants that would be otherwise decommissioned. According to the Government decree eligibility is determined by HEPURA with a maximum of five years that can be extended.

For solid biomass the subsidy level is determined annually by HEPURA on a case-by-case basis, but it cannot be higher than half of the FIT tariffs. For biogas producers the brown premium is determined by a HEPURA decree and the same amount is applied for all producers. There is a maximum level of overall support that can be allocated annually.

#### *Biomass power generation*

Few power plants are operating in Hungary that produce electricity based on solid biomass. Two of them are situated in Pécs, with a total installed power capacity of 87.9 MW. One block was a brown-field investment dating back to 2005, when the old coal-fired power plant blocks were replaced by a solid-biomass cogeneration plant. This was financed by carbon-credits and also supported by feed-in tariffs. The other block was a brand-new straw-fired unit commissioned in the early 2010s. Both blocks also produce heat.

A similar replacement was carried out in Ajka, where coal was replaced by biomass. The installed capacity of this block is 30 $MW_e$. One green-field investment was in Szakoly with an installed capacity of 19.8 $MW_e$, without heat generation. Since it was built in the early 2010s several financial and operational problems have surfaced, and there were two years when the power plant did not produce

[18] The Matra Power Plant has 950 MW installed capacity, and about 10% of its output comes from biomass.



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any electricity at all. One other power plant used solid biomass co-fired with lignite. At the moment there are no planned solid biomass-based power units.

### *Biogas*

Biogas can be used in three ways: fed into the gas system, production of heat, or production of electricity (and heat). In Hungary, it is possible to feed biogas into the network if it meets the quality obligations set by the Hungarian gas TSO, but no supported price can be received for the biogas sold, while the cost of the installation of the biogas upgrading plant and feed-in facilities have to be borne by the producer. As yet, biogas feed-in happens only at a single location in Hungary, near the Agrana sugar plant in Kaposvár, where biogas is produced from beet pulp[19]. The company received an investment grant from EU funds to install the upgrading plant, covering half of the investment costs. In an other city, Zalaegerszeg, biogas produced from sewage in the waste water treatment facility of Zalavíz is used to fuel buses participating in local public transportation[20].

Heat generation by biogas is very low in Hungary, because it is not economically viable. There is some 55 $MW_e$ biogas capacity supported by FIT and around the same not eligible for the support. Most were supported by an investment grant, and the electricity that they produce is not sold but consumed close to the power plant. Because the potential of biogas power production is limited and these types of investments are very complex, capacity has only increased by 3-5 MW annually in recent years.

### *District heat*

There are nearly 100 district heating systems operating in Hungary that together provide heating services to more than 675,000 households and 17 % of the total flats are connected to the district heating system. The share of DH (district heating) in the heat sector is around 15 %, with the majority of the heat supply dominated by natural gas (72%) and a small share of RES, mainly from solid biomass (9%) and geothermal (3%). The decline of Hungary's district heating market ended a few years ago, but it is still stagnant and unable to increase market share. The modernisation of the infrastructure is still required with the replacement of old, inefficient boilers allowing for the penetration of renewable based heat production, e.g. biomass.

Altogether the installed renewable heat capacity in the district heating sector was 926 $MW_{th}$ at the end of 2014, which increased to 998 MW by the end of 2016 (7% increase in three years). Although the biomass-based district heat production increased from 6.8 PJ to 10 PJ, the installed capacities had not been changed significantly (from 807 $MW_{th}$ to 817 $MW_{th}$). The production increase is mainly attributable to two new biomass-based plants in Pécs and Miskolc entering into commercial operation.

### *Direct solid biomass consumption in the residential and service sectors*

In 2016, 48% of final energy consumption (745 PJ) came from the residential and service sectors (356 PJ). The most important fuel is natural gas, accounting for 48% of the final energy consumption in these two sectors, followed by solid biomass with 22.3%, as shown by the following figure.

[19] Sources: https://wsk.agrana.com/en/sugar/ and http://www.biogazfejleszto.hu/
[20] Source: https://www.zalaviz.hu/index.php/rolunk/tarsadalmi-felelossegvallalas


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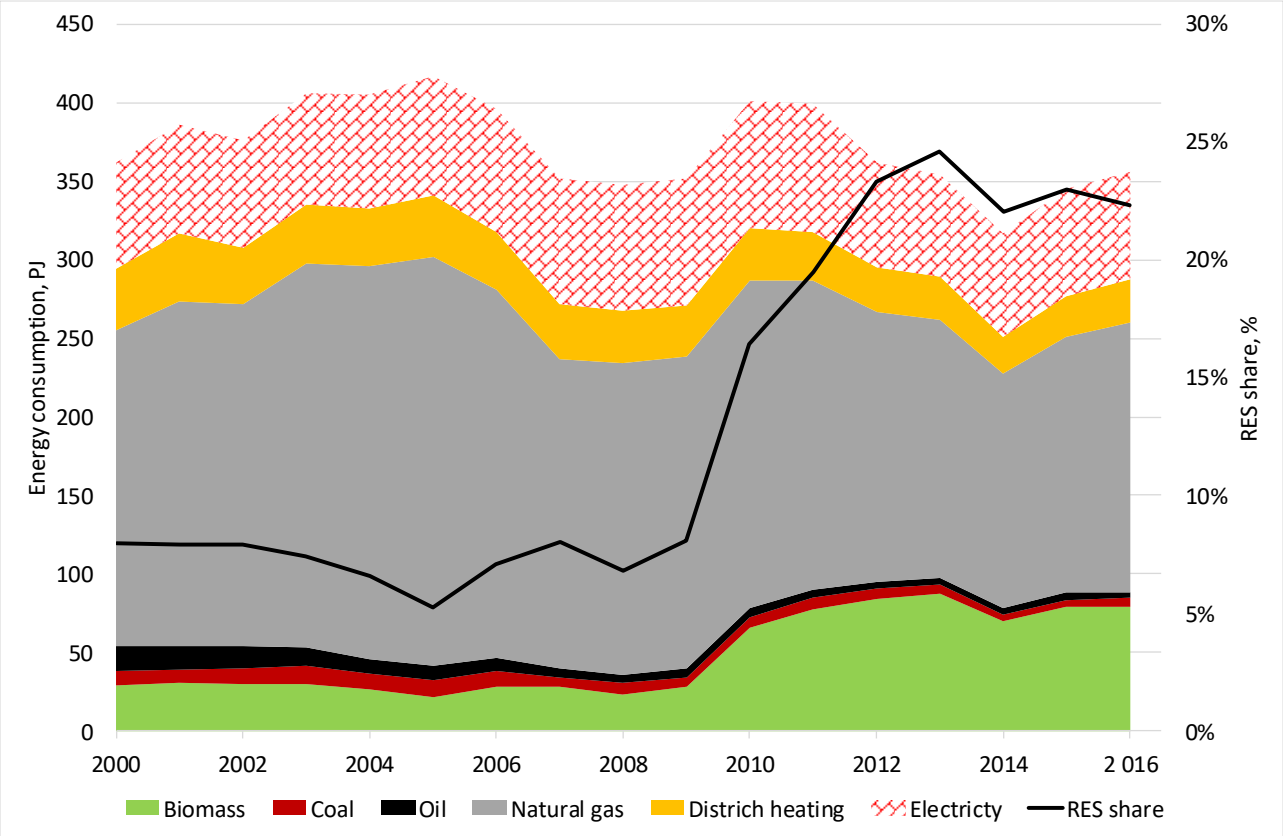
Figure 7: Fuel mix in the residential and service sectors and the RES share, 2000-2016




*Source: Eurostat*

The graph shows a rapid uptake of biomass consumption growth since 2010. This is due to a statistical recalculation of the solid biomass consumption in the residential sector. While according to the previous method the total biomass consumption was calculated using supply side (data on the amount of firewood sold), the new calculation and the correction was based on the demand side (data from a representative household survey on fuels used for heating). The difference between these two methods is substantial. While in 2011 the official data was 30.3 PJ for the residential sector, it grew to 76.2 PJ after the recalculation. Although the statistical correction was carried out in the middle of 2017, data was recalculated backward only to 2010. We also must note that this kind of biomass re-calculation is not a unique method employed by Hungary but the revision was carried out in several EU Member States.

A recent study published by the Hungarian Statistical Office[21] shows that the energy consumption of different income groups varies dramatically. While the share of biomass (and coal) is almost 50% in the lowest income household segment it is only 10 % in the wealthiest, where natural gas consumption dominates. It is important to note that around 20-25% of the total non-DH heating consumption is multi-fuel, which means that these consumers can partly modify their fuel mix,

[21] Source: https://www.ksh.hu/docs/hun/xftp/idoszaki/hazteletszinv/hazteletszinv16.pdf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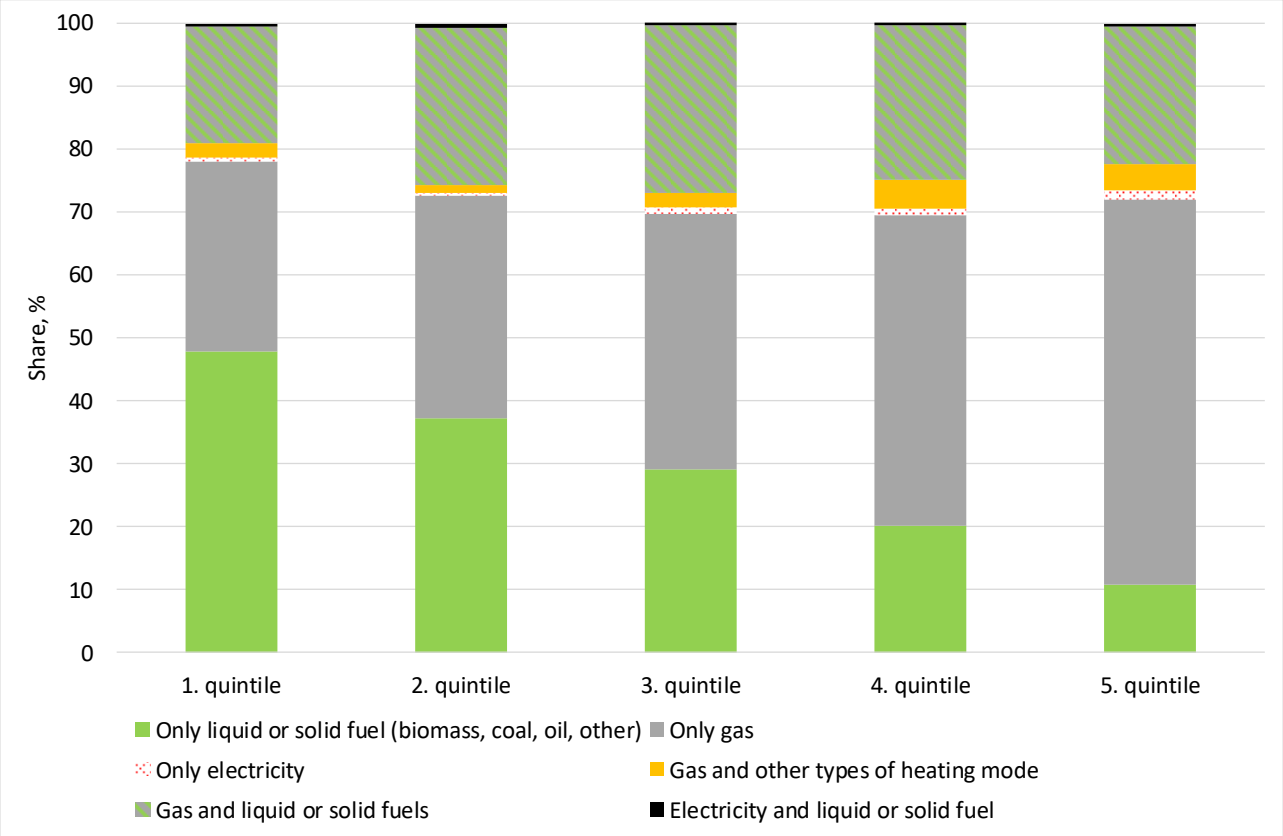
depending on several factors. One of the most important is the relative price difference between wood and natural gas. If gas becomes more expensive, then these households can substitute their gas consumption by wood. This substitution occurs more frequently in the segment with lower income.

**Figure 8: Share of non-DH heating in the different income quintile, 2016**




*Source: Hungarian Statistical Office*

## Governance bottlenecks to biomass and biogas

- Predictable long-term fuel supply is an issue of primary/major importance to biomass power plants. Without a clear price signal financing is a challenge, and interruption in fuel supply results in huge balancing cost for the power plant as it is unable to keep its schedule. However, lack of mature and liquid biomass market put security of fuel supply at risk and results in prices of solid biomass fluctuating. In a worst-case scenario fuel supply interruption can lead to 'financing breakdown'. Financial institutions can refuse to provide working capital loan needed to bridge the gap between fuel purchase and sales revenue, resulting in enduring stoppage.
- Ensuring unbroken long-term fuel supply in an immature biomass market require proactive fuel management. The best example is the development of the straw-fired biomass power plant in Pécs. The investor made huge efforts to build a reliable fuel supply chain, by providing training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and finance for farmers to secure gathering and storing straw. The investor offered long-term fuel supply contracts for farmers to ensure mutual predictability for parties.

- The feed-in tariff price (around 100 €/MWh) and the resulting revenue is not sufficient to finance a new power unit: without sustained demand for waste heat pure electricity generation is not economically viable. However, securing heat market is a hard task, and failures often result in serious economic difficulties. The rise and fall of the 19.8 MW biomass-fired power plant in Szakoly is a perfect example of failing corporate management and an unhelpful regulatory environment. The investor planned to establish energy crop plantations providing secure fuel supply and a garden requiring sustained supply of waste heat produced by the power plant. However, both projects failed, and fuel supply interruptions, heavy losses and freezing working capital loans followed.
- The presence of a nearby district heat market may be the best way to secure additional revenue for the power plants. However, strict regulatory environment surrounding district heat price regulation makes it very difficult to negotiate long-term contract between the heat producer and the heat supplier. The yearly price regime (heat prices) results in a very uncertain cash-flow for the new heat producers, resulting in difficulties in financing the investment.
- The limitation of the profit share at 4.5% of gross asset value for renewable heat producers is another hurdle to private investors requiring higher return on their investments. The regulator cannot approve any heat price containing a higher profit element. That system of taking away returns on private investment considered by the regulator 'too high' gives strong disincentive to potential investors to mobilize private capital and to take the risk of investment.
- Biogas based power production needs an abundant source of feedstock (sewage sludge, organic waste or animal waste) in the close neighbourhood of the power plant, because of costly transport and storage of low calorific value feedstock. Electricity output can be fed into the nearby distribution network, but waste heat cannot be easily marketed because district heating systems are usually located in cities far away from the biogas power plants. Lack of heat demand results in lower efficiency and makes the biogas production unprofitable, resulting in a small number of biogas projects, many of them relying on on-site heat consumption.
- The best way to overcome limits to on-site use of heat and power is upgrading biogas to biomethane to meet natural gas standards and feeding it into the natural gas grid. Biogas conversion provides more flexibility to the power system, leading several EU countries to offer a premium for biogas upgrading and injection into the gas grid. In Hungary, no such support is available at the moment.

## 2.3. Biofuels

### Institutional framework for biofuels

For biofuels, Hungary's primary objective is to meet its EU binding targets and resolve issues related to food, feed and raw industrial biofuel production.


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The share of biofuels in fuel consumption is set by a quota system in Act No. CXVII of 2010 'on the promotion of renewable energy use and the reduction of greenhouse gas emissions in the transport sector', requiring fuel suppliers (defined as the person moving the fuel through the excise duty point) to sell a specified share of biofuels in annual fuel quantity sold. The act transposes the stipulations of the Renewable Energy Directive (RED) (including the recent changes caused by Indirect Land Use Change Directive 2015/1513/EU, also called ILUC Directive) into Hungarian regulation and aims to ensure that transportation targets will be reached by 2020. The mandatory share of biofuels is 4.9 energy percent (e%) in 2018, increasing to 6.4 e% in years 2019 and 2020.[22] The Act was amended in 2017 to account for the changes in the RED by the ILUC Directive setting out sustainability criteria for the biofuels that can be counted towards renewable targets of member states.[23] The new accounting rules set by ILUC encourage the use of sustainable biofuels especially waste- and residue-based biofuels. The Directive did not change the 2 times multiplicator for waste- (e. g. used cooking oil), residue-based and advanced biofuels (e. g. straw), enabling the double counting of energy use from these resources, but defined exact feedstock categories in ANNEX IX. At the same time, as one of the most significant measures, the ILUC Directive introduced a 7% cap for food/feed crop biofuels (e. g. rapeseed, corn, sunflower, palm oil, soy-bean etc.

The governmental administration of the sector has been shared between several ministries and state institutions so far, and it is not expected to change. The Ministry for Innovation and Technology has broad responsibility over the implementation of the Alternative Fuel Directive[24] and ensures compliance with RED (including the ILUC Directive), while the Ministry of Agriculture is responsible for the land use issues pertaining to sustainable biomass production.

The National Tax and Customs Administration controls fulfilment of the required biofuel blending obligation (i.e. whether the required e% has been achieved by the fuel suppliers). The current system requires an annual reporting, meaning the fuel suppliers need to achieve the biofuel mandate on a yearly average (not on a litre/litre basis). The Hungarian system avoids any unnecessary discrimination between different types of biofuels which results in a flexible, competitive and cost-efficient biofuel market environment.

The National Food Chain Safety Office (NÉBIH) is responsible for the administrative control of sustainable biomass value chain. The "BIONYOM" system (biofuel and bioliquid traceability register) was established in accordance with RED and ILUC directives. BIONYOM is an electronic register of agricultural products produced, collected, processed, marketed and imported into Hungary and exported from Hungary, including biomass grown, intermediate products, biofuels and bioliquids. From 2018 all industrial stakeholders (producers, traders) need to report their biomass transactions covered by the sustainability declarations in this system.

### Achievements in the design and implementation of biofuel policies

The Hungarian biofuel market works without any significant problems or failures. The whole industry

[22] Government Decree No. 279/2017
[23] The Act was amended by Act No. LV/2017.
[24] Until the summer of 2018 the Ministry for National Development.


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operates according to prescribed regulation from the EU that the member states implement to varying degrees of effectiveness. Based on the opinion of the interviewed experts, the Hungarian regulators manage well this task in general.

Market players in the sector maintain good relationship with the government and represent their stakeholder interests quite successfully (especially bioethanol producers), owing in part to the fact that the sector relies on domestically sourced agricultural products. The National Energy Strategy accentuates that bioethanol production is especially beneficial for the country in terms of additional demand for crops, creation of jobs and contribution to export revenues.

There are only limited direct state interventions into the sector, as the system of biofuel supply obligation is well-established. The government subsidized the establishment of new medium and large capacity bioethanol production units within the framework of the Environmental and Energy Operational Programme in 2009 with 5 billion HUF (approximately EUR 18 mln) of non-refundable grants.[25] These subsidies have been exhausted by now, and it is not possible to subsidize conventional biorefineries since the introduction of the Guidelines on State Aid for Environmental Protection and Energy of the EC. [26]

Other promotional measures contributing to the development of domestic biofuel production have included various excise tax allowances. Between 2005 to 2007, an excise tax refund was ensured for the bioethanol and biodiesel blended in fuels up to 15 and 5% by volume respectively, later replaced by excise tax differentiation, providing a lower tax for fuels containing at least 4.4 volume percentage of bioethanol and biodiesel from 2007 (bioethanol) and 2008 (biodiesel).[27] In 2009 this was replaced by the biofuel mandate explained above. Additionally, the bioethanol component of fuel E85 (petrol containing at least 70% bioethanol) was exempted from excise duty. As a state subsidy, the measure had to be notified to the European Commission, receiving approval until 2011 and later extended until 2018. The 0% excise tax on bioethanol content was increased in 2011, recently measured at HUF 70 /l.[28] The tax exemption originally led to an uptake of E85 use, reaching 4.42 million litres in 2010. However, as a result of the tax hike and fall in fuel prices in 2015, the demand fell to 40 thousand litres by 2016.[29]

The Hungarian legal framework is broadly favourable because of the flexibility of the regulation. The interviewed experts reported that the Hungarian system is supportive compared to other countries in the region and is fully in line with the EU law. There are not artificial (regulatory) barriers such as, for example, the regulation of litre/litre mixing ratio for each unit of fuel. In Hungary, the 4.9e% mixing ratio of renewable based fuel only needs to be shown on a yearly basis. This is a more consumer-friendly system that leaves more flexibility for traders in purchasing which stabilizes and reduces end customer fuel prices.

From the consumers' perspective there are some positive examples of involvement of the wider public with respect to non-fossil inputs to fuels. The collection of used cooking oil at petrol stations

[25] Calculated by yearly average exchange rate for 2009 (280.58 HUF/EUR), published by the Hungarian Central Bank.
[26] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628(01)&from=EN
[27] On the basis of Act CXXVII of 2003 on excise tax (replaced already by Act LXVIII of 2016).
[28] Act LXVIII of 2016 - on Excise Tax 108/71 (i).
[29] http://kamaraonline.hu/cikk/elszivarog-a-hazai-kutakrol-az-e85-os-uzemanyag


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(by some fuel suppliers like MOL) has been a great success story which is also a great possibility to spread out sustainable thinking in the society.

### Governance bottlenecks to biofuels

- It would be desirable to simplify some administrative and bureaucratic tasks mostly from reporting perspective. One example is the bio-traceability (BIONYOM) report of NÉBIH, which is too much detailed and is not considered to be user-friendly by stakeholders. Market participants find some information requirements to be unnecessary and redundant, claiming that collecting and sending the information requires enormous manual work.
- Companies need to fill out four similar reports to be sent to three different state authorities (NÉBIH, NAV, MEKH). These reports require similar inputs, differing only in some small details which creates redundancy for the staff. Sometimes the notions and definitions also differ which makes it harder to fill out the forms (for example biofuel trader vs. biomass trader).
- The frequent changes in governmental administration make it hard to maintain effective communication between the business and administrative stakeholders. The latest expected changes in the organisational structure of the government are a step in the right direction, e.g. the responsibility over biofuels and GHG reporting on fuels will belong to the same state secretariat whereas previously they were separated.
- Without drastic changes in law and legislation, public trust was stable in the recent period. Society has very limited knowledge about the components of the fuel and the vast majority of consumers are not aware that biofuels are mixed in the gasoline or diesel they use. In the future, when the national blending targets will be raised, or if new types of fuels are introduced to the market (e.g. E10), public attention would probably increase again. According to industry stakeholders, state institutions and professional associations should take a more active role in providing consumer-friendly information based on concrete scientific facts related to biofuels.
- Hungarian legislators have very limited room for manoeuvring given the rules determined by the EU. On the other hand, the legislator has to take into consideration the specificities of the fuel market (in particular, the age and fuel compatibility of the car park). The main aim of domestic regulation is therefore to meet those requirements rather than setting more ambitious targets possibly leading to higher prices in the fuel market affecting some consumers negatively (e.g. the mandatory share of biofuel content for fuels is to be increased from the 4.9% to 6.4% by 2019-2020, taking into account the 7% threshold on crop-based fuels set by the EU).
- The Fuel Quality Directive (FQD) requires at least 6% reduction in life cycle GHG emissions per unit of energy from fuel. Suppliers may consider increasing the biofuel component in the fuels beyond this threshold or can use the so-called Upstream Emission Reduction (UER) certificates for compliance. The latter method must be accredited, but no detailed rules for accounting and reporting related to upstream activities are available yet.


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- Although there is a well-functioning industrial association (MÁSZ[30]), a structured forum or framework for consultation between business stakeholders and the governmental sector (ministries, regulatory bodies) would significantly improve the co-operation of interested parties.
- European market and WTO regulations are the most important elements of current international trading. The market is more effective if traders have access to the cheapest raw materials. Based on the opinion of the interviewees, the artificial market barriers need to be abolished on the unified European market. The Hungarian market currently works properly. A national standard which differs significantly from the European one can be a potential risk. Fortunately, the experts do not see these types of practices in the region. The new targets for "advanced biofuels" to be set by RED II can be difficult to reach, as currently the interviewed experts do not see any effective technology for those biofuels that could supply the volumes needed throughout the EU at a reasonable price level.
- The cost of biofuel production is not likely to fall to the level of fossil-based gasoline or diesel in the near future. This is even more the case with respect to advanced biofuels that need to be used in larger volumes after 2020, since those will be significantly more expensive than conventional biofuels. Currently experts can't estimate the exact magnitude of the effect this will have on fuel prices as there aren't available benchmark prices on the trading hubs for second generation biofuels.

## 2.4. Energy efficiency

### Institutional framework

The main responsibility for designing and implementing energy efficiency plans was delegated to the Ministry of Economy in 1999 after the publication of the first energy efficiency action plan.[31] The financial implementation of energy efficiency programmes was the responsibility of a newly established institution called Energy Centre Kht., a governmental body supporting the activities of the government related to energy efficiency, including administration, management of programmes, and energy statistics.

The institutional framework for energy efficiency transformed after 2010 when the responsibility for energy affairs including climate policy, renewable energy and energy efficiency was moved to the Ministry of National Development, although several other ministries and institutions were involved in designing action plans and preparing regulations. The MND coordinated the contributions from two other ministries: MNE was in charge of electromobility and buildings and the Ministry of Interior (which coordinates affairs related to local government, law and order, immigration and citizenship) was responsible for spatial planning in settlements and building regulations.

[30] Hungarian Petroleum Association
[31] Decision of the Government 1107/1999. (X. 8.)


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MND took the lead in developing energy efficiency action plans along with several other strategies and action plans related to the energy sector. A split within the ministry between the secretary of energy affairs and climate issues and coordination between participating ministries caused some difficulties but the consistency of energy efficiency policies in the context of the energy-related action plans and strategies could be retained.

After 2010 the responsibility for supporting energy efficiency policies shifted to the energy regulatory authority, the HEPURA. In 2013 the Energy Centre Kht. dissolved and its functions related to energy efficiency and energy statistics were transferred to HEPURA. This meant that energy efficiency policies would be more deeply integrated into the general energy regulation. Some of the staff migrated to HEPURA, a much larger institution with more financial and human resources at its disposal.[32] The administration and management of energy efficiency programmes financed by the Hungarian government was taken over by the relevant ministries MND and MNE.

The dissolution of the Energy Centre had limited impact on the design and implementation of energy efficiency policies. The EU funded operational programmes focusing on energy efficiency, which provided much more financial support than government-financed programmes, has been administered by the National Development Agency (NDA) since 2007. The Energy Centre gradually lost its importance from that time onward. In 2013 the NDA was dissolved too, and its functions related to the allocation of EU funds moved to the relevant ministries, the PMO and the GCND. With this transition, the influence of PMO in energy efficiency planning and design increased significantly at the expense of the MND.

Apart from governmental institutions some other organizations (NGOs, associations) are engaged in energy efficiency activities. They play a central role in disseminating information and increasing public awareness by carrying out research, publishing reports and implementing pilot projects. This kind of activity is essential in an environment where the government concentrates on drafting strategies, action plans and policies, and allocating investment subsidies, but performing poorly administering awareness campaigns or implementing real projects.

Energiaklub is a well-known non-governmental organisation concentrating on sustainable energy, climate protection, and energy efficiency. Energiaklub published several studies and implemented many projects aiming to increase awareness of energy efficiency, energy poverty and climate protection. Hungarian Energy Efficiency Institute (MEHI) is a non-profit analytical and advocacy organization, closely co-operating with companies interested in the energy efficiency market. Both organizations are actively evaluating action plans and measures taken by the government. The Hungarian Committee of Domestic Equipment Manufacturers (CEDEC) was also deeply involved in several awareness raising projects. GreenDependent Institute is another organization carrying out research projects (many of them H2020 projects) and awareness raising campaigns related to climate friendly lifestyle and sustainable energy use.

### Achievements in the design and implementation of energy efficiency (EE) policies

[32] HEPURA was transformed from governmental agency into independent regulator in 2013.



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The National Energy Strategy (NES), enacted by the Hungarian parliament in 2011, lays down Hungary's EE policy.[33] Its main goal is to reduce Hungary's energy import dependence through ambitious energy efficiency targets: the NES seeks to reduce final energy consumption by 183 PJ by 2020[34] compared to the forecasted business as usual consumption level.

However, the strategy was updated in 2015 applying new energy demand projections for 2020 to incorporate the effect of economic decline after 2008. The updated strategy lowered the energy savings target from 183 PJ to a more realistic (and less ambitious) 73 PJ calculated in terms of final energy consumption.[35] The third National Energy Efficiency Action Plan (NEEAP III) and the National Building Energy Performance Strategy (NBEPS) set detailed/sectoral energy saving targets for the period 2012-2020. According to these action plans a large part of the energy saving target (40 PJ, or 55% of total) should come from the residential sector.[36]

**Table 1: Final energy consumption, sectoral saving targets and energy efficiency trends**

| Sector | Final energy consumption in 2012 (PJ) | National target for 2012-2020 (PJ) | Energy efficiency improvement 2000-2015 (%) |
|---|---|---|---|
| **Residential** | 215 | 40 | 1.0 |
| **Industry** | 96 | 10 | 3.8 |
| **Transport** | 157 | 14 | 1.9 |
| **Other** | 133 | 9 | |
| **Total** | 600 | 73 | 2.0 |

*Source: IV. NEEAP (2017): final energy consumption and national target), and Odyssee-Mure (2018): energy efficiency improvement*

Stressing the importance of energy savings in the residential sector is based on the characteristics of Hungary's energy consumption. The share of the building sector in final energy consumption is close to 50%, among the highest in the EU 28, and residential buildings make up 65-75% of this, mostly composed of space heating.

### *Programmes and policies*

Hungary decided not to introduce an Energy Efficiency Obligation Scheme (EEOS) concerned it would increase retail energy prices. Another obstacle to EEOS was the financial pressure put on energy companies by the government, pushing through utility rate cuts (gradual decrease of retail energy prices) and imposing special taxes in 2013.

[33] Resolution of Parliament No. 77/2011. (X.11.) on Hungarian energy strategy
[34] National Energy Strategy 2030, table 5, p. 57. (Ministry of National Development, 2012)
[35] Government Resolution No. 1160/2015 on revisioning of energy demand projection applied by National Energy Strategy
[36] Demand projections are revised in every third year. The latest revision was published in June 2018 (Government Resolution No. 1274/2018).


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Instead of EEOS, the government voted for alternative policy measures and financing schemes such as grants and low-interest loans. The lion's share (around 90%) of this financial package came from EU subsidies: grants and loans were provided by Operational Programmes (OPs), financed by the European Structural and Investment Fund and European Cohesion Funds. A smaller part of the financial package was funded by revenues from sales of emission units under the Kyoto Protocol and EU allowance unit quotas under the ETS, which was allocated to the Green Investment Scheme (GIS) and the Green Economy Financing Scheme (GEFS).[37] Financial resources coming directly from the state budget are negligible.

Financial subsidies for energy projects (related to renewable energy and energy efficiency) provided by Operational Programmes for the period 2014-2020 amount to HUF 770 billion.[38] The share of energy efficiency projects is estimated at HUF 340 billion for this 7-year period, averaging HUF 50 billion per year. The annual GEFS budget is smaller, amounting to HUF 4-6 billion per year.

Operational Programmes target a wide range of consumer groups (household, public institutions, local governments, small and large enterprises, or district heating companies) with a wide range of projects (building renovations, renewable energy utilization, or heating system modernization). Projects implemented within OPs delivered 40-60% of total energy savings in 2014-2015.[39]

GIS and GEFS supported projects improved the energy efficiency of households. The most successful part of the GIS was the panel refurbishment programme (launched in 2008/2009) targeting the industrialized residential block houses (panel-blocks). Around 80% of GIS resources (HUF 28 billion / approximately EUR 100 mln)[40] were allocated on the panel-blocks' programme implementing complex energy efficiency measures.[41] 35% of panel-blocks (containing 46 thousand flats) have been renovated, delivering 1,01 PJ energy savings.[42] The panel-blocks' programme was supported by OPs concentrating on the modernization of district heating systems.

The Warmth at Home programme concentrated on residential energy efficiency measures, including replacement of large household appliances (refrigerators, freezers, washing machines), replacement of inefficient heating boilers, or a complex energy refurbishment of the house. However, lack of effective funding (annual budget of HUF 4-6 billion) and unpredictability of tender calls resulted in very limited reach of the program. Between 2014 and 2016, the number of households receiving a subsidy under the program to implement some kind of energy refurbishment remained below 3000 per year[43] and the annual energy savings delivered (varying between 0.13-0.26 PJ per year) did not exceed 4-5% of total energy savings.[44]

The home saving scheme in operation since 1997 can be considered a more successful funding

[37] GIS was launched in 2009 and was replaced by GEFS in 2014. Both programmes were managed by the MND.
[38] Nemes Csaba (2017): Energiahatékonysági szakpolitikák (NFM Zöldgazdaság Fejlesztési Főosztály). In Hungarian.
[39] IV NEEAP (2017), Table 32.
[40] Calculated by yearly average exchange rate for 2009 (280.58 HUF/EUR), published by the Hungarian Central Bank.
[41] IEA (2017): Energy policy of IEA countries. Hungary
[42] III. NEEAP (2015)
[43] These numbers lag far behind the projections of the National Building Energy Performance Strategy and the NEEAP. According to these action plans 15-20000 family houses should be refurbished every year up to 2020, investing HUF 80-100 billion per year.
[44] IV. NEEAP (2017)


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programme supporting construction, purchasing, modernisation, and upgrading/renovation of homes. These investments usually bring some energy saving as well, making the programme one of the most efficient instruments to increase energy efficiency of households. The scheme is based on the principle of self-reliance, sponsored by the state: households engaged into the programme (with saving period of 4-10 years) are entitled to state aid up to 30% of the amount deposited. Deposits and state aid accumulated during the saving period (optionally complemented with a loan granted under favourable conditions) can be used for housing purposes. According to a HEPURA estimation, 28% of total payments in 2015-2016 served energy saving purposes, resulting in 0,5-0,6 PJ energy savings per year.[45]

Other policies aiming at energy savings include mandatory energy audits and employment of energy specialists by industrial enterprises, establishment of a national network of energy -experts (advising local governments, households and small companies), launching a programme supporting electromobility, application of road tolls and the introduction of corporate tax relief for investments serving energy efficiency purposes. Many of these measures have been introduced recently and their effectiveness cannot yet be evaluated: corporate tax relief amounting to 30-50% of investments for increasing energy efficiency and mandatory energy audits are quite promising, but more time is needed to evaluate their results.

Some measures are struggling with defective implementation. Creating the consulting network of energy experts advising local governments, small companies and households on energy efficiency measures was a promising idea, because lack of knowledge is one of the major impediments to taking energy efficiency measures. The lack of additional resources to employ energy specialists resulted in weak and incomplete implementation. County and district government offices that struggled with strict budgets usually delegated energy policy recommendations to a regular employee instead of newly hiring an expert, raising the question whether this 'network' is capable of providing professional advice on preparing energy saving action plans, energy procurement, or planning and implementing energy efficiency measures. As a good initiative, the HEPURA started to organise trainings for the energy specialists.

### *Achievements*

Evaluating the level and trend in energy efficiency, Odyssee ranked Hungary 22nd among 30 EU countries.[46] The high energy efficiency improvements in services and industry were not enough to bring Hungary's energy efficiency in line with EU average. The worst performing is the household sector, ranking 29th. The absolute value of energy intensity of the Hungarian economy (energy consumption relative to GDP) calculated by Eurostat is twice the EU average, ranking 25th among EU

[45] Total payments in 2015-2016 averaged HUF 78-87 billion per year, resulting in energy saving investments of HUF 21-23 billion per year. Source: IV. NEEAP (2017)

[46] Odyssee ranking methodology is based on a composite indicator measuring sectoral level of energy intensity (moving average of the last three years) and the trend of improvement (variation 2000-2015). See Odyssee Scoreboard Methodology (http://www.indicators.odyssee-mure.eu/energy-efficiency-scoreboard.html)



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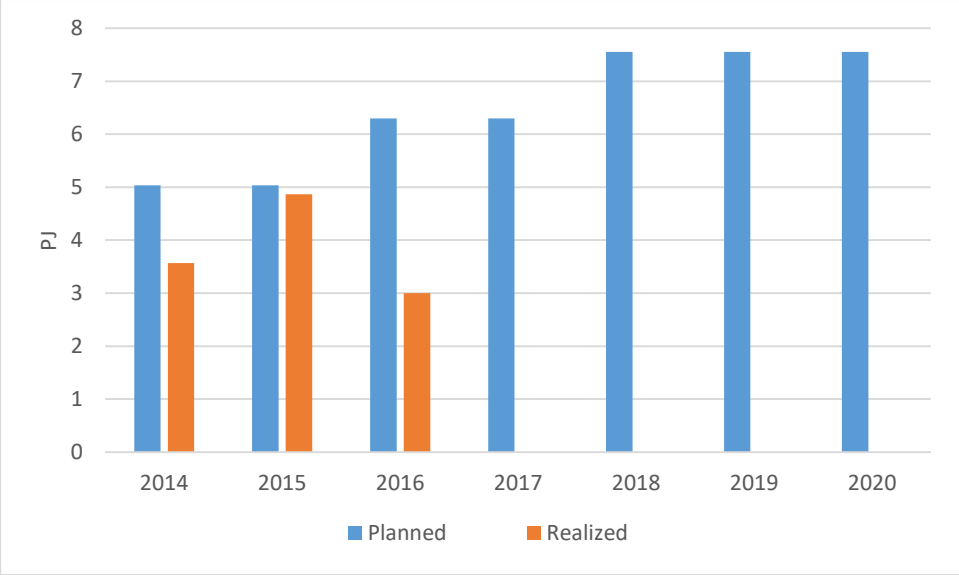
28.[47]

The Energy Efficiency Watch project report in 2015 ranked Hungarian energy efficiency policies 26th among EU 28. Experts specifically flagged a lack of ambition, an uncertain policy framework, strong centralisation, and depressed energy prices as major impediments to energy efficiency. The majority of experts do not believe the saving target will be reached.[48]

**Figure 9: Planned and realized new energy savings (PJ)**




*Source: IV. NEEAP (2017) and National Report of Hungary (2018)*

According to the data reported in the National Report of 2018 on NEEAP, the new energy savings delivered in 2014-2016 amounted to 11.4 PJ, 30% less than the amount planned for this period. It should be noted that the annual savings target increases over the next few years from 6.3 to 7.6 PJ, and energy savings realised (lagging behind targets) must follow this upward trend.[49]

## Governance bottlenecks to implementing energy efficiency policies

Planning and implementing energy efficiency policy faces several challenges in the form of financing barriers, lack of awareness, high transaction costs, institutional bias for supply side measures, energy price distortions, insufficient technical capacities and delivery network.[50] The institutional framework for energy governance is a critical factor and there are several regulatory distortions and institutional

[47] Energy intesity is calculated as kg of oil equivalent per 1000 EUR of GDP. Source: Eurostat Statistics explained. Consumption of energy

[48] Progress in energy efficiency policies in the EU Member States - the experts perspective (Survey Report 2015, Energy Efficiency Watch Project)

[49] IV. NEEAP (2017), Table 5.

[50] World Bank (2008): An analytical compendium of institutional frameworks for energy efficiency implementation (Energy Sector Management Program, Formal Report 331/2008)



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bottlenecks complicating implementation:

- Very limited staff responsible for energy efficiency policy making and frequent turnover of ministerial staff. Number of professionals in the MND responsible for drafting NEEAPs and preparing regulations varied between 1 and 4 persons.
- Overlapping competences and conflicts between ministries (MND and MNE) and the Prime Minister's Office (PMO) over energy efficiency policies. MND lacked the power and leverage to direct and organise activities of other ministries and Prime Minister's Office.
- Strong centralization and top-down attitude to policy making leaving little room for manoeuvring by local authorities. Since 2010 several functions of municipalities were transferred to the central government: regulation of public services (district heating, water works and waste management) moved to HEPURA and the ministry, and several other functions related to schools and health services as well. This has left the local governments with limited power and capabilities to take a more active role in energy efficiency policies.[51]
- Another step toward centralization was the establishment of NFSI (National Strategic Institute for Development) in 2015, a state-owned company responsible for leading energy efficiency projects in public sector buildings financed by OPs. According to a government decree, any project targeting energy efficiency upgrades in public building (schools, hospitals, buildings of local of central government) must be carried out in partnership with NFSI.[52] Involving a central counterparty may catalyse the use of EU funding by offering valuable administrative assistance to the public institutions lacking the experience in managing applications for EU funds. Eventually, NFSI takes the lead in these projects, acting as a central counterparty, leaving the affected public body owning/operating the building with very limited if any control over the investment.[53]
- Ownership presents another obstacle to energy efficiency projects for local governments since several public buildings (schools or health care facilities) were transferred from the local government to the state while the management/operation functions remained with the municipalities.[54]
- Perverse policy making: energy efficiency action plans (NEEAPs) are adjusted to the allocation of EU funding (ambitions are constrained by resources allocated on energy efficiency projects) rather than stated priorities and targets set in the energy strategy (renewable and energy efficiency action plans).
- Lack of implementation: policies envisaged in strategies and action plans are not translated into concrete implementation measures with clear deadlines and allocation of responsibilities.[55] Evaluation of progress is difficult because of weak monitoring and verification (M&V) system.

[51] Between 2010 and 2017 share of expenditures of local governments in percentage of GDP fell from 12.5% to 6.3%, indicating the erosion of financial resources of local governments. See: Eurostat

[52] Decree of the Government 435/2015 (XII. 28.)

[53] The same model was applied for projects related to waste water, waste management and district heating, setting up a state-owned company NFP (Program Office for National Development). Decree of the Government 339/2014 (XII. 19.) and Decree of the Government 158/2016 (VI. 13.)

[54] Analysis of National Energy Efficiency Action Plans and Policies in EU Member States 2014. Country Report Hungary (Energy Efficeny Watch, Co-funded by the Intelligent Energy Europe Programme of the European Union)

[55] This bottleneck is identified by IEA (2017) as one of the major problems in general energy policy.



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- Unpredictability, sudden changes and U-turns in policy making: legislation does not follow energy policy objectives and decisions taken by government sometimes contradict measure envisaged in action plans. According to the report on the status of Hungarian energy efficiency sector, the main challenges according to the companies are the uncertain economic situation, the constantly changing legal environment and lack of demand.[56]
- The most prominent example of unpredictability was the unexpected cancellation of HUF 90 billion EU funding earmarked for residential energy efficiency projects. The money was transferred in favour of energy refurbishment of public buildings, without clear arguments, contrary to prior policy statements stressing the need for refurbishment of residential buildings.[57] The move was announced by the head of the prime minister's office in 2015, contradicting all strategies and action plans published by the government to that point. The 3rd NEEAP of Hungary emphasized on the basis of a household survey that *" while a relatively significant part of households have the intention to modernise their homes, they lack sufficient savings and do not want to take out a loan. **Therefore, any substantial renovation of existing buildings requires the availability of grants.**"* [58]
- Low priority of energy efficiency compared to high priority of energy price regulation: Hungary adopted the Energy Efficiency Directive (EED) only in 2015 after an infringement procedure was launched by the European Commission. The energy saving target was set at low level, reflecting a lack of ambition by the government, which was more concentrated on cutting end user energy prices. Since 2013, with 'utility rate cuts' at the centre of national energy policy, residential electricity and natural gas prices were cut by 20%. The communication suggested that the role of the state is to lower energy costs by slashing regulated prices, neglecting the importance of energy saving measures taken by individuals.
- Choosing the option of Energy Efficiency Obligation Scheme to comply with Article 7 of the Energy Efficiency Directive (EED) was rejected by the government based on the argument that it might result in price hikes that contradict the utility rate cuts. The government suggested alternative policy measures to comply with Article 7 of the EED, without providing financial resources needed for its effective implementation. The decision is based on political considerations rather than a comprehensive economic assessment of the scheme. Special taxes imposed on energy companies discouraged these companies from playing an active role in energy efficiency. The dismissal of EEOS deprived energy efficiency policy of the most powerful instrument, leaving the professional knowledge, competence, and financial power of the energy companies at bay.

## 2.5. Electrification of vehicles

### Institutional framework

[56] MEHI (Hungarian Energy Efficiency Institute) (2015). 2014: A talpon maradás éve volt, 2015: az óvatos reménykedésé. Hangulatjelentés az energiahatékonysági piacról

[57] Government Resolution No. 1831/2015

[58] Source: III. NEEAP (2015), 3.2.1.1 Action Plan in connection with the implementation of the Building Energy National Strategy, p. 63



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In Hungary, the relevant ministry for transport related policies and legislation was the Ministry for National Development until the spring of 2018 (currently the Ministry of Innovation and Technology). The ministry organized the preparation of the National Transport-Infrastructure Development Strategy, accepted by the Government in 2014, which includes some electrification-related projects. As a part of the strategic document, the Action Plan on Transport Energy Efficiency Development nominates several activity areas related to the electrification of transport systems such as railway lines, the development of urban public transportation with tram line reconstructions, and alternative transport fuels.

The government designated the Ministry for National Economy to coordinate the implementation of the "Jedlik Ányos Plan", a complex e-mobility strategy accepted in 2015, which lays out a development strategy for e-charging stations, pilot projects, metering and settlement. The Action Plan aims to achieve three main goals: (1) to reduce environmental impact and GHG emissions; (2) the implementation of new innovative technologies and (3) the modernization of urban and suburban transportation.

The shared responsibilities between the two ministries increased the coordinated administrative tasks which caused some delays and overlapping activities. The reorganisation of the central government after the 2018 election simplified the central coordination of the electric mobility issues; from July 2018 all the responsible units belong to the same ministry, the Ministry of Innovation and Technology. All stakeholders hope that the organizational change will make the inter-ministerial coordination easier and accelerate the legislative processes.

The Hungarian Energy and Public Utility Authority also has a role in the recent setup of the regulatory structure, being responsible for granting the licences of electric charging station operators.

While the ministry is tasked with planning and overseeing the international and domestic passenger and freight transport, local municipalities are responsible for the organization of urban transport systems. They determine how to transform to a more electrified local transport system through the purchase of electric driven buses and/or developing the tram and trolley infrastructure (where available). Municipalities also can support the deployment of electric cars with legislative and purchasing decisions. The majority of the Hungarian municipalities offer free of charge parking for cars with green plate number based on local decrees.

Energy utility companies are very active in the e-mobility segment. The traditional market leading electricity players ELMŰ-ÉMÁSZ[59] (Innogy), E.ON, NKM (National Utilities Ltd.) and MVM (Hungarian Electricity Ltd.) are developing skills and competencies in the e-mobility services and MOL, the Hungarian national oil company, also decided to enter the e-mobility market as an e-mobility service provider.

As a sixth player, the newly established 'e-Mobi Ltd.' (a 100% state-owned entity) also acts as an active stakeholder in the deployment of charging stations for passenger cars. Government Decree No. 443/2017 assigned roles related to certain public service obligations to e-Mobi, which was established originally to speed up the development of e-charging infrastructure in Hungary. According to the decree, its responsibilities include charging point installations and concomitant

[59] Hungarian DSO



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developments financed from the governmental budget and EU funds, as well as the operation and maintenance of the installed charging stations. E-Mobi is also supposed to contribute to the deployment of electric mobility by providing electric vehicles to budgetary institutions not supplied by the Directorate-General for Public Procurement and Supply (KEF).[60] In addition, the government appointed e-Mobi to perform the tasks related to the establishment of a platform for electronic payment ensuring interoperability among the actors of the e-mobility market.

The civil sphere is also active in the field of electric transport. There are several non-governmental organizations with a mission to publicize the electric transport modes. The Hungarian E-Mobility Cluster "Ányos Jedlik"[61] is an advisory and consultative body comprised of the stakeholders in the electric mobility industry. The Cluster has over forty members and cooperating partners including car and bus manufacturers, automotive suppliers, mobility solution suppliers, energy utility companies, academic and research institutes. As an umbrella organization of various stakeholders, the Cluster offers a platform for negotiation and cooperation of companies, non-profit organizations and state entities and takes part actively in legislative processes and preparation of strategic materials.

### Achievements in the design and implementation of policies

The Hungarian National Energy Strategy 2030, accepted in 2011, targets an ambitious 9% share of electric and hydrogen fuelled vehicles in road and rail transport by 2030. As mentioned in the introductory chapter, currently only 2% of transport energy consumption comes from electricity, dominated by rail transportation.

The total length of electrified railway lines was 3018 km in 2016, representing a 38% share of the railway network. The government will direct 1500 billion HUF (~4.7 bn EUR) of EU funds increase electrified railroad to 3300 km by 2020.[62]

As for local passenger transportation, traditional electrified transportation operates in the capital (metro, tram, trolley, suburban railway) and in three other cities (tram and trolley). According to the data of the Hungarian Statistical Office, track-based modes in local passenger transportation represent a high share in terms of carried passengers (50%) as well as passenger kilometres (47%).[63] As yet, only a limited number of electric buses have been put in operation: 20 electric buses were purchased by BKK (transport company of Budapest) in 2016, although often having technical problems under extreme hot, cold or rainy weather conditions. The purchase of buses produced in Hungary was supported by the government with non-refundable grant but since the bus producer company recently filed for bankruptcy due to payment difficulties the maintenance of the buses has been suspended.[64] Municipalities can access electric buses through the 'Modern Cities Program'

[60] KEF is a budgetary organisation controlled by the Minister of Finance in Hungary, implementing the centralised procurement of priority products for government organisations.
[61] http://jedlikanyosklaszter.hu/jedlik-anyos-cluster/
[62] https://www.napi.hu/magyar_vallalatok/indul_a_nagy_vasutfejlesztes.647852.html
[63] KSH (2017) Transport performances and road traffic accidents, Quarter 4 2017, https://www.ksh.hu/docs/eng/xftp/gyor/sza/esza1712.pdf
[64] Source: https://autopro.hu/gyartok/Az-Ikarus-Egyedi-miatt-leallhat-az-elektromosbusz-flotta/26962/


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administered by the Prime Minister's Office. Some of them have already made steps to start the procurement process.

The transport company of Budapest also carried out substantial development projects in the field of track-based transportation, extending tram lines and purchasing trams and trolley buses, mainly financed from EU funds.[65] As regards the development of trollies, track-based buses will be probably replaced by electric buses (road vehicles) in the future. According to experts, while electric buses convert up to 95% of electricity into movement energy, trams and trolleys operate with 40-50% efficiency. Lines are very expensive to build and maintain, especially if the traffic is not so high. Therefore, the boundary between the two types of vehicles is becoming blurred. Modern trolleys (including the ones that will be put in operation in Budapest in 2019) can already be driven a certain distance using electricity from their built-in accumulators charged through the power collector under operation when connected to the overhead wires.

The Hungarian economy is strongly dependent on the performance of the automotive sector, which represents nearly 5% of gross domestic product and about 17% exports. The Hungarian government gives special attention to the transformation of the automotive sector to partially or fully electrically-powered vehicles. To maintain the friendly investment climate for automotive companies the government has created a special platform named "Industry 4.0". The platform *"aims to spread the most modern tools and methods – robotisation, automation, interconnection of machines through the internet – in the Hungarian economy in the quickest possible way."*[66]

The national government promotes the ownership of full electric vehicles by contributing 21% of the purchase price (maximum HUF 1.5 million). Governmental and municipal institutions as well as companies can also benefit from the support scheme, up to a maximum of 35 electric vehicles in case of the latter.

Green licence plates can be acquired for full electric (battery electric vehicle, BEV), plug-in hybrid (PHEV) and extended range electric vehicles (EREV). The owners of these cars are exempted from the car registration tax, annual circulation tax and company car tax, as well as the duty payable at the transfer of vehicle ownership. As mentioned earlier, most municipalities ensure free parking for cars with green licence plates, and the owners might drive in otherwise restricted areas.

Hungary transposed into national law the main elements of the EU legislative framework on charging infrastructure based on the Alternative Fuels Infrastructure Directive (2014/94/EU) in a governmental decree in June 2017.[67] The decree defines the major elements of the legal framework for charging, making it possible for service providers to contract with users and charge a fee for their service, while also providing the possibility of charging on an ad hoc basis. However, some issues are still under discussion. There are several competing concepts related to the most appropriate business model of publicly available charging infrastructure operation. The sharing of tasks and responsibilities between the charging point operator and the e-mobility service provider, the desirable level of interoperability between the competing charging infrastructure operators, the commercial issues of home charging

[65] Sources: https://bkk.hu/kototpalyas/jarmubeszerzes/, https://bkk.hu/fovarosi-fejlesztesek/fejlesztesek-a-kozossegi-kozlekedesben/
[66] Convergence Programme of Hungary 2018-2022. p. 14.
[67] Government Decree No. 170/2017


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and the appropriate level and assurance of the return on investments into charging stations still need to be clarified. These issues are to be addressed by a prospective law on electric mobility expected for autumn 2018, also integrating related pieces of legislation so far adopted.

As regards charging stations, the National Policy Framework required by the Alternative Fuels Infrastructure Directive set the target for 2,250 publicly accessible recharging points able to serve an estimated number of 21,200 vehicles.[68] The number of public charging points presently available in Hungary is around 580.[69]

Setting up and operating charging stations in Hungary is possible by all market participants with a licence from the Hungarian Energy and Public Utility Authority. The government provides an opportunity for municipalities with over 15,000 inhabitants to establish charging stations to apply for a non-refundable grant. One of the conditions for providing the subsidy was the requirement to operate the installed facilities for at least five years. The program, launched at the end of 2016, was expected to increase the number of charging stations by around 492 (~1000 charging points). 76 out of the eligible 112 municipalities applied for the subsidy within the program, including 4 districts in Budapest, seeking funding for 209 charging stations. However, due to a lack of financial sources needed for their operation and maintenance, some of the municipalities stepped back from the installations, which must be completed by the autumn of 2018.[70]

The requirement in the Alternative Fuels Infrastructure Directive for setting up recharging points in member states is carried out with the involvement of e-Mobi, aiming to set up more than 300 charging stations in Budapest and the largest cities; tourist centres, near central and local government offices and along motorways in the period of 2018-2019.[71] Companies are also encouraged to install their own charging facilities using a corporate tax allowance, providing the opportunity for reducing their corporate tax-base with up to a maximum HUF 20 million per charging station.[72]

The number of electric vehicles has been rising as a result of incentives provided to accelerate the uptake of e-mobility. In April 2018, the number of cars with green licence plates was 5,927. The recent number and composition of electric vehicles is as follows:

[68] https://ec.europa.eu/transport/sites/transport/files/2017-11-08-mobility-package-two/ms-fiches.pdf
[69] http://www.eafo.eu/electric-vehicle-charging-infrastructure, data retrieved on 24-Aug-18
[70] https://villanyautosok.hu/2017/11/21/celegyenesbe-fordultak-az-onkormanyzati-toltotelepitesek/
[71] The completion of installations was originally planned for May 2018.
[72] Act LXXXI/1996, 7(1), https://www.nav.gov.hu/nav/ado/tarsasagi/Elektromos_toltoallomas.html


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**Table 2: Number and composition of e-cars in Hungary by category, April, 2018**

| | Number by category | Share by category |
|---|---|---|
| Fully electric (BEV) | 2768 | 46.7% |
| Range extended electric (EREC) | 1527 | 25.8% |
| Plug-in hybrid (PHEV) | 1626 | 27.4% |
| Other zero emission | 7 | 0.1% |
| | **Number by location** | **Share by location** |
| Budapest | 3177 | 53.6% |
| Other settlements | 2750 | 46.4% |
| Total | ***5927*** | ***100.0%*** |

*Source: e-cars.hu*[73]

Almost half of the vehicles are fully electric, one quarter range-extended electric, and the last quarter are plug in hybrid cars. More than half of the e-car owners live in Budapest.

Other government initiative contributing to the expansion of e-mobility is a target set by Government Decree No. 1027/2016 to increase the share of electric vehicles in the fleets of central budgetary institutions and state-owned companies to 30% by 2030. Reaching this goal is implemented through the KEF and the e-Mobi Ltd. Both organisations conduct procurement procedures to purchase cars, providing them to the benefiting institutions at a discount or free of charge.[74]

Two car-sharing companies operating e-cars have recently started operations in the capital. The first was GreenGo, a startup that entered the market at the end of 2016 with a full fleet of electric vehicles (currently including 200 EVs). Then in 2018 MOL Limo, a subsidiary of the Hungarian national oil company MOL started operation with a fleet of 300 vehicles, 100 of which are electric cars. Although no data is available on the utilization rate of cars, both service providers operate on a commercial basis and plan to expand their activities in the near future.

### Governance bottlenecks

- The targets set by the government cannot be regarded as firm since no monitoring and accountability are associated with them and many times they are not specified in the right way. For example, the government decree prescribing the establishment of the charging infrastructure network does not set a deadline for accomplishing the tasks while the dates announced by the responsible parties in the media have already passed.[75] Also, the goal of a 30% share of electric vehicles in the fleet of budgetary institutions by 2030 does not explicitly define the scope of institutions involved, and no information is available on the present number of vehicles in the fleet in the absence of a common registry of vehicles in the public

[73] https://e-cars.hu/2018/05/07/jol-fogytak-a-zold-rendszamok-2018-aprilis-30-ig/
[74] https://www.vg.hu/vallalatok/beteriti-e-toltokkel-hazankat-az-e-mobi-2-660277/
[75] https://villanyautosok.hu/2018/01/12/az-elektromobilitas-hazai-gazdaja-az-e-mobi-kft/


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sector. It is difficult to administer the procurement program in a timely manner without having information on the number of vehicles required.

- It is debatable whether the present secretariat of state is the best suited for administering e-mobility since it is related more to the categories of energy and transportation than sustainable development according to our interviewees.
- Financial resources that can be used to promote e-mobility are not predictable in advance. The programs are mainly funded from the auction revenues of EU ETS allowances, a quarter of which was originally planned to be allocated for e-mobility. However, when the funds are allocated many projects appear from different areas, usually receiving a share of the funding by individual assessment, leaving a limited amount available for support.
- Public interventions are not well-designed in many instances, e.g. the regulation transposing the Alternative Fuels Infrastructure Directive prescribes the establishment of recharging points accessible to the public in the parking areas of shopping centres according to the size of their floor area instead of estimating the demand for charging stations in different urban and rural settlements.
- Conflicts of interest emerge within the public administration as well as between the public and private sector actors, slowing the adoption of the regulatory framework, the roll-out of charging infrastructure and the overall development of the sector. Stakeholder involvement in the regulatory process does not work properly and legislation is often drafted without public consultation to the dismay of market actors. Political loyalty and individual interests tend to override professional reasoned arguments. At the same time, insufficient work capacity and underpayment of administrative staff is a major problem with the relevant authorities.
- The two above mentioned issues are associated with delaying the adoption of the e-mobility act needed to integrate the different pieces of legislation concerning to e-mobility.
- Currently a joint licence can be accessed for both the installation and the operation and maintenance of e-charging infrastructure. An important question is whether licencing of these two rules should be separated in the future, given the fact that the two activities can be carried out by different actors.
- The original reason for establishing e-Mobi was to accelerate promotional activities related to e-mobility, as e-charging point projects can be realised in a faster and more efficient way through a company than a government institution. Market actors acknowledge the positive effects and the necessity of public participation in building the charging station network and in the provision of education and awareness raising but are also concerned about the possible movements towards the centralisation of some market functions. Sector participants also criticise the intentions of the government to develop the National E-mobility Platform by e-Mobi Ltd., claiming that it would lead to a monopoly position for the state-owned company in the market. They would prefer public action to be limited to the support of the uptake of charging stations and electric vehicles, allowing a competitive market with private actors would evolve.


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- The fact that PHEVs and EREVs can also access green plates is viewed negatively by the public, claiming that the green plates might serve as the 'new disability card' of the wealthier demographic, especially because the emission level of some vehicle models does not justify the benefits received. Media news reported that this is likely to be modified but it hasn't occurred yet.[76]
- Currently, home charging can be performed at preferential electricity rates. HEPURA representatives claim that the tariff set for universal service was not designed originally to support the deployment of electric mobility and it remains a question whether this agreement can be maintained even at higher penetration levels.
- The general preference of the Hungarian government for procuring nationally produced products might result in inefficient solutions, ending up like the electric buses purchased by the Budapest Transport Company. The poor quality of the buses caused disturbances in providing transportation services and generate additional costs for the transportation company.

[76] https://logisztika.hu/2017/01/27/nem-minden-hibrid-kap-zold-rendszamot-jovoben/



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# 3. Conclusions and policy recommendations

### Effectiveness of institutional framework

In Hungary, legislation related to energy transition is generally framed by EU policy, and regulatory rules are mostly elaborated in response to EU requirements, but the government has also taken its own initiative for promoting a more sustainable energy system, e. g. by setting a higher renewable energy target in the NREAP than mandated by the Renewable Energy Directive. However, political will varies in the different areas of energy transition. For example, special attention is given to the uptake of e-vehicles, while the government faced an infringement procedure for a delay in adopting the EU's Energy Efficiency Directive.

Over the last years, Hungary's institutional framework and governance has been criticised by stakeholders for lack of clarity over division of tasks and overlapping competencies. This has contributed directly to coordination problems and, perhaps more problematically, divergent and sometimes conflicting initiatives and methods of implementation. Following the latest election, changes were carried out to make the institutional landscape more effective. However, the centralised decision-making structure remains. The Prime Ministers' Office selecting projects of primary importance and controlling the allocation of EU funding. The other major challenge is in the realm of human resources in relevant ministries where experts cited insufficient number of available professional staff generally overburdened with high work load while not adequately compensated, resulting in high turnover of employees.

Strong centralization and a top-down attitude also affect local decision-making and administration. Since 2010 several municipalities functions were transferred to the central government: the regulation of public services (district heating, water works and waste management) was moved to HEPURA and the ministry, leaving only a limited role and budget for local governments to participate in policies related to energy transition.

### Effectiveness of policy implementation

In general, EU regulation is transposed into national law in a timely manner, and the country is on track with reaching its renewable targets (albeit in part as a result of a recent statistical revision of household biomass use for heating). By contrast, achievements in other areas like energy efficiency, where a low, unambitious target is at risk of being missed, leave much to be desired.

The lack of consistency in the overarching climate policies and measures increases regulatory risks for investors. One example is the delayed introduction of a new support scheme for renewable electricity announced to take effect from 2011 that was then postponed for several years and finally replaced by a totally new regime in 2016 based on the EU's state aid regulation. On the other hand, the consistent (but low) level of FIT support was a kind of advantage compared to several other EU countries (Czech Republic, Bulgaria or Spain) because no retroactive modifications were needed.


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Unpredictability, sudden changes and U-turns that are present in policy making often hijack the development process from the path envisaged in initial action plans. The most prominent example was the unexpected cancellation of HUF 90 billion EU funding earmarked for residential energy efficiency projects that was transferred to public building refurbishments. Predictability is also hampered by the lack of proper consultation between market actors and regulators. Even in case of strong government support for ambitious targets, lack of communication and consultation with stakeholders slows down policy making, legislative procedures (e.g. in case of the prospective e-mobility act) and implementation.

Interviewed stakeholders expressed concerns that political considerations override professional arguments in many instances. Indeed, some regulatory measures in place are difficult to rationalize. In spite of being one of the least expensive options to improve RES deployment, wind energy investments are hindered by administrative requirements that are impossible to meet. In addition, policy choices must be aligned with existing measures that are maintained by the government for political reasons. One of the major policy acts that has been detrimental to the uptake of renewable sources and energy efficiency projects was the three-step utility consumer rate cut introduced in 2013.

Other decisions, like choosing the option of alternative policy measures to meet the requirements of Article 7 of the Energy Efficiency Directive without considering the introduction of an Energy Efficiency Obligation Scheme (EEOS), were taken to avoid increasing the retail energy prices of households. Another obstacle to EEOS was the financial pressure placed on energy companies by the government's special taxes in 2013. The Commission has recently announced it would take Hungary to the European Court of Justice, claiming that certain types of costs are excluded from the calculation of network tariffs, violating the cost-recovery principle and hindering market operators from taking legal recourse according to the rules set in the Third Energy Package.

The cost-benefit analysis for intelligent metering systems in accordance with the Energy Efficiency Directive revealed that Hungarian consumers are not responding to information on their energy use. DSO representatives claim that the despondence can be attributed to the utility rate cut introduced in the same period.

### Policy recommendations

- Energy efficiency, as the lowest cost opportunity to reduce greenhouse gas emissions, air pollution and energy costs for households while contributing to energy independency should receive higher priority in the policy agenda in a more decentralized and market-oriented way.
- Decentralized financing solutions should be provided to households to encourage private investment in building renovation and refurbishment. As households pointed to the lack of initial capital as the most important barrier to energy efficient investments, providing non-refundable subsidies should be considered as well. The lowest income households should also receive special subsidies to alleviate their cost burden as a part of special social policy programs.


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- Information dissemination and knowledge transfer should be carried out in a more effective way, involving local authorities and other non-governmental organizations. Local governments should receive more resources to maintain and operate the system of the national network of energy experts. Campaigns introduced by the central administration (such as the Heat Smart! campaign) should be given higher visibility, as they are not largely recognized by the population.
- The implementation of policy measures and programs should be accompanied by adequate monitoring and evaluation and made publicly available to improve social acceptance and involvement.
- A review of the electricity rate cut policy ensuring that household energy prices reflect the full costs of energy supply would contribute substantially to the achievement of targets in the field of energy efficiency, introduction of smart metering, and the uptake of household electricity generating systems. The latter has to be accompanied by a thoughtful overview and adjustment of the associated support system carried out in a transparent, predictable manner.
- Ensuring the supply of services related to energy efficiency and renewable energy in a market-oriented way would contribute to more efficient implementation.
- Involvement of stakeholders in the policy making process would be important to avoid the introduction of ill-defined measures and conflicts or deficiencies after the relevant legislation came into force. It is important to provide adequate information to the business community and ensure a predictable environment for market actors.
- Planning and policy design should take into account resource availability. In Hungary the role of biomass is emphasized while the geothermal does not receive as much attention in spite of its high domestic potential and positive attributed (emissions and cost). Sustainability requirements have to be given proper consideration for both, and it is important that demand and supply are brought in line and are strictly monitored.


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# Appendix 1: Information on the interviews

In Hungary, 9 interviews were conducted in the frame of the research, with 12 experts/stakeholders in the following areas:

- Energy efficiency: 4 interviews, with 1 with an expert representing the administration, 2 with 1 and 2 NGO experts, respectively, and 1 with a researcher representing the academia
- Renewable energy: 2 interviews, 1 with a representative of the administration and 1 with a representative of business stakeholders
- Biofuel: 1 interview with 4 representatives of business stakeholders
- Electric mobility: 2 interviews, 1 with an expert representing the administration and 1 with an expert representing academia


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