

- Designing
- Procurement
- Installation
- Supervision

UKRENERGO

National power company

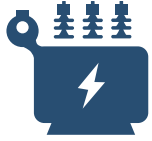
DRIVING POWER OF CHANGE



UKRENERGO

State enterprise | National power company

WHO WE ARE



Substations – 137



Peak load



Transmitted electricity

115,3
Billion kW/h

8 – 750 kV
92 – (330 – 500) kV
37 – (110 – 220) kV

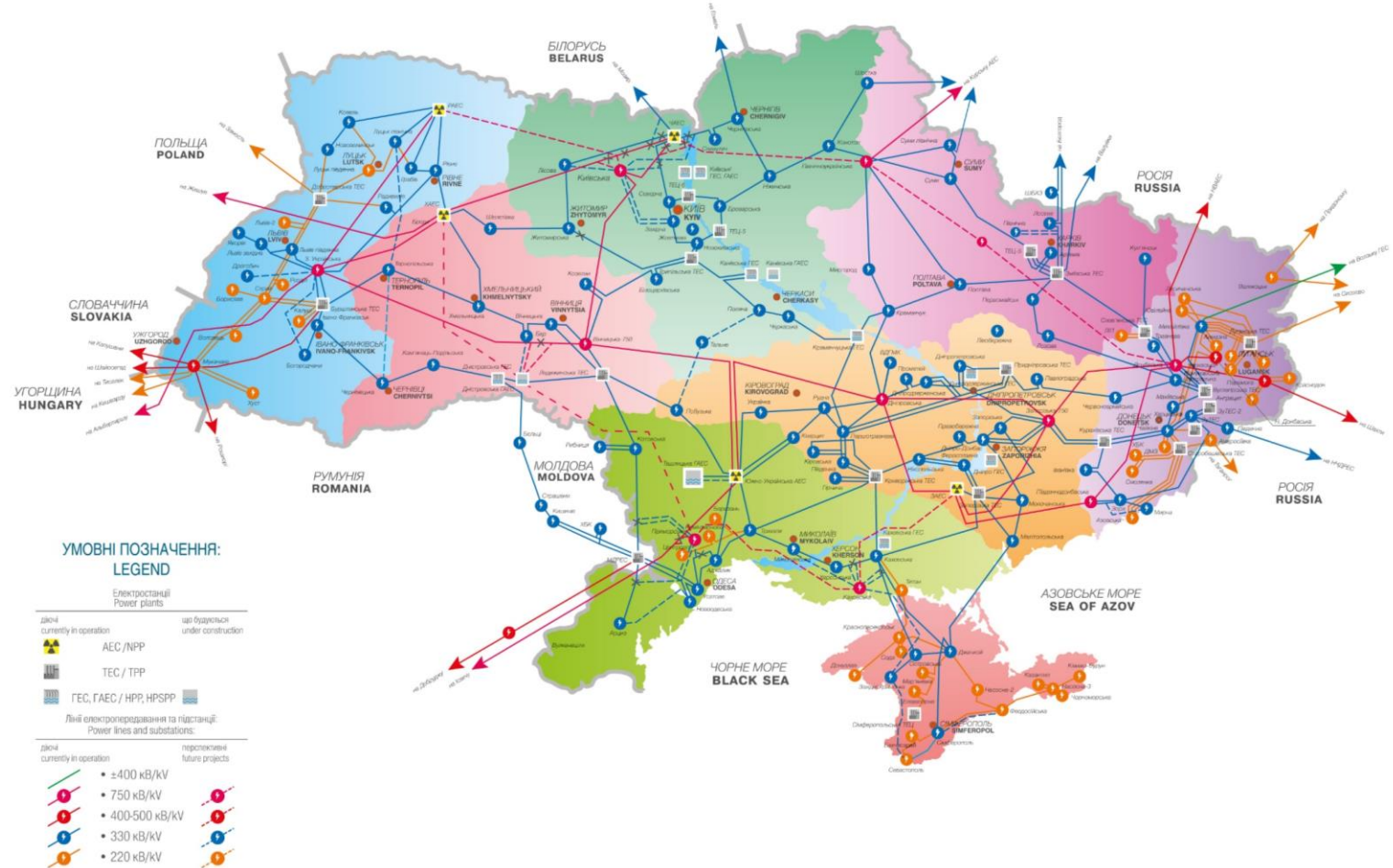
24 GW

Total length of
overhead line
21 000 km

Total amount of poles
70 000 pcs

TRANSMISSION COMPANY (state-owned, consists of 8 regional systems)

ОБ'ЄДНАНА ЕНЕРГЕТИЧНА СИСТЕМА УКРАЇНИ
INTEGRATED POWER SYSTEM OF UKRAINE



ACCOMPLISHED WORKS

IFI	YEARS OF COOPERATION	QUANTITY OF AGREEMENTS	QUANTITY OF FACILITIES	TOTAL LOAN AMOUNT	CONTRACTORS
European Bank for Reconstruction and Development	2008 -2018	3	2 * 750 kV Substations 2 * 330 kV Substations 2 * 750 kV Overhead lines	230 MEUR	Kalpataru Power Transmission Ltd. (India) Dalekovod (Croatia) Soyuz (Russia) ABB (Germany)
European Investment Bank	2008 -2018	2	3 * 330 kV Overhead lines	220 MEUR	
World Bank	2009 -2017	1	13 * 220 - 750 kV Substations 1 * 330 kV Overhead line	200 MUSD	ABB (Germany) Eltel (Sweden) Dalekovod (Croatia) Posco Daewoo & Hyosung (Korea)

IN PROGRESS

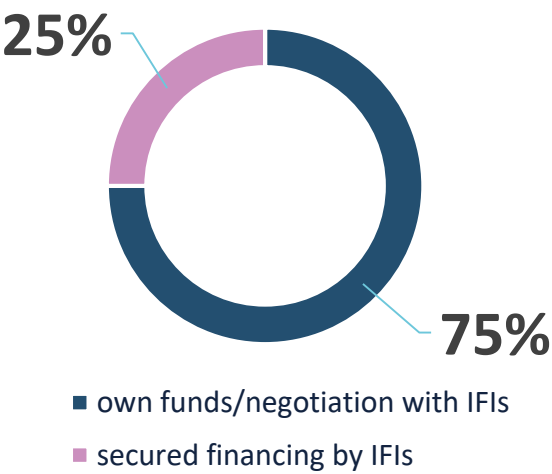
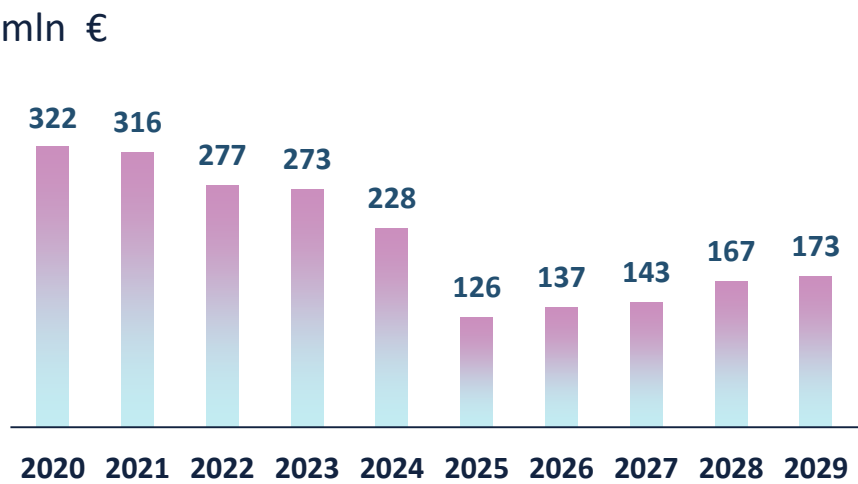
IFI	QUANTITY OF AGREEMENTS	QUANTITY OF FACILITIES	TOTAL LOAN AMOUNT	CONTRACTORS
European Bank for Reconstruction and Development	1	1 * 330 kV Substation 1 * 750 kV Overhead line	80 MEUR	Posco Daewoo Corporation & Hyosung Heavy Industries Corporation (Korea) Inabensa (Spain)
European Investment Bank	2	1 * 330 kV Overhead line 1 * 330 kV Substation 1200 km Optical Ground Wire for 330 kV Overhead line	60 MEUR	Kalpataru Power Transmission Ltd. (India) Xian Electric Engineering Co. Ltd. (China)
KfW	2	4 * 330 kV Substations 2 * 750 kV Substations	190 MEUR	GE Grid GmbH (Germany) Dalekovod d.d. (Croatia)
World Bank	1	12*330 kV Substations 3 * IT Components: <ul style="list-style-type: none"> Balancing Market, Smart Grid (SCADA / WAMS), Asset management system (IAMS) 	378 MUSD	Cobra IyS S.A. (Spain) Posco Daewoo Corporation & Hyosung Heavy Industries Corporation (Korea) Azenco j.s.c. (Azerbaijan) EGEM s.r.o. (Czech Republic) IP Systems Zrt. (Hungary) & Smart technologies (Austria) Ernst & Young

OUR PROSPECTIVE PLANS

€ 2 billions

Our CAPEX for next ten years

Most of these capital costs will be secured by international financing institutions



New substation 750 kV – 1 pcs

New substations 330 kV – 5 pcs

Fully automated substations 220-750 kV – 103 pcs



New overhead lines 750 kV – 425 km

New overhead lines 330 kV – 1350 km

Rehabilitated overhead lines 330 kV – 3000 km



Optical ground wire
overhead line equipment – 6000 km

Optical ground wire
substation equipment – 39 facilities

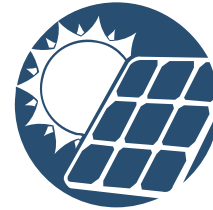
STRATEGY PRIORITIES

Substations automation programme



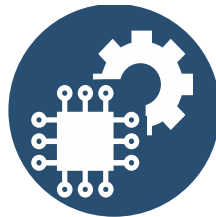
Interconnectors development programme

**Elimination of
bottlenecks in the grid**



Renewable energy sources integration

**Increasing power supply
reliability (Eastern region)**



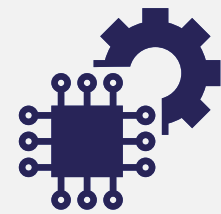
Optical Ground Wire programme

SUBSTATIONS AUTOMATION PROGRAMME

PURPOSE – Optimization of processes, reduction of OPEX, achievement of a technological level sufficient for integration into ENTSO-E and ensuring the integrity of the IPS of Ukraine

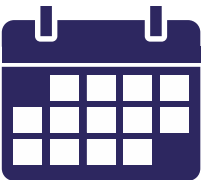
RESULT – Installation of automated systems providing for remote control over substations power equipment

SCOPE OF WORK

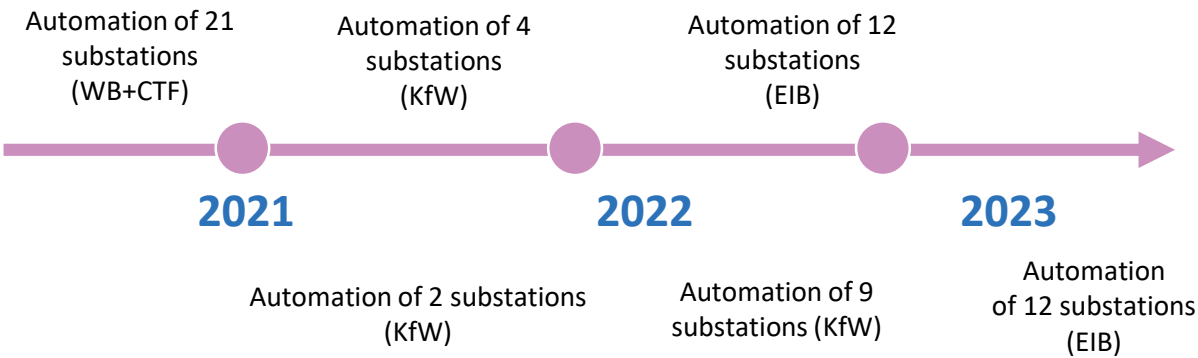


60 fully automated substations 220-750 kV

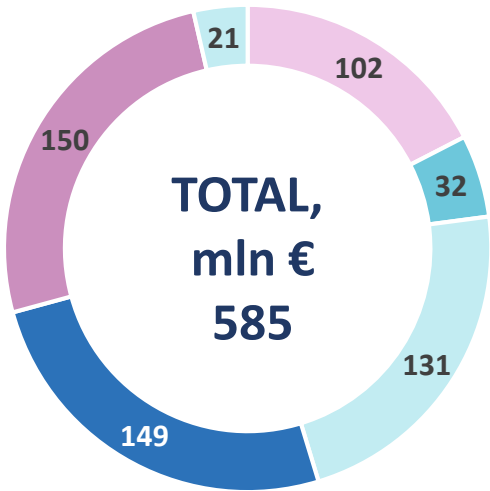
27 new autotransformers 220-750 kV



SCHEDULE



BUDGET



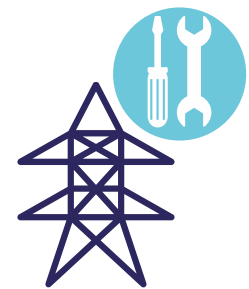
- Automation of 21 substations (WB)
- Automation of 9 substations (KfW)
- Automation of 12 substations (EIB)
- Automation of 12 substations (EBRD)
- Automation of 4 substations (KfW)
- Automation of 2 substations (KfW)

ELIMINATION OF BOTTLENECKS IN THE GRID

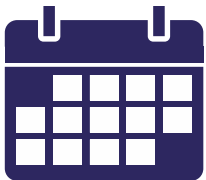
PURPOSE – To ensure the optimal transfer of power from surplus to scarce areas of the Integrated Power System of Ukraine. To increase of technical stability / safety reserve of the system. To increase the reliability of power supply.

RESULT – Removed grid congestions. Grid losses are significantly reduced

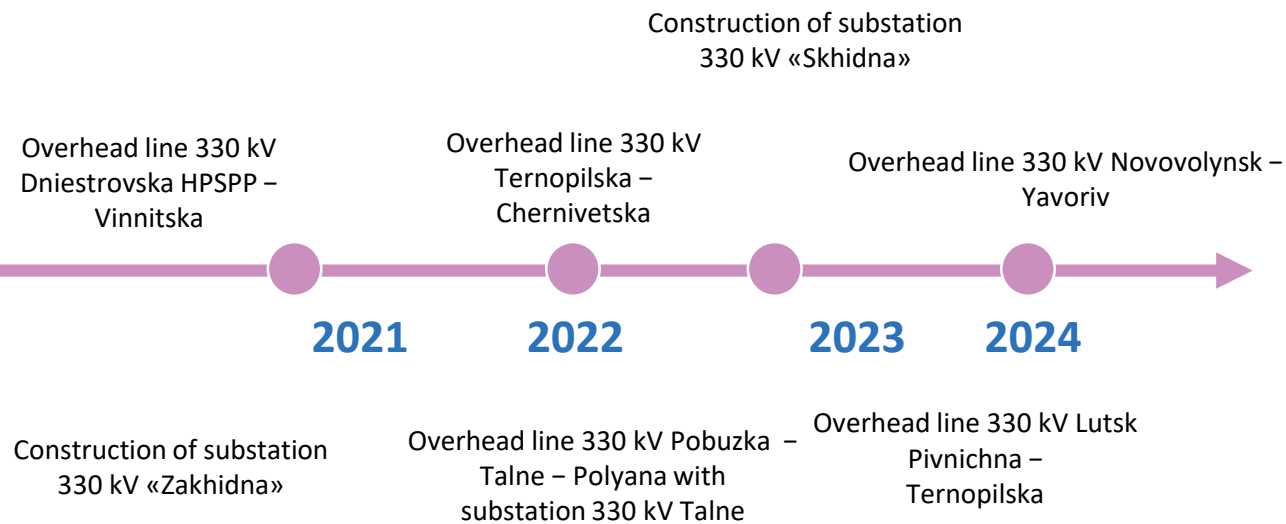
SCOPE OF WORK



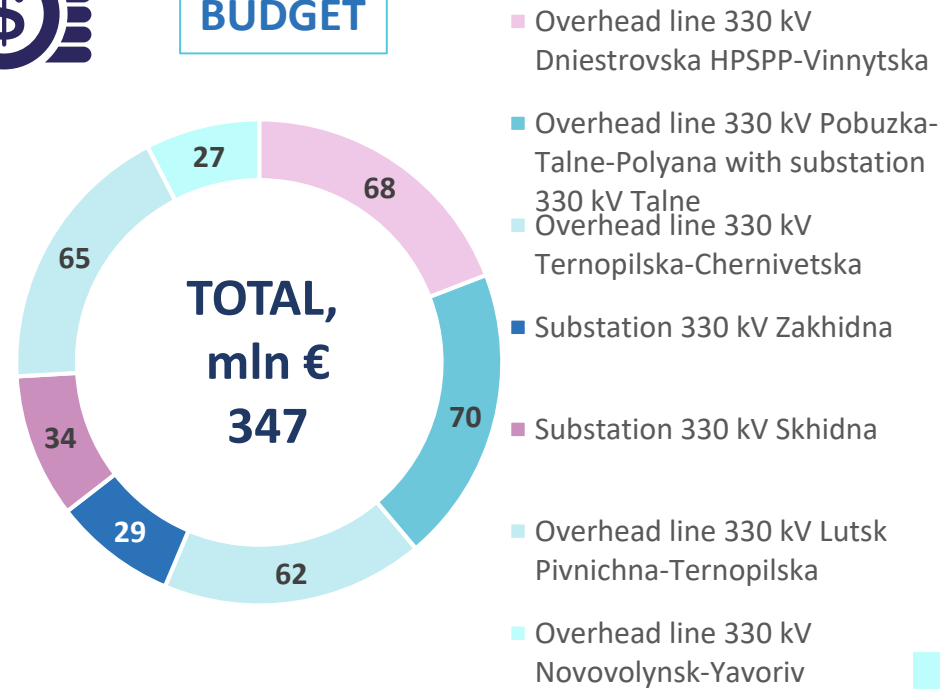
- 620 km new overhead lines 330 kV
- 3 new substations 330 kV
- 5 rehabilitated substations 330 kV
- 2 rehabilitated switchgears 330 kV



SCHEDULE



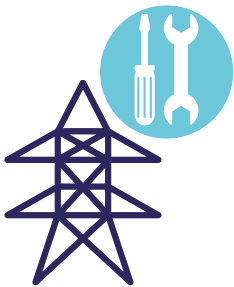
BUDGET



RENEWABLE ENERGY SOURCES INTEGRATION

PURPOSE/PROBLEM – The maximum installed capacity of renewable source integration, which can be adopted by the IPS of Ukraine without serious deviations in operation, is 3000 MW. And this amount is planned to be reached in December 2019. Technical conditions for the connection of "green" generation in the volume up to 8000 MW have already been issued

RESULT – Created and expanded possibilities for of renewable source integration connection



SCOPE OF WORK

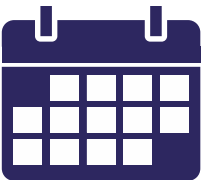
750 km new overhead lines 330-750 kV

1 new substation 750 kV

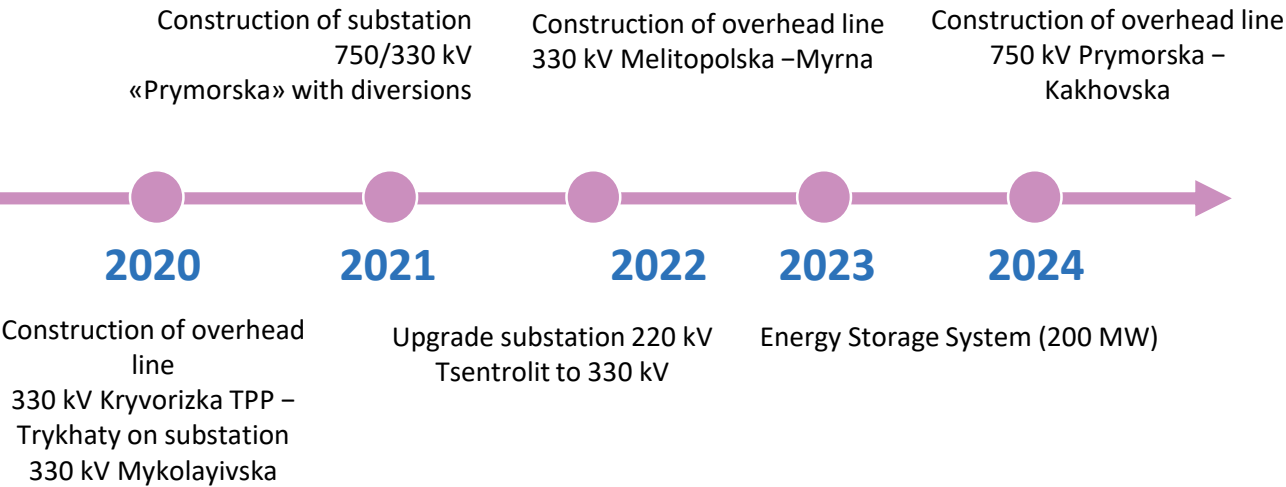
1 upgraded substation 220 kV to 330 kV

1 rehabilitated switchgear 330 kV

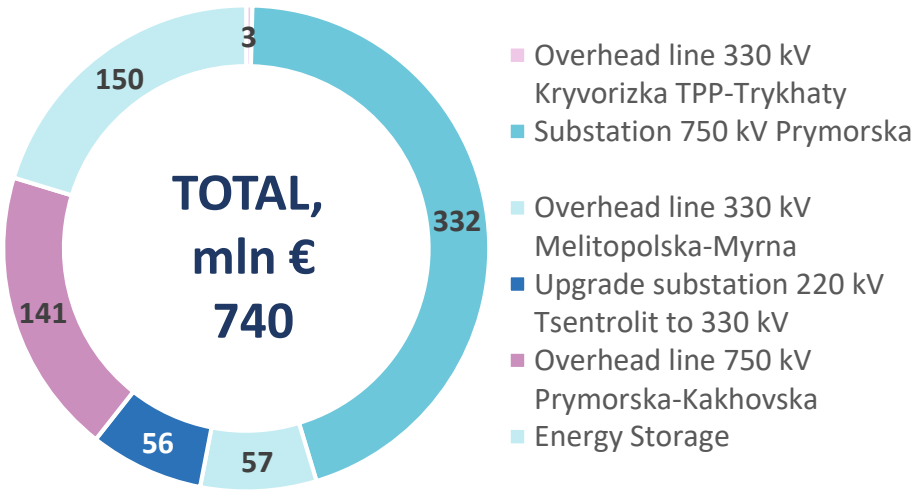
200 MW energy storage



SCHEDULE



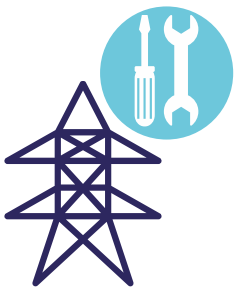
BUDGET



INCREASING POWER SUPPLY RELIABILITY (EASTERN REGION)

PURPOSE – To ensure the reliability criteria of the supply of existing consumers and the prospects for restoring the economic potential of the eastern regions

RESULT –Sufficient capacity of grid between the surplus southern and scarce northern parts of the eastern region of the IPS of Ukraine



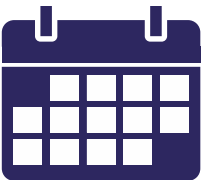
SCOPE OF WORK

250 km new overhead lines 220-330 kV

1 new substation 220 kV

1 upgraded substation 220 kV to 330 kV

2 rehabilitated switchgear 220 kV



SCHEDULE

Upgrade substation 220 kV
Azovska to 330 kV

Construction of 330 kV
substation Slobozhanska
with diversions 330 kV

Construction of overhead line
330 kV Kupiansk –
Kreminska

2020

2021

2022

2023

Rehabilitation
of overhead line 220 kV
Luhanska TPP – Yuvileina

Construction of overhead line
330 kV Kurakhivska TPP – Bilytska

Rehabilitation of substation
220 kV Yuvileina



BUDGET

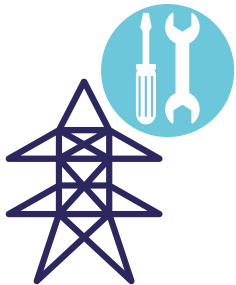


- Overhead line 220 kV Luhanska TPP-Yuvileina
- Upgrade substation 220 kV Azovska to 330 kV
- Overhead line 330 kV Kurakhivska TPP-Bilytska
- Substation 330 kV Slobozhanska
- Overhead line 330 kV Kupiansk-Kreminska
- Substation 220 kV Yuvileina

INTERCONNECTORS DEVELOPMENT PROGRAMME

PURPOSE – To achieve a level of capacity exchange between the IPS of Ukraine and ENTSO-E at least 3400 MW. To enhance a competitiveness of the internal electricity market

RESULT – New double-circuit overhead line 400 kV between Ukraine and Slovakia with new autotransformer at the substation 400 kV Mukachevo. New double-circuit overhead line 400kV between Ukraine and Romania with new autotransformer 750/400 at the substation 750 kV Prymorska



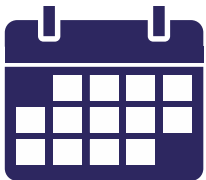
SCOPE OF WORK

434 km new overhead lines 330-750 kV

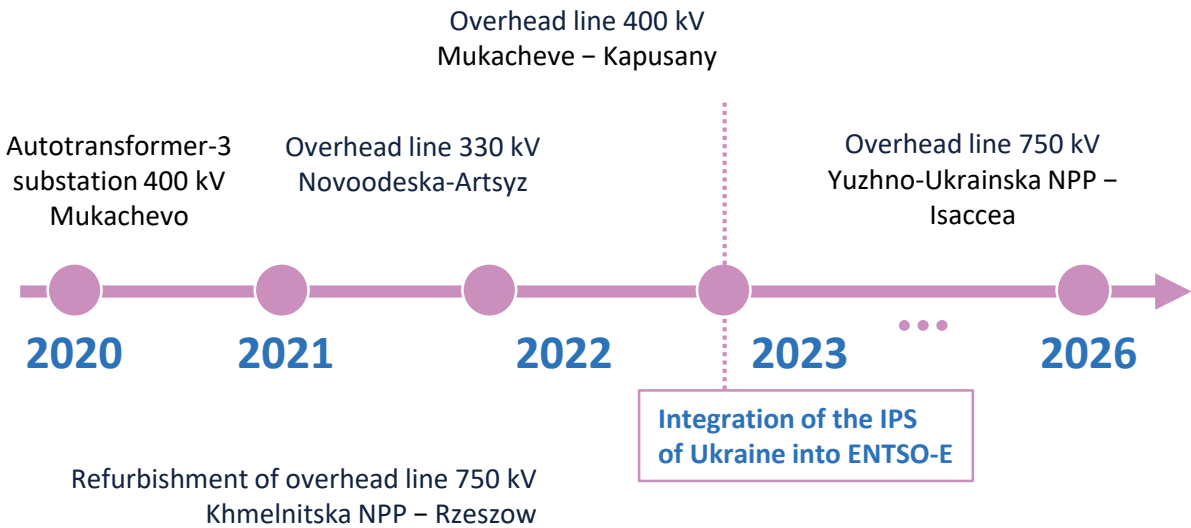
300 km rehabilitated overhead line 750 kV

2 rehabilitated substations 330 kV

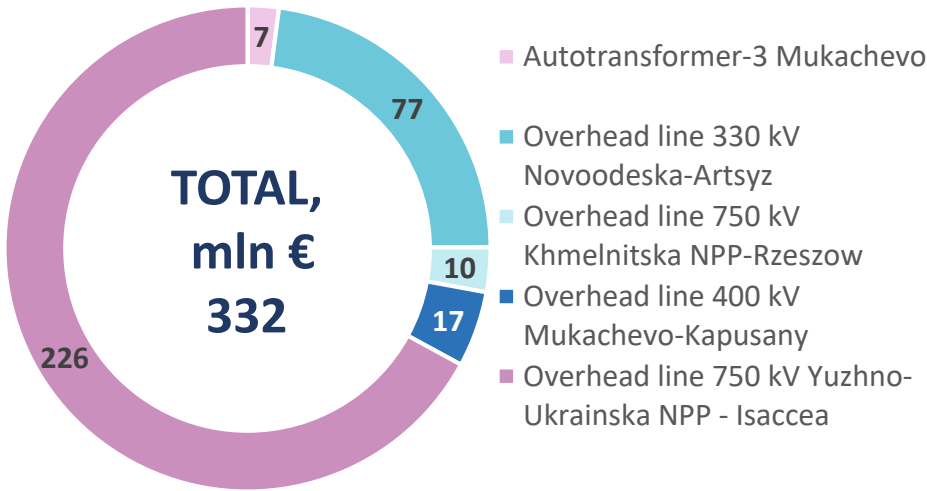
1 expanded substation 750 kV (new switchgear 400 kV)



SCHEDULE



BUDGET

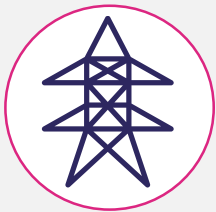


OPTICAL GROUND WIRE PROGRAMME

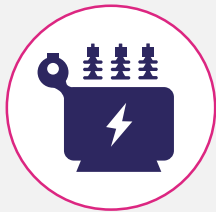
PURPOSE – Implementation of modern cybersecurity measures, that is the separation of technological and corporate transport networks from each other. Automation of substations and organization of operational control of substations with a main control center

RESULT – The reliable IT infrastructure which is ensuring a transfer of technological information between the objects of the Company and related entities

SCOPE OF WORK



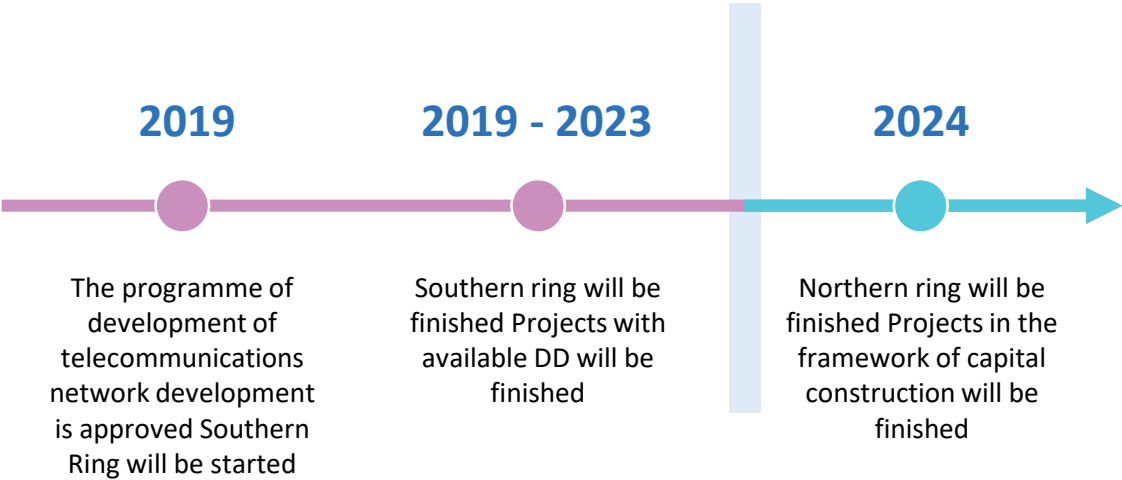
Overhead lines
equipment (6000 km)



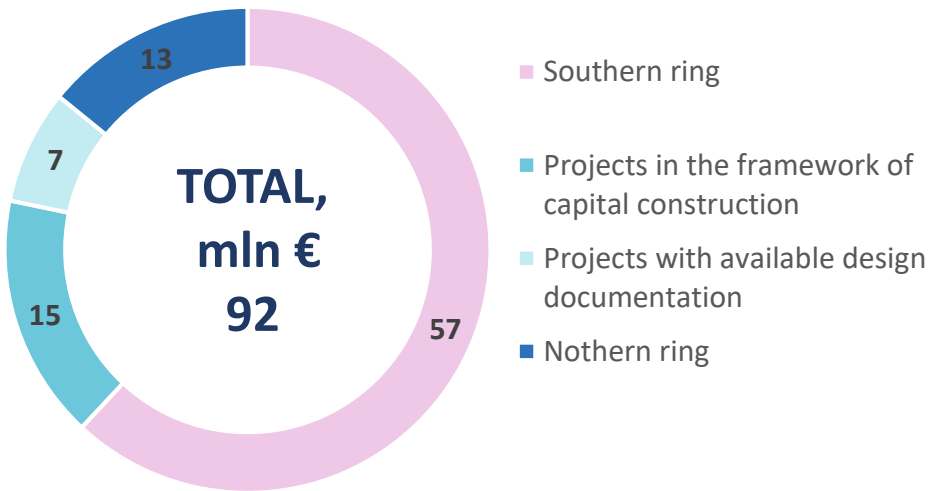
Substations equipment –
39 facilities



SCHEDULE



BUDGET



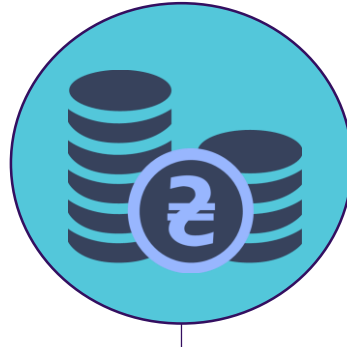
ADVANTAGES OF COOPERATION WITH UKRENERGO



More than 20 years of experience in contract management, including 15 years of cooperation with IFIs



Use of International Electrotechnical Commission standards, Harmonization of technical requirements with standards of EU



Tender procedures according to the rules of IFIs, Freedom to select the currency for price quotations, Transparency of all processes IFI-related secured financing



Practice of using standards of the International Federation of Consulting Engineers



Experience with leading global manufacturers

- Designing

- Procurement

- Installation

- Supervision

Thanks for your attention!



UKRENERGO

State enterprise | National power company