



Co-funded by the Intelligent Energy Europe Programme of the European Union

# The right direction to going green!

## Grand Hotel Balvanyos neZEH pilot project

[www.balvanyosresort.ro](http://www.balvanyosresort.ro)





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## Summary

### **1. Short term measures**

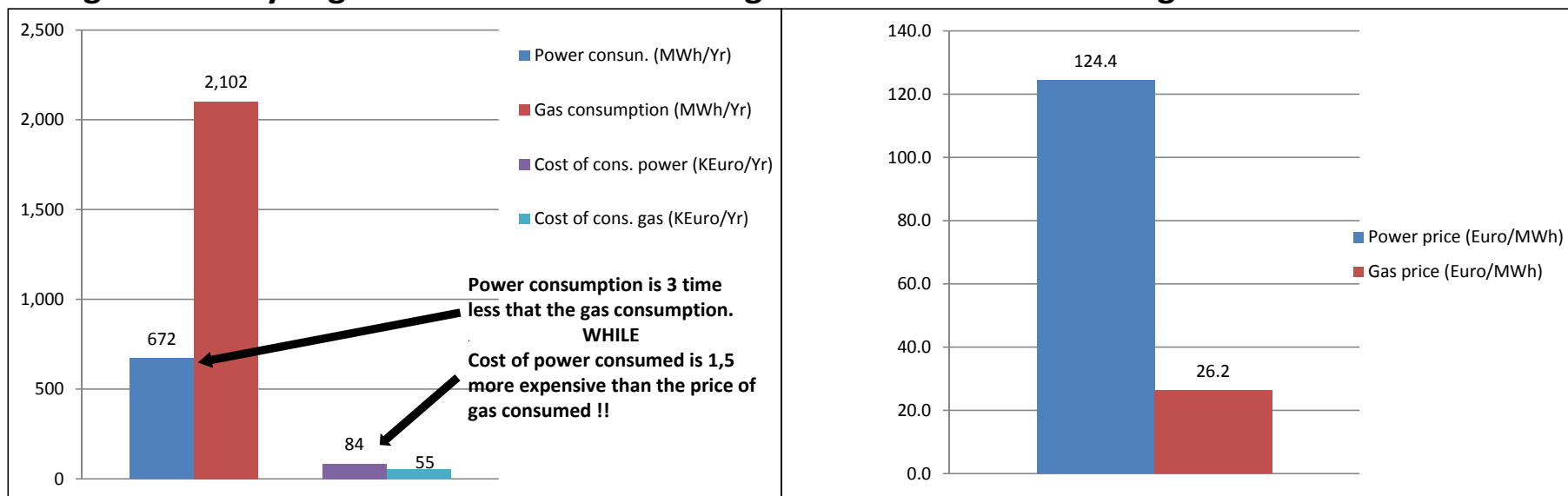
In the last three years, since we joined the neZEH project, we succeeded to implement some important actions:

- a) Installed a high efficiency cogeneration plant on natural gas, generating electricity and heat for the entire hotel infrastructure and facilities
- b) Implemented the BMS System
- c) Switched from inefficient lighting to LEDs
- d) Installed Variable Speed water pumps
- e) Insulated hot water pipes

### **2. Long term actions & challenges**

### **3. Conclusion**

## A high efficiency cogeneration solution leading towards a neZEH Building



### Why we decided to implement a high efficiency cogeneration solution?

Electricity consumption represents 25% of the total energy consumption, BUT the cost is 1.5 times higher than for natural gas (left diagram)

The explanation: 1 MWh electricity is 5 times more expensive than 1MWh natural gas (right diagram). One of the reason : The hotel is situated near one of the major national gas pipelines, and we don't pay distribution cost (with 20% lower cost for gas, than the average). The cogeneration solution helped us produce electricity, which is less expensive than the power acquired from the grid. Additionally, we are producing hot water to support the heating system, also solving the problem of the frequent power supply blackouts – the cogeneration system take over immediately 80% of our electricity consumption.

## Cogeneration – a solution of saving power and cost

### Consumptions and costs in actual solution (only boilers)

Power from the grid:	672	M Wh/Year
Natural gas consumption:	2.102	MWh/Year
Costs with power from grid:	84.456	Euro/Year
Costs with natural gas:	55.744	Euro/Year
Maintenance :	0	Euro/Year

<b>TOTAL COSTS WITHOUT CHP</b>	<b>140.200</b>	<b>Euro/Year</b>
<b>Annual energy savings</b>	<b>147 MWh</b>	
<b>Reduction of GHG emissions</b>	<b>141tCO2</b>	

Annual savings	39.869	Euro/Year
Monthly savings	3.322	Euro
Investment	118.702	Euro
Simple payback ~	3	Years

*39 EUR savings per each MWh produced "in house"*

### Consumptions and costs with CHP

Power from the grid:	234	MWh/Year
Natural gas consumption:	2.393	MWh/Year
Costs with power from grid	29.376	Euro/Year
Costs with natural gas:	63.455	Euro/Year
Maintenance :	7.500	Euro/Year

<b>TOTAL COSTS WITH CHP</b>	<b>100.331</b>	<b>Euro/Year</b>
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KWE 48G-4 SPN





## BMS system

A performant building management system (BMS) was included since the planning phase of the new SPA center, for heating, ventilation, air conditioning and lighting, based on energy efficiency and comfort.

After entering in the neZEH project, we decided to extend the BMS to the old part of the hotel, rooms, lobby, conference rooms, restaurants and bars. The full implementation will be finalized by the end of this year, when we will actively use a BMS system for the entire resort.

Measure/action	Yearly primary energy savings(kWh/y)	Primary energy savings percentage(%)	Investment €	Payback years	Reduction of GHG emissions(tCO <sub>2</sub> /y)
Implement and use BMS	420.000	17,2%	125.685	10,4	98,13

## Switching from an inefficient lighting system to LEDs

From the very beginning of the neZEH pilot project, we started replacing all the incandescent, halogen and fluorescent lamps with LEDs. We are talking about more than 9.500 lamps/lighting sources.

We managed to change about 60% of the system and by the end of the current year the change will be completed. The new spa building was designed and developed using only LEDs.

Measure/action	Yearly primary energy savings(kWh/y)	Primary energy savings percentage(%)	Investment €	Payback years	Reduction of GHG emissions(tCO2/y)
Change inefficient lighting with LED	138.000	3,7%	48.920	7,9	41,41

## Insulation of hot water pipes

During the last general upgrading of the buildings, performed in 2009, the pipes of the new boiler station (CT) were not properly insulated, causing high temperature and energy losses. This was an easy decision, and the hot water pipes insulation was completed in February 2016.

Measure/action	Yearly primary energy savings(kWh/y)	Primary energy savings percentage(%)	Investment €	Payback years	Reduction of GHG emissions(tCO2/y)
Insulation of Hot Water Pipes	107.000	5,2%	9.282	3,8	21,49

## Variable speed driver control/VSD

Installed pumps with frequency converters on entire system. They permanently control the hot water flow, for both heating and use in the hotel and SPA.

### System completed in October 2015

Measure/action	Yearly primary energy savings(kWh/y)	Primary energy savings percentage(%)	Investment €	Payback years	Reduction of GHG emissions(tCO2/y)
VSD on hot water pumps	12.000	0,3%	4.860	8,8	3,71



## Long-term actions & challenges

Long-term actions	Yearly primary energy savings(kWh/y)	Primary energy savings percentage(%)	Investment €	Reduction of GHG emissions(tCO2/y)
Building Insulation	288.000	15,6%	52.483	57,67
Solar collectors for hot water on roof	649.000	35,1%	143.448	129,8
Photovoltaic panels	198.000	12%	99.669	59,4

### Challenges:

Financial sources – we had to secure financing in other EU projects for expensive measures.

Lack of qualified specialists, architects and builders, who really understand or are familiar with the neZEH concept and energy efficient technologies.



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After the implementation of all measures proposed through the neZEH European Project, we estimate a decrease of energy consumption by 80% and a reduction of CO<sub>2</sub> by 76,67%, considering the situation from the start of the neZEH project.

# Thank you!

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