

Smart energy management system (SEMS) Environmental deep tech



# Origin of Idea

Since October 2022, the Ukrainian power system has suffered from 1,200+ russian missiles.

60% of Ukrainians stayed without electricity, every hour including all critical facilities.

This disaster gave birth to the project idea.



### How did it all started?

More than 5 million boilers in Ukraine collectively consume more than 6000 MW.

This is equal to the capacity of the Zaporizhzhya nuclear power plant.

It is the largest nuclear power plant in Europe and the third largest in the world by total capacity.



6000 MW

# What is it all about?

NomiON – is a smart energy management system (SEMS), that automatically analyzes energy usage patterns and intelligently determines which boilers can be turned off to reduce peak energy consumption. NomiON does not require the involvement of a human specialist to set up the controller. Everything is done automatically both in hardware and software parts of system.

# Plug and play

Plug the boiler in the controller



Plug the controller in the socket



Once powered on, the boiler becomes controllable through the software.

# Challenges

Thermal Power Plants (TPP) and Combined Heat and Power (CHP) stations are among the world's largest contributors to CO2 emissions, primarily due to their extensive use of gas and coal for electricity generation. Simultaneously, TPP and CHP play a crucial role in stabilizing the power grid during peak demand periods.



# The SEMS main purpose is to optimize the use of electricity and reduce CO<sub>2</sub> emissions worldwide



To reduce CO<sub>2</sub> emissions by 25 600 000 tons annually



To reduce consuming of coal by 10 900 000 tons annually



To reduce gas consumption by 249 750 000 c.m. annually

### One device with the software costs



At the same time, each device reduces emissions by

1.5 tons CO2 per year

## CO<sup>2</sup> emission reduction potential in US

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based on the power of 2 kW

Generation: 4 406 TWh

Electricity consumption for water heating: 173 TWh

Volume of boiler management per year (300 days of 6 hours): 8,7 TWh

Savings effect on coal-fired power generation:

5 millions t/year

CO2 emissions reduction:

11 millions t/year

## Technical architecture of SEMS

HARDWARE

Through a SIM card, the controller both sends data regarding the boiler's consumption to the software and receives commands from the software to turn off boiler.

Provides a communication channel with controllers via GPRS/LTE.

#### SERVER

Implements the message transfer mechanism between the controller and the software.

#### SOFTWARE

Determines when it is best to turn off the boiler to use electricity wisely and not affect the consumer. TRANSMISSION SYSTEM OPERATOR

The dispatcher reduces the boilers` consumption by issuing commands for their shutdown, which SEMS then executes.

# **Operating principles of SEMS**

Generates user profiles containing heating duration, water volume, and typical time intervals when boilers are usually used.

Applies an algorithm to determine boilers suitable for shutdown, considering season, day, capacity, and ensuring uninterrupted hot water supply.

Predicts the total available shutdown capacity of boilers in 15-minute increments for the upcoming hour.

Furnishes the dispatcher with information on boilers power availability for shutdown based on load management scenarios, with the dispatcher accepting the needed MW.

water heating.

Once the dispatcher's command duration ends, the **boiler is** freed from control for subsequent

Sustains the approved capacity for the defined duration, with the flexibility to rotate boilers within that capacity.

way.

Changes the loading of boilers in a linear

Sends commands the boiler according scenario

to turn on/off to the selected

# Impact

NomiON will help to adjust the energy consumption of any heat storage devices in your home or business, thereby reducing fossil fuel consumption, reducing CO2 emissions and lowering energy costs.



#### Environmental

Global decarbonization – reduction of CO<sup>2</sup> emissions.



#### Social

Avoid humanitarian catastrophe caused by russian attacks on power facilities.



#### Economic

Reduction in electricity prices on the wholesale market.

## Financial needs - \$99M

Developing a software	Server hardware	\$9M	Communication costs for data exchange betwe controllers and software	Support for software ≈ \$1M	
Manufacturing of contro 1 million devices	ollers —				Spare parts warehouse and spare devices \$2M
		\$79M		\$10M	Payroll fund <b>\$1,2M</b>
Shipping controllers to customers \$0,3M	PR and promotional campaign	\$0,5M	Service center \$0,2M	Office rent	\$0,5M
CAPEX – \$83,8M			OPEX - \$15,	2M	

# Roadmap



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for

18 MONTHS

# Expected results

Development of SEMS will enable centralized control of heat storage devices energy consumption based on the needs of the power system.

In general, the implementation of SEMS can lead to improved energy efficiency, resource savings, and reduced environmental impact, making it potentially beneficial for various segments of society and the economy.



#### Ukraine will become a testing ground for proof-of-concept

# Scale potential

The project is not only about boilers - we can also control pool water heaters, underfloor heating, and other heat storage devices in sports complexes, homes, hotels, etc.

#### Target audience:

- governments
- businesses
- electricity suppliers/utilities



# Our team





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# NEMISSION to no emission

#### THANKS FOR YOUR ATTENTION