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

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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
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

- 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%A9sz+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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage level of the connection point (network)</th>
<th>Maximum capacity thresholds for types A, B, C and D power-generating modules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$P_{\text{max, min}}$</td>
</tr>
<tr>
<td>A</td>
<td>$&lt; 110$ kV</td>
<td>0.8 kW</td>
</tr>
<tr>
<td>B</td>
<td>$&lt; 110$ kV</td>
<td>200 kW</td>
</tr>
<tr>
<td>C</td>
<td>$&lt; 110$ kV</td>
<td>5 MW</td>
</tr>
<tr>
<td>D</td>
<td>$\geq 110$ kV, or $P_{\text{max}} &gt; P_{\text{max, min,D}}$</td>
<td>25 MW</td>
</tr>
</tbody>
</table>

Source: International Network Code of MAVIR
Procedure of connecting to the grid (50 kW-50 MW)

Application for connection to the grid

Offer of DSO
- technical conditions, interventions, costs - fee: ~EUR 425, 3 months validity

Connection feasibility study
above 120 kV and in special cases - to be approved by DSO

Letter of intent
The RES-E operator submits to DSO, planned connection point, line path, design of facility

Detailed conditions of connection
Necessary interventions, final point of connection, measurement spec.

Connection plan
To be submitted by the applicant to the DSO

Approval of connection plan
evaluated for a fee of ~EUR 530., valid for 6 months.

Connection contract
approved connection plan, building permit, environmental decision

Implementation plan
approx. 4 months + time for interventions

Implementation of connection

Construction of public network elements

Commissioning

Renewable support and grid issues: the METÁR system in Hungary

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

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)
Thank you for your attention!

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