

The concept of 100 percent replacement of thermal aggregates with power plants that use clean energy is not realistic at all, let alone an approximately optimal variant of the further development of the Bistrica EPS.

The Insistence of the European Union, the **Energy Community**, and local authorities that green energy must be present in the country's energy mix to the greatest extent in the future raises the question of how much new green energy capacity Serbia needs to replace coal and thermal power plants that produce electricity. ? And should these capacities be replaced by the construction of new hydro potentials that are our domestic source, such as "Bistrica" and "Đerdap tri", or through the sun and wind?

There is also the question of how much installed power in **solar power plants, wind power plants and reversible hydropower plants (RHE)** is economically optimal to build to replace the given installed capacity in thermal power plants and maintain the same security of supply to consumers. Because, as things stand, to replace an even more important part of the current production of thermal power plants from coal with production from renewable energy sources (RES), it is necessary to build many times larger production capacities in solar and wind power plants, as well as very important capacities in RHE, he says in an interview with "Politics" Dr Slobodan Ružić, adviser to the company for energy efficiency, engineering and consulting "Energy saving group".

The concept of 100 percent replacement of thermal aggregates with power plants using RES is not realistic at all, let alone an approximately optimal option for the further development of EPS. Water potential is currently the most important source of renewable energy in Serbia. The installed capacity of EPS hydroelectric power plants is 2,401 megawatts.

The contribution of RHE "Bajina Bašta" in terms of capacity and produced energy is not included in the stated values. All power plants of this type are extremely important because of the possibility of transferring energy from the summer to the winter season. The annual production of the **hydro sector** on average makes up 29.8 percent of the total EPS production. But not only do hydropower plants make a significant energy contribution, but more importantly, they provide flexibility throughout the year in covering the variable part of the consumption diagram. Precisely because of this, hydroelectric power plants represent a real treasure of the Serbian electricity industry - explains our interlocutor.

He emphasizes that we have already used most of our large hydro potential. We can hope to build a maximum of 200 megawatts in new HPPs in the future, mostly in mini-hydropower plants. Therefore, to replace at least part of the production from its ancient **thermal aggregates**, EPS urgently needs to start building large solar and wind power plants.

When asked why both, and why not only those that can produce cheaper kilowatt-hours, he answered that these two types of power plants have complementary seasonal production, which means that by properly dimensioning both, the production of thermal aggregates can be replaced without any or with small seasonal accumulation, i.e. transfer of A difficult path

to a greener Serbia energy from summer to winter. – **Solar power plants** in Serbia have an equivalent annual working time of about 1,200 hours, but due to natural oscillations of solar radiation, they produce about 64 percent of energy in summer and about 36 percent in winter. Wind power plants in Serbia have an equivalent working time of around 2,800 hours a year and produce only 39 percent of energy in summer, and even 61 percent in winter – emphasizes our interlocutor.

He adds that it would be very wrong and dangerous to think that the production of thermal power plants can be replaced only by properly dimensioning the capacities of solar and wind power plants. In any case, the production of electricity using their gifts is often possible when we do not need it at all, and it is not there when we cry for it. It happens every day. It should be borne in mind that there are no suitable natural locations in Serbia for the construction of such a huge capacity in RHE, it would be necessary to create them artificially. According to the ideas discussed so far, this could be technically realized only by building the “Lim – Zapadna Morava” hydro system, in which reservoirs with a total energy volume of about 1,000 gigawatt-hours could be built. This idea, however, is debatable due to our relations with Bosnia and Herzegovina, as it implies the transfer of water from the Drina basin to the Morava basin.

Partial replacement of thermal power plants with new RES power plants is, on the other hand, possible and very necessary. Because a decision should be made as soon as possible on the construction of RHE “Bistrica” with the maximum possible storage capacity. It would be ideal if this RHE could be made so that it has, for example, six aggregates, each of which has a power of 175 megawatts and an energy volume of the **storage pool** of 555 gigawatt-hours. It is necessary to plan for RHE “Bistrica” to come into operation by the end of 2030 – says Ružić.

If the RHE “Bistrica” cannot be built with such a large accumulation, and its accumulation may be barely 10 percent, in that case, possible locations for the construction of one or more RHE should be intensively analyzed.

Depending on the characteristics of the “Bistrica” RHE, an additional 500 gigawatt-hours will probably be needed in the storage basins in other RHEs. Those RHEs would not have to come into operation before 2035, since it is realistic to expect that the largest part of the above-mentioned capacity in solar and wind power plants will be connected to the system in the period from 2035 to 2040.

The only idea considered so far that could provide the mentioned energy capacity is the construction of RHE “Đerdap 3”. According to previous analyses, this RHE could provide an accumulation basin with a capacity of about 484 gigawatt-hours. However, as in the case of the “Lim – Zapadna Morava” hydrosystem, the construction of this energy facility would be very expensive, significantly more expensive than the construction of the “Bistrica” RHE, and it would also be conditioned by the creation of an international

agreement, in this case with Romania - concludes the former adviser at the Ministry of energy Slobodan Ružić.