FINANCING THE HUNGARIAN RENEWABLE ENERGY SECTOR

CHALLENGES AND OPPORTUNITIES

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FOREWORD

For the past two years the Central Bank of Hungary (MNB) has been actively addressing environmental sustainability in its Green Program. The risks and adverse impacts of climate change and other environmental anomalies affect our society and economy as a whole, of which the financial system is no exception. Today it is no longer disputable that in order to mitigate such adverse impacts, economies must transform themselves into systems capable of attaining long-term sustainable growth. It is also obvious that this is not the task of the future, but of the present.

It is positive that transformative processes have been unfolding also in Hungary, which induce such sustainable economic reorganization. One example is the launch of the domestic renewable energy support schemes in the power sector, which successfully mobilized the investor community to develop and start installing the country's renewable energy capacities. It is important to highlight the crucial contribution of the Hungarian banking sector, which has provided the lion's share of the required financing to this purpose.

However, the transformation of the power system is still at an early stage. Hungary's national energy strategy earmarks at least a six-fold increase in domestic renewable installed capacities over the next 10 to 20 years, which would in principle lead to a similar increase in the related bank loan portfolio that finances the capacity expansion. All of this has great importance to the MNB as financial regulatory and supervisory authority.

Is the domestic banking system able to finance and support such ambitious expansion and through it conduce environmentally sustainable growth? Can the credit growth take place in a prudent manner, whilst maintaining healthy risk-taking? What barriers do the stakeholders need to overcome to achieve the goals? What regulatory steps has the MNB taken or planning to take to boost funding in the sector? The present study investigates these questions.

dr. Csaba Kandrács
Deputy Governor
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Abbreviations

CRR	Capital Requirements Regulation
DSCR	Debt Service Coverage Ratio
HUPX	Hungarian Power Exchange
KÁT	Mandatory Off-Take System
LCOE	Levelized Cost of Energy
IRENA	International Renewable Energy Agency
IRS	Interest Rate Swap
ISF	Infrastructure Support Factor
ITM	Ministry of Innovation and Technology
MAVIR	Hungarian Transmission System Operator
MEKH	Hungarian Energy and Public Utility Regulatory Authority
METÁR	Support System for Renewable Energies
MNB	Central Bank of Hungary
REKK	Regional Centre for Energy Policy Research

1. INTRODUCTION

1.1. The MNB's Green Program

In its Green Program[1] started in 2019, the MNB set the goal of strengthening the environmental sustainability ("green") aspects in the domestic financial system. To this end, the MNB utilizes various instruments to promote the assessment and effective management of financial risks of environmental origin (especially those related to the climate change) by banks and other financial organizations, and to enhance the ability of financial institutions to expand the financing of green investments.

In line with this goal, focusing first on the retail segment, the MNB was the first among central banks to implement a preferential capital requirement program for green, energy-efficient mortgage and personal loans in 2019.[2] The discount must be passed on by the banks to their customers in the form of a fee or loan interest rate reduction.

For the corporate finance segment, utility-scale renewable energy production is the first sector in which the MNB has examined development and support opportunities. The renewable energy industry has proven to be a relatively stable, crisis-resistant, business cycle-independent, and dynamically growing sector that has a vast potential of creating jobs and value-added in the long run. Moreover, the sector has a paramount role in meeting Hungary's climate policy objectives and to contribute to the well-being to its residents by creating a more sustainable, healthier future.

1.2. The MNB and the power sector

The *National Energy Strategy 2030 with an outlook to 2040*, published by the Ministry of Innovation and Technology (ITM) in January 2020, set very ambitious targets for expanding the installed capacity of renewable, mainly photovoltaic solar power plants in Hungary. The strategy aims to contribute not only to the fulfilment of Hungary's EU commitments and the societal needs towards more sustainable energy production, but also to trigger the development of a stable and healthy credit portfolio for the financiers of the power sector. Considering the current level of installed renewable capacity and the 2030 and 2040 capacity targets of Hungary, as well as capital intensity of renewable energy technologies, it can be stated that both the rate of growth and the large volume of required capital pose a challenge to the Hungarian regulatory and financing environment.

Based on the technology cost forecasts of the Regional Centre for Energy Policy Research (REKK), and the planned 12 GW solar PV power capacities by 2040, it is estimated that approximately HUF 2,250 billion of new investment will be needed (HUF 112 billion per year) in the sector, which would translate to HUF 1,600 billion of new debt financing (Figure 1). This amount will does not include the financing needed for the construction of energy storage capacities and the cost of network development, which also require significant investments adding up to HUF 500 billion.

[1] https://www.mnb.hu/letoltes/mnb-green-program-en.pdf

[2] https://www.mnb.hu/en/pressroom/press-releases/press-releases-2019/mnb-introduces-a-green-preferential-capital-requirement-programme

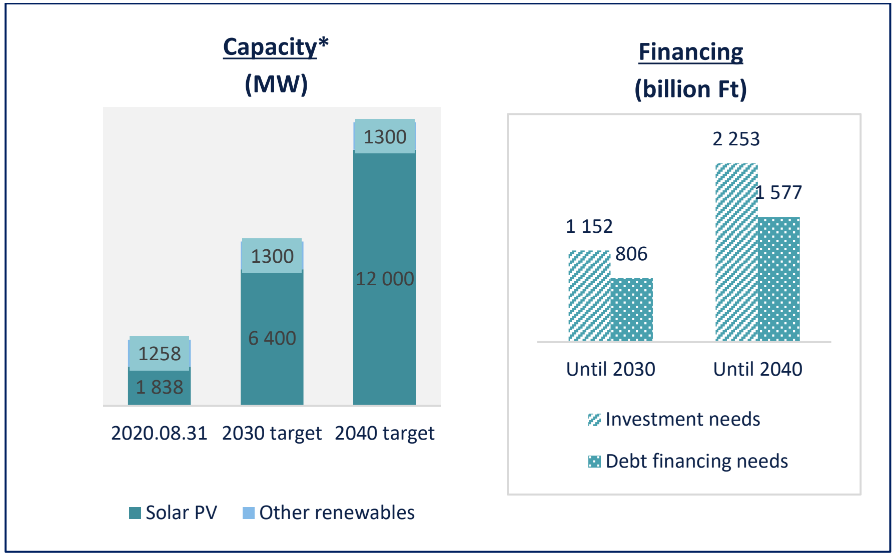


Figure 1: The objectives of the National Energy Strategy and the resulting investment and financing needs. **(*)** The figures include small household-sized power plants and utility-scale power plants.

The MNB's interest in the financing of renewable energy production rests on four distinct motivations:

- On the one hand, in 2019 the MNB started the assessment of environmental risks in the financial system, as part of which it is working on the development of a climate change stress test, which examines the shock resilience of the financial system along different climate change and climate policy scenarios. The ultimate (indirect) goal of the climate stress test is to reduce financial risks derived from the environmental factors in the financial system.
- On the other hand, due to the audacious targets of renewable energy production set out in the National Energy Strategy, investment activity is expected to increase significantly, which will fuel the demand for bank financing. As a guardian of financial stability, it is of utmost importance for the MNB that such credit expansion occurs with the least possible micro-prudential (credit, interest rate, liquidity, etc.) risk.
- Thirdly, due to the transition risk[3] related to the climate change, the MNB considers it desirable that the share of environmentally sustainable industries increases in bank balance sheets increases as compared to the "brown" ones, i.e. those more exposed to increasingly stricter environmental regulations (and therefore more risky in the long run). For the energy sector, this means a larger weight on green assets and support of "green" energy lending.
- Fourthly, the MNB believes that the growth of the renewable energy industry itself is beneficial from a macroeconomic point of view. The mitigation of the effects of climate change abates country risk originating from environmental hazards and dependence on energy imports. Furthermore, renewable energy assets have features offering stable productivity, therefore they can support sustainable economic growth.

The motivations set out above calls for the creation of favourable conditions for the financing of renewable energy production, without compromising due risk management by financial institutions.

[3] The transition risk is a business risk arising from transformative societal and economic changes due to the climate change, which primarily increases credit and market risk in the case of bank exposures.

1.3. Renewable energy support schemes in Hungary

In Hungary, it was possible to submit applications in the “KÁT” fixed feed-in-tariff support scheme until 31.12.2016. In 2017 a new scheme called “METÁR” (renewable energy support scheme) was launched, which had several sub-programs since its inception. Currently, solar PV projects can secure support through the scheme by successfully bidding in the green premium auction system (in the case of biomass and biogas projects there is a brown premium system).

Over time the conditions of the support schemes gradually shifted from a fixed feed-in tariff, which generated stable cash flows to the investors, to a competition-oriented and technology-neutral system. With the exception of the brown premium system and the small household-scale installations, METÁR is available for greenfield renewable electricity production projects prior to the construction phase.

To understand the financing implications of the evolution of support schemes, it is necessary to compare the boundary conditions of such schemes, KÁT and the two METÁR premium tenders (1st tender in 2019, 2nd tender in 2020). This is demonstrated in Table 1 (columns 2 and 3). In summary, the renewable electricity produced by the participants of KÁT system is taken over by the system operator MAVIR (responsible for the KÁT balancing group) for 20-25 years at a pre-determined fixed tariff (following inflation by 1 percentage point lower)[4]. The relatively high and fixed tariff, along with take-and-pay off-take, provides producers with a stable, predictable cash flow. Furthermore, the support tenor provides a significant safety buffer for both investors and bank financiers. The operation of KÁT system is rather simple; it does not require special expertise on behalf of credits to assess business models.

In contrast, the METÁR scheme is much closer to a market-based energy production, which is less predictable and involves more business uncertainties. The primary virtue of the system is, however, that it creates a competition between investors or producers, which, in effect, reduces the life-cycle production costs of electricity. As a result, the system can be much more financially self-sustaining and less dependent on some sort of central budgetary support. The ultimate benefits of such competition are booked by industrial consumers[5] by way of the reduced cost of subsidies (in METÁR such consumers pay for premia subsidy received by renewable energy producers). The incorporation of market signals into the support scheme is also very beneficial in the sense that through market forces the reduction of technology costs due to the advancement of technologies can spiral into the domestic market (see Figure 10 and further discussion of the topic in Chapter 3).

[4] For example, in 2020 for solar power plants with installed capacity of 20 MW or less, this price is HUF 33.36 / kWh.

[5] The costs of the support scheme are not covered by the government budget but are included in the price of electricity of industrial consumers.

Scheme Parameters	TRANSITION BETWEEN THE TWO SCHEMES KÁT until 2017	METÁR (tender premium) from 2017	FINANCING RISK
Offtaker	Mandatory offtake by MAVIR	Market sales	Market risk ↑
Tariff mechanism	Fixed feed-in tariff (MAVIR)	Market price + green premium (support) >> Volatile sales revenue	Price risk ↑
Sales currency	HUF fixed price	EUR market sales + HUF green premium	EUR/HUF FX risk ↑
Balancing costs	from 2021 to 2026 gradually increasing: 5% >> 100%	100%	Price risk ↑
Support tenor	**20-25 years**	**15 years**	Support period ↓
Supported price	**33 HUF/kWh**	**max. 26 HUF/kWh**	Amount of support ↓
Maturity buffer*	5-10 years	0	Support period reserve ↓

Table 1: Comparison of the KÁT scheme and the tender-premium-based METÁR

1.4. Evaluation of support schemes from the financing perspective

Next to system-level benefits, the following risk elements appeared in METÁR (Table 1, column 4) from the financing perspective:

- **Market risk**: While in the previous KÁT scheme MAVIR took over all renewable energy from producers, in the METÁR scheme producers sell their output on the open market through the engagement of energy traders.
- **Price risk**: Figure 2 illustrates the difference in price risk between the two support schemes. While in the KÁT scheme producers receive a fixed price for the produced renewable energy, in the METÁR they bid for a green premium, amounting to max. 26 HUF/kWh, which is 21% lower than the fixed KÁT price. The difference between the awarded subsidized price and the ex-post reference market price for a given month will determine the specific subsidy for that month, i.e. the level of the premium. If this difference is negative, the producer will be obliged to return the difference to the recipient.

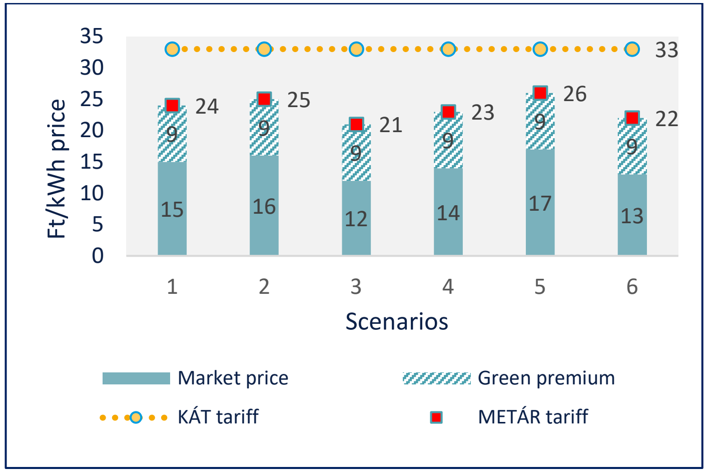


Figure 2: Price risk in METÁR (data are for illustration only)

- **Exchange rate risk**: Exchange rate risk existed in the previous support scheme, too, as most the hardware is imported from abroad. With the continuous development of technology, the technology costs expressed in EUR and USD have been decreasing. At the same time, the weakening of the HUF leads to the inflation of bidding prices and the green premium against the construction costs. Furthermore, in Hungary power market transactions are denominated in EUR, to which, in the current scheme the HUF-denominated green premium is added. Although the green premium is adjusted to the bid price set in HUF and compensates for the exchange rate risk at sector level, short-term exchange rate fluctuations may carry a moderate risk for the individual producer.
- **Balancing costs**: Producers must forecast their energy output in the form of a production schedule calculated from the technical parameters of the power plant and weather forecasts. For the sake of system stability, deviations from the production schedule must be balanced out on the system level, which leads to the so-called balancing costs. Producers in the KÁT scheme have previously been exempted from bearing this cost[6]. In contrast, in METÁR producers bear 100% of balancing cost as from the commercial operations date. Balancing costs averaged 3 HUF/kWh in 2019 according to MAVIR's calculations, but it is prone to change due to many technical (e.g. changes in power plants' availability), geopolitical (e.g. the evolution of the price of natural gas), technological (e.g. improvement of forecast accuracy) and legal factors (such as the terms of the agreement within the balancing group the power plant is part of).
- **Tenor risk**: In the first two METÁR calls for proposals, the support period was reduced to 15 years compared to the 20-25-year support period of KÁT (although the relevant government decree also allows a 20-year support period). The additional support period of 5-10 years after the typical loan term of 15 years entails a significant reserve in the KÁT scheme, which provides room for restructuring project loans in case of payment difficulties. In the METÁR scheme, a loan tenor of 15 years is just covered by the 15-year support period, and it no longer offers the possibility of restructuring.

[6] According to an amendment to the legislation implementing the European Union regulations introduced on 30.12.2019, they will already have to bear the causal costs of balancing energy between 2020-2026, but they are entitled to a declining annual compensation, thus the cost of balancing energy will be gradually included in their costs over 6 years.

2. THE PRESENT PROJECT DEVELOPMENT AND FINANCING LANDSCAPE

This chapter presents the current landscape of renewable energy investors and financiers. Due to the dominance of PV solar technology and its key strategic role, the presented data refers to PV solar power plants.

2.1. Solar PV projects

In September, a total of 3,444 utility-scale solar power plant support resolutions were in force, with a total capacity of 3,277 MW[7] (Figure 1 and Table 2). The vast majority of this, 2,919 MW, was still issued in the KÁT scheme. Due to the transition between the support schemes, the proportion of METÁR resolutions will increase greatly in the coming years.

Calculated on the basis of total capacity, about 40% of the projects that can be linked to support resolutions have started commercial operations with a capacity of 1,300 MW. In terms of number of resolutions, 63% of the projects were implemented; consequently, smaller projects have so far been successfully completed in a larger proportion.

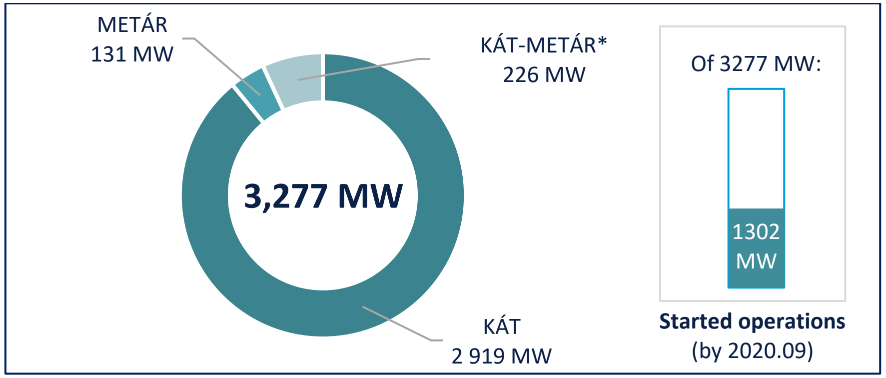


Figure 3: Solar PV support resolutions valid as of 09/2020 (*). The KÁT-METÁR category includes the METÁR-KÁT and METÁR wihout tendering subprograms

Scheme	Resolutions (projects)	Solar PV capacity (MWac)			Installed as of 09.2020
	Number	MW	%	Average	MW
KÁT	2,959	2,919	89%	1.0	1,144
KÁT-METÁR[8]	414	226	7%	0.5	156
METÁR	71	131	4%	2.0	2
Total	**3,444**	**3,276**			**1,302**

Table 2: Support resolutions as of September 2020

The size distribution of these solar PV plants is illustrated in Figure 4. 95% of the plants have a capacity of 0.5 MW or less. These account for almost half of the total capacity (1.576 MW) under the support schemes. The other half, 1.481 MW, comprises projects larger than 5 MW. Fifty-five such projects have been already built or are under construction. The largest projects reach 50 MW. The dominance of small-scale projects is due to regulatory features in the KÁT scheme, in which small projects undergo a simplified licensing process.

[7] The data refers to the total AC side capacity of the inverters (MWac).

[8] This category includes the METÁR-KÁT sub-programs (339 resolutions, 161 MW, 71% implemented) and the METÁR sub-programs without tendering (75 decisions, 65 MW, 63% implemented).

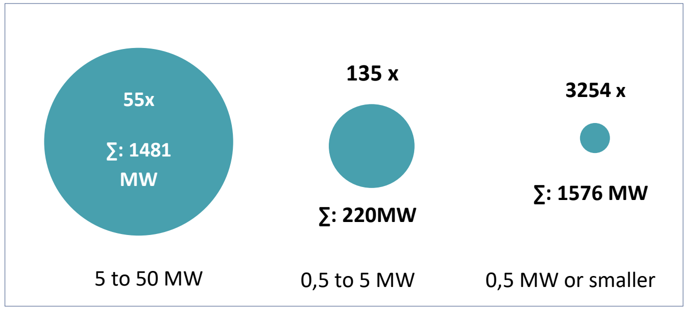


Figure 4: Size distribution of supported solar PV plants

Most of the solar PV plants are not built as stand-alone projects, but rather form clusters with several similar small power plants. Due to the larger project size in METÁR, such cluster forming is expected to be less prominent.

The regional distribution of solar power plants is shown in Figure 5: counties with the largest solar power capacities under development or completed are: Borsod-Abaúj-Zemplén (438 MW), Jász-Nagykun-Szolnok (338 MW) and Somogy (323 MW) counties. It is noteworthy that due to their geographical features, the areas of Hungary with the greatest solar energy potential are Csongrád, Baranya, Tolna and Bács-Kiskun counties.[9] With the exception of the latter, currently there are relatively few solar power plants under construction in these counties when compared to their good solar resource. The opposite is true for Borsod-Abaúj-Zemplén county which has one of the worst solar energy potentials in Hungary.

The regional distribution of solar power plants may still change considerably as a result of the next METÁR tenders. However, it is important to highlight the geographically decentralized nature of PV solar power, which is beneficial from the perspective of supply security and regional development policy.

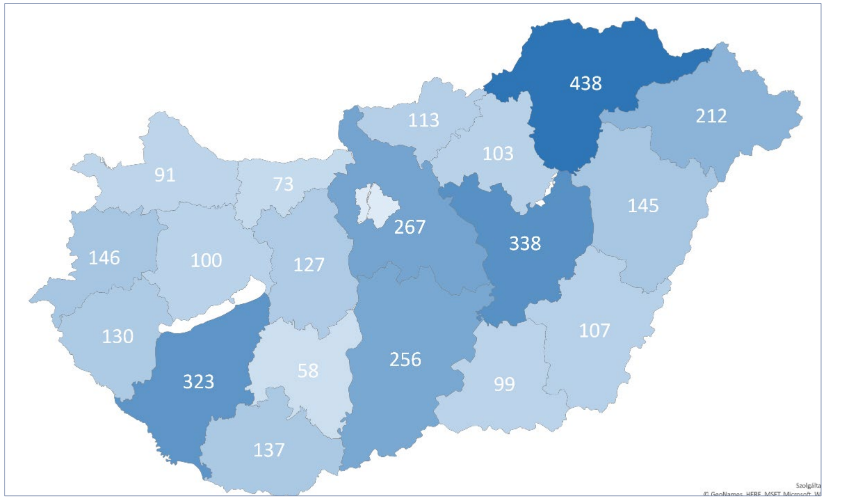


Figure 5: Regional distribution of supported solar PV plants (total MWac capacity)

2.2. Developers

The power plants that were granted support resolutions presented in the previous chapter can be linked to 1,795 developers. ¾ of the developers possess one support resolution and one quarter have at least two (sometimes up to ten) resolutions. The vast majority of developers are profit-oriented businesses, but there are some examples of municipal or individual developers as well.

In terms of sector, it can be shown that about 60% of the investors are energy companies, followed by companies in the service industry (14%) and construction sector (9%). Energy companies are typically special-purpose project companies set up specifically for the installation and operation of solar power plants. These recently founded vehicles do not have significant assets, do not generate revenues from other business activities and employ no or only very few employees.

[9] Based on the findings of SolarGIS: https://solargis.com/maps-and-gis-data/download/hungary

In contrast, a quarter of project developers employ more than 10 people; among the largest ones there are companies with more than 1,000 employees. Examining the aggregate employment data of all developers, the domestic solar energy industry contributes directly or indirectly to the maintenance of about 21,000 jobs, not counting suppliers and those employed during the construction phase of projects.

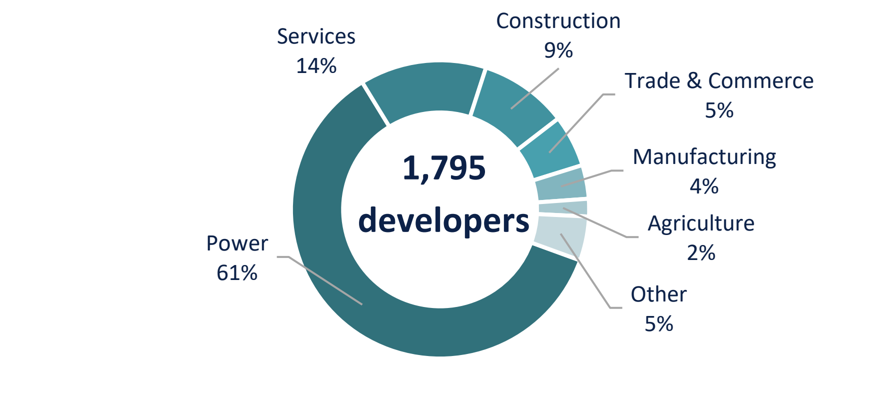


Figure 6: Distribution of solar power investors by industry

The sales revenues of developers show a similar picture to the employment data. Most companies reported revenues below HUF 20 million, 15% of them reported sales between HUF 20 and 300 million and 12-15% above HUF 300 million. This asymmetry is in line with the large presence of special-purpose project companies in the developer pool.

It should be noted that most of the mentioned project companies belong to interest groups or parent companies which encompass several other similar projects. It is estimated that the 1,795 developers are organized into approximately 600-650 different interest groups.[10] Stakeholder groups can often consist of tens, but exceptionally up to a hundred firms.

2.3. The pace of project installation

4% of the total 3,277 MW capacity that can be linked to support resolutions (7% of the resolution, 121 MW capacity) are marked as late in the regulator's register, i.e. they did not start operation by the commercial operations deadline. However, the start-up of many projects is not yet due. According to the general rules of the support scheme, developers have three years to reach project completion. Internationally, this is considered a long time; in some developed markets, solar power projects are implemented within one year.

[10] The estimate is based on the matching of project owners with similar company names and not on ownership data.

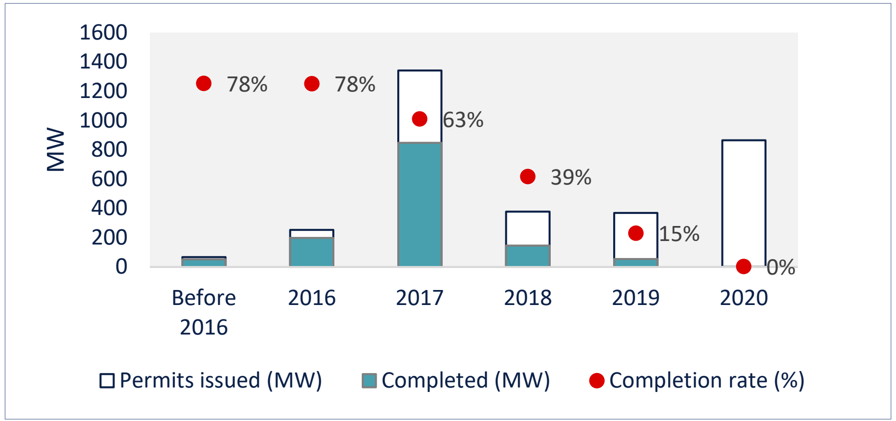


Figure 7: Installation of solar PV plants by the year of the support resolution

At the time of this analysis, 75% of developers still had at least 4 months to start operations. Figure 7 shows the pace of construction of the solar power plants according to the year of issuance of the support resolution. It shows that, with a 63% implementation rate, relatively old KÁT resolutions issued in 2017 have not been implemented yet. This is particularly true for KÁT resolutions issued after 2017: 39% and 15% of the 2018 and 2019 resolutions have been implemented so far, and there is no example for a single swiftly-constructed 2020 project.

Figure 8 illustrates the matter from another perspective by showing the pace of implementation by the commercial start-up deadline. Based on this, it can be presumed that the current construction activity, as expected, is still focused on projects with a deadline of 2021 (60% constructed). The commencement of operation of projects due in 2022 and beyond is yet to come.

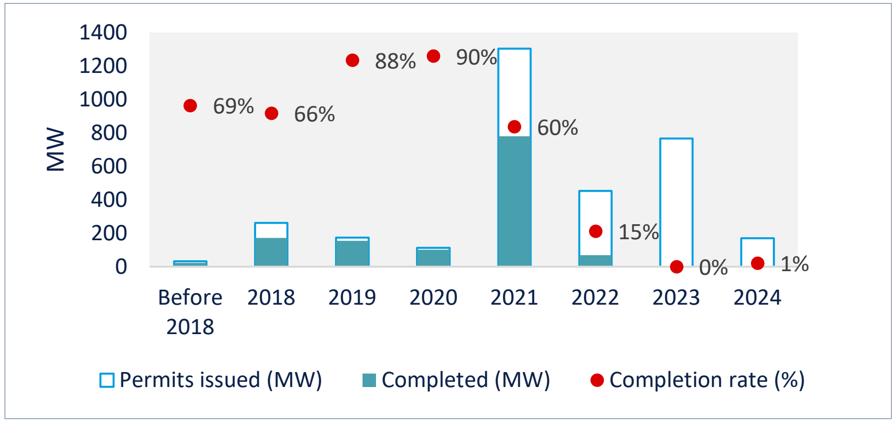


Figure 8: Installation of solar PV plants by the start-up deadline set by the support resolution

2.4. Debt financing

The sources of financing for domestic solar power plants can be grouped as follows:

Equity financing (internal financing): The developer or its mother company finances the investment from its own reserves or cash flow without incurring external indebtedness.

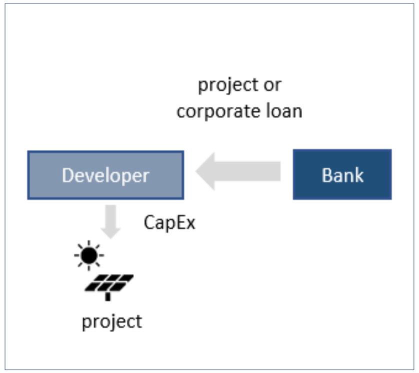
Debt financing (external financing): The developer finances the project using a certain amount of own funding but to a greater extent from external debt financing typically granted by credit institutions. Within this, two subgroups can be distinguished:

- **Direct CapEx term loans/ project financing** (Illustration A): Typically long-term loans granted to a firm holding the support resolution. There are two sub-types of this type of funding:
    - **Project financing:** a special-purpose project company established for the implementation of the solar power plant carries out the investment from a project loan. The only

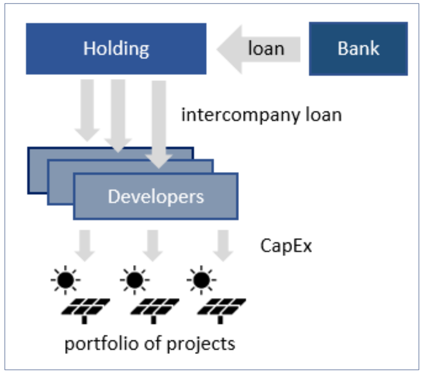
source of repayment of the project loan is the cash flow generated by the solar power plant.

- **Balance-sheet based corporate loans:** A non-energy sector company (e.g. an agribusiness company) finances the solar power plant by a corporate term loan that also takes into account its core business. The source of loan repayment is the cash generated by all the assets of the company.

- **Indirect holding-level financing** (Illustration B)**:** CapEx terms loans drawn down by a parent company and passed on to developers as intercompany loans, which ultimately finance a project portfolio.



Panel A. Direct, balance-sheet-based or project financing



Panel B. Indirect holding-level portfolio financing

Domestic financial institutions do not currently label loans for solar power plant investments, so the total outstanding loan portfolio and its composition can only be approximated using estimation methods (see the methodological note for details).

Debt financing statistic calculated based on the used methodology are shown in Table 2 and Figure 7: almost 80% of the 1,302 MW of constructed capacity was completed from project-level or holding-level debt financing. Approximately 15% was realized solely from developers' equity, while the source of funding for the remaining 5-7% capacity is unknown.

For 60% of the total solar power plant capacity to be built external debt fundraising is still in progress, or in the absence of that, it must rely on owner's equity. It is shown in Table 2 that while the completion rate of projects that have already received debt funding is on average 85%, only slightly more than 10% of the projects that do not have debt financing have been completed so far. It is true, however, that these projects have on average more time until the completion deadline (9 months), yet the data pinpoints the enabling role of debt financing in the successful completion of projects.

The outstanding solar PV bank loan portfolio (both at project and holding level) can be estimated at least HUF 237 billion. Correcting for the lack of data, the actual total exposure may be between HUF 250-270 billion[11], half of which is project-level and the other half is holding-level solar PV loans. In general, project-level financing was used by companies with less assets and employment than in the other loan category.

The average term of project-level solar PV loans is 12 years which is far below the 20-25-year useful economic life of solar power plants. The determinant of loan terms are the length of the support tenor and bank's credit risk policy, which prescribes a considerable buffer period between the end of the support term and the maturity of the loan.

[11] Calculated backwards, with a specific investment cost of HUF 350 million/MW and a leverage of 70%, the HUF 270 billion loan will result in a realized capacity of approximately 1,100 MW from loan financing, which is close to the value shown in Table 2.

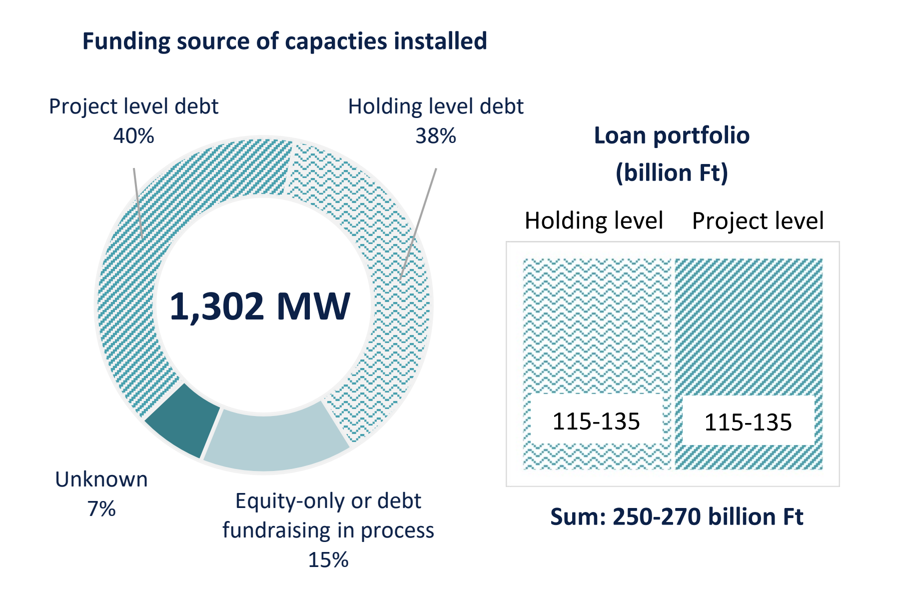


Figure 9: Financing sources of installed solar PV plants and the total outstanding loan portfolio (MNB estimate, see methodology note)

Methodological note:

The loans disbursed at project level were algorithmically tagged in the data retrieved from the Hungarian Credit Register database (downloaded on30/08/2020). To this end, solar power plant loans were defined as any loan that meets the following conditions:

- It is disbursed to a company with a renewable energy support resolution after the date of such resolution
- Its purpose is marked as capital expenditure (so not working capital loan)
- The loan's nominal amount per 1 MW of capacity to be installed is between HUF 150 million and HUF 400 million
- Its tenor is at least 7 years

The outstanding amount of project-level loans is given by the sum of outstanding principal amounts of the loans labelled as described above.

Holding level-loans were approximated from corporate balance sheet data, i.e. long-term and short-term liabilities in the latest financial accounts of companies possessing support resolutions. If a liability with an amount of HUF 150-400 million per 1 MW of capacity to be installed is identified, and the company cannot be associated with project-level financing according to the above algorithm, then the company presumably received holding-level financing. The outstanding amount of holding-level loans was inferred from the capacities associated with this type of financing and the outstanding amount of project-level loans. The assumption is that the two financing methods on average cover projects with similar installation unit costs and loans with similar gearing.

Equity-only financing was attributed to companies with a support resolution that have not been associated with either project-level or holding-level financing as described above. This reflects a momentary situation and does not mean that these companies cannot or will not obtain external det funding. If external debt raising is in progress but not yet completed, the loan does not yet appear in the database.

Source of financing	Developers		Solar power plant capacity (MWac)				Financing	Remaining time until start-up deadline
	Number	%	Permits granted (MW)	Permits granted (%)	Realised (MW)	Implemen-tation rate (%)	Outstanding loans/ financing (HUF million)	Average (month)
Unknown	229	13%	240	7%	89	37%	?	2
Direct solar PV project loans	496	28%	602	18%	522	87%	115 024	5
Indirect holding level financing	560	31%	603	18%	496	82%	115 215	0
Owner's equity or external fundraising still in progress	510	28%	1832	56%	195	11%	0	9
Total	**1 795**	**100%**	**3 276**	**100%**	**1 302**	**40%**	**236 728**	

Table 3: Funding sources of supported solar PV plants (Source: MNB's estimates; see the methodological note for details)

3. STAKEHOLDER CONSULTATION

In the spring of 2020, the MNB initiated a stakeholder consultation with commercial banks through the Banking Association on the limitations and difficulties of domestic financing of renewable energy production and on what changes would be needed in regulation and financing to facilitate the propagation of domestic renewable energy investments and to support the renewable energy expansion target outlined in the *National Energy Strategy 2030 with a view to 2040*.

3.1. Consultation with commercial banks

The commercial banks participating in the consultation ended in the summer of 2020 covered a three-quarters of the loans placed in the field of renewable energy. The issues raised in the consultation can be divided into three priority groups, from acute problems to less frequently mentioned ones.

Key challenges: These are specific major challenges mentioned by most responding banks that affect and aggravate the financing of the sector. Some of them concern the regulatory area, while most relate to the elevated credit risks resulting from the green premium framework in METÁR, which represent several changes as compared to the regulatory background of the KÁT scheme that banks have accustomed to finance:

- **Short duration of support period:** Although the Government Decree[12] allows for a support period of 20 years, the maximum support period in the METÁR tenders was 15 years. This is in line with the tendency of shortening support periods in the transitional subschemes after KÁT; for example, in the METÁR-KÁT and METÁR green premium without tender system, MEKH issued grant decisions mostly for 17 years. Financing banks strongly prefer shorter loan tenors than the support period in order to ensure that, if there are liquidity, operational or other problems during the period that adversely affect the repayment of the loan, there is sufficient time to resolve the issue and restructure the loan. However, in addition to the risks detailed below, financing beyond the duration of the support period also carries the additional risk that the beneficiary will no longer receive support and must meet challenges under market conditions, which may mean lower revenues and cash flow to use for debt service. As a result, funding beyond the maturity of support is not preferred by banks and typically conflicts with group-level lending policies.
- **Market risk:** Unlike in the previous system, producers must sell their output on the free market themselves. The recipient (MAVIR), that had an off-take obligation in KÁT, no longer takes over the entire amount of produced energy at a pre-determined fixed price. The volatility of market prices, the 20% lower maximum subsidized power price (max. 26 HUF/kWh) and the change in the subsidy formula (the premium being the difference between the tender price won and the ex post market reference price) jointly result in lower revenues and weaker income stability, thus making revenue profiles uncertain over the financing period. Market price volatility can be reduced if producers enter into an agreement called a *Power Purchase Agreement (PPA)*, which offers slightly lower prices than the average market prices but can make annual cash flows more stable. At the same time, while 10-year power supply contracts

[12] Government Decree No. 299/2017. (X. 17.) on the mandatory off-take and premium-type support for electricity produced from renewable energy sources

have become widespread in the United States or Western Europe, most power supply contracts in Hungary are for a shorter period and cannot cover the term of the bank loan related to the construction of the power plant.

- **Uncertain balancing costs:** In METÁR energy producers must bear 100% of the balancing costs they cause due to deviations from the energy production schedule. This means additional costs in the business; moreover, the predictability of such costs is uncertain. In the case of Hungarian solar power plants, this cost item is of considerable volume and a multiple of balancing energy costs of solar power plants in Western Europe. According to MAVIR's calculations, the average balancing energy cost of a solar power plant in the period 2019-2020 was 3 HUF/kWh. A long-term forecast is not available for the MNB. Commercial banks have suggested that regulatory changes enabling the licensing of wind farms could be instrumental to reduce balancing costs and diversify the renewable portfolio[13]. The convergence to balancing energy prices in Western Europe are only expected in an approx. 5-year perspective, following the completion of the Slovakian and Slovenian border intercepts and the integration of European balancing energy platforms.
- **Property law treatment of renewable power plants:** The only source of repayment of project loans lent by financing banks is the cash flow generated by the power plant, and one of the means of ensuring this and reducing credit risks is the application of a strong security structure. In the case of renewable power plants, the property law treatment of power plants is not uniform across the country, which has negative consequences on the valuation and enforcement of collateral. This would be solved if solar PV plants, whether built on leased or owned land, were classified as real estate with a separate topographical number in the real estate registration. In addition, it would be beneficial for financiers if the involvement of collateral trustee/agent became more transparent and if, in the event of insolvency and liquidation, the new owner could continue to operate the assets at another location, for example in brownfield areas or on the surface of buildings.

Overall, commercial banks have identified the need for a stable, predictable regulatory environment, as the frequently changing regulatory environment hampers strategic planning, acquiring technical expertise and building portfolios in this segment.

Medium priority challenges: Half of the respondents mentioned the following impediments that are important albeit rank lower than the key challenges.

- **Exchange rate risk**: About 70% of the solar PV equipment is imported, so developers in the KÁT scheme were also exposed to exchange rate risk, but this only affected the construction period. The recipient (MAVIR) paid a fixed price in HUF for the produced energy, and the exchange rate risk arising because of the EUR-based power exchange HUPX was not passed on to KÁT producers. In METÁR, on the other hand, there is no fixed off-take by MAVIR, and

[13] Government Decree No. 253/1997. (XII. 20.) Article 10 4: No wind power station or wind farm may be located in the area intended for construction and within 12,000 metres of the boundary of areas intended for construction, with the exception of small wind power plants considered as a household-sized power plants. There is no corresponding area in Hungary. In several European countries, this clearance is less than 1,200 m. Act LXXXVI of 2007 on Electricity Article 7/B* (1-3): the establishment of wind turbines and wind farms is possible on the basis of a tender announced in accordance with the conditions set out in the Ministerial Decree on the conditions of tenders for the construction of wind power capacity, the minimum content requirements and the rules of the tender procedure. No such tender procedure has yet been launched.

the free market sales are EUR-based or are determined by the parameters of the power purchase agreement made with the energy trader. Aligned with HUF green premium, the financing is based on HUF, so some short-term exchange rate risk arises during operations, the treatment of which may appear as an additional cost item in the cash flow or increase banks' debt service buffer requirements.

- **Support for brownfield investments, the process of reclassifying agricultural plots**: Power plant project developments on agricultural plots require the reclassification of agricultural plots, but this is only possible after the power plant's commissioning has been authorised, which further complicates the financing structure. It would be more efficient to grant the reclassification permit at the same time as the building permit. Another problem regarding developments on agricultural areas is that there is no effective incentive for renewable energy investments to be made in brownfield areas. In the METÁR scheme development in industrial areas cannot be favoured[14]. As a result, the withdrawal of agricultural land from cultivation is widespread practice for solar power plant developments, regardless of their potential productivity or alternative utilization potential for sustainable agriculture and water management.
- **Official regulation of heat prices:** Because of the officially regulated heat prices, certain forms of renewable energy, namely biomass, biogas, and geothermal energy, are only profitable together with electricity generation, which reduces the number of feasible projects. In geothermal energy, the success of well drilling is a special risk which can entail considerable costs, which significantly limits the number of potential investors. To resolve this, it would be necessary to review the official heat prices, to establish a renewable support scheme for the district heating segment, which was also formulated in the National Energy and Climate Plan, and to set up a geothermal venture capital fund that could cover the costs of risky well-drilling.

Less frequently mentioned challenges such problems affect the financing only indirectly and were mentioned by few actors only.

- **High network connection costs**: In Hungary, the scarcity of available network connection points can increase the total project costs, which in turn also increases financing need and weakens projects' debt service capacity.
- **Lack of network developments**: The large-scale capacity expansions in solar PV capacity calls for an extensive grid development program. The National Energy and Climate Plan estimated the cost at HUF 500 billion, which, if unsuccessful, could be a problem for the connection of new weather-dependent renewables.

3.2. Consultation with project developers

The aim of the market consultation launched in the summer of 2020 was to receive information on the financing issues and regulatory obstacles project developers are facing. Several market participants who have operating renewable energy assets portfolio or submitted bids in the first two METÁR

[14] The METÁR documentation approved by the European Commission only allows technology-neutral tenders.

tenders participated in this consultation. In addition, relevant industry associations were also involved.

The market consultation has largely yielded the same result as the consultation with commercial banks. The main problems indicated are by and large the same. It was repeated that the combination of additional costs and more volatile revenues resulting from the more salient market elements in METÁR as well as the reduced support period of 15 years (and the funding period available within it) are too tight for the projects to also satisfy banks' debt service coverage requirements (a coverage ratio (DSCR) of 1.20-1.30x is usual in project financing). The tightness of project cash flow can be lessened by greater equity contributions by the developers, but as this reduces investor returns it does not encourage investment.

It is unfavourable from the investor's point of view that while in the case of a negative market price for 6 consecutive hours, the producer is not entitled to a premium, when the market price exceeds the subsidized price, the producer is obliged to pay the difference to the recipient. This mechanism effectively removes investors' upside potential while keeping the downside risks in the business model. In the case of high market prices, the producer has limited ability to build up reserves, which forces the banks to follow a conservative lending policy.

Another financing challenge is that it has proven to be difficult for the banks to quantify certain parameters of the METÁR system, especially the uncertain additional risk and cost items in the long run. Financiers' lending policies and strategies related to METÁR have not yet matured.

The limitation of available debt funding is also shown by the fact that only foreign investment funds that are capable of financing a larger renewable energy portfolio are represented in the domestic renewable energy market.

One intervention to relieve the tightness of cash flows is to increase the support duration and thus the financing tenors: this would reduce the annual debt service burden while increasing reserves even despite some additional financing cost. Until the cost of the technology decreases to such an extent that lower installation costs lead to lower borrowing needs that can be amortized within 15 years while maintaining sufficient cover ratios, it is recommended to stick to the 20-year support period.

On the positive side, technology has evolved remarkably fast in recent decades, the price of photovoltaic cells has fallen to one hundredth of its 1970 level, and life-cycle unit cost of solar energy production has fallen by 77% between 2012-2018 and a further 58% decline is projected by 2030[15].

The parameters of METÁR which complies with EU legislation stimulate market competition. The price competition in both domestic and international tenders contributes to the push for the continuous development of technology resulting in more advanced and more cost-efficient installations.

[15] IRENA (2020) Global Renewables Outlook: Energy Transformation 2050

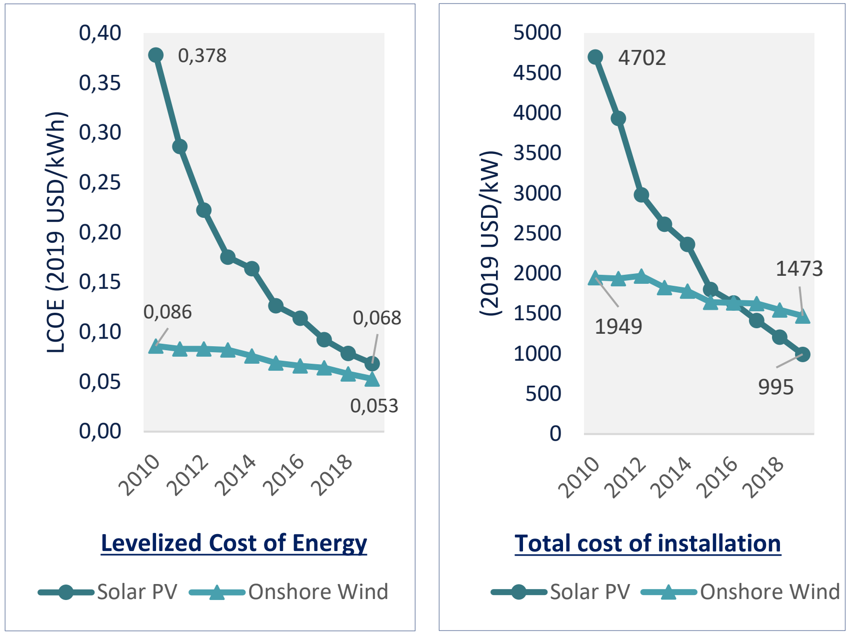


Figure 10: Cost trends of renewable energy technologies (Source: IRENA)

At the same time, the weakening of the HUF is a counterbalancing factor in project budgets (equipment is predominantly imported), as, since 2018, the HUF lost 17% and 18% of its value against the EUR and USD, respectively. As a result, the awarded green premium denominated in HUF depreciates over time against the technology and construction costs payable in USD and EUR.

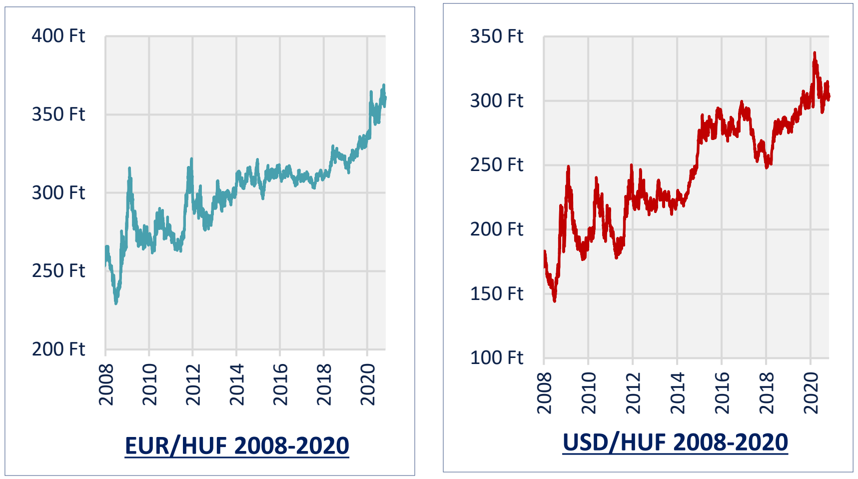


Figure 11: Long-term development of the Hungarian Forint (HUF) exchange rate against the euro and the dollar (Source: MNB)

The consultation with market participants has also shown that the significant increase in weather-dependent renewable capacities necessitates power network improvements and the construction of energy storage capacities, which have an indisputable role in enhancing the "carrying capacity" of networks and, thereby, in the security of supply. With the development of energy storage technology, the balancing costs can also be reduced in the long term. Based on market information, the payback time of current energy storage technologies is approx. 18-20 years, which also goes beyond the current METÁR support period, so this segment of renewable energy should be targeted with subsidies. Balancing costs can be reduced further by more accurate, high-quality scheduling, which requires a large number of aggregated portfolios, better quality operations and developments on the field of digitalisation.

Another way to reduce balancing costs is to add wind energy to the power generation mix. As a good complementor to solar energy both in diurnal and seasonal production, wind energy can remove a heavy toll off the balancing obligation arising from the variable production of solar power plants. This technology would diversify the asset portfolio of renewable energy asset owners and has the additional advantage of helping to moderate our high import-dependency of around 58% (this value is not favourable due to the import dependence regarding the raw materials and assets of certain technologies). Based on our climatic conditions, most of the country seems suitable for the utilization of wind energy, thanks to the fact that the hub height of large wind turbines already falls in the 120-150-metre category, where higher wind speeds can be harvested. The average wind speed in Hungary is 5.9 m/s at a height of 100 m, 6.8 m/s at 150 m and 7.4 m/s at 200 m, i.e. the capacity factor[16] can reach about 25%. In the case of the already installed domestic capacities, the average capacity factor between 2011 and 2018 was 23.3%, the EU average was 22.1%, and in Germany 19.2%. In contrast, the average daily capacity factor of domestic solar parks is typically 20%, while in winter it is around 10%.[17] Thus, in Hungary the production potential of wind power plants is not worse than that of solar power plants. Based on this, the diversification of weather-dependent producer portfolios with the help of wind turbines can have a good impact on the aggregated power production profile.

Extending the renewable support scheme to the district heating sector would be desirable also in the opinion of market participants, however, the technology-neutral tendering of the current support system does not enable the competitiveness of cogeneration capacities. Consequently, under the current conditions, the cogeneration capacity (e.g. biomass, biogas or geothermal) of renewable electricity plants receiving METÁR support could be an additional source of revenue, but the district heat price regulation is inconsistent for both market participants and potential financiers. Thus, on the whole, there is currently no substantial incentive to use Hungary's renewable energy resources for heat production in addition to electricity; whereas, 29% of Hungary's final energy consumption can be attributed to the residential sector which used 72% of this energy for heating in 2018. Furthermore, geothermal energy for heat recovery will be the cheapest technology in the district heating sector in Hungary by 2030, in those areas where geothermal potential can be accessed with good efficiency.[18]

[16] Capacity factor: the ratio of the actually produced electricity to the theoretically achievable maximum based on the rated power.

[17] https://energiaklub.hu/en/news/wind-power-is-an-essential-part-of-modern-energy-systems-even-in-hungary-4875; The technical conditions set forth in Decree 8/2001. (III. 30.) GM could be a constraint on the return of potential investors in wind farms.

[18] REKK: District heating potential estimate 2020

3.3. Bankability assessment of solar PV projects in Hungary

This chapter presents the numerical impact of the above-described financing constraints on the bankability of domestic solar PV projects. The methodology presented here compares the debt service coverage ratio (DSCR) of an average solar power plant in the KÁT scheme and its changes due to the roll-out of METÁR.

Power plants are predominantly funded in a project financing structure. Energy production is the only source of revenue, cash flow and loan repayment. In project financing structures, banks require an acceptable level of debt service buffer. The debt service buffer is measured by the debt service coverage ratio (DSCR)[19] the required rate of which is classically 1.20x. If the value of this indicator is 1.00x, then the cash flow generated is just enough to cover debt service, so this is the break-even point. Given the additional risks inherent in the METÁR scheme, bank financiers very often require a higher debt service buffer. Therefore, the calculations here are based on a DSCR expectation of 1.30x.[20]

The results of the calculations are illustrated in Figure 14, according to which the collective changes brought about by the transition to the METÁR scheme reduce the debt service coverage indicator below the break-even point. The question arises whether the winning METÁR bidders will be able to meet the debt service requirements of the funding credit institutions. The banks can respond by reducing the amount of funding, i.e. by increasing the required equity contribution from developers, which can reduce investor returns and, at the same time, their willingness to invest in renewable energy.

The figure also illustrates that if the annual debt service amount was to decrease by the lengthening of the support period to 20 years and loan tenors to 18 years, the DSCR could rise above the break-even point with a value of 1.17x. Although this level still remains below the assumed METÁR DSCR requirement, it is already approaching the level of the standard project financing DSCR requirement and would provide a 2-year tail (duration reserve). In the absence of a 20-year support period, the financing period could also be extended in such a way that the power plant operates on a market basis for the first 1-2 years (when market prices are more predictable) and then it is allowed enter the support scheme for 15 years.

[19] DSCR: debt service coverage ratio: (operating profit + depreciation - tax payment - creation of operating reserves) / (loan repayment + interest payment)

[20] Preferential loans (such as NHP, Exim etc.) strongly improve the DSCR level. The calculations in the study refer to financing without subsidized loans.

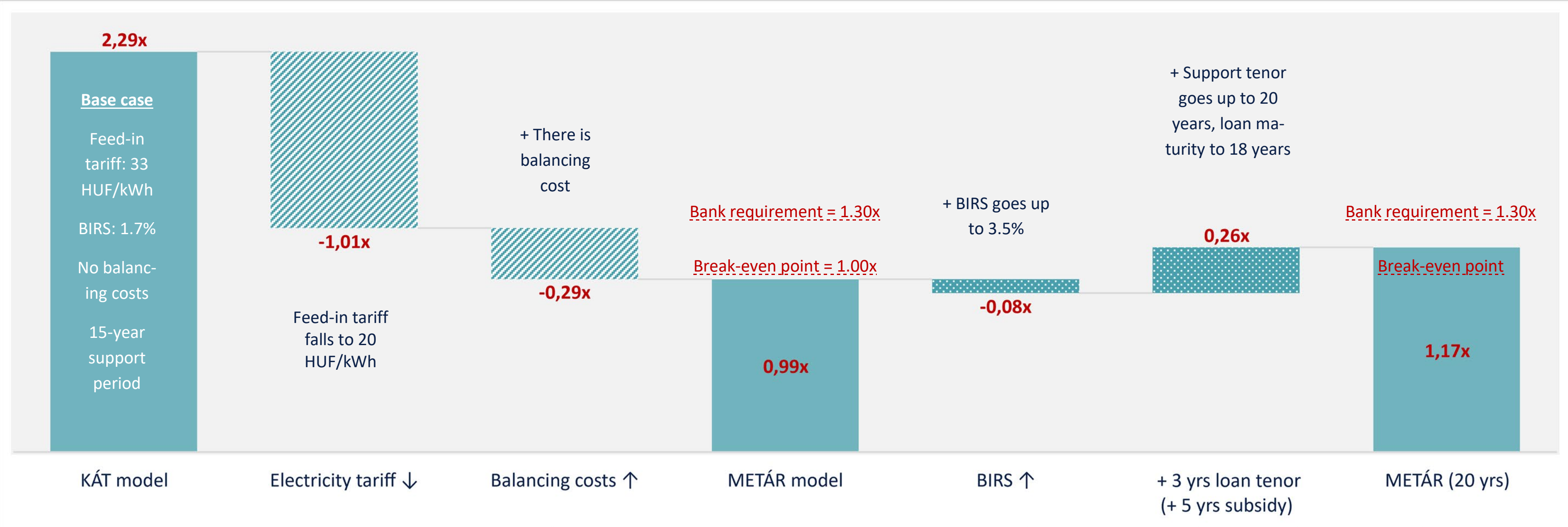


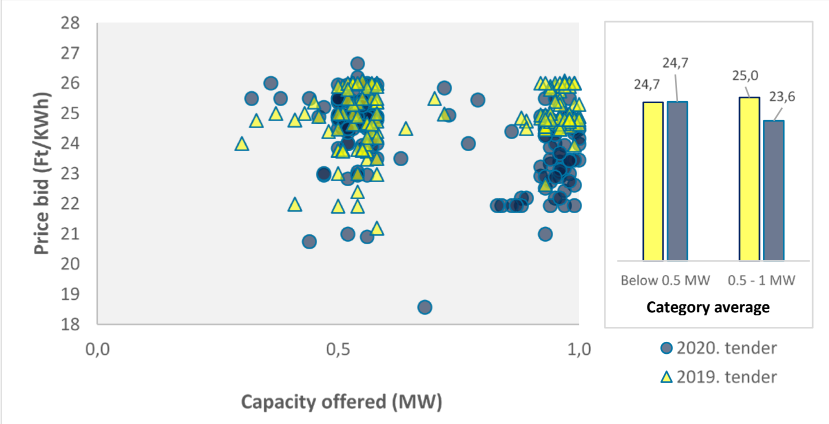
Figure 12: Development of the DSCR indicator of the business model based on KÁT and METÁR (Source: MNB)

The calculations are based on the following assumptions:

- **Project costs**: The calculation of the technology, labour, other raw materials and project costs is based on the MNB's estimate for the 3rd quarter of 2020 for a solar power plant with fixed supporting structure and an average installed capacity between 1MW-50MW. The project costs of smaller power plants may differ from this, which is also reflected in the difference in the average tender prices in the two size categories of METÁR tenders (see Figure 13).
- **Energy production and OpEx**: In order to verify the amount of energy that can be produced and the development of operating costs, banks engage technical advisors and rely on their estimates as the base case scenario. At the same time, in addition to the technical characteristics of the power plant, the production estimates are influenced by the geographical location of the power plant and its solar irradiation potential. In our calculations, we calculated the production potential according to the methodology applied by MEKH for the KÁT scheme.
- **Reserves:** In order to mitigate credit risk, financiers also require reserve accounts cover a certain portion of debt service (in case of temporary difficulties), the costs of maintenance and replacement of assets beyond the expiration of manufacturer's guarantees. In our calculations, we also took into account the obligation to replenish typical reserve accounts, assuming average manufacturer warranty periods.
- **Loan tenor:** In all cases we calculated with a financing term of 15 years, however, it should be noted that while in the case of the KÁT

scheme several years of reserve tail (buffer) falls within the long support period, in the case of METÁR there is no such reserve tail.

- **Tariffs and prices**: For KÁT the current fixed feed-in tariff of 33 HUF/kWh was used. (indexed with inflation minus one percentage point). For METÁR the calculation was based on 20 HUF/kWh bid price. This is based on the average bid prices of the 2nd METÁR tender and the weighted average of the winning prices. Note that in METÁR the maximum price that can be bid for (26 HUF/kWh) is 21% lower than the KÁT tariff. The result of the 40% decrease in the actual energy price (from 33 to 20 HUF/kWh) was a 1.01x decrease in the DSCR indicator. The decline of energy bid prices can also be seen when comparing the 2019 and 2020 METÁR auctions. This is illustrated in the following figures.



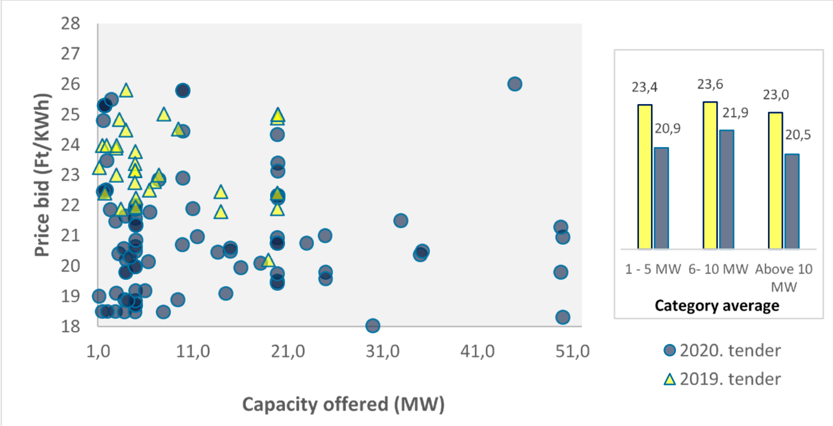


Figure 13: Bids for the 2019 and 2020 METÁR tenders. **Above**: Bids with offered capacity of 1 MW and more. **Below**: Bids with offered capacity of less than 1 MW

Lower energy prices reduce the subsidy charge imposed on industrial consumers who ultimately bear the costs of renewable energy support schemes. Industrial consumers are significant players also in terms of the Hungarian economy and employment; lower energy prices thus contribute to competitiveness of the economy.

- **Completion guarantees**: It entails no additional risk to the cash flow of the projects, but calls for more equity funding that in the auction system developers are required to provide bid bonds and performance bonds in the form of bank , guarantees. These amount to 1.5 and 5% of project costs, respectively, calculated from the benchmark published in the tender invitation and the rated capacity. However, projects that eventually fail because of completion issues will only come to light at the end of the 3-years period. This shortcoming could be resolved if the availability of the necessary financing sources had to be demonstrated within a shorter, fixed period after the tender announcement.
- **Other costs:** Instead of the mandatory offtake that characterize KÁT, METÁR is based on market sales, which requires the engagement of an energy trader. These trader contracts typically include scheduling, balancing and sales services, the combined cost of which causes a further 0.29x decrease in the DSCR, with which it drops below the break-even point.
- **Interest rates**: The cost of financing is strongly influenced by the level of available interest rates. Given the stable revenue and cost profile of solar power plants and the project financing structures of banks, mitigating long-term interest rate risks is in the shared interest of developers and financing banks. Recent solar power plant developments have been supported by the record-low level of long-term fixed HUF interest rates[21], according to which we based our calculations on the very favourable level of 178 bps of the 10-year HUF IRS as of November 2020. However, the potential economic turbulence following the pandemic raises uncertainty about future interest rates. To model such interest rate risk, we set the 10-year HUF level higher to 350 basis points in our calculations, which would result in a further 0.08x decrease in the DSCR indicator. With a value of 0.91x the indicator is well below the break-even point. Lower interest rates can have a significant effect on the debt service capacity of project loans. Consequently, preferential or subsidized loan schemes have a significant potential to improve the creditworthiness of PV solar project loans.

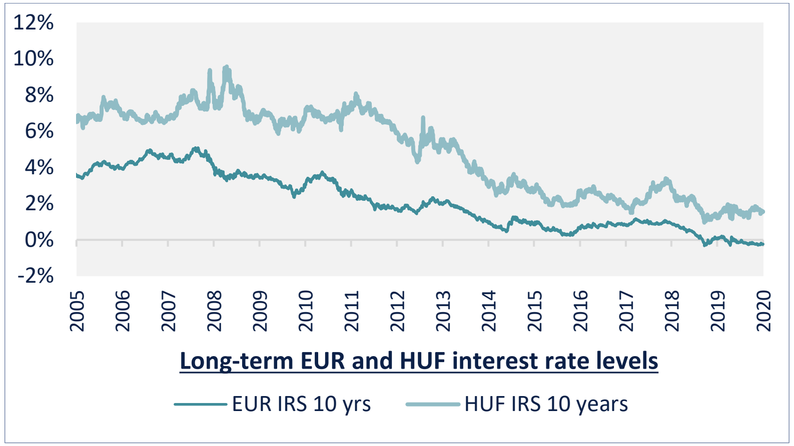


Figure 14: EUR and HUF interest rate swaps levels (Source: Bloomberg)

[21] https://www.mnb.hu/en/pressroom/press-releases/press-releases-2016/from-1-november-2016-the-mnb-acts-as-the-administrator-of-bubor-birs-and-hufonia-swap-index-reference-rates

4. THE REGULATORY TOOLS OF THE MNB SUPPORTING RENEWABLE ENERGY FINANCING

Based on the chapters discussed earlier, it is the interest of the MNB that the financing of renewable energy by banks (or other financial institutions) takes place in a favourable economic environment.

> The MNB made the financing regulation of renewable energy production more favourable in two respects already at the end of 2019:
>
> - Accepting the proposal raised by commercial banks, the MNB does not require the allocation of a balloon-bullet risk capital add-on in the case of renewable energy lending exposures under the KÁT/METÁR system from 2020 onwards.
> - The preferential risk capital requirement introduced for green residential housing is extended to the following investments related to housing:
>   - Installation of solar panels or solar collectors,
>   - Installation of air-to-water and air-to-air geothermal heat pumps,
>   - Wind turbine installations,
>   Installation of heat and electrical storage units.

4.1. Balloon-bullet facilities

With an earlier decision, the MNB classified loans with a maturity of more than one year, in which all or a significant part – 60% or more – of the principal repayment is due in the last 20% of the financing tenor, as risky portfolios. According to the balloon-bullet regulation[22], credit institutions shall allocate a risk capital add-on in the amount of 50% of the Pillar 1 capital requirement of the relevant performing portfolio. The derogation valid as of December 2019, allows deviation from the above mentioned 50% add-on rule on exposures with Pillar 2 risk weight beyond 250%. Allocation of the above-mentioned risk capital add-on is not required on exposures meeting all of the following criteria:

a) the exposure is linked to the organization's operating or supporting physical structures or facilities, systems and networks that provide or support essential public services;

b) cash flows generated by the obligor are low risk, and ensured by a state support schemes and legal regulations;

c) the instructions of the Executive Circular Letter on the risk management of Balloon-Bullet lending exposures are applied and documented on the given exposure.

For condition b), the MNB takes into account the mandatory off-take Feed-in-Tariff set forth in the Act LXXXVI of 2007 on Electricity and the green premium applicable on renewable power generation, i.e. the renewable energy support schemes.

[22] ICAAP-ILAAP-BMA Manual, Annex 4, December 2019 https://www.mnb.hu/felugyelet/szabalyozas/felugyeleti-szabalyozo-eszkozok/felugyeleti-szabalyozo-eszkozok-archivuma/icaap-srep-ilaap-bma-modszertani-utmutatok-es-kapcsolodo-dokumentumok-archivum

4.2. Preferential capital requirement for energy efficient mortgages

Making energy-efficient mortgages and personal loans more favourable can help ensure that household energy efficiency investments enjoy more favourable financing conditions than other types of retail loans. The field of energy efficiency is closely linked to renewable energy, hence renewable energy investments may also be eligible for the preferential capital requirement.

4.3. Infrastructure Support Factor (ISF)

The regulations on ISF were already introduced in the Capital Requirements Regulation (CRR) as amended by Regulation (EU) 2019/876 of the European Parliament and of the Council, but originally would have been applicable only as of 28 June 2021. However, the date of application was brought forward to 27 June 2020 by Regulation (EU) 2020/873 of the European Parliament and of the Council. The ISF allows for a significant *25% reduction in the Pillar 1 risk capital requirement* for infrastructure-type lending exposures that meet the criteria listed in the Regulation.

At the end of 2020 MNB issued an Executive Circular Letter to support the application of the ISF in accordance with EU regulations[23].

The condition for the support factor is that the exposure is linked to an entity established for the operation or financing of physical structures or facilities, systems and networks providing or supporting essential public services. It is also a criterion that at least two-thirds of the source of repayment comes from the income generated by the financed assets or a support scheme provided by central or local government, central bank or other public sector entity. There is an important additional "green" condition for the application of the ISF: the obligor shall assess whether the financed assets contribute to the environmental objectives of the EU Taxonomy (see below), i.e. mitigation of climate change, adaptation to climate change, sustainable use of water and marine resources, circular economy, prevention and reduction of environment pollution or the preservation of ecosystems.

In the context of the joint interpretation of the above conditions, the MNB, as explained in the relevant Executive Circular Letter, considers corporate and special lending exposures that finance assets, systems, networks and other structures operating in the energy sector, including energy production (such as assets producing energy or facilitating energy efficiency as well as energy distribution and public utility infrastructures) waste management, water management and transport sectors are the most relevant for the application of the ISF.

This relief can help facilitate climate-friendly investments in essential public services operating independently of the economic cycle and can thereby be an important pillar in tackling the economic crisis in the aftermath of a pandemic and in combating climate change. It may also contribute to the stimulation of environmentally sustainable economic growth.

4.4. Preferential capital requirements for green corporate financing

In order to reduce the transition risk associated with environmental anomalies, the MNB introduces additional incentives from 2021 onwards to support environmentally sustainable, green economic activities, such as renewable energy, which may provide an additional impulse to the growth of renewable energy investments in addition to existing measures.

[23] https://mnb.hu/letoltes/isf-vezetoi-korlevel.pdf (in Hungarian only)

From 2021, the MNB will introduce a preferential capital requirement for project finance and investment loans in the corporate or municipal segments of bank lending that finance renewable energy investments.

The preferential capital requirement is also applicable for bonds issued by companies or municipalities for the financing of renewable energy investments from the proceeds.

The preferential capital requirement is also applicable for exposures linked to the underwriting of corporate, municipality green bonds, provided that compliance with green bond standards is ensured.

The capital requirement releases a part or all of the capital requirements prescribed in Pillar 2 of capital regulation for environmentally sustainable corporate and municipal exposures that meet a strict criteria. It may be used for 5 years up to a maximum of 5% of the total gross portfolio exposure. The banks shall determine the extent, to which the underlying lending transaction finances "green" goals, which can help to create an more detailed picture on the dynamics of the expansion of green and sustainable investments, which is financed by the banking sector in Hungary.

4.5. Opportunities going forward

We have presented above the regulatory steps that have already been introduced or are being implemented within the competence of the MNB. In the future, the MNB will continuously analyse market developments and in co-operation with its partner institutions, will examine possible additional measures that could help renewable energy to access more favourable financing environment in Hungary

The MNB also intends to facilitate the financing of other green, sustainable activities and industries, especially in the fields of sustainable agriculture, the circular economy, energy efficiency investments and "green" transport and logistics.

4.6. What does the MNB consider green energy?

Under the recently adopted Regulation on establishing a framework for the facilitation of sustainable investment[24], EU Member States are required to adopt their sustainable finance measures in accordance with the Regulation and the related regulatory technical standards (mandatory for investment products, optional for lending for the time being). The regulatory technical standards are still under development, currently the Final report of the Technical Expert Group on Sustainable Finance[25] can be used. Accordingly, the capital requirement programme introduced by the MNB for green mortgage loans has already used the definitions of the Taxonomy regulation.

The Technical annex to the TEG final report on the EU taxonomy[26] identifies in each economic sector the activities considered as environmentally friendly, assists the access of economic actors to green financing by defining various sustainability thresholds, and the Taxonomy regulation in general supports the expansion of low-carbon segments and the carbon neutralization of high-emission segments. In the energy sector, for example, the Taxonomy regulation makes distinctions per the source of energy,

[24] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R2088&from=EN
[25] https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf
[26] https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf

electricity and heat production, energy storage, biomass, biogas and bio-fuel production, district heating and different types of cogeneration plants by resource.

The MNB therefore considers the Taxonomy regulation to be the basis for the definition of environmentally sustainable energy production.

The MNB welcomes comments and questions on the contents of this publication at zold.penzugyek@mnb.hu. Documents related to the Green Program are available at https://www.mnb.hu/green-finance/english mnb.hu