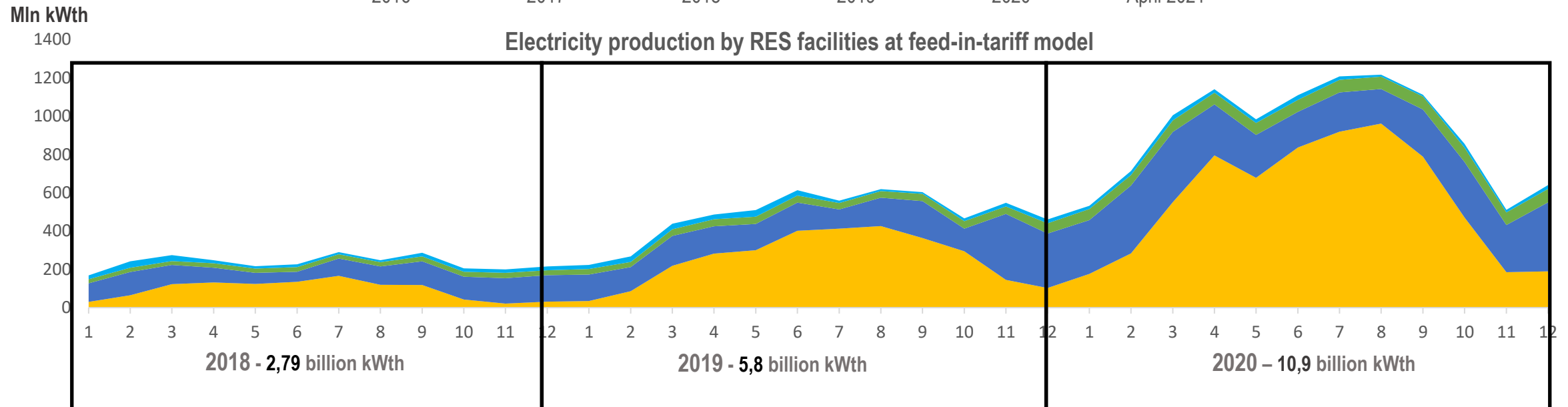
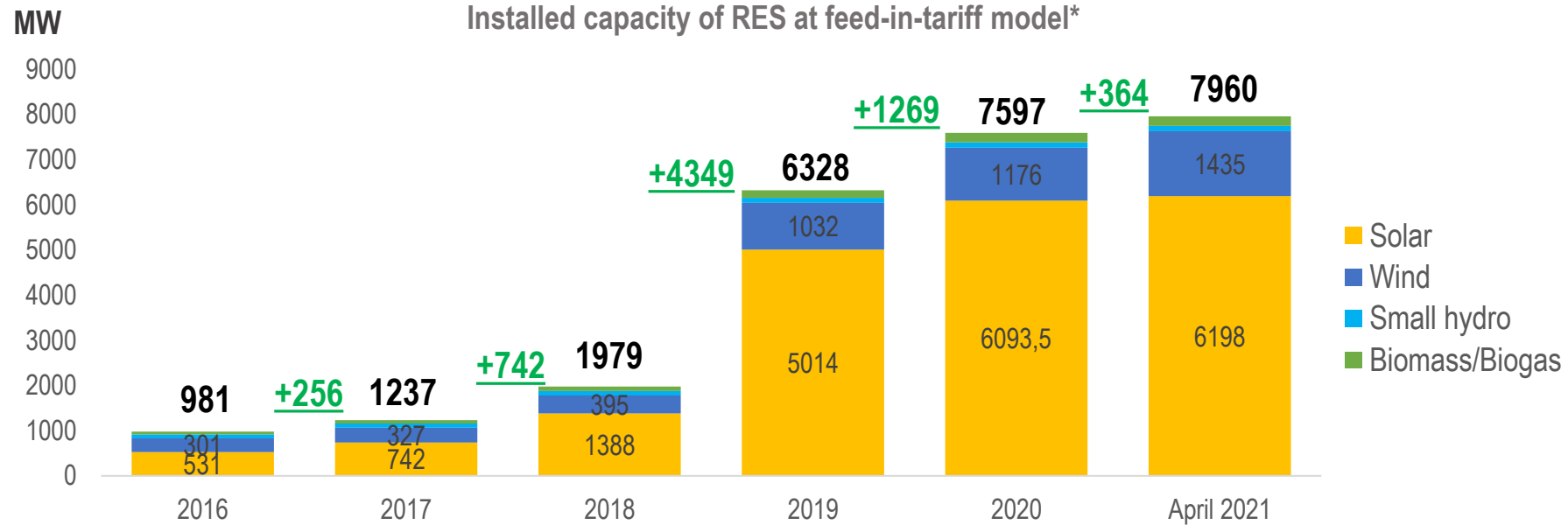




Renewable energy sources development in Ukraine

Due to the introduction of the feed-in-tariff model in Ukraine during 2019-2020 there was a rapid increase in the installed capacity of RES



* excluding facilities in the occupied territories and private households

Examples of renewable energy projects in Ukraine

Teofipol biogas complex 15 MW



Town: **Teofipol**, Khmelnytskyi region

Type of fuel: **sugar beet pulp, corn silage**

Electricity production: **15 MW**

- 5 MW (first line working on sugar beet pulp);
- 10 MW (second line working on corn silage).

Heat production: **15 MW**

Investments: **40 mln EUR**

Equipment: **Jenbacher (Austria)**

Pokrovska SPP 240 MW



Town: **Pokrov**, Dnipropetrovsky region

Installed capacity: **240 MW**

Electricity production: **400 mln kWt per year**

Quantity of panels: **874 thousands**

Investments: **200 mln EUR**

Equipment: **Siemens, Risen**

Comissioned: **2019**

Syvash WPP 250 MW



Area: **Kherson region**

Total capacity: **250 MW**

Number of turbines: **67**

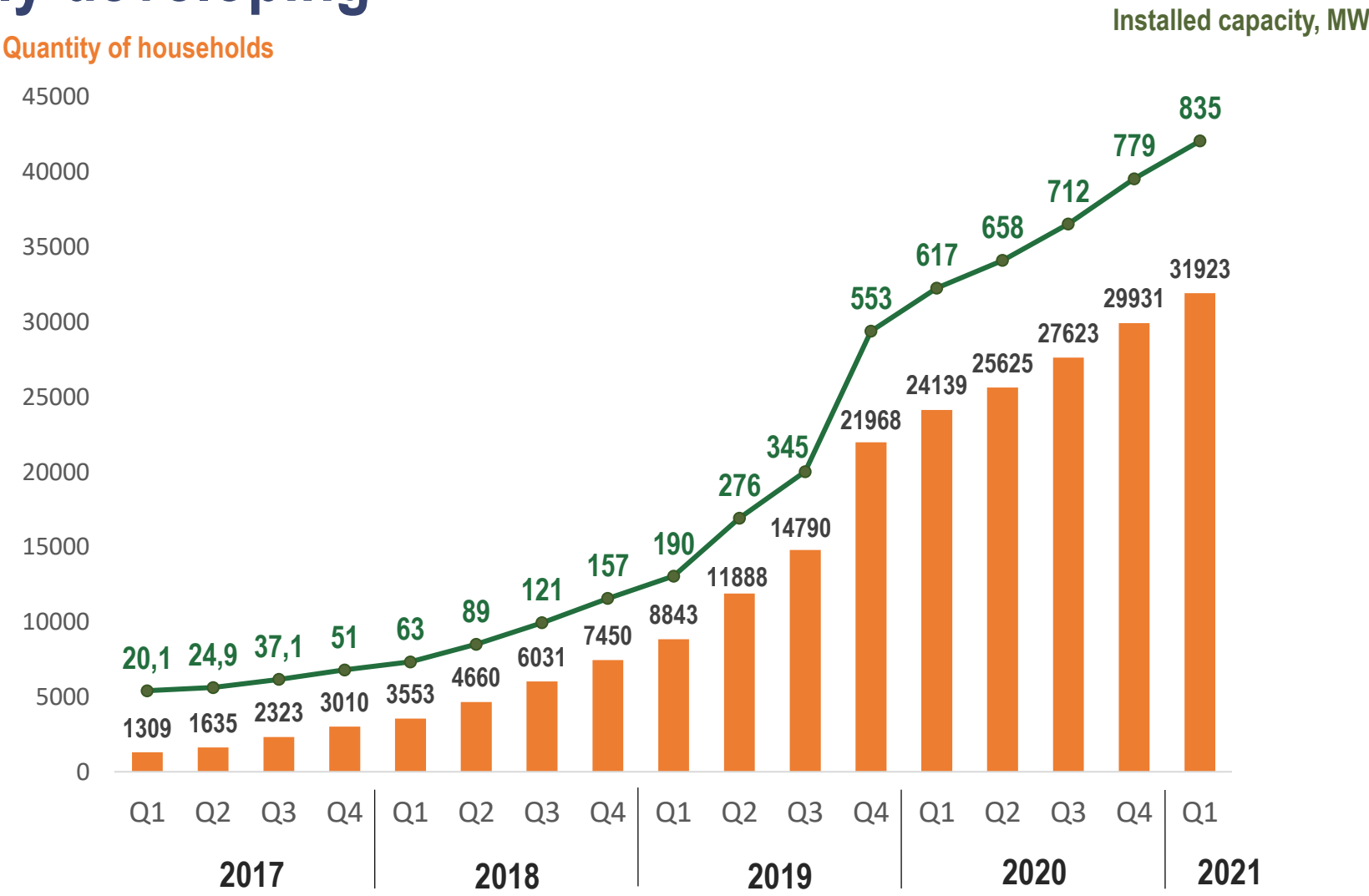
Rotor diameter: **131 m**

Annual production: **800 mln kWth per year**

Year of commissioning: **2021-2022**

Investments: **350 mln EUR**

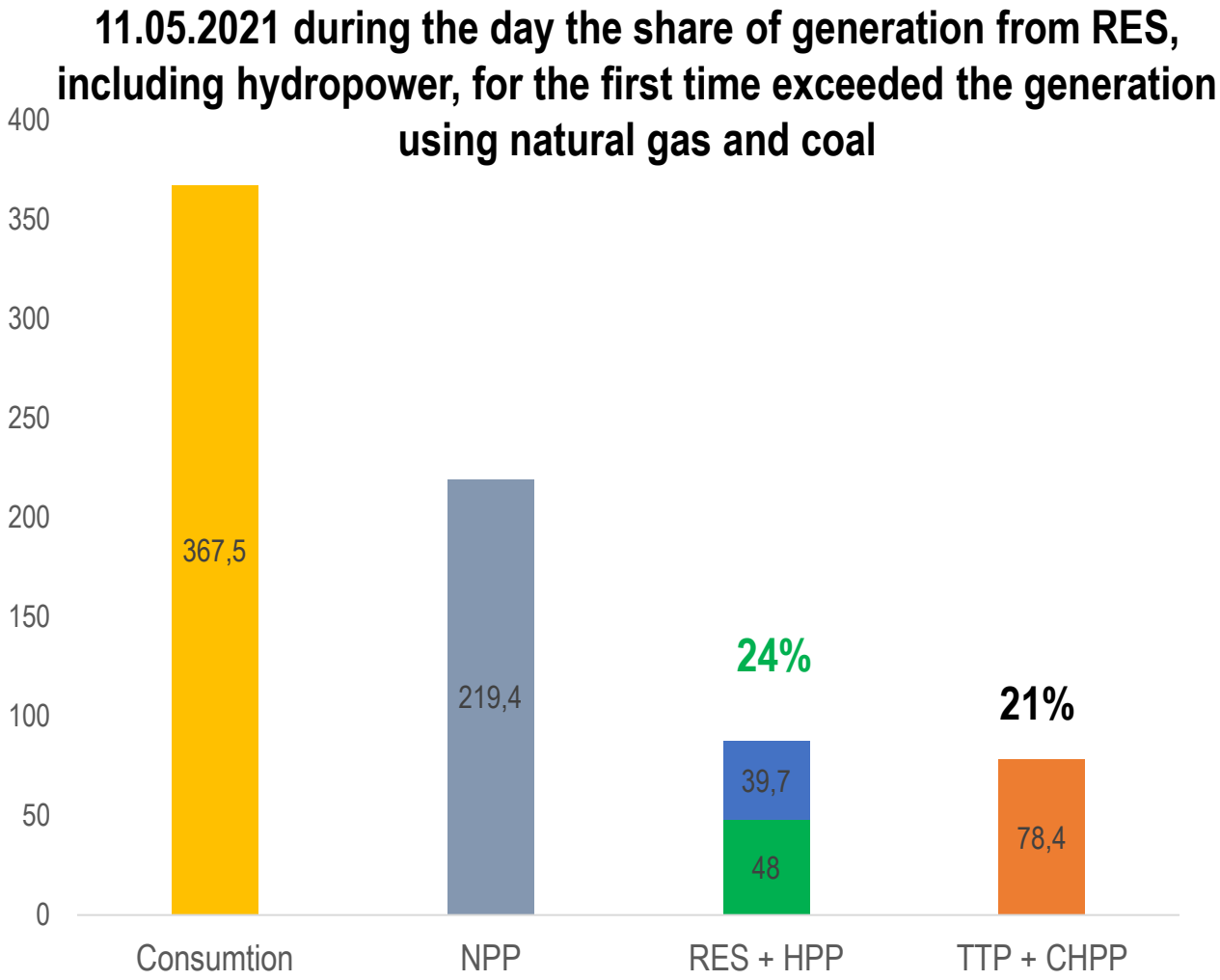
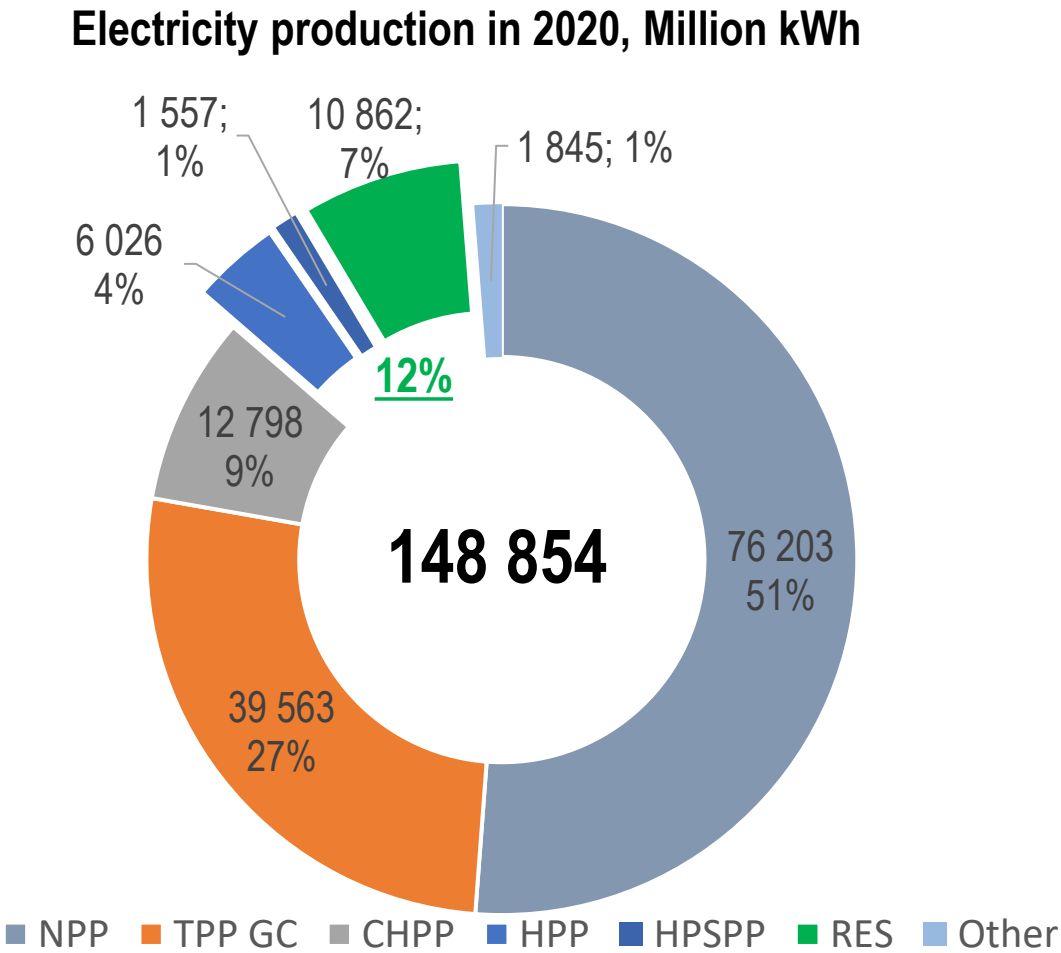
Also, in Ukraine the generation segment with RES of private households is actively developing



Investments - more than 640 million euros

There are about 6.5 million private households in Ukraine

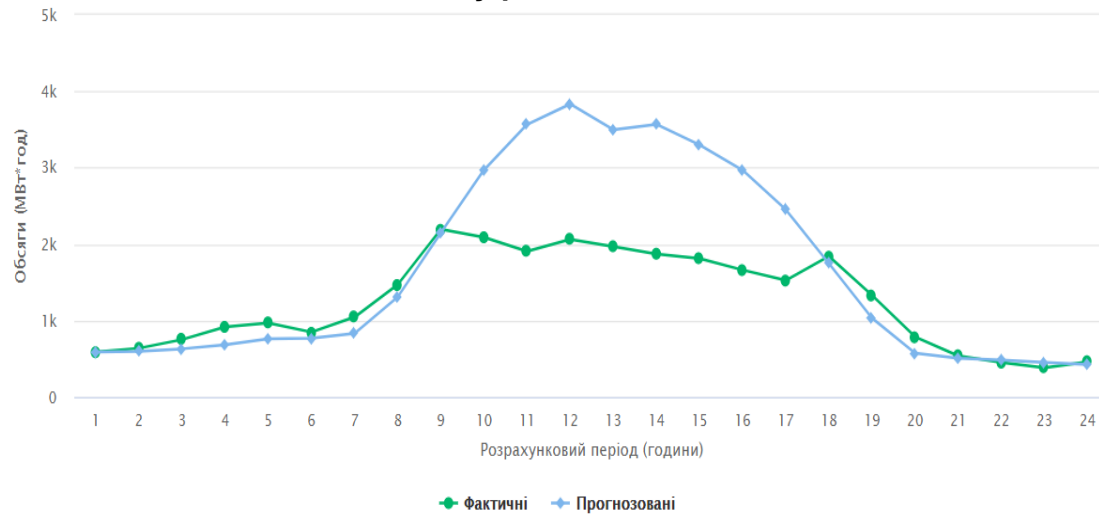
The share of generation from RES in the energy balance is growing, and on some days already exceeds the generation from fossil fuels



The rapid development of RES has led to economic and technical challenges in the power system

- ❗ Overloading of the power system with base load, lack of efficient balancing generation
- ❗ Outdated network infrastructure in need of development and modernization
- ❗ Low accuracy of renewable generation forecasting

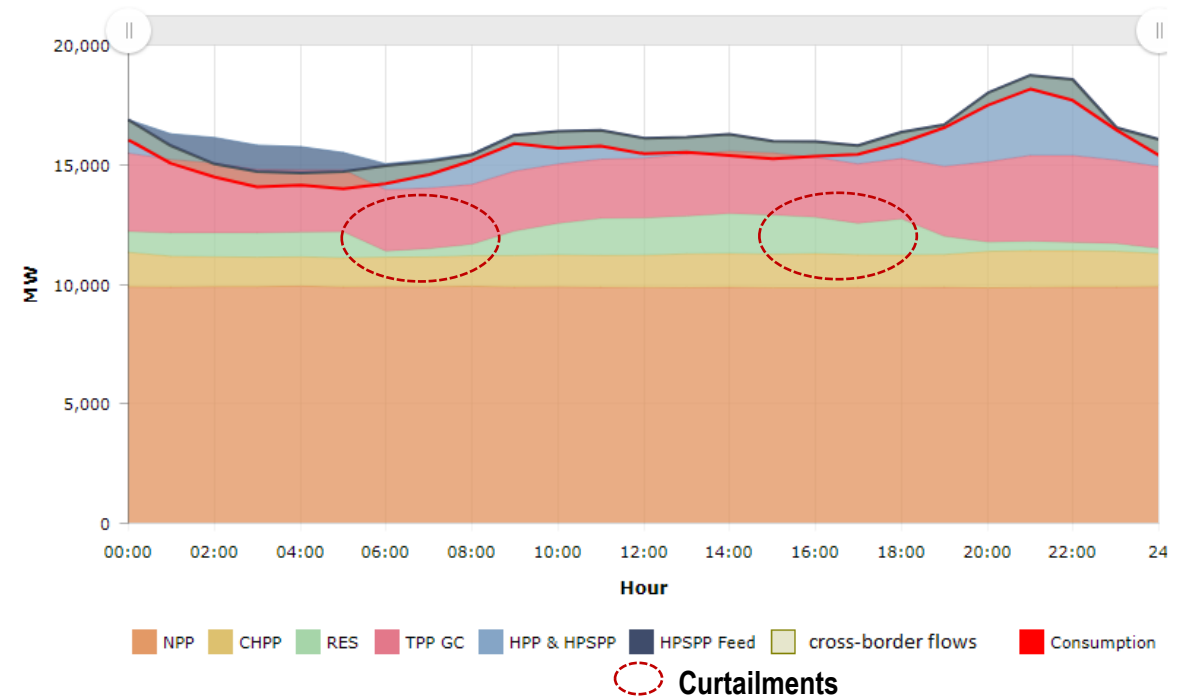
Schedule of electricity production from RES for 24.04.2021



The transmission system operator is forced to periodically apply RES generation curtailments to ensure the operational security of the network.

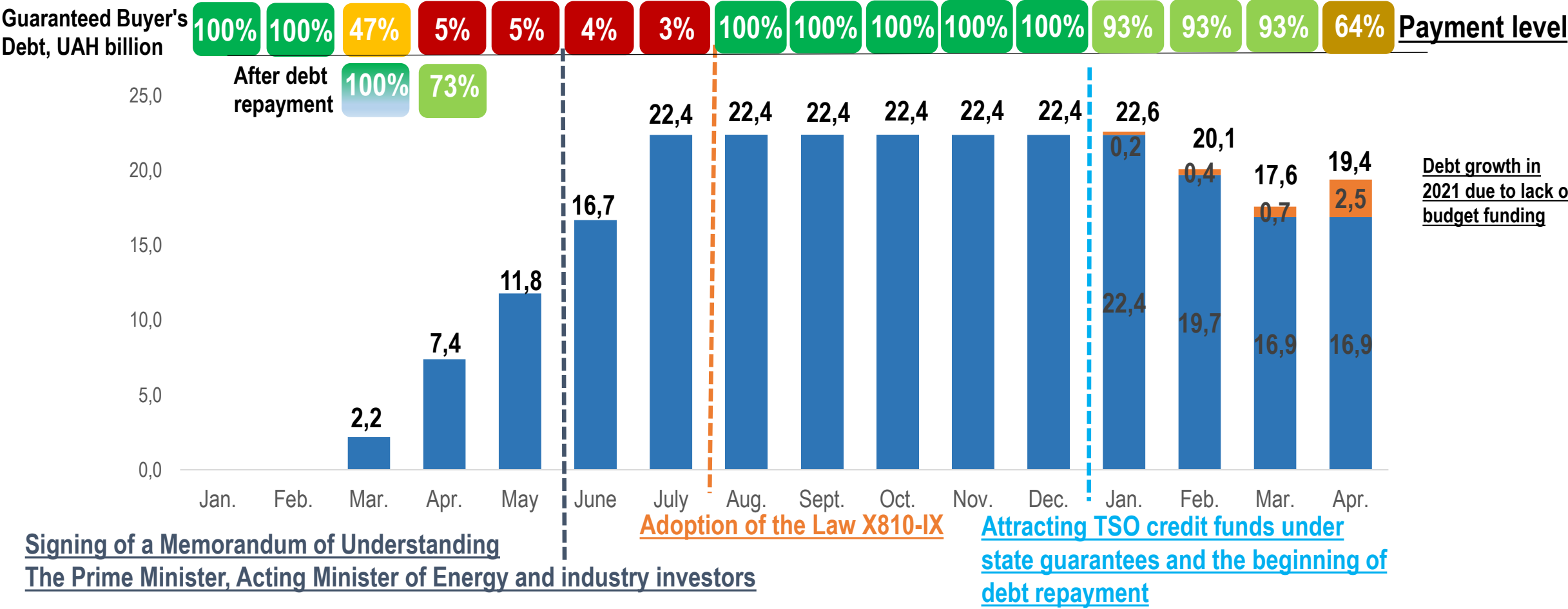
Unproduced electricity must be paid for at feed-in-tariff!

Daily electricity generation/consumption schedule by 11.04.2021



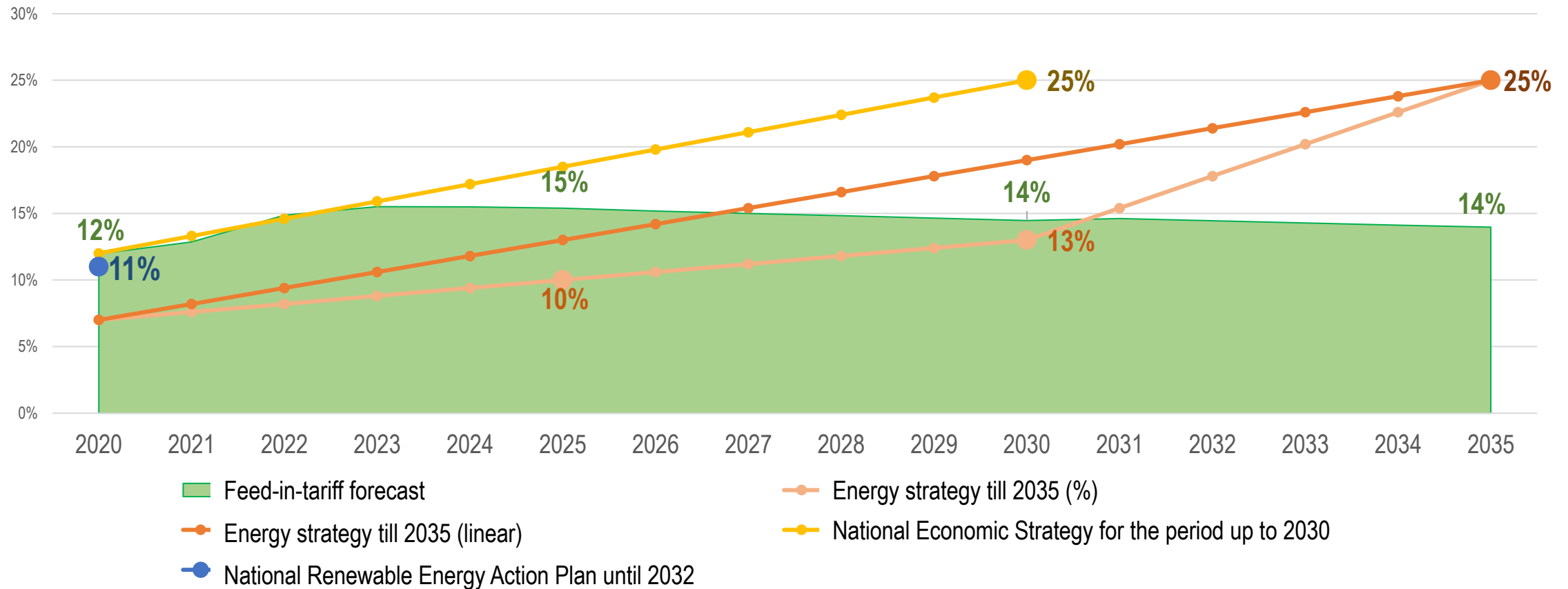
❗ The sharp increase in the volume of installed capacity at a high Feed-in-tariff has led to a deficit of SE "Guaranteed Buyer" and the formation of debts to producers with RES

The Government negotiated with RES producers through the Secretariat of the Energy Community, resulting in a Memorandum, the terms of which were implemented in the Law, which allowed to stabilize the situation in the industry.



- ✓ Feed-in-tariffs were reduced for Solar by 15% for Wind by 7.5%. Full responsibility for imbalances introduced from 2022
- ✓ Repayment of existing debt is planned through credit funds and the issuance of "green" bonds.
- ✓ To ensure further stable financing of RES, the possibility of directing funds from the CO2 tax is being considered.

The strategic goals of RES industry development in accordance with the Energy Strategy of Ukraine until 2035 and the National Plan for RES Development until 2020 have been achieved



Ukraine currently:

- updating Energy Strategy of Ukraine until 2035;
- developing Integrated National Energy and Climate Action Plan to 2030;
- developing National Renewable Energy Action Plan until 2030;
- preparing The second nationally determined contribution to the Paris Agreement.

Further development of RES in Ukraine is planned on a competitive basis, including through auctions

2021

Auctions start from 2021 and run until 2030.



Auctions are held according to the schedule set by the Government



Quotas are approved by the Government annually for next year and indicative quotas for next 4 years (Government may set quotas in certain regions).



25%

Quotas are divided by technology (technologically neutral auctions are possible).

One beneficial owner may not receive more than 25% of the annual quota.

80%

The total quota allocated cannot exceed 80% of the quota offered by all auction participants.



Solar > 1 MW, Wind > 5 MW – necessarily, Biomass, Biogas, Hydro – optional.



Transparent auction system (conducted through an electronic system ProZorro) <https://prozorro.sale/>

Price

Limit auctions price (euro cent): 9 for Solar and Wind till 2024, 8 from 2025. 12 for other RES.

2-3 years

Limitation of construction time of Solar 2 years, other RES 3 years.

20

The auction winner receives 20 years of support (PPA).

2022

Full responsibility for imbalances from 2022.

Ukraine is considering the introduction of market mechanisms for the integration of RES (Feed-in-premium / Contract for difference models)

Current system

RES producers

Feed-in-tariff / Auctions



Electricity

Feed-in-tariff / Auction price
(Market income + premium)

Balance
responsibility

Guaranteed buyer
(balancing group)

TSO

Electricity

Market income (market price)

Electricity market

New FiP / CfD system

Guaranteed buyer

Premium
(Feed-in-tariff/Auction price – market price)

Balancing
group



Balancing
group



Balance
responsibility

TSO

Electricity

Market income (market price)

Electricity market



Stimulating the development of small distributed generation from RES by consumers (prosumers)

The current feed-in-tariff model for private households do not encourage the owners of such power plants use the produced electricity for own consumption.

Significant difference between the size of feed-in-tariff (18-16 eurocents) and market price (~ 4.5 eurocents) encourages power plant owners to maximizing the supply of expensive electricity to the grid in order to obtain profit.

By the end of 2020, the Ministry of Energy plans to improve the consumer support system. The new system is focused on covering own consumption and not lead to an increase in cross-subsidization due to other consumers.

Ways to implement **Net Metering or Net Billing** systems are considered.



Introduction of a guarantees of origin system for electricity from RES

In order to reduce the size of the corresponding allowance to RES producers (the difference between the size of the feed-in-tariff and the market price), in accordance with the requirements of the Directive of the European Parliament and of the Council 2009/28/EU, the Ministry of Energy and the State Agency for Energy Efficiency is currently being processed issues of introduction of the system of issuing guarantees of origin ('green' certificates) electricity from alternative energy sources, which will increase its value (value) for consumers who are interested in buying it is environmentally friendly clean "green" energy/

Development of RES in district heating systems



During 2009-2019, the capacity of thermal power facilities, which produce thermal energy from renewable sources, increased to 4,147 MW, in particular:

- solar power capacity up to 1 MW;
- capacity of heat pumps up to 227 MW;
- capacity of the bioenergy facility up to 3,919 MW.

In 2019, the share of RES in centralized supply systems reached 9%.

This was facilitated by the introduction of a mechanism for setting an incentive tariff for heat energy from alternative sources. Tariff for thermal energy from alternative sources is set at 90% of the current tariff for thermal energy from gas (a in its absence - at the level of the weighted average tariff for thermal energy with gas in terms of regions).



To increase the share in heating of the State Agency for Energy Efficiency together with Ministry of energy developed a draft law on development **of trade in solid biofuels (introduction of electronic trading system)**.

Adoption of the draft Law will facilitate:

- ✓ creation of a transparent and competitive biofuel market in Ukraine;
- ✓ reduction of biofuel prices;
- ✓ providing generating capacity with biofuels;
- ✓ increase budget revenues, create additional workers seats.

Development of RES in the transport sector



Volume of RES energy consumption in the transport sector in 2019 compared to 2018 increased by 58 thousand tons AD (+ 41%), and reached 3.1%.

To increase the share of the transport sector in Ukraine, the issue of adopting a bill on mandatory is being considered use of liquid biofuels (biocomponents) in the field of transport and determination of the appropriate share.

Also, in order to develop renewable energy sources, legislative initiatives and measures are currently being discussed in Ukraine on:



stimulating the cultivation of energy crops;



biomethane market development;



development of hydrogen technologies;



stimulation development of storage systems;



conducting competitive procedures for the construction of highly maneuverable generation.



**Thank you for your
attention!**

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