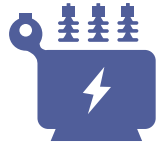


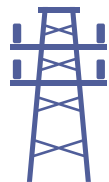
2017/2018 AUTUMN-WINTER PERIOD PASSING  
OF THE IPS OF UKRAINE OUTLOOK



# MAP OF INTERCONNECTED POWER SYSTEM OF UKRAINE

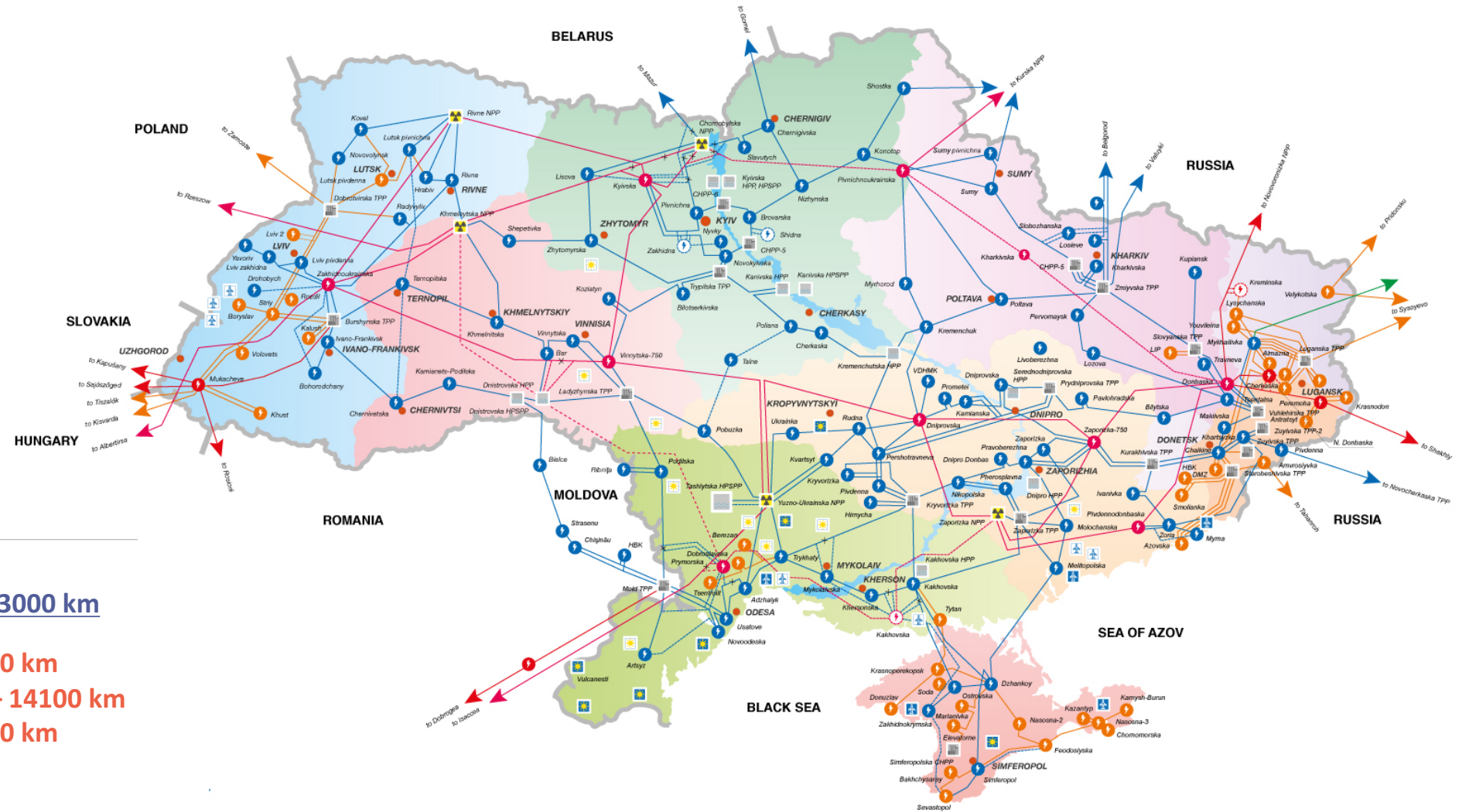


**SUBSTATIONS – 137**  
**220-750 kВ**



**HV LINES – 23000 km**

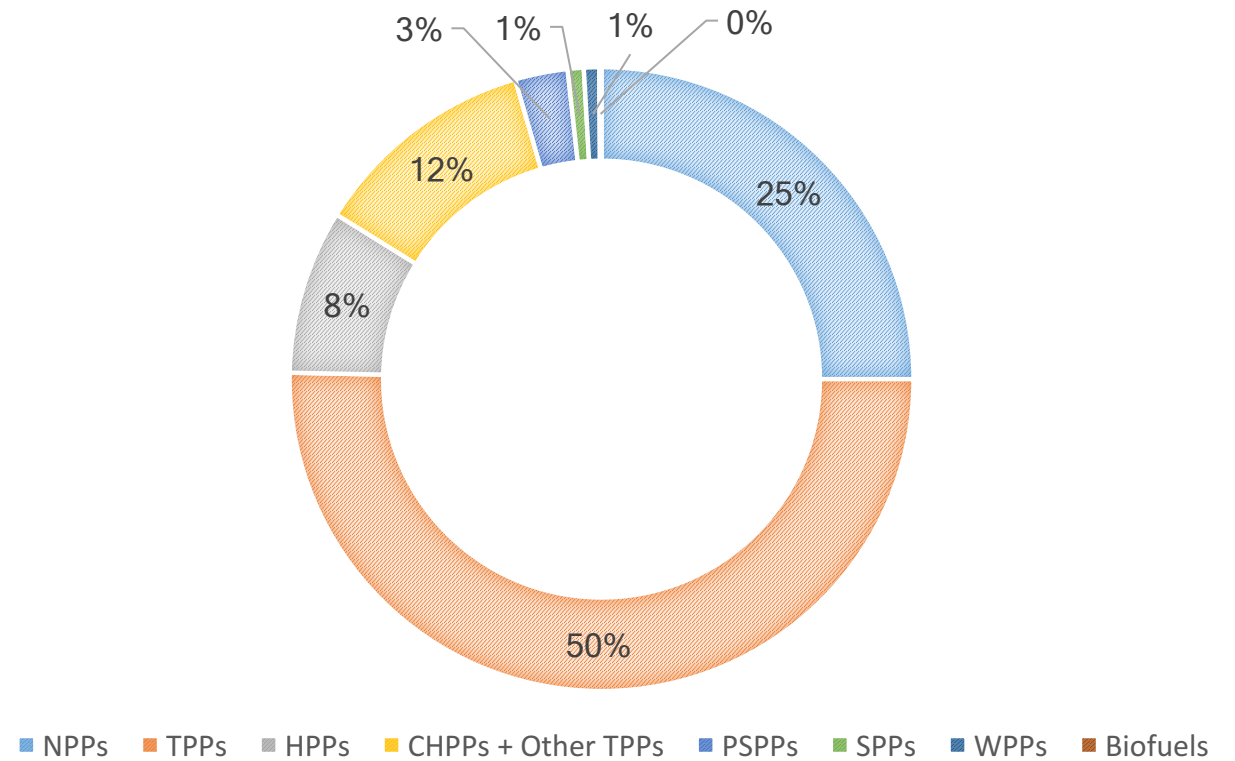
**750 kV – 4200 km**  
**330-500 kV – 14100 km**  
**220 kV – 4700 km**



- **Installed capacity 54,83 GW**
  - TPPs – **27,85 GW**
  - CHPPs and other TPPs – **6,47 GW**
  - NPPs – **13,84 GW**
  - HPPs – **4,71 GW**
  - PSPPs – **1,51 GW**
  - WPPs – **0,44 GW**
  - Solar PPs – **0,46 GW**
  - Biofuel PPs – **0,65 GW**

Maximum  
of power consumption:  
**23900 MW**

## PRODUCTION OF ELECTRICITY



**Technical specifications:**

	<p><b>Installed capacity</b> <b>2,5 GW</b></p>	<p><b>Burshtyn TPP</b> <b>2351 MW</b></p>
	<p><b>Population</b> <b>3 Mln</b></p>	<p><b>Kaluska CHPP</b> <b>200 MW</b></p>
	<p><b>Export possibility</b> <b>650 MW</b></p>	<p><b>Tereblia-Rikska HPP</b> <b>27 MW</b></p>

"Burshtyn Thermal Power Plant Island" was created due to the separation of the South-Western part of the IPS of Ukraine. It was put into parallel operation with the ENTSO-E (UCTE) in 2002 (the 1st of July)



Preparation of the fuel and energy complex of Ukraine for the autumn-winter period of 2017/2018 and its passage is performed based on Order of the Cabinet of Ministers of Ukraine No. 410-r dated 14 June 2017.  
SE NPC Ukrenergo developed and approved the following measures aimed at preparing for the passing of AWP:

“On measures aimed to increase the level of operation of trunk power grids and emergency response,” approving primary emergency measures;

“On measures aimed to ensure the reliable operation of trunk and interstate power grids in 2017,” approving scopes and schedules for repair works as well as equipment and materials for emergency reserves;

“On preparation for operation during the autumn-winter period of 2017/2018”;

“On implementation of the Plan of actions on preparation for operation during the autumn-winter period of 2017/2018;

“On measures aimed to ensure the reliable operation of trunk and interstate power grids in 2018,” approving scopes and schedules for repair works as well as equipment and materials for emergency reserves;

“On measures aimed to increase the level of operation of trunk power grids and emergency response,” approving primary emergency measures;

“On verifying the readiness of power systems for operation during the autumn-winter period of 2017/2018,” specifying the programs of inspections and defining the composition of commissions and the schedule of work of these commissions

# LIQUIDATION OF A SPECIAL SYSTEM BLACKOUT IN THE IPS OF UKRAINE

SE NPC Ukrenergo developed plans for restoration of the IPS of Ukraine after a special system blackout, providing for several options of voltage delivery from external power systems (IPS of Belarus, UPS of Russia and ENTSO-E)



Each regional dispatching center (RDC) of Ukrenergo also developed plans for restoration of operation of each regional power system, providing for the involvement of primarily internal sources to “start from scratch” – HPP or HPSPP that managed to keep operating on the neighboring balanced load district by means of special automatic emergency response systems



Regional plans for restoration of power systems and a plan of voltage delivery from external power systems are mutually reconciled in part of the equipment of power plants and substations with possible asynchronous voltages, as well as possible points of synchronization

# MAIN STAGES OF IMPLEMENTING THE PLAN FOR RESTORATION OF THE IPS OF UKRAINE



Voltage delivery from external sources to power own needs of all NPP of Ukraine during a time period of less than 30 minutes



Synchronization with a network of 750 kV - 330 kV, provided with voltage from external sources, primarily hydropower plants (DsHPP, KremHPP, DnHPP-1 and DnHPP-2), as well as TPP with the units chosen by the automatic frequency division for isolated load



Dosed load connection, with simultaneous loading of units that were synchronized with the prepared network, is performed in accordance with the schemes, procedures and priority of connected consumers, preliminary developed by RDC and power supply companies

# PLAN OF MEASURES FOR PREPARATIONS TO AUTUMN-WINTER PERIOD 2017-2018



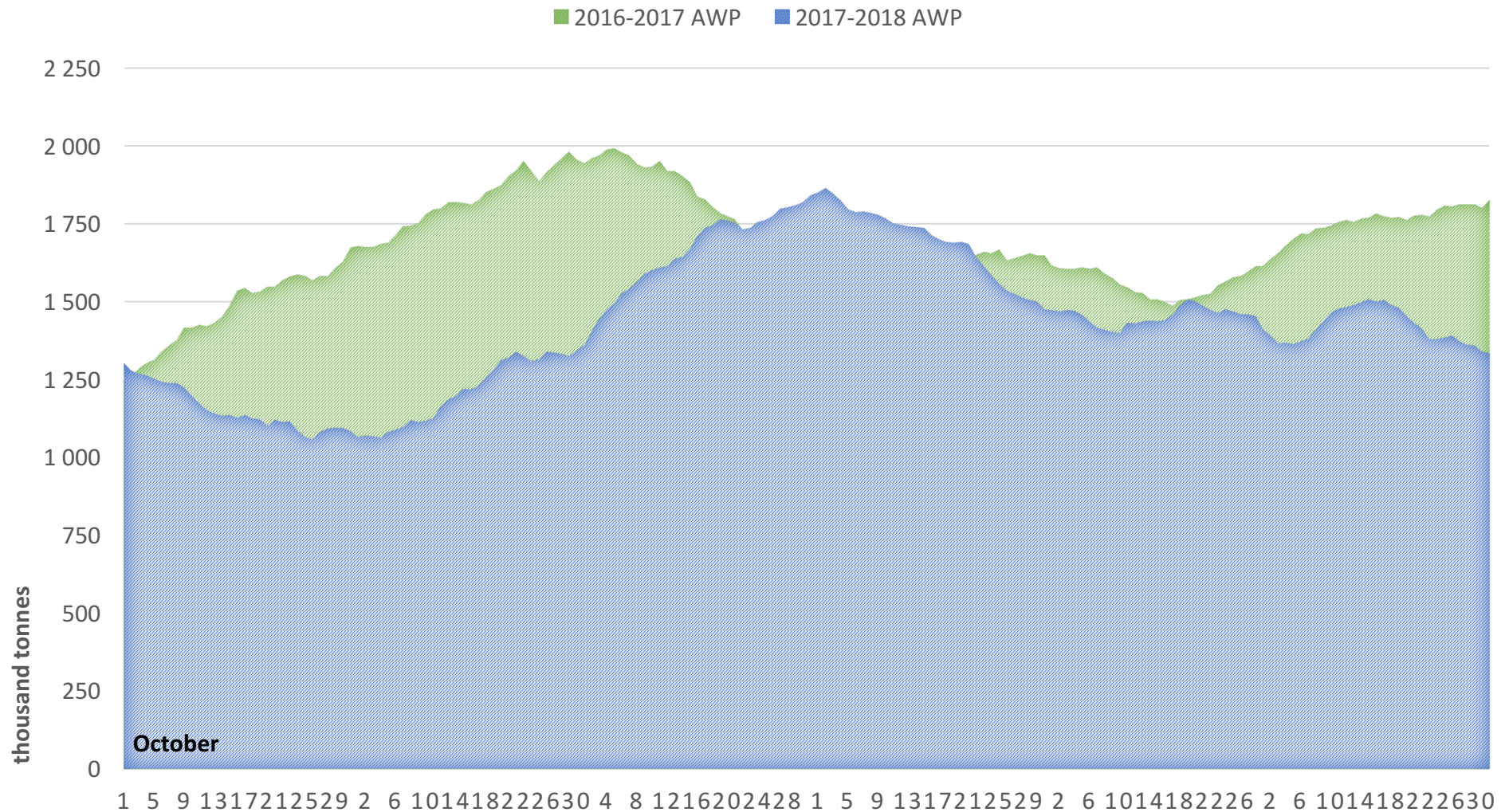
Emergency training of operational personnel of SE NPC Ukrenergo, power generation and power supply companies, aimed at preventing a special system blackout in the IPS of Ukraine in case of an emergency failure of power transmission lines and generating equipment were held planned repairs of power installations of trunk and interstate power grids were performed

technical re-equipment of trunk and interstate power grids was performed. The existing equipment was replaced with more reliable and costly efficient in operation. emergency reserve of equipment and materials was formed.

5 power units of the anthracite group were reequipped for combusting coal of the gas group, with a total installed capacity of **960 MW**, namely Zmiivska TPP units Nos. 2, 5 (175 and 185 MW), Prydniprovska TPP units Nos. 7, 8 (150 and 150 MW) and Trypilska TPP unit No. 4 (300 MW).



# DYNAMICS OF COAL RESERVES AT THE STORAGES OF TPP GC DURING 2016-2017 AWP AND 2017-2018 AWP



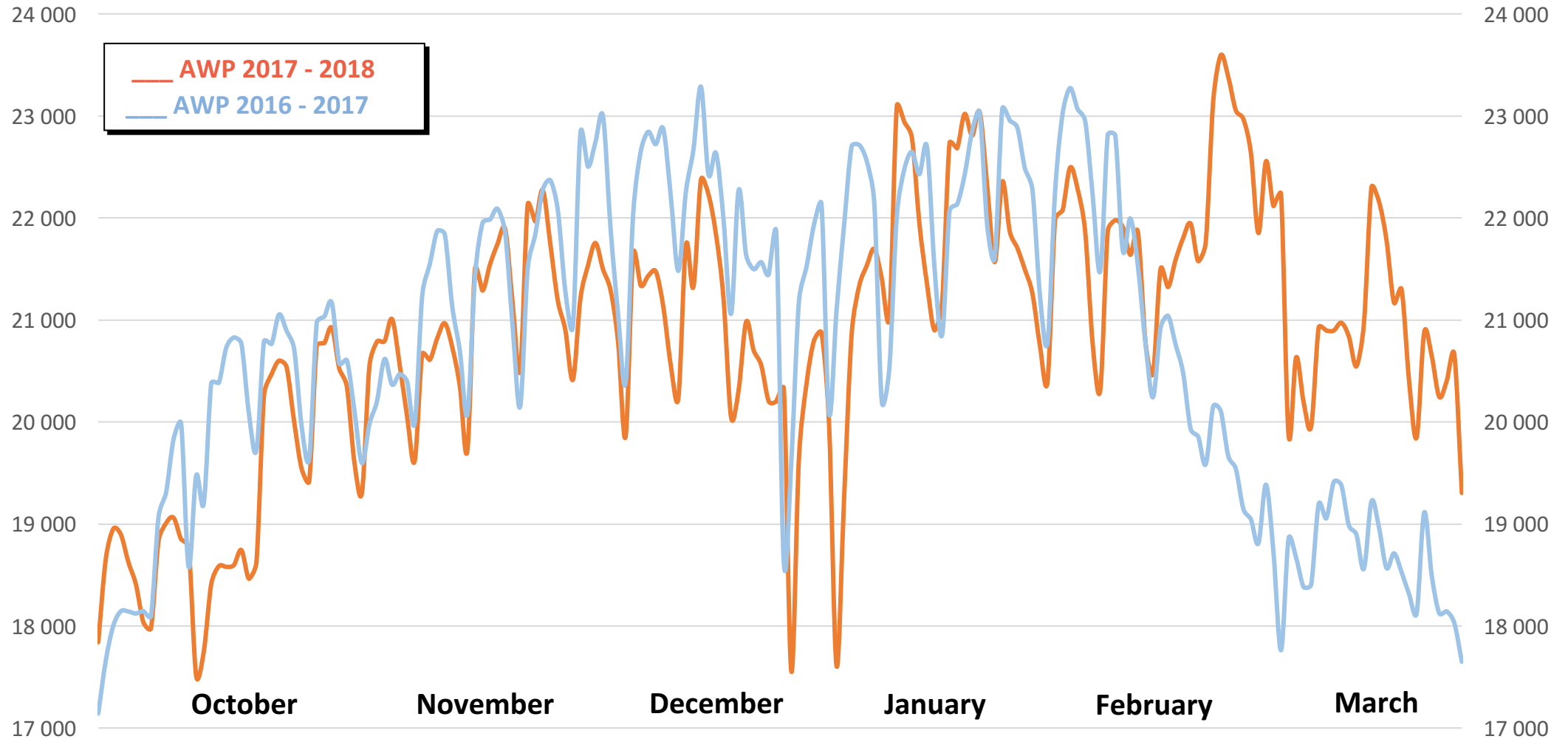
# SUMMARY ON THE PASSING BY THE IPS OF UKRAINE OF 2017/2018 AUTUMN-WINTER PERIOD (OCTOBER 2017 – MARCH 2018)



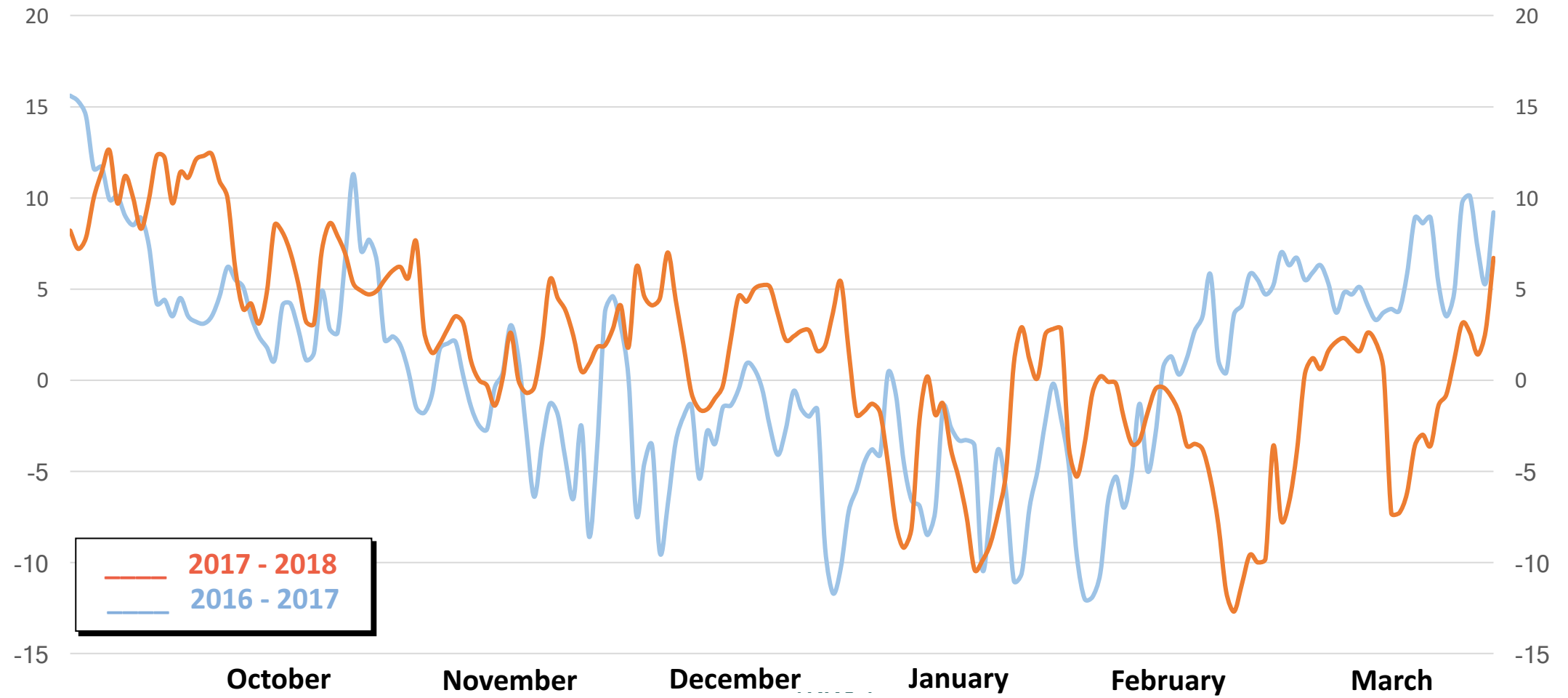
The Integrated Power System of Ukraine has passed 2017/2018 autumn-winter period in a balanced mode with the observance of operational safety requirements. Electricity coverage was fully ensured by the IPS own generating capacities without any import of electricity. The schedules of restrictions and emergency outages of consumers did not apply. There were daily supplies of electricity on a commercial basis to Moldova and European countries.

Unlike in 2016/2017, there were no temporary extraordinary measures taken in the electricity market.

# ELECTRICITY CONSUMPTION CAPACITY PER HOUR OF DAILY MAXIMUM (MW)



# AVERAGE DAILY AIR TEMPERATURE IN THE IPS OF UKRAINE (°C)



# ELECTRICITY BALANCE IN THE IPS OF UKRAINE DURING 2016-2017 AWP AND 2017-2018 AWP

## ELECTRICITY BALANCE IN THE IPS OF UKRAINE DURING 2016-2017 AWP AND 2017-2018 AWP

	2016-2017 AWP	2017-2018 AWP	mIn kWh Deviation from 2016-2017 AWP
1. Electricity generation - total including:	86 413	86 329	-84
1.1. TPP of power generation companies	24 178	26 164	1 986
1.2. Combined heat and power plants and cogeneration units delivering electricity to the wholesale electricity market (WEM)	7 797	8 009	212
1.3. HPP	4 833	6 176	1 343
1.4. HPSPP	830	797	-33
1.5. NPP	47 208	43 393	-3 815
	54.6%	50.3%	
1.6. Block-stations	744	804	60
1.7. Alternative sources including:	823	986	163
WPP	562	641	79
SPP	170	219	49
others	91	126	35
2. Import of electricity	0	0	0
3. Export of electricity including:	2 567	2 580	13
3.1. Export to CIS countries	0	310	310
to Russia	0	0	0
to Belarus	0	0	0
to Moldova	0	310	310
3.2. Export to the countries of Eastern Europe	2 567	2 270	-297
to Poland	540	594	54
export of "Burshtyn Island"	2 027	1 676	-351
4. Difference in electricity flows with neighboring power systems	-880	0	880
5. Technological electricity flow caused by the parallel operation with power systems of neighboring countries	29	18	-11
6. Electricity consumption (gross)	81 863	82 676	813
7. Electricity consumption by HPSPP in a pumping mode	1 132	1 091	-41

# ELECTRICITY BALANCE IN THE IPS OF UKRAINE DURING 2016-2017 AWP AND 2017-2018 AWP

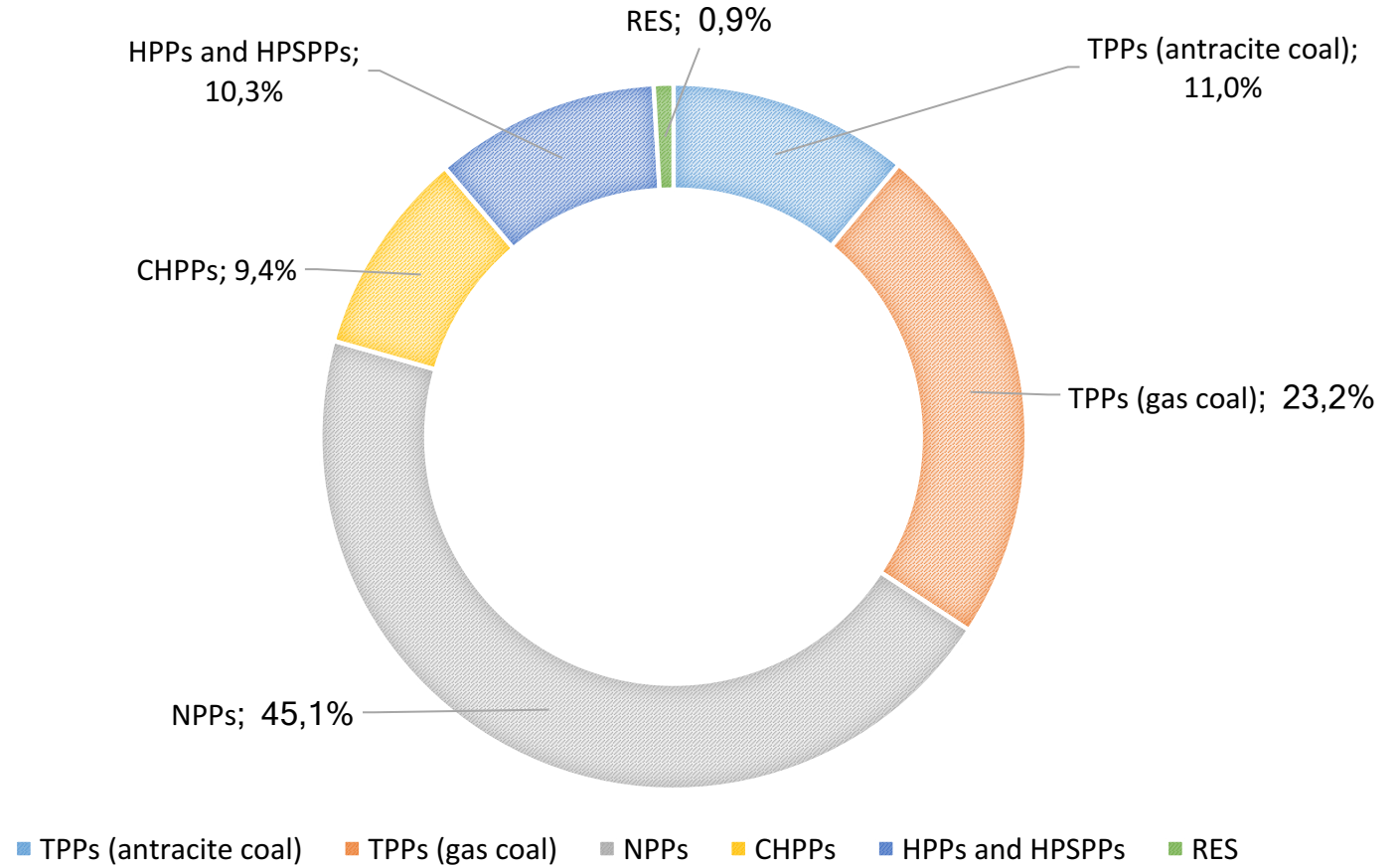
	<b>Maximum fuel consumption by “Burshtyn Island” during AWP 2017-18 (tonnes)</b>	<b>Electricity production by Burshtynska TPP in part of “Burshtyn Island” during AWP 2017-18 (thous. kWh)</b>
29.12.2017	17204	30423
10.01.2018	18424	30414
13.02.2018	16925	33997

Maximum export of “Burshtyn Island” during the winter period of 2017-18 – 650 MW

# PEAK LOADS OF THE IPS OF UKRAINE DURING AWP OF 2016-2017 AND 2017-2018 AWP

**1044 MW**

Maximum consumption of  
“Burshtyn Island” during the  
winter period of 2017-18:  
as of 27.02.2018



# FORECAST CAPACITY BALANCE IN THE IPS OF UKRAINE FOR A DAY OF MAXIMUM CONSUMPTION OF ELECTRICITY IN SUMMER 2018

The average daily air temperature on the territory of Ukraine will be approximately +26°C

As for 2018 summer period, the expected level of maximum consumption of “Burshtyn Island” is 800 MW, the minimum expected level is 410 MW

	minimum	maximum
Consumption	13600	18800
HPSPP pumping	-1160	-
Balance of external flows	-750	-650
Coverage, including:	15510	19450
- NPP	9480	9480
- TPP, including:	5730	8150
- TPP of generating companies (GC)	4930	7350
- CHPP (Kyivska CHPP-5, CHPP-6, Kharkivska CHPP-5)	200	200
- Other CHPP	600	600
- RES (SPP, WPP and others)	150	150
- HPP	150	1000
- HPSPP	-	670
Number of operating units of TPP GC	31	40,0



THANK YOU  
FOR YOUR ATTENTION!

