

Contrary to the established skepticism, which is also supported by certain statements of officials in the field of [energy](#), the new [wind farms](#) would not threaten the functioning of the existing **power grid in Serbia**.

According to two new domestic studies published at the end of last year, the network in Serbia could accept and balance many times more installed wind power, and the existing wind power plants already have a more stable production than we might expect.

But it's understandable to be skeptical of wind.

On the one hand, from industrial plants to small household appliances, our electricity supply must be stable - otherwise nothing from modern civilization.

On the other hand, the wind blows according to the elusive and mysterious rules of the local climate, changing its strength from hour to hour, from day to day and through the seasons.

Almost all of our layman's skepticism towards wind farms arises from this fundamental disagreement: why should we tie our constant need to one impermanent source? Do we need a light bulb to smolder, a freezer to break, because the basket has given way?

Fortunately, the reality of wind energy is somewhat different.

The nature of the network

Namely, as Dr. Nenad Jovanović, an energy consultant at the company LDK Consultants from Belgrade and the author of one of the two mentioned papers, describes it, the entire [power system of Serbia](#) can be imagined as one lake.

Countless very variable and unstable rivers, streams and streams flow from it (in translation: all consumers in the country), and a much smaller number of tributaries flow into it. The largest among the tributaries, and the most stable in yield, is the one that comes from thermal power plants, while the ones that bring energy to the lake from hydro and wind power plants are somewhat smaller and more erratic, perhaps similar to larger mountain streams.

The managers of this lake of ours (in translation: EMS) aim to **maintain a stable water level** in this complex ecosystem, i.e. to equalize the inflows and outflows of electricity, but also to maintain the network operating frequency at a stable 50 Hz. In other words, the electric power system is a whole, and its building elements make sense to be viewed only as parts of that whole.

On a system-wide level, consumption fluctuates widely throughout the day - for example, on a typical day this January, it ranged from 3,500 MW in the early morning hours to over 4,500 in the afternoon - rising, in other words, by almost a third. In the meantime, production is adjusted in accordance with those needs, and this also applies to thermal power plants. Although the production of thermal power plants during a day is relatively stable, this January alone, a minimum production of around 1800 MW and a maximum of over 3200 were measured.

It is a complex job, managing the network - generators are hired in accordance with needs,

reserves are evaluated and employed, imports are made if there is a shortage, and all this hour by hour. One important tool is the estimate **of planned consumption**, which is calculated one day in advance, and for every ten minutes of every (future) hour. Network management is planned in relation to this estimate, and **the deviation rate** is calculated based on it : once the data on real consumption is obtained, it becomes clear how accurate the original estimate was.

Well, that's where there (could) be a problem with wind farms: can we **estimate their production a whole day in advance**, using the weather forecast? Will we have large deviations, and therefore lose the power to relatively precisely plan the balance between production and consumption, which is crucial for the functioning of the entire network?

Wind stability

As shown by Milica Radovanović (**EMS**) and Dr. Željko Đurišić (**ETF**) in a recently published paper, winds can surprise us and significantly affect daily deviations in individual power plants, but overall wind energy is actually relatively, perhaps **unexpectedly predictable**. Namely, they analyzed the deviations of five wind farms in South Banat during 2020, and found that the average weekly power imbalance (difference between planned and actual production) did not exceed 30 MW, i.e. **only about 8 percent** of about 374 MW of the total installed power of these five wind farms connected to the transmission network.

"It's an encouraging result," says Dr. Nenad Jovanović, explaining the factors that influence risk reduction: "the wind can unexpectedly weaken in one location, but it's not a problem for me if it increases in another location, where I also have a wind farm."

After all, the key is not the deviation of production in one specific location, but the total production from renewable sources such as wind.

"This means that the production deviation should be smaller the more wind farms are spread," says Jovanović. "Tomorrow we will not only have South Banat, but also the rest of Vojvodina, Golubac, many more localities..."

Jovanović's research had a different approach: he modeled the optimization of system operation for one specific day in the past (January 29, 2022), for which we already have all the relevant data. He then included one question in his model - what would have happened that day if the installed wind power had been five times greater?

The answer of the model was unequivocal: contrary to the expectations of the skeptics, the drastically increased installed wind power did not lead to a disaster in the balancing of electricity generation. The model also identified which existing power plants can perform the reserve function in such a system.

"This means that the existing system, of course if EMS were to prepare the network, is already ready and can accept much more energy from the wind, without major problems," says Jovanović.

After all, as he says, the fivefold increase was only an example he took in the model - it is

not a maximum. And wind instability is, by all accounts, a largely unfounded concern, as long as we have a “base” that is now more than capable of stepping in when the weather lets us down.

“And on days like these, with strong wind,” says Jovanović, “if you follow the production of wind farms, you see that they work as stable as a nuclear plant.”

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