HEAT ACCUMULATOR
ELEKTROCIEPŁOWNIA BIAŁYSTOK

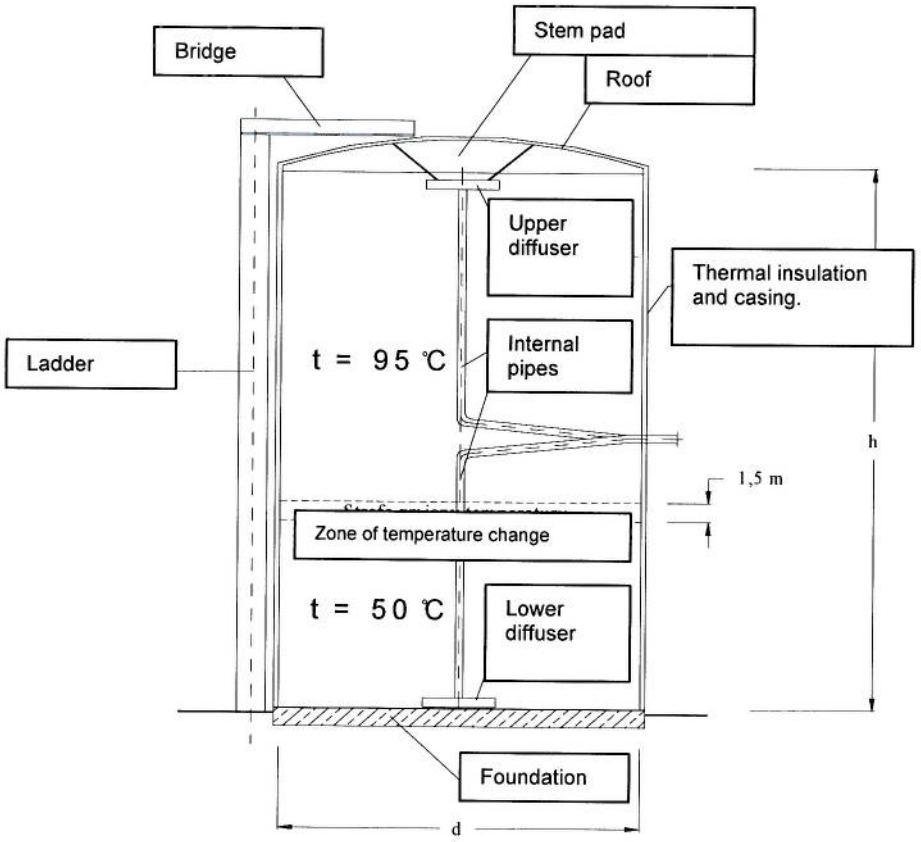
1 INTRODUCTION

Elektrociepłownia Białystok (ECB) operates a CHP plant in the north east of Poland. This heat driven unit has the opportunity to unbundle a part of its power generation from heat needs. It will increase efficiency of the plant and improve peak sales power. The project is to build up a classic heat accumulator on the site. This investment represent 21,3 MPLN (4,8 MEUR) and the UE gives the opportunity for a 6,375 MPLN subsidy (1,43 MEUR).
This investment with subsidy is the main opportunity to increase ECB value.

2 THE PROJECT

2.1 THE GENERAL DEVICE

EC Białystok commissioned Elsamprojekt Polska to prepare preliminary techno-economical analysis of building heat accumulator. The job was completed in year 2007 and has served as basis for working out the business plan for showing the validity and feasibility of this enterprise.
Since In case of EC Bialystok the accumulator without pressure seems to be the best solution, presented below are the most significant information which characterize this type of installation.
In the without-pressure accumulator the temperature of hot water in the reservoir cannot exceed the boiling point temperature of water at atmospheric pressure and does not exceed 95oC .
Heat accumulator is a gas tight cylindrical shaped reservoir made of steel for storing hot water. Water level in the accumulator during operation is basically constant, only the quantities of hot water and cold water change. To prevent the aeration of DH system water, a pad of steam (or nitrogen) is maintained above the water surface. The hot water is stored in the upper part of the reservoir while the water at the temperature of return is stored in the lower part.
The thermal insulation of the reservoir consists of layer of mineral wool of about 30 mm thickness. Thermal insulation is covered by trapeze-corrugated steel sheet. For ensuring proper operation the reservoir is equipped with the equipments like piping system, diffusers, temperature and pressure sensors, protections against vacuum and overflow, system of water seals (water lock), manholes for checking and stairs leading to the reservoir roof etc.
The sketch given below shows a simplified section across the accumulator.



Accumulator reservoirs, if they are properly designed, fabricated and operated , do not create any danger requiring building of special protections.

2.2 ECB SPECIFICATIONS

In the analysis for Selection of optimum size of the accumulator the following versions were considered :
Only flattening of daily heat-load fluctuations
Taking into consideration the consequences of participation on balancing market
Taking into consideration the benefits of selling electricity at peak prices instead off-peak.

The economical optimum size takes the three into consideration. ECB chose

- A hot water tank with atmospheric pressure
- 12 000 m3, half winter day production
- 95°C
- Efficiency 97%
- 20 years duration life

Three available locations can suit. ECB chose the terrain of former Air fan type Cooler OXP. Accumulator would be connected to the DH water system in such a way that :

- accumulator could be filled with water at temperature up to 95 oC even during the heating season when the temperature of DH water at the exit from ECB is higher than 95oC.
- accumulator could be filled with water at temperature up to 95 oC even during the transition period and In summer when the temperature of DH water at the exit from ECB is lower than 95oC.

3 BUSINESS CASE

3.1 INVESTMENT COSTS.

To the cost budget for realization of heat accumulation installation has been added an installation of water to water heat exchanger of 30 MWt capacity which would replace the dismantled dry fan coolers. Investment costs of the above mentioned installation amount to 1.7MPLN.

Costs	kPLN
Turn Key	15,108
Investor's Costs	2,600
Reserve	3,542
Total Costs	21,250

3.2 ASSUMPTIONS FOR ANALYSIS

3.2.1 General assumptions:

- Life span of the installation - 20 years (2011-2030)
- The investment costs will be incurred completely in years 2009-2010.
- Location in the terrain of Air fan type Cooler OXP (dry)
- The heat accumulation installation will go into operation at the beginning of 2011.
- The investment financed by own resources

3.2.2 Others assumption

These one can be subject for sensitive studies. We give you figures for main calculation.

The technical analysis considers there would be a possibility of replacing the production of electricity from condensation , by electricity produced in cogeneration mode by an amount of about 19 000 MWh. For the purpose of the business case we assumed

- Swap condensing to cogeneration power : 12 000 MWh/y

The investment would open a possibility of shifting the production and sale of electricity to peak periods by an amount of 37 GWh. For the purpose of the business case we assumed

- Swap off-peak to peak electricity 8,3% 110kV grid (about 26 GWh/y)

		2009	2010	2011	2012	2013
Inflation	%	4	4	2,5	2,5	2,5
Salaries Inflation	%	4	4	2,5	2,5	2,5
Interest rate	%	5,5	5,5	4	4	4
PLN/EUR		3,4	3,4	3,4	3,4	3,4
PLN/USD		2,25	2,25	2,25	2,25	2,25
Coal Price	USD/t	150,14	143,44	137,55	138,92	140,31
API2 Reference	USD/t	188,00	186,75	185,75	185,75	185,75
CO2 price	€/t	12,70	26,58	27,33	28,10	28,89
Off-peak	PLN/MWh	157,67	165,56	173,28	182,11	192,58
Peak	PLN/MWh	195,52	205,29	216,28	227,11	238,58
Green Certificates	PLN/MWh	244,28	254,05	260,40	266,91	273,59
Red Certificates	PLN/MWh	18,74	20,66	25,17	26,43	27,75

3.3 RESULT

In average after 2013

Reduction of coal consumption :	1,2 MPLN/y
Reduction CO2	0,8 MPLN/y
Increase revenue from power	1,5 MPLN/y
Maintenance and taxes	- 0,6 MPLN/y
Free Cash flow	+ 2,9 MPLN/y

IRR = 18,5%
With a 11,32% WACC the Net Present Value is 6,33 MPLN (1,42 MEUR)

4 RISKS AND OPPORTUNITIES

A very simple device, a wide test technology : low technical risk
Use of water and nitrogen : low environmental impact
Already into the MTP (after PTW measures) : low financial risk

We have the opportunity to catch a 6,35 MPN European subsidy.

5 CONCLUSION

The treasury statement of ECB will permit to pay the project on its own cash. ECB has the ability to improve the financing with bank if it worth. No cash from shareholders is needed.

The MTP already includes this project (after PTW measures) with an amount of 0,5 MPLN (0,11 MEUR) in 2009.

It is not the right moment to invest. EON has decided to freeze new activity in Poland and disposal of ECB.

Now, ECB can catch a 6,35 MPLN European subsidy to finance a 21,3 MPLN investment into accumulator project. This subsidy represents 30% of the investment.
That is an opportunity to increase the asset value of the company, with managed risks.