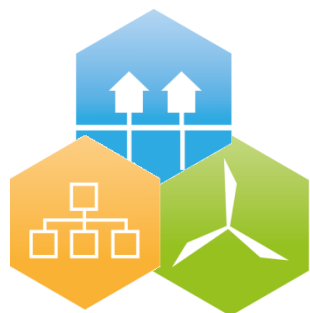


**International Conference on Smart Energy Systems and 4th Generation  
District Heating  
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# **Modelling of Technological Solutions to 4<sup>th</sup> Generation DH Systems**

**PhD Edgars Vigants,  
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# Research Goal

To create efficient technological solutions of thermal energy sources for low temperature district heating systems

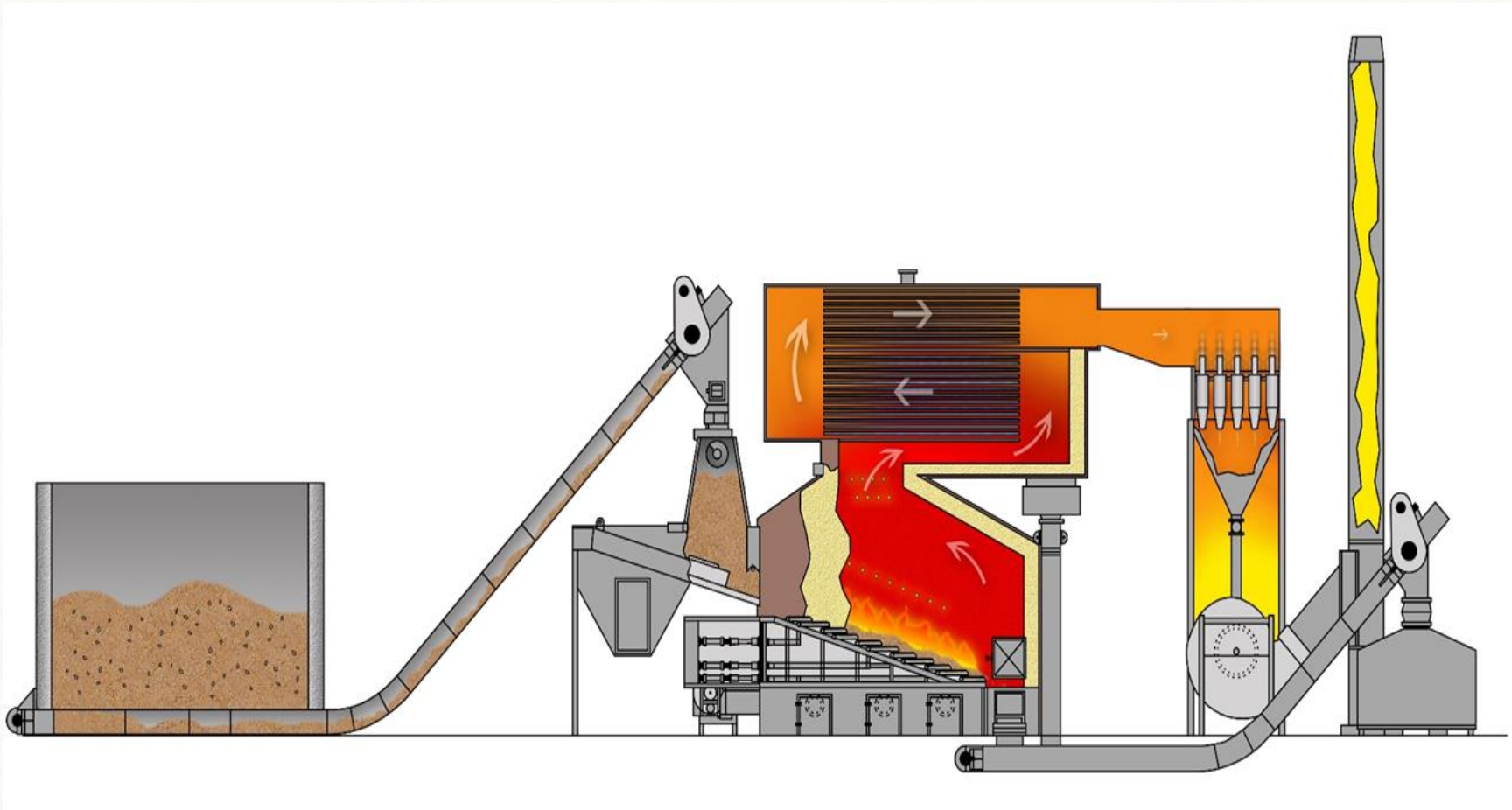


# Research hystory

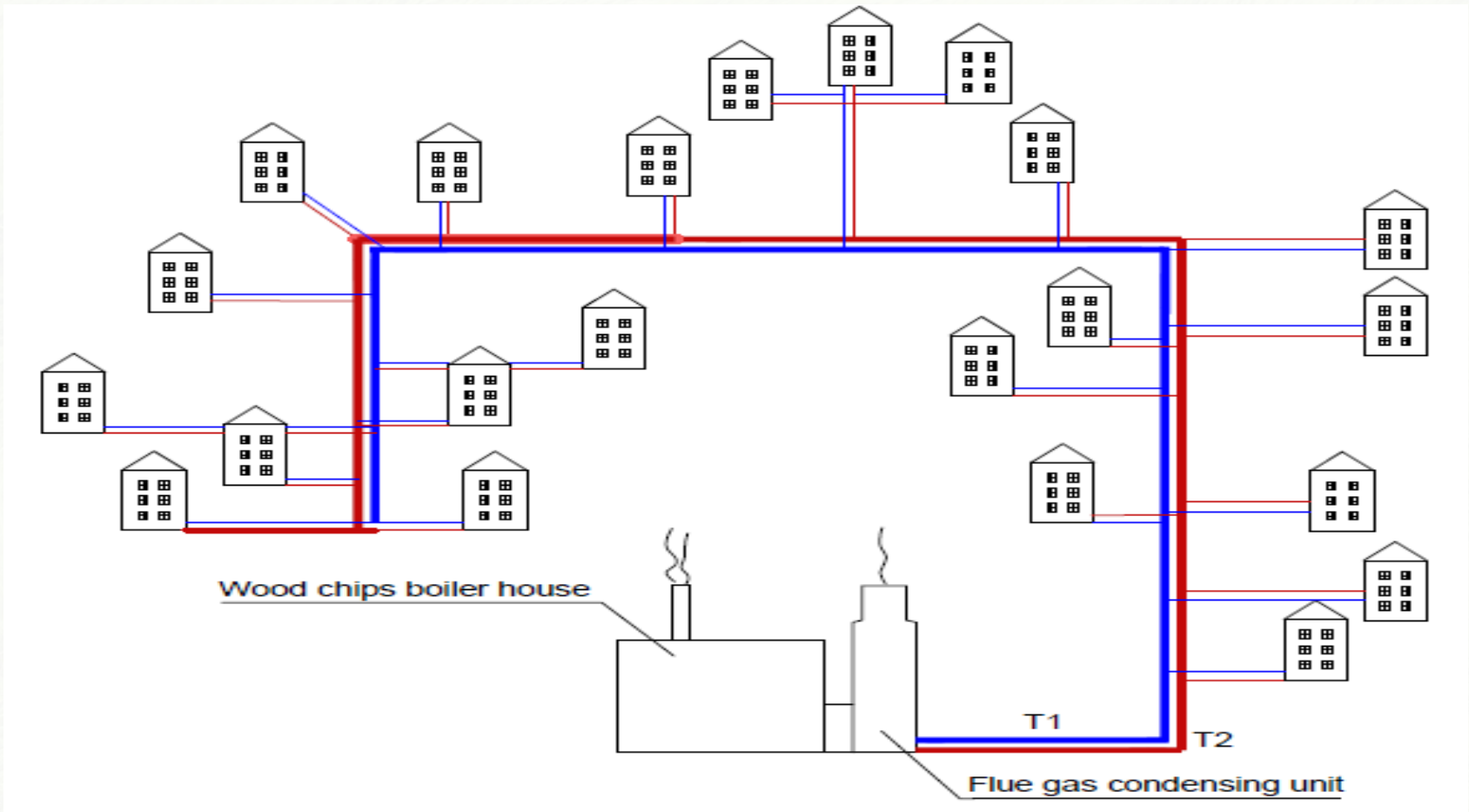
- Fuel switch from heavy oil to local wood biomass
- The transition from the 2 GDH to the 3 GDH (grid temperature reduction from 120/70 to 90/60)
- Design and installation of flue gas condenser
- Further lowering of DH return temperature
- Gradually transition to 4th Generation DH



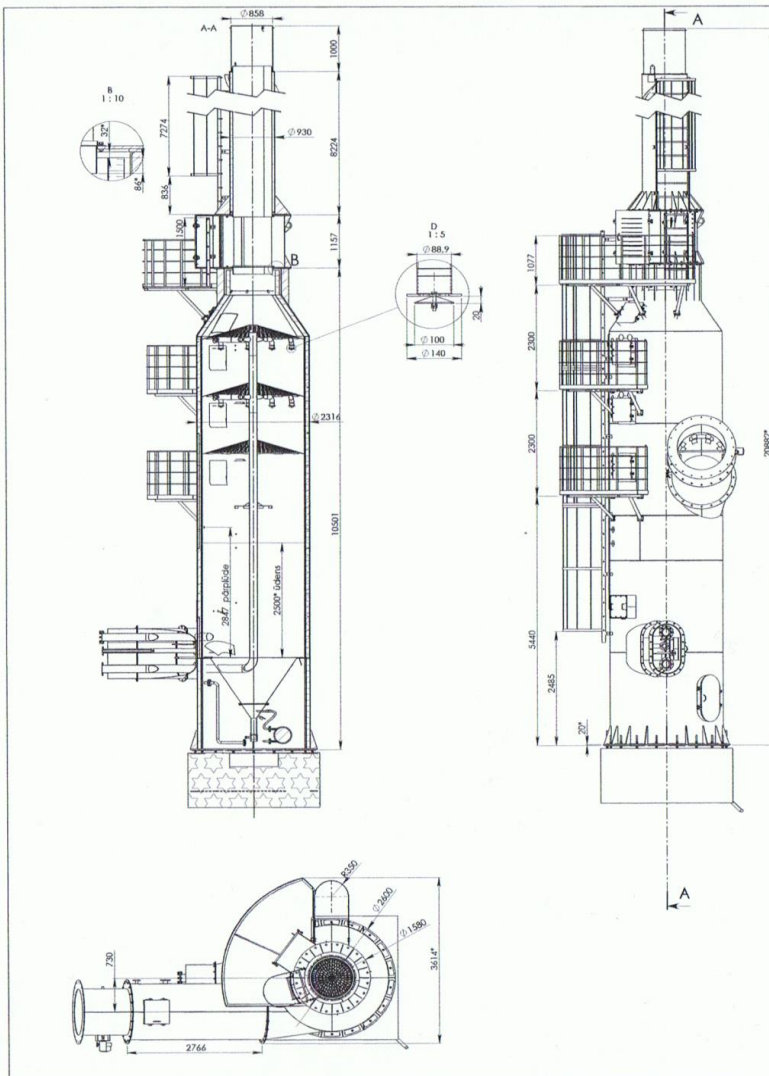
# Efficient technological solution (1)



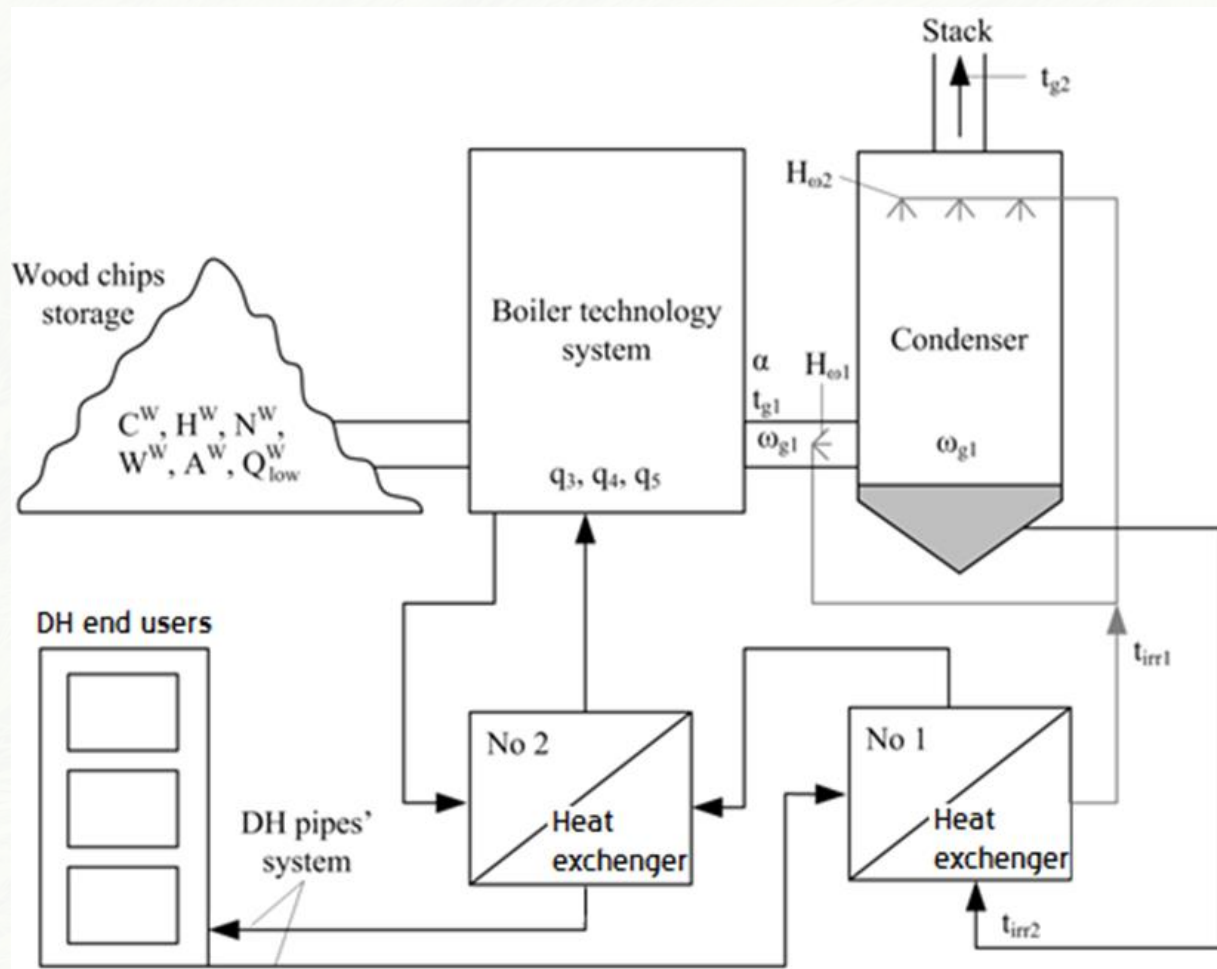
# Efficient technological solution (2)



# Condensing unit in Ludza DH boiler house

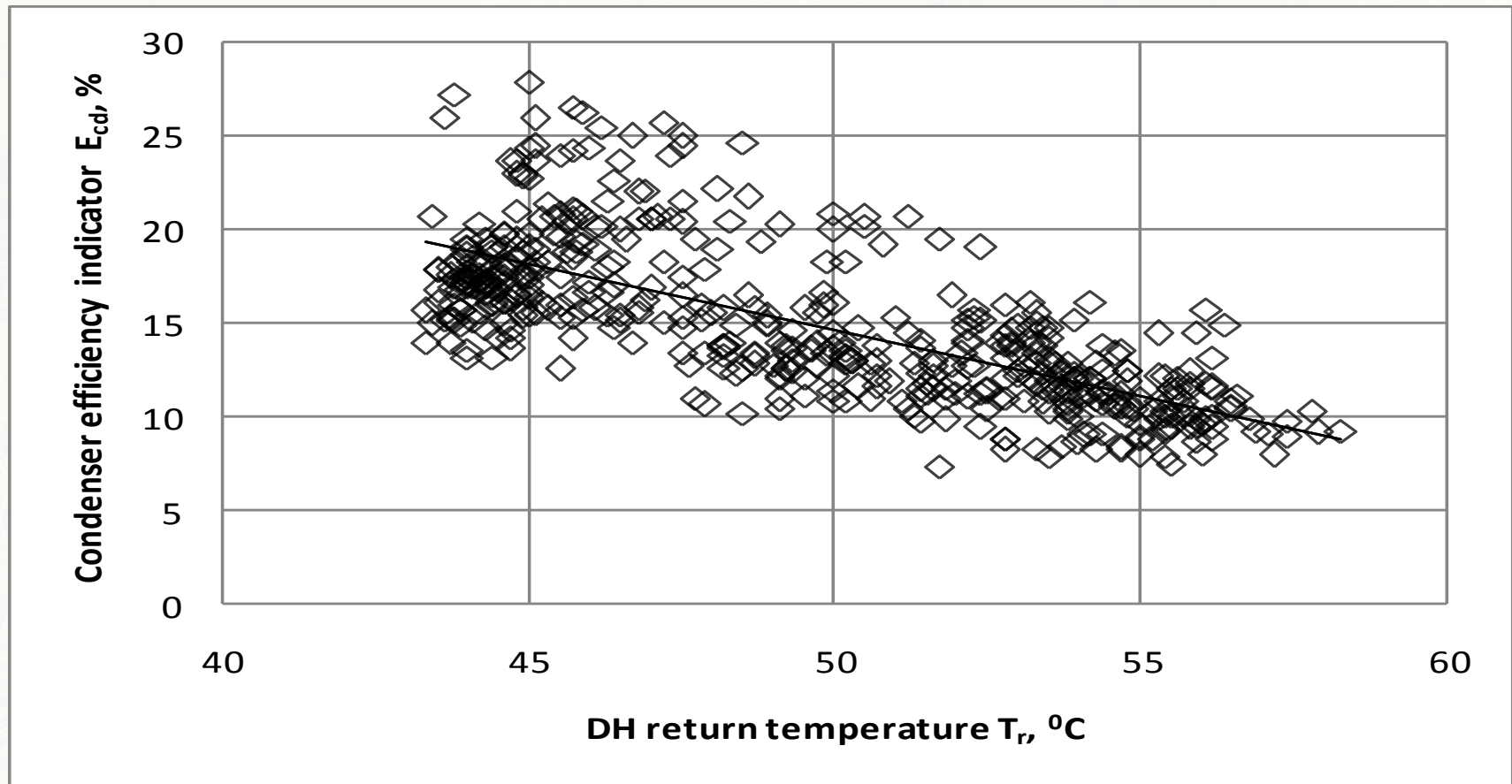


# Efficient technological solution (3)

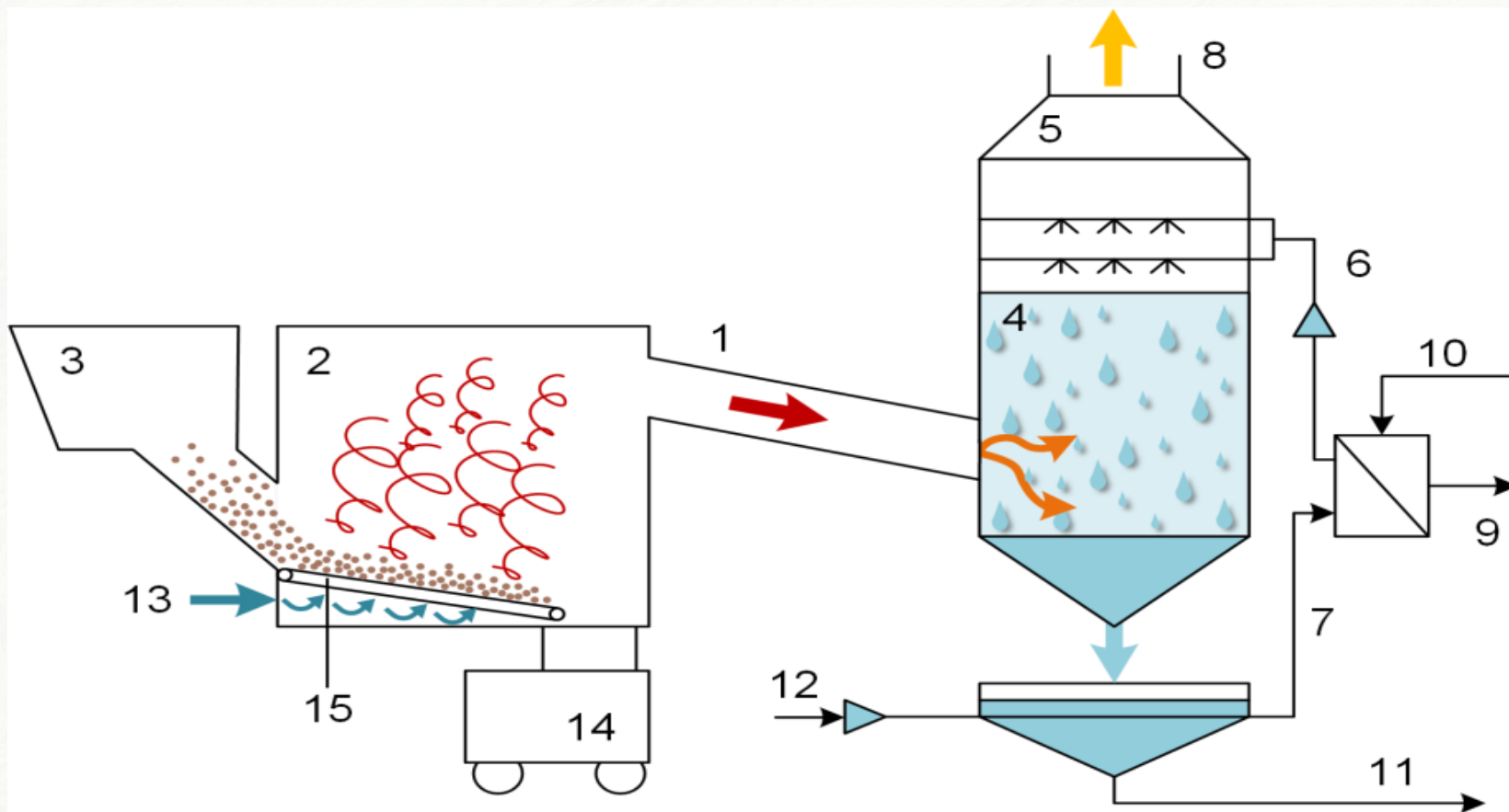




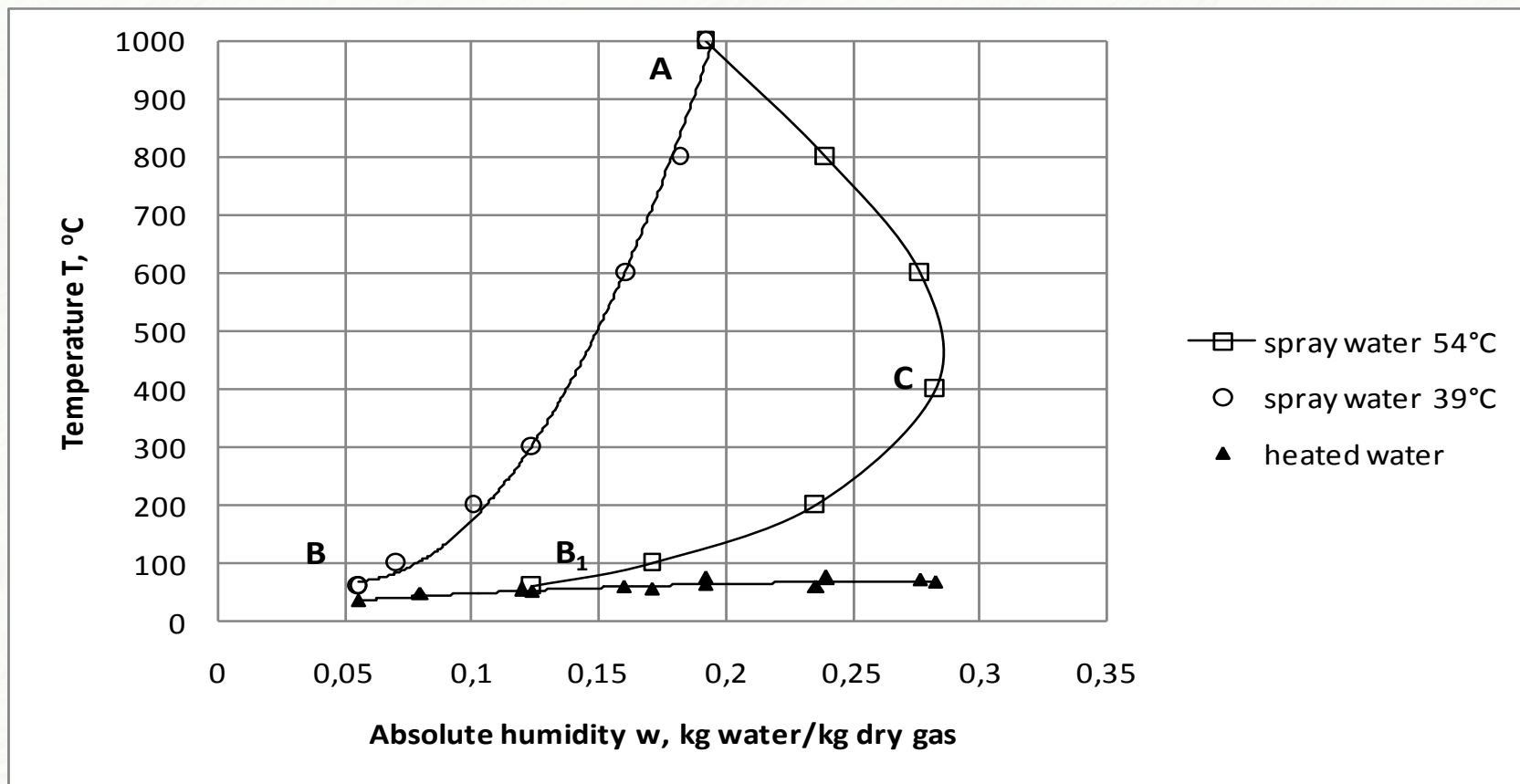
# Experimental data of condensing unit



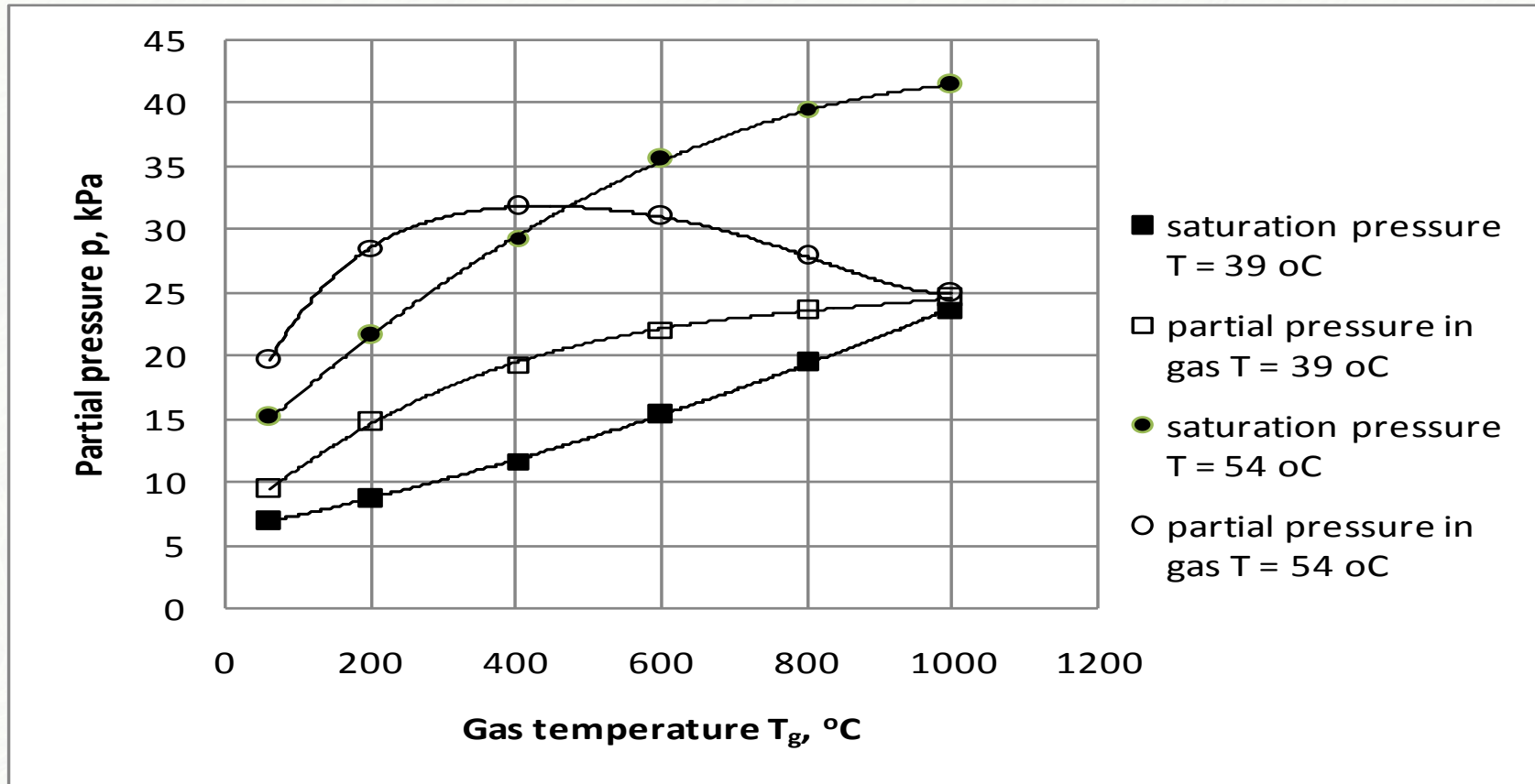
# Efficient technological solution (4)



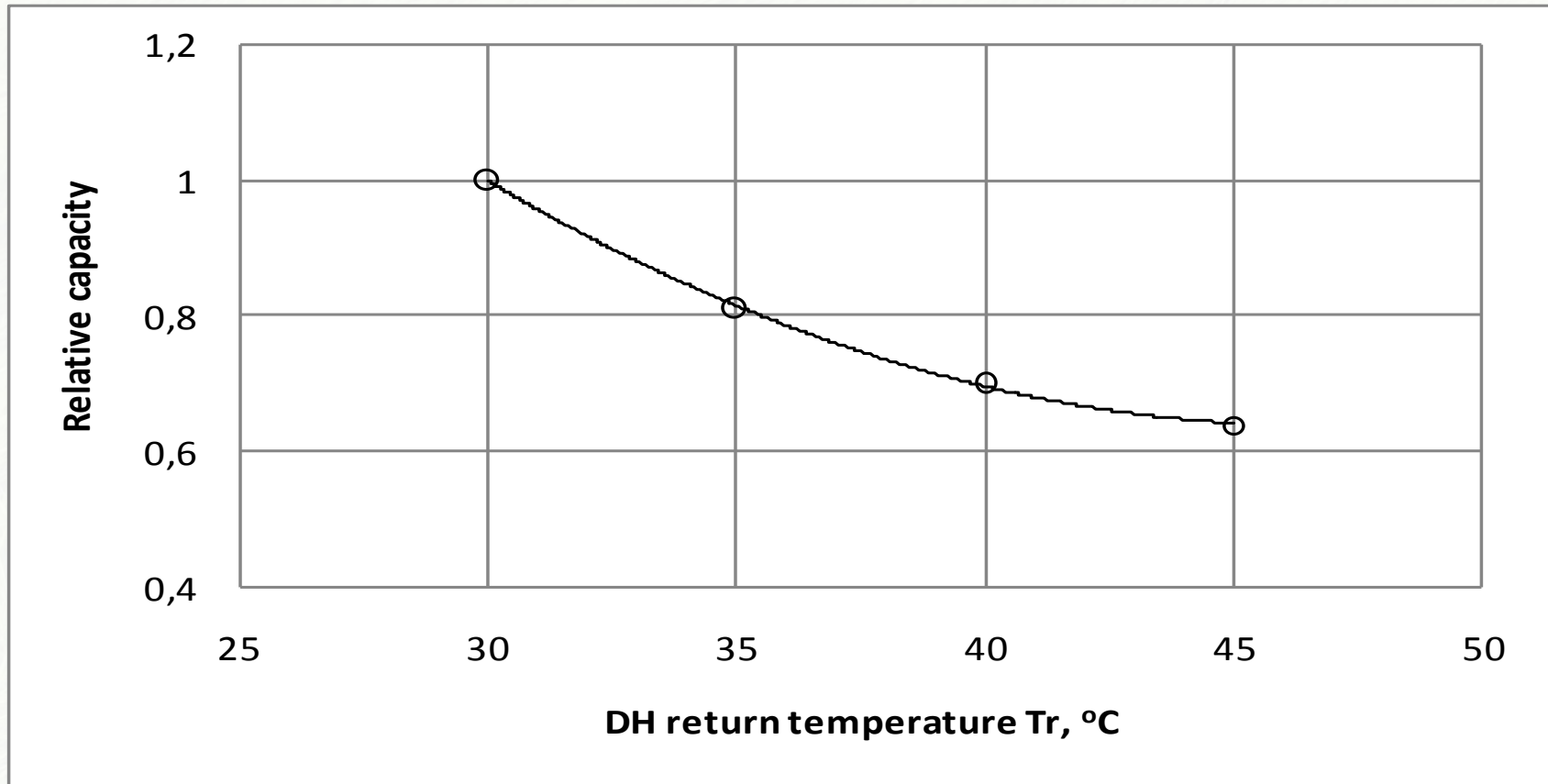
# Heat and mass transfer parameters (1)



# Heat and mass transfer parameters (2)



# Capacity versus DH return temperature



# Conclusions (1)

- Modelling results show that capacity of water heater of a direct-contact equipment decreases, when the return temperature of DH system increases. The correctness of tendency is confirmed by experimental researches.
- In order to carry out a detailed process analysis based on heat and mass process descriptive equations, as well as the correlation for wet gas parameter calculation, software is being developed.



# Conclusions (2)

- Introduction of the 4<sup>th</sup> generation DH systems will increase the energy efficiency of the direct-contact equipment.
- Methodology suggested in the article can be used to assess it in each particular situation.



# Acknowledgment

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IEGULDĪJUMS TAVĀ NĀKOTNĒ





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