THE POSSIBILITIES TO INCREASE THE EFFICIENCY OF THE POWER PLANT THROUGH HEATING OF SYSTEM WATER BY USING OF HEAT of CIRCULATION WATER OF THE PLANT

LOGO

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1. Introduction

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2. Heat pumps

During the operation of heat pumps and cooling equipment, as a result of certain work from outside, energy carriers receive heat from resources with lower temperatures and distribute it to a sphere with a higher temperature. Therefore, this facility will be operated on the inverse thermodynamic cycle.

Recently the steam compressors, cascade, heat sinks and steam ejector cooling devices are used. The heat absorption pumps are more suitable for use in a power plant waste heat.

2.1 Absorption heat pumps

The boiling temperature at the same pressure of the heat absorption cooling pumps is used for two much different types of physical mixture and the substances boiling at low temperature serves as a cooler and the substances boiling at high temperature serves as a absorber relatively.

H_2O-LiBr liquids heat exchanging scheme

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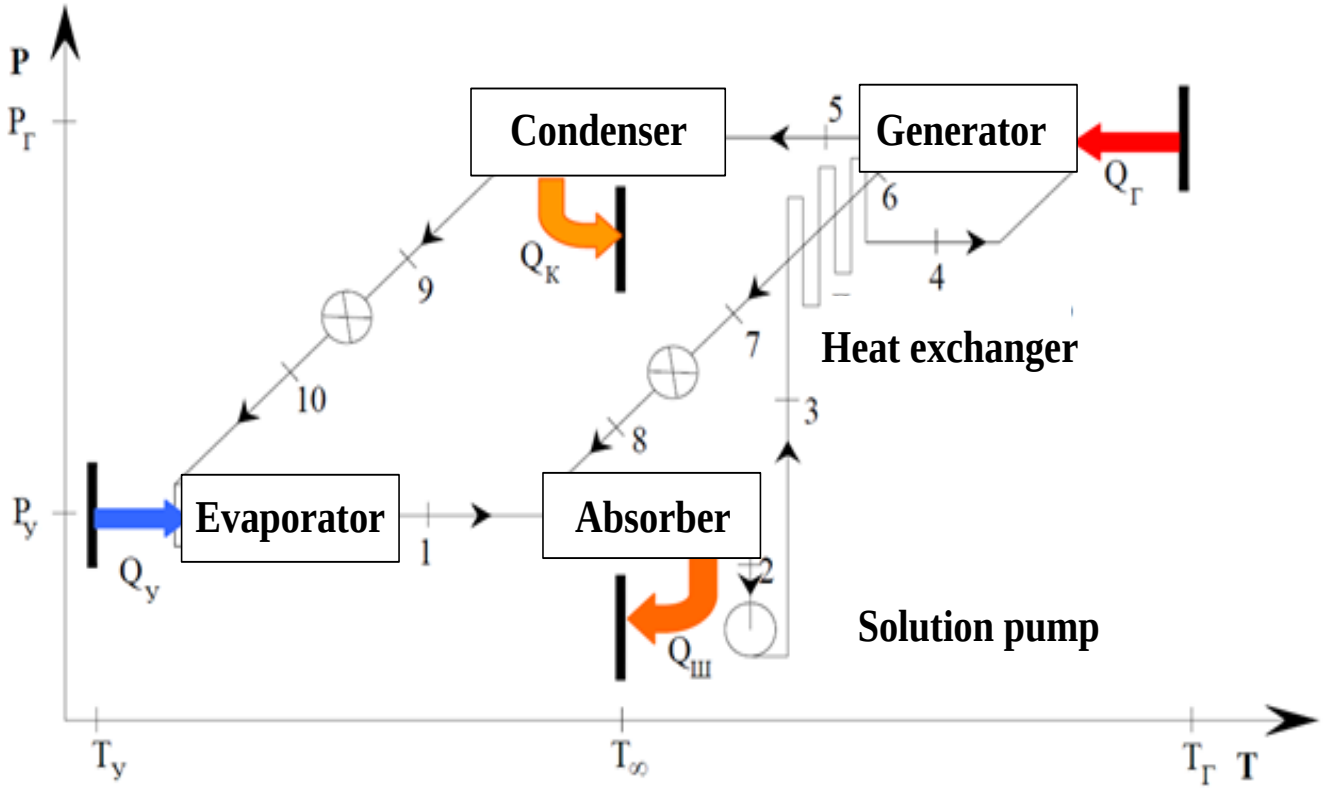

3. Possibilities to increase the heat supplied to a heat supplying system in thermal power plant using a absorption heat pumps

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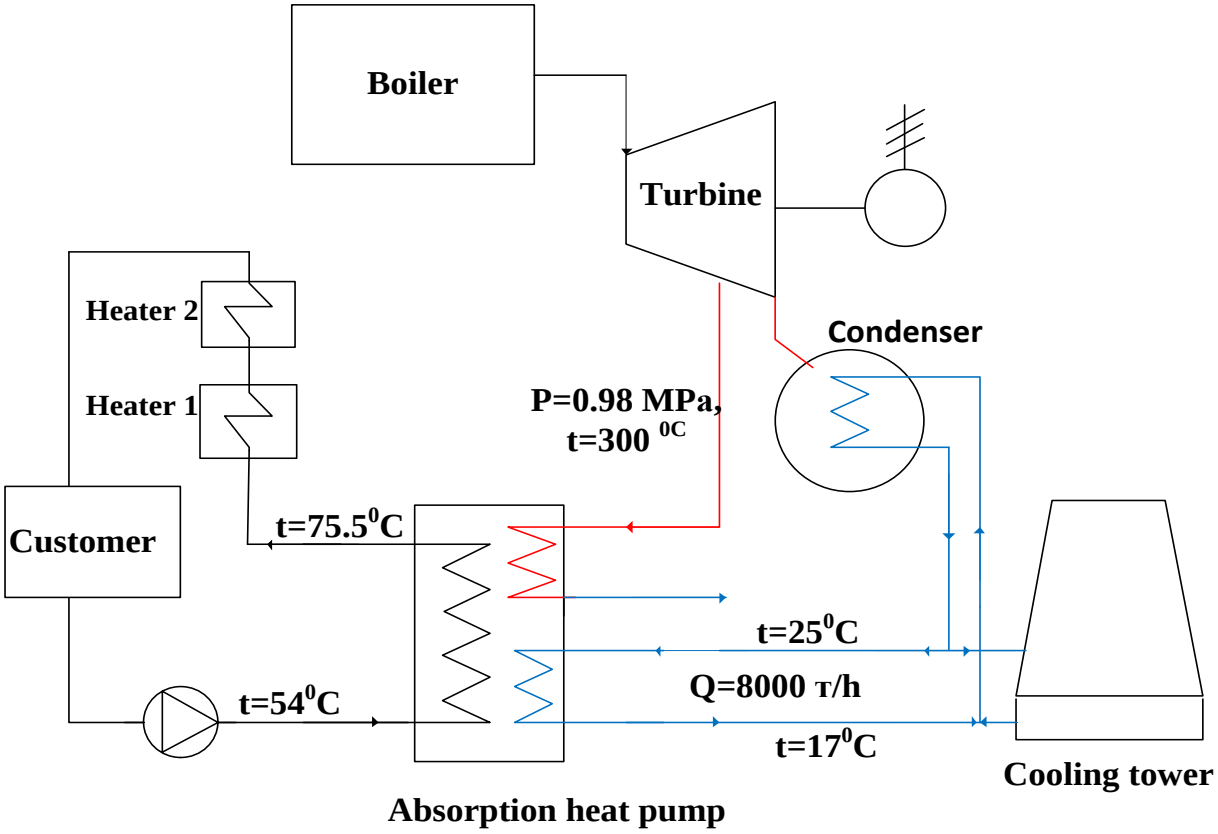
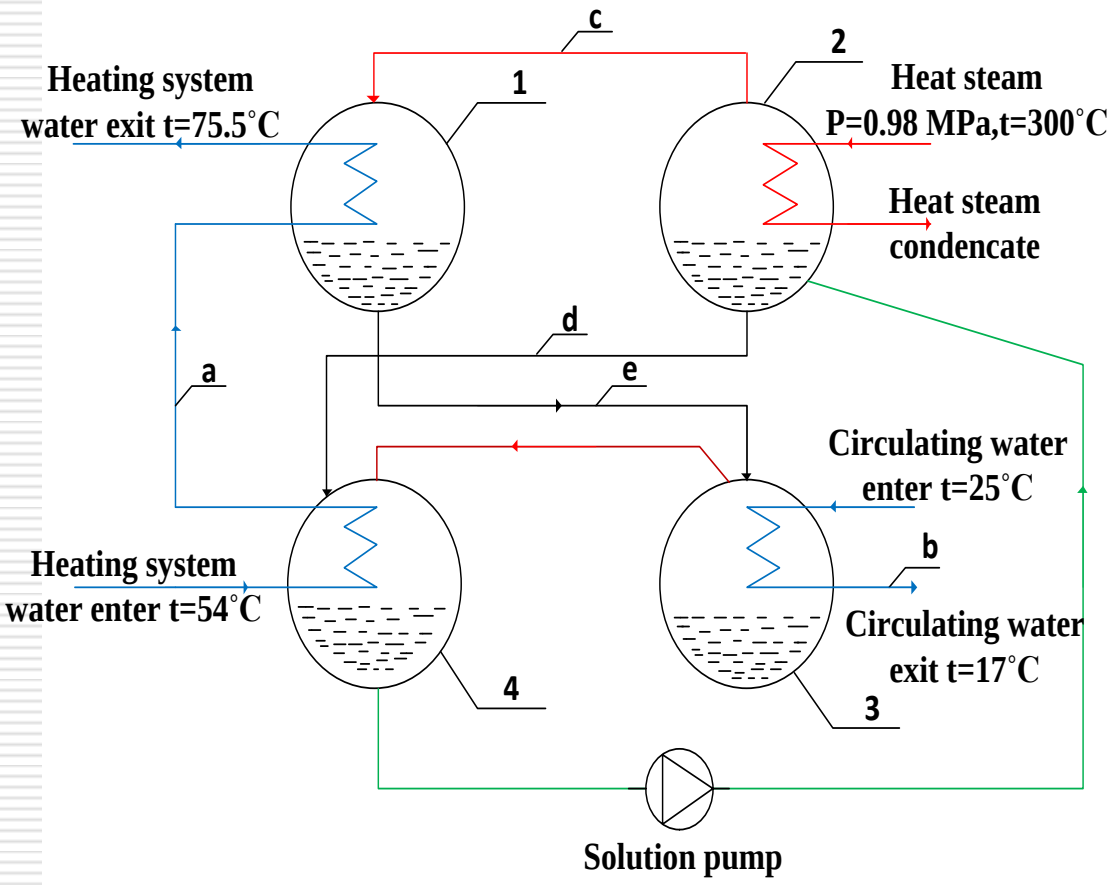
The main reason for reducing the heat efficiency (efficiency factor) in thermal power plants and increasing equivalent fuel consumption is that therm al power plants lose 50-60% of total heat on the cooling tower. Therefore it is important to use the heat pump with absorbance when it can be used. The inve stigation works on parameters and indicators at the high pressure plant of the CHP-3 were performed and following indicator factors were used and are sho wn on the below Table:

Indicators	Unit
Electric power, MW	25
Heating steam extraction /t/h/	50
Process steam extraction /t/h/	70
Consumption in water heating system /t/h/	4800
Average temperature in return water heating system /C° /	54
Circulating water consumption /m^3/h/	8000
Circulating average water temperature / C° /	25/17

Heating system



Technology diagram of the absorption heat pump



1 – Condenser, 2 – Generator, 3 – Evaporator,
4 – Absorber,

a - The district heating water flow: consumption district heating system water 4800 t/h, supply/back water temperature 75,5°C/ 54°C

b - Circulating water flow: Circulating water consumption 8000 t/h, supply/back water temperature 25°C /17°C

c - Steam flow: Steam pressure of 0.98 MPa, temperature 300°C

d- lithium bromide,
e- steam condensate

Heat balans

Title	Amount
Heat recovery	18,6 MW
Heat of heating steam	11,4 MW
Heaing capacity	30,0 MW

Parameters of the absorption heat pump

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Heating capacity (MW)	30.0	120
District Heating system supply/ back water temperature (°C)	54/75.5	
Consumption in district heating water (m^3/h)	1200	4800
Extraction steam pressure (MPa)	0.98	
Extraction steam temperature (°C)	300	
Heat pump steam consumption (t/h)	17,85	71,4
Circulating water consumption (m^3/h)	2000	8000
Heat used by heat pumps (MW)	18,6	74,4
Circulating water supply/ return temperature (°C)	25/17	
Electric power used by Heating pump (kWh)	40	160

4. Outputs from the use of absorption heat pump

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Title	Amount/year
Heat recovery	431726 MW
Saving amount of standard coal	55774 t
Reducing emission of CO_2	157400 t
Saving amount of feeding water for cooling tower	928000 t
Totally savings	3157,2 million tug

5. Conclusion

The present investigation shows that the utilization of the waste h eat in combination with renewable energy and the traditional power station is able to improve efficiency and to reduce the equivalent fuel consumptio n within the existing capacity of heat supply and positively impacts to the e nvironment.

This project can be implemented at the TPP-3 State Owned Comp any. However, the expansion of our plant is going at this moment, outputs of this investigation work is required to be included into the expansion proj ects of the plant. Regarding to other power plants, this environmentally saf e and economically efficient project should be supported and implemented in accordance with the policy of the Ministry of Energy.

Thank You !

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