

Research of The Complex Mobile Independent Power Station for the power supply of the Facilities, located in Recreational Areas

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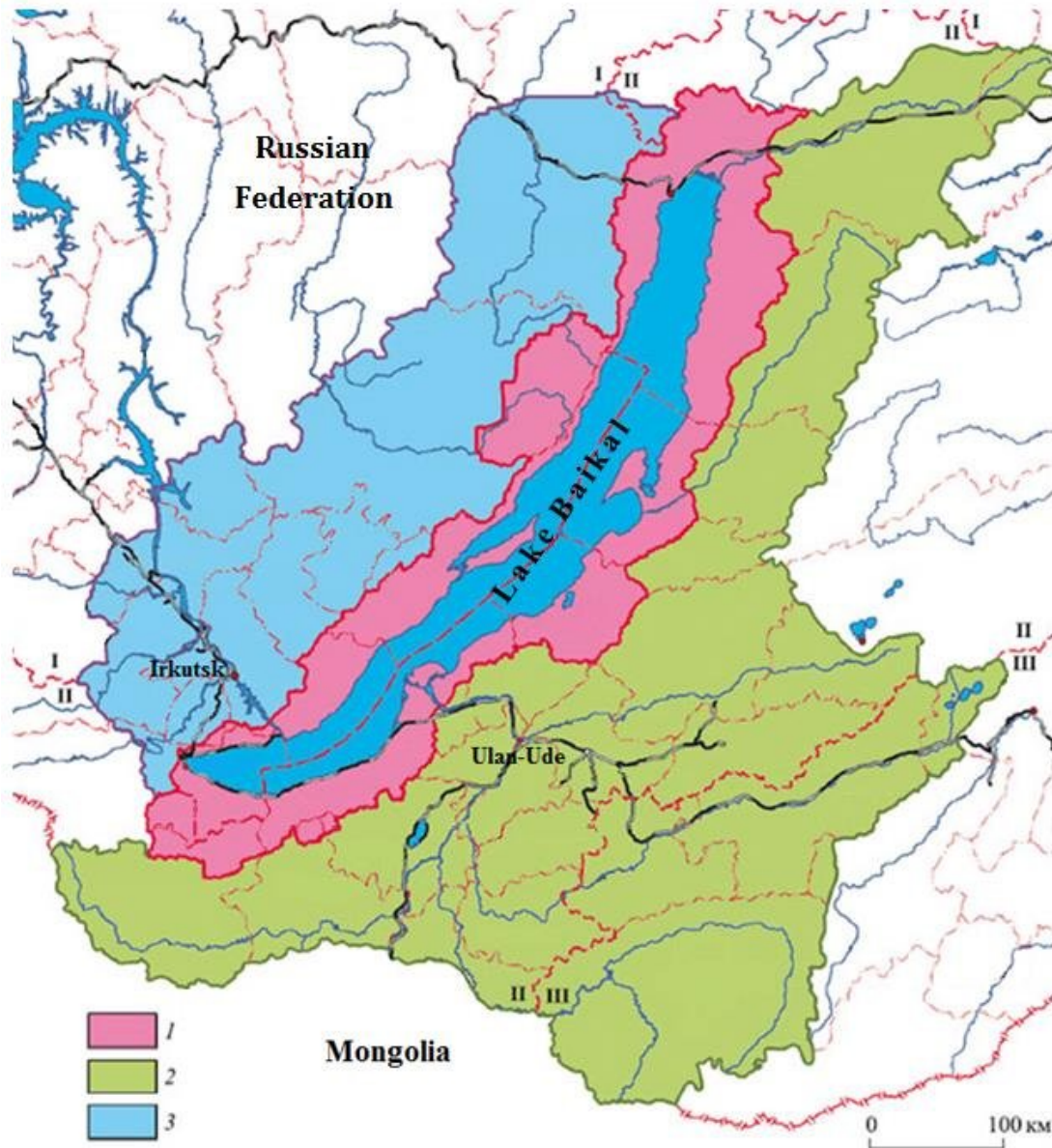
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Problems of traditional engineering systems

- After deterioration it's necessary to carry out major repairs and reconstruction or conservation;
- It is impossible to move them with reusing;
- Environmental impact;
- Great restrictions on recreational areas.

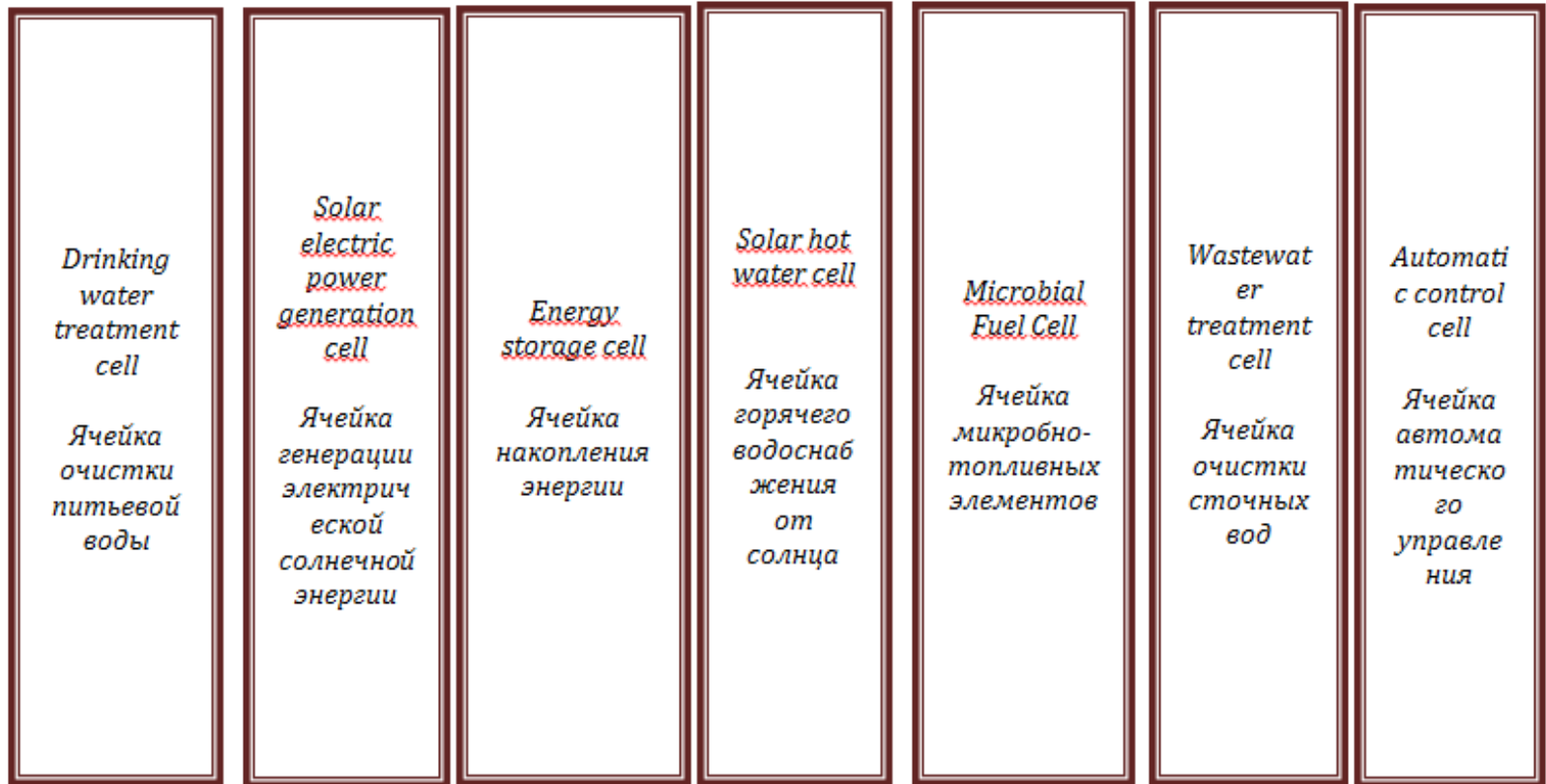
Baikal natural territory



Power station functionality

- Thermal energy production;
- Electric energy production;
- Waste water treatment;
- Obtaining purified industrial water.

The Complex Mobile Independent Power Station for recreational areas



Polytechnic



- 17 km of the Baikal Highway;
- Season duration – 3 month;
- Arrivals amount per month – 1;
- The average number of people per arrival - 115;
- Required: waste water treatment, hot water supply and electric energy supply

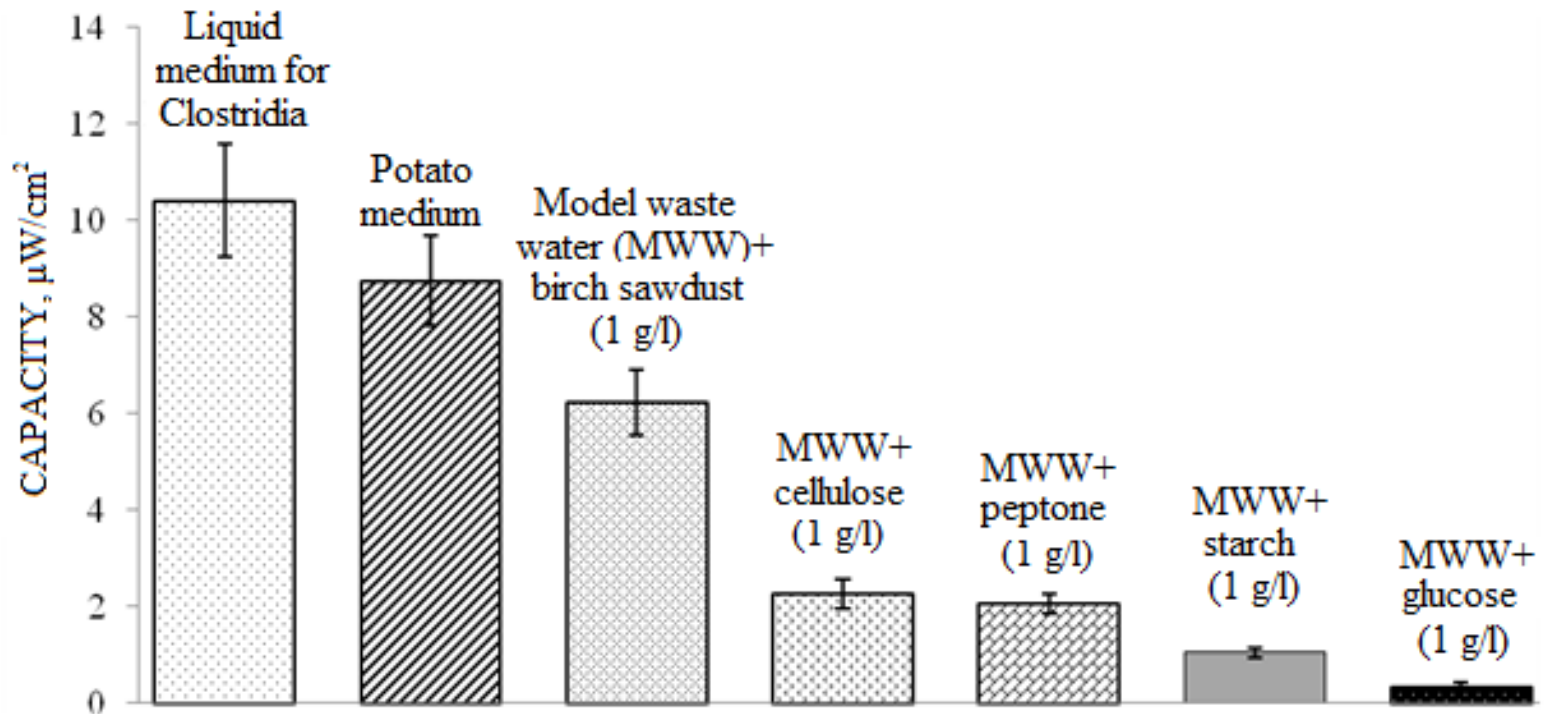
The results of modeling the dependence of solar panel performance on the degree of luminosity

	Distance, mm	luminosity, Lux	Received current I, A	Received voltage U, B
Measurement 1	300	18 038	0,21	16,00
Measurement 2	600	15 932	0,20	15,80
Measurement 3	900	11 110	0,16	15,20

The results of calculation the required number of solar panels

Month	June	July	Aug.	Season
Duration of month, days	30	31	31	92
Monthly average solar energy values falling on an optimally oriented surface, kW·h/m ² ·day	5,4	4,7	4,31	4,80
Amount of cloudy days	8,1	11,1	9,5	28,7
Average sunny day duration, hours	8,8	7,8	7	7,9
The total value of solar energy per month, kW·h/m ²	135,76	114,40	109,04	359,20
The average hourly value of solar energy per month, kW·h/m ²	0,61	0,60	0,62	0,61
Electricity consumption by the installation per day, kW/day	13,04	13,04	13,04	13,04
Average hourly electricity consumption by the installation, kW/h	0,54	0,54	0,54	0,54
Power of single solar panel, kW	0,15	0,15	0,15	0,15
The average monthly solar panels performance, kW/h	1,48	1,67	1,86	1,67
Required number of solar panels	10	11	12	11

MFC capacity based on *Cl. acetobutylicum* VKPM-B-4786 using various media as anolyte



The results of calculation the MFC performance

MFC capacity, $\mu\text{W}/\text{cm}^2$	10
MFC capacity with membrane area 1 m^2, μW	100 000
MFC capacity with membrane area 1 m^2, W	0,1
The optimal amount of MFC in power station	5
Total MFC capacity with membrane area 1 m^2, W	0,5
The amount of electricity produced by MFC per day, W	12

The results

During the summer period in the sports and recreation camp "Polytechnic" electricity will be spent on household needs, mostly for cooking and lighting. One power plant is capable to produce from **10 kW** of electricity per day only through the use of solar panels. Using modern energy-saving appliances and lighting devices, the station is capable to provide from **30 to 50 %** of the power required for the camp.

Advantages of a power plant

- Mobility;
- Easy integration into existing LSS;
- Reducing the dependence of facilities from centralized energy supply systems;
- Reduce fossil fuel consumption;
- Minimal or no environmental impacts;
- Waste water utilization.



THANK YOU FOR ATTENTION!

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