

Hungary
Ministry of Innovation and Technology

Report

on the use of renewable energy sources in Hungary in 2017 and 2018
(Reporting by the Member States pursuant to Articles 18 and 22 of
Directive 2009/28/EC)

Budapest
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Introduction

Environmental sustainability and responsible management of resources with limited availability are values of special importance for Hungary. This idea is represented in the highest legislation in Hungary, in the country's new Fundamental Law adopted in 2011, which mentions the careful utilisation of natural resources.

The consumption of energy from renewable sources stood at 12.49% in Hungary in 2018. Between 1994 and 2018, the share of gross final consumption of energy from renewables rose from 2.2% to 8.29% in the field of electricity, from 0.9% to 7.68% in transport, and – primarily as a result of biomass use – from 6.5% to 18.12% in the heating and cooling sector. Solar power plants and heat pumps have recorded the strongest growth in recent years.

The consumption of solid biomass, which accounts for most of the renewable energy consumed in Hungary, was influenced (and replaced by) household consumption of natural gas, which has grown sharply, led by rising GDP. There was significant growth in renewables in the electricity sector, and further growth can be expected in the transport sector during the last two years of the decade as a result of recent measures.

The aim of this report is to demonstrate – as part of the reporting obligation of Member States defined under Articles 18 and 22 of 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 ('RED'), published in the *Official Journal of the European Union* L 110, 5.6.2009 – the progress achieved in the utilisation of renewable energy sources in 2017 and 2018.

The report has been compiled using the template issued by the European Commission, with the structure and data content specified therein.

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1. Sectoral and overall shares and actual total consumption of energy from renewable sources in the preceding 2 years

Table 1:

The sectoral (electricity, heating and cooling, and transport) and overall shares of energy from renewable sources¹

	Year 2017	Year 2018
RES-H&C ² (%)	19.70	18.12
RES-E ³ (%)	7.52	8.29
RES-T ⁴ (%)	7.71	7.68
Overall RES share ⁵ (%)	13.48	12.49
Of which from cooperation mechanism ⁶ (%)	0	0
Surplus for cooperation mechanism ⁷ (%)	0	0

Source: MEKH

Table 1a:

Calculation table for the renewable energy contribution of each sector to final energy consumption (ktoe)⁸

	Year 2017	Year 2018
(A) Gross final consumption of RES for heating and cooling	2123.5	1865.5
(B) Gross final consumption of electricity from RES	266.1	299.7
(C) Gross final consumption of energy from RES in transport	196.9	222.6
(D) Gross total RES consumption ⁹	2586.5	2387.8
(E) Transfer of RES <u>to</u> other Member States	0	0
(F) Transfer of RES <u>from</u> other Member States and 3rd countries	0	0
(G) RES consumption adjusted for target (D)-(E)+(F)	2586.5	2387.8

Source: MEKH

¹ Facilitates comparison with Table 3 and Table 4a of the NREAPs.

² Share of renewable energy in heating and cooling: gross final consumption of energy from renewable sources for heating and cooling (as defined in Articles 5(1)(b) and 5(4) of Directive 2009/28/EC) divided by gross final consumption of energy for heating and cooling. The same methodology as in Table 3 of NREAPs applies.

³ Share of renewable energy in electricity: gross final consumption of electricity from renewable sources for electricity (as defined in Articles 5(1)a) and 5(3) of Directive 2009/28/EC) divided by total gross final consumption of electricity. The same methodology as in Table 3 of NREAPs applies.

⁴ Share of renewable energy in transport: final energy from renewable sources consumed in transport (cf. Article 5(1)(c) and 5(5) of Directive 2009/28/EC) divided by the consumption in transport of 1) petrol; 2) diesel; 3) biofuels used in road and rail transport and 4) electricity in land transport (as reflected in row 3 of Table 1). The same methodology as in Table 3 of NREAPs applies.

⁵ Share of renewable energy in gross final energy consumption. The same methodology as in Table 3 of NREAPs applies.

⁶ In percentage point of overall RES share.

⁷ In percentage point of overall RES share.

⁸ Facilitates comparison with Table 4a of the NREAPs

⁹ According to Art. 5(1) of Directive 2009/28/EC gas, electricity and hydrogen from renewable energy sources shall only be considered once. No double counting is allowed.

Table 1b:
Total actual contribution (installed capacity, gross electricity generation) from each renewable energy technology in [Member State] to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in electricity¹⁰

	Year 2017		Year 2018	
	MW	GWh	MW	GWh
Hydro ¹¹ :	57	231.6	57	234.4
non-pumped	57	231.6	57	234.4
<1MW	4	16.3	4	16.4
1 MW-10 MW	12	48.8	12	49.3
>10MW ¹²	41	166.6	41	168.6
pumped	0	0	0	0
mixed ¹³	0	0	0	0
Geothermal	3	1	3	12
Solar:	344	349	726	620
photovoltaic	344	349	726	620
concentrated	0	0	0	0
Tide, wave, ocean	0	0	0	0
Wind:	329	702.9*	329	679.8*
onshore	329	758**	329	607**
offshore	0	0	0	0
Biomass ¹⁴ :	438	1998	461	2133.8
solid biomass	356	1646	385	1799
biogas	82	352	76	334.8
bioliquids	0	0	0	0
TOTAL	1171	3282.5	1576	3680
of which in CHP		937		916

Source: MEKH and ITM

* Normalised

** Not normalised

Table 1c:
Total actual contribution (final energy consumption¹⁵) from each renewable energy technology in Hungary to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in heating and cooling (ktoe)¹⁶

	Year 2017	Year 2018
Geothermal (excluding low temperature geothermal heat in heat pump applications)	127.5	124.2
Solar	11.8	12.6

¹⁰ Facilitates comparison with Table 10a of the NREAPs.

¹¹ Normalised in accordance with Directive 2009/28/EC and Eurostat methodology.

¹² Following the amendment of Directive 1099/2008/EC, Member States are no longer required, from the reference year 2017, to produce data on hydropower plants broken down by these performance categories.

¹³ In accordance with new Eurostat methodology.

¹⁴ Take into account only those complying with applicable sustainability criteria, cf. Article 5(1) of Directive 2009/28/EC last subparagraph.

¹⁵ Direct use and district heat as defined in Article 5(4) of Directive 2009/28/EC.

¹⁶ Facilitates comparison with Table 11 of the NREAPs.

Biomass ¹⁷ :	1,958.7	1,698.3
<i>solid biomass</i>	1,935.5	1,678.3
<i>biogas</i>	23.2	20.1
<i>bioliquids</i>	0	0
Renewable energy from heat pumps:		
- of which aerothermal	2.6	3.9
- of which geothermal	2.9	3.0
- of which hydrothermal	1.0	1.0
TOTAL	2,104.5	1,843.0
<i>Of which DH</i> ¹⁸		
<i>Of which biomass in households</i> ¹⁹	1623.6	1352.2

Source: MEKH

Table 1d:
Total actual contribution from each renewable energy technology in Hungary to meet the binding 2020 targets and the indicative interim trajectory for the shares of energy from renewable resources in the transport sector (ktoe)^{20,21}

	Year 2017	Year 2018
- Bioethanol	28.8	42.3
- Biodiesel (FAME)	96.4	138.8
- Hydrotreated Vegetable Oil (HVO)	2.5	2.5
- Biomethane	0	0
- Fischer-Tropsch diesel		
- Bio-ETBE	6.5	6.7
- Bio-MTBE		
- Bio-DME		
- Bio-TAEE		
Biobutanol		
- Biomethanol		
- Pure vegetable oil		
Total sustainable biofuels	134.0	190.3
Of which		
sustainable biofuels produced from feedstock listed in Annex IX Part A		
other sustainable biofuels eligible for the target set out in Article 3(4)(e)	100	93
sustainable biofuels produced from feedstock listed in Annex IX Part B		
sustainable biofuels for which the contribution towards the renewable energy target is limited according to Article 3(4)(d)	67	99
Imported from third countries		
Hydrogen from renewables	0	0
Renewable electricity	29.92	30.64
Of which		
consumed in road transport	0.59	0.66
consumed in rail transport	29.06	29.68
consumed in other transport sectors	0.27	0.31

¹⁷ Take into account only those complying with applicable sustainability criteria, cf. Article 5(1) last subparagraph of Directive 2009/28/EC.

¹⁸ District heating and / or cooling from total renewable heating and cooling consumption (RES- DH).

¹⁹ From the total renewable heating and cooling consumption.

²⁰ For biofuels take into account only those compliant with the sustainability criteria, cf. Article 5(1) last subparagraph.

²¹ Facilitates comparison with Table 12 of the NREAPs.

others (Please specify) transport by pipeline		
others (Please specify)		

Source: MEKH and NAV

2. Measures taken in the preceding 2 years and/or planned at national level to promote the growth of energy from renewable sources taking into account the indicative trajectory for achieving the national RES targets as outlined in your National Renewable Energy Action Plan (Article 22(1)(a) of Directive 2009/28/EC).

**Table 2:
Overview of all policies and measures**

Name and reference of the measure	Type of measure*	Expected result**	Targeted group and or activity***	Existing or planned****	Start and end dates of the measure
<i>1. Mandatory off-take scheme</i>	legal	2017: Amount sold: 2,361.12 GWh Support: HUF 41.02 billion 2018: Amount sold: 2,161.52 GWh Support: HUF 35.28 billion	Electricity from renewable energy sources	Implemented	Submission of applications under the former Mandatory Off-Take Scheme: January 2003 to December 2016 Submission of applications under the Renewable Energy Support/Mandatory Off-Take Schemes: January 2017 to April 2018
<i>2. Premium support scheme</i>	legal	2017: Amount sold: 188.75 GWh Support: HUF 2.02 billion 2018: Amount sold: 652.68 GWh Support: HUF 7.13 billion	Electricity from renewable energy sources	Implemented	Submission of applications for green premium without call: January 2017 to April 2018 Submission of applications for brown premium: Ongoing since October 2017 No Renewable energy support scheme tenders launched in 2017 or 2018.
<i>3. GINOP-4.1.1-8.4.4-16 Support for the improvement of the energy performance of buildings with the use of renewable energy through combined loan products</i>	Financial Financial envelope: HUF 13.9 billion	Additional capacity of renewable energy production (6,980 kW); Estimated annual decrease of GHG (8,095 t CO2 equivalent) Decrease of annual primary energy consumption of company buildings (40,494,150 kWh/year)	Target group: Aid applications may be submitted by small and medium-sized enterprises which fully comply with the eligibility criteria specified in the call. Aid applications may not be submitted under this call by consortia. Activity: Projects combining: Increasing energy efficiency (Improving the thermal characteristics of and reducing heat loss in buildings, Modernisation of heating, cooling and domestic hot water systems of buildings, Refurbishment of indoor and outdoor lighting systems to be	Implemented	16.03.2017 - 08.01.2018

		<p>Decrease of annual primary energy consumption as a result of energy efficiency developments (105,163 GJ/year)</p> <p>Annual energy from RES (40,684 GJ/year)</p>	<p>more energy-saving) using any renewable energy source (Installation of solar collector system to partially or fully meet the domestic hot water energy needs of buildings involved in the development, and/or assist the heating system and/or for cooling;</p> <p>Developing a briquette, pellet, woodchip wood-gasification boiler system to partially or fully meet the heating and domestic hot water energy needs of buildings involved in the development;</p> <p>Installation of a solar cell system for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development;</p> <p>Application of heat pump systems to provide heating and/or cooling and/or produce domestic hot water and/or assist the heating system)</p>		
<p>4. GINOP-4.1.2-18 Support for the improvement of the energy performance of buildings with the use of renewable energy</p>	<p>Financial Financial envelope: HUF 12 billion</p>	<p>Additional capacity of renewable energy production (11,903 kW)</p> <p>Estimated annual decrease of GHG (22,427 t CO2 equivalent)</p> <p>Decrease of annual primary energy consumption of company buildings (59,157,948 kWh/year)</p> <p>Decrease of annual primary energy consumption as a result of energy efficiency developments (312,104 GJ/year)</p> <p>Annual energy from RES (57,881 GJ/year)</p>	<p>Target group: Aid applications may be submitted by small and medium-sized enterprises which fully comply with the eligibility criteria specified in the call. Aid applications may not be submitted under this call by consortia.</p> <p>Activity: Projects combining: Increasing energy efficiency (Improving the thermal characteristics of and reducing heat loss in buildings, Modernisation of heating, cooling and domestic hot water systems of buildings, Refurbishment of indoor and outdoor lighting systems to be more energy-saving) using any renewable energy source (Installation of solar collector system to partially or fully meet the domestic hot water energy needs of buildings involved in the development, and/or assist the heating system and/or for cooling;</p> <p>Developing a briquette, pellet, woodchip wood-gasification boiler system to partially or fully meet the heating and domestic hot water energy needs of buildings involved in the development;</p> <p>Installation of a solar cell system for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development;</p> <p>Application of heat pump systems to provide heating and/or cooling and/or produce domestic hot water and/or assist the heating system)</p>	<p>Implemented</p>	<p>14.03.2018 - 27.03.2019</p>
<p>5. GINOP-8.4.1/A-17 Credit aimed at improving the energy efficiency of residential buildings and increasing the use of renewable energy</p>	<p>Financial Financial envelope: HUF 105.2 billion</p>	<p>Additional capacity of renewable energy production (kW)</p> <p>Annual energy from RES (GJ/year)</p> <p>Estimated annual decrease of GHG (t CO2 equivalent)</p> <p>Decrease of annual primary energy consumption of residential buildings (kWh/year)</p> <p>Decrease of annual primary energy consumption as a result</p>	<p>Target group: Natural persons, shared residential buildings and housing cooperatives, under the terms of the call</p> <p>Activity: Modernisation of single-family, residential, detached, terraced and semi-detached houses, weekend and holiday homes, shared residential buildings or housing cooperative dwellings</p> <p>Activities concerning the improvement of energy efficiency (heat insulation of building envelope structures, replacement of windows and doors qualifying as building envelope structures, improvement of the thermal protection of buildings during the summer, installation of sun-</p>		<p>24.04.2017 - 31.12.2022</p>

		of energy efficiency developments (GJ/year) Number of households with improved energy consumption classification	protection or shading structures, modernisation of heating and/or domestic hot water systems, modernisation of heat recovery equipment, conversion of indoor and outdoor lighting systems to be more energy-saving); Activities concerning the use of renewable energy sources (installation of solar collector system, developing a briquette, pellet, woodchip wood-gasification boiler system, installation of a solar cell system for grid-connected or independent (off-grid) electricity generation, up to maximum 5-kW household power plant, use of geothermal-to-water, water-to-water, air-to-water heat pump systems to provide heating and/or cooling and/or to produce domestic hot water and/or to assist the heating system) Implemented/ongoing		
6. GINOP-8.4.1/B-16 <i>Energy loan for SMEs</i>	Financial Financial envelope: HUF 55.13 billion	Additional capacity of renewable energy production (kW) Annual energy from RES (GJ/year) Estimated annual decrease of GHG (t CO2 equivalent)	Target group: Within the framework of the loan scheme, companies, self-employed entrepreneurs, sole traders, cooperatives or Hungarian branches of foreign enterprises which are financially viable but have limited to no access to funding, are resident in Hungary and have a registered seat in Hungary, or a registered seat in the European Economic Area and a branch office in Hungary, and are classified as a micro, small or medium-sized enterprise under Annex I to Commission Regulation (EU) No 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty, are eligible for the loan. Accordingly, the loan may be applied for by an enterprise which is a micro, small or medium-sized enterprise within the meaning of Annex I to Commission Regulation (EU) No 651/2014 on the basis of its consolidated annual statements involving its partner enterprises or affiliates – which may be foreign partner enterprises or affiliates – or, in the absence of such, the accounts and records of the applicant and, where appropriate, its foreign partner enterprises or affiliates. An enterprise already registered or recorded by a competent court or authority and which began operating during the business year concerned may also be entitled to the loan. Consortia may not apply for a loan under this loan scheme. Activity: The loan scheme supports financially viable and income-generating investments which produce electricity for network production using a renewable energy source (other than wind energy).	Implemented	28.02.2017 - 30.06.2018
7. KEHOP-1.2.1 <i>Developing local climate strategies and raising awareness of climate issues</i>	Financial Financial envelope: HUF 3.19 billion	Number of inhabitants actively involved in awareness-raising activities relating to climate adaptation (234,732 persons) Total number of inhabitants of municipalities with a climate strategy (2,320,923 persons) Number of inhabitants reached	Target group: Local governments, local government associations Civil society organisations may not apply for support independently, but only as part of a consortium. Activity: The following activities are eligible independently under the call: a) Development of local climate strategy for local governments; b) Organisation and conduct of interactive thematic awareness-raising programmes at institutional or municipal level or spanning several	Implemented	01.04.2018 - 01.08.2019

		by the awareness-raising campaign (passive target) (2,668,404 persons)	municipalities; c) Implementation of municipal awareness campaigns; d) Raising awareness among local stakeholders, including: organisation and conduct of infossessions/workshops/forums for employees of institutions involved in the project; e) Preparation and conduct of regional and local school competitions that impart practice-oriented knowledge and provide positive examples that can be integrated into and applied to everyday activities.		
8. KEHOP-5.1.1-17 <i>Promoting green electricity generation from renewable sources by installing electricity generation systems with an installed capacity exceeding 4 MW</i>	Financial Financial envelope: HUF 6.4 billion	Annual decrease of GHG (41,914 t CO2 equivalent) Additional capacity for renewable energy production (41 MW) Annual energy from RES (154,666 GJ/year)	Target group: Companies Activity: Developing a system for generating electricity from renewable sources that is connected to the grid rather than linked to a building Developing a system for cogeneration using renewable sources that is connected to the grid rather than linked to a building	Implemented	17.04.2017 - 17.04.2019
KEHOP-5.1.2-17 <i>Promoting green electricity generation from renewable sources by installing electricity generation systems with an installed capacity not exceeding 0.5 MW</i>	Financial Financial envelope: HUF 10.8 billion	Annual decrease of GHG (66,641 t CO2 equivalent) Additional capacity for renewable energy production (64 MW) Annual energy from RES (245,908 GJ/year)	Target group: Companies Activity: Developing a system for generating electricity from renewable sources that is connected to the grid rather than linked to a building Developing a system for cogeneration using renewable sources that is connected to the grid rather than linked to a building	Implemented	17.04.2017 - 17.04.2019
9. KEHOP-5.1.3-17 <i>Promoting green electricity generation from renewable sources by installing electricity generation systems prepared as part of the KEOP-7.9.0 scheme</i>	Financial Financial envelope: HUF 1.47 billion	Additional capacity for renewable energy production (6 MW) Annual decrease of GHG (8,368 t CO2 equivalent) Annual energy from RES (35,335 GJ/year)	Target group: Companies Activity: Developing a system connected to the grid and not to buildings for the production of electricity and cogenerated heat using renewable sources, and selling the heat and electricity produced a) Biogas production and use (Developing a system for the recovery of biogas produced from wastewater for the production of cogenerated heat and electricity) b) Production of solar energy-based electricity (Developing photovoltaic systems connected to the grid and not to buildings)	Implemented	15.05.2017 - 15.05.2019
10. KEHOP-5.2.10-16 <i>Calls for proposals concerning the improvement of the energy performance of buildings for budgetary authorities</i>	Financial Financial envelope: HUF 15.98 billion	Additional capacity for renewable energy production (185 MW) Decrease of annual primary energy consumption of public buildings (48,192,582 kWh/year) Annual decrease of GHG	Target group: Buildings exclusively owned or managed by central budgetary authorities providing publicly funded in-patient care, buildings exclusively owned or managed by internal affairs authorities, and the boards of state-run primary and secondary educational establishments. Activity: I. Improvement of the thermal characteristics of buildings by developing the building envelope structures listed in Table 1 of Annex 5 to Decree No 7/2006 of 24 May 2006 of the Minister without	Implemented	01.08.2016 - 31.07.2018

		<p>(10,106 t CO2 equivalent)</p> <p>Decrease of annual primary energy consumption as a result of energy efficiency developments (154,943 GJ/year)</p> <p>Annual energy from RES (13,558 GJ/year)</p>	<p>Portfolio.</p> <p>II. Application of solar cells for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development.</p> <p>III. Application of solar collectors to partially or fully meet demand for domestic hot water.</p>		
<p>11. KEHOP-5.2.11-16 Establishment of photovoltaic systems for central budgetary authorities</p>	<p>Financial Financial envelope: HUF 24.46 billion</p>	<p>Additional capacity for renewable energy production (41 MW)</p> <p>Annual energy from RES (161,919 GJ/year)</p> <p>Decrease of annual primary energy consumption of public buildings (98,227,144 kWh/year)</p> <p>Annual decrease of GHG (26,490 t CO2 equivalent)</p>	<p>Target group: Central budgetary authorities</p> <p>Activity: I. Establishment of a grid-connected solar cell system or systems with an interconnection capacity of less than 50 kVA (household power plant) to partially or fully and directly meet own electricity needs.</p> <p>II. Establishment of a grid-connected solar cell system with an interconnection capacity of 50-500 kVA to partially or fully and directly meet own electricity needs.</p> <p>Applications for support may be submitted for the development of several buildings within a project, but developments of coherent systems broken down into several projects are not eligible.</p>	<p>Implemented</p>	<p>17.10.2016 - 16.10.2018</p>
<p>12. KEHOP-5.2.12-17 Energy development of state-owned sports facilities</p>	<p>Financial Financial envelope: HUF 4.81 billion</p>	<p>Additional capacity for renewable energy production (2 MW)</p> <p>Decrease of annual primary energy consumption of public buildings (6,068,370 kWh/year)</p> <p>Annual decrease of GHG (1,168 t CO2 equivalent)</p> <p>Decrease of annual primary energy consumption as a result of energy efficiency developments (13,414 GJ/year)</p> <p>Annual energy from RES (9,365 GJ/year)</p>	<p>Target group: the National Sports Centres, and Magyar Nemzeti Vagyonkezelő Zrt.</p> <p>Activity: Activities concerning the improvement of energy efficiency: I. Improving the thermal characteristics of a building, buildings or a part or all of a cluster of buildings in direct contact with each other and involved in the development. II. Modernisation of heating, cooling, ventilation and domestic hot water systems of institutions. Activities concerning the use of renewable energy sources: III. Application of solar collectors to partially or fully meet demand for domestic hot water and/or assist the heating system. IV. Utilisation of biomass, including agricultural by-products, horticultural by-products, energy crops, forestry products and by-products, wood-industry and other industry wastes and by-products or a mixture of the above to provide heating and/or assist the heating system. V. Application of heat pumps to provide basic heating and/or produce domestic hot water and/or assist the heating system. VI. Utilisation of geothermal energy to provide heating or assist the heating system and/or produce domestic hot water. VII. Application of solar cells for grid-connected or independent (off-</p>	<p>Implemented/ongoing</p>	<p>02.05.2017 - 31.07.2020</p>

			grid) electricity generation to supply electricity exclusively for the building involved in the development.		
13. KEHOP-5.2.2-16 <i>Priority development of the energy performance of public buildings</i>	Financial Financial envelope: HUF 154.3 billion	Additional capacity of renewable energy production (MW) Decrease of annual primary energy consumption of public buildings (kWh/year) Annual decrease of GHG (t CO2 equivalent) Decrease of annual primary energy consumption as a result of energy efficiency developments (GJ/year) Annual energy from RES (GJ/year)	Target group: public-sector organisations or their support institutions listed in Government Decision No 1084/2016 of 29 February 2016 on the determination of the KEHOP annual development budget Activity: Activities concerning the improvement of energy efficiency: I. Improving the thermal characteristics of a building, buildings or a part or all of a cluster of buildings in direct contact with each other and involved in the development. II. Modernisation of heating, cooling, ventilation and domestic hot water systems of institutions. Activities concerning the use of renewable energy sources: III. Application of solar collectors to partially or fully meet demand for domestic hot water and/or assist the heating system. IV. Utilisation of biomass, including agricultural by-products, horticultural by-products, energy crops, forestry products and by-products, wood-industry and other industry wastes and by-products or a mixture of the above to provide heating and/or assist the heating system. V. Application of heat pumps to provide basic heating and/or produce domestic hot water and/or assist the heating system. VI. Utilisation of geothermal energy to provide heating or assist the heating system and/or produce domestic hot water. VII. Application of solar cells for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development.	Implemented	30.03.2016 - 02.09.2019
14. KEHOP-5.2.3-16 <i>Development of the energy performance of ecclesiastical buildings with the option of using renewable energy sources</i>	Financial Financial envelope: HUF 13.31 billion	Additional capacity of renewable energy production (MW) Decrease of annual primary energy consumption of public buildings (kWh/year) Annual decrease of GHG (t CO2 equivalent) Decrease of annual primary energy consumption as a result of energy efficiency developments (GJ/year) Annual energy from RES (GJ/year)	Target group: public, state-recognised religious institutions listed in Government Decision No 1084/2016 of 29 February 2016 on the determination of the KEHOP annual development budget Activity: A. Activities concerning the improvement of energy efficiency: I. Improving the thermal characteristics of a building, buildings or a part or all of a cluster of buildings in direct contact with each other and involved in the development. II. Modernisation of heating, cooling, ventilation and domestic hot water systems of institutions. B. Activities concerning the use of renewable energy sources: I. Application of solar collectors to partially or fully meet demand for domestic hot water and/or assist the heating system. II. Utilisation of biomass, including agricultural by-products, horticultural by-products, energy crops, forestry products and by-products, wood-industry and other industry wastes and by-products or a mixture of the above to provide heating and/or assist the heating system.	Implemented	30.09.2016 - 16.09.2019

			<p>III. Application of heat pumps to provide heating and/or produce domestic hot water and/or assist the heating system.</p> <p>IV. Utilisation of geothermal energy to provide heating or assist the heating system and/or produce domestic hot water.</p> <p>V. Application of solar cells for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development.</p>		
<p>15. KEHOP-5.2.5 Construction of nearly zero energy buildings as pilot projects</p>	<p>Financial Financial envelope: HUF 6.23 billion</p>	<p>Additional capacity of renewable energy production (MW)</p> <p>Decrease of annual primary energy consumption of public buildings (kWh/year)</p> <p>Annual decrease of GHG (t CO₂ equivalent)</p> <p>Decrease of annual primary energy consumption as a result of energy efficiency developments (GJ/year)</p> <p>Annual energy from RES (GJ/year)</p>	<p>Target group: central budgetary authorities and their consortium partners listed in Government Decision No 1084/2016 of 29 February 2016 on the determination of the KEHOP annual development budget</p> <p>Activity: Building construction and building engineering works for the construction of buildings used for demonstration purposes that provide a public-interest function or assist the performance of a public function from no later than 31 December 2018, are listed in Annex 6 to Decree No 7/2006 of 24 May 2006 of the Minister without Portfolio, and meet the requirements for nearly zero energy buildings.</p>	<p>Implemented</p>	<p>19.09.2016 - 24.10.2017</p>
<p>16. KEHOP-5.2.8-17 Improvement of the energy performance of buildings in accordance with State aid rules</p>	<p>Financial Financial envelope: HUF 1.6 billion</p>	<p>Additional capacity for renewable energy production (2 MW)</p> <p>Decrease of annual primary energy consumption of public buildings (7,058,062 kWh/year)</p> <p>Annual decrease of GHG (1,359 t CO₂ equivalent)</p> <p>Decrease of annual primary energy consumption as a result of energy efficiency developments (11,640 GJ/year)</p> <p>Annual energy from RES (8,687 GJ/year)</p>	<p>Target group: companies majority-owned by Budapest Municipality</p> <p>Activity: A. Activities concerning the improvement of energy efficiency: I. Improving the thermal characteristics of a building, buildings or a part or all of a cluster of buildings in direct contact with each other and involved in the development. II. Modernisation of heating, cooling, ventilation and domestic hot water systems of institutions. B. Activities concerning the use of renewable energy sources: I. Application of solar collectors to partially or fully meet demand for domestic hot water and/or assist the heating system. II. Utilisation of biomass – the biodegradable fraction of products, waste and residues from agriculture (including plant and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste – to produce domestic hot water and/or provide heating and/or assist the heating system. III. Application of heat pumps to provide heating and/or produce domestic hot water and/or assist the heating system. IV. Utilisation of geothermal energy to provide heating or assist the heating system and/or produce domestic hot water. V. Application of solar cells for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development.</p>	<p>Implemented</p>	<p>10.05.2017 - 15.08.2019</p>
<p>17. KEHOP-5.2.9-16 Call for proposals concerning</p>	<p>Financial Financial</p>	<p>Additional capacity for renewable energy production</p>	<p>Target group: The municipal authorities of Central Hungary</p>	<p>Implemented</p>	<p>15.06.2016 - 15.06.2018</p>

<i>the energy performance of buildings for municipal governments in the Central Hungary Region</i>	envelope: HUF 21.27 billion	(4 MW) Decrease of annual primary energy consumption of public buildings (60,813,837 kWh/year) Annual decrease of GHG (12,159 t CO2 equivalent) Decrease of annual primary energy consumption as a result of energy efficiency developments (181,711 GJ/year) Annual energy from RES (26,979 GJ/year)	Activity: I. Improvement of the thermal characteristics of buildings by developing the building envelope structures listed in Table 1 of Annex 5 to Decree No 7/2006 of 24 May 2006 of the Minister without Portfolio. II. Application of solar cells for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development.		
<i>18. KEHOP-5.1.1-17 Energy modernisation of the district heating sector</i>	Financial Financial envelope: HUF 25.07 billion	Annual decrease of GHG (56,953 t CO2 equivalent) Decrease of annual primary energy consumption as a result of energy efficiency developments (823,576 GJ/year)	Target group: Undertakings providing district heating services Activity: 1. Separation of service provider heating stations, modernisation of user heating stations 2. The energy-efficient upgrading of district heating equipment (boilers, other heat supply technology/ancillary equipment), change of heat transfer medium (conversion of steam system to running-water system), development of variable mass flow system 3. Replacing existing electric cooling systems with district heating-operated refrigerators (expansion of district cooling) 4. Connecting new consumers to the district heating system 5. Building a new cooperation pipeline (interconnecting heating districts) 6. Interconnecting separated district heating distribution systems to improve efficiency	Implemented	30.05.2017 - 30.05.2019
<i>19. KEHOP-5.3.2-17 Meeting local heat and cooling needs with renewables</i>	Financial Financial envelope: HUF 19.89 billion	Annual decrease of GHG (181,943 t CO2 equivalent) Additional capacity for renewable energy production (221 MW) Annual energy from RES (2,810,012 GJ/year)	Target group: Companies producing heating or district heating Activity: Developing district-cooling/district-heating and district heat-production systems utilising renewable energy sources or converting them partially or fully to a renewable energy source, increasing the capacity of installations currently using renewable energy	Implemented	17.04.2017 - 17.04.2019 20.
<i>KEHOP-5.4.1-16 Awareness-raising programmes</i>	Financial Financial envelope: HUF 1 billion	Number of inhabitants (persons) actively participating in energy and climate awareness campaigns	Target group: Civil society organisations, church-run institutions, local governments, educational establishments, central budgetary authorities Activity: a) Organisation and conduct of interactive thematic awareness-raising	Implemented	03.10.2016 - 03.10.2018

			<p>programmes at institutional or municipal level or spanning several municipalities</p> <p>The activity involves the implementation of various types of programme, based on a pre-defined theme, serving one or more well-defined, interrelated topics using a variety of approaches, and suitable for involving various target groups and activating communities. A basic requirement for developing the programmes is that the target groups be actively and demonstrably involved.</p> <p>b) Implementation of municipal awareness campaigns</p> <p>The activity involves the raising of energy awareness as part of independently organised awareness-raising events or other events (e.g. individual stands with stand-alone programmes).</p> <p>c) Encouraging participation in the dissemination of energy awareness among municipal and institutional stakeholders, including: organisation and conduct of infoessions/workshops/forums for employees of institutions involved in the project</p> <p>The sole purpose of the organisation and conduct of infoessions/workshops/forums is the formation and dissemination of energy awareness among decision-makers and employees of the institutions (mayor's office, schools, kindergartens, etc.) of the municipality or municipalities involved in the awareness-raising as part of the project.</p> <p>d) Preparation and conduct of regional and local school competitions that impart practice-oriented knowledge and provide positive examples that can be integrated into everyday activities</p> <p>Small-scale, institutional, inter-school, municipal or regional competitions and contests are eligible under this activity.</p>		
21. TOP-3.2.1-16 <i>Development of the energy performance of local government buildings</i>	Financial Financial envelope: HUF 55.29 billion	<p>GHG reduction: Estimated annual decrease of GHG (39,930 t CO2 equivalent)</p> <p>Energy efficiency target: Decrease of annual primary energy consumption of public buildings (144,146,766 in kWh/year)</p> <p>Renewables: Additional capacity of renewable energy production (158,238 kW)</p> <p>Decrease of annual primary energy consumption as a result of energy efficiency developments (559,959 GJ/year)</p> <p>Annual energy from RES (56,654 GJ/year)</p>	<p>Target group: Local governments and companies under majority local-government ownership</p> <p>Activity: Improving the thermal performance of buildings (thermal insulation, replacement of windows and doors), modernisation of thermal and heating systems of buildings; modernisation of outdoor and indoor lighting systems of buildings; modernisation of central ventilation and air-conditioning systems of buildings; installation of solar collectors, household power plants and heat pumps; establishing connections to community heating plants, preparing Sustainable Energy Action Plans (SEAPs) and Sustainable Energy and Climate Action Plans (SECAPs) at county level</p>	Implemented	16.06.2017 - 14.10.2019
22. TOP-3.2.2-15	Financial	GHG reduction: estimated	Target group:	Implemented	20.05.2016 - 07.01.2019

<i>Comprehensive development programmes controlled by local governments for the implementation of energy supply aimed at the exploitation of renewable energy sources in a way which fits into the local environment</i>	Financial envelope: HUF 15.72 billion	annual decrease of GHG (in tonnes); Renewables: Additional capacity for renewable energy production (MW); Annual energy from RES (PJ/year)	Local governments and companies under sole local-government ownership Activity: Meeting own (public) heating, cooling and electricity needs with renewable energy from biomass; Meeting own (public) heating, cooling and electricity needs with geothermal energy; Establishment of solar power plants to meet own (public) electricity needs		
<i>23. TOP-6.5.1-16 Development of the energy performance of local government buildings</i>	Financial envelope: HUF 33.74 billion	GHG reduction: Estimated annual decrease of GHG (20,198 t CO2 equivalent) Energy efficiency target: Decrease of annual primary energy consumption of public buildings (71,426,620 in kWh/year) Renewables: Additional capacity of renewable energy production (323,872 kW) Decrease of annual primary energy consumption as a result of energy efficiency developments (211,952 GJ/year) Annual energy from RES (28,383 GJ/year)	Target group: Local governments and companies under majority local-government ownership Activity: Improving the thermal performance of buildings (thermal insulation, replacement of windows and doors), modernisation of thermal and heating systems of buildings; modernisation of outdoor and indoor lighting systems of buildings; modernisation of central ventilation and air-conditioning systems of buildings; installation of solar collectors, household power plants and heat pumps; establishing connections to community heating plants, preparing Sustainable Energy Action Plans (SEAPs) and Sustainable Energy and Climate Action Plans (SECAPs) at county level	Implemented	16.06.2017 - 01.07.2019
<i>24. TOP-6.5.2-15 Comprehensive development programmes controlled by local governments for the implementation of energy supply aimed at the exploitation of renewable energy sources in a way which fits into the local environment</i>	Financial envelope: HUF 5.598 billion	GHG reduction: estimated annual decrease of GHG (11,528 t CO2 equivalent) Renewables: Additional capacity of renewable energy production (2,018 kW); Annual energy from RES (18,473 GJ/year)	Target group: Local governments and companies under sole local-government ownership Activity: Meeting own (public) heating, cooling and electricity needs with renewable energy from biomass; Meeting own (public) heating, cooling and electricity needs with geothermal energy; Establishment of solar power plants to meet own (public) electricity needs; Producing renewable energy from the biogas generated during the operation of wastewater purification facilities under the sole ownership of the local government of a city with county rights and operated under a public service contract to supply energy for the facilities and service buildings of the same station, including related activities	Implemented	26.05.2016 - 01.10.2018
<i>25. VEKOP-5.1.1-5-1-2-16 Support for the improvement of the energy performance of company buildings using renewable energy through</i>	Financial envelope: HUF 7.81	Estimated annual decrease of GHG (2,546 t CO2 equivalent) Additional capacity of renewable energy production	Target group: Small and medium-sized enterprises Activity: Activities concerning the improvement of energy efficiency:	Implemented	16.03.2017 - 20.05.2019

<p><i>combined loan products in the Central Hungary region</i></p>	<p>billion</p>	<p>(1,177 kW) Annual energy from RES (14,827 GJ/year) Decrease of annual primary energy consumption as a result of energy efficiency developments (30,510 GJ/year); Decrease of annual primary energy consumption of company buildings (12,304,885 kWh/year);</p>	<p>I. Improving the thermal characteristics of and reducing heat loss in buildings II. Modernisation of heating, cooling and domestic hot water systems of buildings III. Refurbishment of indoor and outdoor lighting systems to be more energy-saving Activities aimed at increasing the use of renewable energy sources: I. Installation of solar collector system to partially or fully meet the domestic hot water energy needs of buildings involved in the development, and/or assist the heating system and/or for cooling II. Developing a briquette, pellet, woodchip wood-gasification boiler system to partially or fully meet the heating and domestic hot water energy needs of buildings involved in the development VII. Application of solar cells for grid-connected or independent (off-grid) electricity generation to supply electricity exclusively for the building involved in the development IV. Application of heat pump systems to provide heating and/or cooling and/or produce domestic hot water and/or assist the heating system</p>		
<p>26. VEKOP-5.2.1-17 <i>Credit aimed at improving the energy efficiency of residential buildings and increasing the use of renewable energy</i></p>	<p>Financial Financial envelope: HUF 9.41 billion</p>	<p>Additional capacity of renewable energy production (kW) Annual energy from RES using repayable funds (GJ/year); Estimated annual decrease of GHG (t CO2 equivalent); Decrease of annual primary energy consumption of residential buildings (kWh/year); Decrease of annual primary energy consumption as a result of energy efficiency developments using repayable funds (GJ/year); Number of households with improved energy consumption classification</p>	<p>Target group: Natural persons, shared residential buildings and housing cooperatives Activity: Improving the energy efficiency of residential buildings (heat insulation of building envelope structures, other than windows and doors, replacement/modernisation to achieve energy saving of building envelope structures (windows and doors) separating heated and non-heated areas, improvement of the thermal protection of buildings during the summer, installation of sun-protection or shading structures, modernisation of heating and/or domestic hot water systems, modernisation of heat recovery installations, conversion of indoor and outdoor lighting systems to be more energy-saving); and increasing the use of renewable energy sources relating to residential buildings (installation of solar collector system to partially or fully meet the domestic hot water energy needs of buildings involved in the development, and/or assist the heating system, developing a briquette, pellet, woodchip wood-gasification boiler system to partially or fully meet the heating and domestic hot water energy needs of buildings involved in the development, installation of a solar cell system for grid-connected or independent (off-grid) electricity generation to supply electricity, up to a maximum-kW household power plant, but exclusively for the building involved in the development, use of geothermal-to-water, water-to-water, air-to-water heat pump systems to provide heating and/or cooling and/or produce domestic hot water and/or assist the heating system)</p>	<p>Implemented</p>	<p>24.04.2017 - 31.12.2017</p>
<p>27. VP2.-4.1.4-16 Development of the agricultural water management sector</p>	<p>Financial HUF 49.57 billion</p>	<p>Expected results of the call in terms of renewable energy: - Increase in energy efficiency - Use of renewable energy sources</p>	<p>Target group: - Farmers - Young farmers - Producer groups - Producer organisations</p>	<p>Implemented</p>	<p>07.11.2016 - 03.08.2020 (Date of submission of applications)</p>

			<ul style="list-style-type: none"> - Farmers' cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Improving the energy-use efficiency of irrigation equipment (in particular wind and solar energy use) 		
28. VP3-4.2.1-4.2.2-18 Increasing the value of agricultural products in processing	Financial HUF 50 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Micro- and small enterprises not classified as farmers - Producer groups - Producer organisations - Farmers' cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Activities involving a decrease in energy use in food-processing plants and wineries (renovation and modernisation of existing installations and buildings to increase energy efficiency) <p>- Use of renewable energy technologies in food-processing plants and wineries</p>	Implemented	<p>16.01.2019 - 04.01.2021</p> <p>(Date of submission of applications)</p> <p>Submission of applications suspended: 04.04.2019</p>
29. VP5-4.1.6-4.2.3-17 Improving the energy efficiency of agricultural and processing plants	Financial HUF 35 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Young farmers - Micro- and small enterprises not classified as farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Reducing energy use and improving resource efficiency on horticultural and livestock farms <p>- Use of renewable energy technologies on horticultural and livestock farms</p> <p>- Reducing energy use and improving resource efficiency in food-processing plants and wineries</p> <p>- Use of renewable energy technologies in food-processing plants and wineries</p>	Implemented	<p>19.03.2018 - 19.02.2020</p> <p>(Date of submission of applications)</p> <p>Submission of applications suspended: 20.02.2019</p>
30. VP2-4.1.1.1-16 Modernisation of livestock installations	Financial HUF 5.95 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Young farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives 	Implemented	<p>22.07.2016 - 22.05.2018</p> <p>(Date of submission of applications)</p> <p>Submission of applications suspended: 25.04.2017</p>

			<p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Reducing energy use and improving resource efficiency on livestock farms. <p>Refurbishments and renovations affecting building energy, building engineering and energy supply, and use of renewable energy technologies</p>		
31. VP2-4.1.1.2-16 Modernisation of poultry farms	Financial HUF 19.86 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Young farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Reducing energy use and improving resource efficiency on livestock farms. <p>Refurbishments and renovations affecting building energy, building engineering and energy supply, and use of renewable energy technologies</p>	Implemented	<p>18.07.2016 - 18.05.2018 (Date of submission of applications)</p> <p>Submission of applications suspended: 23.07.2016</p>
32. VP2-4.1.1.3-16 Modernisation of cattle farms	Financial HUF 19.86 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Young farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Reducing energy use and improving resource efficiency on livestock farms. <p>Refurbishments and renovations affecting building energy, building engineering and energy supply, and use of renewable energy technologies</p>	Implemented	<p>18.07.2016 - 16.05.2018 (Date of submission of applications)</p> <p>Submission of applications suspended: 23.07.2016</p>
7. VP2-4.1.1.4-16 Modernisation of sheep and goat farms	Financial HUF 3.97 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Young farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Reducing energy use and improving resource efficiency on livestock farms. <p>Refurbishments and renovations affecting building energy, building</p>	Implemented	<p>19.07.2016 - 21.05.2018 (Date of submission of applications)</p> <p>Submission of applications suspended: 20.01.2017</p>

			engineering and energy supply, and use of renewable energy technologies		
33. VP2-4.1.1.5-16 Modernisation of pig farms	Financial HUF 19.86 billion	Expected results of the call in terms of renewable energy: - Increase in energy efficiency - Use of renewable energy sources	Target group: - Farmers - Young farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives Activities (energy-related activities listed in the call): - Reducing energy use and improving resource efficiency on livestock farms. Refurbishments and renovations affecting building energy, building engineering and energy supply, and use of renewable energy technologies	Implemented	18.07.2016 - 17.05.2018 (Date of submission of applications) Submission of applications suspended: 23.07.2016
34. VP2-4.1.2-16 Construction and modernisation of small-scale grain storage, drying and cleaning plants	Financial HUF 19.68 billion	Expected results of the call in terms of renewable energy: - Increase in energy efficiency - Use of renewable energy sources	Target group: - Farmers - Young farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives Activities (energy-related activities listed in the call): - Improving the energy efficiency of small-scale grain storage, drying and cleaning plants, use of renewable energy technologies Implemented		05.10.2016 - 06.08.2018 (Date of submission of applications) Submission of applications suspended: 05.10.2016
35. VP2-4.1.3.1-16 Modernisation of horticulture – building greenhouses and foil houses, increasing energy efficiency with the option of using geothermal energy	Financial HUF 23.31 billion	Expected results of the call in terms of renewable energy: - Increase in energy efficiency - Use of renewable energy sources	Target group: - Farmers - Young farmers - Producer groups - Producer organisations Activities (energy-related activities listed in the call): - Activities improving the energy efficiency of existing foil houses or glass-covered greenhouses - Use of renewable energy technologies in new or existing foil houses or glass-covered greenhouses	Implemented	15.04.2016 - 06.03.2018 (Date of submission of applications) Submission of applications suspended: 01.02.2017
36. VP-2-4.1.3.2-16 Modernisation of horticulture – support for crop-planting with the option of irrigation	Financial HUF 19.33 billion	Expected results of the call in terms of renewable energy: - Increase in energy efficiency - Use of renewable energy sources	Target group: - Farmers - Young farmers - Producer groups - Producer organisations	Implemented	30.04.2016 - 08.03.2018 (Date of submission of applications)

			<p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Construction of irrigation water supply works providing a built-in irrigation system water supply in new or modified plantations or plantations that are no older than 12 years from the date of installation (with no existing irrigation system) at the time of submission of the application (installation of new, up-to-date water and energy-saving machines, equipment and fittings) - Construction of water-saving irrigation infrastructure and related structures in new or modified plantations or plantations that are no older than 12 years from the date of installation (with no existing irrigation system) at the time of submission of the application (installation of new, state-of-the-art water and energy-saving machines, equipment and fittings) - Support for the procurement of energy-saving irrigation technology in new or modified plantations or plantations that are no older than 12 years from the date of installation (with no existing irrigation system) at the time of submission of the aid application, improving the energy-use efficiency of irrigation equipment (replacing existing, low-efficiency pumps, with an expected minimum 10% unit energy efficiency gain, providing irrigation installations with energy from renewable sources (using wind and solar energy) 		
37. VP3-4.2.1-15 Increasing the value of agricultural products and improving resource efficiency in processing	Financial 167.37 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Micro- and small enterprises not classified as farmers - Producer groups - Producer organisations - Farmers' cooperatives - Social cooperatives <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Support for developments aimed at increasing the value of agricultural products and improving environmental resource efficiency. Introducing processing technologies and operational methods that save on materials, energy and water, and reduce the environmental burden in other ways. <p>Activities improving energy efficiency, use of renewable energy technologies</p>	Implemented	<p>25.04.2016 - 25.02.2018 (Date of submission of applications)</p> <p>Submission of applications suspended: 30.11.2016</p>
38. VP3-4.2.2-16 Support for product development and resource efficiency of wine-growing	Financial HUF 39.23 billion	<p>Expected results of the call in terms of renewable energy:</p> <ul style="list-style-type: none"> - Increase in energy efficiency - Use of renewable energy sources 	<p>Target group:</p> <ul style="list-style-type: none"> - Farmers - Micro- and small enterprises not classified as farmers - Producer groups - Producer organisations <p>Activities (energy-related activities listed in the call):</p> <ul style="list-style-type: none"> - Support for developments aimed at increasing the value of wine 	Implemented	<p>12.10.2016 - 11.09.2018 (Date of submission of applications)</p> <p>Submission of applications suspended: 13.06.2017</p>

			<p>products and improving environmental resource efficiency. Introducing processing technologies and operational methods that save on materials, energy and water, and reduce the environmental burden in other ways.</p> <p>Activities improving energy efficiency, use of renewable energy technologies</p>		
<p>39. VP5-4.1.3.4-16 Modernisation of horticulture – construction of cold store houses and mushroom houses, upgrading of existing mushroom houses and cold store houses</p>	<p>Financial HUF 22.33 billion</p>	<p>Expected results of the call in terms of renewable energy: - Increase in energy efficiency - Use of renewable energy sources</p>	<p>Target group: - Farmers - Young farmers - Producer groups - Producer organisations</p> <p>Activities (energy-related activities listed in the call): - Activities improving the energy efficiency of existing cold store houses, mushroom houses and composting plants - Use of renewable energy technologies in cold store houses, mushroom houses and composting plants</p>	<p>Implemented</p>	<p>11.04.2016 - 03.03.2018 (Date of submission of applications)</p> <p>Submission of applications suspended: 17.01.2017</p>

* Indicate if the measure is (predominantly) regulatory, financial or soft (i.e. information campaign).

** Is the expected result behavioural change, installed capacity (MW; t/year), energy generated (ktoe)?

*** Who are the targeted persons: investors, end users, public administration, planners, architects, installers, etc.? or what is the targeted activity / sector: biofuel production, energetic use of animal manure, etc.)?

**** Does this measure replace or complement measures contained in Table 5 of the NREAP?

2.a. Please describe the progress made in evaluating and improving administrative procedures to remove regulatory and non-regulatory barriers to the development of renewable energy. (Article 22(1)(e) of Directive 2009/28/EC).

The concept of household power plants was introduced in 2008 by Electricity Act LXXXVI of 2007.

A household power plant is a small power plant not subject to licensing which is connected to a low-voltage grid (a network with a nominal voltage of no more than 1 kV) and has an interconnection capacity not exceeding 50 kVA at the connection point. This is roughly equivalent to a small power plant with a maximum installed capacity of 50 kW²².

Where a household power plant is installed, electricity flow is measured by means of a special two-way electronic meter, from which the amount of electricity received from and supplied to the grid can be read for the reference period (year or month) in each direction. Service providers make their calculations based on the balance of the total amounts of energy consumed and supplied, as recorded by the meters, taking account of current unit prices²³.

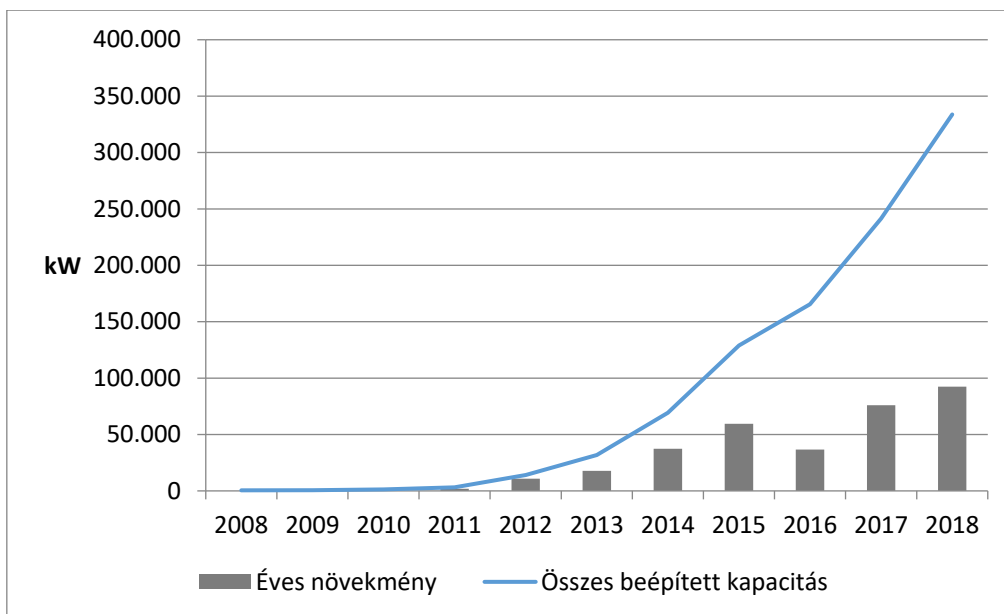
Balance accounting means that the amount of electricity received from the grid (i.e. to be purchased) during the accounting period (no more than one year) is reduced by the amount of electricity supplied to the grid. That way, the unit price of electricity produced by an operator of a household power plant for residential consumers is **equal to the total end consumer price** (product price + grid use and other charges + VAT) **as long as the amount of electricity supplied to the grid does not exceed the amount received from the grid during the accounting period.** If the amount of electricity supplied to the grid during the accounting period is greater than the amount of electricity received, the electricity trader or universal service provider selling at that connection point must pay for the surplus a price corresponding to the average electricity price to be paid otherwise (as a user) by the operator of the household power plant. That amount is considerably lower than the total end consumer price; in 2018, the universal service tariff energy prices for residential consumers under universal supply in price category ‘A1’ (annual consumption of up to 1,320 kWh) varied between HUF 13.34 and HUF 14.2 per kWh, depending on the service provider²⁴.

The number and installed capacity of household power plants have increased considerably in recent years: while their total capacity at the end of 2008 was only 0.51 MW, **it had reached 333.8 MW by the end of 2018.** After a slight increase in 2016, the total capacity of new household power plants recorded its largest increase – of 92.4 MW – in 2018 (Figure 1).

²² The installed capacity of a small solar power plant at the public grid connection point is equal to the nominal capacity of the alternating voltage inverter output. It is important to note that the momentary capacity of small solar power plants varies constantly, according to the intensity and angle of incidence of solar radiation and to the temperature.

²³ The relevant legislation is the following: Decree No 4/2011 of 31 January 2011 of the Minister for National Development on the pricing of universal supply of electricity, Decree No 7/2016 of the Hungarian Energy and Public Utility Regulatory Authority of 13 October 2016 on the framework rules for the determination of electricity grid use charges, connection charges and other specific charges, Decree No 10/2016 of the Hungarian Energy and Public Utility Regulatory Authority of 14 November 2016 on the rules for applying electricity grid use charges, connection charges and other specific charges, and Decree No 15/2016 of the Hungarian Energy and Public Utility Regulatory Authority of 20 December 2016 on the amount of electricity grid use charges, connection charges and other specific charges.

²⁴ The website of the Authority provides specific information on the rules relating to household power plants: <http://www.mekh.hu/tajekoztatas-a-haztartasi-meretu-kiseromuvekrol-villamos-energia>

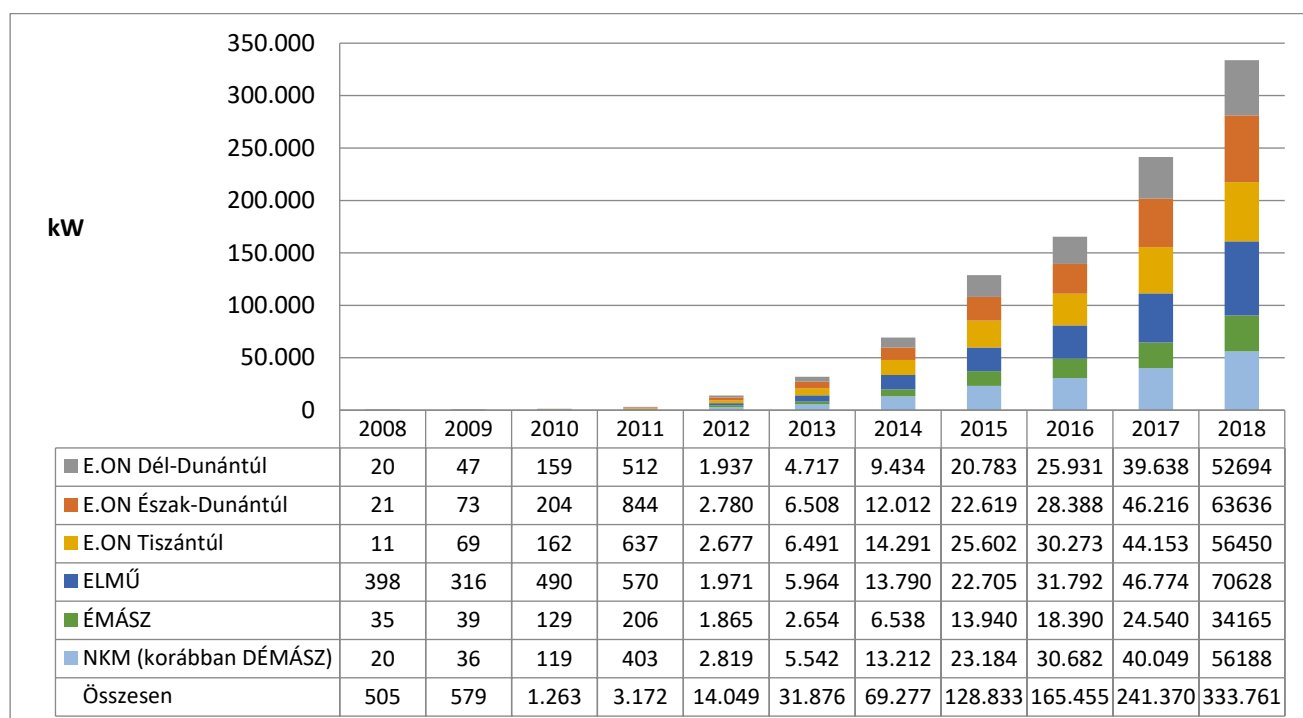


Source: MEKH

Figure 1: Overall annual increase in installed capacity of household power plants (2008-2018)

Éves növekmény	Annual increase
Összes beépített kapacitás	Total installed capacity

A breakdown of installed capacity of household power plants by distribution area is shown in Figure 2.



Source: MEKH

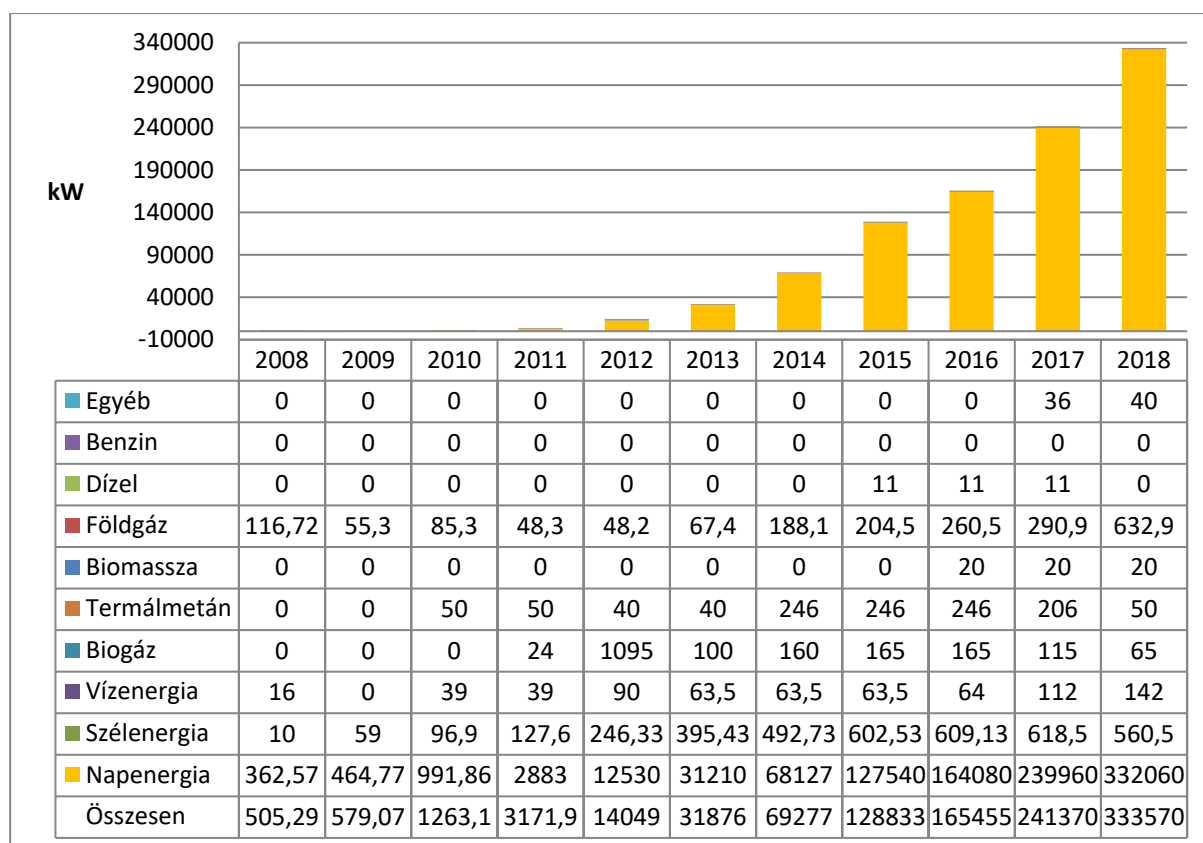
Figure 2: Installed capacity of household power plants by distribution area (2008-2018)

E.ON Dél-Dunántúl	E.ON South Transdanubia
E.ON Észak-Dunántúl	E.ON North Transdanubia
E.ON Tiszántúl	E.ON Eastern Hungary
ELMŰ	-
ÉMÁSZ	-

NKM (korábban DÉMÁSZ)	NKM (formerly DÉMÁSZ)
Összesen	Total

At the end of 2018, a total of **41,080** household power plants were connected to the electricity grid, which is a 38% increase on the previous year's figure of 29,685²⁵.

Regarding the type of energy source used, household power plants utilise solar energy, wind energy, hydropower, biogas²⁶, biomass, natural gas, thermal methane, petrol, diesel and other energy sources. The most widespread are small solar power plants (Figure 3). The installed capacity of **solar** household power plants was **332 MW** at the end of 2018, which accounted for 99.55% of total installed capacity and was supplied by **40,987 household solar power plants**. The increase in the number of household solar power plants in recent years was facilitated by the rapid decrease in their cost of purchase, the use of balance accounting for household power plants, and the investment subsidies made available periodically through tenders.



Source: MEKH

Figure 3: Installed capacity of household power plants by energy source (2008-2018)

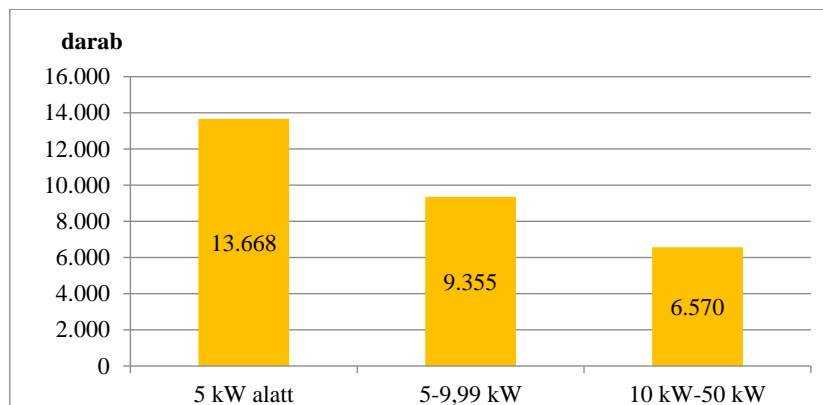
Egyéb	Other
Benzin	Petrol
Dízel	Diesel
Földgáz	Natural gas
Biomassza	Biomass
Termálmetán	Thermal methane
Biogáz	Biogas

²⁵The number of household power plants is presented in an additional table on the Authority's website, broken down by authorised distributor and energy source used.

²⁶Including landfill gas and sewage gas.

Vízenergia	Hydroenergy
Szélenergia	Wind energy
Napenergia	Solar energy
Összesen	Total

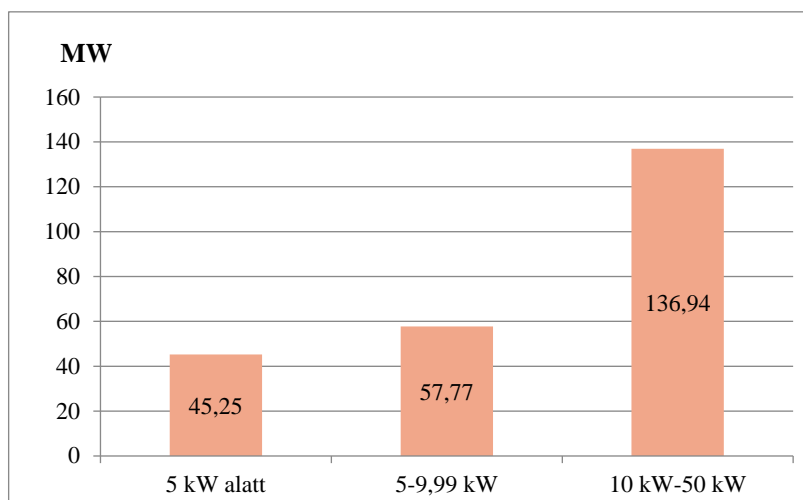
Most household *solar power plants* have a capacity of less than 5 kW, the most common category for the household segment (13,668 such plants in 2017). The highest cumulated capacity in 2017 was in the 10-50 kW size category, the most common category for the institutional/corporate segment (136.9 MW). Average installed capacity was 3.3 kW in the size range of less than 5 kW, 6.2 kW in the 5-9.99 kW range, and 20.8 kW in the 10-50 kW range in 2017.



Source: MEKH

Figure 4: Number of household solar power plants by size category (2017)

darab	Units
5 kW alatt	Less than 5 kW



Source: MEKH

Figure 5: Breakdown and cumulated installed capacity of household solar power plants by size category (2017)

5 kW alatt	Less than 5 kW
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2.b. Please describe the measures in ensuring the transmission and distribution of electricity produced from renewable energy sources and in improving the framework or rules for bearing and sharing of costs related to grid connections and grid reinforcements (Article 22(1)(f) of Directive 2009/28/EC).

The measures planned for the period between 2010 and 2020 are described in detail in Hungary's Renewable Energy Utilisation Action Plan 2010-2020, which has been sent to the European Commission. This report therefore includes only a brief summary of the planned measures.

The rules ensuring the transmission and distribution of electricity produced from renewable energy sources and relating to grid connections and grid reinforcements can be summarised as follows:

International Network Code

The connection requirements for production units are set out in Section 6 of Part II, Special Provisions, of the International Network Code (INC) approved by Decision No 5145/2016 of the Hungarian Energy and Public Utility Regulatory Authority, which contains the national requirements drawn up on the basis of Regulation (EU) 2016/631 establishing a network code on requirements for grid connection of generators.

The INC is available at: <https://www.mavir.hu/web/mavir/nemzetkozi-uzemi-es-kereskedelmi-szabalyzat>

Operational Code of the Hungarian Electricity System

Pursuant to Clause 1.2.2 of the Operational Code (OC) adopted by Decision No 1494/2019 of the Hungarian Energy and Public Utility Regulatory Authority:

‘The OC has been devised with a view to the establishment of an efficiently functioning, competitive electricity market, the enforcement of the principles of energy efficiency and energy conservation in the interest of sustainable development, the provision of electricity supply to customers in a secure and uninterrupted way, to a satisfactory standard of quality and with a transparent cost structure, the integration of the Hungarian electricity market into the increasingly integrated electricity markets of the European Communities, compliance with the legislation of the European Communities, and the development of objective and transparent regulations that meet the requirement of equal treatment and ensure the implementation of the above objectives.’

According to Clause 1.2.4 of the OC: ‘The OC defines:

(D) the technical conditions for the off-take of electricity produced from renewable energy and at power plants defined in specific other legislation, and the connection of such electricity production equipment.’

Pursuant to Clause 4.2.4 of the OC, the transmission system operator – when preparing the network development plan and the underpinning analysis of medium- and long-term resource

capacity development – must pay special attention to the common indicators of electricity supply in Hungary, including the share of electricity produced from renewable sources.

Since 2015, power plants producing electricity from renewable energy sources are also represented in the Operational Code Committee preparing the amendment of the OC.

The OC is available at: <http://www.mavir.hu/web/mavir/uzletszabalyzat>

Code of Trade of the Hungarian Electricity System

The Code of Trade of the Hungarian Electricity System (CoT) lays down detailed rules on the operation of the mandatory off-take balance group, comprising power plants producing electricity from renewable energy sources, and of the premium support scheme. Under the mandatory off-take scheme, the mandatory off-take producers' day-ahead schedules are sold in full on the organised electricity market's day-ahead market. Since 1 July 2018, mandatory off-take producers have the possibility to change their intra-day schedule. The positions arising from changes to the mandatory off-take producers' intra-day schedule are traded on the organised electricity market's intra-day market.

Since 2015, power plants producing electricity from renewable energy sources are also represented in the Code of Trade Committee preparing the amendment of the CoT.

The CoT is available at: <http://www.mavir.hu/web/mavir/kereskedelmi-szabalyzat>

Code of Business Practice of the Transmission System Operator

Pursuant to Section III/3.1.1 of the Code of Business Practice of the Transmission System Operator:

'The medium-term network development objective of MAVIR ZRt. is to provide users with supply and system security as required under the Electricity Act, regulations and contracts. The aim is to construct (or arrange for the construction of) a transmission network and a 132-kV network which allows the achievement of the highest possible common profit (usefulness) for the electricity market as a whole. In the long run, bearing current medium-term objectives in mind, it must be ensured that the Hungarian electricity system complies with the principles laid down in the legislation, regulations and contracts, and cooperation must be ensured, in a proportionate manner, in maintaining the viability of the European electricity system.'

As laid down in Clause IV./2.12 of the Code of Business Practice, the transmission system operator operates an autonomous mandatory off-take balance group and a premium support scheme to facilitate the production of electricity from renewable energy sources or from waste, and establishes the contractual legal relationships required for the relevant settlements of account (Annexes VII/7.7a., VII/7.7b. and VII/7.7c of the Code of Business Practice).

The Code of Business Practice is available at:
<https://www.mavir.hu/web/mavir/uzletszabalyzat>

Connection charge discounts

Section 28 of Decree No 10/2016 of 14 November 2016 of the Hungarian Energy and Public Utility Regulatory Authority on the rules for applying electricity grid use charges, connection charges and other specific charges lays down the rules for determining connection charge discounts for the grid connection of renewables.

Pursuant to Section 28 of Decree No 10/2016 of 14 November 2016 of the Hungarian Energy and Public Utility Regulatory Authority on the rules for applying electricity grid use charges, connection charges and other specific charges, power plants using renewable energy sources are eligible for connection charge discounts as follows:

‘Section 28(1) A new power plant or a new unit of an existing power plant requiring excess capacity beyond the existing connection capacity shall be eligible for a connection charge discount if:

(a) it can only be operated using primary renewable energy sources for the purposes of clause (a)(aa) to (ad) of Annex 7 to the Implementing Decree, or

(b) it can be fully or partially operated using renewable energy sources other than those under clause (a) but considered as primary for the purposes of clause (a) of Annex 7 to the Implementing Decree, and the operator of the power plant undertakes to use renewable energy sources classified as primary under clause (a) of Annex 7 to the Implementing Decree for the production of all the final products in the new power plant or power plant unit

(ba) at a minimum of 70%, or

(bb) at a minimum of 90%

calculated as an annual average from the beginning of the first calendar year to the end of the fifth calendar year after the year of commencement of operation.

(2) For the purposes of connection charge discounts, technical solutions connected in any technical manner to an existing power plant or power plant unit – except for lines and other electrical equipment used to supply electricity to the grid – or having common main equipment therewith, shall not qualify as a new power plant or power plant unit.

(3) Before concluding a connection agreement, the operator of a power plant claiming a connection charge discount (for the purposes of this Section, hereinafter referred to as the applicant) shall submit a written declaration to the authorised network operator that it intends to make use of the connection charge discount.

(4) To certify the content of the declaration referred to in paragraph (3), the applicant shall submit a request to the Authority within one month from the date of commissioning to obtain a qualification relating to the new power plant or power plant unit for which the connection charge discount is calculated in accordance with the Government Decree on the certification of origin as regards electricity produced from renewable energy sources or high-efficiency cogeneration plants.

(5) The undertaking of the applicant under paragraph (1)(b) shall be fulfilled as calculated on the basis of the ratio between:

- (a) the amount of primary renewable energy sources measured in gigajoules (GJ) and
- (b) the total amount of the primary energy sources measured in gigajoules (GJ) used for the operation of the new power plant or the new power plant unit requiring excess connection capacity.

(6) The extent of the connection charge discount shall be:

- (a) where paragraph (1)(a) applies: 50% of the connection charge,
- (b) where paragraph (1)(b)(ba) applies: 30% of the connection charge,
- (c) where paragraph (1)(b)(bb) applies: 50% of the connection charge.

(7) The fulfilment of the eligibility requirements under paragraph (1) shall be verified by the Authority, and the operator of the power plant shall refund to the authorised network operator:

(a) the connection charge discount received, in a single payment, if it is found that the power plant or power plant unit(s) for which the connection charge discount is calculated has or have not obtained the qualification under paragraph (4),

(b) a part of the connection charge discount proportionate to the unqualified period within 5 years, if it is found that the qualification under paragraph (4) of the power plant or power plant unit(s) for which the connection charge discount is calculated was withdrawn within 5 years from the launch of operation, or

(c) 20% (annually) of the connection charge discount received, if it is found that the rate for a given calendar year of primary renewable energy sources used in the power plant under paragraph (1)(b) calculated from the beginning of the first calendar year after the year of commencement of operation to the end of the fifth calendar year has not reached the threshold values undertaken in advance pursuant to paragraph (1)(b),

in accordance with the Authority's Decision.'

Exemption from paying connection charges

In addition to the above, pursuant to Section 146/A(9) of the Electricity Act, plants below a nominal capacity of 32 A may be granted an exemption from paying any connection and other charges to the distribution system operator. This provision facilitates the more widespread use of household power plants in the field of electricity produced from renewable sources.

Pursuant to Section 146/A(9) of the Electricity Act: 'No connection or other charges shall be paid to the distribution system operator for the installation of a consumption meter up to a nominal capacity of 32 A, with the proviso that, where the needs of the applicant require

- (a) the construction of a low-voltage public distribution network, no charge shall be paid for a maximum of one connection point per place of use
 - (aa) up to 100 metres of public overhead lines (also including insulated overhead lines),
 - (ab) up to 50 metres of public underground cables

(b) the construction of a medium-voltage public distribution network, no charge shall be paid for each new medium/low-voltage transformer station with low-voltage consumption or for each connection point with medium-voltage consumption

(ba) up to 500 metres of overhead lines,

(bb) up to 250 metres of public underground cables

or for the construction of a new high/medium-voltage or medium/medium-voltage transformer station.’

3. Please describe the support schemes and other measures currently in place that are applied to promote energy from renewable sources and report on any developments in the measures used with respect to those set out in your National Renewable Energy Action Plan (Article 22(1)(b) of Directive 2009/28/EC).

Hungary’s renewable energy support scheme consists of operational and investment support.

Investment support for renewable energy-based electricity production:

- Several operational programmes (Environmental and Energy Efficiency OP, Territorial and Settlement Development OP, Competitive Central Hungary OP and Economic Development and Innovation OP) support the use of renewable energy sources. A more detailed description is provided in Table 2.
- A heating system modernisation programme financed with revenue from the CO2 emissions quota (Green Economy Investment Scheme (ZBR); Green Economy Financing Scheme (ZFR)) in the form of a grant using domestic budgetary resources was implemented under the ‘Otthon Melege’ (Warm at Home) Programme.

Operational support for renewably energy-based electricity production:

- The Renewable Energy Support Scheme (METÁR) was launched on 1 January 2017 following the termination of the Mandatory Off-Take Scheme (KÁT). The Renewable Energy Support Scheme was drawn up in line with European Commission guidelines, and the scheme was approved by decision of the European Commission. Under the Renewable Energy Support Scheme, support is awarded mainly through tenders and takes the form of a premium paid above the reference market price. Additional costs associated with the Renewable Energy Support Scheme are borne by users not eligible for universal service (industrial users).
- Through annual balance accounting, owners of small household power plants (less than 50 kVA) can balance their electricity input and off-take into/from the grid.

Investment support for renewable energy-based heating and cooling:

- Several operational programmes (Environmental and Energy Efficiency OP, Territorial and Settlement Development OP, Competitive Central Hungary OP and Economic Development and Innovation OP) support the use of renewable energy sources in the heating and cooling sector. A more detailed description is provided in Table 2.
- A heating system modernisation programme financed with revenue from the CO2 emissions quota (Green Economy Investment Scheme (ZBR); Green Economy Financing Scheme (ZFR)) in the form of a grant using domestic budgetary resources was implemented under the ‘Otthon Melege’ (Warm at Home) Programme.
- When setting their prices based on official pricing, district heating producers and service providers that operate using renewable energy can have a return on assets of, respectively, 2% or 4.5% above costs recognised.

Operational support for renewable energy-based heating and cooling:

- With H pricing, heat supply equipment using heat pumps and in heating systems built from a renewable energy source can be operated at a more favourable price during the heating season.
- The residential firewood programme helps local governments to purchase fuel for people in need, using budget support grants for local governments with fewer than 5,000 inhabitants.

Renewable energy-based transport investment, operational or mandatory incentives:

- The domestic e-mobility complex has been developed under the Jedlik Ányos Plan. Expanding the electric car infrastructure, introducing and using distinctive licence plates, purchase subsidies, parking and toll discounts, optimising the vehicle fleet of the government and central budgetary authorities.
- The mandatory blending rate for biofuels between 1 January 2016 and 31 December 2018 was 4.9 e% (for diesel and petrol combined).

The two main incentives for producing electricity from renewable energy sources are the Mandatory Off-Take Scheme (KÁT) under Government Decree No 389/2007 and the new Renewable Energy Support Scheme (METÁR) under Government Decree No 299/2017, which entered into force on 1 January 2017.

Compared with the old Mandatory Off-Take Scheme, the Renewable Energy Support Scheme represents a step towards market mechanisms. Only new power plants with an installed capacity of less than 0.5 MW (except wind power stations) and ‘demonstration projects’ presenting a significant technological innovation are eligible under mandatory off-take (METÁR-KÁT). Under this scheme, other producers are required to sell their electricity on the open market, and obtain a green premium on the market price, rather than a guaranteed price, for the electricity they produce. The starting subsidised price (= market benchmark price + green premium) for new power plants with an installed capacity of less than 1 MW that are eligible for premium-type support is set by legislation (Government Decree No 299/2017). Under the Renewable Energy Support Scheme, the starting mandatory off-take price, or for green premium-type support the starting subsidised price, is indexed each year at 1 percentage point below inflation. The duration of the subsidy and the amount of electricity subsidised in the case of new power plants with an installed capacity of less than 1 MW and demonstration projects are determined by the Authority on the basis of a decree²⁷ issued by it. The duration of the subsidy and the amount subsidised are reviewed each year – or every six months in the case of solar panels – but obviously only in respect of new entrants. Eligibility for subsidies and the subsidised price for new power plants with an installed capacity of at least 1 MW, wind power stations, and power plants making a significant new investment are defined by tender. The date and main conditions of the tender are defined by the minister responsible for energy policy, whereas the Authority is responsible for issuing and conducting the tender²⁸. No Renewable Energy Support Scheme tenders were launched in 2017 or 2018.

It was also the Renewable Energy Support Scheme that introduced the brown premium, which can provide operational support only for biomass or biogas plants already in operation in

²⁷ See Decrees Nos 17/2016 and 13/2017 of the Hungarian Energy and Public Utility Regulatory Authority on the amount of operational support for electricity produced from renewable energy sources.

²⁸ See Decree No 62/2016 of the Minister for National Development for the tender framework.

order to maintain economical biomass-based production. The amount of the brown premium is set by the Authority by decree²⁹ on an annual basis.

The number of entitlements to support under the green and brown premium and the mandatory off-take schemes increased in 2018, the year after the Renewable Energy Support Scheme was introduced. In 2018, 155 applications under the Renewable Energy Support/Mandatory Off-Take Schemes were approved by the Authority, with a further 475 applications in processing (as at December 2018). The ‘Small Renewable Energy Support Scheme’ mandatory off-take category covers applicants that submitted their applications before 9 November 2017 and were assessed on the basis of Decree No 17/2016 of the Authority. Under this category, 19 entitlements to support were granted by the Authority in 2018, with a further 24 applications in processing. Under the category of green premiums without a call, 43 entitlements were granted, with 57 applications in processing, while for the brown premium the Authority granted entitlements for all 11 applications received in 2018. The large number of applications received under the Mandatory Off-Take Scheme at the end of 2016, mostly for the construction of solar power plants, continues to impose a significant administrative burden on the Authority. Some 5,000 amended applications under the Mandatory Off-Take Scheme have been received by the Authority since 1 January 2017, mostly involving changes to the site or topographical lot number or an extension of the delivery deadline.

The costs of the Mandatory Off-Take and Renewable Energy Support Schemes are borne by users not eligible for universal service, in proportion to the amount of electricity they purchase. The amount of support that can be allocated under the Renewable Energy Support Scheme is limited³⁰; for applications without a call, entitlements are allocated in the order in which complete applications are received.

The Authority has published detailed information on the Mandatory Off-Take and Renewable Energy Support Schemes on its website³¹.

Table 3:
Support schemes for renewable energy

RES support schemes year n (e.g. 2011)		Per unit support	Total (M€)*
[(sub) category of specific technology or fuel]			
Instrument (provide data as relevant)	Obligation/quota (%)	0	0
	Penalty/Buy out option/ Buy out price (€/unit)	0	0
	Average certificate price	0	0
	Tax exemption/refund	0	0
	Investment subsidies (capital grants or loans) (€/unit)	N/A	HUF 1,244.5 billion* *
	Production incentives		
	Feed-in tariff	Per unit support under the Mandatory Off-Take Scheme: HUF 17.25/kWh in 2017, HUF 16.09/kWh in 2018	Support under the Mandatory Off-Take Scheme HUF 41.02 billion 2017, HUF 35.28 billion in

²⁹ See Decree No 13/2017 of the Hungarian Energy and Public Utility Regulatory Authority on the amount of operational support for electricity produced from renewable energy sources.

³⁰ See Decree No 62/2016 of the Minister for National Development.

³¹ See: <http://www.mekh.hu/megujulo-energiak-villamos-energia> and <http://www.mekh.hu/kat-beszamolok>

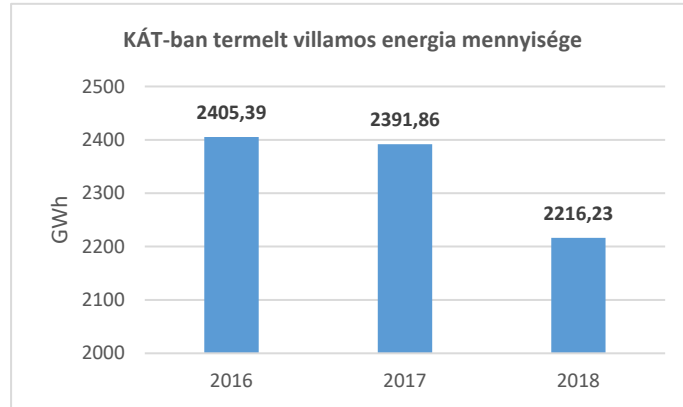
			2018
	Feed-in premiums	Per unit support under the Renewable Energy Support Scheme: HUF 10.69/kWh in 2017, HUF 10.93/kWh in 2018	Support under the Renewable Energy Support Scheme HUF 2.02 billion 2017, HUF 7.13 billion in 2018
	Tendering	0	0
Total annual estimated support in the electricity sector		N/A	
Total annual estimated support in the heating sector		N/A	
Total annual estimated support in the transport sector		N/A	

Source: MEKH and ITM

* The quantity of energy supported by the per unit support gives an indication of the effectiveness of the support for each type of technology

**Renewable energy and energy efficiency support under the Operational Programmes and the Otthon Melege (Warm at Home) Programme.

The amount of electricity produced under the Mandatory Off-Take Scheme has been on a downward trend since 2015, falling by 189.16 GWh between 2017 and 2018. The fall was caused by power plants exiting the Mandatory Off-Take Scheme and transferring to the Renewable Energy Support Scheme.

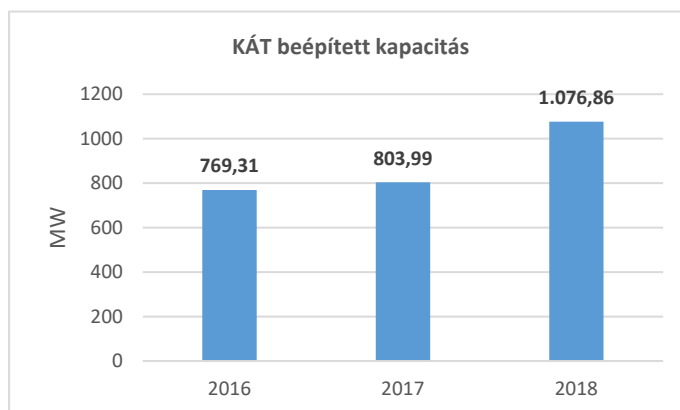


Source: MEKH

Figure 6: Amount of electricity produced under the Mandatory Off-Take Scheme

KÁT-ban termelt villamos energia mennyisége	Amount of electricity produced under the Mandatory Off-Take Scheme
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The amount of installed capacity under the Mandatory Off-Take Scheme shows an upward trend, rising by 307.55 MW between 2016 and 2018. There was a significant increase in 2018, caused by a larger number of solar power plants entering production. (At the same time, the installed capacity sold under the mandatory off-take scheme fell between 2016 and 2018 by 12.7 MW for wind power stations, by 11.09 MW for biomass-based power plants, by 8.06 MW for landfill gas power plants, and by 1.06 MW for power plants using solid waste.)



Source: MEKH

Figure 7: Installed capacity under Mandatory Off-Take

KÁT beépített kapacitás	Installed capacity under the Mandatory Off-Take Scheme
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The rate, relative to funder consumption, of mandatory off-take funding resulting from the balance of revenue and expenditure of the mandatory off-take balance group is published by MAVIR Zrt. on its website each month. This is paid by users not eligible for universal service on the electricity they purchase (through the intermediary of the balance group managers). Mandatory off-take funding worth HUF 45.01 billion was allocated in 2017, HUF 39.4 billion in 2018. The average rate of mandatory off-take funding stood at HUF 1.71/kWh in 2017 and HUF 1.46/kWh in 2018.

Producers in receipt of support under the premium scheme have been selling under the scheme since October 2017. Following an amendment to the Mandatory Off-Take Decree on

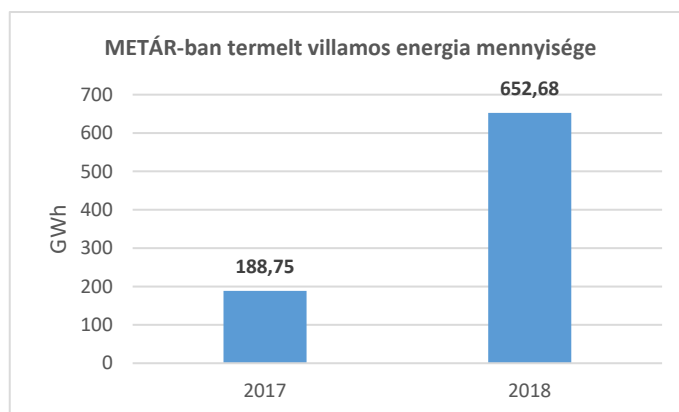
1 October 2017, mandatory off-take producers selling to the market simultaneously using the same generating unit had to switch to the premium support scheme; they sold under the ‘mandatory off-take-replacement’ premium scheme³². There have also been sales under the brown premium scheme since December 2017, based on entitlements granted by the Authority. These sales are linked to new entitlements and have increased the burden on funders through premium funding.

Amount of electricity under the premium scheme (GWh)	2017	2018	Change (GWh)	Change (%)
Green premium	37.61	80.74	43.14	114.71%
Brown premium	151.15	571.93	420.78	278.39%
Total	188.75	652.68	463.92	245.78%

Source: MEKH

Supplementary table 1: Amount of electricity under the premium scheme

In 2017, a total of **188.75 GWh** of electricity produced from renewable energy sources received support under the premium scheme. In 2018, a total of 652.68 GWh of electricity was produced under the premium scheme.

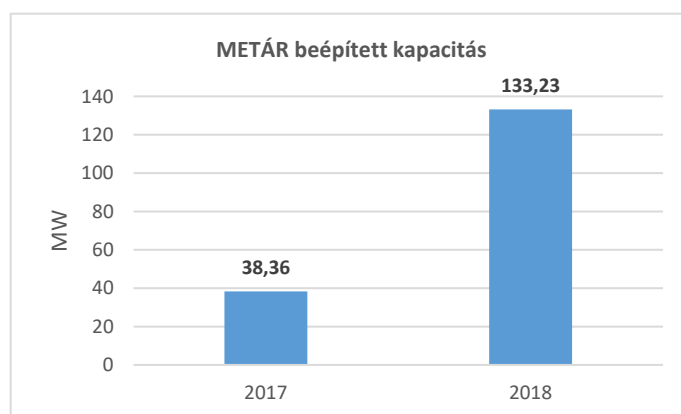


Source: MEKH

Figure 8: Change in electricity production under the Renewable Energy Support Scheme

METÁR-ban termelt villamos energia mennyisége	Amount of electricity produced under the Renewable Energy Support Scheme
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Renewable energy producers participated in the premium scheme using 38.36 MW in 2017 and 133 MW in 2018.



³² Section 4(13) of the Mandatory Off-Take Decree.

Source: MEKH

Figure 9: Installed capacity under the Renewable Energy Support Scheme

METÁR beépített kapacitás	Installed capacity under the Renewable Energy Support Scheme
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Combined effect of the Mandatory Off-Take and Renewable Energy Support Schemes

Since 1 January 2017, support for electricity produced from renewable energy sources has been awarded under two schemes: the mandatory off-take and the premium support schemes³³. The combined effect of the two schemes should be analysed by examining the mandatory off-take and the premium data together. As they are not linked to new capacity, the sales of producers that switched to the premium scheme in October and November 2017 has reduced sales under the mandatory off-take scheme (reducing in turn the rate of mandatory off-take funding), although they appear under the data for the premium scheme (increasing the value of premium funding). The aggregate data for the two support schemes are shown in the tables below, with a comparison against the data for 2016.

	2016	2017				Change (absolute)	Change (%)
	Mandatory off-take producers	Mandatory off-take producers	Green premium	Brown premium	Total		
Actual sales (GWh)	2,405.39	2,391.86	37.61	151.15	2,580.62	175.23	7.28%
Power plant installed capacity (MW)	769.31	803.99	7.64	30.72	842.35	73.04	9.49%
Mandatory off-take or premium payments (HUF billions)	77.66	77.76	0.61	1.41	79.78	2.12	2.73%
Average feed-in tariff or average premium (HUF/kWh)	32.29	32.51	16.18	9.32	-	-	-
Mandatory off-take or premium support (HUF)	51.19	41.26	0.61	1.41	43.28	-7.91	-15.46%
Per unit support (HUF/kWh)	21.28	17.25	16.18	9.32	16.77	-4.51	-21.20%

	2017	2018				Change (absolute)	Change (%)
	Total	Mandatory off-take producers	Green premium	Brown premium	Total		
Actual sales (GWh)	2,580.62	2,216.23	80.74	571.93	2,868.91	288.29	11.17%
Power plant installed capacity (MW)	842.35	1,076.86	16.24	116.99	1,210.10	367.75	43.66%
Mandatory off-take or premium payments (HUF billions)	79.78	72.62	1.81	5.32	79.75	-0.02	-0.03%
Average feed-in tariff or average premium (HUF/kWh)	-	32.77	22.40	9.31	-	-	-

³³ Also for electricity produced from waste in the case of old mandatory off-take entitlements.

Mandatory off-take or premium support (HUF)	43.28	35.66	1.81	5.32	42.79	-0.48	-1.12%
Per unit support (HUF/kWh)	16.77	16.09	22.40	9.31	14.92	-1.85	-11.06%

Source: MEKH

Supplementary table 2: Combined effect of the mandatory off-take and premium support schemes between 2017 and 2018

In **2017**, subsidised producers sold a **total of 2,580.62 GWh** of electricity under the mandatory off-take and premium support schemes *combined*. Consequently, the total amount of electricity sold under the support schemes rose against the previous year (2,405.39 GWh in 2016, +7.28%). In **2018**, the upward trend continued, with total electricity sales of **2,868.91 GWh**, an increase of 11.17%.

In **2017**, **mandatory off-take and premium payments totalled HUF 79.78 billion**, up 2.73% on the 2016 figure (which includes only support paid to mandatory off-take producers) of HUF 77.66 billion. While the amount paid to producers under the mandatory off-take scheme is calculated on the basis of the overall subsidised price, support paid to producers under the premium scheme adds revenue from market sales and is therefore a proportionally lower amount. In **2018**, almost identical payments were made, totalling **HUF 79.75 billion**. This figure resulted in a very slight fall, of 0.03%.

Mandatory off-take producers receiving per unit support received HUF 17.25/kWh in **2017**, or in the case of premium producers an average of HUF 16.18/kWh for the ‘mandatory off-take-replacement premium’ and HUF 9.32/kWh for the brown premium. Looking at both support schemes together, **average per unit support stood at HUF 16.77/kWh** in 2017, which is much lower than the figure of HUF 21.28/kWh in 2016. In **2018** the figure was **HUF 14.92/KWh**, a fall of 11.06%.

The amount **paid as support** under the mandatory off-take and premium support schemes in **2017** (the amount of electricity sold under the scheme multiplied by per unit support) was HUF 41.26 billion in the case of mandatory off-take producers and HUF 2.02 billion for producers in receipt of premium support, the total of which, at **HUF 43.28 billion**, was much lower than the 2016 figure (containing only mandatory off-take support) of HUF 51.19 billion (-15.46%). The fall in the amount paid as support can be explained mainly by the lower aid component due to an increase in the average market price under the mandatory off-take scheme. Total support stood at **HUF 42.79 billion** in **2018**, a fall of 1.12%.

3.1. Please provide the information on how supported electricity is allocated to final customers for purposes of Article 3(6) of Directive 2003/54/EC (Article 22(1)(b) of Directive 2009/28/EC).

Pursuant to the Electricity Act, power plants producing electricity in the mandatory off-take system form a separate balance group, for which the transmission system operator (MAVIR Zrt.) is responsible as the Recipient. The parties involved in the balance group are producers participating in the mandatory off-take scheme (mandatory off-take producers), MAVIR Zrt. as the manager of the mandatory off-take balance group and the Recipient, and the parties required to pay the mandatory off-take funding (known before 1 April 2016 as recipients of electricity subject to mandatory off-take).

The task of the transmission system operator is to take over the electricity subject to mandatory off-take, to operate the mandatory off-take balance group, to compensate for any deviations from the schedule under this framework, and to sell and account for the electricity received under the mandatory off-take scheme.

As the manager of the mandatory off-take group, MAVIR Zrt. concludes a balance group membership agreement with mandatory off-take producers. As the Recipient, MAVIR Zrt. pays the feed-in tariff to mandatory off-take producers for the electricity received by the balance group.

Since 1 April 2016, the total amount of electricity subject to mandatory off-take has been sold on the organised electricity market (HUPX). **The mandatory off-take funding allocated** for the reference month is derived from the balance of the balance group's revenue and expenditure, which gives the monthly *rate of mandatory off-take funding* relative to funder consumption. The parties required to pay the mandatory off-take funding thereby contribute to supporting electricity produced from renewable sources. The rate, measured in HUF/kWh, of the mandatory off-take to be borne by consumers not eligible for universal service during the current month can be followed directly on the website of MAVIR Zrt., and that rate must be passed on by traders to consumers and shown separately on the invoice.

Since April 2016, all mandatory off-take producers are required to give a **daily rather than monthly production schedule**, in accordance with the conditions laid down in the Code of Trade of the Hungarian Electricity System³⁴ (CoT). The daily production schedule must be submitted by 10.00 a.m. on the day preceding the reference day and no earlier than the eighth working day of the month preceding the reference day.

Rate of mandatory off-take funding in 2017 and 2018

The rate, relative to funder consumption, of mandatory off-take funding resulting from the balance of revenue and expenditure of the mandatory off-take balance group is published by MAVIR Zrt. on its website each month. This is paid by users not eligible for universal service on the electricity they purchase (through the intermediary of the balance group managers).

Table 5 shows the data for 2017-2018, and for 2016 for comparison purposes. In **2017**, allocated mandatory off-take funding totalled **HUF 45.006 billion**, and the average rate of mandatory off-take funding stood at **HUF 1.71/kWh**. In **2018**, allocated mandatory off-take funding totalled **HUF 39.382 billion**, and the average rate of the funding stood at **HUF 1.46/kWh**. Consequently, the burden of those funding the mandatory off-take scheme was lower than the average of HUF 2.2/kWh in 2016. (Due to switching between the two mandatory off-take models in 2016, mandatory off-take funding was calculated differently during Q1 and Q2-Q4. The mandatory off-take premium calculated for Q1 was HUF 2.09/kWh, and is estimated at HUF 2.21/kWh for Q2-Q4 of 2016, which gives an average premium for 2016 of HUF 2.2/kWh). It should be noted that at the same time as mandatory off-take funding has fallen, premium funding has appeared as a result of sales under the premium scheme, which has increased the burden of funders since October 2017.

³⁴ <https://www.mavir.hu/web/mavir/kereskedelmi-szabalyzat>

Rate and components of mandatory off-take funding 2016-2018	2016	2017	2018
Mandatory off-take funding (HUF millions)	55,868.00	45,006.31	39,382.29
Mandatory off-take amount sold (GWh)	2,405.00	2,391.86	2,216.23
Average market price (HUF/kWh)	11.00	15.26	16.68
Market value of mandatory off-take amount sold (HUF millions)	26,455.00	36,499.83	36,959.90
Funder consumption (GWh)	25,415.00	26,370.64	27,015.48
Rate of mandatory off-take funding (HUF/kWh)	2.20	1.71	1.46

Source: MAVIR

Supplementary table 3: Rate and components of mandatory off-take funding between 2016 and 2018

The preliminary support paid to producers under the premium scheme in **2017** stood at **HUF 2.029 billion** (production was during the last quarter of 2017 only). This figure was adjusted by the balance of revenue and expenditure for the reference month, changes in the issuing of producer documentation before the reference month, changes in the balance sheet manager's accounts before the reference month, and the balance of operating costs declared by the Authority. These items reduced the **amount of premium funding to HUF 2.017 billion**. In **2018**, the rate of premium funding was much higher, i.e. **HUF 7.122 billion**, which was accounted for by full-year operation. Dividing this by actual monthly purchases by users not eligible for universal service gives the **rate of premium funding**, which ranged from HUF 0.17 to HUF 0.66/kWh between October and December, resulting in a three-month **average HUF 0.31/kWh premium**, or **HUF 0.26/kWh** when projected to the full year 2018. (Supplementary table 4)

Premium funding	2017	2018
Premium paid to producers under the premium scheme (HUF millions)	2,029.84	7,104.02
Adjustment items (HUF millions)	-12.69	18.24
Amount of premium funding (HUF millions)	2,017.14	7,122.26
Actual monthly sales of balance group managers (GWh)	6,593.62	27,015.48
Published premium (HUF/kWh)	0.31	0.26

Source: MAVIR

Supplementary table 4: Rate and components of premium funding in 2017 and 2018

4. **Please provide information on how, where applicable, the support schemes have been structured to take into account RES applications that give additional benefits, but may also have higher costs, including biofuels made from wastes, residues, non-food cellulosic material, and ligno-cellulosic material?) (Article 22(1)(c) of Directive 2009/28/EC).**

5. **Please provide information on the functioning of the system of guarantees of origin for electricity and heating and cooling from RES, and the measures taken**

to ensure reliability and protection against fraud of the system (Article 22(1)(d) of Directive 2009/28/EC).

The provisions relating to guarantees of origin are laid down in Directive 2009/28/EC (**RED**) and Directive 2012/27/EU (**EED**). As defined in the RED, ‘guarantee of origin’ means an electronic document which has the sole function of providing evidence to a final customer that a given share or quantity of energy was produced from renewable sources. Member States must ensure that a guarantee of origin is issued in respect of electricity produced from renewable energy sources or high-efficiency cogeneration plants, as well as heating and cooling energy. The standard unit for a guarantee of origin is 1 MWh.

The Union provisions relating to guarantees of origin are transposed into national legislation by Section 12(1) of Electricity Act LXXXVI of 2007 and Government Decree No 309/2013 of 16 August 2013 on the certification of origin of electricity from renewable energy sources and from high-efficiency cogeneration (**‘the Government Decree on Guarantees of Origin’**). Since 1 January 2014, a system complying with the provisions of the Directives has been in place in Hungary.

The guarantee of origin system is accessible to account holders that have concluded an agreement with the Authority. There were 28 account holders at the end of 2017 and 33 at the end of 2018.

A guarantee of origin is recorded by the Authority in the management system upon request, on the basis of national power plant generation or in accordance with a certificate issued by a body of another Member State. In 2017 a total of 123,876, and in 2018 a total of 228,262 national guarantees of origin were registered. In those two years, an additional 353,443 and 664,258 foreign guarantees of origin respectively were recognised by the Authority on the basis of requests submitted by account holders. This demonstrates that the Hungarian guarantee of origin system predominantly includes foreign guarantees of origin.

To provide a user with a certificate, the Authority deletes the guarantee of origin from the management system upon request. Guarantees of origin certifying the renewable origin of electricity were issued to users in an amount of 598,269 MWh in 2017 and 605,428 MWh in 2018. The amount of electricity certified by guarantees of origin was more than 1% of annual consumption during those years.

The reliability of the system is ensured by the following:

- The management system containing the register of guarantees of origin is handled by the Authority in accordance with the Government Decree on Guarantees of Origin. The Authority performs its related tasks via an interface provided by the Finnish Grexel Systems Oy, which successfully operates similar systems in a number of European countries.
- Access rights to the system are provided by the Authority to customers with whom it has signed a contract.
- The Authority can closely monitor each transaction in the electronic management system.
- Guarantees of origin can be registered only by the Authority. The Authority can only register guarantees of origin in respect of production carried out in a qualified power plant unit pursuant to Section 3 of the Government Decree on Guarantees of Origin.

- The registration of guarantees of origin in the management system, the recognition of foreign guarantees of origin and the presentation of guarantees of origin to users are carried out on the basis of requests submitted to the Authority. In public administration procedures initiated upon request, the Authority ensures that guarantees of origin contain reliable and credible information.

6. Please describe the developments in the preceding 2 years in the availability and use of biomass resources for energy purposes (Article 22(1)(g) of Directive 2009/28/EC).

According to administrative data collected by the Hungarian Energy and Public Utility Regulatory Authority, 100,000 tonnes of cultivated plant biomass was used as a raw material in Hungarian biogas facilities in 2017. Maize and sorghum silage accounted for 85% of the amount used in 2017. The data for 2018 have not been released yet, but the relative stabilisation of the technology and previous years' figures suggest that the use of raw materials should be roughly equivalent to that of 2017. Based on the annual yields per hectare of silage maize (2017: 25.7 tonnes per ha; 2018: 30.9 tonnes per ha), 3,307 ha were required to produce biogas silage in 2017, against 2,751 ha in 2018. The role of other cultivated plant raw materials, mainly grass haylage, is negligible.

Adjusted for data from the SHARES database, 79 million litres of bioethanol and 137 million litres of biodiesel were used as biofuel in Hungary in 2017. Some 73% (100 million litres) of the biodiesel was derived from cooking oil, the remaining 27% (37 million litres) probably from rapeseed oil. Excluding the possibility that the raw material was imported, approximately 196,000 tonnes of maize was required to produce the bioethanol used, and 92,000 tonnes of processed rapeseed was required to produce biodiesel. Based on yields for the current year (maize: 6,820 kg/ha, rapeseed: 3,080 kg/ha), 28,900 ha were probably used to grow the maize and 29,900 ha to grow the rapeseed. The total area of land required for the biofuels used was 59,000 ha, which accounts for less than 1.4% of Hungary's total arable land area.

According to preliminary data for 2018, the use of both biodiesel and bioethanol increased in Hungary. Over 115 million litres of biodiesel produced from cooking oil and 57 million litres of biodiesel produced from other, mainly rapeseed, oil was used by fuel distributors. The use of bioethanol (together with ETBE) rose to around 90 million litres. Based on default yields, 225,000 tonnes of maize and 143,000 tonnes of processed rapeseed were required to produce the amount of biofuel used. Based on the average national yields for 2018 (maize: 8,490 kg/ha, rapeseed: 3,030 kg/ha), 27 000 ha of land were used to grow the maize, 47,000 ha to grow the rapeseed.

The production of biofuel is in excess – in the case of bioethanol well in excess – of its use in Hungary. According to data from Eurostat, in 2017 the Hungarian biofuel industry produced 557 million litres of bioethanol and 180 million litres of biodiesel. According to preliminary estimates, in 2018 ethanol production probably increased to some 600 million litres, while biodiesel production remained unchanged.

The raw material for ethanol production in Hungary is domestically grown maize, of which the two Hungarian plants used 1.392 million tonnes in 2017 and 1.5 million tonnes in 2018 to produce biofuel. Based on the average yields referred to above, Hungarian farmers managed

to produce the amount of crops used on 204,000 ha in 2017 and, thanks to better yields, 177,000 ha in 2018.

The biodiesel produced in Hungary was produced from some 100 million litres of rapeseed oil in both 2017 and 2018, for which 200,000 tonnes of rapeseed had to be processed each year. The quantity of crops required were grown on 65,000 ha in 2017 and 66,000 ha in 2018.

	Amount of domestic raw material (*)		Primary energy in domestic raw material (ktoe)		Amount of imported raw material from EU (*)		Primary energy in amount of imported raw material from EU (ktoe)		Amount of imported raw material from non EU(*)		Primary energy in amount of imported raw material from non EU (ktoe)	
	Year 2017	Year 2018	Year 2017	Year 2018	Year 2017	Year 2018	Year 2017	Year 2018	Year 2017	Year 2018	Year 2017	Year 2018
Others (please specify)												
Biomass supply for transport:												
Common arable crops for biofuels (please specify main types)	Based on production: Maize 1,392,000 t Rapeseed 200,000 t Based on use: Maize 196,000 t Rapeseed 92,000 t	Based on production: Maize 1.5 million t Rapeseed 200,000 t Based on use: Maize 225,000 t Rapeseed 143,000 t										
Energy crops (grasses etc.) and short rotation trees for biofuels (please specify main types)												
Others (please specify)												

* Amount of raw material if possible in m3 for biomass from forestry and in tonnes for biomass from agriculture and fishery and biomass from waste

** The definition of this biomass category should be understood in line with table 7 of part 4.6.1 of Commission Decision C (2009) 5174 final establishing a template for National Renewable Energy Action Plans under Directive 2009/28/EC

Table 4 a:

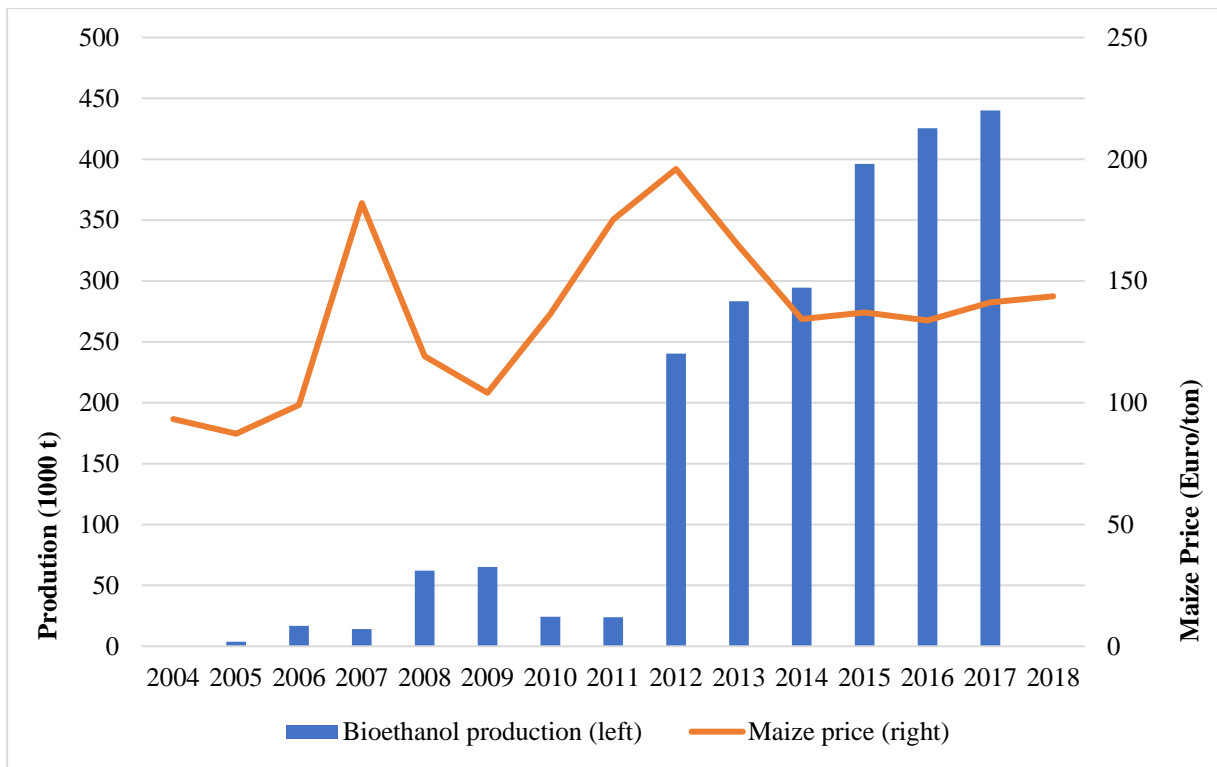
Current domestic agricultural land use for production of crops dedicated to energy production (ha)

Land use	Surface (ha)	
	Year 2017	Year 2018
1. Land used for common arable crops (wheat, sugar beet etc.) and oilseeds (rapeseed, sunflower etc.) (Please specify main types)	Maize: 177,000 Rapeseed 66,000 Silo maize and silo sorghum: 2,751	Maize: 204,000 Rapeseed 65,000 Silo maize and silo sorghum: 3,307
2. Land used for short rotation trees (willows, poplars). (Please specify main types)	4,104.04	4,104.04
3. Land used for other energy crops such as grasses (reed canary grass, switch grass, Miscanthus), sorghum. (Please specify main types)	N/A	N/A

- 7. Please provide information on any changes in commodity prices and land use within your Member State in the preceding 2 years associated with increased use of biomass and other forms of energy from renewable sources? Please provide where available references to relevant documentation on these impacts in your country (Article 22(1)(h) of Directive 2009/28/EC).**

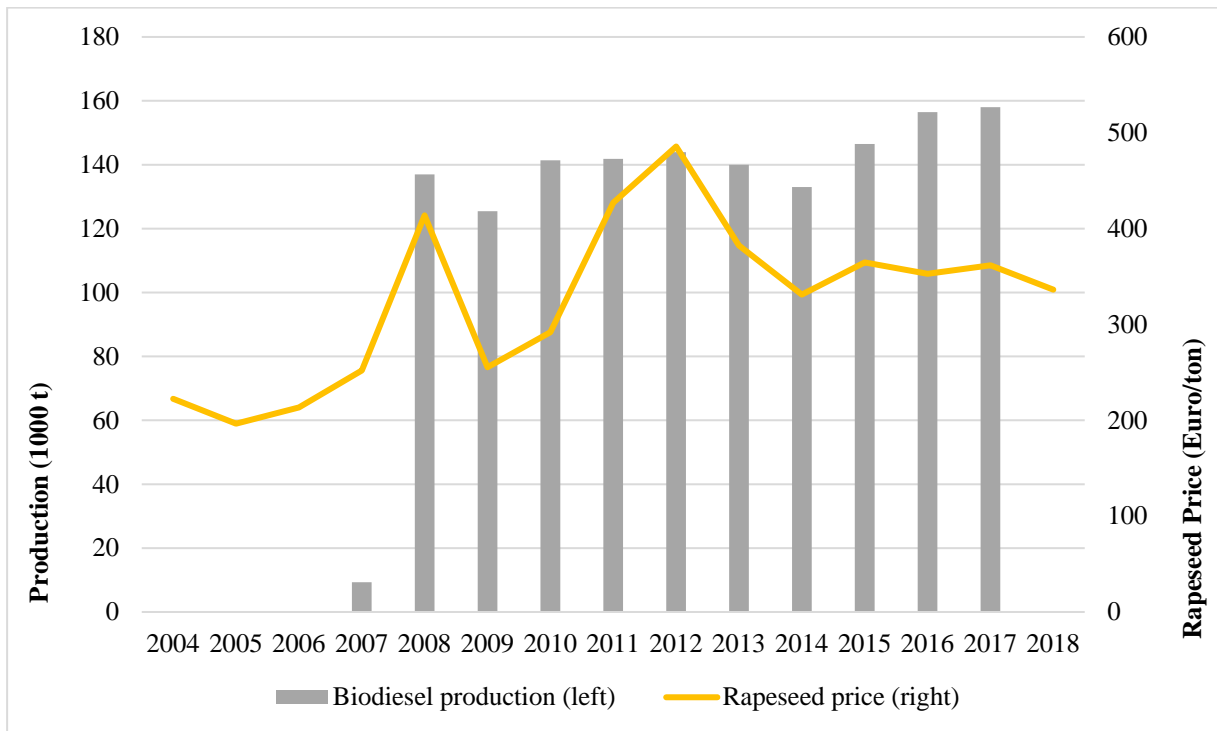
We managed to examine the correlation between biofuel production in Hungary and raw material prices. We took account of annual average purchase prices rather than commodity prices. The data on biofuel production are available in the Eurostat databases. The basis for comparison was the maize price in the case of bioethanol (Figure 10) and the rapeseed price in the case of biodiesel (Figure 11). According to Figures 10 and 11, there was no close correlation during the 2004-2018 period under review between biofuel production in Hungary and raw material prices.

Change of land use is described under point 9.



Source: NAIK AKI calculations based on Eurostat data

Figure 10: Bioethanol production and purchase price for maize in Hungary between 2004 and 2018



Source: NAIK AKI calculations based on Eurostat data

Figure 11: Biodiesel production and purchase price for rapeseed in Hungary between 2004 and 2018

8. Please describe the development and share of biofuels made from wastes, residues, non-food cellulosic material, and ligno cellulosic material (Article 22(1)(i) of Directive 2009/28/EC).

Table 5:
Development Biofuels
(ktoe)

<i>Feedstock as listed in Annex IX Part A of Directive 2008/28/EC</i>	Year 2017	Year 2018
(a) <i>Algae if cultivated on land in ponds or photobioreactors</i>		
(b) <i>Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC</i>		
(c) <i>Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection as defined in Article 3(11) of that Directive</i>		
(d) <i>Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B of this Annex</i>		
(e) <i>Straw</i>		
(f) <i>Animal manure and sewage sludge</i>		
(g) <i>Palm oil mill effluent and empty palm fruit bunches</i>		
(h) <i>Tall oil pitch</i>		
(i) <i>Crude glycerine</i>		
(j) <i>Bagasse</i>		
(k) <i>Grape marcs and wine lees</i>		
(l) <i>Nut shells</i>		
(m) <i>Husks</i>		
(n) <i>Cobs cleaned of kernels of corn</i>		
(o) <i>Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil</i>		
(p) <i>Other non-food cellulosic material as defined in point (s) of the second paragraph of Article 2</i>		
(q) <i>Other ligno-cellulosic material as defined in point (r) of the second paragraph of Article 2 except saw logs and veneer logs</i>		
<i>Feedstock as listed in Annex IX Part B of Directive 2008/28/EC</i>	Year 2017	Year 2018
(a) <i>Used cooking oil</i>	39	44
(b) <i>Animal fats classified as categories 1 and 2 in accordance with Regulation (EC) No 1069/2009 of the European Parliament and of the Council</i>		

9. Please provide information on the estimated impacts of the production of biofuels and bioliquids on biodiversity, water resources, water quality and soil quality within your country in the preceding 2 years. Please provide information on how these impacts were assessed, with references to relevant documentation on these impacts within your country (Article 22(1)(j) of Directive 2009/28/EC).

There was only a slight change in land use in Hungary during the period 2003-2018. According to statistical data, the arable land area averaged 4.33 million hectares for the years 2014-2018, representing a decrease of 176,000 ha (or 4%) compared to the average for the 2004-2008 period, before the Renewable Energy Directive was adopted (see Supplementary table 5).

In Hungary, grain maize and rapeseed are the number-one raw material for domestic biofuel production, and it can be assumed that a part of the volume sold on foreign markets may also be used to produce biofuels in foreign processing plants. The harvested area of maize decreased by 10.2% (1.055 million hectares) over the five years between 2014 and 2018 compared to the average for the period 2004-2008, and its share of arable land fell from 26.1% to 24.4%.

The harvested area of rapeseed was 168,000 hectares on an annual average between 2004 and 2008, which increased by around 60% as an annual average during the period 2014-2018. Despite the intensive growth in area, rapeseed occupied only 4.9% of the arable land area, with an average harvested area of 265,000 hectares. The crop became steadily more popular among Hungarian farmers until 2010, when it went into temporary decline. After the economic downturn, the area under rapeseed cultivation returned to 2010 levels in 2016, and the crop was harvested over an historically large area over the two years covered by the report. Despite this strong growth, rapeseed production still accounted for only 7.6% of Hungary's arable land in 2018.

The area of crops used to produce biofuels has changed only slightly over the past 15 years, so that the change in production structure can be said to have had no effect on water resources. The amount of water used to irrigate agricultural land in Hungary increased by almost half (50 million cubic metres) in the period 2014-2018 compared to the annual averages for 2004-2008. The average size of the area under irrigation also rose, from 81,000 ha to 117,000 ha, yet less than 3% of Hungarian land is under irrigation, which is extremely low compared with other EU Member States.

Consequently, the production of raw materials for biofuels and liquid fuels in 2017 and 2018 failed to reach a sufficiently high level in Hungary to place any extra load on environmental resources. We estimate that the production of raw materials for the implementation of the Renewable Energy Directive had no effect on biodiversity, water resources, water quality or soil quality.

Year	Arable land	Maize area	Share of maize	Rapeseed area	Share of rapeseed	Water use	Irrigated area
	1,000 ha	1,000 ha	%	1,000 ha	%	mcm	1,000 ha
2004	4,510	1,190	26.4	105	2.3	109	93
2005	4,513	1,198	26.5	122	2.7	57	68
2006	4,510	1,215	26.9	142	3.1	70	68
2007	4,506	1,079	23.9	225	5.0	163	82
2008	4,503	1,192	26.5	247	5.5	143	94
2009	4,502	1,177	26.1	261	5.8	161	100
2010	4,322	1,079	25.0	259	6.0	55	55
2011	4,322	1,230	28.5	234	5.4	105	73
2012	4,324	1,191	27.5	165	3.8	192	107
2013	4,326	1,243	28.7	198	4.6	282	96
2014	4,331	1,191	27.5	214	4.9	173	130
2015	4,332	1,146	26.5	221	5.1	193	124
2016	4,332	1,012	23.4	257	5.9	116	108
2017	4,334	989	22.8	303	7.0	156	109
2018	4,334	939	21.7	331	7.6	156	111

2004/2008	4,508	1,175	26.1	168	3.7	108	81
2014/2018	4,333	1,055	24.4	265	6.1	159	117
Change (%)	-3.9	-10.2	-6.5	57.7	64.0	46.5	43.7

Source: KSH data edited by NAIK AKI

Supplementary table 5: Change in production of raw materials and water use in Hungary 2004-2018

10. Please estimate the net greenhouse gas emission savings due to the use of energy from renewable sources (Article 22(1)(k) of Directive 2009/28/EC).

**Table 6:
Estimated GHG emission savings from the use of renewable energy (t CO₂eq)**

Environmental aspects	2017	2018
Total estimated net GHG emission saving from using renewable energy³⁵	6,670	6,718
- Estimated net GHG saving from the use of renewable <u>electricity</u>	1,068	1,071
- Estimated net GHG saving from the use of renewable energy in <u>heating and cooling</u>	5,080	4,937
- Estimated net GHG saving from the use of renewable energy in <u>transport</u>	522	710

11. Please report on (for the preceding 2 years) and estimate (for the following years up to 2020) the excess/deficit production of energy from renewable sources compared to the indicative trajectory which could be transferred to/imported from other Member States and/or third countries, as well as estimated potential for joint projects until 2020. (Article 22(1)(l), (m) of Directive 2009/28/EC).

**Table 7:
Actual and estimated excess and/or deficit (-) production of renewable energy compared to the indicative trajectory which could be transferred to/from other Member States and/or third countries in [Member State] (ktoe),³⁶³⁷**

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Actual/estimated excess or deficit production (Please distinguish per type of renewable energy and per origin/destination of import/export)	N/A	968	1,150	1,213	1,295	883	970	803	470	271		

³⁵ The contribution of gas, electricity and hydrogen from renewable energy sources should be reported depending on the final use (electricity, heating and cooling or transport) and only be counted once towards the total estimated net GHG savings.

³⁶Please use actual figures to report on the excess production in the two years preceding submission of the report, and estimates for the following years up to 2020. In each report Member State may correct the data of the previous reports.

³⁷When filling in the table, for deficit production please mark the shortage of production using negative numbers (e.g. - x ktoe).

11.1. Please provide details of statistical transfers, joint projects and joint support scheme decision rules.

Pursuant to Articles 6, 7, 9 and 11 of the RED, Member States may agree on statistical transfers, joint projects and joint support schemes (hereinafter jointly referred to as cooperation mechanisms).

Pursuant to the RED, the substantial elements of these agreements are stipulated in the agreements concluded by the Member States – in this particular case by Hungary – and the EEA States (or third countries, where applicable).

By 31 December 2018, Hungary had not concluded any such cooperation agreement with another country. In accordance with the relevant articles of the RED, Hungary transposed the concepts of joint investment, joint support schemes and statistical transfer in Section 1(1)(6), (7) and (13) of Decree No 1/2012 of the Minister for National Development of 20 January 2012 on the methodology for calculating the share of energy from renewable sources ('the Calculation Decree'). The Calculation Decree sets forth the national calculation methodologies and procedures for determining the share of energy from renewable sources also for cooperation mechanisms. This means that the various legal conditions required to conclude intergovernmental agreements are in place.

The Calculation Decree therefore stipulates – in line with the RED – that if Hungary concludes cooperation agreements with other countries, the provisions of the cooperation agreements must be taken into account when determining the share of energy from renewable sources in Hungary. The Calculation Decree stipulates, inter alia, that the energy from renewable sources transferred by Hungary to another country under, for example, a statistical transfer, may not be taken into account when determining the share of energy from domestic renewable sources, or, on the contrary, that the quantity imported from other Member States must be added to the domestic share.

12. Please provide information on how the share for biodegradable waste in waste used for producing energy has been estimated, and what steps have been taken to improve and verify such estimates (Article 22(1)(n) of Directive 2009/28/EC).

The current methodology goes beyond the previous one, as it is based not on an estimate, but on the data transmitted by data providers (i.e. it is not 50% of municipal waste that is considered biodegradable). In statistical questionnaires, data providers must distinguish between the amounts of renewable and non-renewable waste.

TJ		2017	2017	2017	2017	2018	2018	2018	2018
		Renewable municipal waste	Industrial waste (non-renewable)	Non-renewable municipal waste	Industrial waste (non-renewable)	Renewable municipal waste	Industrial waste (non-renewable)	Non-renewable municipal waste	Industrial waste (non-renewable)
+	Primary production	1,930	3,777	1,676	1,485	1,626	4,322	1,791	1,053
+	Imports	836	848	562		1,281	1,657	364	
=	Gross available energy	2,766	4,625	2,238		2,907	5,979	2,155	
=	Total energy supply	2,766	4,625	2,238		2,907	5,979	2,155	
Transformation input		2,427	1,672	1,887		2,481	2,042	1,917	
+	Electricity and heat production	2,427	1,672	1,887		2,481	2,042	1,917	
	+ Main-activity producers, electricity only	889	428	354		855	336	294	
	+ Main-activity producers, cogeneration	1,538	0	1,533		1,626	0	1,623	
	+ Autoproducers, electricity only	0	323	0		0	664	0	
	+ Autoproducers, cogeneration	0	187	0		0	222	0	
	+ Autoproducers, heating only	0	734	0		0	820	0	
Available for final use		339	2,953	351		426	3,937	238	
Final energy use		339	2,952	351		426	3,937	238	
+	Industry	339	2,816	351		426	3,761	238	
	+ Chemical and petrochemical industry	0	14	0		0	15	0	
	+ Manufacture of non-metallic mineral products	339	2,388	351		426	3,239	238	
	+ Paper production, printing industry	0	414	0		0	507	0	
+	Other sectors	0	136	0		0	176	0	
	+ Commercial and public services	0	136	0		0	176	0	
Statistical difference		0	1	0		0	0	0	

Source : MEKH

Supplementary table 6: Change in production of raw materials and water use in Hungary 2004-2018

- 13. Please provide the amounts of biofuels and bioliquids in energy units (ktoe) corresponding to each category of feedstock group listed in part A of Annex VIII taken into account by that Member State for the purpose of complying with the targets set out in Article 3(1) and (2), and in the first subparagraph of Article 3(4).**

Feedstock group	Year 2017	Year 2018
Cereals and other starch-rich crops	67	99
Sugars	N/A	N/A
Oil crops	N/A	N/A