

And this fall is characterized by numerous newspaper articles, TV reports, even protest rallies due to **air pollution** in **Belgrade**. And indeed, the **air** in the capital is polluted beyond measure by fine dust particles, as well as increased concentrations of **CO₂**, **CO**, **SO₂**, **NO_x** – those gases that are registered by the instruments at the measuring stations. And what about those components that are not registered, and which are sometimes even more dangerous than particle pollution itself?! It went so far that **Belgrade**, breaking all records this autumn, stood side by side in terms of pollution, with the cities of **India**, **Pakistan**, **China** and other more populous countries than **Serbia**. Some days, according to measured **pollution**, it even occupied the infamous first place in the world!

No one like Belgrade

Let's face it, **Belgrade** has been a city seriously burdened by various forms of **pollution** for decades: noise, heat, gases, dust, solid waste, wastewater. Let's stay here only on the **air** and its pollution. The constant growth of the **population** contributes to this, causing a corresponding increase in the density of traffic, both passenger and freight. With the growth in the number of inhabitants, the need for **electricity** also increased – consequently also for the number of large and small **fireplaces** in the heating season. Intensive construction causes additional local particulate **air pollution**. The number of large and small communal **landfills** around the city and suburban settlements is also growing, producing unknown amounts of methane and, spontaneously igniting, contributing to additional pollution, already polluted air.

Until a few years ago, **Belgrade** somehow coped with this pollution thanks to the existence of natural air circulation – **košava**, which local managers, from miles away, called their best utility. There were also larger **green areas**, both in the city (parks, tree rows) and in the periphery (forests), which contributed to the preservation of such and such **air quality**, which experts in the field of forestry and **horticulture** could say more about, and which (areas) slowly decreased under the onslaught of the city and its needs for growth.

Admittedly, there were not that many measuring stations that would periodically or continuously register data on air quality, so when there is no relevant information on pollution, it was somehow, I guess, easier for people.

The race for “green energy”

Parallel to the growth and development of the city, the awareness of the need for the production of “**green energy**” – energy from **renewable sources** (wind, biomass, solar energy, water flows) – which should reduce the existing share of energy from **fossil fuels**, was also developing here. the cause of global warming of the atmosphere. Technologically

developed and developing countries are conquering new technologies for this purpose and introducing them into industrial production, so they have already built and are building **solar** cell plantations, wind farms, and large and small **biomass** burning plants, producing “green energy”, thereby giving their contribution to the reduction of “**greenhouse**” gases. Not wanting to fall behind this world trend, **Serbia** is rapidly getting involved, wanting to reduce the lag behind **Europe**, first of all. Thus, during the second decade of the **21st century**, the potential of renewable energy sources (sun, wind and biomass from agriculture and the wood industry) was determined, and locations with the greatest energy potential were defined. A legal framework was created for the construction of energy plants, by passing the appropriate legislation; benefits for the production and delivery of “green energy” in the form of feed-in tariffs are also defined.

In response to these initial steps in **Serbia**, large and small investors – domestic and foreign – appeared. Large investors gave priority to obtaining energy from the wind, despite the capriciousness and fickleness of this “**energy source**”, over solar energy, i.e. biomass energy, although it turned out that electricity from the wind is not so “green” and benign towards nature and environmental protection. Small investors have shown interest in using biomass and building mini-hydropower plants. The latter was met with fierce opposition from the people, even to the point of conflict between the local community and the investors on **Stara planina**.

In response to the expressed interest of large investors, the sale of wind, as our most important natural resource for the production of electricity, began. Concessions were granted, projects were carried out, and thus, in the period from 2016 to 2021, as many as eight wind farms were built in **South Banat**, as the area with the greatest wind energy potential, but also with the best location and other benefits for investors – the plain, the network of access roads, availability of connection to the electrical distribution network, etc. Some wind farms were of small capacity, so to speak, pilot plants, such as **La Picolina** with two wind generators, **Kula** with three or **Malibunar** with four, and then larger, even large wind farms were built and put into operation – **Košava**, **Alibunar**, **Kovačica**, **Čibuk**, **Plandište** – with a total power of about 500 MW.

Production of “green energy” from the wind and the air quality in Belgrade

There is a close connection between **Belgrade**, a large producer of dust, vehicle exhaust gases, smoke from heating plants and power plants, and **košava** – the wind that has affected the air quality in it for years. Due to the construction of wind parks, located in the direction northeast-east of **Belgrade**, the city is “enveloped” on that side with more than 140 wind

generators, on poles with a height of $>100\text{m}$ and a propeller radius of $>50\text{m}$, which turn the kinetic energy of the wind into electricity, which is essential reduces the speed of the wind on its way to **Belgrade**, and thus the efficiency of removing smog from this city. It is not difficult to show that a wind generator, with an average power of more than 3 MW, operating at a wind speed of 10 m/s, with a degree of utilization of wind energy of max. 59 percent, reduces that speed to about 6 m/s behind the generator. At wind speeds of less than 4-5 m/s, the kinetic energy of the wind is not enough to start the wind generators, so they do not produce electricity, but they still contribute to reducing the wind speed due to the resistance to the free flow of air, which these arrays of wind generators represent. Hence, the more pronounced **air pollution** in **Belgrade** coincides with the commissioning of these wind farms.

In the future, air pollution in Belgrade will be even worse, considering its further development and the dynamics of air pollution, but also the fact that the construction of seven more wind farms in the vicinity of **Pancevo** with 142 wind generators, larger than those already built, is planned soon, and about 2.7 times the total installed power (1345 MW). It is planned that these wind farms will be built east and northeast of Pančevo. The existing eight wind farms, with the planned seven around Pancevo, are located in such a way that they cover the entire north-east quadrant, creating a solid “leeward wind” for Belgrade, which will result in an additional reduction in the intensity of wind flow in that direction. In any case, we should expect that, with each commissioning of the newly built wind farm, the air quality in **Belgrade** in the coming years will be worse than it was this and last fall.

Whose profit is it

The motive of investors in **wind farms** is clear. They are there to make a profit from the energy produced and delivered, they do not take into account the consequences of the built objects on the **environment**, in the location assigned to them. Those who were supposed to take care of it either didn't know how such wind generators would affect the existing wind flow, or maybe they knew, but they didn't care, for reasons known only to them.

Generally, when one reads or listens to the statements of local managers regarding the commissioning of **power plants**, it turns out that the municipalities, to which those wind farms cadastrally belong, will experience an economic boom with honey and milk that will flow in those municipalities. They (managers) do not have a broader picture of any negative consequences. Admittedly, on such occasions such things are not talked about. And the consequences will be, not only for **Belgrade**, but also for **Serbia**. Not only through

fragmented plots of arable land, which will be reduced and more difficult to cultivate, but also for other reasons.

Honey and milk will go to the owners of **wind farms** – that’s probably why they built them. This is why getting energy from wind is so popular for investors. The state guarantees them that they will buy the produced electricity, guarantees them a privileged position as electricity producers, which ensures their profit. The investment matrix is proven and well-known: a part of one’s own funds is invested, and the remaining part consists of incentive bank loans for obtaining energy from **renewable sources**. **Business** risk is thus minimized. Residents of local communities, on whose territory there are wind power plants, will not feel any improvement, nor any economic benefit, except for a small number of those who sold plots for the construction of wind generators. What they will feel, like all residents of **Serbia**, will be electricity bills increased by the price of “green” energy. And it grew from year to year, reaching an average value per household of 368 dinars per month.

No one to draw the public’s attention to the fact that the working life of the wind power plant is about 20 years. What after that? Wind turbine blades are made of composite materials that cannot be recycled, but must be disposed of as hazardous waste in a landfill. Postponing is already prohibited in **Finland**, the **Netherlands**, **Germany** and **Austria**, and it is expected that the rest of the **European Union** countries will do the same. The State of Serbia would have to decide with some legal act how to dispose of **wind generator propellers** and the costs that arise from it. Should investors be obliged to do so, or will it also be burdened on the backs of future generations? And what about the poles on which the propellers and generator are mounted? And what about the huge concrete blocks that were the foundation for the columns? Or will that also remain in the trust of the future? And looking at all this, perhaps it would be best for **Belgrade** and **Pančevo** and for the country to somehow give up the benefits of building new wind farms in **Banat**, which have not yet started, or are still in the initial phase from construction, which will certainly have a negative impact on **air quality**. Or to relocate them to some less attractive places, far from **Belgrade**. And in South Banat, let wheat, corn and other agricultural crops be produced; let livestock and poultry farming develop, which will contribute to the production of meat, milk and eggs, as well as manure and biomass, which would be used for the production of energy – thermal or cogenerative. And that can bring prosperity to the municipalities of South Banat, sometimes even more than they would get from the taxes paid by the owners of the wind farms. But this is already a matter for the state, these two cities and their strategic determination, NIN writes.