

# Renovation of the energy infrastructure of Mykolaivoblenergo

with the transfer to the 20 kV voltage class and implementation of EU's standards

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# Mykolaiv Region



Mykolaiv Region (Oblast) is located on the south of Ukraine. Its area (24,600 km<sup>2</sup>) comprises about 4.07% of the total area of Ukraine.

Population is about 1,091,821 people.

300 sunny days a year and access to the sea make Mykolaiv region attractive for renewable energy development.

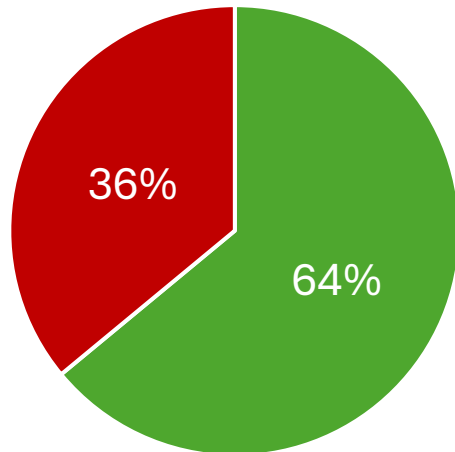
Mykolaivoblenergo is a large regional electricity distribution system operator that serves up to 0.5 million household and non-household consumers and own more than 24 thousand km of the power grid up to 150 kV

# Damaged energy infrastructure of Mykolaivoblenergo

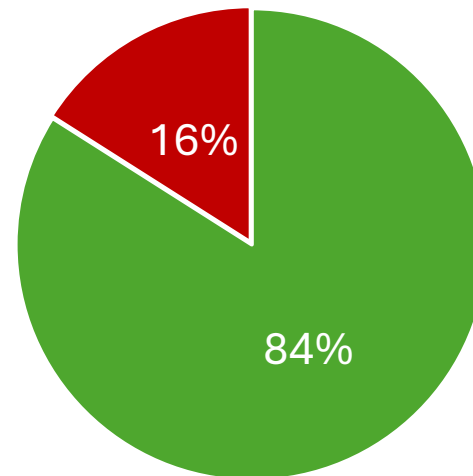


# Damaged energy infrastructure of Mykolaivoblenergo

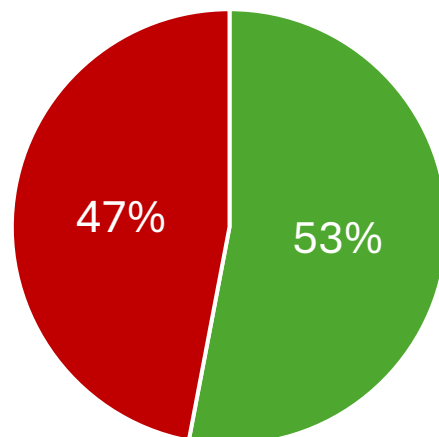
150 kV substations



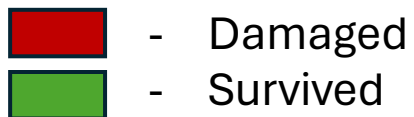
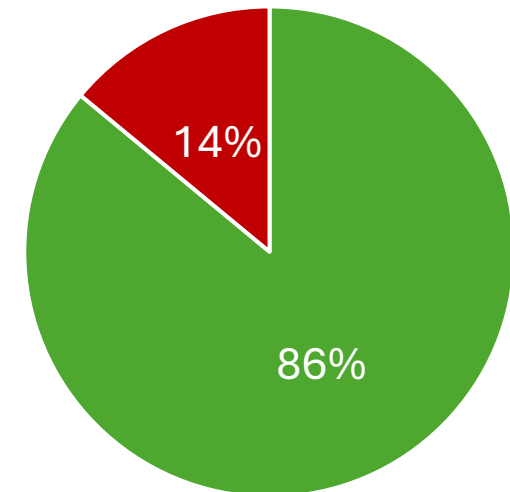
35 kV substations



150 kV power lines



35 kV power lines



# Losses

## Analysis of the level of power losses in the 35-150 kV network of Mykolaivoblenergo before and after reconstruction and construction of new grids

Title	Unit of measurement	Forecasted load for 2029 - 555 MW		Difference, %.
		Pre-war (as of 02.2022)	After the reconstruction	
Active power loss ( $\Delta P$ )				
Voltage 150 kV	MW	9,8	7,063	-28%
Voltage 110 kV		1,87	1,43	-23%
Voltage 35 kV		5,28	4,79	-9%
Total		16,95	13,28	-21%
Power loss ( $\Delta W$ )				
Voltage 150 kV	MWh per year	54 880	39 552,8	-28%
Voltage 110 kV		10 472	8 008	-23%
Voltage 35 kV		29 568	26 824	-9%
Total		94 920	74 368	-21%
Average voltage levels (U)				
Voltage 150 kV	kV	153,49	154,75	+0,8%
Voltage 110 kV		115,79	116,12	+0,3%
Voltage 35 kV		35,02	35,47	+1,3%

# On the way to energy transition

One of the real bottlenecks on the way to Ukraine's “green” transition is our distribution network infrastructure, which has been heavily damaged by the war and needs to be rebuilt on the principle of build back better, in line with European standards and best practices.



# Equipment



With the support of the Ministry of Energy of Ukraine, Ukraine Energy Support Fund, USAID Energy Security Project, the Energy Community Secretariat, and the Red Cross the company has already received equipment for the implementation of the 20 kV transition project as humanitarian aid, namely:

The Investment Program 2025 plans to design the reconstruction of two 35/150 kV substations and power lines as part of the restoration and networks transfer to the 20 kV class. During 2026-2029, the following stages are planned for the reconstruction of 3 substations 35 kV.

# Cooperation with



and



## Main areas of cooperation

- Mid- and long-term development planning
- Digital substations
- Grid automation
- ...





# Summary



€450M



7-10 years



International  
Energy Cluster

Project executor



Mykolaivoblenergo

System Operator



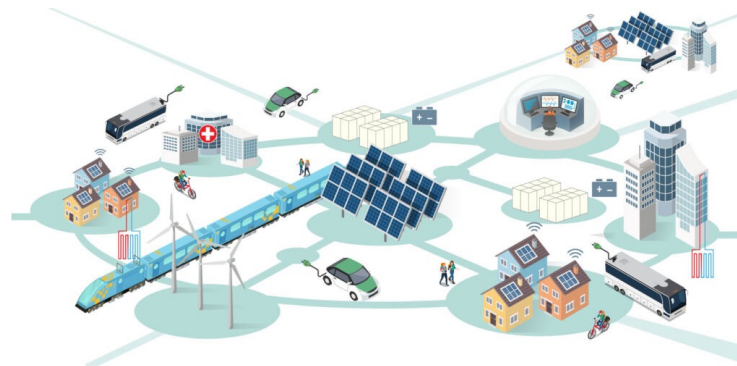
## Documents

- The Cluster was established in the legal framework of the Republic of Lithuania.
- Memorandum of cooperation with the Ministry of Energy.
- Agreement with Mykolaivoblenergo for the implementation of the project “Renovation of Mykolaivoblenergo's energy infrastructure with transfer to the 20 kV voltage class”.
- Conceptual design of the renovation of Mykolaivoblenergo.
- Scheme for the long-term development of the distribution system.
- Distribution system development plan.
- Digital model of the distribution network,
- Concept of microgrid development at Mykolaivoblenergo.



## Scope of work

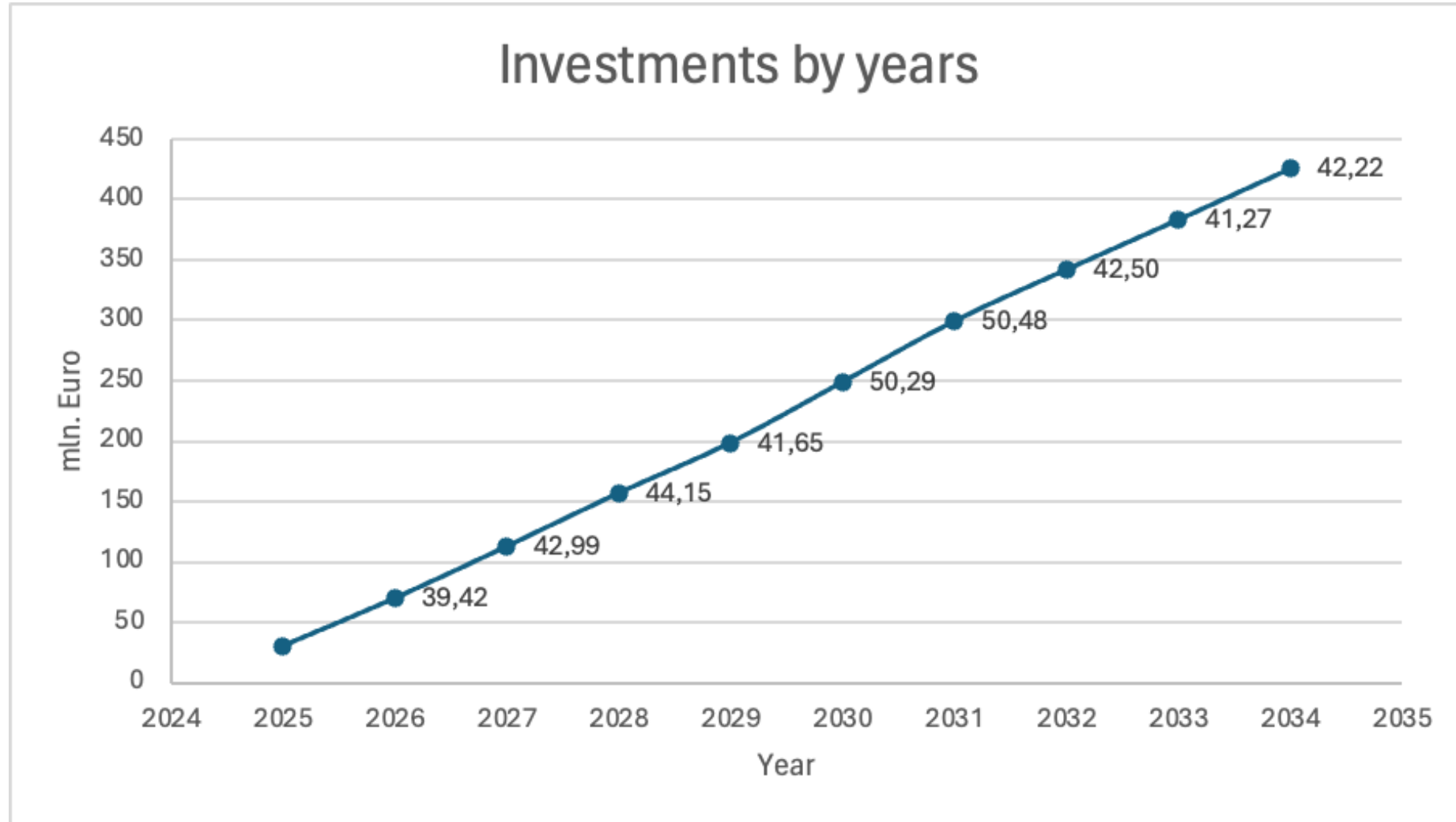
1. Replacement of primary and secondary equipment (some of it has already been supplied by donors)
2. Deep automation.
3. Modernization of dispatching.
4. Implementation of the ability to operate in a balanced island mode (microgrid).



## Benefits of application

- Creating an ability for the consumers to provide with electricity autonomously in the event of a large-scale blackout.
- Increasing the potential for RES connection.
- Reduce downtime and related financial losses.
- Reduce SAIDI, SAIFI, MAIFI indicators and provide consumers with greater access to quality electricity.
- Reduce the carbon footprint by transmitting energy closest to the consumer in the most cost-effective way.
- Increase the energy security of the region.
- Reduce technological losses in the grid.
- Create a positive social effect.
- Possibility of project scale-up.

# Investment needs



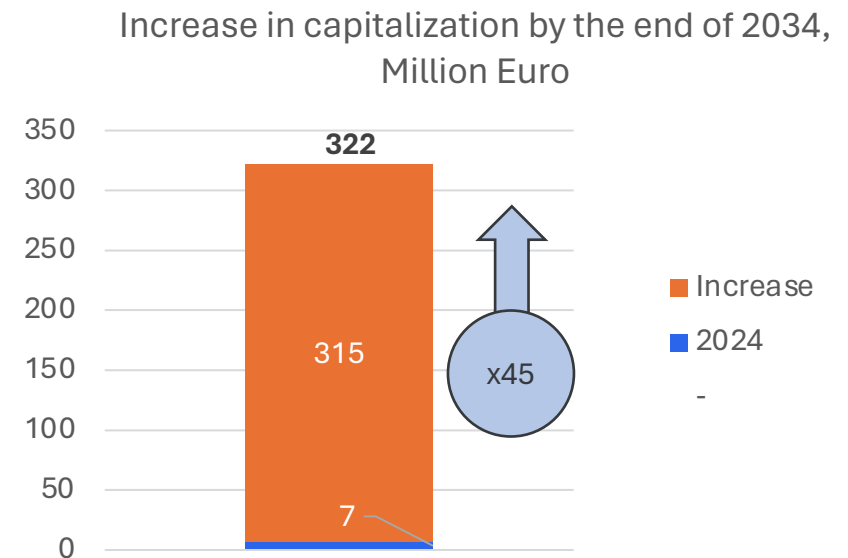
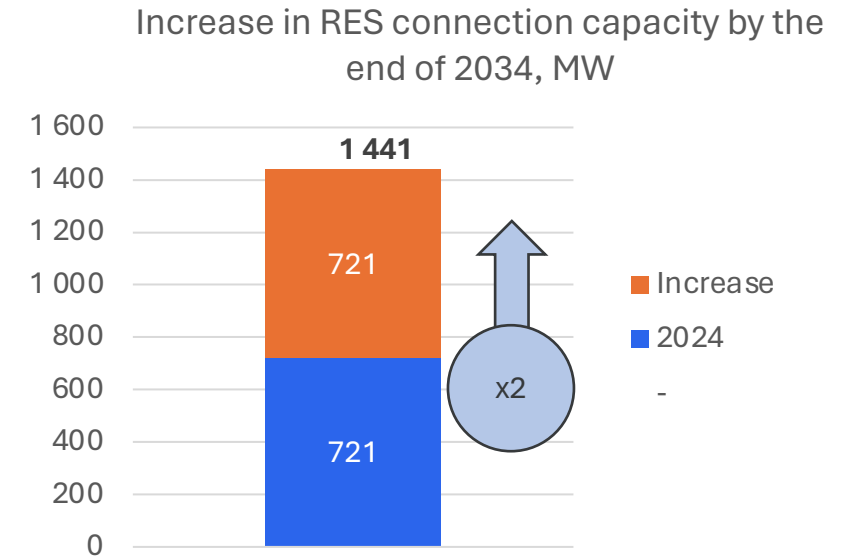
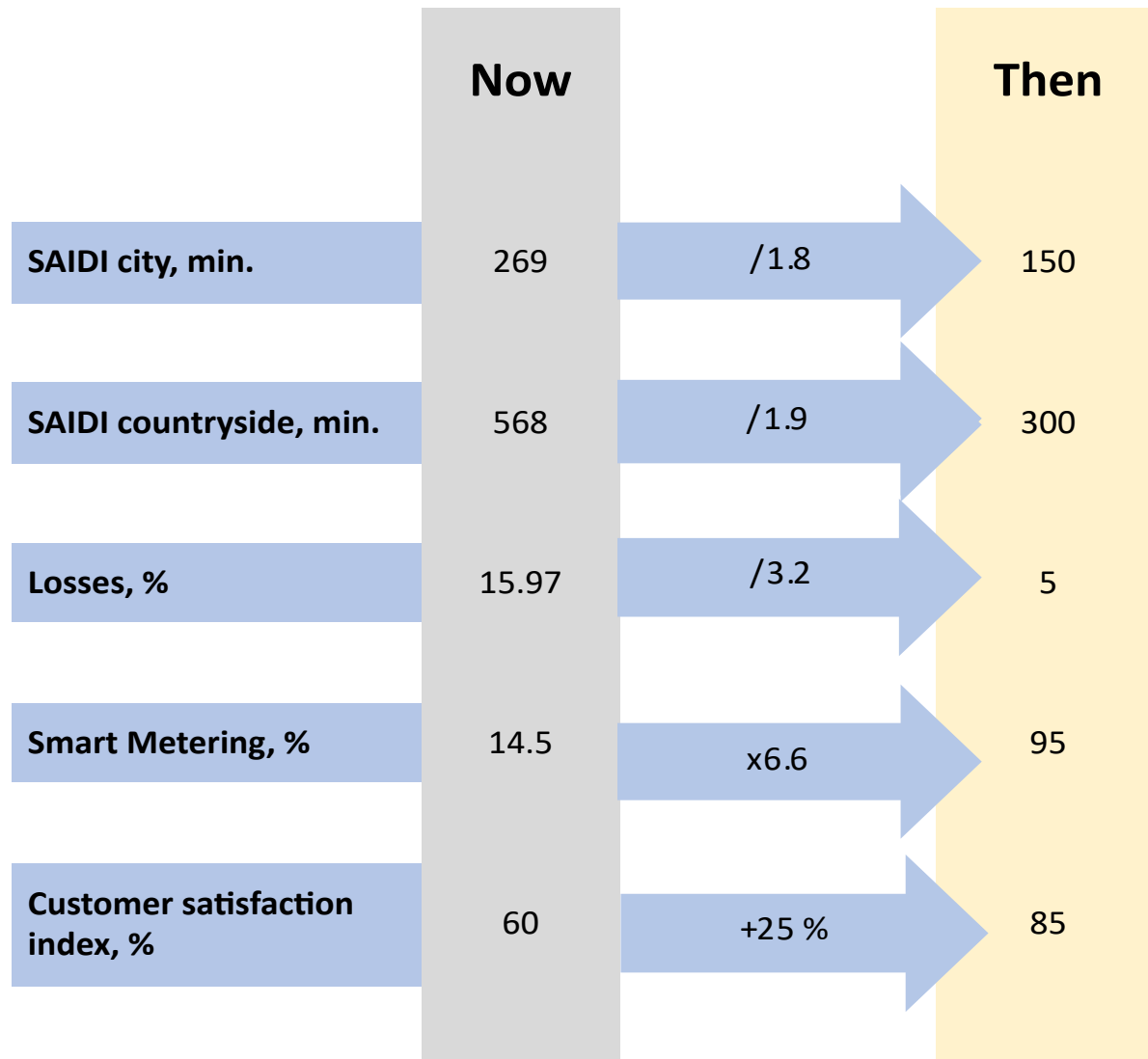
# Schedule of implementation of priority actions

№	The event name	design and research works	construction and assembly works		Note
		year of performance	year of performance	year of completion	
1	The substation 150/35/6 kV "██████████" reconstruction for the purpose of recovery after damage due to hostilities with the transition to the 20 kV voltage class in the city of Mykolaiv.	2025	2026	2029	Clause 2.1.18 distribution system development plan
2	The substation 35/10 kV "██████████" reconstruction for the purpose of recovery after damage due to hostilities the transition to the 20 kV voltage class.	2025	2026	2028	Clause 2.2.7 distribution system development plan
3	The substation 35/10 kV "██████████" reconstruction for the purpose of recovery after damage due to hostilities the transition to the 20 kV voltage class.	2028	2029	2029	Clause 2.2.8 distribution system development plan
4	The substation 35/10 kV "██████████" reconstruction for the purpose of recovery after damage due to hostilities the transition to the 20 kV voltage class.	2026	2027	2027	Clause 2.2.9 distribution system development plan
5	The substation 35/10 kV "██████████" reconstruction for the purpose of recovery after damage due to hostilities the transition to the 20 kV voltage class.	2027	2028	2029	Clause 2.2.10 distribution system development plan

# Payback period

Name of indicator	Units of measurement	JSC "Mykolaivoblenergo"		
Tariff	EUR/MWh	10,77 (active)	13,46 (+25%)	16,16 (+50%)
Discount rate	%	10	10	10
Capital investment in reconstruction/construction including VAT	million euros	425,29	425,29	425,29
Maximum load for the start of reconstruction/construction	MW.	508	508	508
Integral effect (NPV)	million euros	-108,62	-54,85	+1,98
Internal rate of return (IRR)	c.u.	0,032	0,066	0,101
Discounted payback period (DPP)	years	$>T_{calc}$	$>T_{calc}$	23
Payback period (PP)	years	20	11	7

# Benefits



Thank you!