



The Electric Power System

- Hungary -



Basic facts

- ❑ Area: 93 030 km²
- ❑ Number of electricity consumers/Population:
9 818 000 (2016)
- ❑ Number of TSOs: 1
- ❑ Number of DSOs: 6
- ❑ Gross annual maximum peak load:6780 MW
(2017)

VILLAMOSENERGIA-RENDSZEREK EURÓPÁBAN

POWER SYSTEMS IN EUROPE

- **Kontinentális Európa**
Continental Europe
- **Észak-Európa**
Northern Europe
- **Balti országok (szinkron üzemben az UPS/IPS rendszerrel)**
Baltic countries (synchronously interconnected with UPS/IPS system)
- **Nagy-Britannia**
Great Britain
- **Ír-sziget**
Ireland
- **Különálló szigetek**
Isolated systems

■ **UPS/IPS szinkronrendszer**
UPS/IPS synchronous system

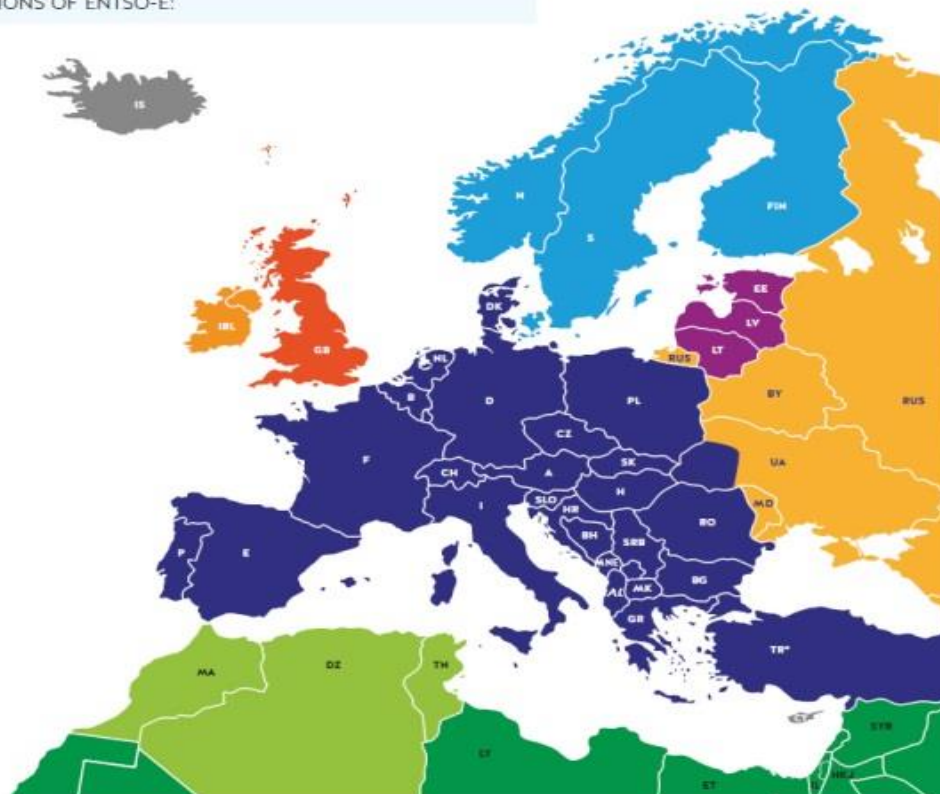
■ **Kontinentális Európa rendszerével szinkron üzemelő villamosenergia-rendszer**
Power system synchronously interconnected with the power system of Continental Europe

☑ **ENTSO-E-tag**
ENTSO-E member

☑* **ENTSO-E megfigyelő tag**
ENTSO-E observer member

☒ **Nem ENTSO-E-tag**
Not member of ENTSO-E

AZ ENTSO-E SZINKRONTERÜLETEIN: SYNCHRONOUS REGIONS OF ENTSO-E:



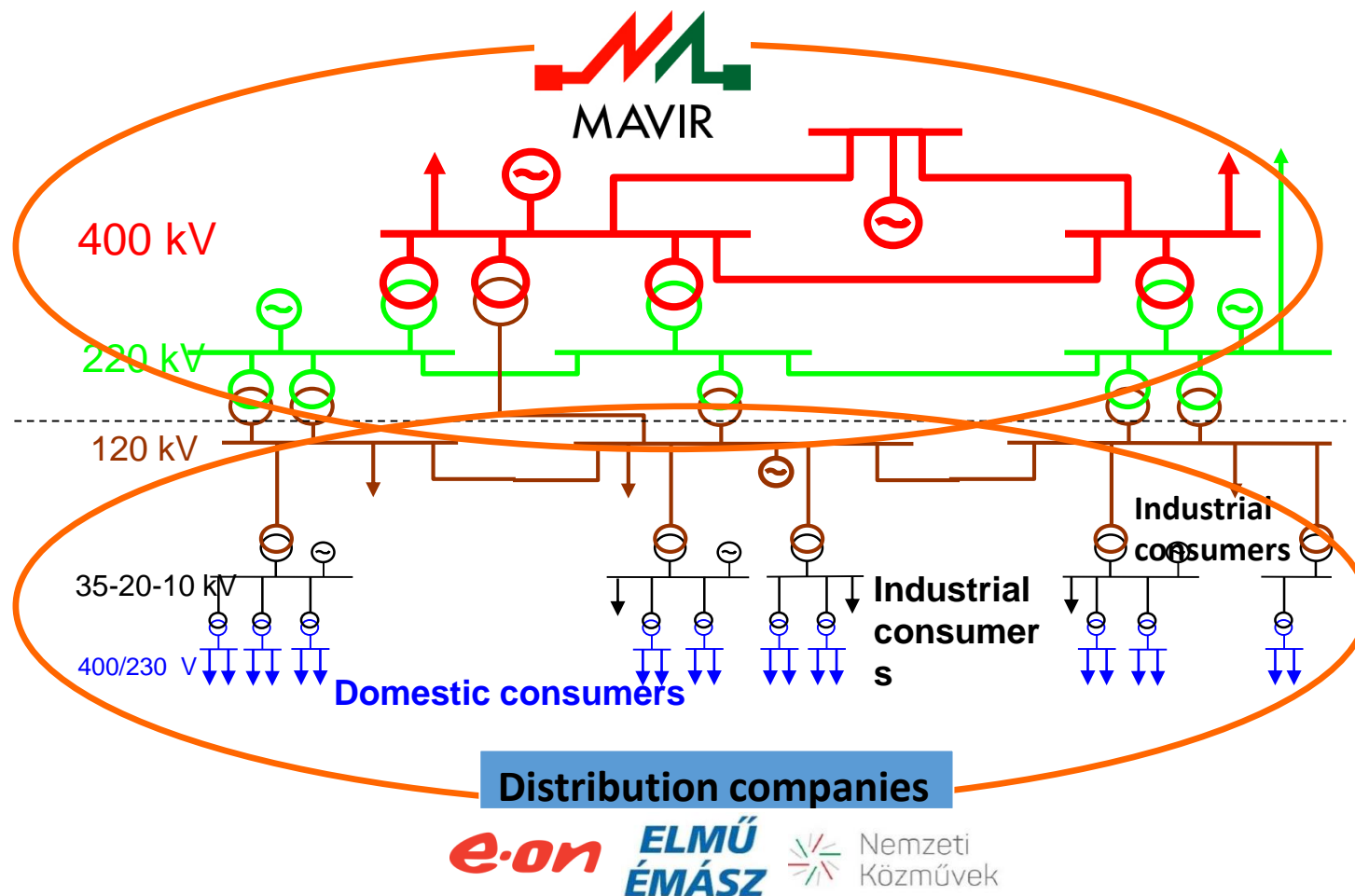


Grid facts and characteristics

		TRANSMISSION NETWORK LENGTH (km)	
		ROUTE	CIRCUIT
OVERHEAD LINE	750 kV	268,10	268,10
	400 kV	2 287,16	2982,91
	220 kV	1 099,32	1393,65
	132 kV	142,04	199,24
CABLE	132 kV	16,64	16,64
	TOTAL	3 813,26	4860,54



Structure of electrical power system



Map of the high voltage grid



A magyar átviteli hálózat (2017)
The Hungarian transmission network (2017)

HUNG2017ah_közös_plan.CDR 2017.12.04. F.Z.



Information on TSO(s)

- ❑ Name: MAVIR ZRt.
- ❑ Network length (km):
 - 3813, 26 (route)
 - 4860,54 (circuit)
- ❑ Served area (km²): 93 030 km²
- ❑ Website: <http://www.mavir.hu>



Cooperation of TSO and DSOs

□ Main challenges:

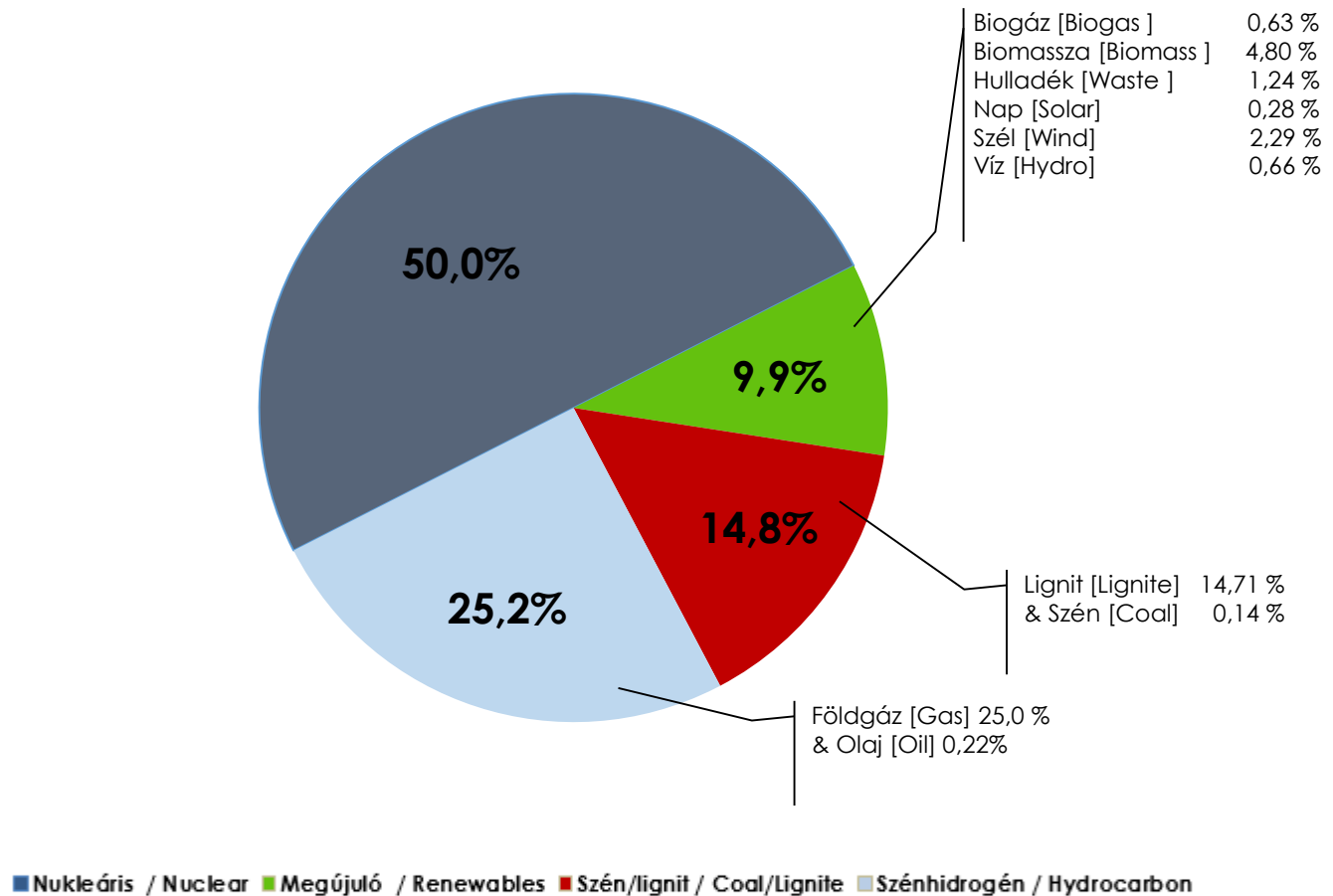
- Demand side and renewables integration
- handling multiple aggregators

□ Main cooperation areas:

- Congestion management (both real-time and in operational planning/outage planning)
- Participation of distributed assets in frequency and non-frequency related services
- Extension of the observability into lower voltage level (installing meters and involving the meter data into data exchange)

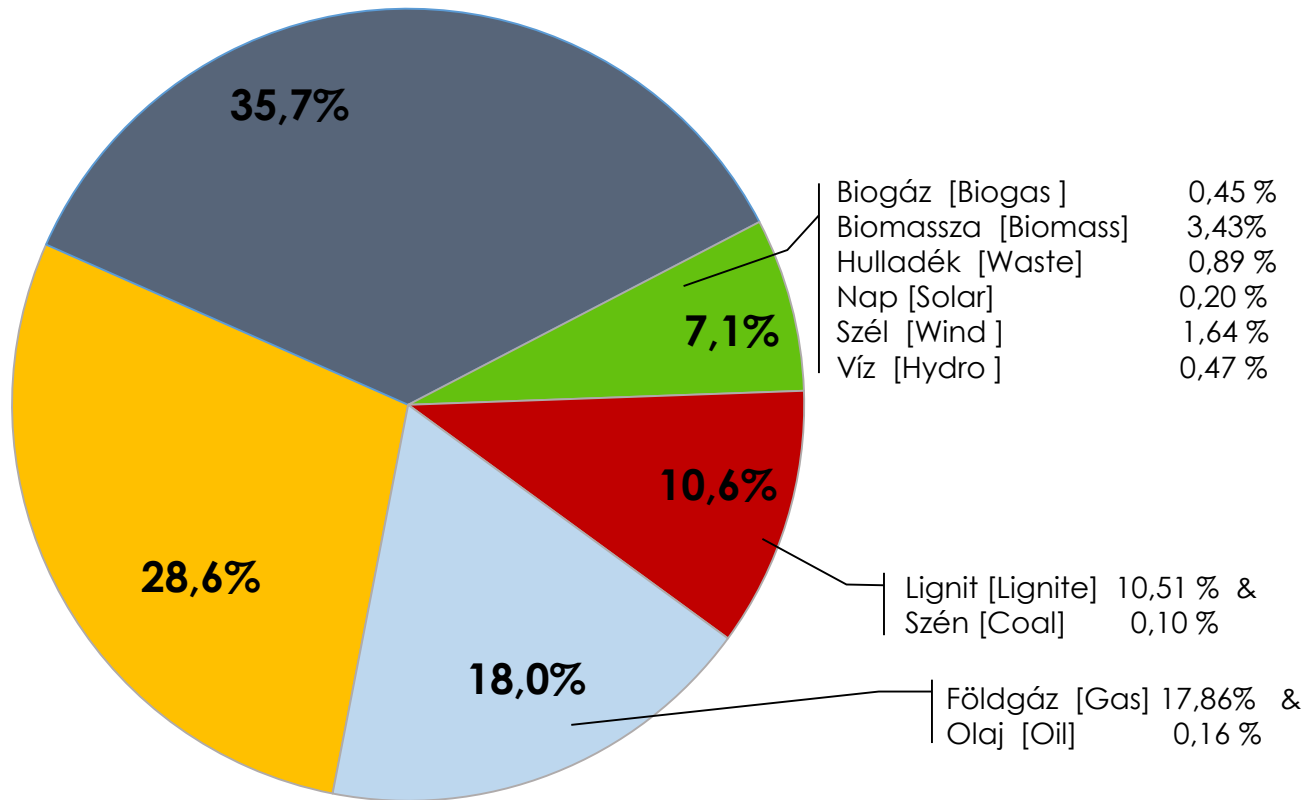


Sources of domestic energy production 2017





Sources of the total gross electricity consumption 2017



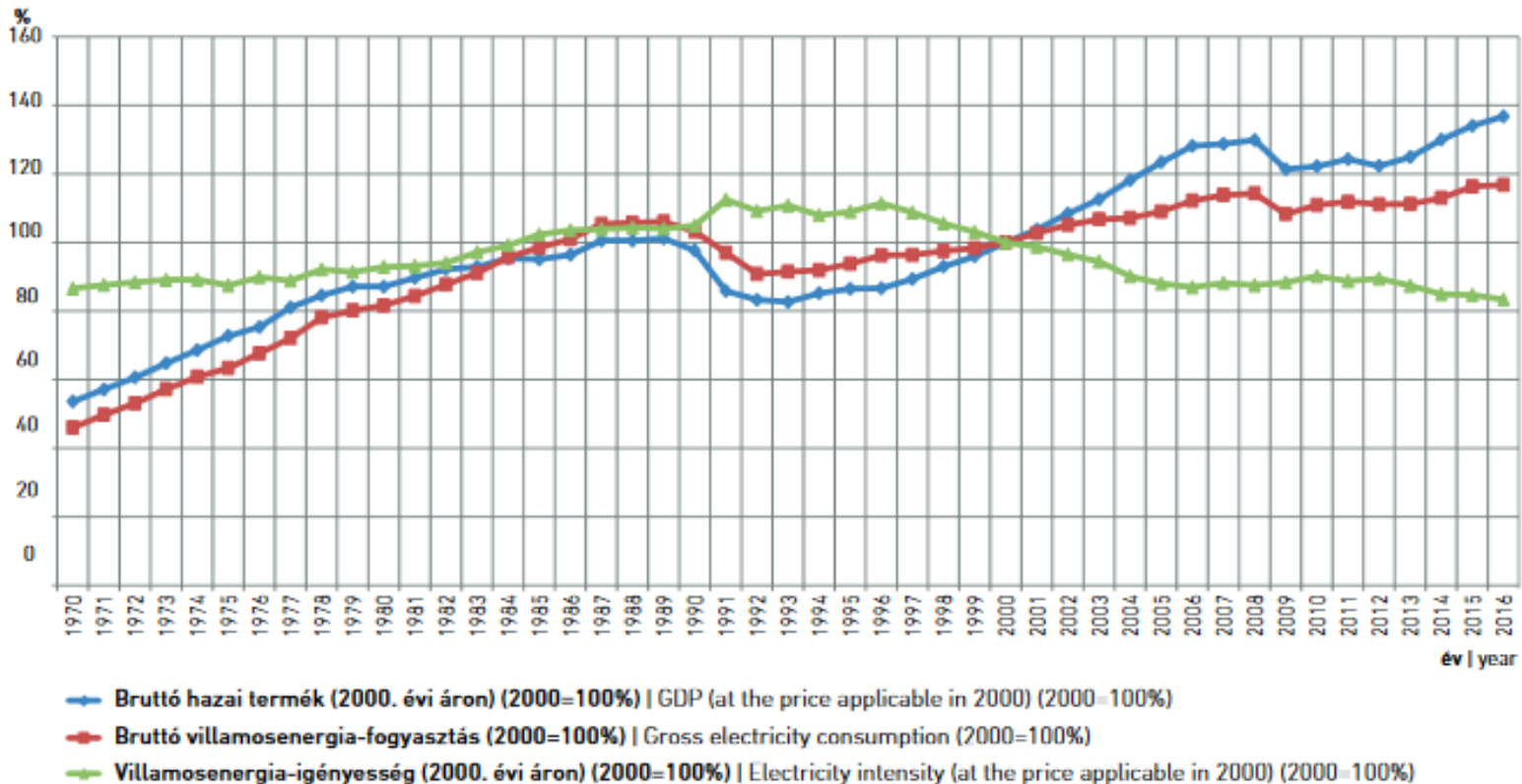
■ Import / Import ■ Nukleáris / Nuclear ■ Megújuló / Renewables ■ Szén/lignit / Coal/Lignite ■ Szénhidrogén / Hydrocarbon



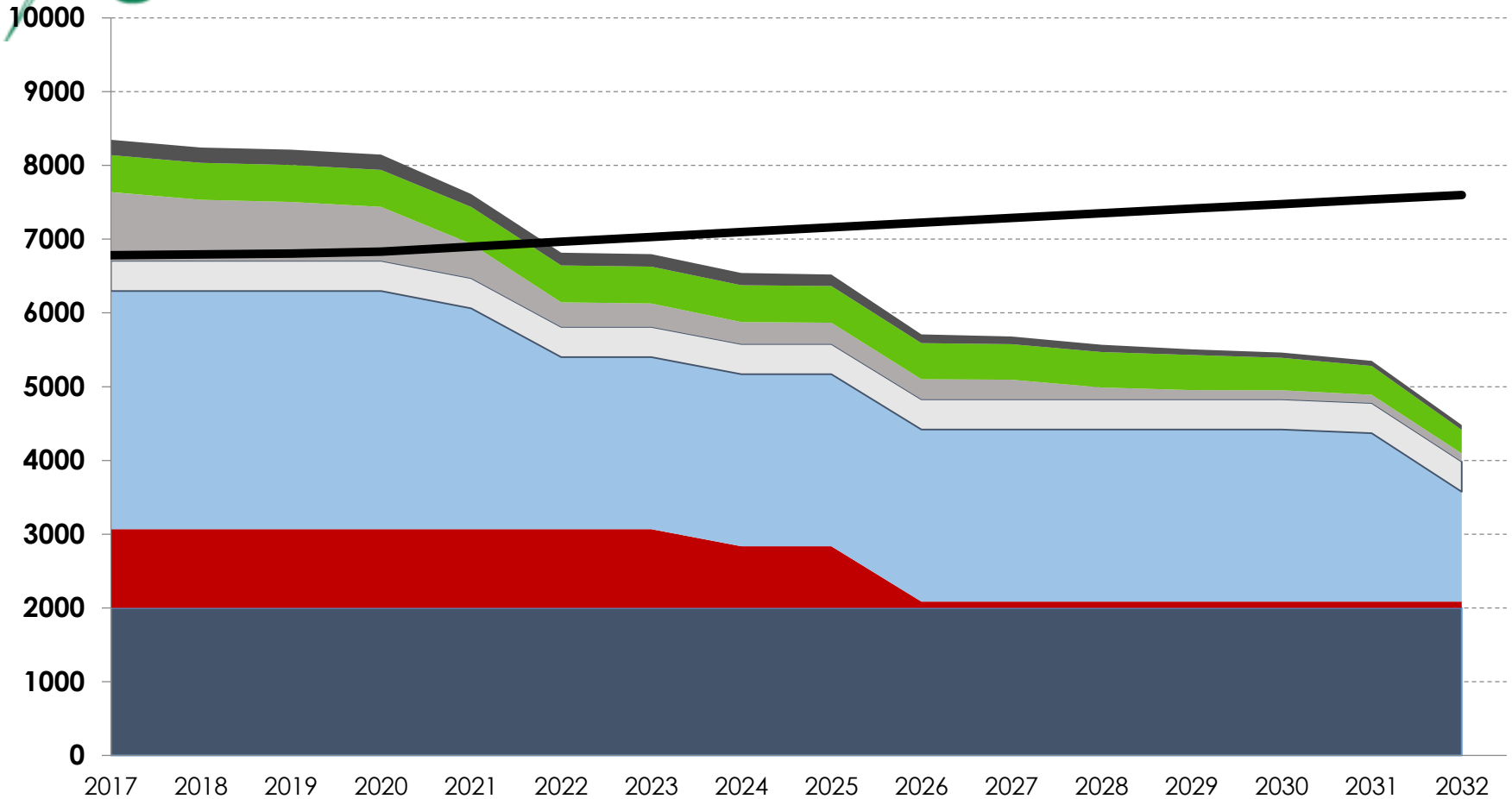
Sources of the total gross electricity consumption 2017

- ❑ Total gross electricity consumption : 45 057,4 GWh
- ❑ Domestic energy production : 32 181,0 GWh
- ❑ Import energy : 12 876,4 GWh

Development of gross domestic product, gross electricity consumption and electricity intensity



Licensed generation capacities



- Nukleális / Nuclear
- Szén és Lignit / Coal and Lignite
- Gáz / Gas
- Olaj / Oil
- Kiserőművek nem megújuló / Dispersed generation [not renewable]
- Kiserőművek időjárásfüggő megújuló / Dispersed generation [weather-dependent renewable]
- Kiserőművek egyéb megújuló / Dispersed generation [other renewable]

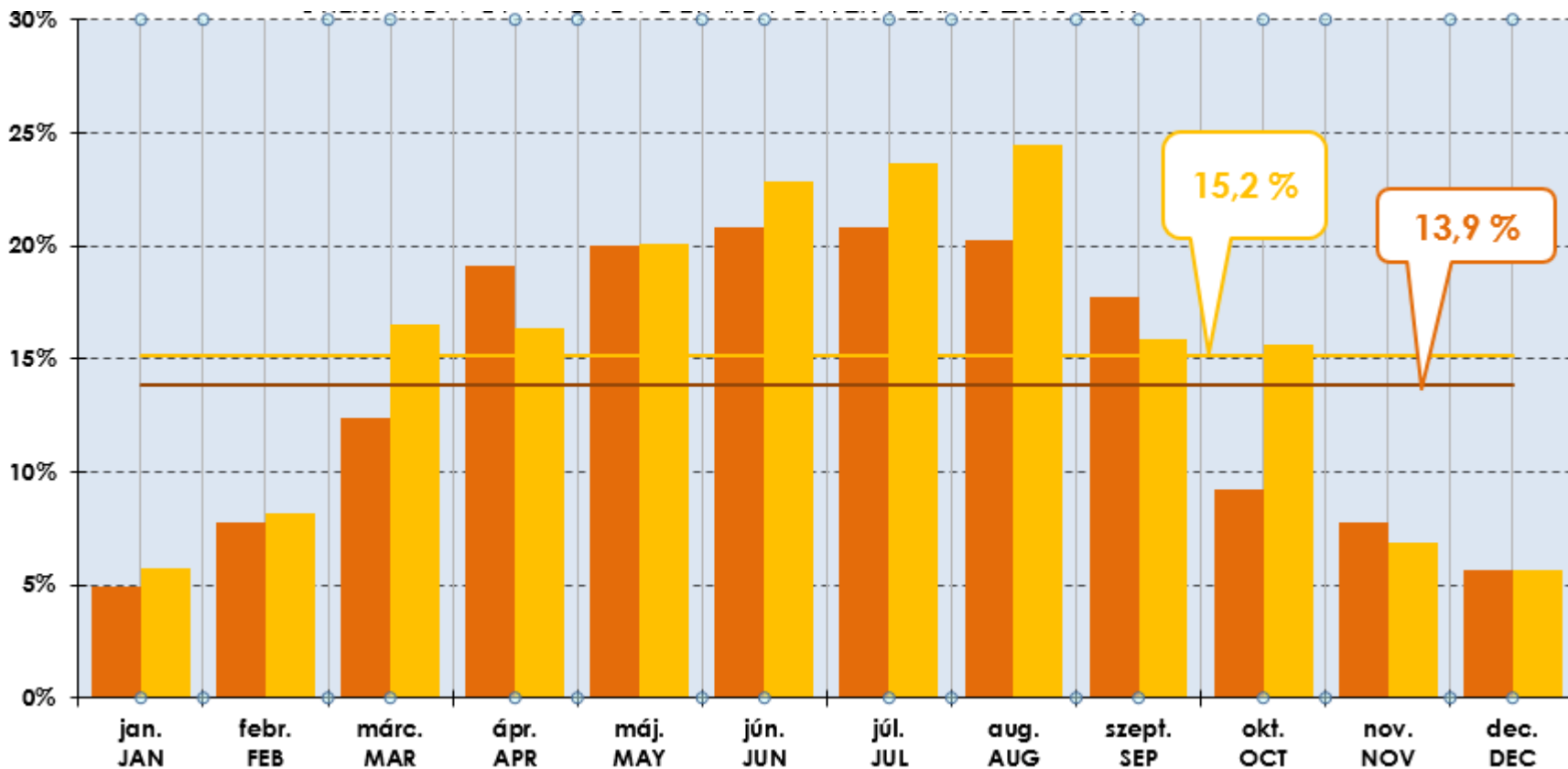


Consumption of renewable energy sources, 2016

MEGNEVEZÉS NAME		MEGÚJULÓ ENERGIAHORDOZÓK ÖSSZESEN TOTAL OF RENEWABLE ENERGY SOURCES
Vízenergia Hydropower	PJ	0,9
Szélenergia Wind power	PJ	2,5
Geotermikus energia Geothermal energy	PJ	5,8
Napenergia Solar energy	PJ	1,0
Biomassza ² Biomass ²	PJ	110,3
Kommunális hulladék (megújuló része) ³ (The renewable part of) communal waste ³	PJ	3,4
Biogáz, depóniagáz, szennyvízgáz Biogas, landfill gas, sewage gas	PJ	3,7
Bioüzemanyagok Biofuels	PJ	5,2
ÖSSZESEN TOTAL	PJ	132,8



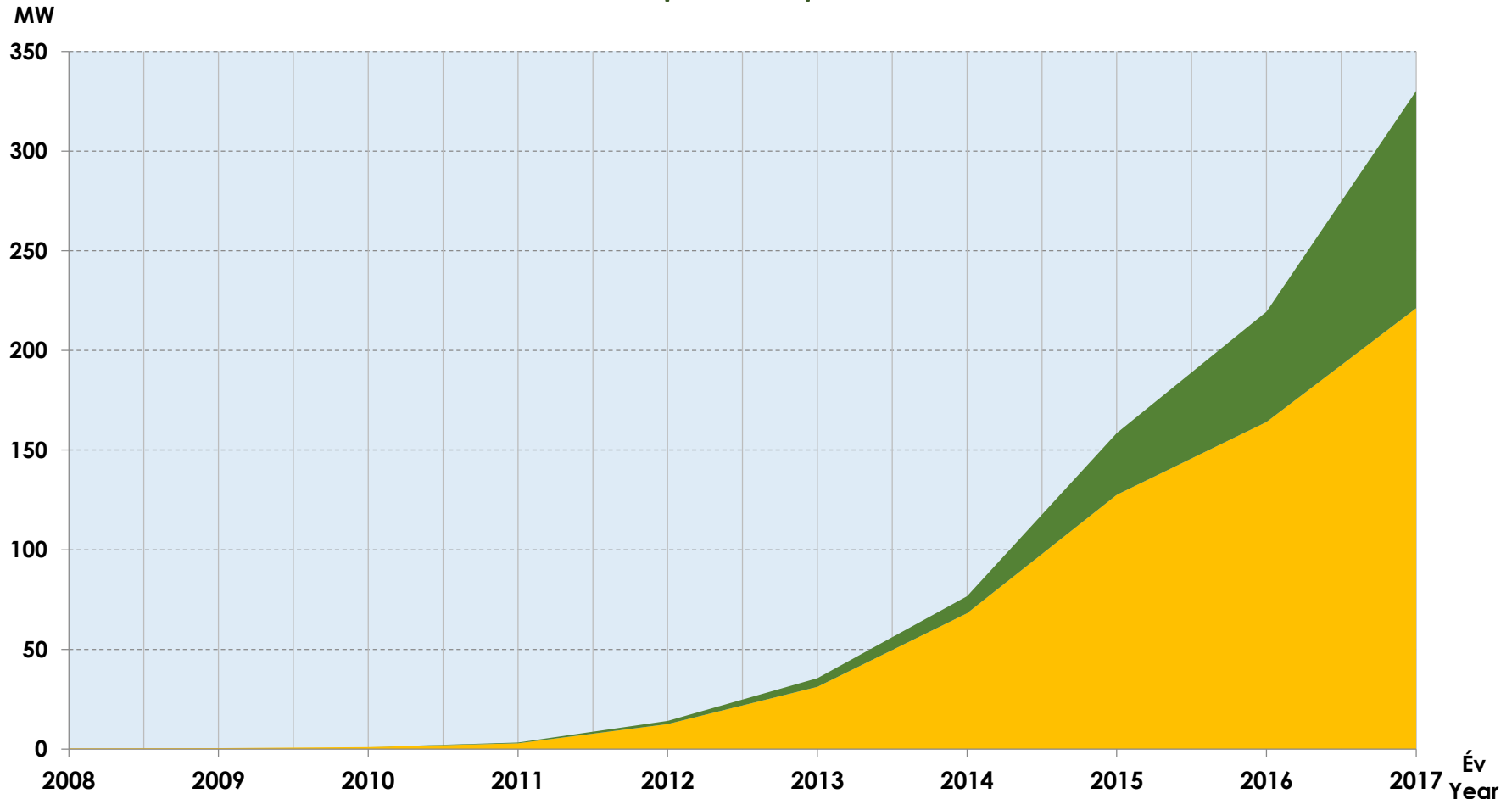
Utilisation of photovoltaic power plants 2016-2017



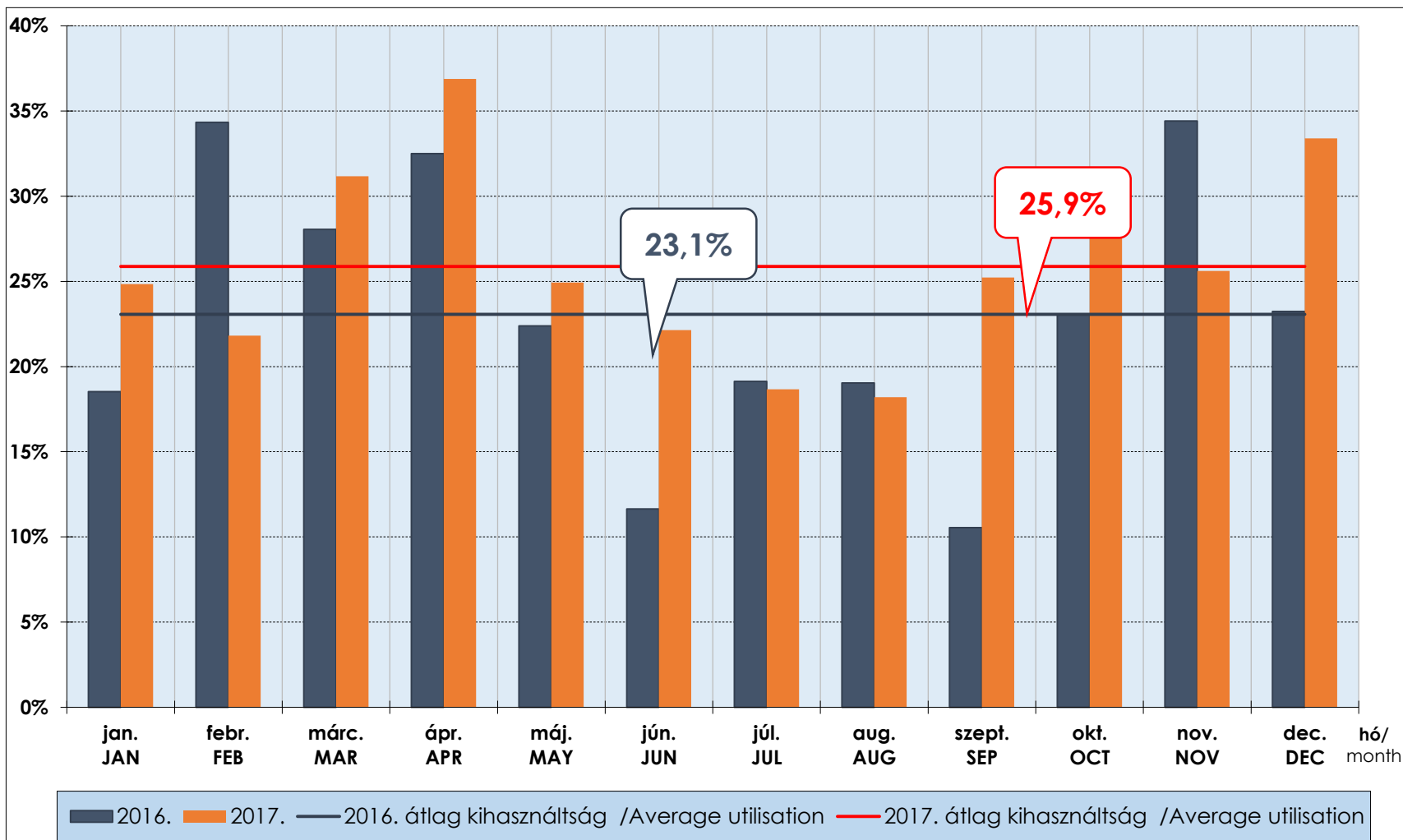
2016. | 2017. | ---2016. average | ---2017. average



Change of installed capacity of household pvs, and that of licensed and non-licensed small photovoltaic power plants



Utilisation of wind power plants 2016-2017



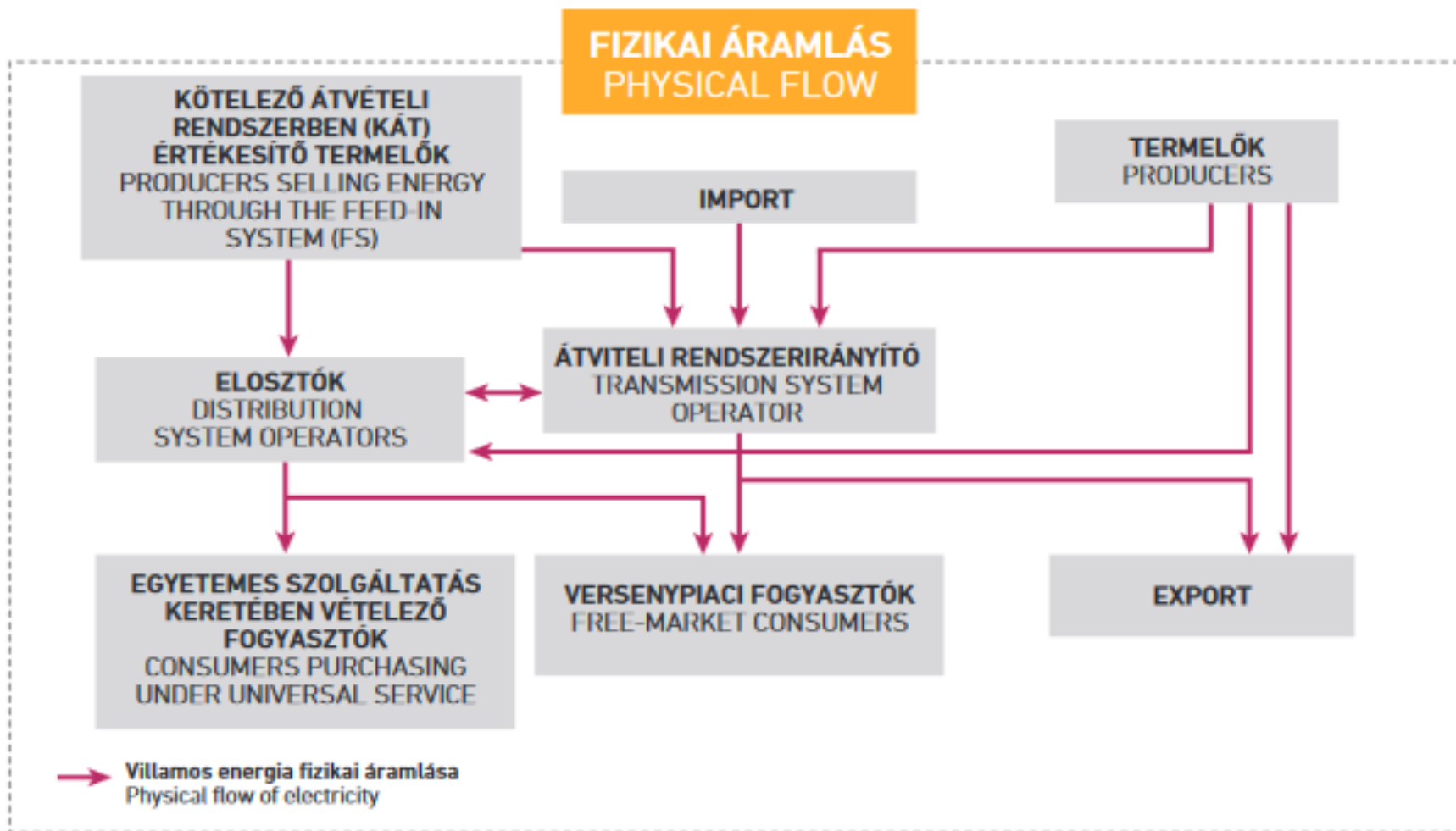


Utilisation of wind power plants 2016-2017

Wind production data 2016-2017	2016	2017
Daily produced energy maximum [MWh]	6840,3	7014,9
Daily produced energy minimum [MWh]	0,4	0,1
Generated yearly electrical energy [GWh]	664,8	737,1
Installed electrical capacity of wind power plants [MW]	328,9	324,9
According to 15' average [MW]	315,1	317,0
According to 15' average [MW]	0,0	0,0
Utilisation (yearly average) [%]	23,1	25,9

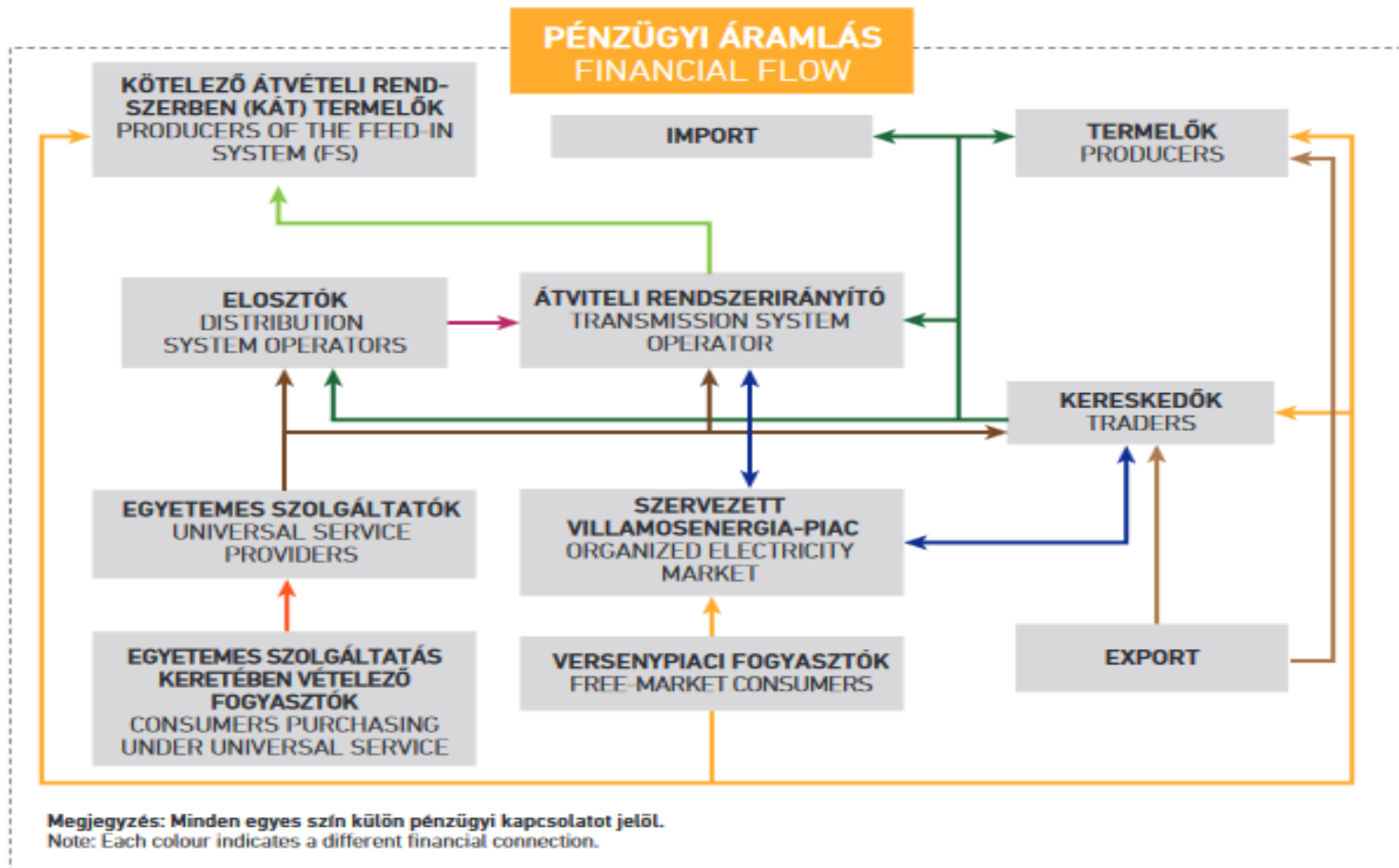


Operating model of the hungarian electricity market





Operating model of the hungarian electricity market





A szlovák-magyar határra vonatkozó szállítások irányonkénti összege tartalmazza a GCC szállítás és a nem szándékolt eltérés éves összegét.
Total deliveries on the Slovak-Hungarian border, in each direction, include the yearly sum of GCC deliveries and unintended deviation.

A százalékos adatok a változás mértékét jelenítik meg a bázishoz (2016) képest.
The figures in % show the extent of change compared to the base (2016)

Összes export / Total export -16 579,26 GWh 108 %

Összes import / Total import 29 431,34 GWh 105 %

Import-export szaldó /
Import-export balance 12 852,08 GWh 101 %



Összes export / Total export	-6 926,32 GWh	132%
Összes import / Total import	19 802,56 GWh	110%
Import-export szaldó / Import-export balance	12 876,24 GWh	101%

A százalékos adatok a változás mértékét jelenítik meg a bázishoz (2014) képest.

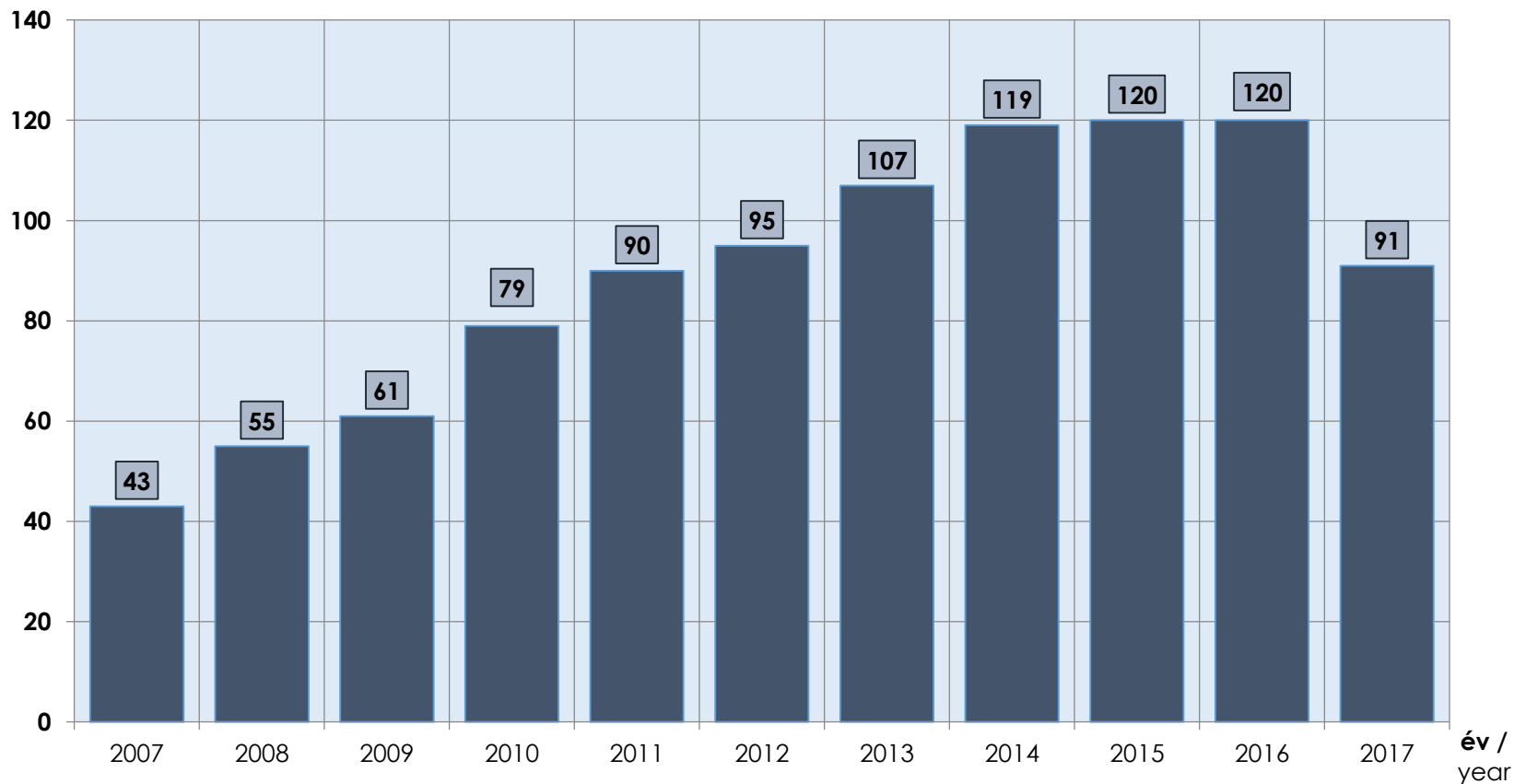
The figures in % show the extent of change compared to the base (2014)

- GCC Import: 80,502 GWh	- GCC Export: 54,421 GWh
- Tervenkívüli Import: 0 GWh Unintended deviation import	- Tervenkívüli Export: 1,922 GWh Unintended deviation export
- MRA Import: 0 GWh	- MRA Export: 7,087 GWh
- Nemzetközi kisegítési Imp.: 0 GWh Emergency Energy delivery import	- Nemzetközi kisegítési Exp.: 0 GWh Emergency Energy delivery import



Number of balance groups 2007-2017

db/pc



Megjegyzés: 2016 > 2017 Az inaktív mérlegkörök formálisan is megszűntették tevékenységüket

Note: 2016 > 2017 The inactive balance groups have also formally cancelled their activity