



**CONNECTION OF RENEWABLE
GENERATORS TO THE GRID IN
HUNGARY: REGULATION,
PROCEDURES AND CURRENT
ISSUES**

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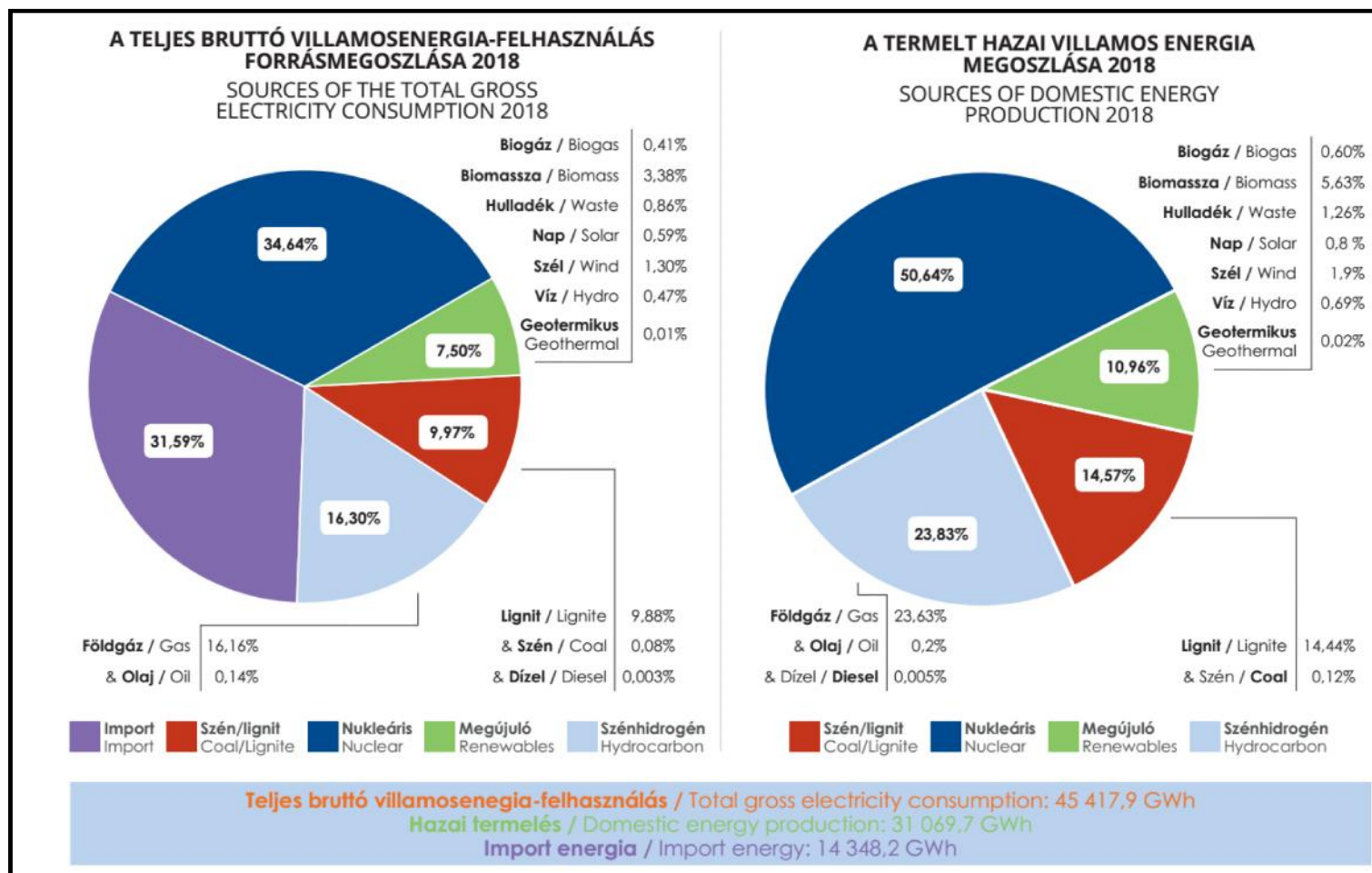
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Electricity Grid Code Connection Rules
for Renewable Energy Generators
Minsk, 19 November 2019*

Summary

- Generation mix in Hungary
- Evolution of renewable electricity generation
- Implementation of the RfG Grid Code in Hungary
- Procedure of connecting to the grid
- Current issues related to the connection of RES-E generators

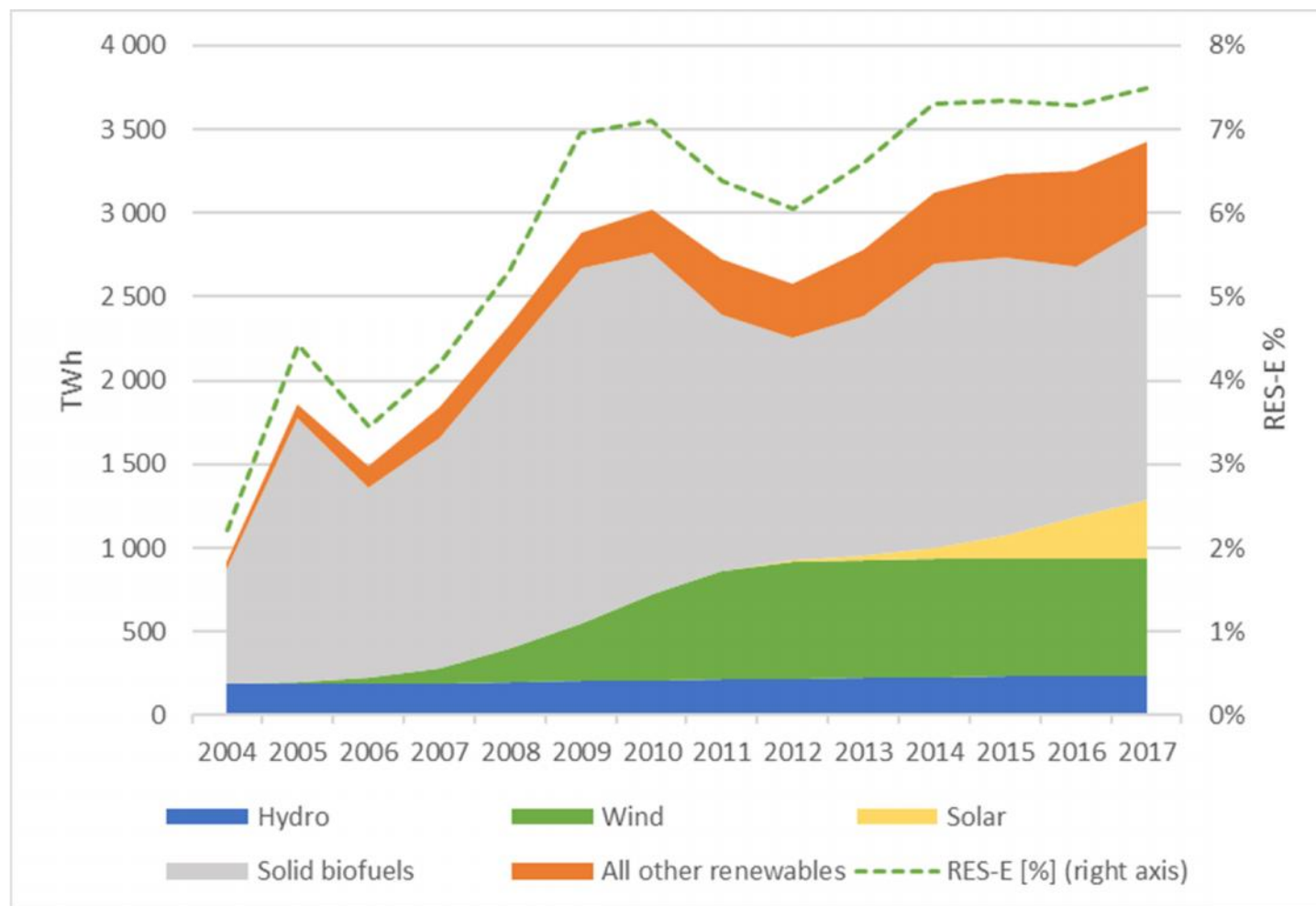
The Hungarian electricity sector – composition of production and consumption



- Nuclear has the highest share in production and consumption.
- Share of RES-E is 7.5%, based mostly on biomass firing.
- High import share: about 32% in the last 7 yrs
- Lignit-based electricity is important – will be phased out from 2030.

Source: MAVIR, 2019

Evolution of renewable electricity

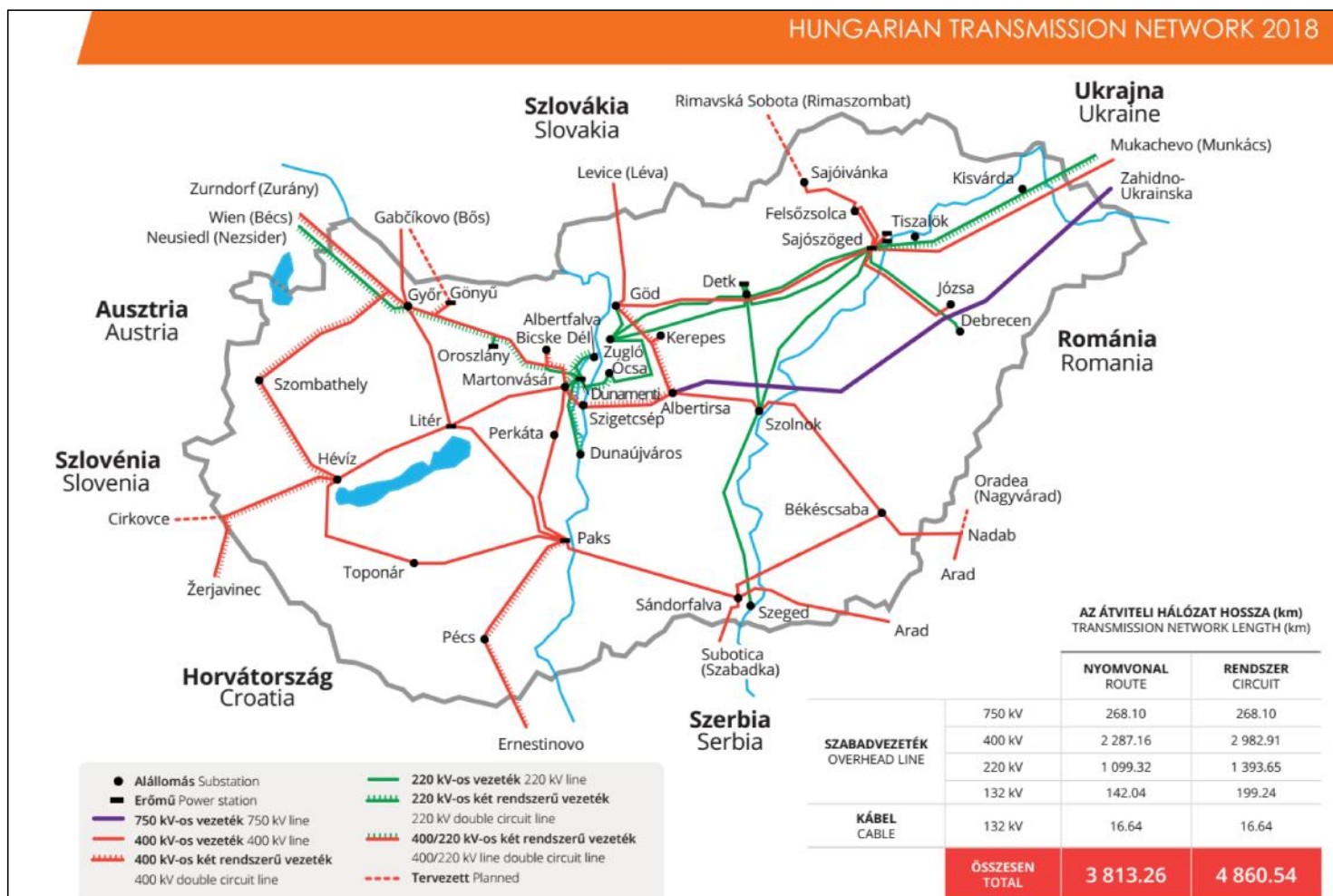


- Mostly based on biomass, partially co-fired with lignite.
- Wind capacity and production has remained constant since 2011.
- Solar capacity is expected to increase to over 2000 MW by 2020, approaching 6000 MW by 2030*

*Projections of the energy agency of Hungary (MEKH).

Source: Shares, Eurostat, 2019

Electricity transmission and distribution



Transmission System Operator:
MAVIR

6 Distribution Systems - owned
by 3 market participants (LV:
0.4 kV, MV: 3-35 kV, HV: 120
kV -132 kV)

HU has a well-interconnected
system, enabling the high
import share

- 34,98% of the cross-border
transmission serves transit

Source: MAVIR, 2019

Implementation of RfG Network Code in Hungary

- The Commission Regulation (EU) 2016/631 (NC RfG) is a binding regulation
- Within the prescribed technical ranges, member states could decide on special technical parameters – the Hungarian specificities are listed in an excel file attached to the International Network Code of MAVIR – accessible through:
<https://www.mavir.hu/documents/10258/231596221/Nemzetk%C3%B6zi+%C3%9Czemi+%C3%A9s+Kereskedelmi+Szab%C3%A1lyzat+uj+ENG+20191025+HAR+Annex+2nd+Amendment.pdf/f3c3f0b7-5867-09c9-40f6-7b60f855268e>
- Rules have been compulsory for facilities newly connected to the grid since November 2018. In case of existing power plants, rules apply in case they undergo a major retrofit.
- In case of evolution of system application to existing plants could be carried out only if based on the outcome of a cost-benefit analysis.
- Technical requirements are the result of a consultation process. Rules are stricter than previously but do not affect investment costs substantially.

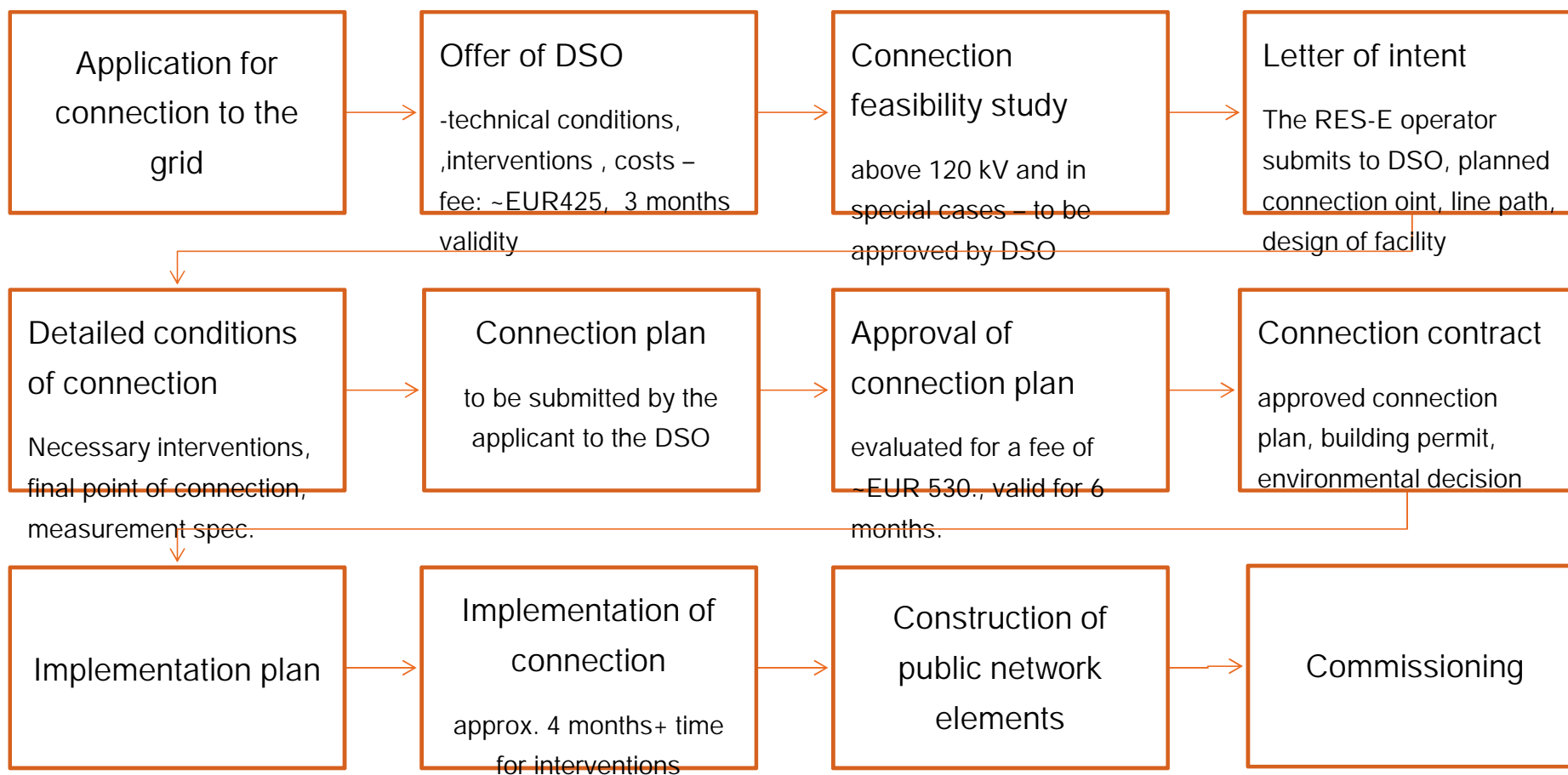
Implementation of RfG Grid Code – categorization of power plants

- Proposed maximum capacity thresholds for types A, B, C and D power-generating modules according to Art. 5 (3) of (EU) 2016/631:
- Currently, large wind parks and PV plants are connected to the 132 kV lines belonging to DSOs in Hungary.
- The largest wind plant is of 48 MW capacity, while several PV plants above 100 MW are planned or under construction.

| Type | Voltage level of the connection point (network) | Maximum capacity thresholds for types A, B, C and D power-generating modules | |
|----------|---|--|----------------------|
| | | P _{max,min} | P _{max,max} |
| A | < 110 kV | 0,8 kW | 200 kW |
| B | < 110 kV | 200 kW | 5 MW |
| C | < 110 kV | 5 MW | 25 MW |
| D | ≥ 110 kV, or P _{max} > P _{max,min,D} | 25 MW | |

Source: International Network Code of MAVIR

Procedure of connecting to the grid (50 kW-50 MW)



Sources: E.On, NKSZ, Gov Decree 273/2007.

Renewable support and grid issues: the METÁR system in Hungary

| FIT system Below 500 kw | Green premium system 500 kW – 1 MW | Green premium system above 1 MW | Brown premium system |
|--|--|---|--|
| <p>Feed in tariff</p> <p>FIT administratively set</p> <p>Currently the level is around 110 EUR/MW Support period determined plant by plant</p> | <p>Floating premium</p> <p>Premium = administratively set supported price – reference market price</p> | <p>Floating premium accessible for winners in the auction</p> <p>Premium = bid price – reference market price</p> | <p>Premium for power plants based on bioenergy</p> <p>Premium = Supported price determined by the HEO – reference market price</p> |

State Aid Decision for the Hungarian METÁR System

- Hungary has confirmed that the tasks of power plants receiving premium-based support are the same as for any other power plant.
- Rebates on grid connection fees will also be considered as support.
- These plants need to join a balancing circle and they have to fulfil the timetable related tasks according to their agreements with the balance circle managers – similarly to all other generation plants
- They need to pay the sanctions in case of deviations from the timetable.
- The balance circle managers implement their tasks related to providing the timetable to the Hungarian TSO (MAVIR) in accordance with the commercial regulation, and they pay the sanctions for the deviations of their balance circle from the timetable.

Change in the support system – surge in FIT applications

- The new system applies from 1 January 2017
- The predictably lower level of expected support, decrease in investment costs and favourable interest rates induced a surge in FIT applications: 2500 new applications were submitted to the MEKH
- This will entail an increase of capacities to over 2000 MW by 2020
- Due to the large number of applicants, brought about a problem of scarce capacities – grid connection points, administrative resources, availability of plant constructors

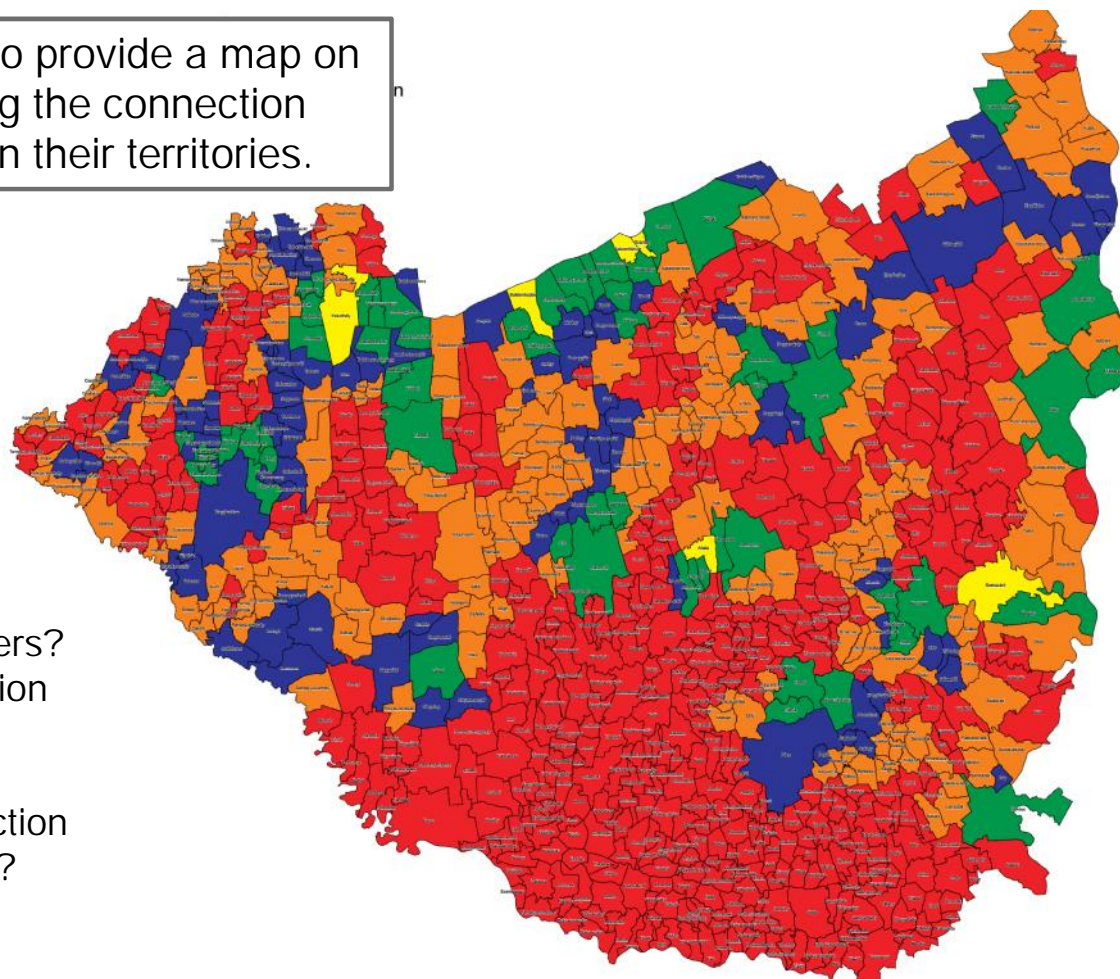
Main features of the METÁR tenders

- Technology neutral pay-as-bid auctions – mainly PV applications are expected to bid
- Evaluation is based on the level of bid
- The floating premium is the difference between the bid price indexed yearly with CPI – 1% and the reference market price.
- Maximum bidding price ~79 EUR/MW
- Two size categories: 0.3-1 MW and 1-20 MW (66 and 134 GWh offered, respectively)
- Support period: 15 years (adjusted if other types of support were utilized).
- A grid connection offer received from the relevant system operator is a prerequisite for participation
- Measures for avoiding the segmentation of production sites: plants having connection points located within 1000 m distance regarded as one installation. <https://terkep.mekh.hu/metar>
- If more plants apply with overlapping sites and connection points, only the cheapest bidder can receive support.

Availability of grid connection points

DSOs are supposed to provide a map on their websites showing the connection capacities available on their territories.

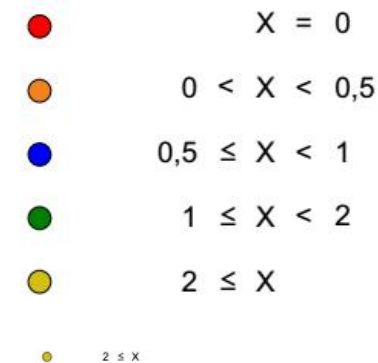
e-on Hálózat
ÁHO - Stratégiai szakterület



The arising scarcity of connection points raises the questions:

- How capacities shall be allocated fairly among users? (e.g. incorporating allocation within the RES-E tender system)
- How availability of connection points should be ensured? (costs, solutions)

Connection capacity available:



Thank you for your attention!

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