

AUCTIONS FOR PROVIDING RESERVES

**TO BALANCE THE POWER
SYSTEM WITH A TERM OF UP
TO 5 YEARS**



FREQUENCY CONTAINMENT RESERVES (FCR)



FCR – a service of constant readiness provided to the Transmission System Operator (Ukrenergo) to ensure power output or stop power output to the grid at a high speed – up to 15 seconds

Need – 99 MW



On August 15, there will be an auction for a term of 5 years with the start of services in Q4 2025

EXAMPLE:

10 MW energy storage won the auction with a price of UAH 1,250 = 5-annual revenue of UAH 275 million



Ukrenergo is willing to pay for such a service

Up to 1339 UAH/MW



Price is pegged to € exchange rate

Today, a 10 MW energy storage costs UAH 360 million

AUTOMATIC FREQUENCY RESTORATION RESERVES (aFRR)



aFRR – a service of constant readiness provided to the Transmission System Operator (Ukrenergo) to ensure power output or stop power output to the grid automatically at a speed of 15 minutes

Need up to:

579 MW for loading

421 MW for loading and unloading



On August 22, there will be an auction for a term of 5 years with the start of services in Q4 2025



Ukrenergo is willing to pay for such a service

from **939 to 1339 UAH/MW**



Price is pegged to € exchange rate

EXAMPLE:

10 MW maneuvering generation won the auction with a price of UAH 900 = revenue for 5 years ≈400 million UAH

Cost of a power plant with a 10 MW capacity:

- Gas turbine ≈ UAH 300 mln,
- Gas piston ≈ UAH 450 mln,
- Biogas cogeneration ≈ UAH 900 mln

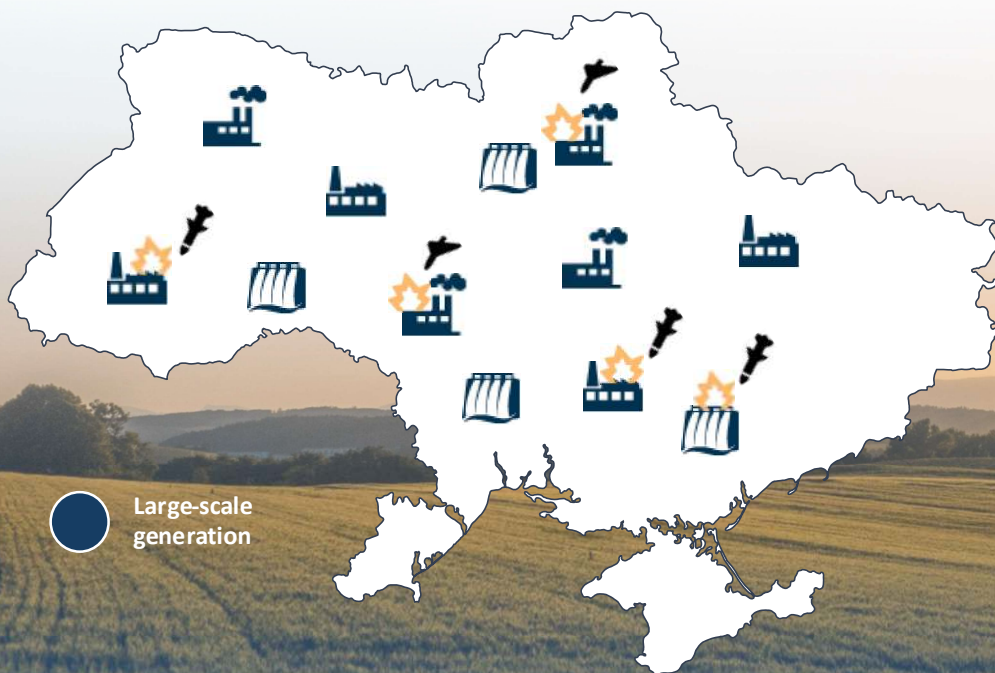
BUILDING A NEW FOUNDATION OF A RESILIENT POWER SYSTEM:

**HOW TO START SUCCESSFUL
DECENTRALIZED GENERATION
PROJECTS TODAY**



HOW TO COUNTERACT RUSSIAN ENERGY TERROR

Conventional power system



Adversarially robust power system



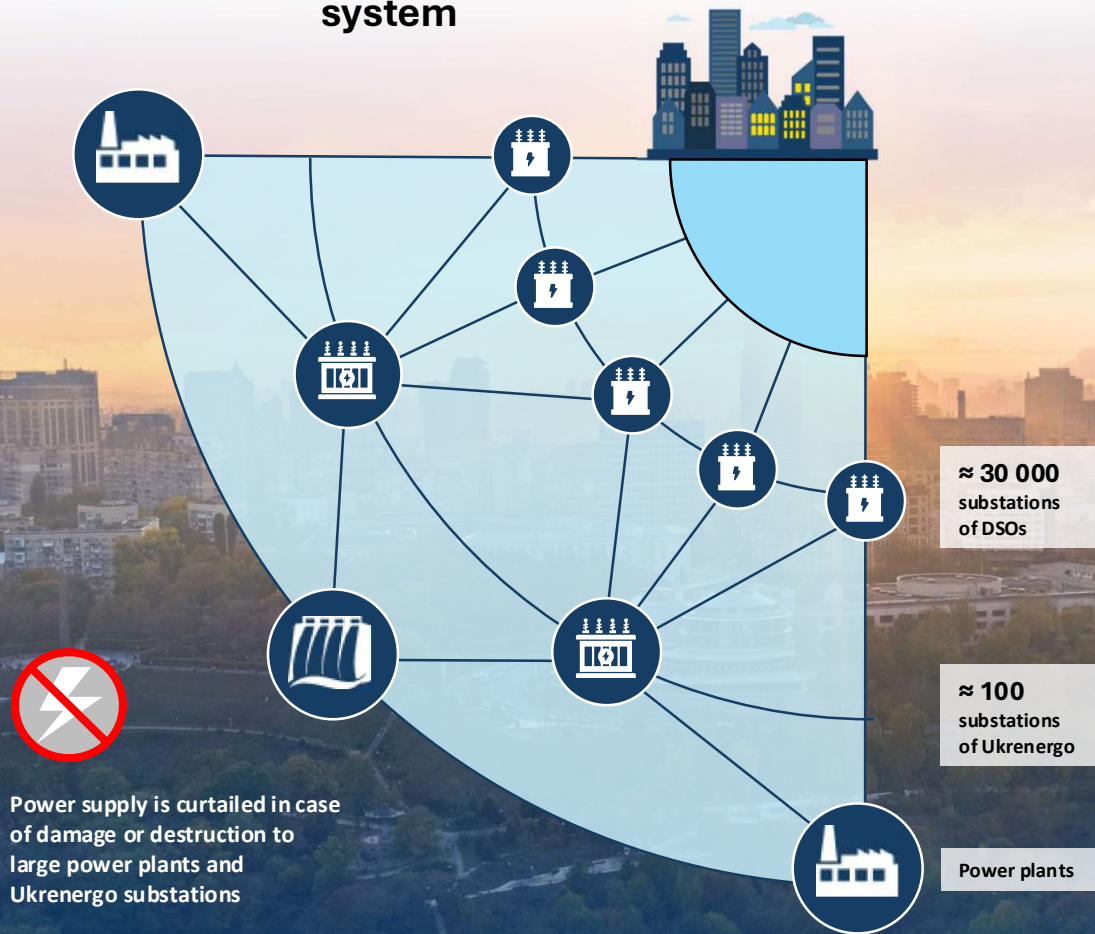
All large thermal and hydroelectric power plants are prone to damage during massive missile and drone attacks



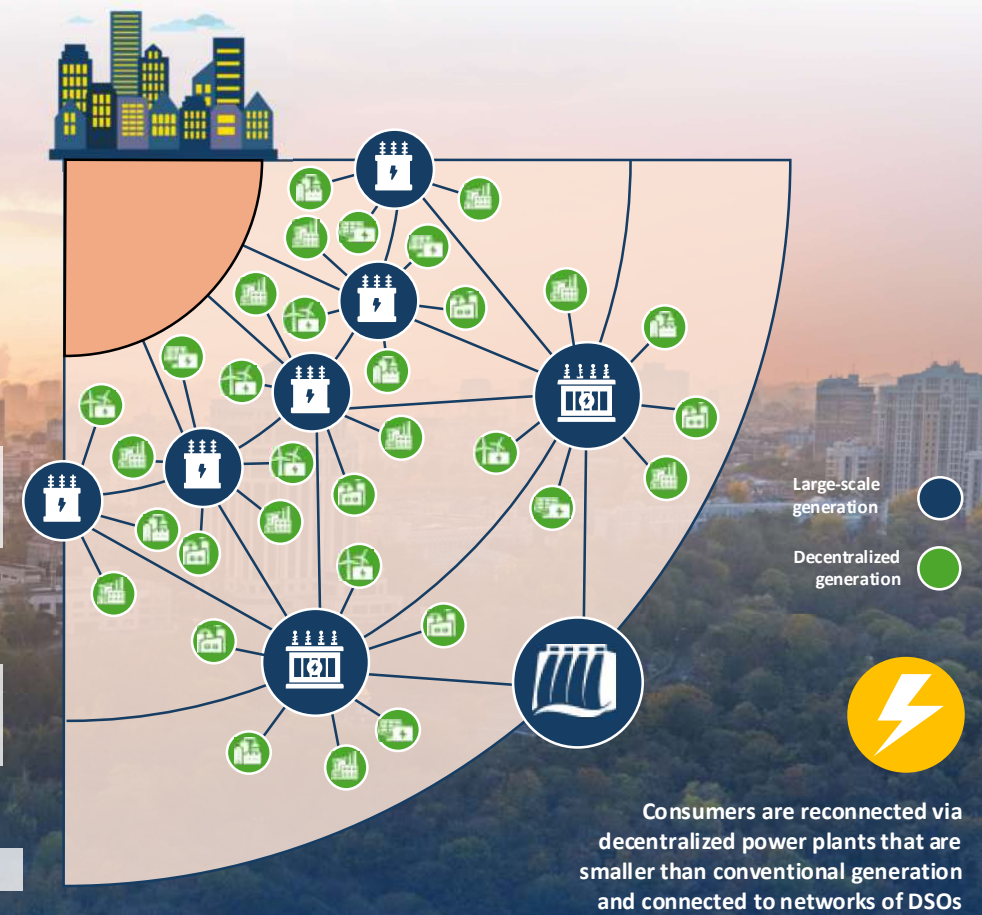
In case of similar massive missile and drone attacks, only a small part of decentralized power plants is likely to be damaged

HOW TO PROVIDE POWER SUPPLY FOR A TYPICAL LARGE UKRAINIAN CITY

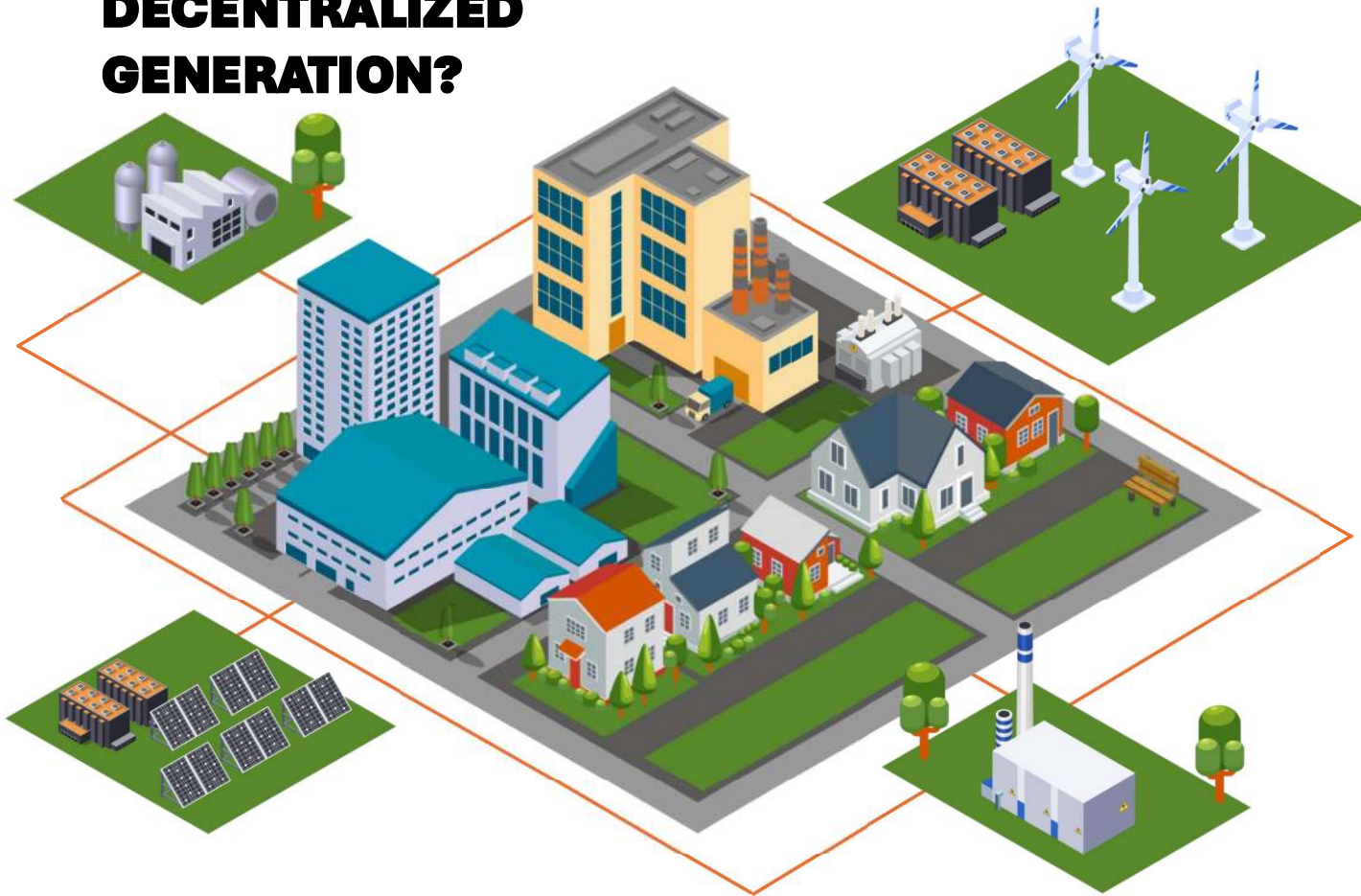
Conventional power system



Decentralized power system



WHAT ARE THE BENEFITS OF DECENTRALIZED GENERATION?



ADVANTAGES OF A POWER SYSTEM WITH DECENTRALIZED GENERATION:



▼ Resistance to russian attacks

▼ Energy-efficient technologies

▼ New competitive electricity market

▼ Stable power supply for communities

▼ Diversified energy mix

▼ Decarbonized energy sector

▼ New local employment

WHERE TO GET RESERVES FOR BALANCING THE POWER SYSTEM?



Ukrenergo is ready to conclude a 5-year contract with investor companies for the purchase of services that will provide at least 579 MW (for loading) and 421 MW (for loading and unloading) of reserves



FOR THIS, UKRENERGO WILL CONDUCT TWO LONG-TERM AUCTIONS:

1st AUCTION

AUGUST 15

High-speed loading and unloading service – up to 15 seconds

NEED – 99 MW

For this service, Ukrenergo is willing to pay

up to 33 EUR/MW

In EU countries, such a service costs **up to 1.5 – 3 EUR/MW**

2nd AUCTION

AUGUST 22

Automatic loading and unloading service at a speed of 15 minutes

NEED – 579 MW

(for loading) and








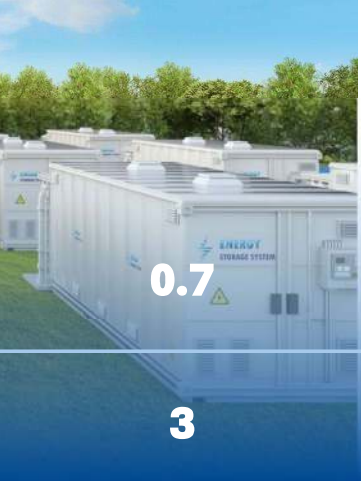


421 MW (for loading and unloading)

For this service, Ukrenergo is willing to pay

from 24 to 33 EUR/MW

In EU countries, such a service costs **up to 4 – 11 EUR/MW**

WHAT NEW GENERATION NEEDS TO BE BUILT:

Type of generation	 Gas-fired power plants	 New biofuel TPPs	 Energy storages	 WPPs	 PVs
Current installed capacity	0.0	0.3	0.0	0.5	6.2
Installed capacity to be built	+1.4	+1.1	+0.8	+4.5	+3.8
Resulting installed capacity	1.4	1.4	0.8	5.0	10.0
<p>12.8 Investments (€ billion)</p>	 1.5	 3.9	 0.7	 4.0	 2.7
Expected non-discounted payback period (years)	3-4	3-4	3	3	4

GAS-FIRED POWER PLANT

(5 MW PROJECT)



Project investment

≈ € 5-6 mln



Construction period

1-2 year(s)



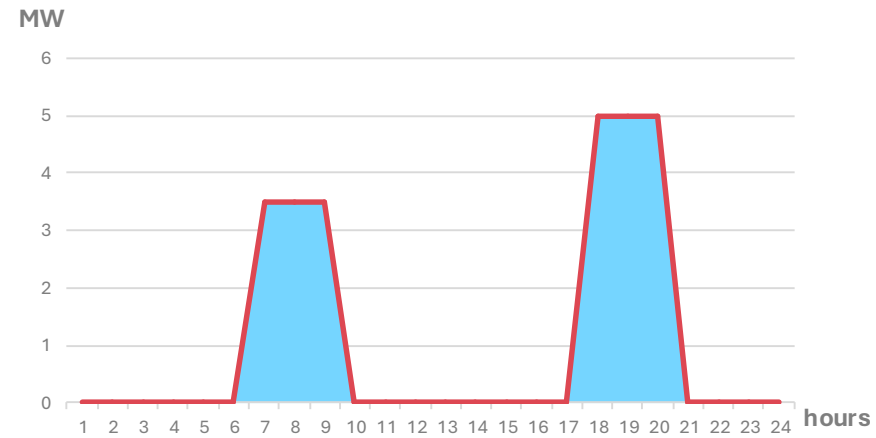
Payback period

3-4 роки



Fuel
Biogas,
natural gas or
hydrogen

Generation profile



HOW INVESTOR WILL BE ABLE TO RETURN INVESTED MONEY:

REVENUE:

≈ € 1.0 million per year - reserve provision service

≈ € 2 millions per year - sale of electricity in the market

COSTS:

≈ € 0.3 million per year – operation and repairs

≈ € 0.6 million per year – fuel (natural gas)

P&L: + € 2.1 millions per year

BIOFUEL POWER PLANT



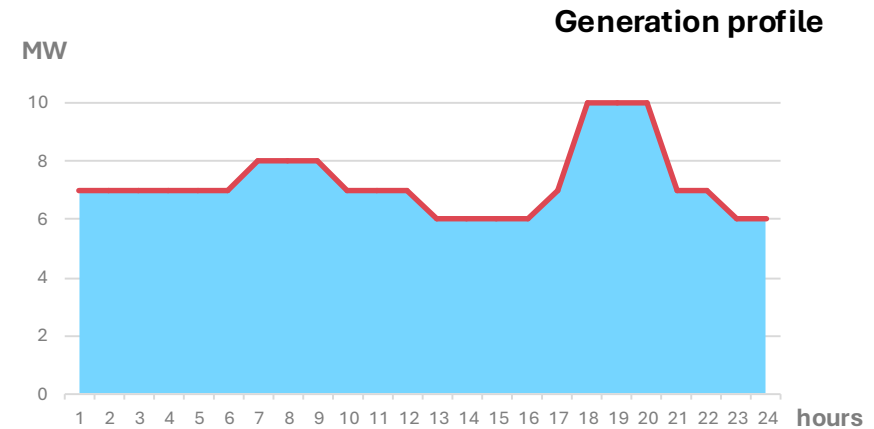
(10 MW PROJECT)

 **Project investment**
≈ € 20-25 mln

 **Construction period**
1-3 year(s)

 **Payback period**
3-4 years

 **Fuel**
 Agricultural pellets, wood chips, solid household waste, biogas



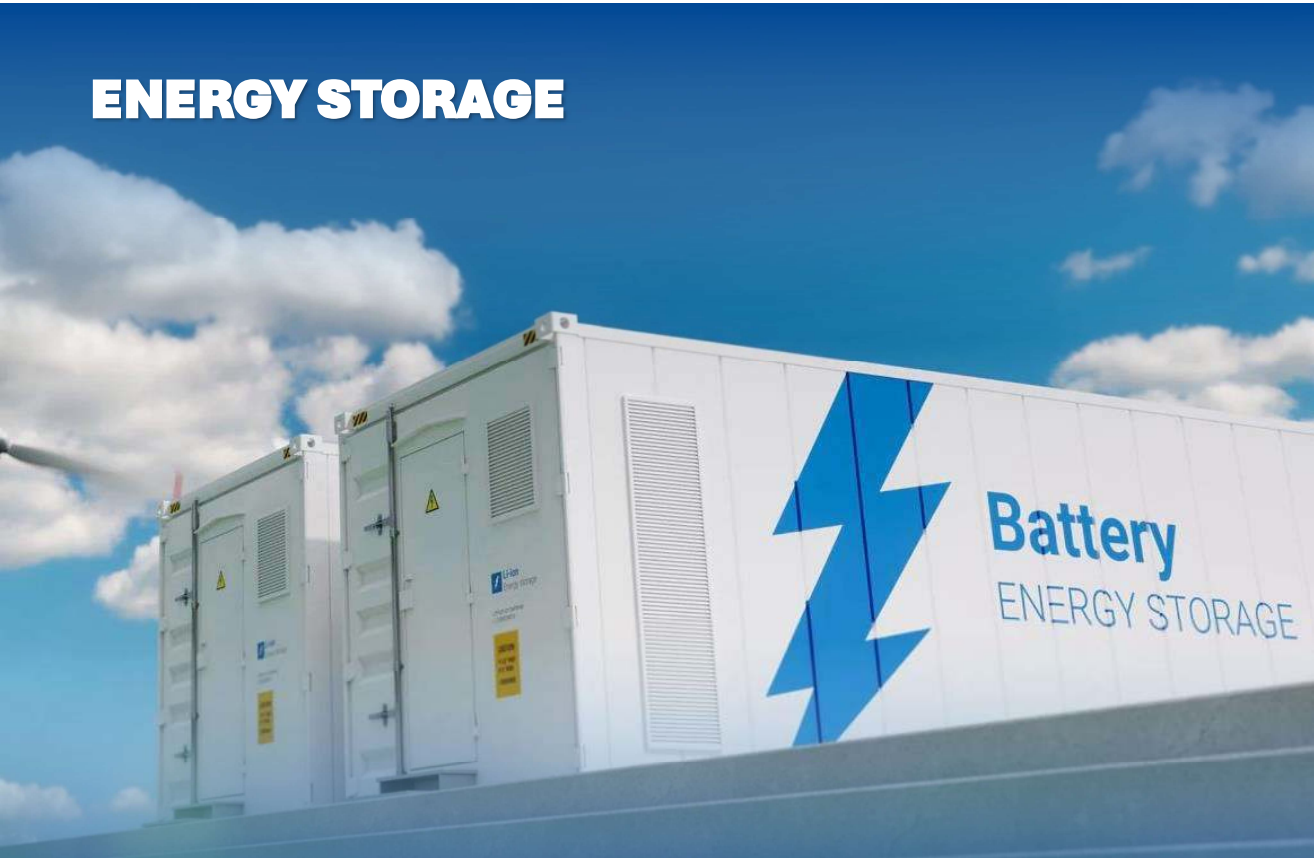
HOW INVESTOR WILL BE ABLE TO RETURN INVESTED MONEY:

REVENUE:	Option 1	Option 2
	≈ € 0.4 million per year - ancillary services	≈ € 1.7 million per year - sale of thermal energy
	≈ € 7.8 millions per year – sale of electricity in the market	≈ € 10 millions per year- sale of electricity in the market

COSTS:

≈ € 0.6 million per year - operation and repairs	≈ € 0.8 million per year - operation and repairs
≈ € 1.7 million per year – fuel (wood waste)	≈ € 2.3 millions per year – fuel (wood waste)
	≈ € 5 millions - additional investments
P&L: + € 5.9 millions per year	P&L: + € 8.6 millions per year

ENERGY STORAGE



(10 MW PROJECT WITH 4 HOUR CAPACITY)



Project investment

€ 9 mln



Construction period

Up to 1 year



Payback period

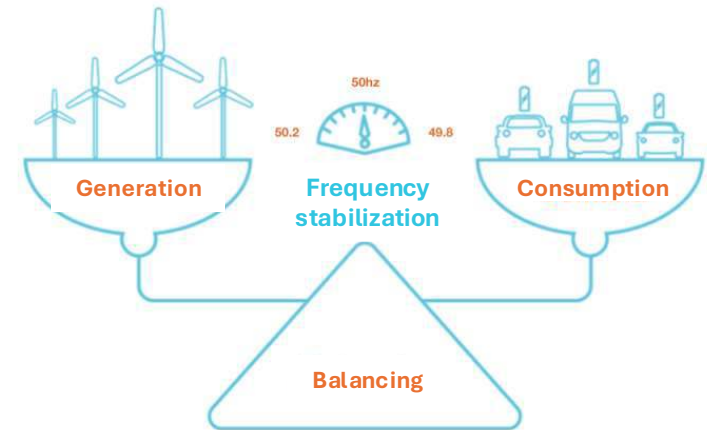
3 years



Fuel

No need

PLACE OF ENERGY STORAGE IN THE POWER SYSTEM OF UKRAINE



HOW INVESTOR WILL BE ABLE TO RETURN INVESTED MONEY:

REVENUE:

≈ € 1.4 million per year – reserve provision service

≈ € 4 millions per year – sale of electricity in the market

COSTS:

≈ € 0.3 million per year – operation and repairs

≈ € 0.7 million per year – purchase of electricity

P&L: + € 4.4 millions per year

SOLAR POWER PLANT



(10 MW PROJECT)



Project investment

€ 4.3 mln



Construction period

Up to 1 year



Payback period

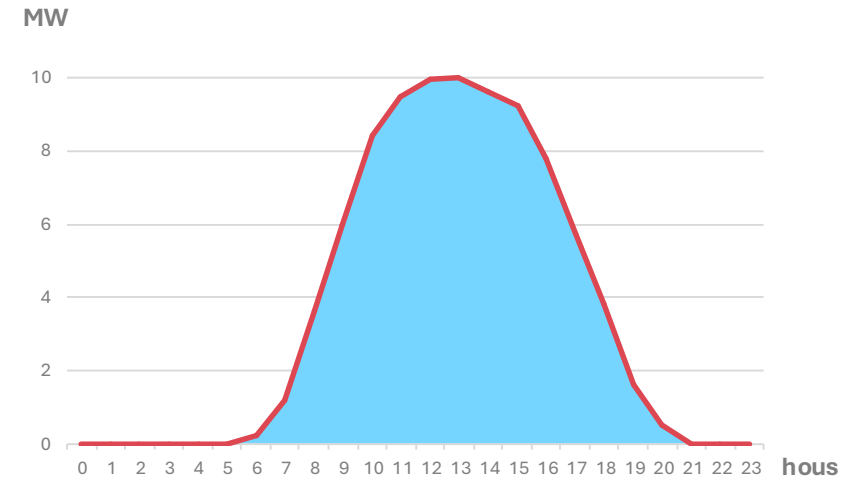
4 years



Fuel

No need

Generation profile



HOW INVESTOR WILL BE ABLE TO RETURN INVESTED MONEY:

REVENUE:

≈ € 1.2 million per year – sale of electricity in the market

COSTS:

≈ € 0.06 million per year – operation and repairs

P&L: + € 1.14 million per year

WIND POWER PLANT



(50 MW PROJECT)



Project investment

€ 38 mln



Construction period

≈ 1-2 year(s)



Payback period

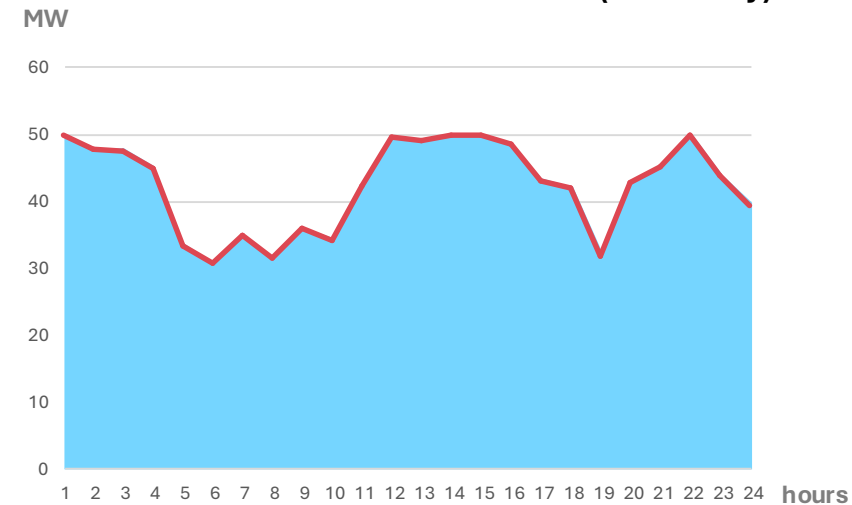
3 years



Fuel

No need

Generation profile
(winter day)



HOW INVESTOR WILL BE ABLE TO RETURN INVESTED MONEY:

REVENUE:

≈ € 14 millions per year – sale of electricity in the market

COSTS:

≈ € 0.8 million per year – operation and repairs

P&L: + € 13 millions per year

WHY COMPANIES SHOULD BUILD THEIR OWN GENERATION (10 MW EXAMPLE)



BASIC OPTION

The power plant operates during business hours and only to cover its own needs



The company has safeguarded power supply

Annual profit from using own electricity instead of grid one
≈ € 3.5 mln

ADDITIONAL OPTION 1

(additional income from selling reserves)

The power plant provides Ukrenergo with reserve service beyond business hours

● Additional annual revenue

≈ € 1 mln

● Additional annual costs

≈ € 0.2 mln

Additional annual profit from the sale of service to Ukrenergo
≈ € 0.8 mln

or

ADDITIONAL OPTION 2

(additional income from thermal and electrical energy)

The power plant sells thermal energy in winter and electricity beyond business hours

● Additional annual revenue

≈ € 1,7 mln

from the sale of thermal energy

● Additional annual costs

≈ € 0,5 mln

for operation and repairs

≈ € 4,8 mln

from the sale of electricity

≈ € 3,5 mln

for fuel (natural gas)

Additional annual profit from the sale of thermal and electrical energy
≈ € 2.5 mln

Specifications
Special Auction for Ancillary Services No. 2025-2030/1_FCR
for the AS delivery period of 01.10.2025 - 30.09.2030

1. Auction bidding zone: *IPS of Ukraine (UA_IPS_MBA)*.
2. Date and place of the AS Auction and results publication in case of the fallback procedure: *fallback procedure is not applied*.
3. Procurement period: **AS are procured for 1826 days – from 01.10.2025 to 30.09.2030**.
4. Time of the AS Auction ([according to the Schedule of AS Auctions for 2024](#)):
 - gate opening time of the AS Action: **10:00 15.08.2024**;
 - gate closure time of the AS Auction: **15:00 15.08.2024**.
5. Products to be procured at the Auction:

Product	Direction of procurement	Product name on the Auction Platform
FCR	Symmetric*	ДРПЧ_с_XX-YY

where XX-YY = 01-04, 05-08,..., 21-24 is the time period that includes 4 consecutive settlement periods

6. AS volumes procured at the AS Auction:

Bidding zone: IPS of Ukraine	
Delivery period	Procurement volumes per each product, MW
	FCR
00:00-04:00	99
04:00-08:00	99
08:00-12:00	99
12:00-16:00	99
16:00-20:00	99
20:00-24:00	99

7. Prices for each type of the AS formed according to the Methodology approved by the Regulator: *current prices at the time of publication of these Specifications (2024, Revision 1)*:

Product	Price according to the Methodology (excluding VAT), UAH/MW
FCR	973,39 + 366,43 = 1339,82**

**** - since the product is symmetric, the symmetric volume for upward and downward loading will be procured simultaneously under a single bid at the corresponding marginal prices, thus forming a marginal price for the symmetric product.**

8. Bidding format: [according to the functionality of the Market Management System](#) and in accordance with the requirements of Section 3.13 of the Market Rules approved by NEURC Resolution No. 307 dated 14.03.2018 (as amended by NEURC Resolution No. 1172 dated 26.06.2024).

9. Postal address/email address to which bids are submitted in case of the fallback procedure: *fallback procedure is not applied.*

10. Deadline for contestation of the Auction results: **15:30 16.08.2024** in accordance with the requirements of paragraph 3.17.1 of the Market Rules approved by NEURC Resolution No. 307 dated 14.03.2018 (as amended by NEURC Resolution No. 1172 dated 26.06.2024). Email address for contestation: appeals-asm@ua.energy.

11. Contact details of employees responsible for organising and conducting the Auction:
Sviatoslav Sakhno; Sakhno.SM@ua.energy; Tel.: +38 (098) 495-92-03.
Working hours: Mon – Fri 08:00–17:00.

Contact information and working hours of the Auction Platform support team:
Tel.: +38 (073) 425-02-38.
Working hours: Mon – Fri 08:00–17:00.

12. Marginal prices for each type of the AS in accordance with paragraph 10.1 of the Market Rules: *current prices at the time of publication of these Specifications (2024, Revision 1):*

Product	Marginal price (excluding VAT), UAH/MW
FCR	973,39 + 366,43 = 1339,82**

**** - since the product is symmetric, the symmetric volume for upward and downward loading will be procured simultaneously under a single bid at the corresponding marginal prices, thus forming a marginal price for the symmetric product.**

13. According to paragraph 3.6.1 of the Market Rules approved by NEURC Resolution No. 307 dated 14.03.2018 (as amended by NEURC Resolution No. 1172 dated 26.06.2024), the price of the AS delivery, determined by the results of the Special AS Auction, shall be converted to EUR at the official exchange rate of the National Bank of Ukraine, averaged for the month in which the relevant Auction was held, with subsequent conversion to UAH at the official exchange rate of the National Bank of Ukraine in relation to EUR exchange rate, averaged for the month in which the relevant AS was delivered.

Other terms and conditions

When submitting a bid for symmetric FCR products, the volume shall be indicated only for one direction - either for upward or downward loading (for example, 20 MW submitted by a bidder to the Auction means that this volume can be delivered in both directions - that is ± 20 MW), and the price shall not exceed the value being the sum of the marginal prices for upward and downward loading ($973,39 + 366,43 = 1339,82$).

Each ASP or PASP has the right to submit, for each AS delivery unit or for each potential AS delivery unit for each product of the FCR reserve, one reserve bid that shall not exceed the maximum regulation range for existing units or the planned level of the installed capacity for potential units.

Potential ancillary services delivery unit means a delivery unit or an energy storage unit with the total regulation capacity not less than 1 MW, which the PASP or the ASP undertakes to present in the AS Market after the fulfilment of the requirements of the Agreement on provision of ancillary services of frequency and active power control.

Ancillary services delivery unit means an offtake unit, a delivery unit, an energy storage unit, or an aggregation unit managed by a relevant market participant who has acquired the status of the Ancillary Service Provider and has the technical capabilities to provide ancillary services as required by the Transmission Network Code.

ASPs/PASPs who intend to participate in the Special Auction, at least 7 business days prior to each Special Auction in which they will participate, shall provide to the TSO the following information:

1. Payment instruction on the payment of the guarantee deposit marked by the Bank as executed.
2. Details of the escrow account (if opened) and the payment of the guarantee deposit to the escrow account/current account of the TSO.

As part of the maintenance/recertification of equipment, the winners of the Special Auction have the right, no later than one quarter (3 calendar months) prior to the beginning of the quarter in which such maintenance/recertification is scheduled, to provide to the TSO information about timelines (number of hours in each quarter) when such participant is entitled to suspend its obligations of the AS delivery based on the results of the Special Auctions. **The maximum number of hours (for 1 year) shall not exceed 336.** The AS payments and non-compliance charges will not be accrued for this period.

* For information

Submitting a bid to the Auction and executing the “upward loading” command means that the electrical installation shall deliver electrical energy to the grid at the corresponding time and at the corresponding capacity level in MW.

Submitting a bid to the Auction and executing the “downward loading” command means that the electrical installation shall stop delivering electrical energy to the grid, and in case of an energy storage facility – it can also start consuming electrical energy at the corresponding time and at the corresponding capacity level in MW.

Submitting a bid to the Auction for the “symmetric” reserve means that the electrical installation shall ensure at the corresponding time both the possibility of the delivery and the possibility of stopping the delivery of electrical energy to the grid, and in case of an energy storage facility – it shall also be able to both stop and start consuming electrical energy.

Example 1. If the installed capacity of a gas-piston power plant is 20 MW and this power plant already generates 10 MW at a particular hour, then during this time period it is able to provide 10 MW of symmetric reserve. That is, increase the capacity of electrical energy generation from 10 to 20 MW or stop generation by changing its capacity from 10 to 0 MW.

Example 2. If the installed capacity of the inverter of an energy storage facility is 20 MW and this facility does not deliver or offtake electrical energy at a particular hour, then during this time period it is able to provide 20 MW of symmetric reserve. That is, start the delivery of electrical energy with a capacity of 20 MW or start the offtake of electrical energy with a capacity of 20 MW.

Specifications

Special Auction for Ancillary Services 2025-2030/1_aFRR for the AS delivery period of 01.10.2025 - 30.09.2030

1. Auction bidding zone: *IPS of Ukraine (UA_IPS_MBA)*.
2. Date and place of the AS Auction and results publication in case of the fallback procedure: *fallback procedure is not applied*.
3. Procurement period: **AS are procured for 1826 days – from 01.10.2025 to 30.09.2030**.
4. Time of the AS Auction ([according to the Schedule of AS Auctions for 2024](#)):
 - gate opening time of the AS Action: **10:00 22.08.2024**;
 - gate closure time of the AS Auction: **15:00 22.08.2024**.
5. Products to be procured at the Auction:

Product	Direction of procurement	Product name on the Auction Platform
aPBЧз (aFRRu)	Upward loading*	даPBЧ_з_XX
aPBЧп (aFRRd)	Downward loading*	даPBЧ_п_XX
aPBЧс (aFRRs)	Symmetric*	даPBЧ_с_XX

where XX = 01, 02, ..., 24 is the settlement period

6. AS volumes procured at the AS Auction:

Bidding zone: IPS of Ukraine			
Delivery period	Procurement volumes per each product, MW		
	даPBЧз (daFRRu)	даPBЧп (daFRRd)	даPBЧс (daFRRs)

00:00-01:00	579	0	421
01:00-02:00	579	0	421
02:00-03:00	579	0	421
03:00-04:00	579	0	421
04:00-05:00	579	0	421
05:00-06:00	579	0	421
06:00-07:00	579	0	421
07:00-08:00	579	0	421
08:00-09:00	579	0	421
09:00-10:00	579	0	421
10:00-11:00	579	0	421
11:00-12:00	579	0	421
12:00-13:00	579	0	421
13:00-14:00	579	0	421
14:00-15:00	579	0	421
15:00-16:00	579	0	421
16:00-17:00	579	0	421
17:00-18:00	579	0	421
18:00-19:00	579	0	421
19:00-20:00	579	0	421
20:00-21:00	579	0	421
21:00-22:00	579	0	421
22:00-23:00	579	0	421
23:00-00:00	579	0	421

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Product	Price according to the Methodology (excluding VAT), UAH/MW
aPB4c (aFRRs)	973,39 + 366,43 = 1339,82**
aPB4з (aFRRu)	973,39
aPB4p (aFRRd)	366,43

**** - since the product is symmetric, the symmetric volume for upward and downward loading will be procured simultaneously under a single bid at the corresponding marginal prices, thus forming a marginal price for the symmetric product.**

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9. Postal address/email address to which bids are submitted in case of the fallback procedure: *fallback procedure is not applied.*

10. Deadline for contestation of the Auction results: **15:30 23.08.2024** in accordance with the requirements of paragraph 3.17.1 of the Market Rules approved by NEURC Resolution No. 307 dated 14.03.2018 (as amended by NEURC Resolution No. 1172 dated 26.06.2024). Email address for contestation: appeals-asm@ua.energy.

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Other terms and conditions

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Each ASP or PASP has the right to submit for each AS delivery unit or for each potential AS delivery unit for each product of the aFRR reserve one reserve bid, each containing up to 10 (inclusive) "price - volume" bids in ascending order of price. The total volume in MW of all bids submitted for a single product shall not exceed the maximum regulation range for existing units or the planned level of the installed capacity for potential units.

Potential ancillary services delivery unit means a delivery unit or an energy storage unit with the total regulation capacity not less than 1 MW, which the PASP or the ASP undertakes to present in the AS Market after the fulfilment of the requirements of the Agreement on provision of ancillary services of frequency and active power control.

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As part of the maintenance/recertification of equipment, the winners of the Special Auction have the right, no later than one quarter (3 calendar months) prior to the beginning of the quarter in which such maintenance/recertification is scheduled, to provide to the TSO information about timelines (number of hours in each quarter) when such participant is entitled to suspend its obligations of the AS delivery based on the results of the Special Auctions. **The maximum number of hours (for 1 year) shall not exceed 336.** The AS payments and non-compliance charges will not be accrued for this period.

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Example 1. If the installed capacity of a gas-piston power plant is 20 MW and this power plant already generates 10 MW at a particular hour, then during this time period it is able to provide 10 MW of symmetric reserve. That is, to increase the capacity of electrical energy generation from 10 to 20 MW or stop generation by changing its capacity from 10 to 0 MW.

Example 2. If the installed capacity of the inverter of an energy storage facility is 20 MW and this facility does not deliver or offtake electrical energy at a particular hour, then during this time period it is able to provide 20 MW of symmetric reserve. That is, to start the delivery of electrical energy with a capacity of 20 MW or to start the offtake of electrical energy with a capacity of 20 MW.