

- Green generation
- Renewables
- Technical conditions
- Auctions

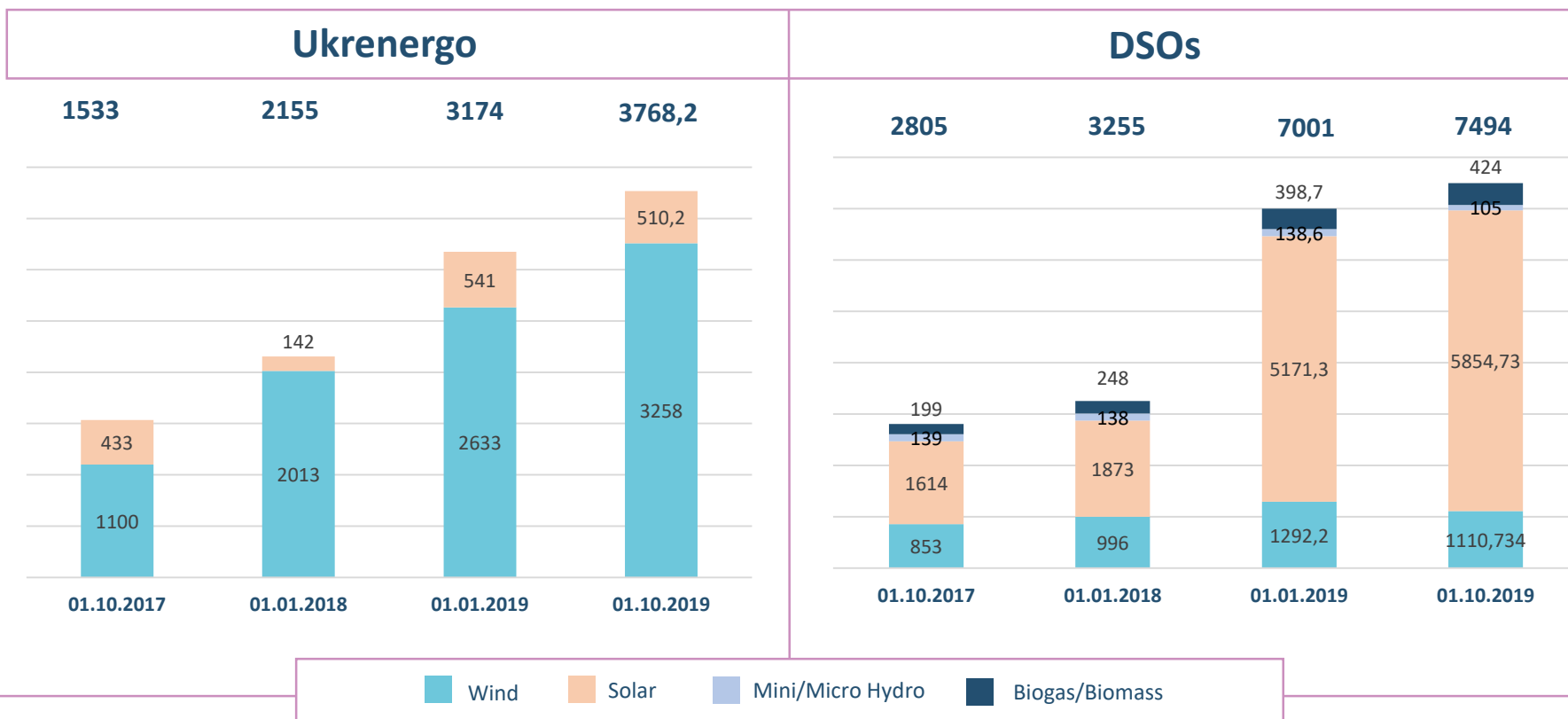
INTEGRATING RENEWABLES INTO UKRAINE'S ENERGY SYSTEM: grid development and requirements



UKRENERGO

State enterprise | National power company

Dynamics of signed agreements and number of issued technical conditions for connection to the Integrated Power System of Ukraine of RES projects from 1 October 2017 to 1 October 2019, MW



Total, incl. 01.10.2019:



Wind –
4879 MW



Solar –
6365 MW



Mini/Micro Hydro –
105 MW



Biogas/Biomass –
424 MW

Key factors:

1. Changing market rules (green auctions)
2. Green auction; green tariff reduction
3. Dark side moon factor new network codes does not envisage approval Ukrenergo

RES installed capacities

ISSUED TECHNICAL CONDITION ON RES INTEGRATION INCLUDING ALREADY INSTALLED

DATE	01.01.2016	01.01.2017	01.01.2018	01.01.2019	01.10.2019
Wind PP	942	1 151	3 473	4 314	5 577
Solar PP	656	998	2 770	6 937	8 880
Mini/Micro Hydro	100	107	239	235	212
Biogas/Biomass	61	106	325	490	532
TOTAL	1 759	2 362	6 807	11 983	15 201

INSTALLED POWER RES

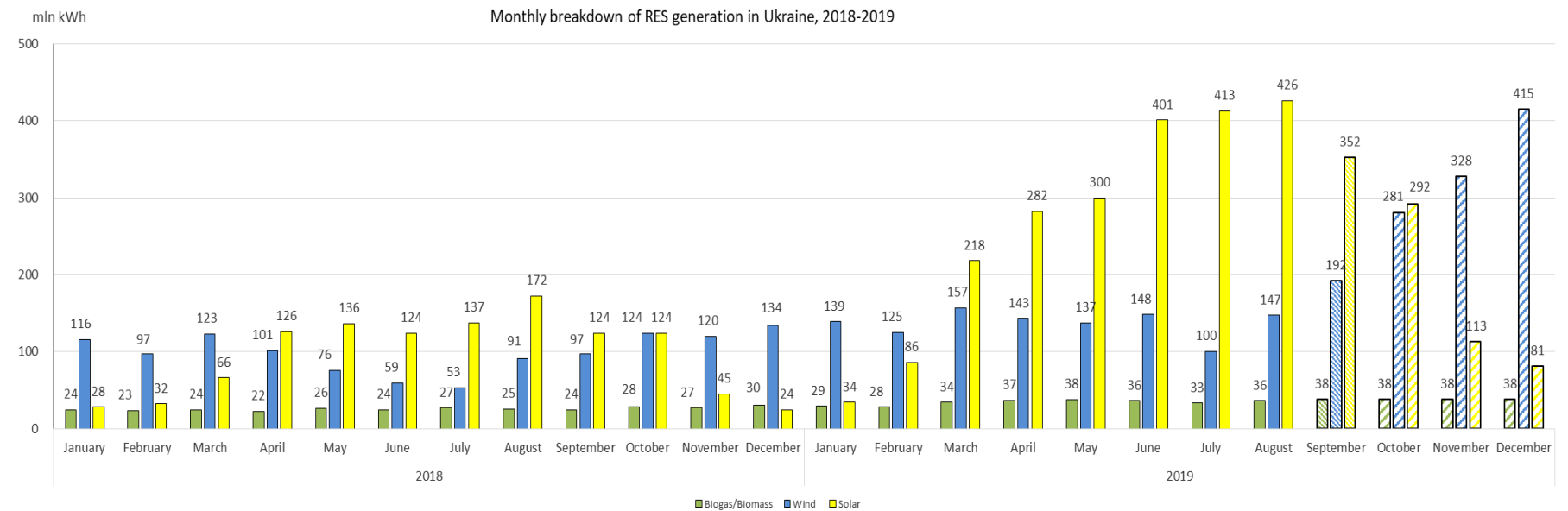
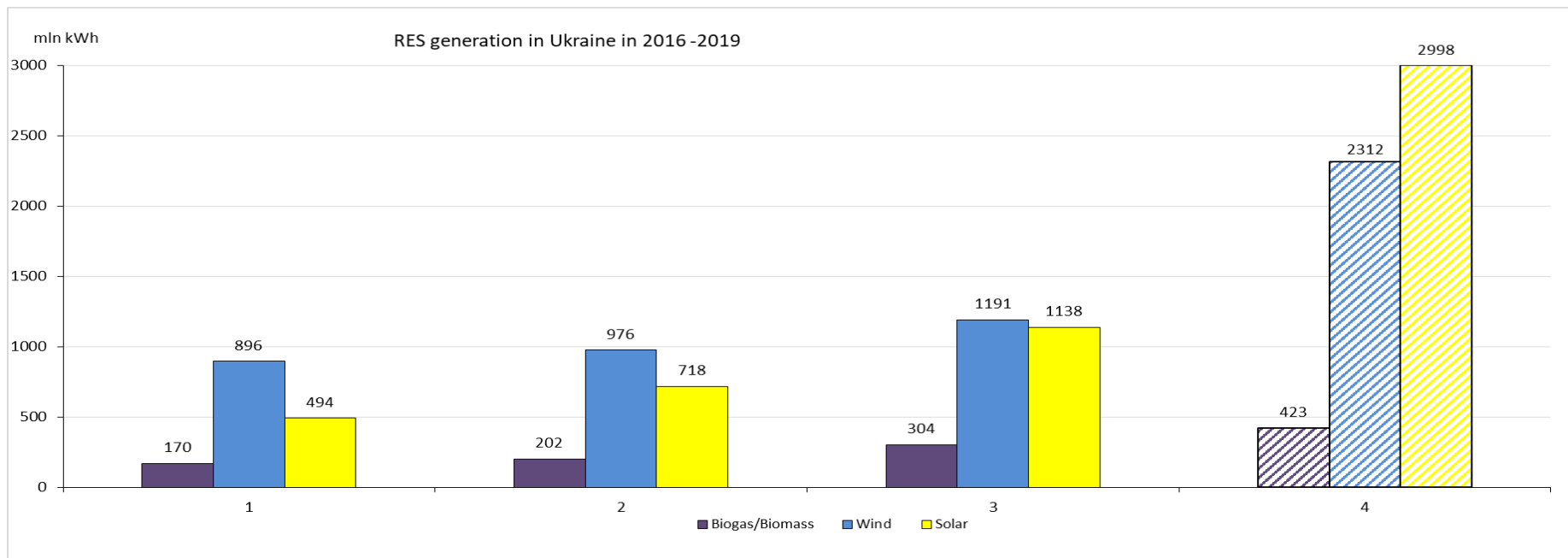
DATE	01.01.2017	01.01.2018	01.01.2019	01.01.2020*
Wind PP	300,5	328,4	389,0	800
Solar PP	458,0	758,4	1224,8	2950
Mini/Micro Hydro	77,8	92,3	95,8	107
Biogas/Biomass	64,3	96,9	98,7	108
TOTAL	900,6	1275,4	1808,3	3 965

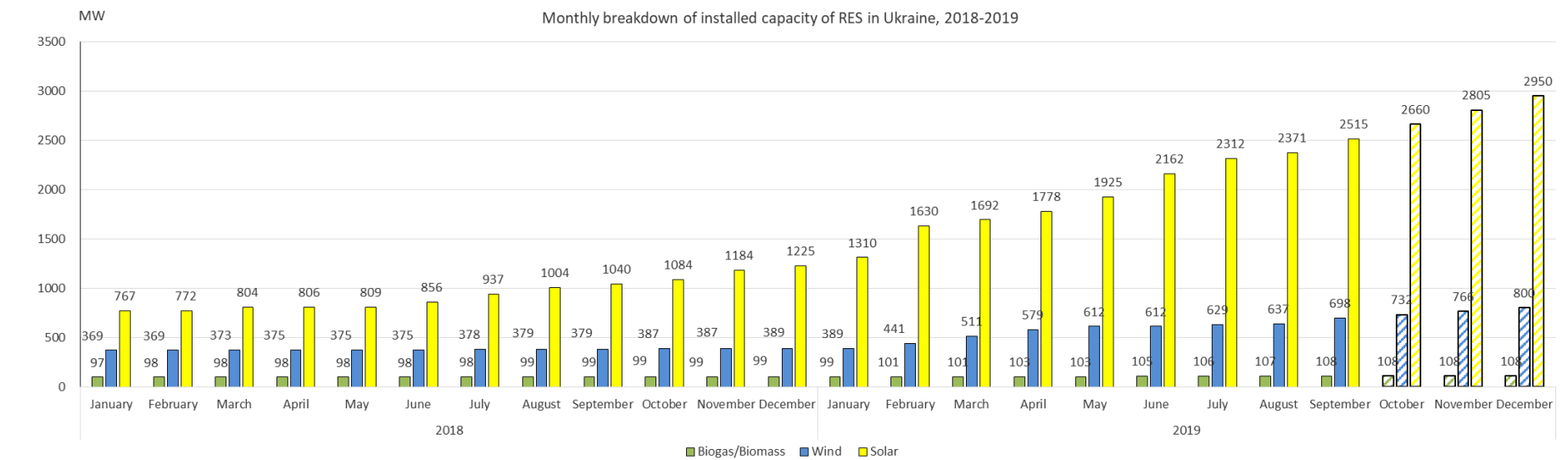
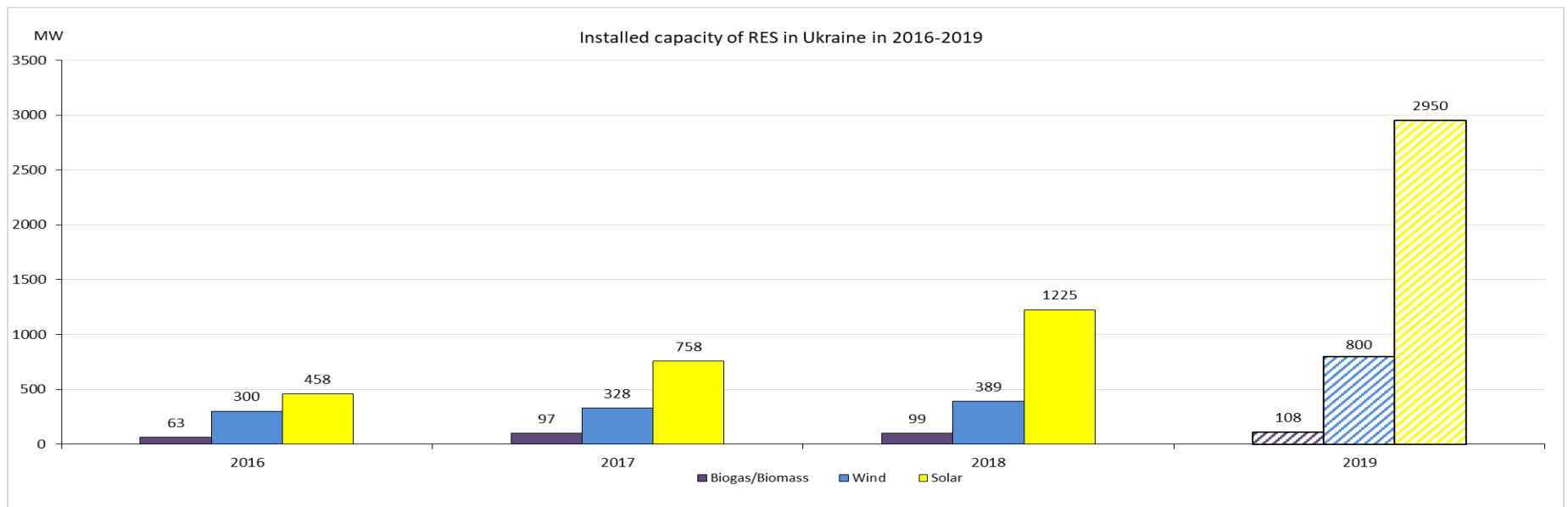
* Forecast



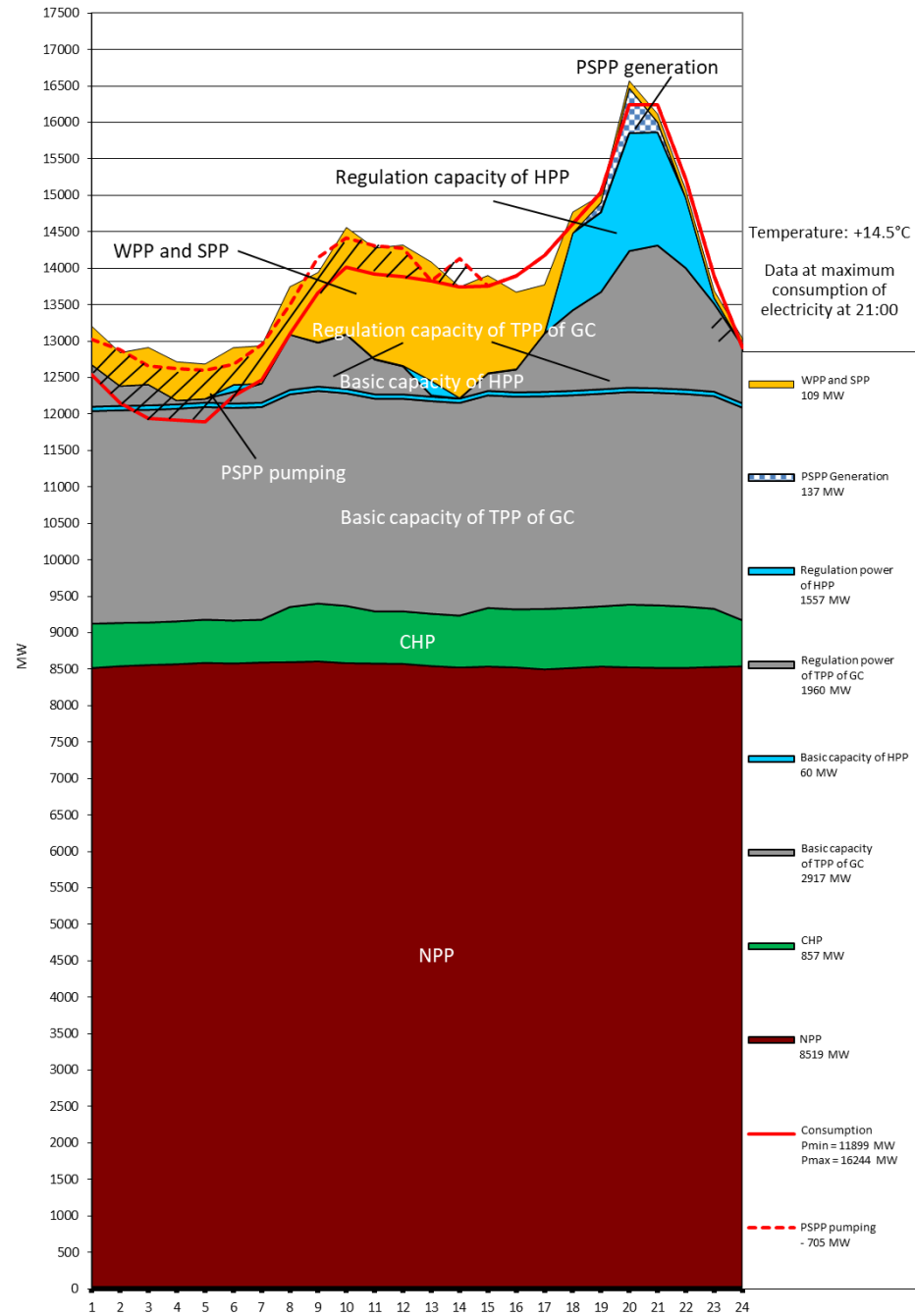
MESSAGES:

- 2019 – the highest share of installed RES capacities
- Disproportion between issued technical conditions for grid connection and installed RES projects
- Market speculations by owners of technical conditions for grid connection





IPS of Ukraine, coverage schedule on 15.09.19



“Green” auctions in Ukraine – talking the talk and walking the walk



Verkhovna Rada
Committee on Fuel

Recommendations on “green” auctions



New legislation changes regarding “green” auctions



07.06.2018

Draft Law «On amendments to some laws of Ukraine to provide competitive conditions for electricity generation from RES»

20-25.06.2018

7 alternative draft laws on electricity generation from RES and “green” auctions

12.09.2018

Round table “World experience of introducing auctions for electricity purchases”

04.12.2018

Integration into one draft law No. 8449 for voting in session hall

06.12.2018

Law of Ukraine No.9260 “On amendments to Tax Code of Ukraine...” to exclude VAT on import of equipment for solar and wind power plants

Issued technical conditions for RES

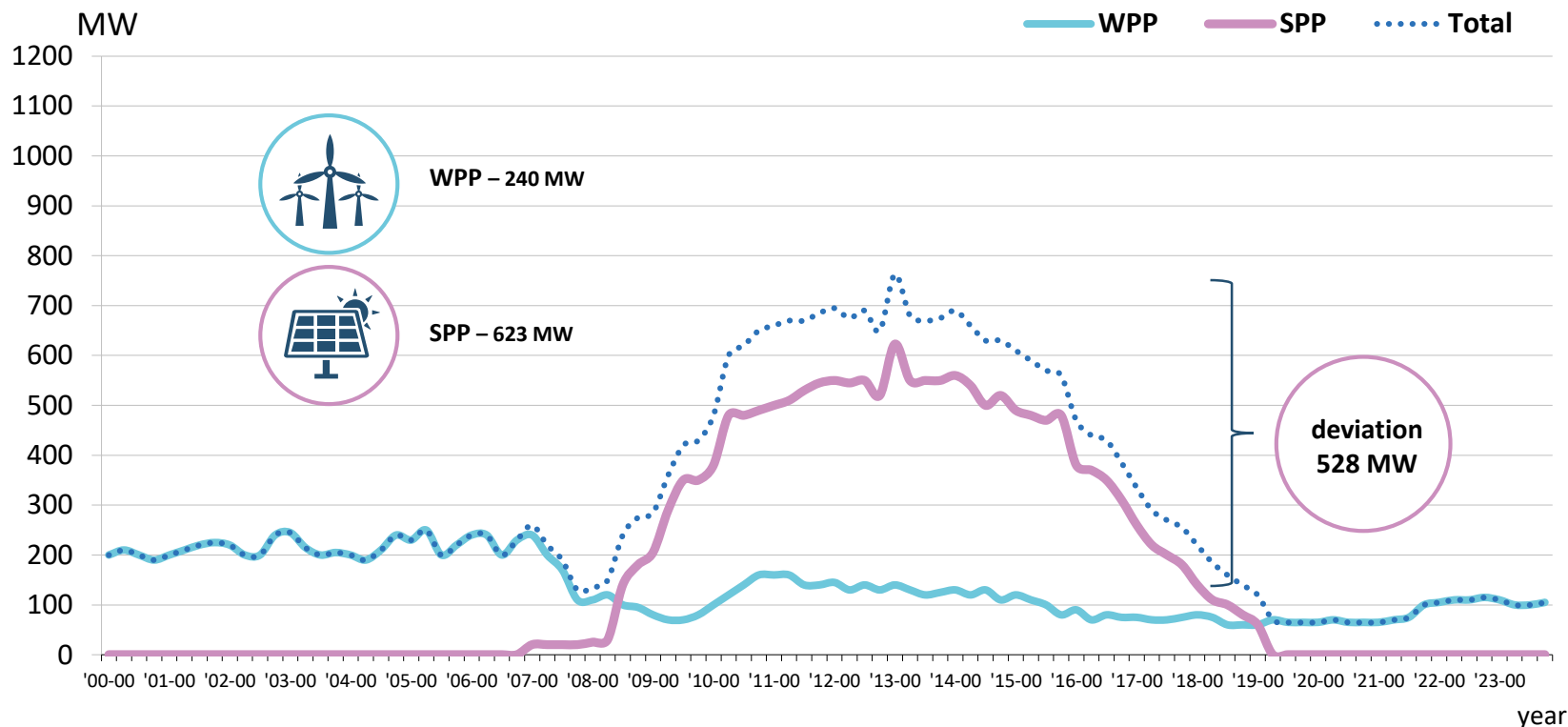
01.07.2018 – 8897 MW

01.10.2018 – 15201 MW

more than 6GW

– “price” of delay in taking decision
regarding auction system

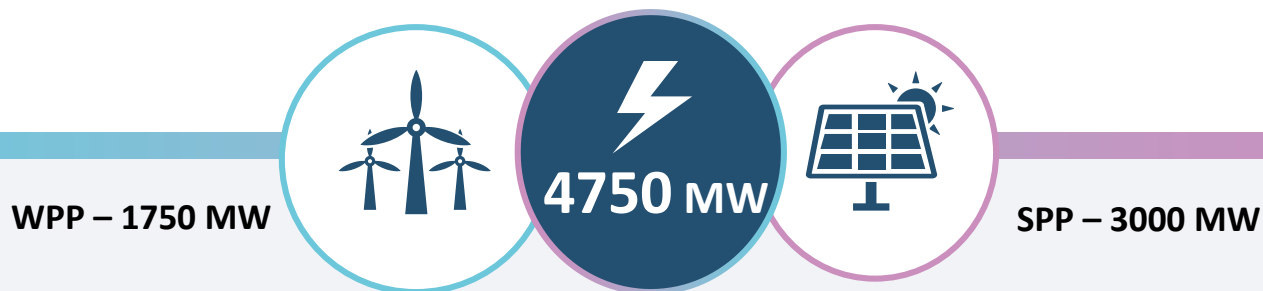
Volatility of “Green” generation: key challenges



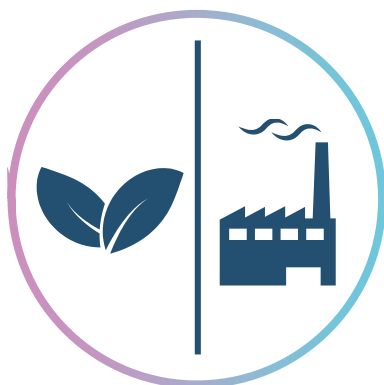
The normative amount of reserves in the IPS of Ukraine must be equal to **650 MW**. The target fluctuations of RES generation in the amount of **up to 528 MW** must be taken into account when drafting a daily chart.

The inaccuracy of the existing system of forecasting requires Ukrenergo to attract additional balancing reserves

Green generation: breaking point in 2020



The **maximum level** of the capacity of SPP and WPP, possibly managed by the Integrated Power System of Ukraine without serious deviations in the operation **by 2020** according to **USAID/Mercados Research**



GREEN-COAL PARADOX

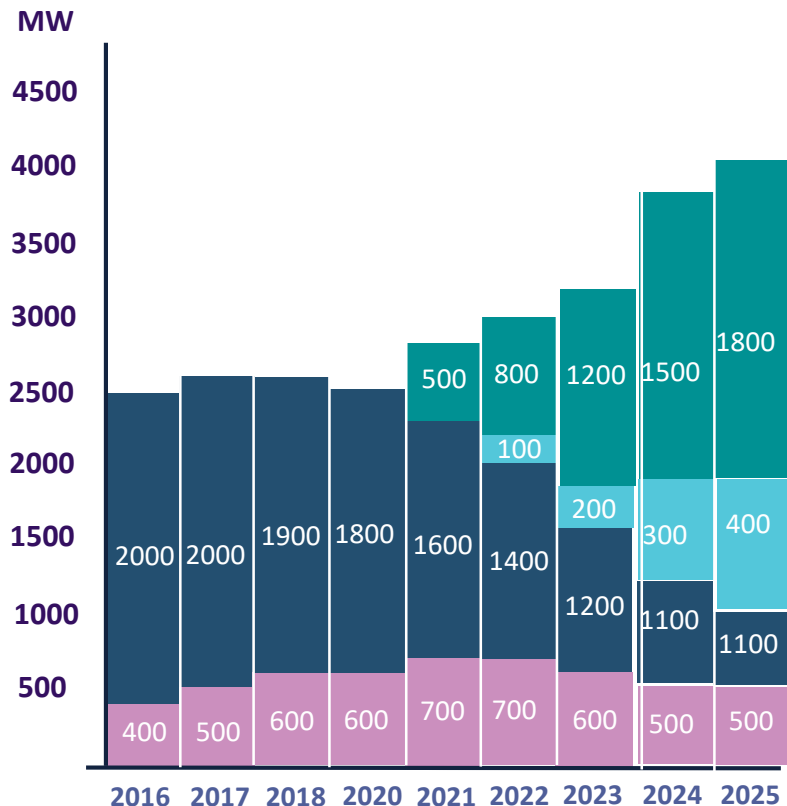
Providing the limitation of nuclear generation, the absence of restrictions for RES and a significant increase in the basic generation of the generating companies of thermal power stations.



Until **mid-2020** the structure of generation should be adjusted to ensure the increase in the share of RES in the energy mix

High-maneuvering balancing capacities: possible combinations

Reserves of capacities in energy system of Ukraine for the regulation of WPP and SPP at the expense of new maneuvering capacities and rechargeable batteries2,



The main task of the IPS of Ukraine is to ensure the reliable operation of the system, taking into account the introduction of the required share of RES

Solution – the introduction of new capacities:

- **2000 MW** of gas-piston power plants
- **500 MW** of batteries

2 bln USD of investments needed to install 2500 MW additional capacities by 2025



Energy storage Project



30 October Memorandum of cooperation signed by the Presidents of RTE & Ukrenergo

Option 1

centralized installation of 200
MW of ESS at one of
Ukrenergo's substations

Option 2

decentralized installation of
5 ESS up to 40 MW at
Ukrenergo's substations

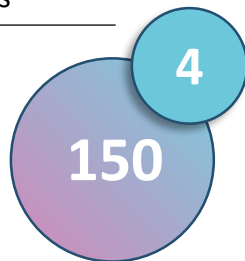
In October 2018 Ukrenergo signed MOE with RTE to carry out the feasibility study of the project



Installation works



ESS equipment

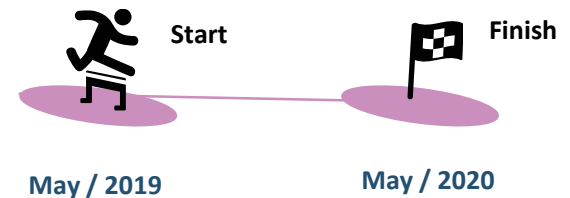


154 mln EUR

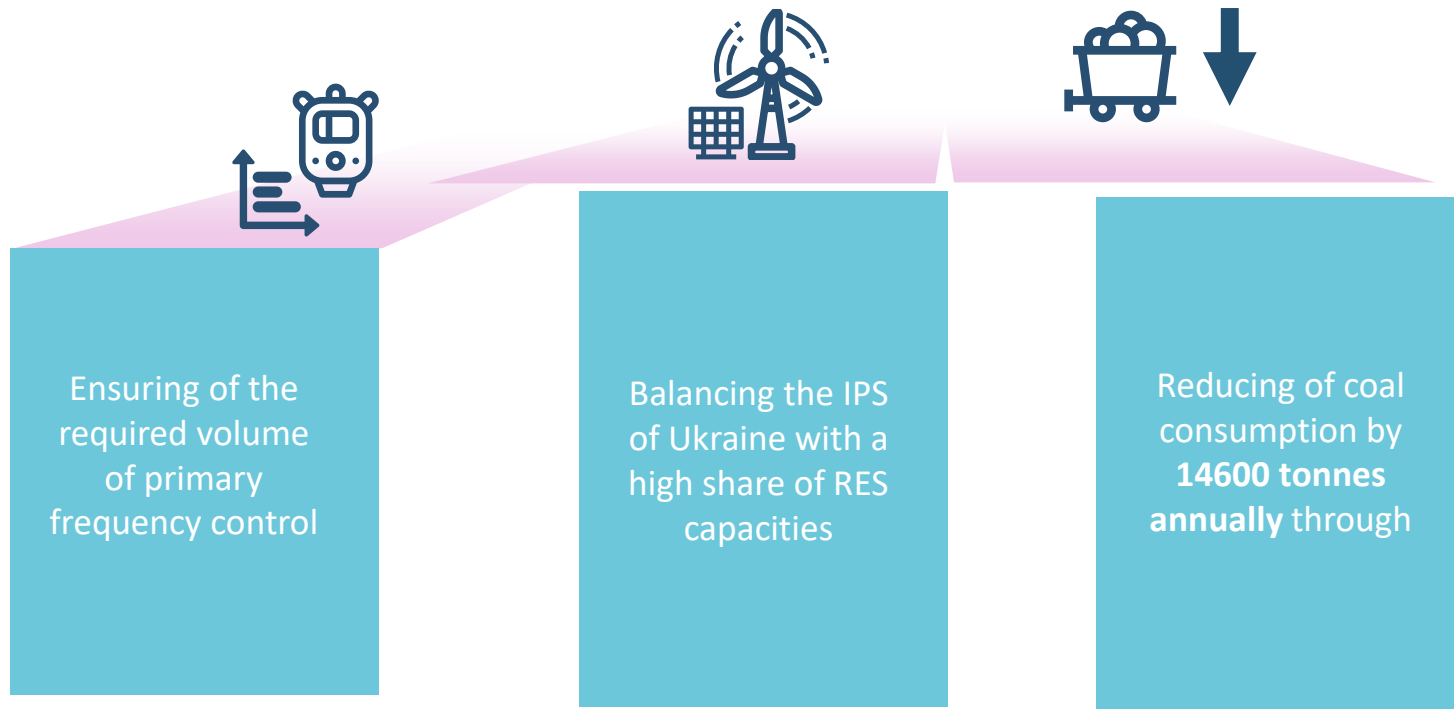
+ Electric charging stations

4.8***

IMPLEMENTATION TIMESCALE



Implementation of the project will allow:



Successful implementation of the Project will ensure the balancing of the IPS of Ukraine under the conditions of the expected introduction up to 10000 MW of RES

Development RES in Ukraine: the way of solutions



Improved accuracy of forecasting of RES generation



Implementing strict responsibilities for RES imbalances



Creation of “fast start” high-maneuvering generating capacities and energy storages



Implementing demand response mechanism



The regulator

- To implement the changes to the Transmission system code with regards decrease (up to 1 MW) of level of RES DSO grid connection to be approved by TSO
- To implement the changes to the market rules by introduction “ready to serve” fees or other financial instruments for supporting new reserve capacities



The Government

- To develop and approve the procedure for conducting tenders for the construction of generating capacity including high-maneuvering generating capacities
- To hold a competition for the construction of the maneuvering generating capacity



Verkhovna Rada

Introduction RES auction model by changing existing legislation
Envisage in Ukrenergo tariff the cost of purchasing services to ensure construction of new generating capacity (primarily maneuverable)

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- Auction

Thank you for your attention!



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