THE POTENTIAL OF THE HYDRO-POWER ARRANGEMENTS OF RIVERS AND BASINS IN REPUBLIC OF MOLDOVA

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ABSTRACT: *On the basis of studying of water funds, of the regimes and characteristics of flow of rivers Prut and Nistru, of those internal larger and smaller one's, taking into consideration what basins exist and the one's with perspective can demonstrated the hidroenergetical potential values of Republic of Moldova for the current time and on long-time period.. Basic variant of the scheme of arrangement on r. Prut and Nistru on the basis of the requirements of today's impact with the environment, the ecologic flows, hidroenergetical equipments chosen for the parameters of sufficient operation, and the hidrotehnical unit must have an appearance of a complex utilization. The assurances of the flows and head of the hydro-electric plants with operation in cascade on rivers is caused by the strength of given data and the hydrologic calculations after interstate normatives applied now. Suggested scheme foresees to build dozens of hydro-electric plants with small head on r. Prut and Nistru from which an unit functions as the minimum on the ecologic flow. The potential of the basins of existing accumulation on little rivers must be capitalized first because it requires only the power equipment. Prof. D. Pavel proposed some schemes with the arrangement of MCHE on r. Prut, Raut and Bacu in his researches*
Keywords: The potential, of rivers Prut and Nistru, the basins, the hydro plants**.**

1. Introduction.

The partial solving of the energetical safety in the Republic of Moldavia can be performed by development of potential of the boundary rivers Prut,Dniestr and by fitting the hydrotechnical structures provided on small rivers for hydroenergetical porposes. The mounting of turbines on these structures permits to supply with electric energy small objective in agro-industrial farms, mills etc. This method of obtaining electric energy allows reduces expenses for capital structures and operation. The hydro power unit operation depends on the river flow, which varies during one year and the Moldavian rivers have not been equipped to obtain electric energy.This factors do not permit to use the whole water flow and the whole hydro power unit power. Therefore it appears a difference between the hydro unit power and the possible flow power. The solution is to provide several turbines, depending on the minimum and maximum flow in the storage basin. For the turbine dimension selection it is necessary to determine the optimum conditions for a maximum efficiency; i.e. design load and discharge. For the first time researches of potential of the rivers were carried out Prof. D. Pavel proposed some schemes with the arrangement of MCHE on r. Prut, Raut and Bacu.(Fig.1) [1].

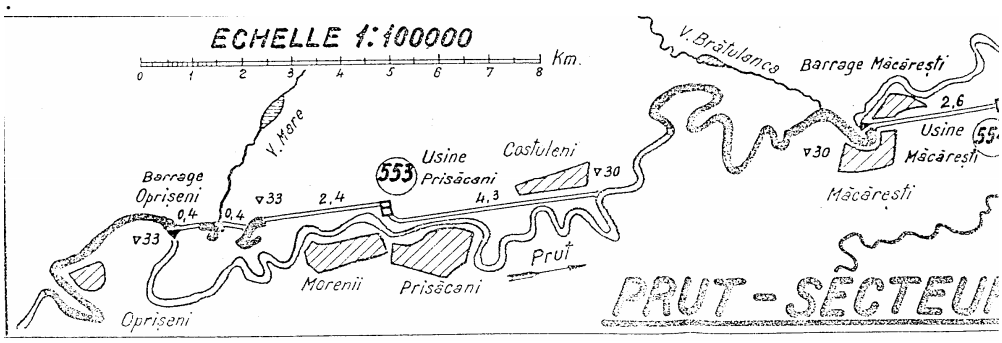

Fig.1.Site of the r. Prut proposed some schemes with the arrangement of MCHE

In the years 1930 -1950 basin and river water energy has been used in water level lifting installations, to operate mechanisms.The first micro power units have been constructed on the following rivers Rautu (Fig.2), Cubolta, Camenca, Cainari, Ciuhur,Vilia,Racovat etc Nowadays beside high power station there are used micro hydro power stations with small turbines. Up to date automation sistems allow a higher level operation of small turbines especially when the energy users are located near the small hydro power stations. Nowadays none of the aprox.20 power stations do operate. They have been put out order because high power stations have been used.

Fig.2. Hydroelectric Power Plant Piatra-Jeloboc on the Raut River (1953)

2. The potential, of rivers Dniestr and Prut.

In the Republic of Moldavia there are used as potential tehnical energetic sources hydroelectric power plants of river Dniestr,fig.3-5. The first to be mentioned is the CHE Dubasari (1954 year) power plant of 48 MW and CHEDnestrovsc-2 (1990 year) of power15- 40MW.

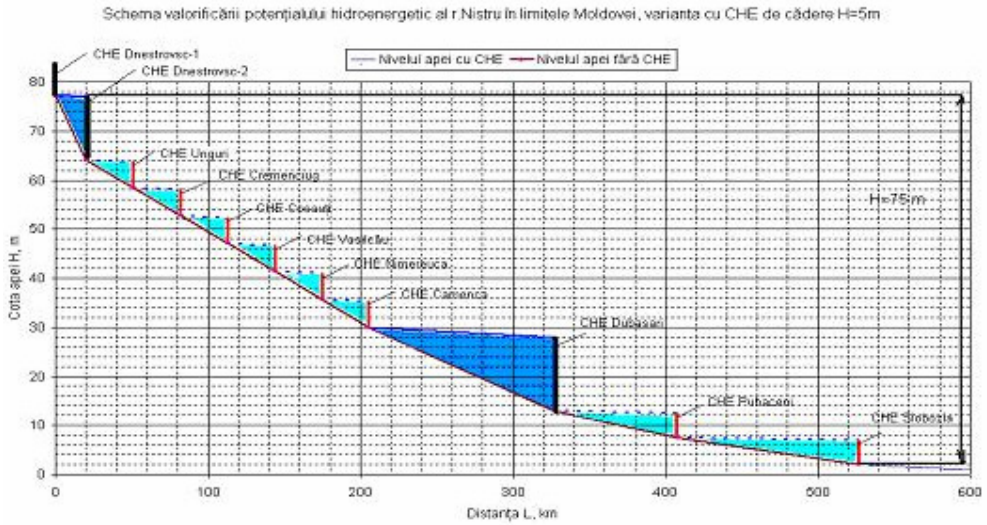

Fig.3.The circuit of development of an energy potential of River Dniestr, 8 new CHE power plant of 60MWpart Moldavia and CHEDubasari,Dnestrovsc

Fig.4.CHE Dnestrovsc-2 (River Dniestr) power plant of 15-40 MW, (MD-UA)

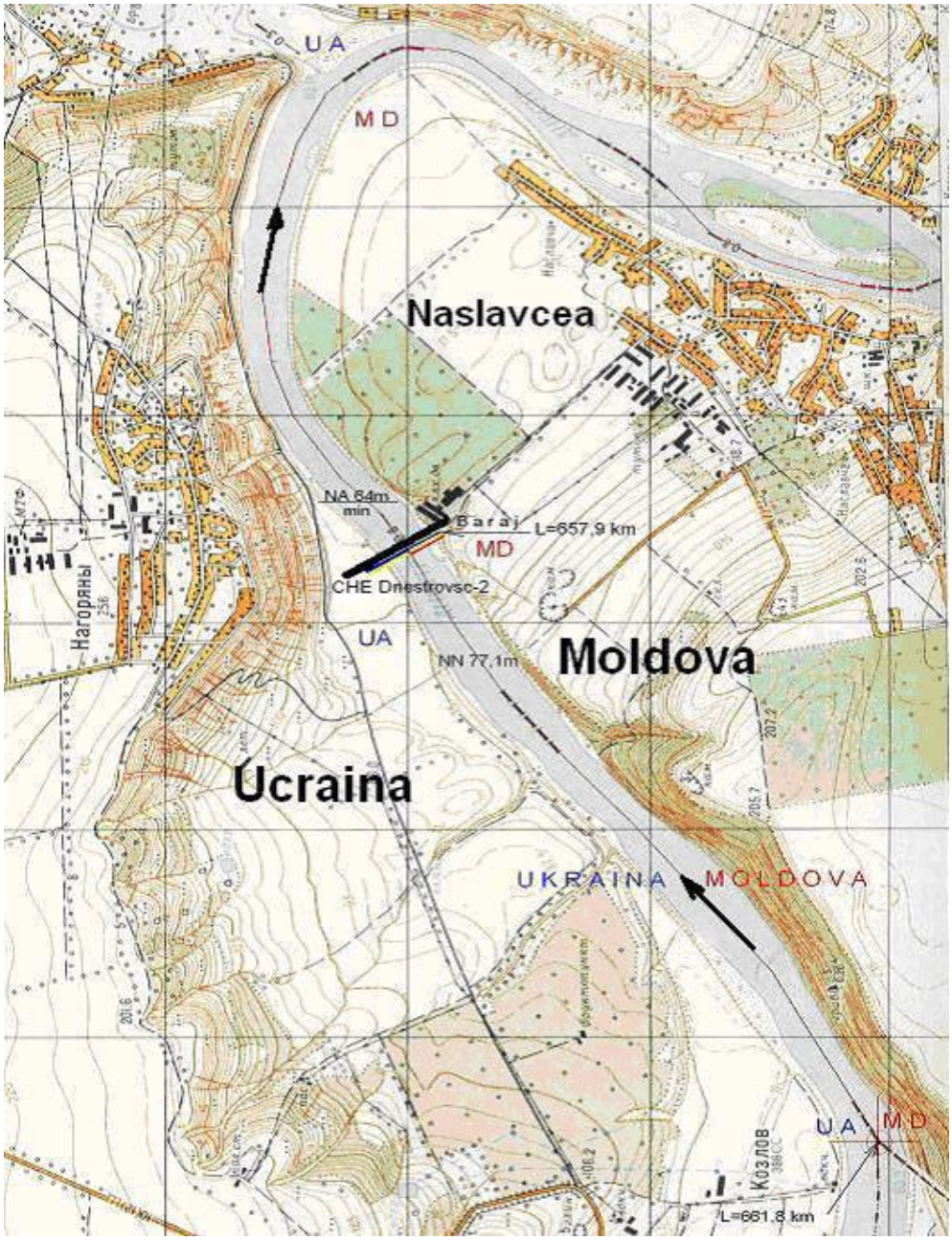

Fig.5. The plan of a site of the river Dniestr in north Moldavia (Naslavcea) with a dam by buffer hydroelectric power station Dnestrovsc-2 and zone of length 3,9 km in the top part of reservoir belonging Moldavia as well as and half of dam with hydrotehnical structures

Some increase of potential of water resources for increase of development of energy allows use of hydroelectric power station waters, working on drains, which can not pass through turbines and convertible hydromachines move in top basin and then in the intense periods of time on consumption of energy water moves on hydrounits in a mode of the turbine. Such hydrostation was provided at expansion an CHE Dubasari of hydroelectric power station under the project submitted on figure 6, with submission of water on height 100m, in basin in volume up to 25 mln.m3 with capacity up to 600 MW. The same station was stipulated and at non-realized CHE Camenca of hydroelectric power station and in present conditions their parameters are necessary for reconsidering in view of complex use and protection water and main modern requirements of water ecology.

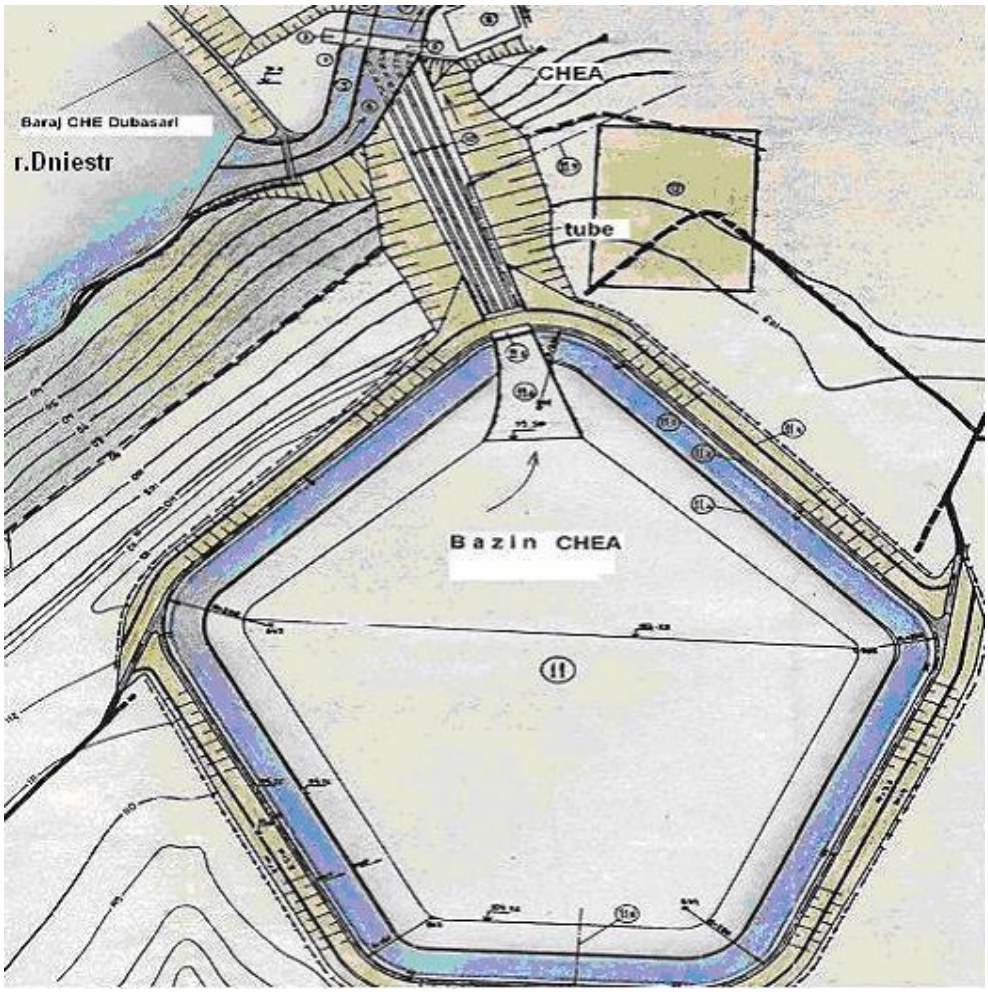

Fig.6. The circuit of an arrangement of heat-sink hydrostation for development of energy from the right party of the river Dniestr for CHE Dubasari.

In 1978 it has been commissioned the hydroelectric power station from Costeşti-Stanca (Prut) equipped with one 16 MW turbines with a head of 27,3m and debit 65m^3/s.Below in fig.7,8 the circuit of development of potential is given of River Prut with variant from19 CHE by total capacity power plant of 50 MW (head 3,5-4m, Qmed=80-90m3/s).

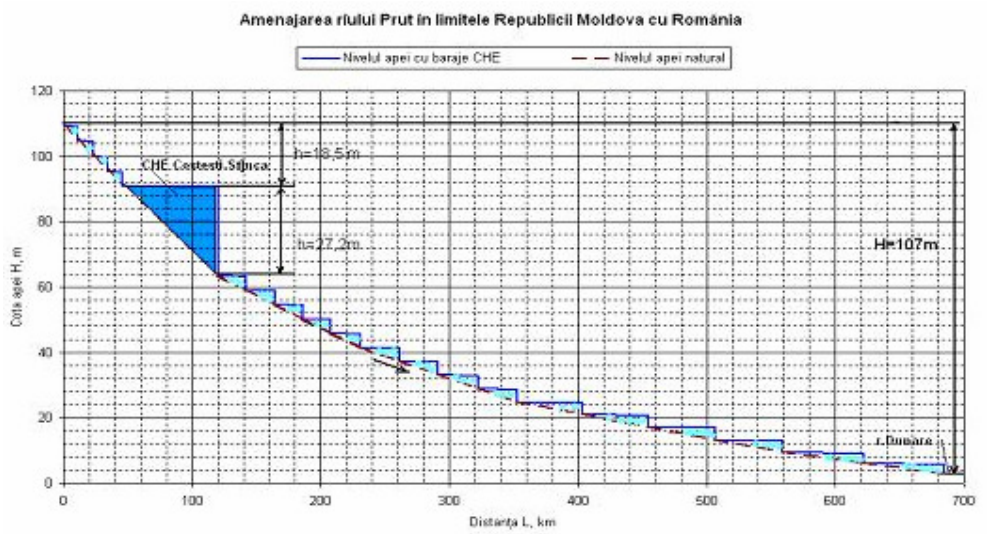

Fig.7.The circuit of development of an energy potential of River Prut

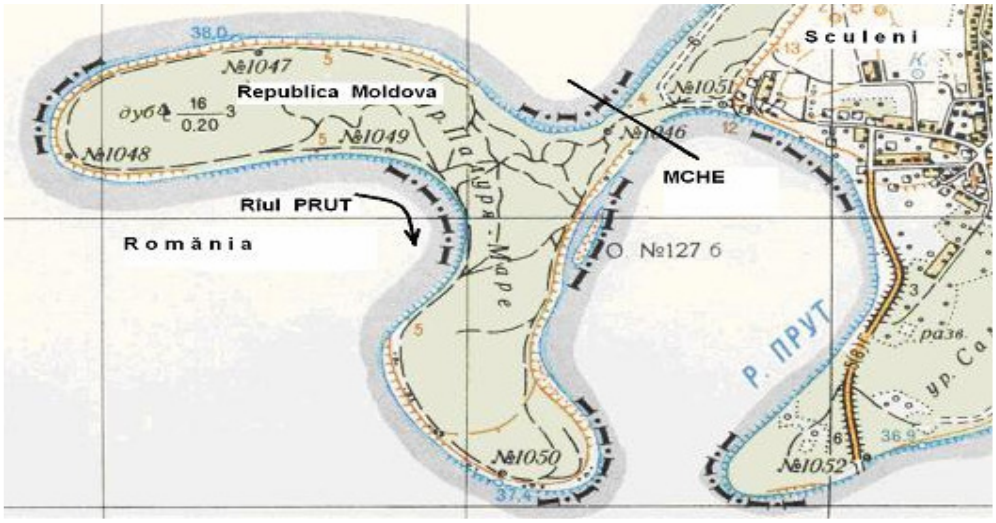

Fig.8. The site of the river where is possible development of potential using derivation hydraulic engineering structures for development of energy(r.Prut, Sculeni,Ungheni)

For a structure of hydrostations with small pressures the variant is offered is given in fig.9 of a dam with automatic boards rising and falling under action of water using hydraulic effects, and at the large charges in the river the board falls also structure works as having poured. For development of energy it is recommended between boards to establish tight line hydrounits.For rise of a board water under it moves on a tube with side.[2].

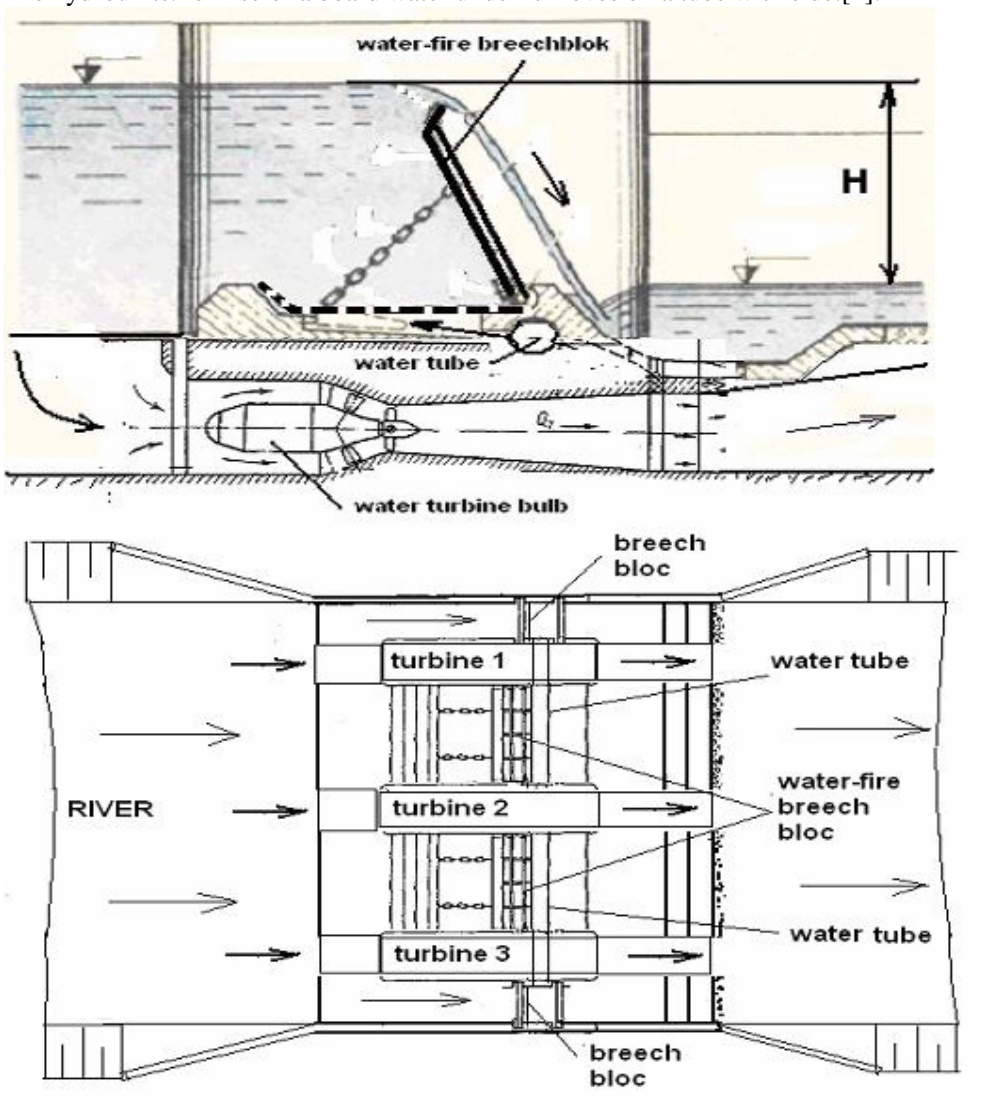

Fig.9. Section and plan of a structure for job of hydrostation with a small pressure with boards under action of water on the small rivers (Prut) with line hydrounits for example.

In the Republic of Moldavia between the Nistru and Prut rivers there are about 90 water accumulations with a water volume of more than 1 mil. m each. We have now more than 3600 large and small water accumulations.They have no energetical destination and are used for irrigation, pisciculture, recreation.

Today it is indicated to use the hydroenergetic potential of the water accumulations on the following rivers:Bac (Ghidighici-Vatra); Botna (Ulmu, Costesti, Rezeni);Cainari (Bolboci, Zgurifa, Cotova); Lapusna (Lapusna, Minjir); Sarata (Kneazevka.Sarata-Noua); Racovaţ; (Badrajii-Vechi, Tarnova); Dradiste (Calicauti, Trinca); Ciugur (Cupcini, Pocembauti), Ciuluc (Chişcareni, Dumbraviţa, Mandreşti, Ghiliceni,Veregeni, Ezarenii Vechi, Cubolta (Mandic, Maramonovca, Cubolta, Putinesti), Copacianca (Riscani, Recea, Corlateni), Camenca (Malaeşti, Sturzeni), Galdarusa (Viişoara, Danul), Şovaţ (Navarneţ, Limbenii Noi), Işnovaţ (Ialoveni, Danceni), Ichel (Drasliceni, Micauti), Vilia (Tetcani), Lopatinca (Corgeuti, Caracusenii Vechi), Soltoaia (Petresti), Iaz (Orhei), Delia (Ungheni), Garla Mare (Scumpia, Sarata Noua, Cioropcani), Bratuleanca (Bratuleni, Mileşti),Vladnic (Zahorancia), Taraclia and others.

6. Conclusions

1. The hydroenergetic technical potential designed by means of well known methods for the mean Moldavian rivers Dniestr and Prut is comprised between the fllowing values new stations power 106 MW and with already (CHE Dubasari+CHE Costesti/ Stinca) existing only 170 MW
2. The restoration about twenty old hydrostations basically on the river Raut will give somewhere 3MW,from them CHE Cazanesti,CHE Piatra/Jeloboc and others
3. For functioning hydrostations in the cascade in an average part of the river Raut it is necessary to make capacity of water of volume not less than 50 millions with hydrostation that will increase capacity of the river up to power 7 MW.
4. Potential of energy about hundred reservoirs with volume more than 1 million meters of cubic water can give power 4 MW (Ghidighici,Taraclia, Badraji Vechi)
5. The energy potential others we of reservoirs with volume of water less than 1 million can reach about power 3 MW.
6. The energy potential of gravitational pipelines of water, using a free pressure, in systems of water supply and irigation enables to develop somewhere 1 MW
7. The possible development of capacity from of energy of water flows is appreciated at present in power 2 MW.
8. All can be estimated technical potential of water resources of Moldavia without heat-sink hydrostations in power 190 MW.[3].

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