Seasonal operation of WWTP in tourist areas of periodic use

НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ СТРОИТЕЛЬНЫЙ УНИВЕРСИТЕТ

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Our team

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- Vladislav Gerasimov – master, area of interest: Wastewater Treatment Plants
- Alla Lebedyuk – bachelor, area of interest: Efficient usage of heat pumps
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Problem description

Why wastewater treatment in areas of periodic is challenging?

- High discrepancy in WW flow rate;
- Hard to predict number of tourists;
- Usually, the area is remote;
- Requires trained personnel;
- Hard to keep microorganisms alive;

Concept and solution

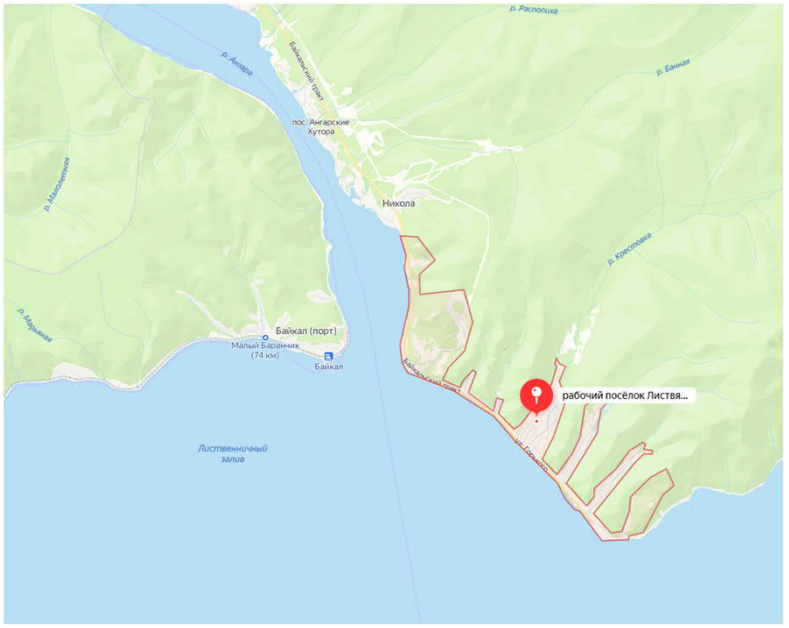
Main concept of our group is to use 2 wastewater treatment plants in 1. How is that possible in three question:

- Why? We can change between both treatment lines or use both at the same time to meet the WWT demands; plus, we use sewer trucks to get WW from remote areas to the main WWTP;
- How? By using compact modular WWT solutions or membranes;
- How much? Little capital costs, medium operating costs.

Concept and solution

We will take a closer look at the tourist area of Listvyanka town near lake Baikal.

- Current population: 2178 people;
- Max. tourist count: 2144 people;
- Theoretical max. daily flow rate: 1400 m3/day;
- Seasonal min. daily flow rate: 450 m3/day;
- Imported WW from sewer trucks: ~300 m3/day;



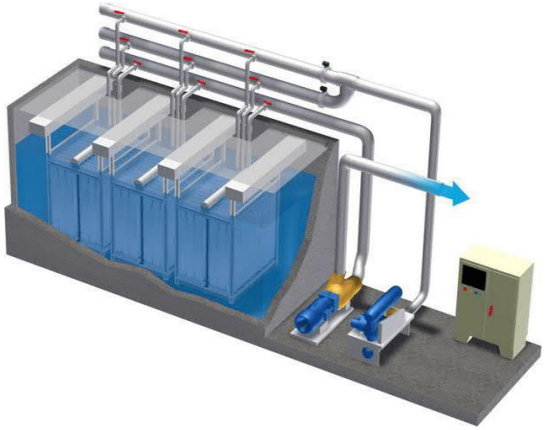
Concept and solution

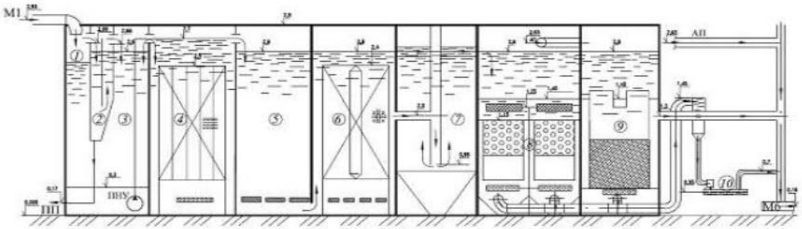
Technical solutions are modular WWTP or membrane bioreactors.
As the water can get as little as 8 degree Celsius, it's mandatory for a WWTP to be in a closed building.
Modular WWTP:

- Pros: compactness, relative ease of use;
- Cons: high capital costs, requires trained personnel to operate

Membrane bioreactors:

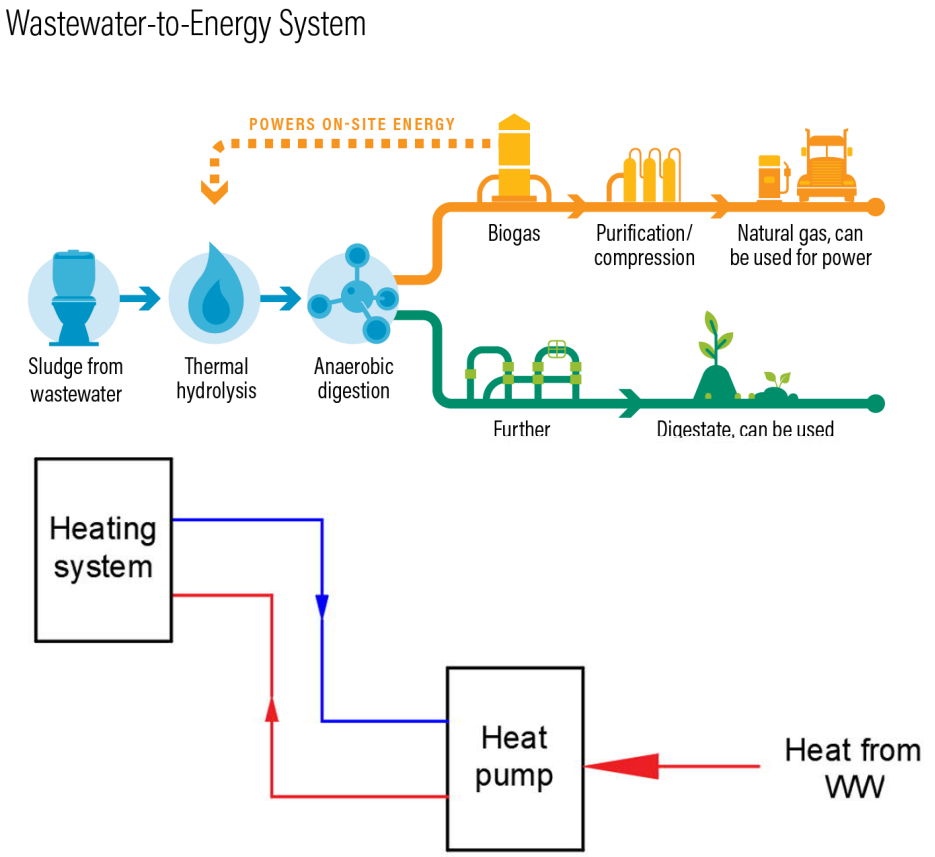
- Pros: high WWT effectiveness;
- Cons: requires a lot of chemicals, thus have very high operational costs.





How to improve

- It is possible to use biogas to produce electricity for on-site re-use of power.
- Also, we can use heat pumps to re-use the heat from treated water in the heating system of WWTP.



Conclusion and next steps

- Using the idea of 2 interchanging lines of WWT, it is possible to eliminate the variance in flow rate of WW;
- Implementation of the idea is possible, when using compact modular WWTP or membrane bioreactors;
- Possibility to re-use some of the energy from WW and sludge to reduce operating cost of WWTP.

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Danke für die Aufmerksamkeit!

Thank you for your attention!